TOWN OF WAITSFIELD, VERMONT

WAITSFIELD VILLAGE (BIG EDDY) COVERED BRIDGE
WORLD GUIDE NO. 45-12-14
TOWN BRIDGE NO. 4

REHABILITATION PROJECT

VTRANS PROJECT NO. STP EH08 (6)

BRIDGE INVESTIGATION AND RECOMMENDATIONS REPORT (FINAL)

AUGUST, 2011

D&K Project No. 620922

ENGINEERING ● PLANNING ●DEVELOPMENT ● MANAGEMENT

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ENGINEERING STUDY
WAITSFIELD VILLAGE (BIG EDDY) COVERED BRIDGE
WAITSFIELD, VT
STP EH08 (6)

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EXECUTIVE SUMMARY

The Waitsfield Village Covered Bridge (a.k.a. the Big Eddy Bridge) carries Bridge Street over the Mad River in the center of the village area of Waitsfield. The bridge is the oldest operating covered bridge remaining in Vermont, and is an icon of the community. Not only is it an important transportation link between the village and the neighborhoods to the east, but it is also a symbol of the Town and a major tourist attraction. The bridge is owned and maintained by the Town of Waitsfield.

The primary goal of the project is to investigate what improvements are needed at this time to maintain the bridge in good condition. Several issues have been identified with the bridge, and the Town received a Transportation Enhancement grant in 2008 to fund the design and repairs of several problems. These include:

- Improve the support of the cantilevered sidewalk, or relocate the sidewalk within the main bay of the original covered bridge
- Fix the deterioration of the abutments

Other issues that have been identified and were considered during the course of investigations include:

- Repairing or replacing other structural members
- Repairing or replacing the existing wooden runner planks and lag bolts
- Repairing the scour hole on the face of the north abutment
- Replacing or keeping the existing cedar shake roof
- Repainting or stripping the painted bridge portals
- Alleviating ongoing vehicular damage to the interior of the bridge

The available funding through the 2008 Transportation Enhancement grant is $270,000, plus local matching funds of approximately $70,000 result in total project funding available of $340,000. Engineering fees are $60,000, right-of-way is estimated at $5,000, construction inspection is estimated at $30,000, and administration is $3,000. This leaves approximately $242,000 available for construction.

Recommended improvements to the bridge that fit within the available budget consist of the following:

- Remove the existing cantilevered sidewalk
- Replace the sidewalk with a self-supporting structure consisting of steel trusses and a timber deck
- Widen the abutments to accommodate the new sidewalk
- Repair areas of deteriorated concrete on the existing abutments

The recommended schedule for the project is to complete permitting, plans and specifications (bid documents) by March of 2012, advertise for bids in May, and perform construction from July to December 2012.

I. INTRODUCTION

The Town of Waitsfield (Town) has engaged DuBois & King, Inc. (D&K) of Randolph, VT to provide engineering services for the design and construction of improvements to the Waitsfield Village Covered Bridge. The Waitsfield Village Covered Bridge, also known as the Big Eddy or Great Eddy Bridge, is located over the Mad River on Bridge Street in the heart of historic Waitsfield village. It is a major transportation route connecting residential neighborhoods to the village center, not only for vehicles but also for bicyclists and pedestrians. The bridge is believed to be the oldest operating covered bridge in Vermont and is known to be the longest clear span of any Burr arch bridge in Vermont. It is a beloved symbol of the community that contributes to Waitsfield's identity and economy.

The Town has received a Transportation Enhancement grant to fund improvements to the bridge. With the use of Federal funds, the project development must follow the project development process as administered by the Local Transportation Facilities unit of the Vermont Agency of Transportation (VTrans). The project has been given the designation of STP EH 08(6) by VTrans.

The bridge utilizes a King post truss and Burr arch framing, wood rafter roof framing, floorbeams, and deck plank floor framing, wood board siding, and cedar shake roofing. The bridge lies within a 4-rod wide right-of-way (ROW) of Bridge Street, and is owned and maintained by the Town. The bridge is on the National Register of Historic Places (74000261 NRIS (National Register Information System)) as the Great Eddy Covered Bridge.

When reviewing this report, please refer to the Glossary of Terms contained in Appendix A.

The bridge is an approximately 105 foot long, single span structure constructed in 1833. The clear opening between the trusses is approximately 16'-1", so the bridge is only wide enough to provide for a single lane for traffic. The bridge is actively used by vehicles, pedestrian, and bicyclists. A cantilevered, enclosed sidewalk was added to the outside of the downstream truss around 1940. A 2003 traffic count revealed the bridge as an average daily traffic of 2,400 vehicles per day. The bridge is in fair to good condition with several noticeable structural problems. The problems include a slight racking of the downstream (east) truss with significant distortion (negative camber), abutment deterioration, rotting structural members, and worn deck plank boards.

The available funding of approximately $340,000 must fund all aspects of the project. The project includes consulting engineering services for the design and development of contract documents (plans and specifications) and contract administration (bid phase and construction phase services), and construction to make the structural repairs.

II. BACKGROUND/HISTORY

The Waitsfield Village Covered Bridge is listed on the National Register of Historic Places, having been entered into the Register on September 6, 1974. The bridge is listed in the Covered Bridge World Guide as Bridge No. 45-12-14. A separate covered sidewalk was added to the outside of the original bridge sometime around 1940. Several published sources indicate the bridge was originally constructed with an outside sidewalk that was removed at a later date. The current sidewalk is covered by an extension of the original roof, and is supported underneath by cantilevered beams attached to the original floor beams.

There is no record of repair work done before the 1970's. VTrans commissioned a project that made several major improvements in 1973, including the addition of concrete extensions on the north and south abutments to help support the truss bearing members, repair and replacement of numerous structural members, replacement of all of the cantilevered sidewalk members (roof rafters, posts, decking and floorbeams), installation of a new sheet metal roof over the sidewalk, and replacement of all board siding. Since the time of the 1973 restoration, the bridge has had the floor deck planks replaced; the metal roof was removed and replaced with cedar shakes, and some additional structural members have been repaired.

Over the last several years, the Town has become increasingly concerned about the deterioration of the abutments, and the support of the cantilevered sidewalk system. In 2008, they applied for, and received, a Transportation Enhancement grant to investigate the extent of the problems at the bridge, and to construct repairs or improvements to keep the bridge in good working order for many years into the future.

III. DATA COLLECTION/FIELD OBSERVATIONS/STANDARDS

A. Data Collection

A review of available files was made in order to obtain pertinent information on the bridge that would relate to the proposed rehabilitation. The following information was reviewed and data obtained:

- VTrans Structures Section: Correspondence, inspection reports, etc.
- Vermont Historic Covered Bridge Preservation Committee: *Historic Covered Bridge Preservation Plan*, dated April 10, 2003.
- Waitsfield Historical Society: No files available.
- Town of Waitsfield: Right-of-way and abutter information. On-site interview with Charlie Hosford (Selectboard) on 9/22/10 to discuss bridge.

Engineers from DuBois & King, Inc. performed field observations on September 22, 2010. The following observations were made:

- Cedar shingle roofing in good condition, with no leaks observed
- Timber roof rafters in good condition, with the exception that six (6) rafters are split, rotted, or broken
- Upstream siding in fair condition with some broken, loose and warped boards, gaps between siding planks, and some decay.
- Downstream siding in fair condition with some broken, loose and warped boards, gaps between siding planks, and some decay
- Downstream truss in poor condition, with excessive downward deflection (negative camber) of up to 3 5/8". Some minor rot observed at the ends of the web members (compression members)
- Upstream truss in fair condition, with downward deflection of up to 1 5/8". Some minor rot observed at the ends of the web members (compression members)
- Deck planking in fair condition, with significant abrasion damage and wear at the center travelway
- Floor beams in good condition, with five (5) showing severe decay
- Sidewalk floorbeams in good condition, with the exception of significant corrosion of the bolted connections with the bridge floorbeams
- Concrete abutment sections in fair to poor condition with severe surface spalling and voids
- Stone abutment sections in good condition, some missing chinking stones
- Approach signing cluttered and some signs out of plumb
- North sidewalk timber approach (bridge) and bearing is being undermined and has settled
- Cantilevered edge of sidewalk (downstream) showing signs of downward deflection
- Sidewalk deck planks in fair to good condition with some minor rot and excessive wear
- Timber approach rail at southeast quadrant broken in several locations, and rail is substandard (or non-existent) on southeast, southwest and northeast approaches

See the bridge photos contained in Appendix B for a further understanding of the existing conditions.

B. Right-of-Way

Records of the right-of-way provided by VTrans to the Town indicate that the right-of-way along Bridge Street is 4-rods (66 feet) in width. Assuming the bridge is roughly centered within this width, there is adequate room to perform any repairs or improvements at the bridge.

A staging area for the contractor will be needed on a temporary basis during construction. Because of the desire by the Town to keep the bridge open, and the view unspoiled as much as possible during construction, a nearby location away from the bridge will be sought for a staging area. One possible location is behind the Bridge Street Marketplace. The Town is investigating the ability to acquire temporary rights in this area.

C. Permitting

Our review of the project leads us to believe that all work will be performed within the exiting roadway right-of-way. However, some work will be needed in the Mad River. Therefore, a Stream Alteration permit will be needed from the Vermont Agency of Natural Resources.

Because the project will disturb only a very small area, and no additional impervious areas will be created, neither a Construction Stormwater permit nor an Operational Stormwater permit will be required. Also, no wetlands will be impacted so a Wetlands permit will not be needed.

Because the project is funded in part by a federal Transportation Enhancement grant, the National Environmental Policy Act (NEPA), will apply to the project. Therefore, a Categorical Exclusion will need to be prepared and approved by VTrans. This will include a Section 106 historical review. We will also submit plans to the Vermont Historic Covered Bridge Preservation Committee for their review and input.

D. Covered Bridge Improvement Standards

1. Secretary of the Interior Standards

The United States Secretary of the Interior has developed guidelines for the rehabilitation of historic structures, and these guidelines are the Standards of Rehabilitation (36 CFR 67). These standards are to insure that the historic integrity of the structure is preserved while at the same time rehabilitated for continued use. Generally, these standards dictate that structural repairs:

- Will be unobtrusive and for the most part, not visible to the casual observer
- Will not affect the character of the bridge
- Will blend in with surroundings and match color

- Will be hidden from view whenever possible
- Will not cause damage or removal of historic features

This project will follow the Federal Standards of Rehabilitation, but will also be in accordance with additional guidelines developed by the State of Vermont that are more specific to historic covered bridges.

2. Vermont Historic Covered Bridge Preservation Plan

VTrans, in conjunction with the Vermont Historic Preservation Officer and the Federal Highway Administration, prepared and adopted a preservation plan specific to Vermont and its covered bridges. The plan is similar to the Secretary of the Interior Standards in that key elements of the Vermont plan include:

- Minimal change will occur to defining characteristics of the structure
- Distinctive features shall be preserved
- Repair, rather than replace deteriorated elements, if at all possible
- If replacement is warranted, then match original design, and materials, if possible
- New additions or alterations shall be reversible

The *Vermont Historic Covered Bridge Preservation Plan* takes precedent over the Secretary of the Interior standards, and will be followed as the defining plan for repairs and rehabilitation of the Waitsfield Covered Bridge.

Representatives of DuBois & King and the Town of Waitsfield conducted meetings with the Vermont Historic Covered Bridge Preservation Committee on April 1, 2011 and June 9, 2011. Through these Committee meetings, DuBois & King and the Town were able to focus on specific issues and priorities that have been incorporated into this Report.

IV. CONSIDERATIONS AND RECOMMENDATIONS

A. Considerations

There are a number of improvements that have considered as part of this project. Some of these were suggested by the Selectboard, VTrans, and a local builder. Others were suggested by concerned citizens at the Local Concerns Meeting held at the inception of the project development process. Still others were identified by D&K through the review of the bridge in the field, and our expertise in covered bridge repair and rehabilitation.

The following paragraphs briefly identify the individual concerns or issues considered during the development of this Report. Following in the "Recommendations" section, each consideration is discussed in more detail and specific recommendations are made.

1. Strengthening of the cantilevered sidewalk

The first consideration of this project is what should be done with the existing cantilevered sidewalk. It is adding additional loads and stresses to the downstream truss, and causing the deflection and slight racking of the truss. The sidewalk itself is experiencing downward deflection of the downstream (east) edge. Strengthening of the truss, adding additional support along the length of the sidewalk itself, removing the cantilever sidewalk and replacing it with a self-supporting sidewalk, and removing the sidewalk from the outside of the bridge and accommodating pedestrians within the main bay of the bridge have all been considered.

2. Repair of the abutments

The existing abutments exhibit a number of problems, including a significant void at the base of the north abutment, areas of severe spalling, and minor surface cracking.

3. Repair of other structural members

The structural members throughout the bridge have been inspected and evaluated. Areas of rot, splitting, cracking, and inadequate sizing have been identified and considered for repair or replacement.

4. Repairing or replacing the existing timber deck planks

The existing deck planks that vehicles drive on are showing signs of wear, including deterioration, warping, and loss of fasteners. Consideration has been given to replacing all or some of the planks. This is also the case for the sidewalk deck.

5. Replacing or keeping the existing cedar shingle roof

The cedar shingle roof does not shed snow easily, and therefore contributes to the live load on the bridge during the winter. Fearing this is overstressing the bridge, the Town has occasionally shoveled the snow off of the bridge. This is a safety concern for the

Town. Consideration has been given to replacing the roof with another surface that will more easily shed the snow.

6. Repainting or stripping the painted bridge portals

The existing portals are the only components of the bridge that are painted. This is thought to detract from the historic character of the bridge. Stripping and/or repainting the portals has been considered.

7. Alleviating ongoing vehicular damage to the interior of the bridge

Especially in recent years, the rafters and portals of the bridge have been hit by vehicular traffic. Consideration has been given to ways that this situation can be minimized or eliminated.

8. Reducing sign clutter on the approaches

There are a number of signs on the roadway approaches to the bridge that detract from the look and character of the bridge. Also, the signs are not plumb. Consideration has been given to reducing the signs and straightening the posts should the signs remain.

9. Improving the railings/walls on the approaches

There is a tall concrete curb with a wooden railing on the northwest approach of the bridge, and there are short wooden railings on the other three approaches. Cutting the concrete curb down to a normal curb height or replacing it with a stone wall was requested at the Local Concerns Meeting. These changes have been considered.

10. Strengthening of the main trusses

During our field reconnaissance of the bridge, our engineers observed the vertical deflection (sag) of the main trusses. The upstream truss deflects as much as 1 5/8" and the downstream truss deflects as much as 3 5/8". We consider this a serious structural issue and have recommended what should be done about it in this Report.

11. Abutment supports for the sidewalk

There is no support of the south end of the sidewalk structure at the abutment, causing some downward deflection. There is no support of the north end of the sidewalk structure. A short timber pedestrian bridge spans between the end of the bridge sidewalk and the street sidewalk. The bridge is in poor condition with rotting members and significant deflections and settlement.

B. Recommendations

1. Cantilevered Sidewalk

The most important consideration for this project is improving the support of the existing sidewalk and reducing the stress it is causing on the main vehicular bridge truss members. Four options to deal with this issue have been investigated, and are described below:

a. Remove the sidewalk and use the existing vehicular bridge for pedestrians

This option is to eliminate concerns with the structural integrity of the sidewalk by simply removing the sidewalk altogether and creating a walkway within the main bay of the bridge. At the Local Concerns Meeting, many citizens voiced their opposition to this alternative and no one supported it. Many reasons were given for keeping the sidewalk on the outside of the bridge, including:

- There isn't sufficient room within the bridge to accommodate pedestrians
- The existing sidewalk allows users to stop and look out over the river
- It is safer to have the sidewalk on the outside of the original bridge rather than inside of it.
- It pedestrians are required to walk inside the bridge, it may increase vehicular traffic back-ups.
- It is desirable to be able to look through the sidewalk openings to observe the framing of the bridge.

The interior bay of the bridge has a rail-to-rail opening of 15'-0" currently. The addition of a sidewalk within the bridge would result in a travel lane approximately 10' wide. This is much less than the minimum recommended width of 16', and would be too narrow for larger vehicles to pass without the danger of hitting either the sidewalk or the interior railings.

Because it is not supported by the public, and it would create unsafe conditions within the bridge, the relocation of the sidewalk into the interior bay of the bridge is not recommended.

b. Add a counter-weight to the main trusses

An option that was discussed at the Local Concerns Meeting was to attach something to the upstream side of the bridge to counterbalance the sidewalk loading. This is not recommended because it would add even more unsupported weight to the bridge and would further contribute to the bridge's detriment.

c. Add a structural support to the downstream side of the existing sidewalk

Another option to relieve some of the stress on the downstream truss was to better support the sidewalk structurally. This would be done by adding a new beam or truss element on the downstream side of the sidewalk and supporting it at each end of the bridge. The south end of the new beam or truss could be supported on the existing abutment, but at the north end a new abutment and wingwall extension would need to be constructed.

A new I-beam or steel truss could be placed on the downstream side of the sidewalk and could be hidden from view by the existing siding and wainscoting. The beam or steel truss would be simply supported at each end on the abutments, and it would support the existing sidewalk floor beams along the length of the sidewalk.

A new timber truss could also be placed on the downstream side of the sidewalk. It also would be simply supported at each end on the abutments, and would support the existing sidewalk floor beams along the length of the sidewalk. However, the timber truss would need to be quite tall and could not therefore be hidden by the existing siding. The truss would need to be approximately as tall as the existing height between the floor beams and the sidewalk roof (approximately 11 feet tall). The truss, with its diagonal or web members, would change the downstream view of the bridge, and it would partially obscure the view from the bridge. Also, to provide adequate strength over the span, it would likely need to be a Howe style truss. This style is inconsistent with the existing trusses within the main bridge.

Supporting the existing sidewalk with a new structural member on the downstream side would provide more support than exists today for the sidewalk; however, the sidewalk would still be partially supported by the existing main bridge trusses. Because this option would not remove the loading and stress on the main bridge trusses, it is not recommended.

d. Remove the existing cantilever sidewalk and replace it with a self-supporting sidewalk in the same location

A suggestion made at the April 1st Historic Covered Bridge Preservation Committee Meeting was to remove the existing cantilever sidewalk altogether, and install a new, self-supporting sidewalk in its place. This would remove all of the loading from the sidewalk off of the main bridge's downstream truss.

D&K investigated four alternatives for a self-supporting sidewalk. These were:

- Pre-fabricated, glulam beams and glulam deck
- Pre-fabricated, glulam trussed arch with timber deck
- Pre-fabricated steel truss with timber deck
- Custom made, sawn lumber King post truss and Burr arch with timber deck

Drawings with example photographs of these bridge types are included in Appendix C, and cost estimates for each are included in Appendix E.

Pedestrian bridge fabricators were contacted, and construction costs for each of the four options were developed. D&K developed cross section and elevation drawings, and compiled representative photographs of the four options.

Each option was presented to the Historic Covered Bridge Preservation Committee (HCBPC) and the Town for discussion. Initially, the Town's preference was to use the sawn lumber queen post truss and Burr arch configuration for the new sidewalk system. However, after considerable deliberation with the HCBPC, the Committee and VTrans Historic Preservation Officer (VHPO) concluded that neither the sawn lumber queen post truss and Burr arch configuration, nor the pre-fabricated, glulam trussed arch configuration would be acceptable. This is due to the fact that both of these configurations could give the false impression that they were historic elements, and both would diminish the view of the actual historic elements of the main bridge. Either the steel truss or the pre-fabricated glulam beam configurations would be acceptable. Upon discussing this information with the Town, the Town's preference became the steel truss.

Based on the foregoing information, our recommendation is to add a new steel truss configuration, self-supporting sidewalk to replace the existing cantilevered sidewalk. This option has the most modest impact to the existing bridge, and a reasonable cost. This option will eliminate the sidewalk loading on the existing downstream truss, which will be beneficial to the bridge as it continues to age.

