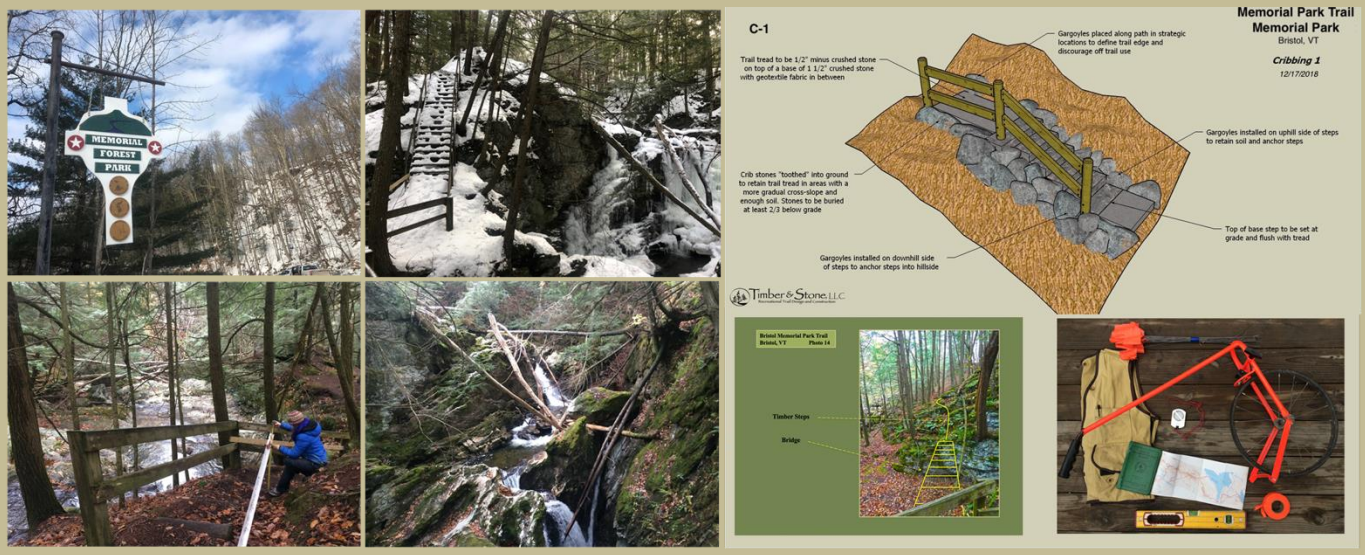
Bristol Memorial Park

Bristol, VT



Trail Design Document

Prepared by:

Timber & Stone, LLC
Recreational Trail Design and Construction

4764 Center Road
East Montpelier, VT 05651

December 18, 2018

Bristol Memorial Park

Trail Design

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Timber & Stone, LLC
Conservation Minded Construction

Memorial Park Trail Design

Bristol, VT



Part I - Introduction

The Bristol Memorial Park Trail, located alongside Baldwin Creek, provides visitors with an impressive view of dynamic waterfalls that have scoured the landscape down to bedrock. The trail meanders within reach of the water as it cascades over cliffs and drops through the gorge. The landscape is impressive, however the current trail structures are in dire need of upgrades to allow visitors sure footing as they access the site.

Due to the unsafe structures, poor trail condition, and equally poor native soils, the Bristol Memorial Park Trail is in immediate need of repair. The condition of the existing elevated staircase is unsafe, the timber steps have decayed and have rebar exposed, and the trail tread is eroding into the watershed. In short, this trail poses a hazard to visitors, as well as, an erosive impact on the waterway.

During the fall and early winter of 2018, Timber & Stone, LLC was contracted by the Bristol Trail Network/Bristol Recreation Club to do a thorough assessment of the Bristol Memorial Park Trail. This work required multiple site visits to explore the terrain, meetings with committee members, hours of field work to gather data, and multiple consultations with a structural engineer. This work was compiled to produce the Bristol Memorial Park Trail Design.