It should be noted that the existing sidewalk was completely reconstructed and replaced as part of the improvements made in 1973. Therefore, the sidewalk itself is not an historic element. However, it was noted by a local resident during the Town and HCBPC meetings that the roof line of the bridge was changed when the sidewalk was reconstructed in 1973. When the sidewalk was originally constructed around 1940, it was provided with a roof that was completely separate from the main bridge roof (lower and not quite as steep). This roof was removed and the roof of the main bridge was extended to cover the sidewalk in 1973. A question was raised whether the roof should be changed back to its original configuration along with replacing the sidewalk. The VHPO stated it would not be required as part of the historic approval, and it would be the Town's decision. The Town would like to understand the feasibility, impacts, and costs of changing the roof. D&K will investigate this during the design process.

2. Abutment Repairs

The abutments of the bridge were originally constructed with stone and mortar, and these abutments still support the bridge. Subsequent to the construction of the original abutments, concrete elements were added to better support the bridge.

The concrete sections have areas of severe spalling and voids. These areas should be repaired. All loose material should be removed and concrete patching performed in the areas of spalling. There is a sizeable void located near the base of the north abutment at the normal water line of the Mad River. Also, the bridge seat where the upstream truss rests on the north abutment is experiencing advanced deterioration. These areas, and any other areas of spalling or deterioration should be repaired.

With the replacement of the sidewalk with a self-supporting structure, the north and south abutments will have to be widened to accommodate the new sidewalk trusses. As confirmed at the HCBPC meeting on June 9th, extending the abutments using reinforced concrete will be acceptable.

3. Repair of other structural members

There are several structural members that are in need of repair or replacement. These members are split, cracked or showing signs of rot. These include five floor beams, five sidewalk rafters, one cross beam, and one roof rafter. We recommend that these elements be entirely replaced with new elements that match the existing members or be fitted with “sister” beams (doubled with new beams).

As noted by VTrans in their inspection reports, a number of cross braces in the roof and floor rafters have been removed, damaged, or were never present. Upper lateral cross bracing (wind bracing) on the bridge is in good condition where present. There are two (2) bays where lateral bracing is missing (removed and not replaced). Missing upper later bracing should be reinstalled in these two bays. There is no lower lateral cross bracing on the underside of the bridge beneath the deck and floorbeams. Lacking this bracing, the bridge is not capable of adequately resisting high wind loads. Lower lateral bracing should be installed on the bridge over its entire length.

4. Repairing or replacing the existing timber deck planks and screws

The condition of the timber deck planks in the main part of the bridge varies throughout its length, and approximately 50% need to be replaced. The middle 8-10 foot of width of planks throughout the length of the bridge is in poor condition, due to repeated exposure to traffic. These planks exhibit signs of wear (section loss), splitting and warping. However, the exterior 3-4 feet on both sides are in good condition. It would be most economical to replace only the middle 8-10 feet of planking; however, it may be difficult to match the thickness of the exterior 3-4 feet on either side if this approach were taken. Additionally, the exterior 3-4 feet may warp or split much sooner than the middle 8-10 feet if only the middle planks are replaced. Therefore, it is recommended that the entire 16 feet of planking be replaced throughout the length of the bridge.

The timber planking in the sidewalk portion of the bridge is also showing signs of wear. Approximately 20% of planks are splitting or rotting, and these planks should be replaced.

5. Replacing or keeping the existing cedar shingle roof

The existing cedar shingle roof is in good condition. There are several shingles that need to be replaced, but these are quite limited. We recommend only that any loose or split shingles be replaced. We do not recommend that the entire roof be replaced with a metal or other type of roof at this time. While a metal roof would be lighter than the shingles and would shed snow better, the existing roof is still in good condition and

probably has another 10-15 years of service life. Once the existing roof needs to be replaced, the Town should consider replacing it with a metal or other lightweight roof that sheds snow better than the shingles. While snow loads contribute to the overall loading on the bridge, only a small reduction will be gained in the snow load with replacement of the cedar shake roof, due to the roof's moderate pitch. Therefore, replacing the cedar shakes with a metal roof is not an imminent concern and is not recommended at this time.

6. Repainting or stripping the painted bridge portals

Paint on only the portals is a common treatment to covered bridges in Vermont. The portals are commonly painted because, unlike the sides of the bridges, there is not an overhanging roof section to protect the exterior planking from the elements. We do not recommend that the existing painting on this bridge's portals be changed at this time.

One paint treatment worth considering is the addition of an intumescent (fire retardant) protectant. Providing a fire retardant protective coating is a common treatment for covered bridges in Vermont and New England. Unfortunately, vandalism by fire is one of the most common ways that towns lose their covered bridges. Therefore, we recommend that the Town paint the entire bridge with an intumescent paint system.

7. Alleviating ongoing vehicular damage to the interior of the bridge

Occasionally, motor vehicles have struck the interior of this bridge and caused damage to the structural elements, primarily the roof rafters. Ideally, this could be altogether prevented from reoccurring in the future.

Measures that could be taken include installing "tell tale" bars or non-structural false beams just inside the bridge portals. These normally hang a small amount lower than the lowest structural member. These elements would be struck by motorists before they strike any of the structural elements. They can be unsightly, and also require their own maintenance. If these elements are struck and damaged they need to be replaced or repaired just like structural members, and because they hang lower, they can be struck more often than structural members. Because of these considerations, the addition of "tell tales" or other nonstructural beams is not recommended.

One measure that has proven effective at other locations is the addition of advance warning signs on the roads that lead to the bridge. Redirecting oversized vehicles away from the bridge prior to getting to the bridge will relieve drivers from having to decide if they should try to fit through the bridge or turn around at the bridge. In the case of the Village Bridge, signs could be posted on VT 100 redirecting traffic onto Tremblay Road,

and Bridge Street traffic from the south could be directed onto Joslin Hill Road. The addition of advanced warning signs on Bridge Street and VT 100 is recommended.

8. Reducing sign clutter on the approaches

There are five signs on the approach to each end of the bridge. These are:

- A “STOP” sign
- A 9’-6” vertical clearance sign
- A “NO TRUCKS BUSSES AND RV’S” sign
- A “ONE LANE BRIDGE” sign
- A “WEIGHT LIMIT 6000 POUNDS” sign

The “NO TRUCKS BUSSES AND RV’S” sign and the “WEIGHT LIMIT 6000 POUNDS” are redundant. We recommend the elimination of the “NO TRUCKS BUSSES AND RV’S” sign, and recommend that the “WEIGHT LIMIT 6000 POUNDS” sign be moved so it is mounted below the “STOP” sign. We also recommend that the signs be supported on square steel tube posts and set plumb, and that any signs that do not have the current reflectivity coating be upgraded to be compliant with the latest Manual on Uniform Traffic Control Devices (MUTCD).

9. Improving the railings/walls on the approaches

The southern corners of the bridge currently have timber guard rails that extend from the bridge a short distance at the southeast quadrant and a more significant distance at the southwest quadrant. The northeast corner has no approach railing, and on the northwest corner there is a concrete wall with a timber rail mounted on top. It does not appear that the timber rails would meet current crash criteria. Therefore, it is recommended that the timber guard rails be replaced on the south approach, and a new guard rail be added on the northeast corner. The proposed rail would be a steel backed timber rail to provide the strength to resist vehicular impacts, yet maintain the rustic look that exists today.

We see no reason to modify or replace the concrete wall and timber rail system that exists today on the northwest corner. This wall was constructed to keep vehicles from falling into the River and to support the roadway itself. Because of the solid ledge directly below, there is no other way to mount guard rail and support the road. The timber rail was added to the top of the wall to match the look of the bridge elements, but serves no structural purpose.

10. Strengthening of the main trusses

There are several inches of vertical deflection in each of the main trusses – as much as 1 5/8" in the upstream truss and 3 5/8" in the downstream truss. This is an undesirable condition and is a symptom of the age of the bridge. There are no rotten or broken members in the trusses; therefore it appears this condition is due to long term creep. The only way to repair this condition is to jack up the trusses and rebuild them. We recommend that this type of repair be considered for both trusses, depending on how they look after the cantilevered sidewalk is removed.

This repair would not involve the replacement of any of the existing truss elements. However, most truss members would be "lengthened" by the addition of wood shims at the end of each member. Once each truss is temporarily jacked so that there is no deflection, "gaps" would appear at the ends of the elements. These gaps would be filled with custom milled wood blocks that match the existing truss elements. Bolted and trundled connections would be reconstructed/replaced. Once the temporary jacking is removed, the trusses would no longer sag, and would have a zero (flat) or positive (upward) camber.

V. ESTIMATES OF COST

Construction cost estimates were prepared for each considered improvement for this project. Construction costs include contractor mobilization, system installations, structural repairs and disposal of debris.

Project cost data was obtained from VTrans (VTrans Weighed Unit Prices), and from recent D&K covered bridge rehabilitation projects. Costs were also estimated using nationally published construction cost data predicted for 2011 (RS Means Heavy Construction Cost Data). Cost data is for the Continental United States and regionally for Vermont.

The cost estimate to complete all of the repairs desired for the bridge (full repairs) is $485,000. This amount exceeds the $242,000 that is available for construction. Costs that have been estimated for the various project components are shown in the summary on the following page:

Required for New Self-Supporting Sidewalk

• Sidewalk bridge	$117,000
• Demolish the existing sidewalk	$ 12,000
• Construct abutment extensions to support the new sidewalk	$ 25,000
SUBTOTAL:	**$154,000**

Other components that should be addressed

• Repair existing concrete substructure elements	$ 80,000
• Repair superstructure floor beams, roof rafters, decking	$ 50,000
• Paint with fire protective coating	$ 30,000
• Jack, shore, & rehabilitate trusses to eliminate decay & negative camber	$150,000
• Signing improvements	$ 2,000
• Guard rail replacement	$ 18,000
SUBTOTAL:	**$330,000**
CONSTRUCTION TOTAL:	**$485,000**

A detailed "Engineers Estimate of Probable Construction Costs" is provided in Appendix E for the construction cost estimates of all options.

VI. SUMMARY

The estimated costs to complete all recommended structural and aesthetic improvements and structural repairs far exceeds available funding. A limited program of structural improvements is proposed.

The primary goal of the project is to repair and/or rehabilitate the bridge and extend its life so that future generations can use and enjoy the bridge. Specific recommendations have been made at this time to extend the life of the bridge. The improvements that are proposed to be implemented at this time include the highest priority items that can be afforded under the available funding. These are:

- Remove the existing cantilevered sidewalk
- Replace the sidewalk with a self-supporting structure consisting of steel trusses and a timber deck
- Widen the abutments to accommodate the new sidewalk
- Repair areas of deteriorated concrete on the existing abutments (this component would be a Bid Alternative that could be deleted if the price was prohibitive)

The total cost of these improvements is estimated to be:

➢ Sidewalk bridge	$117,000
➢ Demolish the existing sidewalk	$ 12,000
➢ Construct abutment extensions to support the new sidewalk	$ 25,000
➢ Repair existing concrete substructure elements	$ 80,000
TOTAL:	**$234,000**

The recommended schedule for the project is as follows:

➢ Complete Study and Public Meeting:	August, 2011
➢ Complete Permit Applications:	October, 2011
➢ Complete Engineering Design and Bid Documents:	March, 2012
➢ Bid Submission/Bids Due:	May, 2012
➢ Award Construction Contract, Begin Construction:	July, 2012
➢ Construction Complete:	December, 2012

Please note that no load rating analysis has been performed for the bridge as part of this Report. A load rating analysis may be necessary as part of the design of the sidewalk improvements. The bridge is currently posted with a weight limit of 6000 pounds, as recommended by VTrans.

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY OF BRIDGE TERMS

AASHTO – American Association of State Highway and Transportation Officials.

ADT – Average Daily Traffic.

ABUTMENT – A substructure element supporting each end of a single span bridge of superstructure and, in general, retaining or supporting the approach embankment.

BEAM – A linear structural member designed to span from one support to another.

CAST-IN-PLACE – Concrete poured within formwork on site to create a structural element in its final position.

CAMBER – A slight convexity on the road surface.

CHORD – A horizontal member of a truss.

COLUMN – A verticle structural member that transfers dead and live load from the bridge deck and girders to the footings or shafts.

COMPRESSION – The pushing force, which tends to shorten a member; opposite of tension.

CONCRETE – A mixture of water, sand, stone, and a binding element, which hardens to a rock-like consistency.

CROSS BRACE – Transverse brace between two main longitudinal members.

DEAD LOAD – A static load due to the weight of the structure itself.

DECK – The roadway portion of a bridge that directly supports vehicular and pedestrian traffic.

DIAGONAL – A sloping structural member of a truss or bracing system.

EXPANSION JOINT – A joint designed to provide means for expansion and contraction movements produced by temperature changes, load, or other forces.

FATIGUE – Cause of structural deficiencies, usually due to repetitive loading over time.

FLANGE – The flat top and bottom plates of a beam, stringer, or girder.

FLOORBEAM - A transverse beam supporting other beams (stringers) and the bridge deck.

FOOTING – The enlarged, lower portion of a substructure that distributes the structure load either to the earth or to supporting piles; the most common footing is the concrete slab.

GIRDER – A main support member for the structure that usually receives loads from floor beams and stringers; also, any large beam, especially if built up.

GVW – Gross Vehicle Weight.

HINGE – A point in a structure at which a member is free to rotate.

INVENTORY RATING - A live load, which can safely utilize an existing structure for an indefinite period of time.

LIVE LOAD – Vehicular traffic, wind, water, etc.

LOAD RATING – The determination of the live load carrying capacity of an existing bridge.

LOWER CHORD – The bottom horizontal member of a truss.

MEMBER – An individual angle, beam, plate, or built piece intended to become an integral part of an assembled frame or structure.

OPERATING RATING – The maximum permissible live load to which the structure may be subjected.

PIER – A vertical support or substructure unit that supports the spans of a multi-span superstructure at an intermediate location between its abutments.

PILE – A verticle shaft driven into the ground that carries loads through weak layers of soil to those capable of supporting such loads.

PLATE GIRDER – A large, solid web plate with flange plates attached to the web plate by flange angles or fillet welds; fabricated from steel.

POSTING LOAD – A live load a bridge may safely utilize on a routine basis for a limited period of time.

PRE-CAST GIRDER – Fabricated off site of Portland Cement Concrete, reinforcing steel, and post-tensioning cables. These girders are shipped to the construction site by truck and hoisted into place by cranes.

REINFORCED CONCRETE – Concrete with steel reinforcing bars bonded within it to supply increased tensile strength and durability.

RIVETED CONNECTION – A rigid connection of metal bridge members that is assembled with rivets. Riveted connections increase the strength of the structure.

SPALLS – Popouts, shallow holes and deteriorated areas in concrete.

SPAN – The distance between piers or abutments.

SECTION LOSS – Loss of material (thickness or width) in steel members, usually from corrosion.

STAY – Diagonal brace installed to minimize structural movement.

STRINGER – A longitudinal beam supporting the bridge deck.

SUBSTRUCTURE – The parts of a bridge that are below the bottom of the girders. Pilings, shafts, spread footings, piers and abutments are part of the substructure.

SUPERSTRUCTURE – The parts of a bridge that are above the piers and abutments. Girders, trusses, bridge deck, and bridge railing are parts of the superstructure.

TENSION – A force that pulls or stretches.

TRUSS – A rigid, jointed structure made up of individual straight pieces arranged and connected, usually in a triangular pattern, so as to support longer spans.

TRUSS BRIDGE – A bridge having a pair of trusses for the superstructure.

UPPER CHORD – The top longitudinal member of a truss.

VOIDED SLAB – A reinforced concrete slab with a hollow interior, similar to, but normally wider and flatter than, a pre-cast girder.

WEB – The portion of a beam located between and connected to the flanges.

APPENDIX B

PHOTOGRAPHS

Area beneath sidewalk on NE approach

Looking along the downstream (east) fascia

Cantilevered support of the sidewalk

Looking at the south entrance

Roof rafters

Truss and arch configuration

Spalling concrete at south abutment – west side

Spalling concrete at south abutment – east side

Signing on the south approach

Signing on the north approach

Scour hole at north abutment

Timber deck planks

Support for the sidewalk approach on northeast corner

Sidewalk approach on the northeast corner

Cedar shake roof in good condition

Existing storm drain pipe near the northeast wingwall

APPENDIX C

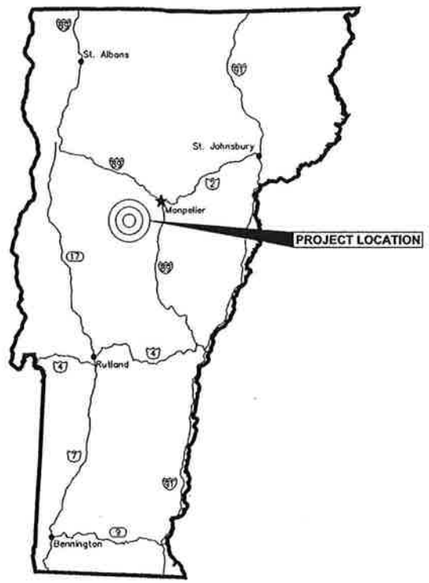
CONCEPTUAL BRIDGE DRAWINGS

TOWN OF WAITSFIELD,VT

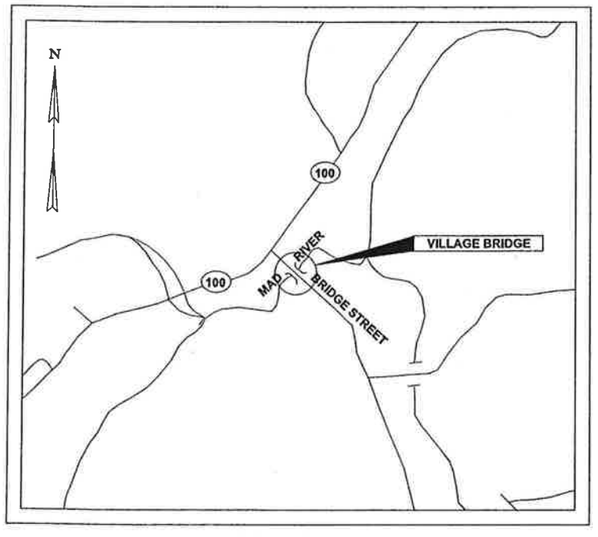
CONCEPTUAL PLANS OF PROPOSED REHABILITATION OF THE VILLAGE (BIG EDDY) COVERED BRIDGE

JANUARY 2011

WORLD GUIDE NO. 45-12-14
TOWN BRIDGE NO. 4
VTRANS PROJECT NO. STP EH08(6)
DUBOIS & KING PROJECT NO. 620922



VICINITY MAP
NOT TO SCALE



LOCATION MAP
1" = 1000'

DRAWING INDEX

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28 NORTH MAIN ST.
RANDOLPH, VT 05060
TEL: (802) 728-3376
FAX: (802) 728-4930
www.dubois-king.com

ENGINEERING • PLANNING • MANAGEMENT • DEVELOPMENT

GENERAL NOTES:

1. GENERAL NOTES SHALL APPLY TO ALL DRAWINGS CONTAINED HEREIN.

2. DESIGN STANDARDS AND SPECIFICATIONS:
   - A. AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17TH EDITION, 2002 (ASD)
   - B. AASHTO MANUAL FOR CONDITION EVALUATION OF BRIDGES, 2ND EDITION, 1994.
   - C. VTRANS STRUCTURES MANUAL, 2004
   - D. NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION, 2006(ASD)
   - E. ASCE 7-05, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
   - F. DESIGN LIVE LOAD: H6 (BRIDGE) 85 psf (SIDEWALK)
   - G. SNOW LOAD, Pg = 60 psf
   - H. WIND LOAD, V= 90 mph

3. SPECIFICATIONS:
   - A. VTRANS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2006, WITH CURRENT ADDITIONS AND MODIFICATIONS BY VTRANS.

4. ALL WORK PERFORMED BY THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AND REQUIREMENTS.

5. ALL DIMENSIONS AND FIELD CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF THE WORK, ORDERING OF MATERIALS, OR FABRICATION. (V.I.F. = VERIFY IN FIELD)

6. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SAFETY, AND MEANS AND METHODS TO PERFORM AND COMPLETE THE WORK.

7. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND DETERMINING ALL UTILITIES (ABOVE AND BELOW GROUND) WITHIN THE PROJECT LIMITS, AND TO TAKE THE NECESSARY PRECAUTIONS TO PROTECT UTILITIES DURING CONSTRUCTION. CONTACT DIG-SAFE AT 1-800-DIG-SAFE (WWW.DIGSAFE.COM).