Part II - Trail Enhancement Overview

To improve the safety and sustainability of the trail, it is recommended to install a series of stone steps and elevated viewing platforms along the existing trail alignment. In addition, all existing trail structures and hazard trees should be removed. Ultimately, the Bristol Memorial Park Trail will be a 3' wide trail surface that allows for hikers to pass one another safely, view the waterfalls from designated locations, and feel confident with each step on predictable and sound surfacing.

Due to the location of the trail and the instinct of visitors to get as close to the falls as possible, it is recommended to construct specific viewing platforms that will allow for group gathering and photo taking. Construction of steps will provide consistent rise/run patterns enabling trail users to walk confidently down the trail while they view the falls. Additionally, timber barriers will be constructed alongside steep runs of steps and around viewing platforms. These barriers will provide a visual edge to the trail, sturdy assistance along staircases, and a sense of safety at gathering points. This sense of safety and sustainability will be achieved while keeping the natural environment intact and minimally disturbed.

Part III - Construction Materials

To ensure long lasting trail structures, it is recommended to use highly rot resistant material for the Bristol Memorial Park Trail reconstruction effort. This will reduce maintenance costs, ensure long term durability of the structures, and provide sure footing for trail users

Step Construction

As such, it is recommended to use stone for all steps, cribbing, and trailside gargoyles (guide stones). If installed correctly, stone will last indefinitely as compared to the 15-20 year lifespan of timber. Timber steps built directly into the soil will eventually rot which would lead to the backfill eroding into the waterway.

Although more expensive during the initial installation, stonework will enable the structures to last generations versus only years. Additionally, stone steps naturally provide a surface that has traction regardless of moisture, whereas over time timber steps can become slippery when wet, especially if Pressure Treated timbers are used.

The stone steps along the trail will be built to have a 3’ width and will have a consistent 6-8” rise and a 12-18” run. Stone cribbing will be used to support the slope per the attached Trail Log and Photopages.

Barrier Construction

The barrier system outlined in this report is constructed out of Black Locust hardwood. Black Locust is exceptionally dense and naturally rot resistant. This material's high density reduces replacement maintenance costs, discourages carving, and blends into the natural landscape.

Due to the natural alignment of the trail, the barrier system will be located exclusively on one side of the stone steps, as needed. This will prevent users from accessing dangerous locations along the falls during their recreational experience. Given the design of the barrier system, users will have sturdy protection from hazardous areas, but will still be able to view the landscape.

Due to the trail's proximity to Baldwin Creek, a Black Locust barrier system will be drilled and pinned to the stone steps and will provide protection from trail's edge along the waterfall.

Elevated Walkway and Step Construction

After consulting with a structural engineer regarding the condition of the existing elevated timber structures, it was determined that the staircase that accesses the bridge should be removed immediately. The structure poses an immediate safety risk to all users who attempt to walk down it. Additionally, the existing 35' bridge should be rebuilt within 2-5 years (please see attached report from Dewolfe Engineering.)

By realigning the trail around the ledge and back towards the bridge, the grades of the trail are reduced and the safety is increased. This curvilinear approach will require stone steps as well as a small series of elevated walkway and a series of elevated timber steps. These structures will be drilled and pinned to the bedrock and will have full railings on both sides of the structure.

A realignment of the access to the falls will involve an elevated timber walkway that connects to the existing bridge. This will result in a safer access while also improving the visual experience.

Part V - Project Quantities

The table below summarizes the total number of construction items required for the reconstruction of the trail. This table, working in unison with the attached Design Pages and Typical Designs, provides the quantities that were used for construction estimates.

Item	Unit	Quantity	Description
Stone Steps	Each	100	Installed with gargoyles
Stone Cribbing	Square Feet	52	Installed along trail edge to maintain grade, and elevate tread, and prevent erosion
Black Locust Barrier	Linear Feet	115	Installed on side of steps closest to the falls
Trail Surfacing	Cubic Yards	14	Trail tread to be surfaced throughout

Part VI – Work Prioritization

Due to the complicated nature of this project, we are proposing a sequence of installation that is respective to the current safety of the site, immediacy of need for repair, and the costs associated. We combined our observations with those of the structural engineer and have developed this list of priorities for navigating the work at Bristol Memorial Park.

Priority 1 – Remove the existing elevated timber staircase

Rationale – This staircase is hovering without solid footings or attachment to bedrock. It is exceptionally slippery when wet and should not be used during the winter months due to ice and snow load. The railings are not structurally sound and the potential for injury by an unknowing visitor is extremely high.

Priority 2 – Construct trail reroute from Trail Log item 128 – 224.

Rationale – This section involves stone steps and an elevated walkway with stairs that connects to the existing bridge. By constructing this section first, it addresses safety issues while also recognizing that not everything has to be accomplished immediately if funds are not available.

Priority 3 – Construct the entrance stone steps from Trail Log 00 – 128

Rationale – The timber steps that were made from telephone poles are rotted, slippery, and have rebar sticking out. The existing barrier system is functional, but would be far more structurally sound if built to a higher standard including larger timbers, pinning to steps, and elevating the height. The stone steps intended for replacement can be imported easily down the existing alignment.

Priority 4 – Replace bridge and install steps and viewing platform from Trail Log 224-338

Rationale – The existing bridge showed signs of rot on the steel I-beams that resulted in a replacement of 2-5 years. The replacement would involve removing all parts of the structure and reinstalling new I-beams and wood decking/railing members. When this is undertaken the stone steps leading up to the viewing area could also be installed as well as the barrier along the waterfall's edge. Mobilization for this effort would need to happen from the driveway above the site.

Part VII - The Use of This Document

This document is exceptionally field focused. The field work was conducted with an eye towards providing the reader with an ability to walk the trail and visualize which structures are needed and what they will look like. To use this document efficiently, please consider the following guidelines:

1. Use a Rolatape:

- This measuring wheel serves as a vital link to the trail log that documents each linear foot of the trail system. The rolatape guides the user of this document around the trail system. Please visit: http://www.rolatape.com/ to learn more about this tool.

2. Trail Log Accuracy

- The Trail Log begins at set points along the trail system. Be sure to start the wheel at 00 while standing at the correct point described on the document.
- Each beginning and end point of the trail log is expected to change, depending on who is using the rolatape. Be prepared for the points to have a variance of 5-10 feet.
- The Trail Log cites reference points to help indicate where certain Design Directives are located. These reference points could change slightly over time due to the expected change of a forest's composition.

3. Analysis Sequence

a) **Identify a Site:** Arrive at a proposed work site using the rolatape wheel.
b) **Check the Reference Point:** Look for the reference point to make sure you are at the right point
c) **Realize the Design Directive:** The directive will identify the proposed solution to the work site.
d) **Check the Sitework Photopage:** Cross reference the photo number with the correct photo page for more detailed information on the work site.
e) **Review the Design Page:** The Design Pages provide overall description for the proposed work to be accomplished at each site. They are identified in the Trail Log as SO-1, SO-2 etc. Each design page provides detailed information on construction materials, specs, and dimensions.
f) **Review the Typical Design:** Each work zone has a Typical Design associated with it. These designs are referenced as 1, 2, 3 etc. They provide cross sectional views of the proposed work to be accomplished.