8. SUBMIT SHOP DRAWINGS AND PRODUCT LITERATURE (MANUFACTURER'S LITERATURE, CUT SHEETS, APPLICATION PROCEDURES, ETC.) FOR ALL PRODUCTS PROPOSED FOR USE ON THE PROJECT, FOR APPROVAL BY THE ENGINEER.

9. SITE WORK SHALL BE CONSTRUCTED FROM A COMPLETE SET OF PLANS. FOLLOW ALL DETAILS, NOTES, SPECIFICATIONS, ETC. CONTAINED ON THESE DRAWINGS FOR ALL ASPECTS OF THIS PROJECT. THE ENGINEER IS TO BE NOTIFIED OF ANY CONFLICT WITHIN THIS PLAN SET.

10. ALL WORK MUST BE DONE IN THE DRY TO MINIMIZE THE POTENTIAL FOR THE DISCHARGE OF SEDIMENT-LADEN WATER. CONTRACTOR IS RESPONSIBLE FOR DIVERTING, PUMPING, OR OTHERWISE CONTROLLING WATER AS NECESSARY. CONTRACTOR SHALL SUBMIT CONTROL OF WATER METHOD TO THE ENGINEER FOR APPROVAL 14 DAYS PRIOR TO START OF WORK. CONTRACTOR SHALL NOT BEGIN WORK PRIOR TO RECEIPT OF APPROVAL.

PROPOSED CONSTRUCTION SEQUENCE:

1. INSTALL SILT FENCE AND EROSION CONTROL MEASURES.
2. INSTALL TEMPORARY SHORING (STEEL OR WOOD BEAMS, COLUMNS AND CRIBBING) UNDER BOTTOM OF CHORD OF BOTH TRUSSES. JACK BRIDGE OFF OF EXISTING ABUTMENTS.
3. PERFORM CONCRETE REPAIRS TO ABUTMENTS AND ABUTMENT SEATS.
4. REPAIR TRUSSES AND FLOORBEAMS. INSTALL NEW DECK PLANKS AND RUNNER PLANKS.
5. LOWER BRIDGE ONTO ABUTMENTS. REMOVE TEMPORARY SHORING.
6. REMOVE AND REPLACE SIDING AND PORTAL SIDING.
7. REMOVE SILT FENCE AND EROSION CONTROL MEASURES.

DATUM
VERTICAL _____
HORIZONTAL _____

TIMBER NOTES:

1. NEW TIMBER SHALL BE AS FOLLOWS.
   - A. RAFTERS (2⅛"x4⅞"): EASTERN WHITE PINE, NO.1
   - B. SIDING (¾"x7½"): EASTERN WHITE PINE, COMMON PREMIUM GRADE
   - C. BEARING BLOCKS: WHITE OAK, GRADE NO. 1 OR BETTER, PRESSURE TREATED (PENTA).
   - D. DECK PLANKS (2½"x7½" OR 2½"x9½"): DOUGLAS FIR NO. 2
   - E. RUNNER PLANKS
   - F. CURB (5½"x5½")

2. ALL TIMBER CONSTRUCTION SHALL COMPLY WITH THE 2006 NATIONAL DESIGN SPECIFICATION (NDS) AND SUPPLEMENT FOR WOOD CONSTRUCTION AND THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC) SPECIFICATIONS.

3. ALL JOB SITE FABRICATION CUTS AND BORINGS OF TIMBER SHALL BE TREATED WITH TWO COATS OF AN APPROVED PRESERVATIVE LIBERALLY APPLIED. THE PRESERVATIVE SHALL BE COMPATIBLE WITH ANY PRESSURE TREATMENT PRESERVATIVE USED IN ACCORDANCE WITH AWPA STANDARD M4.

4. ALL NUTS, BOLTS, WASHERS, SPIKES AND SCREWS FOR TIMBER CONSTRUCTION SHALL CONFORM TO ASTM A307 AND BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.

5. ALL NAILS USED SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153. THE USE OF ELECTRO GALVANIZED NAILS WILL NOT BE PERMITTED.

6. THROUGH BOLTS SHALL BE INSERTED IN HOLES OF SAME DIAMETER OF THE BOLT. LAG BOLTS AND SPIKES SHALL BE INSERTED IN PREDRILLED PILOT HOLES 2/3 THE DIAMETER OF THE BOLT OR SPIKE.

7. ALL LAG BOLTS AND NUTS FOR THROUGH BOLTS SHALL BE TIGHTENED SNUGLY. DO NOT EXCESSIVELY TIGHTEN TO CAUSE CRUSHING OF THE WOOD UNDER THE WASHER.

8. MOISTURE CONTENT OF WOOD USED SHALL NOT EXCEED 16% AT THE TIME OF USE.

9. EACH PIECE OF WOOD OR TIMBER SHALL BE GRADED BY A RECOGNIZED LUMBER GRADING AGENCY. A CERTIFICATE OF COMPLIANCE SHALL BE SUBMITTED FOR ALL WOOD.

STEEL NOTES:

1. ALL PLATES, ANGLES, RODS, ANCHOR BOLTS AND MISC. STEEL SHALL CONFORM TO ASTM A36.
2. ALL NEW STEEL HARDWARE SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.
3. SUBMIT SHOP DRAWINGS FOR ALL STEEL FABRICATIONS, FOR APPROVAL.

CONCRETE NOTES:

1. THE CONTRACTOR WILL NOTIFY ENGINEER A MINIMUM OF 24 HOURS IN ADVANCE OF ALL CONCRETE OPERATIONS.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60.
3. WELDED WIRE FABRIC (W.W.F.) SHALL CONFORM TO ASTM A185 AND BE FIRNISHED IN FLAT SHEETS.
4. CONCRETE FOR CAST IN PLACE FOOTINGS, SLABS, WALLS, ETC., SHALL HAVE A COMPRESSIVE STRENGTH OF f'c = 4000 psi@ 28 DAYS.
5. GROUT FOR GROUTING REBAR DOWELS SHALL BE A REDI-MIX, CEMENTITIOUS, NON-SHRINK, NON-METALIC TYPE (SIKA GROUT 212, FOSROC OR APPROVED EQUAL), WITH A COMPRESSIVE STRENGTH OF f'c = 5000 psi@ 28 DAYS
6. ALL CONCRETE WORK SHALL COMPLY WITH THE LATEST ACI SPECIFICATIONS. (ACI-318).
7. ALL CONCRETE SHALL BE CURED ACCORDING TO THE LATEST ACI SPECIFICATIONS. NOTIFY THE ENGINEER OF CURING METHOD AND PERIOD PRIOR TO CASTING.
8. FOR CONSTRUCTION DURING COLD WEATHER, ALL CONCRETE WILL REQUIRE PROTECTION FROM FREEZING TEMPERATURES IN ACCORDANCE WITH ACI 306R.
9. FOR CONSTRUCTION DURING HOT WEATHER, ALL CONCRETE WILL REQUIRE PROTECTION FROM HIGH TEMPERATURES IN ACCORDANCE WITH ACI 305R.
10. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED ¾"

BID ITEM LIST
(THIS INFORMATION IS FOR BIDDING PURPOSES ONLY)

ITEM NO.	DESCRIPTION	UNIT	QUANT.
203.16	Rock Excavation	CY	4.0
204.25	Structure Excavation	CY	4.0
502.10	Shoring Superstructure	LS	1.0
506.55	Structural Steel, Plate Girder/Steel Truss	LB	10526.3
506.75	Structural Steel	LB	153.0
507.15	Reinforcing Steel	LB	1600.0
507.16	Drilling and Grouting Dowels	LF	36.0
514.10	Water Repellant	GAL	10.0
522.20	Structural Timber and Lumber - Untreated (Roof)	LS	1.0
522.20	Structural Timber and Lumber - Untreated (Deck)	LS	1.0
522.20	Structural Timber and Lumber - Untreated (Floorbeams)	EA	5.0
522.30	Non-Structural Timber and Lumber	MFBM	0.2
524.21	Joint Sealer	LF	45.0
529.20	Partial Removal of Bridge Structure	LS	1.0
541.25	Concrete, Class B	CY	15.0
580.10	Repair of Concrete Substructure Surface Class I	SY	50.0
580.11	Repair of Concrete Substructure Surface Class II	SY	8.0
580.18	Overhead and Vertical Concrete Repair material	CF	80.0
621.18	Steel Backed Timber Guardrail	LF	140.0
621.75	Remove Guardrail	LF	10.0
631.10	Field Office, Engineers	LS	1.0
635.10	Mobilization	LS	1.0
649.51	Geotextile for Silt Fence	SY	15.0
660.10	Timber Painting, Environmental protection	LS	1.0
660.20	Timber Painting, Fire Retardant	LS	1.0
660.30	Timber Painting, Insecticide/Fungicide	LS	1.0
675.20	Traffic Signs, Type A	SF	24.0
675.341	Square Tube Sign Post and Anchor	LF	120.0
675.50	Removing Signs	EA	12.0
675.60	Erecting Salvaged Signs	EA	12.0
900.620	Wood Epoxy Repairs	EA	20.0
900.645	Rehabilitating Covered Bridge Superstructure (Trusses)	LS	1.0
900.645	Repairs or Replacements as Needed	LS	1.0

JACKING AND TEMPORARY SHORING NOTES:

1. THE CONTRACTOR SHALL INSTALL TEMPORARY SHORING BENEATH OR ABOVE TRUSS BOTTOM CHORDS AND JACK THE BRIDGE OFF THE EXISTING ABUTMENTS TO REMOVE AND REPLACE TRUSS MEMBERS AND PERFORM ABUTMENT REPAIRS (ITEM 502.10)
2. THE EXISTING BRIDGE SHALL BE JACKED AND SHORED AS REQUIRED TO STRAIGHTEN, RELEASE STRESSES, PLUMB AND RE-ALIGN THE TRUSSES, SHIMMING OF THE EXISTING TRUSSES WITH HARDWOOD SHIMS AND ADJUSTING BOLTS AND RODS WILL BE REQUIRED. THE CONTRACTOR SHALL SUBMIT THE PROPOSED METHOD OF JACKING AND SHORING TO THE ENGINEER PRIOR TO THE START OF JACKING OPERATIONS. (SEE SPECIFICATIONS)
3. SHORE AND JACK THE BRIDGE AT POINTS AS CLOSE AS POSSIBLE TO EXISTING BRIDGE TRUSS LOWER PANEL POINTS.
4. TOTAL ESTIMATED DEAD LOAD WEIGHT OF COVERED BRIDGE TRUSS SPAN IS XX,000 POUNDS.
5. SUBMIT SHOP DRAWINGS OF PROPOSED JACKING AND SHORING SCHEMES FOR APPROVAL.

REHABILITATING TRUSSES NOTES:

1. BOTH TRUSSES SHALL BE JACKED AND SHORED SIMULTANEOUSLY (ITEM 502.10)
2. REMOVE AND REPLACE TRUSS MEMBERS AS INDICATED OR DIRECTED BY THE ENGINEER (ITEM 522.20). TRUSSES SHALL BE RE-ALIGNED, STRAIGHTENED, PLUMBED, SQUARED, AND CAMBERED. CONTRACTOR TO DISMANTLE MORTISE/TENON CONNECTIONS AND BOLTED AND TRUNNEL CONNECTIONS AS REQUIRED TO ACHIEVE THE DESIRED REALIGNMENT AND CAMBER. INSTALL NEW HARDWOOD BEARING BLOCKS AND HARDWOOD SHIMS. RECONSTRUCT CONNECTIONS WITH REUSED MATERIAL OR NEW TRUNNELS AND THROUGH BOLTS AS DIRECTED BY THE ENGINEER (ITEM 900.645)

PLOTTED 1/4/2011

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

DuBois & King Inc.
26 NORTH MAIN STREET
P.O. BOX 339
RANDOLPH, VT 05060
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TOWN OF WAITSFIELD
WAITSFIELD, VERMONT
WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION
GENERAL NOTES

PROJECT NO:	DESIGNED BY:
620922P1	XXX
	DRAWN BY: JDG
DATE: JAN. 2011	CHECKED BY: RHD

DRAWING NO: 2

SHEET 2 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

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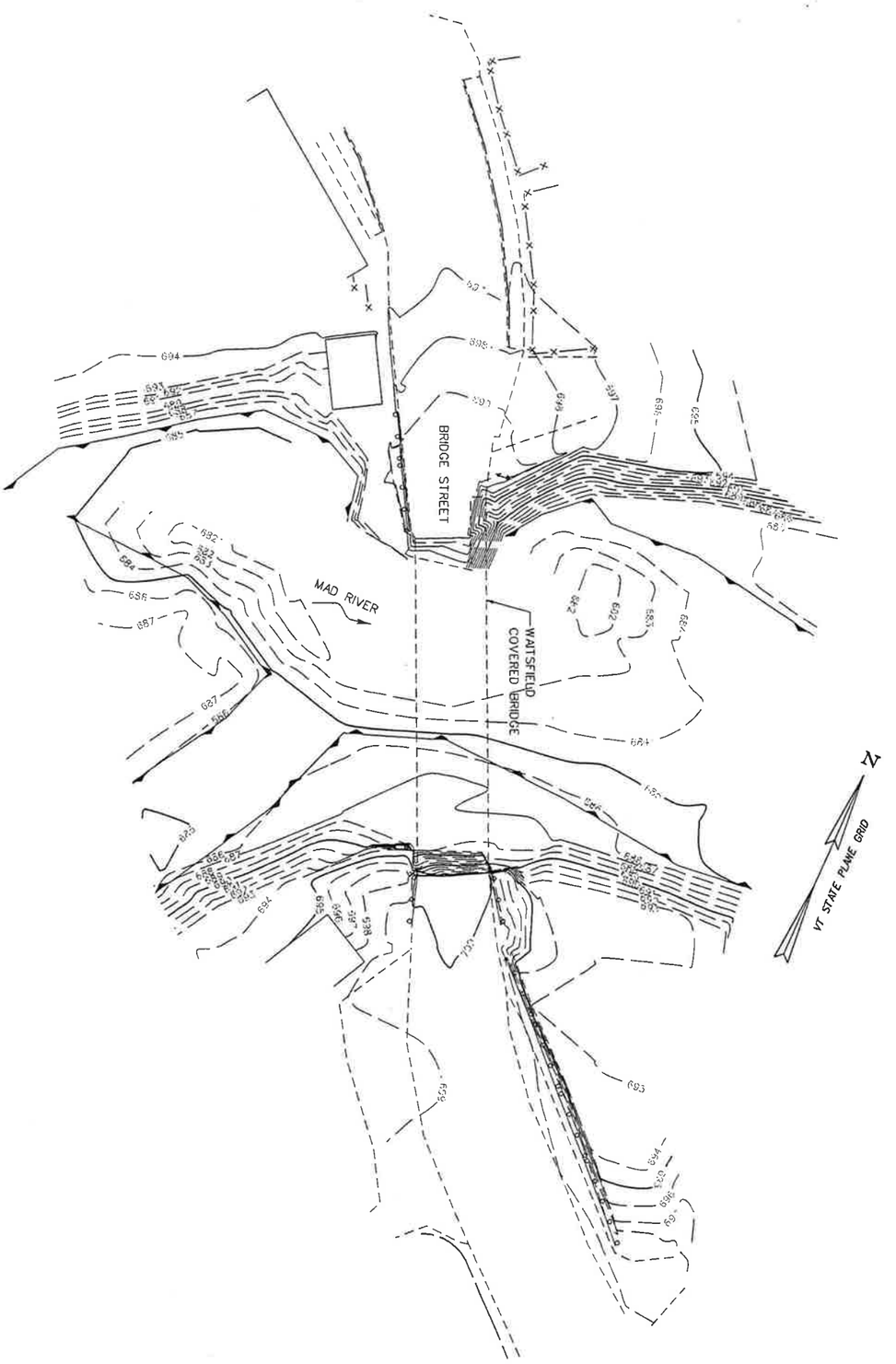
DATUM
VERTICAL
HORIZONTAL



SCALE 1" = 20'-0
20 0 20

PLOTTED 1/4/2011

SHEET 3 OF 10

3

DRAWING NO:

DATE: JAN. 2011

DESIGNED BY: RHD

DRAWN BY: JDG

CHECKED BY: XXX

PROJECT NO: 620222P1

TOWN OF WAITSFIELD
WAITSFIELD, VERMONT

WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION

SITE PLAN

DuBois & King inc.
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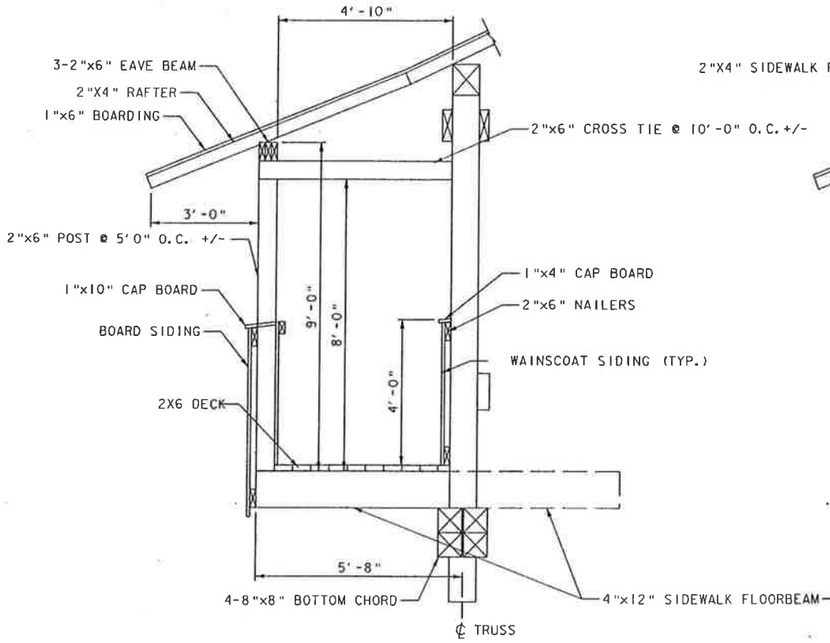
NO.	DATE	REVISIONS	BY	CK'D

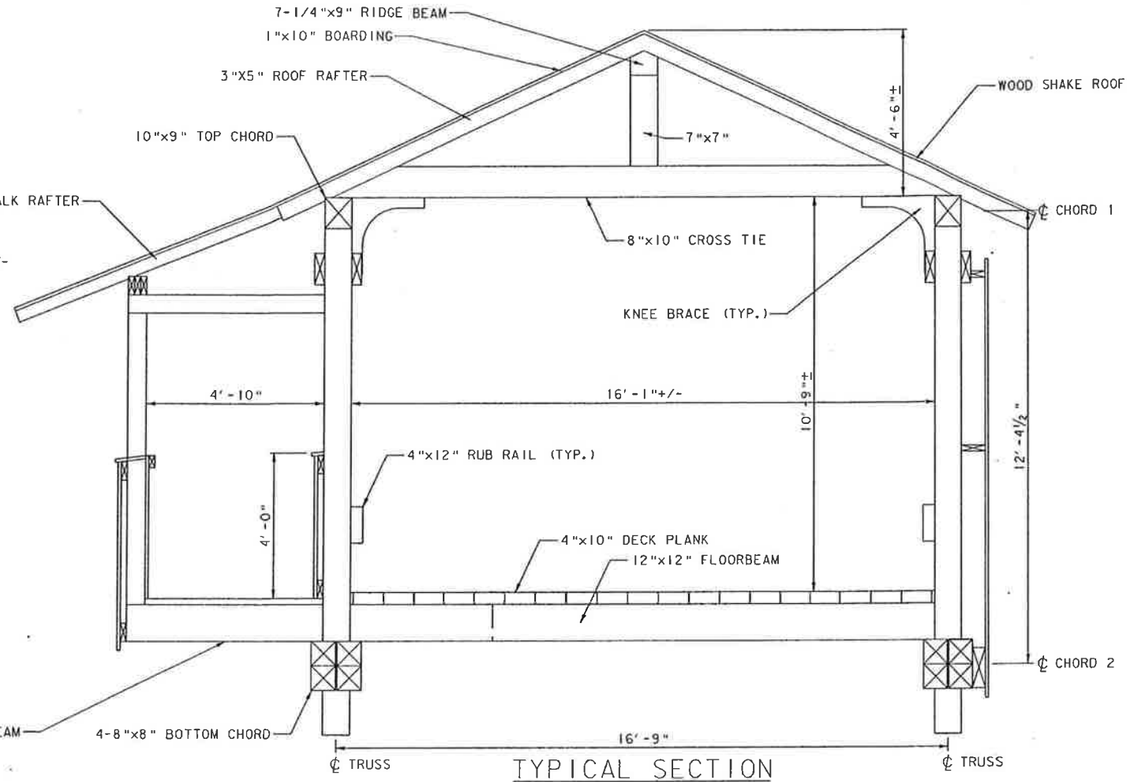
ENGINEER

NOT FOR CONSTRUCTION - PRELIMINARY PLANS



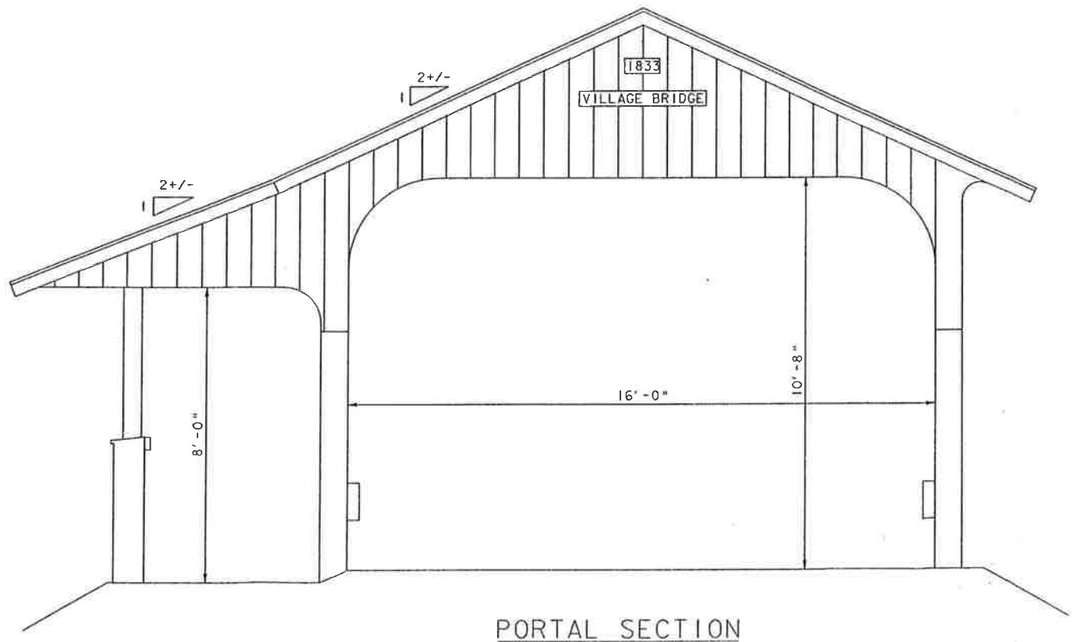
SIDEWALK DETAIL

SCALE ½" = 1'-0"



TYPICAL SECTION

SCALE ½" = 1'-0"



PORTAL SECTION

SCALE ½" = 1'-0"

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

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TOWN OF WAITSFIELD
WAITSFIELD, VERMONT
WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION
TYPICAL SECTIONS
AND DETAILS

PROJECT NO:	DESIGNED BY:
620922P1	XXX
DATE:	DRAWN BY:
JAN. 2011	JDG
	CHECKED BY:
	RHD

DRAWING NO:
4

SHEET 4 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

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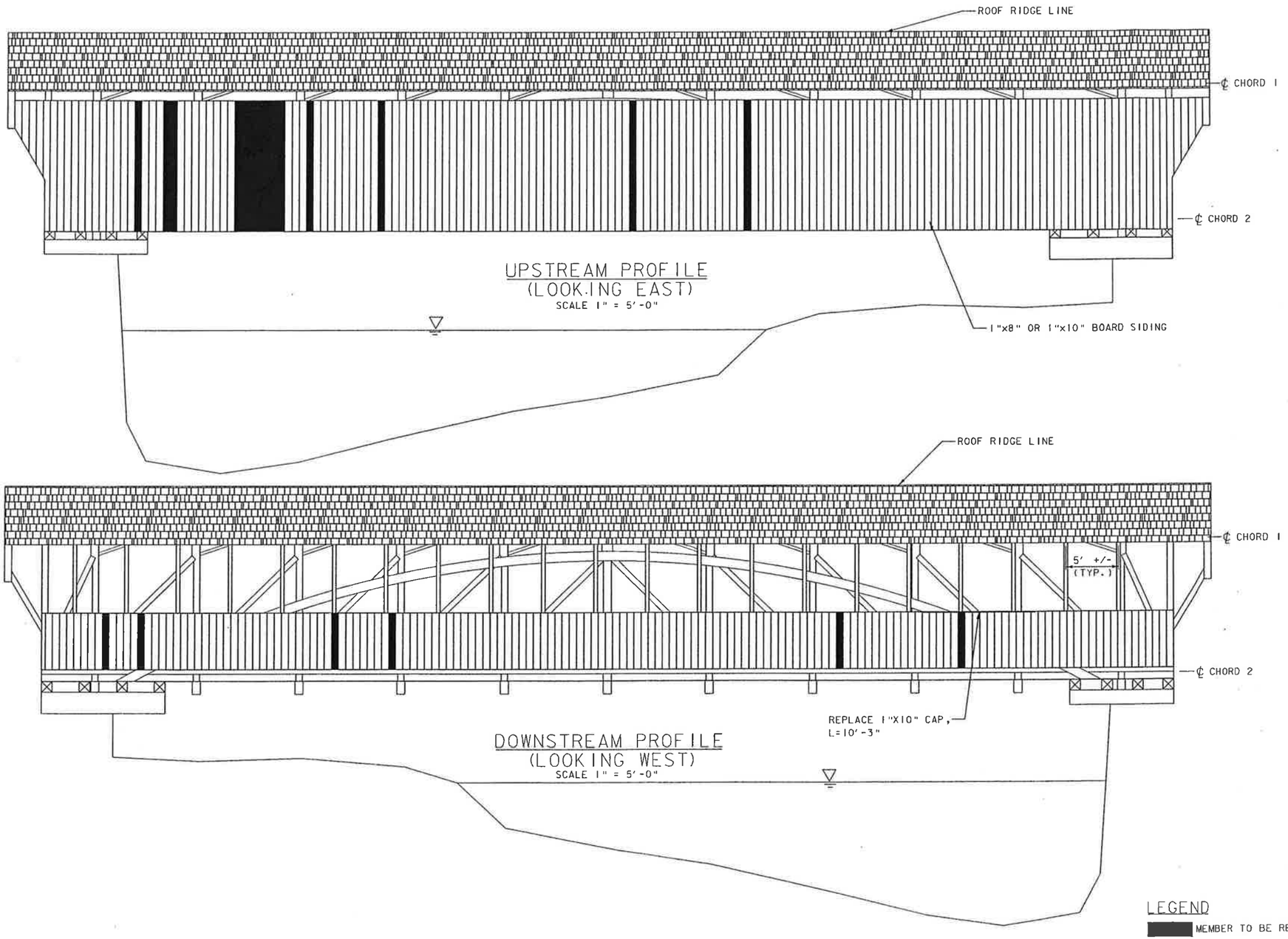

UPSTREAM PROFILE
(LOOKING EAST)
SCALE 1" = 5'-0"

DOWNSTREAM PROFILE
(LOOKING WEST)
SCALE 1" = 5'-0"

LEGEND

MEMBER TO BE REPLACED

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

DuBois & King inc.
28 NORTH MAIN STREET
P.O. BOX 339
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TOWN OF WAITSFIELD
WAITSFIELD, VERMONT

WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION

EXTERIOR PROFILES

PROJECT NO:	DESIGNED BY:
620922P1	XXX
DATE:	DRAWN BY:
JAN. 2011	JDG
	CHECKED BY:
	RHD

DRAWING NO:
5

SHEET 5 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

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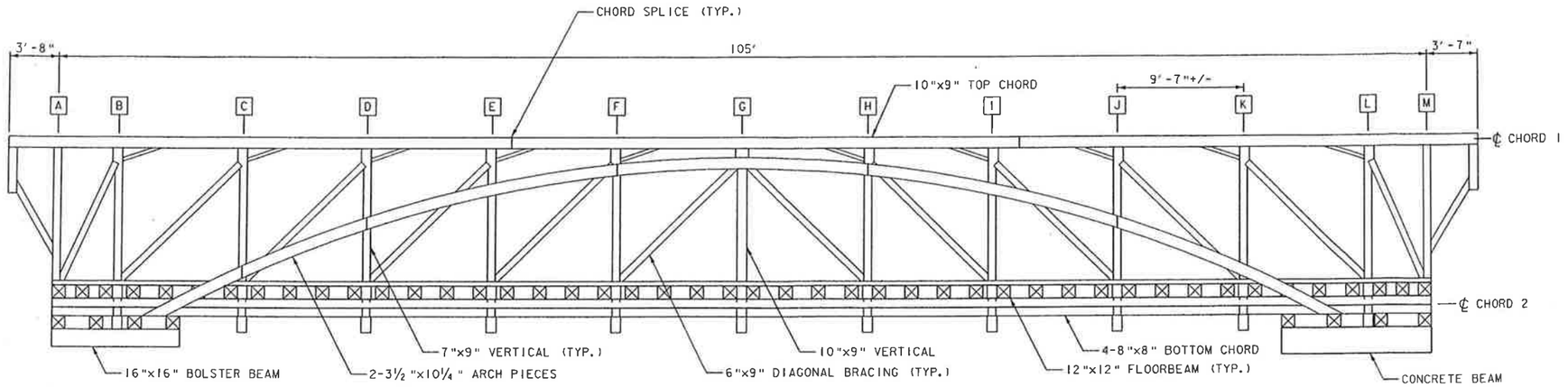
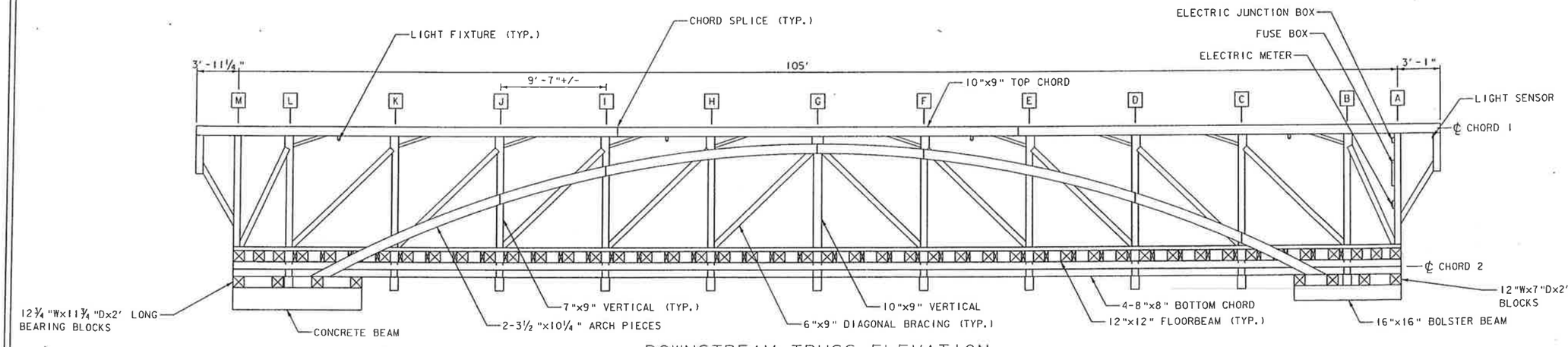


UPSTREAM TRUSS ELEVATION
(LOOKING EAST)
SCALE 1" = 5'-0"



DOWNSTREAM TRUSS ELEVATION
(LOOKING WEST)
SCALE 1" = 5'-0"

DATUM
VERTICAL _____
HORIZONTAL _____

EXISTING AND AS-BUILT TRUSS CAMBER (INCHES)*				
NODES	UPSTREAM		DOWNSTREAM	
	EXISTING	AS-BUILT	EXISTING	AS-BUILT
A	0		0	
B	0		-1/16"	
C	-1/8"		-3/16"	
D	-5/16"		-1/4"	
E	-7/16"		-7/16"	
F	-5/8"		-5/16"	
G	0		-7/8"	
H	-1/8"		-1 5/16"	
I	-5/16"		1¾"	
J	-1 1/8"		-3½"	
K	-1 3/8"		-3 3/8"	
L	-½"		-1 5/8"	
M	0		0	

*NEGATIVE VALUES INDICATE SAG

CAMBER NOTES:

1. THE REFERENCE LINE IS A STRAIGHT LINE CONNECTING POINTS LOCATED AT THE TOP OF CHORD 2 WITH RELATIVE ELEVATIONS SHOWN.
2. PROPOSED JACKING TRUSS CAMBER (PRIOR TO RELEASE) GOALS ARE 3" POSITIVE IN EAST AND WEST TRUSS GIVEN AT THE CENTER NODE POINT AT THE TOP OF CHORD 2. ALL VALUES ARE MEASURED FROM THE REFERENCE LINE. THE ENGINEER WILL DIRECT THE AMOUNT OF CAMBER DURING JACKING THAT WILL NOT CAUSE DAMAGE TO THE TRUSSES.
3. ITEM XXX INCLUDES JACKING OF THE BRIDGE THROUGHOUT CONSTRUCTION TO LESSEN SAG IN THE TRUSSES. THE PROPOSED FINAL CAMBER AFTER RELEASE IS 1.0" POSITIVE IN EAST AND WEST TRUSS.
4. CONTRACTOR WILL ASSIST ENGINEER IN OBTAINING AS-BUILT CAMBER VALUES ALONG TRUSSES AFTER COMPLETETION OF REPAIRS AND REMOVAL OF SHORING/JACKING.

PLOTTED 1/4/2011

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

DuBois & King inc.
28 NORTH MAIN STREET
P.O. BOX 339
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TOWN OF WAITSFIELD
WAITSFIELD, VERMONT
WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION

TRUSS ELEVATIONS

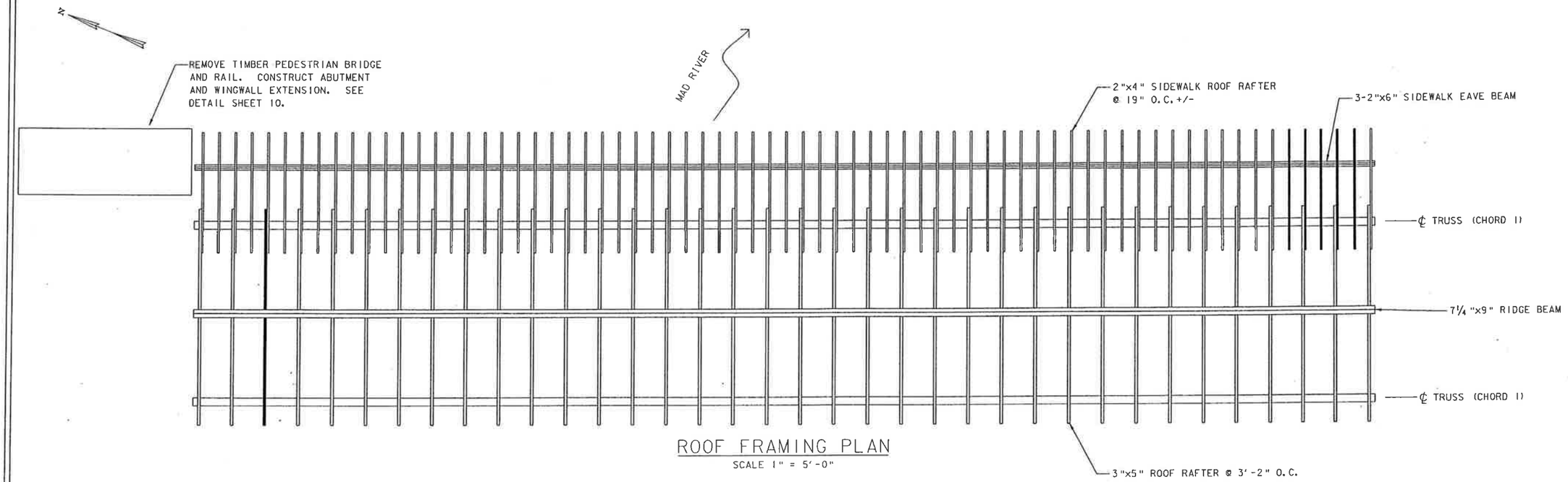
PROJECT NO: 620922P1
DESIGNED BY: XXX
DRAWN BY: JDG
DATE: JAN. 2011
CHECKED BY: RHD

DRAWING NO: 6

SHEET 6 OF 10

NOT FOR CONSTRUCTION • PRELIMINARY PLANS

I:\620922s_Waitsfield Covered Bridge\Design\CADD Files\620922_Det001.dgn



ROOF FRAMING PLAN

SCALE 1" = 5'-0"

LEGEND

MEMBER TO BE REPLACED

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

E:\620922_Waitsfield_Covered_Bridge\Design\CADD Files\620922_Deta04.dgn

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WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION

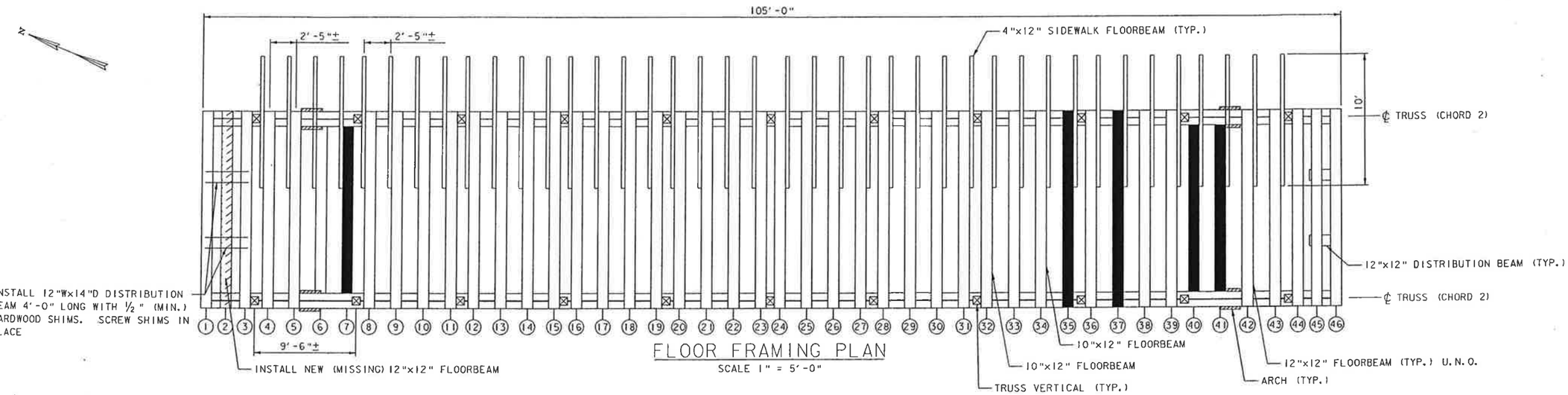
ROOF FRAMING PLAN

PROJECT NO.	DESIGNED BY:
620922P1	XXX
DATE:	DRAWN BY:
JAN. 2011	JDG
	CHECKED BY:
	RHD

DRAWING NO:
7

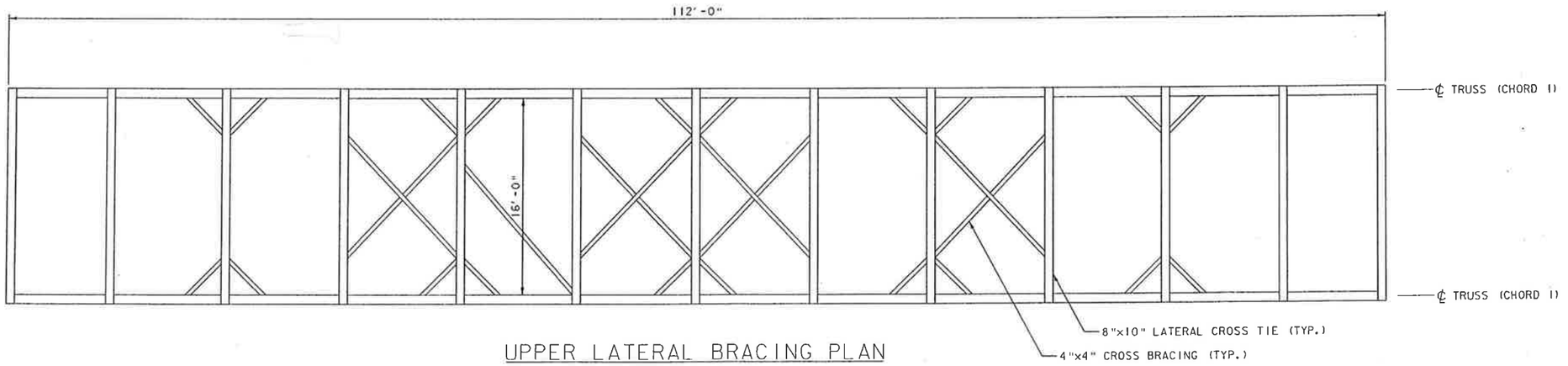
SHEET 7 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS



FLOOR FRAMING PLAN

SCALE 1" = 5'-0"



UPPER LATERAL BRACING PLAN

SCALE 1" = 5'-0"

LEGEND

- MEMBER TO BE REPLACED
- (X) FLOORBEAM NUMBER
- U.N.O. UNLESS NOTED OTHERWISE

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

H:\620922p_Waitsfield Covered Bridge\Design\CADD Files\620922_Detail02.dgn

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

DuBois & King inc.
25 NORTH MAIN STREET
P.O. BOX 339
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FAX: (802) 728-4930
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TOWN OF WAITSFIELD
WAITSFIELD, VERMONT

WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION

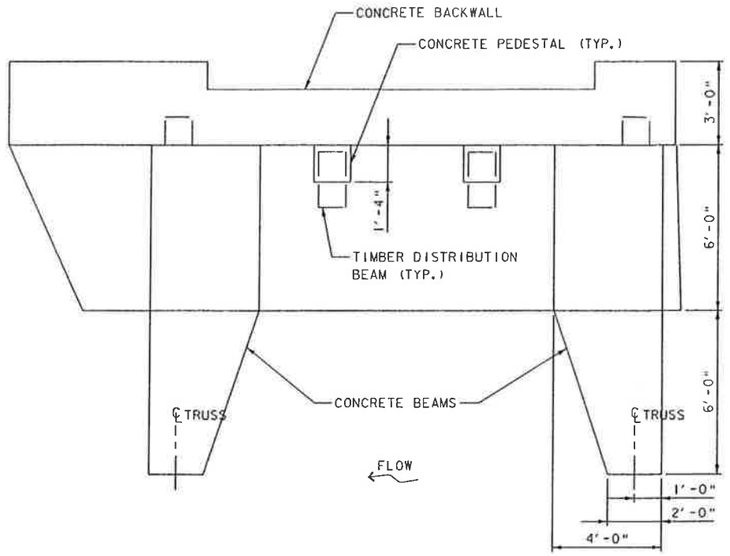
FLOOR FRAMING AND
UPPER LATERAL BRACING PLAN

PROJECT NO:	DESIGNED BY:
620922P1	XXX
DATE:	DRAWN BY:
JAN. 2011	JDG
	CHECKED BY:
	RHD

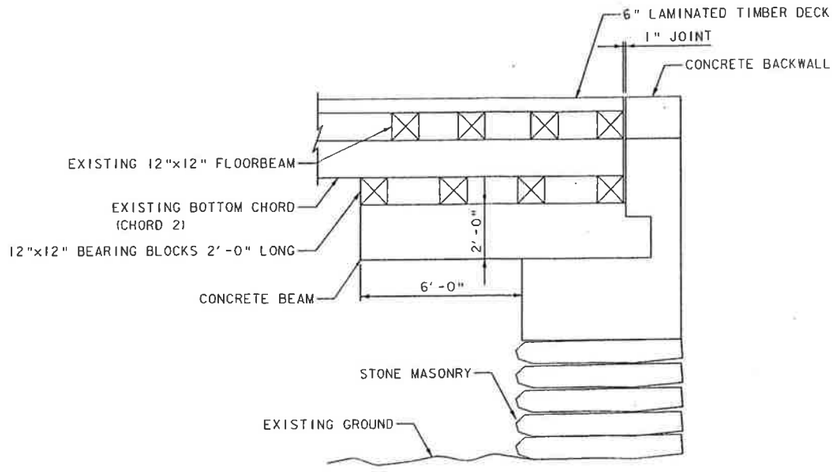
DRAWING NO:
8

SHEET 8 OF 10

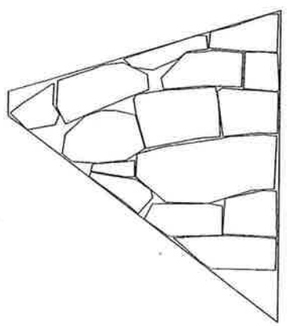
NOT FOR CONSTRUCTION - PRELIMINARY PLANS



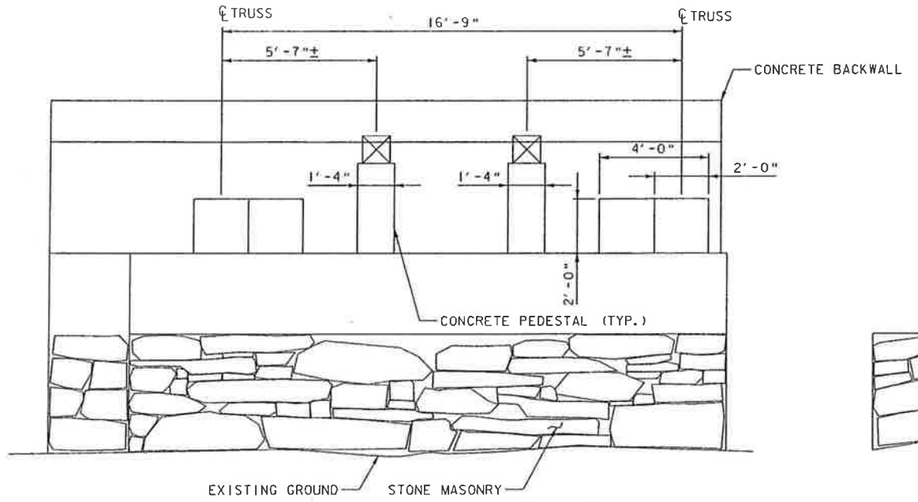
SOUTH ABUTMENT PLAN
SCALE: ⅜" = 1'-0"



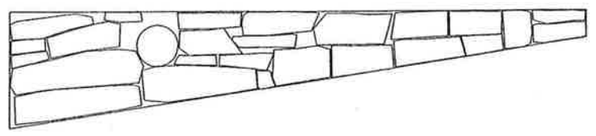
SOUTH ABUTMENT END VIEW
SCALE: ⅜" = 1'-0"



SOUTHEAST WINGWALL
SCALE: ⅜" = 1'-0"



SOUTH ABUTMENT ELEVATION
SCALE: ⅜" = 1'-0"



SOUTHWEST WINGWALL
SCALE: ⅜" = 1'-0"

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

ENGINEER

NO.	DATE	REVISIONS	BY	CK'D

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WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION
SOUTH ABUTMENT
PLAN & ELEVATION

PROJECT NO.	DESIGNED BY:
620922P1	XXX
DATE:	DRAWN BY:
JAN. 2011	JDG
	CHECKED BY:
	RHD

DRAWING NO:
9
SHEET 9 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

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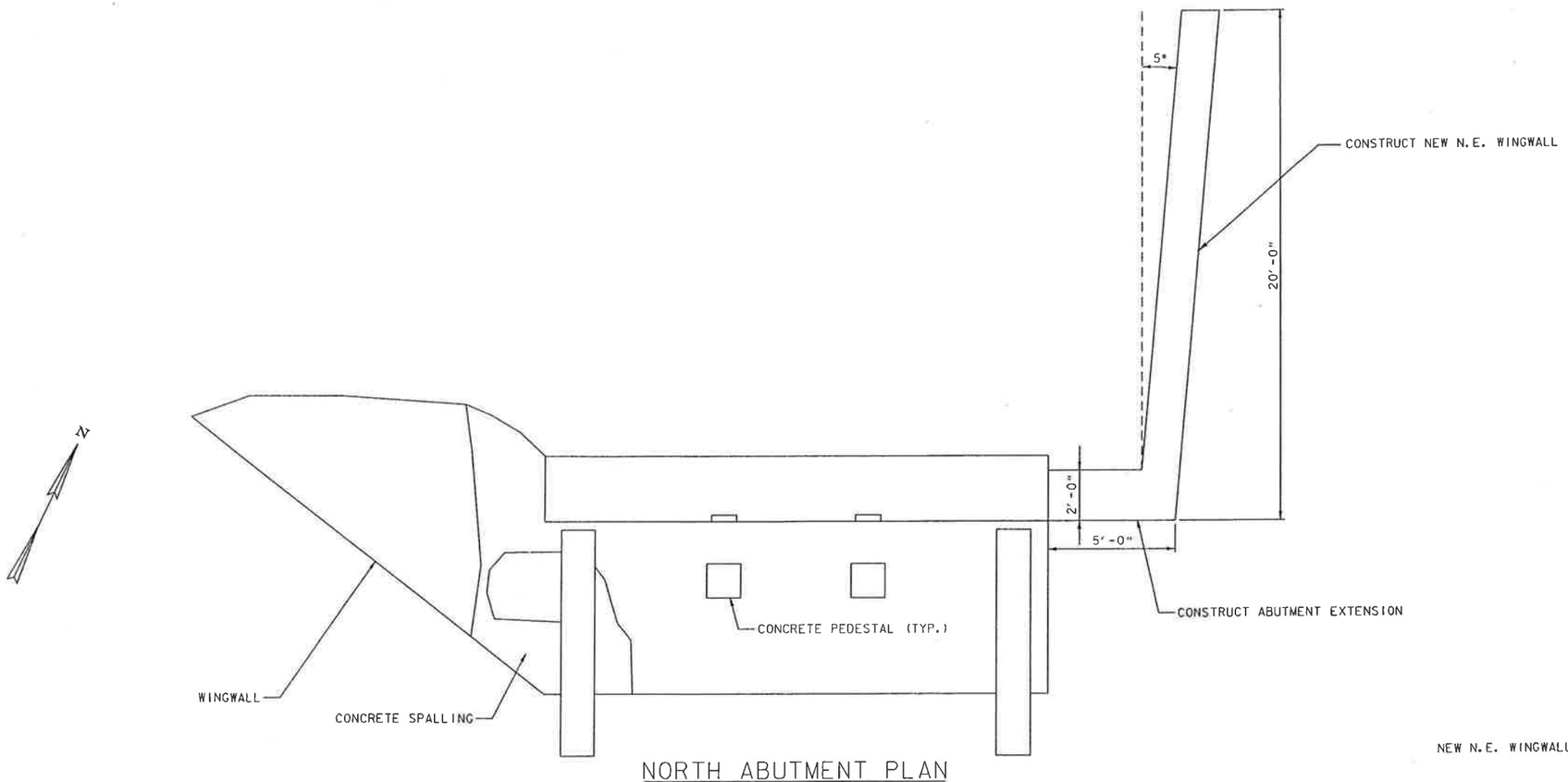
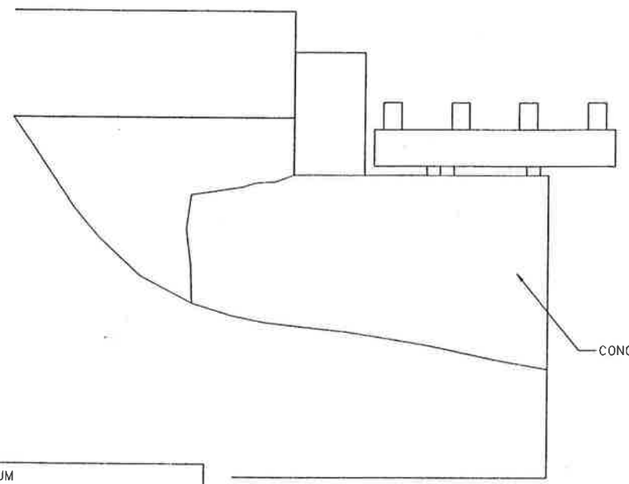
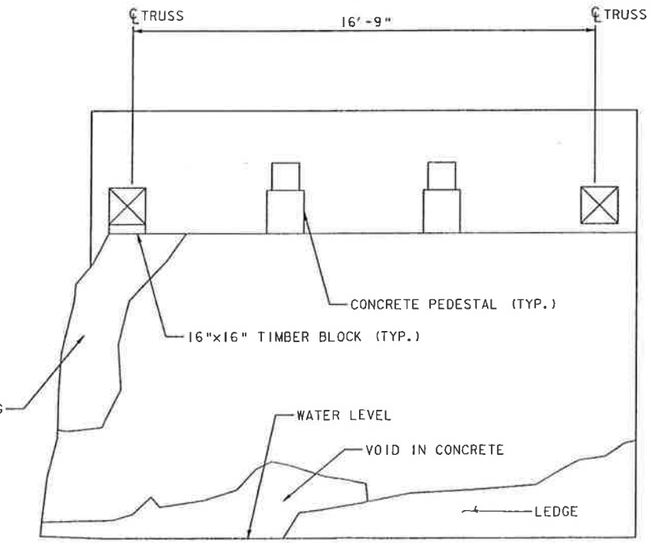


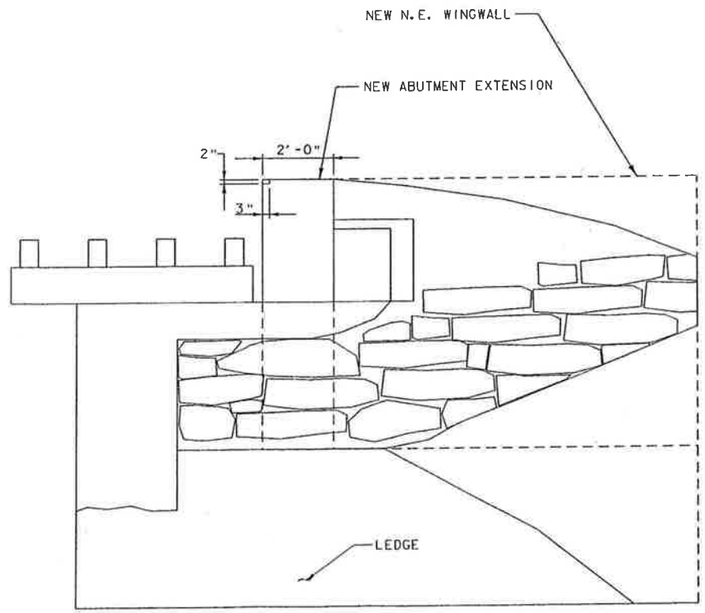
NORTH ABUTMENT PLAN
SCALE: 3/8" = 1'-0"



NORTHWEST WINGWALL
SCALE: 3/8" = 1'-0"



NORTH ABUTMENT ELEVATION
SCALE: 3/8" = 1'-0"



NORTHEAST WINGWALL
SCALE: 3/8" = 1'-0"

DATUM
VERTICAL _____
HORIZONTAL _____

PLOTTED 1/4/2011

ENGINEER

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WAITSFIELD VILLAGE (BIG EDDY)
BRIDGE REHABILITATION
NORTH ABUTMENT
PLAN & ELEVATION

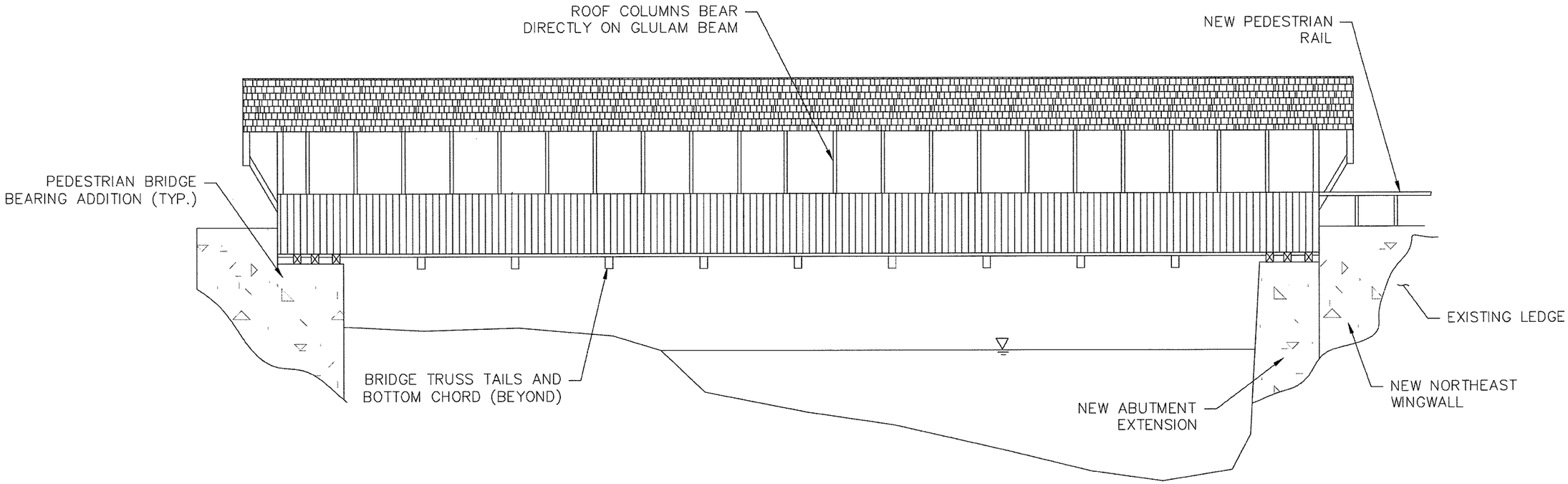
PROJECT NO.	DESIGNED BY:
620922P1	XXX
	DRAWN BY: JDG
DATE: JAN. 2011	CHECKED BY: RHD

DRAWING NO: 10

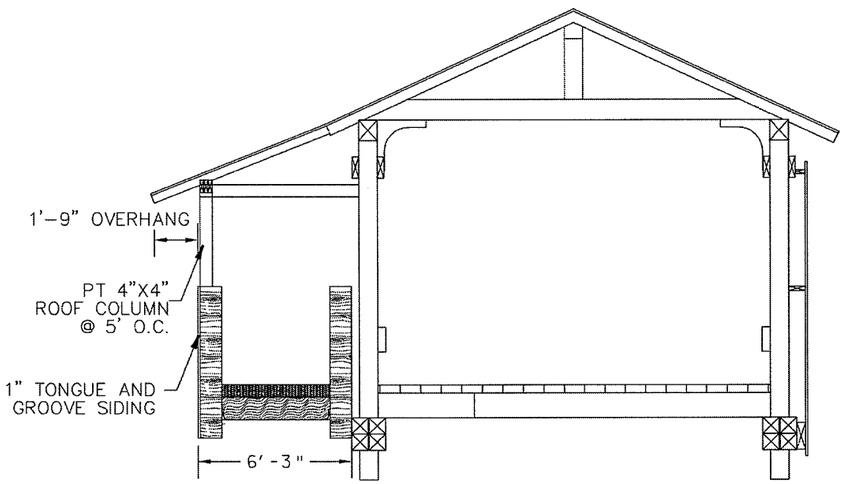
SHEET 10 OF 10

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

I:\620922-_Waitsfield Covered Bridge\Design\CADD Files\620922-North Abutment.dgn



GLULAM BEAM ELEVATION
(LOOKING WEST)



℄ TRUSS TYPICAL SECTION ℄ TRUSS

ENGINEER

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TOWN OF WA ITSFIELD, VT

VILLAGE BRIDGE REHABILITATION

STELL TRUSS / GLULAM BEAM ELEVATION

PROJECT NO.	DESIGNED BY.
620922	RHD
DATE:	DRAWN BY.
MAY, 2011	MAB
	CHECKED BY: RHD

DRAWING NO:

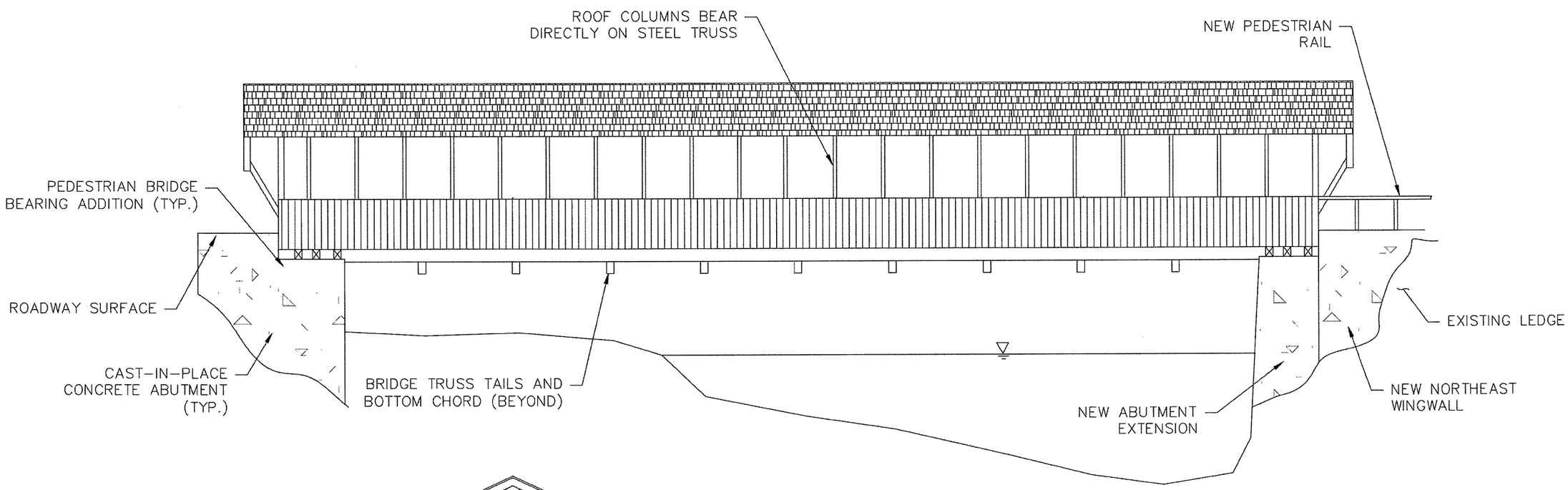
2

SHEET 2 OF 04

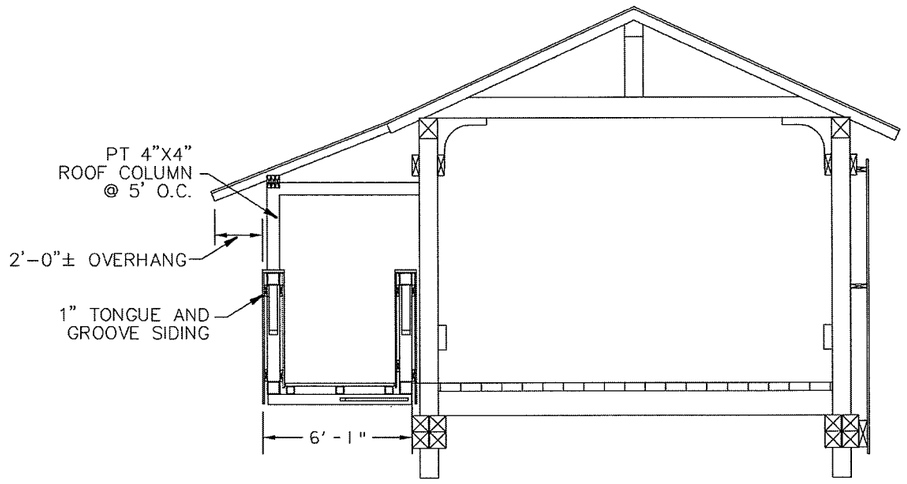
NOT FOR CONSTRUCTION - PRELIMINARY PLANS

I:\620922x_Wolsfield Covered Bridge\Pedestrian Sidewalk\Steel Truss.dwg Jun. 02, 2011

Glulam Beam Pedestrian Bridge



STEEL TRUSS ELEVATION
(LOOKING WEST)



℄ TRUSS TYPICAL SECTION ℄ TRUSS

ENGINEER

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TOWN OF WA ITSFIELD, VT

VILLAGE BRIDGE REHABILITATION

STEEL TRUSS PEDESTRIAN BRIDGE

PROJECT NO.	DESIGNED BY:
620922	RHD
	DRAWN BY: MAB
DATE: MAY, 2011	CHECKED BY: RHD

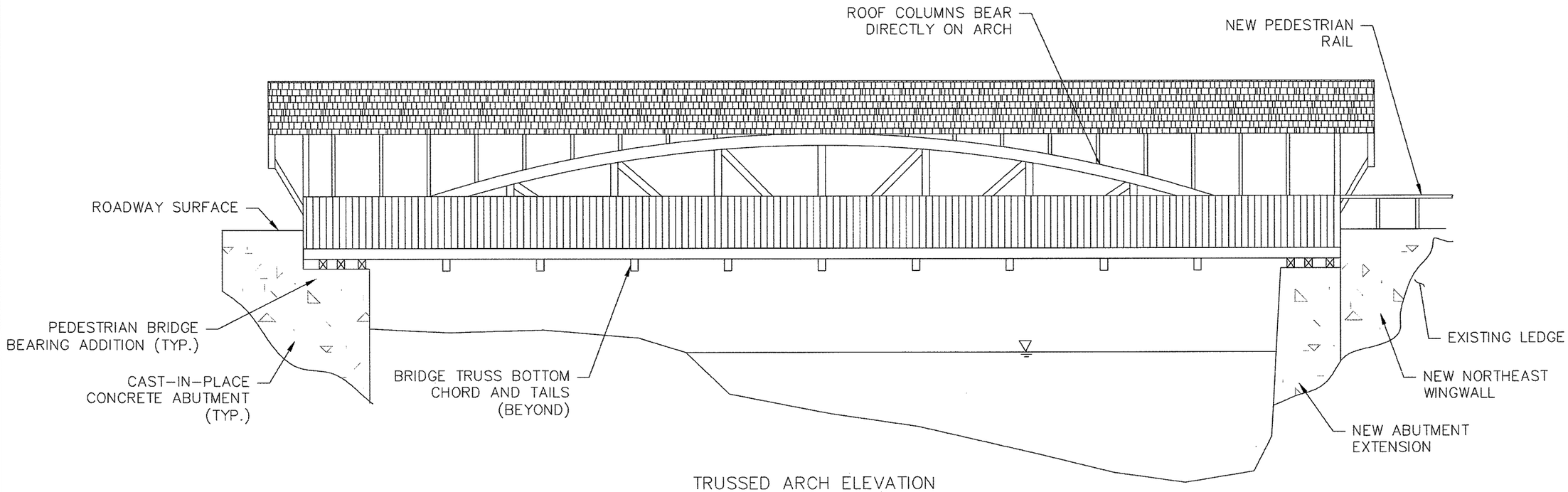
DRAWING NO: 3

SHEET 3 OF 04

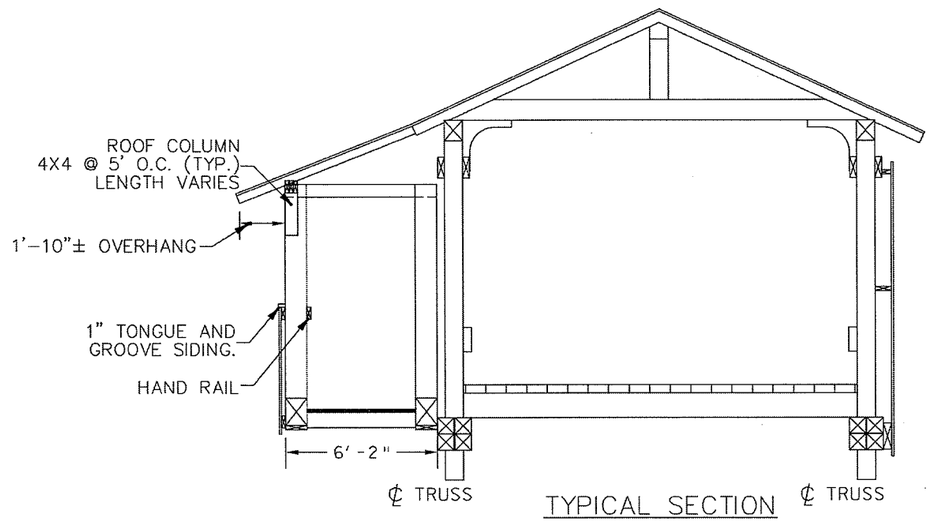
NOT FOR CONSTRUCTION - PRELIMINARY PLANS

I:\620922s_Waitsfield Covered Bridge\Pedestrian Sidewalk\Steel Truss.dwg Jun. 02, 2011

Steel truss pedestrian bridges



TRUSSED ARCH ELEVATION
(LOOKING WEST)



TYPICAL SECTION

ENGINEER

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TOWN OF WATSFIELD, VT
VILLAGE BRIDGE REHABILITATION
TRUSSED ARCH PEDESTRIAN BRIDGE

PROJECT NO.	DESIGNED BY.
620922	RHD
	DRAWN BY. MAB
DATE: MAY, 2011	CHECKED BY: RHD

DRAWING NO: 2

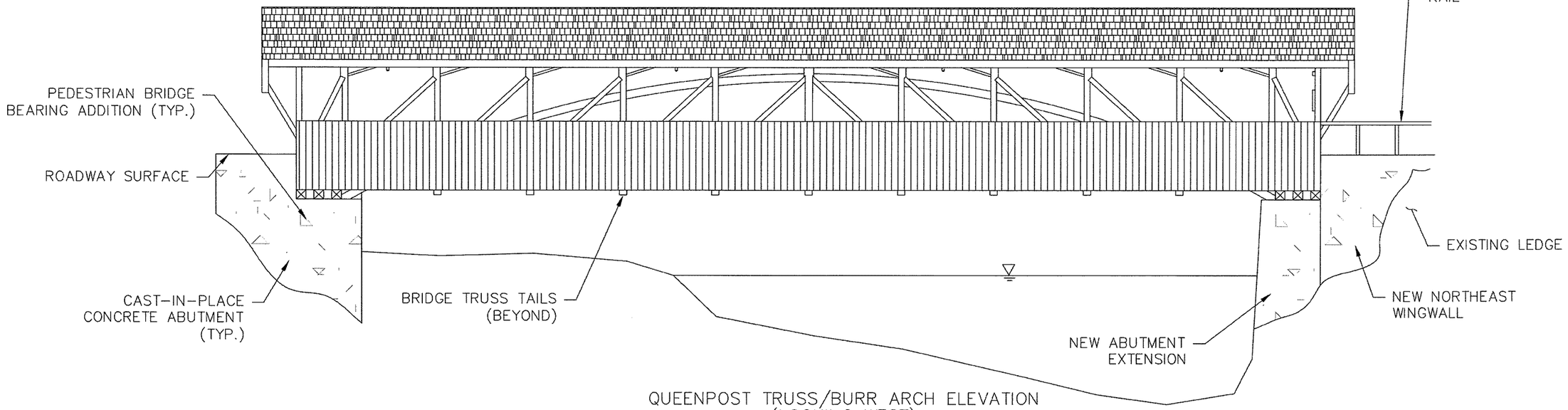
SHEET 2 OF 04

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

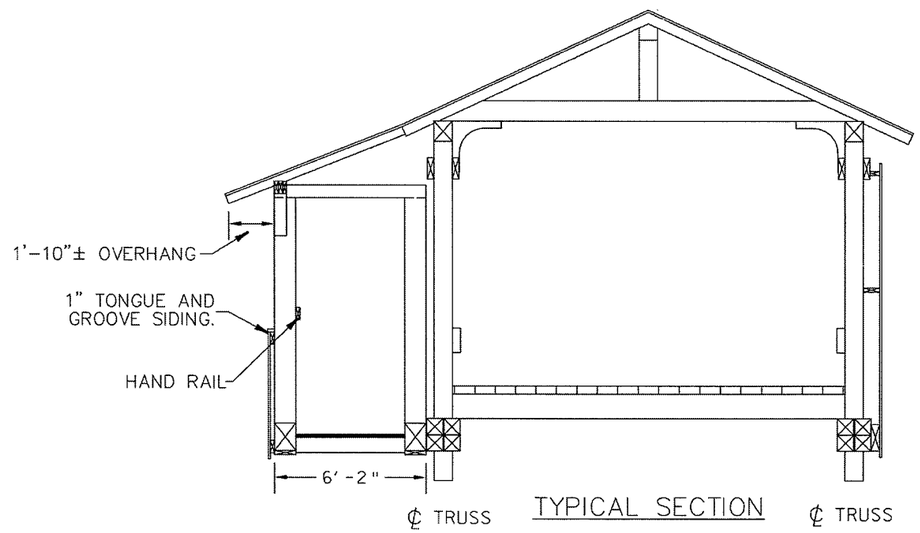
I:\620922x_Watsfield Covered Bridge\Pedestrian Sidewalk\Steel Truss.dwg Jun. 02, 2011

Wooden Trussed Arch Pedestrian Bridge

Covered Bridge with Wooden Trussed Arch



QUEENPOST TRUSS/BURR ARCH ELEVATION
(LOOKING WEST)



TYPICAL SECTION

ENGINEER

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TOWN OF WAITSFIELD, VT

VILLAGE BRIDGE REHABILITATION

QUEENPOST TRUSS/BURR ARCH

PROJECT NO.	DESIGNED BY:
620922	RHD
	DRAWN BY: MAB
DATE: MAY, 2011	CHECKED BY: RHD

DRAWING NO:
4

SHEET 4 OF 04

NOT FOR CONSTRUCTION - PRELIMINARY PLANS

I:\620922x_Waitsfield Covered Bridge\Pedestrian Sidewalk\Steel Truss.dwg Jun. 02, 2011

APPENDIX D

INSPECTION REPORTS

From: Thurber, Pam
To: Valerie Capels;
Subject: RE: Waitsfield Covered Bridge Information
Date: Friday, July 20, 2007 9:32:05 AM

Valerie,

Here are the bridge inspectors' comments in regard to Big Eddy (I believe that to be the local name for the covered bridge).

The bridge is in quite good condition overall. Consider repairs to:

- Members have been omitted along the truss bracing system over the years mainly due to collision damage. The original 4X4 cross bracing had mitered ends which were (cut) nailed to the tie beams, then crossed at mid panel and nailed to the top chords. One brace remains of the original detail in tie beam bay #8. Retro-fit cross bracing was added later, but has been omitted in each of the end three bays as well as bay five. Installing additional bracing to re-place the missing should be considered.

- Abutment #2 (west) could use concrete repair to correct areas of heavy scaling, particularly along the upstream end.

- The deteriorated stone retaining (wing) below the northwestern sidewalk ramp needs improvement. Slow deterioration of this wall has caused a chronic erosion/settlement issue. This wall is not readily seen and could be replaced with concrete off the ledge outcrop and could in part help support the sidewalk ramp itself.

Nothing really substantial or structural other than the bracing which, even missing, is not a significant concern, but again considerations.

These last two are, in the inspectors' view, in just for kicks; with little chance of action:

- Remove the added sidewalk in its entirety and add curbing inside the bridge for pedestrian traffic as our latest design standards.

- Return the arch ribs back to the original Burr style. The "cutting short" of the arch ribs at the bottom chord was an unfortunate alteration.

Hope you find this information helpful.

Respectfully, Pam

-----Original Message-----
From: Valerie Capels [mailto:townadmin@madriver.com]
Sent: Wednesday, July 18, 2007 3:46 PM
To: Thurber, Pam
Subject: RE: Waitsfield Covered Bridge Information

Thank you, Pam. We have the bridge inspection reports of various years, but I suspect I need more substantive information to develop a scope of work and estimated budget for the work the Covered Bridge needs. I am also planning to contact Jan Lewandowski, who has worked on this bridge in the past, for his thoughts.

Thank you VERY much for your help.

--Valerie

Valerie Capels
Waitsfield Town Administrator
9 Bridge Street
Waitsfield, VT 05673
P: (802) 496-2218
F: (802) 496-9284
E: townadmin@madriver.com
W: www.waitsfieldvt.us

From: Thurber, Pam [mailto:Pam.Thurber@state.vt.us]
Sent: Wednesday, July 18, 2007 3:37 PM
To: townadmin@madriver.com
Subject: Waitsfield Covered Bridge Information

Hi Valerie,
I received your voice message and wanted to test out the email address. I hope to have something for you by Friday afternoon / Monday morning timeframe regarding specific work that the bridge needs. I have spoken with the bridge inspector most familiar with the bridge and requests that he provide a general list of needs ranging for

approach to actual truss needs.
Respectfully, Pam

"Life is not about what happens to us. It is about what happens between us." - M. Beck

Pamela Maza Thurber, P.E.
Bridge Management and Inspection Engineer
Program Development - Structures Section
One National Life Building - Drawer 33
Montpelier, VT 05633-5001

telephone number: (802) 828-0041
fax number: (802) 828-3566
email address: pam.thurber@state.vt.us

Joy, Matt

From: Joy, Matt
Sent: Thursday, July 19, 2007 4:15 PM
To: Thurber, Pam
Subject: RE: Waitsfield CB Needs?

Pam,

Martin and I stopped by Big Eddy this afternoon. The bridge is in quite good condition overall. Consider repairs to:

- Members have been omitted along the truss bracing system over the years mainly due to collision damage. The original 4X4 cross bracing had mitered ends which were (cut) nailed to the tie beams, then crossed at mid panel and nailed to the top chords. One brace remains of the original detail in tie beam bay #8. Retro-fit cross bracing was added later, but has been omitted in each of the end three bays as well as bay five. Installing additional bracing to re-place the missing should be considered.
- Abutment #2 (west) could use concrete repair to correct areas of heavy scaling, particularly along the upstream end.
- The deteriorated stone retaining (wing) below the northwestern sidewalk ramp needs improvement. Slow deterioration of this wall has caused a chronic erosion/settlement issue. This wall is not readily seen and could be replaced with concrete off the ledge outcrop and could in part help support the sidewalk ramp itself.

Nothing really substantial or structural other than the bracing which even missing is not a significant concern, but again considerations. My summary from 2004 and 2006 outlines these issues.

I'm throwing these last two in just for kicks; albeit with little chance of action:

Remove the added sidewalk in its entirety and add curbing inside the bridge for pedestrian traffic as our latest design standards.

Return the arch ribs back to the original Burr style. The "cutting short" of the arch ribs at the bottom chord was an unfortunate alteration.

I hope this helps.

Matt

-----Original Message-----
From: Thurber, Pam
Sent: Wednesday, July 18, 2007 3:19 PM
To: Joy, Matt
Subject: Waitsfield CB Needs?
Importance: High

Matt,
The Town of Waitsfield is looking to prepare an enhancement grant for the covered bridge in town. You are certainly the most knowledgeable about the bridge and its needs so would you please provide me with a detailed list of needs which would bring the bridge back into an acceptable condition. Here is the catch – this information is needed ASAP.
Thanks for all your help, advice, and guidance. ~Pam

"Life is not about what happens to us. It is about what happens between us." - M. Beck

On March 24th, 2008 Dwayne Somers and Ryan Foster looked at the following bridges and made the following observations:

- Waitsfield, C2001, Bridge #4 over The Mad River
  - Abutment 1 is posted for 3 tons. Abutment 2 is posted for 6000 pounds at the beginning of the road.
  - The bridge is posted for a vertical clearance of 9'6" at both ends of the bridge. However, item 10 was measured at 10'9"; therefore the vertical clearance signs could be replaced with signs that read 10'6". — not needed
  - Item 53 was measured at 9'9".

- Stowe, C3052, Bridge #49 over Gold Brook
  - Abutment 2 is posted for 4 tons. An additional sign needs to be added for abutment 1.
  - Both ends are posted for 8'4" clearance. This is acceptable.
  - Item 53 was measured at 7'11".

- Cambridge, C3031, Bridge #30 over Brewster River
  - Both abutments are posted for 10,000 pounds.
  - Both ends are posted for 9'9" which is the correct value as item 10 was measured at 10'0".
  - Item 53 was measured at 9'1"

SUBSTRUCTURE -

Backwall
Bridge Seat
Stem
Wing
Cap
Shaft
Column
Footing
Piles
Undermining
Settlement

CHANNEL -

Alignment
Scour
Erosion
Debris
Protection

GENERAL DATA:

REMARKS:

Does the bridge have a F.C. component? -	Yes (No) circled	
he bridge posted for loading? -	(Yes) circled No	3 tons, no trucks, buses, or RVs
Is the bridge posted for width restriction? -	(Yes) circled No	One lane bridge
Is the bridge posted for clearance restriction? -	(Yes) circled No	9'-6" caution signs

Measured VERTICAL clearances - LFT. SHOULDER ________ *CENTERLINE* 10'-1" *RT. SHOULDER* ________ *OVERALL LOW* ________

SKETCH

INSPECTORS CONDITION RATINGS:

DECK	7
SUPERSTRUCTURE	6
SUBSTRUCTURE	6
CHANNEL	8
APPROACH	4
PAINT	4

Summary: Recent collision damage [illegible] [illegible]

No significant change since last insp.
Refer to the 2004 insp. report for more info. - Note: [illegible] - consider adding [illegible] [illegible] [illegible] in all but end bays in the [illegible]

PROBLEM AREAS ★ CRITICAL AREAS ★★

ITEM	CONDITION RATING	REMARKS
# 60 SUBSTRUCTURE:		
1. Abutments -		
Backwall		
Curtainwall		
Cheekwall		
Wingwall		
Pedestals		
★ Bridge Seat		
★ Stem		
Footings		
Undermining		
Settlement		
2. Piers -		
Pedestals		
Bridge seat		
Cap		
Shaft		
Columns		
Piles		
Footings		
Undermining		
Settlement		
Debris		
		SUBSTRUCTURE RATING:
#61 CHANNEL:		
Alignment		
Scour		
Erosion		
Debris		
Vegetation		
Protection		
Recent Change		
		CHANNEL RATING:
#71 WATERWAY ADEQUACY:		
Hydraulic opening		
Freeboard		
Overtopping chance		
		WATERWAY ADEQUACY RATING:

- Posted Vertical Clearance
- Actual Measured Vertical Clearance Lt. CL Rt.
  Lt. CL Rt.

Posting @ Abut.#1
Posting @ Abut.#2

Summary:

VTRANS

BRIDGE INSPECTION FORM

ROUTE C2 TH 1 **BRIDGE#** 4 **INSPECTORS** [illegible]

TOWN Waitsfield **CROSSING** Mad River

BR TYPE Was a Queen post style now multi King w/ tie rod.

BR. CHECK LIST: ***Problem Areas **** ***Critical Areas *****

GENERAL COMMENTS:

APPROACH -

Alignment
Rail
Settlement
Erosion

DECK -

Wearing Surface
Curbs
Sidewalk
Fascia
Rail System
Exp. Joint
Drains
Soffit

SUPERSTRUCTURE -

Girders
Beams
Truss
Arch
Floorsystem
Cover Plates
Bearings
Paint
Impact Damage
Alignment

Recent support repairs [illegible] construction, tie beams 1, 2, 11, 12 & 13 replaced w/ new "ship knees". 5 King posts off corresponding [illegible] ties. Replaced King braces off tie [illegible]

Note: only one original [illegible] brace member remains, which is in the panel # 8. The brace was nailed up and [illegible] off the top chord. [illegible] (upstream) [illegible] originally all [illegible] end [illegible]

Spring Insp.

STATE OF VERMONT - VTRANS
BRIDGE INSPECTION

DATE 8/25/2005

ROUTE ______ BR. NO. 4 CROSSING Mad River
TOWN Waitsfield DISTRICT 6 BR. TYPE-- Multiple King post w/
T.H. NAME Bridge ST. INSP. BY [illegible] BR. NAME Big Eddy [illegible] arch (orig. [illegible])

PROBLEM AREAS ★ CRITICAL AREAS ★★

ITEM	CONDITION RATING	REMARKS
#72 APPROACH:		
1. Alignment		
2. Pavement		
3. Rail		
4. Relief Joints		
5. Settlement		
6. Erosion		
7. Signing		STOP COND., No Trucks, Buses or RVs ONE LANE BRIDGE
APPROACH RATING:		
#58 DECK:		
1. Wearing surface		oak deck - Good condition.
2. Fascia		
3. Curbs		
4. Sidewalk		
5. Rail		
6. Exp. Joint		
7.Joint Leakage		
8. Drains		
DECK RATING:		
# 59 SUPERSTRUCTURE:		
1. W - Beams		
2. I - Beams		
3. Weld Girders		
4. Riveted Girders		
5. Floor Beams		
6. Stringers		
7. Bearings		
8. Diaphragms		
9. Trusses - General		
Posts		- lower [illegible] of 2nd post from S. [illegible] end broken @ bot. chord conn. - obvious bending of post [illegible]
Braces		
Top Chord		
Bottom Chord		- soft rot - minimal decay - augmented bot. chords w/ spruce planks & oak pins + post lapped scarf splice damage)
Portals		
Roof		
Siding		
10. Arch		
11. Slab		
12. Paint		~ 3" ~ 1" [illegible]
13. Collision Damage		
14. Member alignment		ok - some pos. camber
SUPERSTRUCTURE RATING:	6	

[illegible] [illegible] [illegible] bearing areas.
~ [illegible] [illegible] [illegible] only South [illegible]

STRUCTURAL INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for WAITSFIELD | *bridge no.: 00004* | *District: 6*

Located on: C2001 *over MAD RIVER* | *approximately 0.08 MI TO JCT W VT100* | *Owner: 03 TOWN-OWNED*

CONDITION

Deck Rating: 7 GOOD

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 101216000412161

Federal Sufficiency Rating: 9

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1833 Year Reconstructed: 1973

Service On: 5 HIGHWAY-PEDESTRIAN

Service Under: 5 WATERWAY

Lanes On the Structure: 01

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 05

ADT: 001900 % Truck ADT: 03

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0099

Structure Length (ft): 000111

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 4.3

Bridge Rdwy Width Curb-to-Curb (ft): 14.7

Deck Width Out-to-Out (ft): 14.7

Appr. Roadway Width (ft): 030

Skew: 00

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 09 FT 09 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: MULTI KG PST/ARCH CB

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

Kind of Material and/or Design: 7 TIMBER

Deck Structure Type: 8 TIMBER

Type of Wearing Surface: 7 WOOD OR TIMBER

Type of Membrane: 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 2 INTOLERABLE, REPLACEMENT NEEDED

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: 4 MEETS MINIMUM TOLERABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESING VEHICLE, RATING, and POSTING

Rating Method (Inv): 5 NO RATING ANALYSIS PERFORMED

Rating (Inv): 2 HS LOADING 03 Tons

Rating Method (Oper): 5 NO RATING ANALYSIS PERFORMED

Rating (Oper): 2 HS LOADING 03 Tons

Bridge Posting: 4 POSTING REQUIRED

Posting Status: P POSTED FOR LOAD

Design Load: 1 H 10

INSPECTION and CROSS REFERENCE

Cross Ref. Route:

Insp. Date: 092006 *Insp. Freq. (months) 24* *Cross Ref. BrNum:*

INSPECTION SUMMARY and NEEDS

05/17/2004 - The "Big Eddy" bridge is in fair to good condition. Approach surface and back wall needs repair at abutment #2 (north). Most of the deterioration in this area is due to the chronic erosion occurring below the sidewalk as the laid up stone retaining wall fails. Construction of a new retaining wall should be considered. Also, some shimming is needed at the entrance to the walkway at abutment #1, to alleviate displacement from settlement. The abutment #2 facing and bridge seat could use concrete repair to correct areas of heavy abrasion. An A.O.T. staging inspection along the floor system will be performed in the next 1 to 2 years.

09/13/2006 -The bridge is in fairly good condition. Recent repairs have been made to correct over height vehicle impact damage. The portals have been reconstructed. Tie beams 1, 2,11,12 and 13 have been replaced along with 6 new "ship knees". Roughly 75% of the original cross bracing has been omitted over the years. Consider adding complete cross brace system in all but the end bays (one original brace example remains in bay 8). Refer to the 2004 report for more information and recommendations.

APPENDIX E

COST ESTIMATES

DuBois & King inc.

☐ Randolph, VT 05060 (802) 728-3376
☐ Bedford, NH 03110 (603) 637-1043
☐ Williston, VT 05495 (802) 878-7661

Engineering • Planning • Development • Management

JOB Waitsfield, VT Village Bridge

SHEET NO. 1 OF 1

CALCULATED BY: MAB/JDG DATE: 23-Dec-10

CHECKED BY: EPD DATE: 01-Aug-11

SCALE:

ENGINEERS ESTIMATE OF PROBABLE COST (ALL REPAIRS)

ITEM NO.	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
203.16	Rock Excavation	CY	4.0	$400.00	$1,600.00
204.25	Structure Excavation	CY	12.0	$125.00	$1,500.00
502.10	Shoring Superstructure	LS	1.0	$70,000.00	$70,000.00
507.15	Reinforcing Steel	LB	1600.0	$1.20	$1,920.00
507.16	Drilling and Grouting Dowels	LF	36.0	$22.00	$792.00
514.10	Water Repellant	GAL	20.0	$75.00	$1,500.00
522.20	Structural Timber and Lumber - Untreated (Roof)	LS	1.0	$1,200.00	$1,200.00
522.20	Structural Timber and Lumber - Untreated (Deck)	LS	1.0	$30,000.00	$30,000.00
522.20	Structural Timber and Lumber - Untreated (Floorbeams)	EA	5.0	$3,000.00	$15,000.00
522.20	Structural Timber and Lumber - Untreated (Lateral Bracing)	LS	1.0	$30,000.00	$30,000.00
524.21	Joint Sealer	LF	45.0	$21.00	$945.00
529.20	Partial Removal of Bridge Structure	LS	1.0	$12,000.00	$12,000.00
541.25	Concrete, Class B	CY	32.0	$650.00	$20,800.00
580.10	Repair of Concrete Substructure Surface Class I	SY	50.0	$400.00	$20,000.00
580.11	Repair of Concrete Substructure Surface Class II	SY	20.0	$600.00	$12,000.00
580.18	Overhead and Vertical Concrete Repair material	CF	80.0	$200.00	$16,000.00
621.18	Steel Backed Timber Guardrail	LF	140.0	$127.00	$17,780.00
621.75	Remove Guardrail	LF	10.0	$10.00	$100.00
631.10	Field Office, Engineers	LS	1.0	$8,000.00	$8,000.00
635.10	Mobilization	LS	1.0	$40,000.00	$40,000.00
641.10	Traffic Control	LS	1.0	$10,000.00	$10,000.00
649.51	Geotextile for Silt Fence	SY	15.0	$6.00	$90.00
660.10	Timber Painting, Environmental protection	LS	1.0	$7,000.00	$7,000.00
660.20	Timber Painting, Fire Retardant	LS	1.0	$20,000.00	$20,000.00
660.30	Timber Painting, Insecticide/Fungicide	LS	1.0	$2,500.00	$2,500.00
675.20	Traffic Signs, Type A	SF	24.0	$12.25	$294.00
675.341	Square Tube Sign Post and Anchor	LF	90.0	$9.00	$810.00
675.50	Removing Signs	EA	12.0	$21.50	$258.00
675.60	Erecting Salvaged Signs	EA	10.0	$28.25	$282.50
900.620	Wood Epoxy Repairs	EA	20.0	$200.00	$4,000.00
900.645	Repairs or Replacements as Needed	LS	1.0	$20,000.00	$20,000.00
900.645	Pre-Fabricated Sidewalk and components	LS	1.0	$117,000.00	$117,000.00
TOTAL					**$483,371.50**

Use for Preliminary Estimate **$485,000.00**

Note: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the work will not vary from the Opinion of Probable Construction Cost provided herein.

DuBois & King inc.
Randolph, VT 05060 (802) 728-3376
Bedford, NH 03110 (603) 883-0463
Williston, VT 05495 (802) 878-7661
Engineering • Planning • Development • Management

JOB Waitsfield STP EH 08(6)
SHEET NO. 1 OF 1
CALCULATED BY: MAB DATE: 03-May-11
CHECKED BY: RHD/EPD DATE: 04-May-11
SCALE:

ENGINEERS ESTIMATE OF PROBABLE COST - Glulam Stringers

	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
	Pre-fabricated Glulam Bridge - delivered to site	LS	1.00	$92,300.00	$92,300.00
	Contractor mark-up (12%)	LS	1.00	$11,075.00	$11,075.00
	Crane Rental	Day	3.00	$1,800.00	$5,400.00
	Carpentry Crew (siding/assembly)	Day	5.00	$1,500.00	$7,500.00
	Timber Siding (untreated)	SF	2400.00	$8.00	$19,200.00
	Demolish and Repair Roof Ends (for crane access)	LS	1.00	$1,500.00	$1,500.00
	Miscellaneous Lumber (framing/roof posts)	MFBM	0.30	$7,200.00	$2,160.00
TOTAL					**$139,135.00**

Preliminary Estimate

Note: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the work will not vary from the Opinion of Probable Construction Cost provided herein.

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JOB Waitsfield STP EH 08(6)
SHEET NO. 1 OF 1
CALCULATED BY: MAB DATE: 03-May-11
CHECKED BY: RHD/EPD DATE: 04-May-11
SCALE:

ENGINEERS ESTIMATE OF PROBABLE COST - Steel Truss Bridge

	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
	Pre-fabricated Steel Truss Bridge (weathering steel) - delivered to site	LS	1.00	$70,300.00	$70,300.00
	Contractor mark-up (12%)	LS	1.00	$8,435.00	$8,435.00
	Crane Rental	Day	3.00	$1,800.00	$5,400.00
	Carpentry Crew (siding/framing/railing)	Day	3.00	$1,800.00	$5,400.00
	Steel Crew/Erection	Day	3.00	$2,200.00	$6,600.00
	Timber Siding (untreated)	SF	2100.00	$8.00	$16,800.00
	Demolish and Repair Roof Ends (for crane access)	LS	1.00	$1,500.00	$1,500.00
	Miscellaneous Lumber (framing/railing/roof posts)	MFBM	0.30	$7,200.00	$2,160.00
TOTAL					**$116,595.00**

Preliminary Estimate

Note: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the work will not vary from the Opinion of Probable Construction Cost provided herein.

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☐ Williston, VT 05495 (802) 878-7661
Engineering • Planning • Development • Management

JOB Waitsfield STP EH 08(6)
SHEET NO. 1 OF 1
CALCULATED BY: MAB DATE: 03-May-11
CHECKED BY: RHD/EPD DATE: 04-May-11
SCALE:

ENGINEERS ESTIMATE OF PROBABLE COST - Trussed Arch Bridge

	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
	Pre-Fabricated Trussed Arch Bridge - delivered to site	LS	1.00	$90,000.00	$90,000.00
	Contractor mark-up (12%)	LS	1.00	$10,800.00	$10,800.00
	Crane Rental	Day	3.00	$1,800.00	$5,400.00
	Carpentry Crew (erection/framing/siding)	Day	5.00	$1,500.00	$7,500.00
	Timber Siding (untreated)	SF	630.00	$8.00	$5,040.00
	Demolish and Repair Roof Ends (for crane access)	LS	1.00	$1,500.00	$1,500.00
	Miscellaneous Lumber (framing/roof posts)	MFBFM	0.30	$7,200.00	$2,160.00
TOTAL					**$122,400.00**

Preliminary Estimate

Note: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the work will not vary from the Opinion of Probable Construction Cost provided herein.

DuBois & King inc.

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Engineering • Planning • Development • Management

JOB Waitsfield STP EH 08(6)

SHEET NO. 1 OF 1

CALCULATED BY: MAB DATE: 03-May-11

CHECKED BY: RHD/EPD DATE: 04-May-11

SCALE:

ENGINEERS ESTIMATE OF PROBABLE COST - Kingpost/Burr Arch Truss

	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
	Trusses (Assembled on Site)	Truss	2.00	$55,000.00	$110,000.00
	Floor Framing / Decking	LS	1.00	$25,000.00	$25,000.00
	Crane Rental	Day	3.00	$1,800.00	$5,400.00
	Carpentry Crew (erection / framing / siding)	Day	20.00	$1,500.00	$30,000.00
	Timber Siding (materials)	SF	630.00	$8.00	$5,040.00
	Demolish and Repair Roof Ends (Crane Access)	LS	1.00	$1,500.00	$1,500.00
	Engineering Design/CADD	LS	1.00	$8,000.00	$8,000.00
TOTAL					**$184,940.00**

Preliminary Estimate

Note: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the work will not vary from the Opinion of Probable Construction Cost provided herein.

APPENDIX F

PUBLIC MEETING INFORMATION

28 North Main Street
Randolph, VT 05060
Phone (802) 728-3376 x1456
Fax (802) 728-4930
edetrick@dubois-king.com

Evan P. Detrick
Transportation Department Manager
Transportation Division

ENGINEERING • PLANNING
MANAGEMENT • DEVELOPMENT

MEMORANDUM
(620922)

TO: Historic Covered Bridge Preservation Committee Attendees

RE: Historic Covered Bridge Preservation Committee
Waitsfield Village Covered Bridge
STP EH 08(6)
Meeting Minutes

DATE: June 9, 2011

The Vermont Historic Covered Bridge Preservation Committee met on June 9th, 2011 at VTrans' offices to discuss the referenced project. A list of attendees and a copy of the PowerPoint presentation is attached to this memo. The following was discussed at the meeting:

Evan Detrick updated the Committee regarding activities/progress since the last Committee meeting on April 1st, 2011. Since the April meeting, D&K has:

- Developed 4 alternatives for a self-supporting sidewalk
- Met with VTrans' Structures Engineers to discuss the alternatives, costs, and priorities
- Met with the Waitsfield Selectboard to provide an update, and discuss the alternatives

Evan Detrick presented the 4 alternatives using a PowerPoint presentation, and the Committee discussed numerous issues. The 4 alternatives are:

- Pre-fabricated glulam beams
- Pre-fabricated glulam trussed arch
- Pre-fabricated steel truss
- Sawn lumber queen post truss and Burr arch

The width of the sidewalk was discussed. The existing sidewalk is approximately 4'-2" rail-to-rail, and a question was raised: Would a width of 5"-0" be required for a new

sidewalk to be in compliance with ADA? It was generally thought that 4'-0" minimum would be acceptable, but D&K will discuss with VTrans' Bike and Pedestrian Coordinator, Jon Kaplan.

Because the new sidewalk will be self supporting and separate from the vehicular bridge, yet share a roof, the flexibility of the roof for differential movement was raised as a concern by Mike Hedges. The general consensus was that the vehicular bridge deflects very little during live loading, and that the roof system is flexible enough that any minor differential deflections will not be an issue.

Former Waitsfield resident Mary Alice Bisbee voiced her concern that the current sidewalk roof was changed in the 1970's when the sidewalk was reconstructed, and the roof is not historically accurate. She asked if the sidewalk roof could be rebuilt to its original (~1940) configuration as a separate roof. The Committee concluded that the change would not be necessary for the Section 106 clearance, and that it would be up to the Town to decide if they wanted to change it back. Concerns such as roof overhang, roof headroom clearance, rain and snow getting into the vehicular bridge, and additional costs were raised and need to be considered. This issue will be taken up with the Town Selectboard.

There was much discussion about materials and visual impact of the new sidewalk bridge. Scott Newman had concerns that a new trussed arch or the sawn lumber arch/truss structures would detract from historic context of the original bridge. He noted you don't want to confuse the actual historic elements with replicated historic elements, and you don't want to visually distract from the actual historic elements.

Charlie Hosford expressed his desire to have a custom made wood structure, and does not prefer the pre-fabricated laminate products, or steel.

Mike Hedges expressed his concern about a steel truss being hidden under wainscoting, and noted that it should be accessible and galvanized or painted.

Eric Gilbertson prefers the glulam beams, because they won't detract from the actual historic truss.

Scott Newman confirmed Eric's assertion that a new trussed arch or the sawn lumber arch/truss structure will not meet the Secretary of the Interior Standards.

Bob Durfee stated that steel is best option for longevity and John Weaver agreed. Charlie Hosford disagreed, and stated that he thought timber is the best option for longevity (as evidenced by the long standing timber bridge).

John Weaver stated that he thought the arch option would accentuate the existing sag of the main trusses.

The discussion of sidewalk alternatives concluded with Scott Newman stating that either the steel truss or glulam beam options would be acceptable in order to issue a Section 106 clearance, but that the trussed arch and the arch/truss structures would not be acceptable.

Charlie Hosford asked for a letter from Scott Newman stating his position so that his thoughts/conclusions could be shared with the Waitsfield Selectboard. Scott agreed to send a summary.

Evan Detrick stated the existing abutments are comprised of both field stones and concrete. Evan asked if the new abutment extensions could be made of concrete. A consensus was reached that the abutment extensions could be concrete.

Charlie Hosford expressed his concern that the existing vehicular bridge floor planks are badly worn and should be replaced, even if only the planks along the vehicle tracks can be afforded. He also expressed his concern about the need to replace any existing floor beams that are rotted or broken.

Evan Detrick discussed options for Add Alternatives. Including Add Alternatives in the final bid documents for items that may include timber and concrete repairs will be acceptable in order to fully utilize the available funding.

The conclusion of the meeting was that the project can advance with a separated sidewalk using either a steel truss or glulam beam system for support. No further meetings with the Committee will be required for this project, unless additional work is proposed in the future.

Historic Covered Bridge Committee Meeting
April 1, 2011

Waitsfield Village (Big Eddy) Covered Bridge

Attendance: VTRANS: J.B. McCarthy, Mike Hedges, Wayne Symonds, Scott Newman, Kaitlin O'Shea, Kevin Russell (project manager), Pam Thurber, and Bob McCullough (Historic Bridge Program); Vermont Division for Historic Preservation: Nancy Boone; DuBois & King, Inc., Consulting Engineers: Evan Detrick, Bob Durfee, Ryan Barnes; Preservation Trust of Vermont: Eric Gilbertson; Town of Waitsfield: Charlie Hosford, Valerie Capels; Vermont Covered Bridge Society: Joe Nelson and John Weaver.

Introduction: J.B. McCarthy and Kevin Russell introduced the Historic Covered Bridge Committee to town representatives and the consulting engineers.

Summary of Structural and Other Concerns. Evan Detrick summarized the project as it as developed following the town's hiring of Dubois and King. Initially, the cantilevered sidewalk, deteriorating abutments, and lack of support at the bridge approach were the principal points of concern. At a meeting with the town, various other concerns surfaced, including whether the wood-shingle roof should be replaced because it doesn't shed snow well and thus adds weight to the bridge; whether the approach railings are adequate; whether structural components have deteriorated; concern about trucks hitting the bridge portals and rafters; and the confusing clutter of signs at the bridge entrances.

Bob Durfee then summarized the results of his field inspection, which uncovered additional problems. In general, the roof is in good condition as are roof rafters, with only 6 of 40-50 broken. The siding is in fair condition, both upstream and downstream, requiring replacement of approximately 5-10% of total area. The truss systems are facing serious structural problems. The downstream truss has 3 5/8 inch negative camber and the upstream truss has 1 5/8 inch negative camber. Compression blocks areas show deterioration, and additional rot may become apparent after work begins.

Deck planks have worn severely and require replacement, but the floor beams are generally in good condition. Only five or six beams will require replacement. The sidewalk floor beams are in fair-to-good condition, revealing some corrosion through the bolt holes.

Concrete abutments are in fair-to-poor condition. The northerly abutment is especially poor with a large scour hole and severe spalling at the bearing seat. The surviving stone on that abutment requires repointing.

The clutter of signs makes it difficult for drivers to see the weight and height restrictions, putting the bridge at risk.

On the north side approach, the deck plank pedestrian approach is in very poor condition and is unsafe. A simple solution is to extend the north abutment and eliminate that approach.

Rails at the outside edge of the sidewalk are substandard for a sidewalkand should be replaced. Roof trusses reveal various modifications to the lateral bracing, which should be corrected.

Overall estimated cost for all repairs is $340,000, which exceeds the grant of $240,000. Dubois and King thus recommends addressing concerns in order of priority: (1) truss rehabilitation; (2)

construction of a sidewalk support beam to remove the weight of the cantilever on the downstream truss, also extending the wing wall on the abutment to eliminate the pedestrian approach; (3) repair abutments and wing walls; (4) replace deteriorated structural components; (5) clarify warning signage; and (6) add a fire retardant.

Committee members expressed reservations about the cost estimates, suggesting that actual costs would be much greater for the work identified, specifically reversing the negative camber in the trusses, which would require jacking the bridge and require some disassembly.

Town officials also expressed priorities, including: repairs to abutments; repairs to the wearing surface of the deck; floor beams; and roof rafters. The town is also concerned about keeping a sidewalk as part of the bridge, but doing so without changing the bridge's visual appearance.

Discussion of Sidewalk. Discussion among committee members then focused on the design of the beam required to support the sidewalk, which was probably constructed in 1940 but then rebuilt in 1973 with pressure-treated floor beams. Two alternatives, steel and truss, were considered, and Bob Durfee provided sketches to illustrate the various advantages and disadvantages of the two alternatives.

Committee members voiced concerns about the visual impact of steel, whether a rolled beam or truss, and Wayne Symonds suggested that a better alternative would be to separate the two structures, sidewalk and bridge, and to construct a sidewalk using glu-laminated panels. That solution would address the overloading of the downstream truss more directly, giving the town a chance to confront that problem separately as funding and opportunity permit. Discussion about the various methods for designing such a sidewalk followed. Scott Newman indicated that a design separating sidewalk and bridge would avoid any regulatory concerns under Section 106 or Section 4(f), and representatives from the Vermont Covered Bridge Society agreed that this solution would be preferable.

Conclusion. Dubois and King will investigate various alternatives for designing a separate sidewalk system, including glu-laminated panels, truss systems, and possibly arches. The goal is to integrate the independent structural system and avoid altering the bridge profile. Cost estimates and will be provided and field samples studied. Drawings of the various alternatives will be provided, including the design for extending the abutment and wing wall to eliminate the pedestrian approach span.

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Project Manager
Transportation Division

ENGINEERING • PLANNING
MANAGEMENT • DEVELOPMENT

MEMORANDUM
(620922)

TO: File

RE: Town of Waitsfield
Waitsfield Village Covered Bridge Project
Local Concerns Meeting

CC: Kevin Russell, VTrans

DATE: September 21, 2010

Evan Detrick of DuBois & King, Inc. attended the Waitsfield Town Select Board Meeting on September 20, 2010 at the Waitsfield Town Hall. The purpose for the meeting was to discuss the Waitsfield Village Covered Bridge Project, and for solicitation of public comment about the project. Also in attendance were the Town Administrator Valerie Capels, the Select Board, and members of the general public. The Select Board meeting began at 7:00 p.m. The following are notes from the meeting:

- Kate Williams (Select Board Chair) and Valerie Capels gave a short overview of the project and the reasons for the meeting, which were to:
  - Provide background information
  - Describe the Project Development Process
  - Solicit input from the public and Select Board

- Evan explained the project development process including the Project Definition, Design, and Construction phases. Evan stated that DuBois & King has been hired to develop the design, and that VTrans will be providing oversight of the project development. After the project moves through the Project Definition and Design phases, it will be advertised for bid, and then ultimately constructed. The plan is to complete the Project Definition and Design phases, so that construction can take place towards the end of the 2011 season.

- Evan described the improvements that will be considered, which include:
  - Strengthening the sidewalk, or alternately relocating it within the original bridge
  - Repairing or replacing other structural members

- Repairing or replacing the existing wooden deck planks and bolts
- Repairing the cracking and spalling abutments
- Repairing the scour hole on the face of the west abutment
- Replacing or keeping the existing cedar shingle roof
- Repainting or stripping the painted bridge facades
- How to alleviate ongoing vehicular damage to the interior of the bridge
- Traffic detour scheme, and estimated time for construction

Evan stated that the foregoing issues will be addressed with the development of the initial Study to define the alternatives. However, the Town would like hear all comments about the bridge that the public may have. With that, Evan opened the floor for public discussion of the project.

Comments from the public were as follows (for purposes of orientation, the bridge is considered to run in a north/south direction, with the downstream face on the east side of the bridge):

Ms. Goodwin lives at the southeast corner of the bridge. She stated that trucks make conditions worse than other vehicles.

Mr. Woodruff distributed a sketch of the bridge and surrounding area, and stated several concerns as highlighted on the sketch. These included:

- The curb on the northwest approach is very tall (~2 feet), and should be lowered, camouflaged, or removed.
- There is "wasted space" on the river side of this wall that could be made available for additional abutment support.
- If a metal roof is recommended to replace the shingle roof, it should have a dull, non-glare finish.
- The approach signs should be straightened.
- A trash can should be provided at the bridge.
- Mr. Woodruff prefers to keep the sidewalk on the outside of the original bridge.
- The existing path to the swimming hole beneath the bridge should be improved.
- The wooden approach railings are rotting, and can consideration be given to replacing them with stone walls.
- The existing cedar shingle roof is continuously being damaged by the swimmers that jump off of it.

Ms. Ingalls stated she preferred to keep the sidewalk outside of the original bridge. She also suggested using "fake slate" for the roof if a new roof is recommended. She stated the snow slips right off of this type of roof, and they are relatively light weight. Ms. Ingalls also stated that there are a lot of signs on the approaches and asked if the appearance could be improved. She also noted that the Mad Marathon is scheduled for July 10, 2011, and that the race begins on the bridge so it can't be closed at that time.

Mr. Palmer stated he didn't think a metal roof would be appropriate since it probably was not how the original bridge was constructed. Evan stated that was the type of issue that would be discussed with the Vermont Historic Bridge Commission as the project is developed. Mr. Palmer also stated he is concerned about emergency personnel response times, and encouraged Evan to minimize the time that the bridge is closed to traffic.

It was noted that the Town's water supply improvement project is scheduled to be under construction next year, and that it's construction may impact the construction of the bridge improvements. Construction of the two projects should be coordinated to minimize disruptions.

A citizen noted that the available light inside the bridge is inadequate, and it is sometimes difficult to see on-coming vehicles. She asked if it would be possible to create some openings in the upstream siding to let more light into the interior of the bridge.

The Town noted that there is a streambank erosion control project currently in the works that will extend down to the bridge location. They asked Evan to make sure any work at the bridge is coordinated with the erosion control project.

A citizen expressed her concerns about the abutment repairs made in the past, and that they have constricted the opening under the bridge. She asked that no additional material be placed in the river channel, and asked if the concrete that had been added to the abutments in the past could be removed to open the channel.

Many citizens expressed their concerns about closing the bridge during construction. The "wedding season" (mid-May thru mid-October) seemed to be the most important, but all seasons were a concern. However, everyone acknowledged that the project was important and that some period of closure was understandable. It was asked if the bridge could be reopened during weekend periods, even if it were closed during the week for repairs. Evan stated this could be possible, depending on what kind of repairs were being performed.

Ms. Capels summarized a number of emails that she had received prior to the meeting. She stated that most were in support of keeping the sidewalk in its current configuration. Some reasons that were stated included:

- It is safer to have the sidewalk on the outside of the original bridge rather than inside of it.
- It pedestrians are required to walk inside the bridge, it may increase vehicular traffic back-ups.
- It is nice to be able to look through the sidewalk openings to observe the framing of the bridge.

One of the emails also asked if outriggers could be added to the upstream side of the bridge to counterbalance the sidewalk on the downstream side.

A citizen asked if the bridge construction should be postponed until 2012, to avoid conflicts with the water project. It was the consensus that it would be better to coordinate the two construction projects rather than extend construction in the Village into a second season.

Mr. Boynton asked that advanced warning be provided of the construction so that clientele could be notified of any bridge closures. Evan stated that the dates of construction would be known weeks in advance and the Town would be able to notify residents of the planned closures.

The presentation and discussion ended at 7:55 p.m.

TOWN OF WAITSFIELD, VERMONT
Selectboard Meeting Minutes of
September 20, 2010

I. **Call to Order.** The meeting was called to order at 7:00 p.m. at the Waitsfield Town Office. Present were Selectboard members Kate Williams (Chair), Charlie Hosford (Vice-Chair), Paul Hartshorn, Bill Parker (7:40), and Sal Spinosa; Town Administrator Valerie Capels, Fire Chief Delbert Palmer; Evan Detrick (Dubois & King), Lisa Loomis (Valley Reporter), Tony Italiano (Channel 44/45); Peter Boynton, Darryl Forrest, Jane Goodwin, Dori Ingalls, Ted Joslin, Troy Kingsbury, Drew Simmons, Ellen Strauss, Vickie Trihy, Stan Ward, and Myndy Woodruff.

II. Waitsfield Historic Covered Bridge.

1. **Overview.** Ms. Capels and Selectboard members gave an overview of the project and purpose of the meeting. They explained the abutments of the Covered Bridge need repair and that the cantilevered sidewalk is affecting the stability of the bridge. Waitsfield received an 80/20 grant of $270,000 from the Vermont Transportation Enhancements Program to address those two issues and Dubois & King has been hired to develop the design and engineering plans. This is an opportunity to hear about the overall scope of the project, the expected schedule, and other details. The Covered Bridge is an important icon for the community. Issues affecting the entire bridge are open for discussion.

2. **Scope and timeline of VTrans Enhancement Project.** Mr. Detrick explained there are three stages to this process: project definition, design, and construction. This is the definition stage where detailed information is gathered about the bridge, the various issues, and range of approaches to address them. Some issues that have been suggested include:

   - Strengthen the sidewalk, or relocating it within the bridge;
   - Repair and/or replace other structural members;
   - Repair or replace the existing wooden deck planks and bolts;
   - Repair the cracking and spalling abutments;
   - Repair the scour hole on the face of the west abutment;
   - Replace or keep the existing cedar shingle roof to alleviate the snow load on the roof;
   - Repaint or strip the painted bridge facades;
   - Explore ways to alleviate damage done to the interior by the vehicular collisions;
   - Traffic management and/or detour during construction; and
   - Locating a construction staging area.

   These and other issues will be addressed with the development of the initial study to define alternatives. A report with recommendations and cost estimates will be produced and there will be another opportunity for public comment.

3. **Discussion and Other issues affecting the Covered Bridge.** The following is a summary of comments and discussion.

Ms. Goodwin has lived at the east side of the bridge since 1985 and frequently sees trucks go through the bridge despite the signs prohibiting them.

Mr. Woodruff has lived at the east side of the bridge since 1974. He provided a sketch illustrating the following concerns and suggestions:

- The curb on the northwest approach is very tall and should be lowered, camouflaged, or removed;
- Wasted space on the river side of this wall could be made available for additional abutment support;
- If a metal roof is proposed, it should have a dull, non-glare finish;
- The approach signs should be straightened;
- A trash receptacle should be provided at the bridge;
- The existing path to the swim hole beneath the bridge should be improved;
- The wooden approach railings are rotting; consider replacing them with stone walls; and
- The existing cedar shingle roof is frequently damaged by the swimmers that jump off of it.

Ms. Ingalls prefers the bridge stay as it is with the exterior sidewalk. She suggested using "fake slate" for the roof. It is light-weight and sheds snow easily. She suggested doing something to clean up the sign clutter at each end of the bridge. She noted that the Mad Marathon is scheduled for July 10, 2011, which begins as the bridge.

Fire Chief Palmer does not believe a metal roof would be appropriate for the historic qualities of the bridge.

Mr. Forrest cautioned about coordinating with the municipal water project, which will be under construction next year.

Ms. Trihy expressed concern about the dim lighting in the bridge that makes it difficult to see on-coming vehicles. She asked whether openings could be created in the upstream siding to let more light into the interior of the bridge.

The Town raised the concern about erosion control and recommended coordinating with the streambank stabilization project currently being planned on the west side of the river extending from the bridge abutment.

Ms. Strauss cautioned about abutment repairs creating any constrictions to the water flow, as happened in Warren when the bridge abutments were repaired there. She asked that no additional material be in the river channel. She and Mr. Woodruff suggested that efforts be made to make the channel wider.

Mr. Kingsbury urged sensitivity in scheduling the closure of the bridge with the Valley's wedding season, which runs from mid-May to mid-October. Mr. Boynton added that venues have other events in addition to weddings, such as exhibits and performances. With enough

advanced notice, he and others can provide updated directions and post the information on their Web sites. It was asked if the bridge could be closed during the week for the repairs and re-opened for the weekends.

Mr. Ward asked about the feasibility of a counterbalancing weight on the southern (upriver) side.

Fire Chief Palmer noted that the detour associated with closure of the bridge would add 8 minutes response time of the fire fighters getting to the fire station to respond to a call. If a fire truck does have to pass through it, there is only 3 inches clearance.

Mr. Joslin recommended the sidewalk be retained. It allows pedestrians to linger and observe the interior design of the bridge and how it was built.

Ms. Capels provided the following summary of e-mails or other messages received from people who were not able to attend (some added into the notes subsequent to the meeting):

- Sheila Getzinger: Uses the covered bridge almost every day and it seems there are always pedestrians using the walkway year-round. Thinks it would be dangerous to put the pedestrians within the bridge. Wonders if it would be possible to reconstruct the walkway so not cantilevered or to somehow separate it from the bridge. Maintaining the bridge and walkway would be best solution.
- Michael Sharkey: Thinks it is important to save the walkway. Not removing the huge amount of ugly wires on the west side of the bridge will leave us with an ugly bridge that will not fall down.
- Bill Curley: The bridge should be kept as built. A historic bridge he knew in the town where he grew up was burnt by an arsonist but rebuilt to the original design. Perhaps historic preservation funds could be used.
- AnnMarie Harmon: We should do everything we can to keep the sidewalk from a historic preservation perspective and importance to the community.
- Clayton-Paul Cormier: would like a copy of the meeting summary.
- Friends of the Mad River: Consult with the River Management Division at the Agency of Natural Resources.
- Lynne Kingsbury: Would hate to see pedestrians moved to within the bridge. It would detract from the bridge design. Could the sidewalk be built independently but remain abutting the bridge. Without the sidewalk, all the photos and paintings would be wrong.
- Dan Holtz: Lives near the bridge and sees a lot of people using it. Enjoys the partitioned sidewalk area and believes smooth traffic flow and pedestrian safety would be negatively affected if sidewalk removed. Would not want to be walking through in the dark where the vehicles are.
- Chris Pierson: Would like the pedestrian sidewalk to remain. Perhaps a carrying beam or some other anchor system could be incorporated into the abutments. Should revisit the alternative route to Bridge Street. The one he recommends would extend the East

Warren Rd and Joslin Hill junction into a 4 way intersection, with the new road going across from East Warren Rd. and into the field between the Joslin and Pestle properties, crossing the river on the backside of the field, and coming out across the corn field behind the school where it can then join Route 100. It would be provide a more reliable means of egress during high flood waters for access to the southeast side of town, provide a viable truck and emergency vehicle route, and would relieve traffic from Bridge Street and open the possibility of making Bridge Street one-way. A cap on traffic volume should be considered to help extend the life of the bridge.

- Jon Jamieson: Is concerned about the kids swimming at the bridge, damage they are doing to the bridge, and the potential liability to the town if someone gets hurt, particularly jumping from the roof. The trash they leave is annoying, too.
- Louise Moulton: Enjoys regular walks and stands on the sidewalk at the bridge watching the water. Does not want the sidewalk removed or placed inside the bridge.

Mr. Detrick provided a form for people to fill out and send back if they have any other thoughts or concerns.

4. **Next steps.** Mr. Detrick explained that the plan is to complete the project definition and design phases so construction could occur toward the end of 2011. The report with recommendations will be presented at another public meeting. All of the recommendations will need to meet with the approval of state permitting agencies and the division for Historic Preservation. The length of time the bridge may need to be closed will depend on the work that is proposed to be done; it could be two to three weeks. Some recommendations may be deferred to later phases depending on the cost or other factors.

III. <u>Other Business</u>.

1. **Bills payable & Treasurer's warrants** were paid.

2. **Other.** Selectwoman Williams presented a letter of support she drafted for the Mad River Path Association's grant application to the Mad River Valley Recreation District. There was consensus of the Selectboard to send the letter.

IV. <u>Adjourn</u>. The meeting was adjourned at 7:55 p.m.

Respectfully Submitted,

Valerie Capels
Town Administrator