Summary

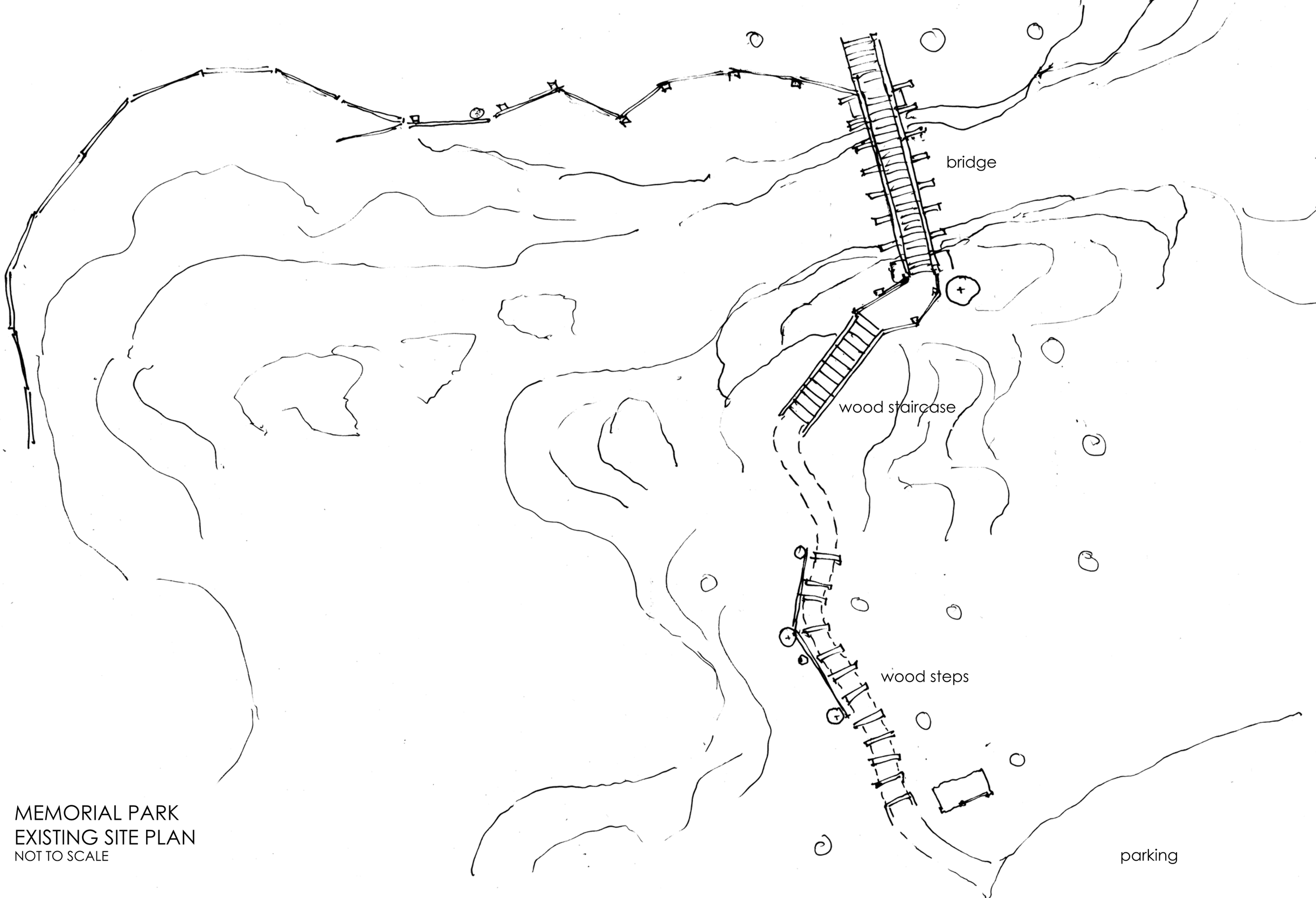
Although a short trail, the Bristol Memorial Park Trail has tremendous potential. The existing structures are in immediate need of repair and replacement, but the waterfall continues to welcome and inspire guests.

With focus paid to the construction standards of this report, Timber & Stone, LLC is confident that the site will continue to host many visitors for years to come. It is an impressive destination, one that is worthy of attention and maintenance.

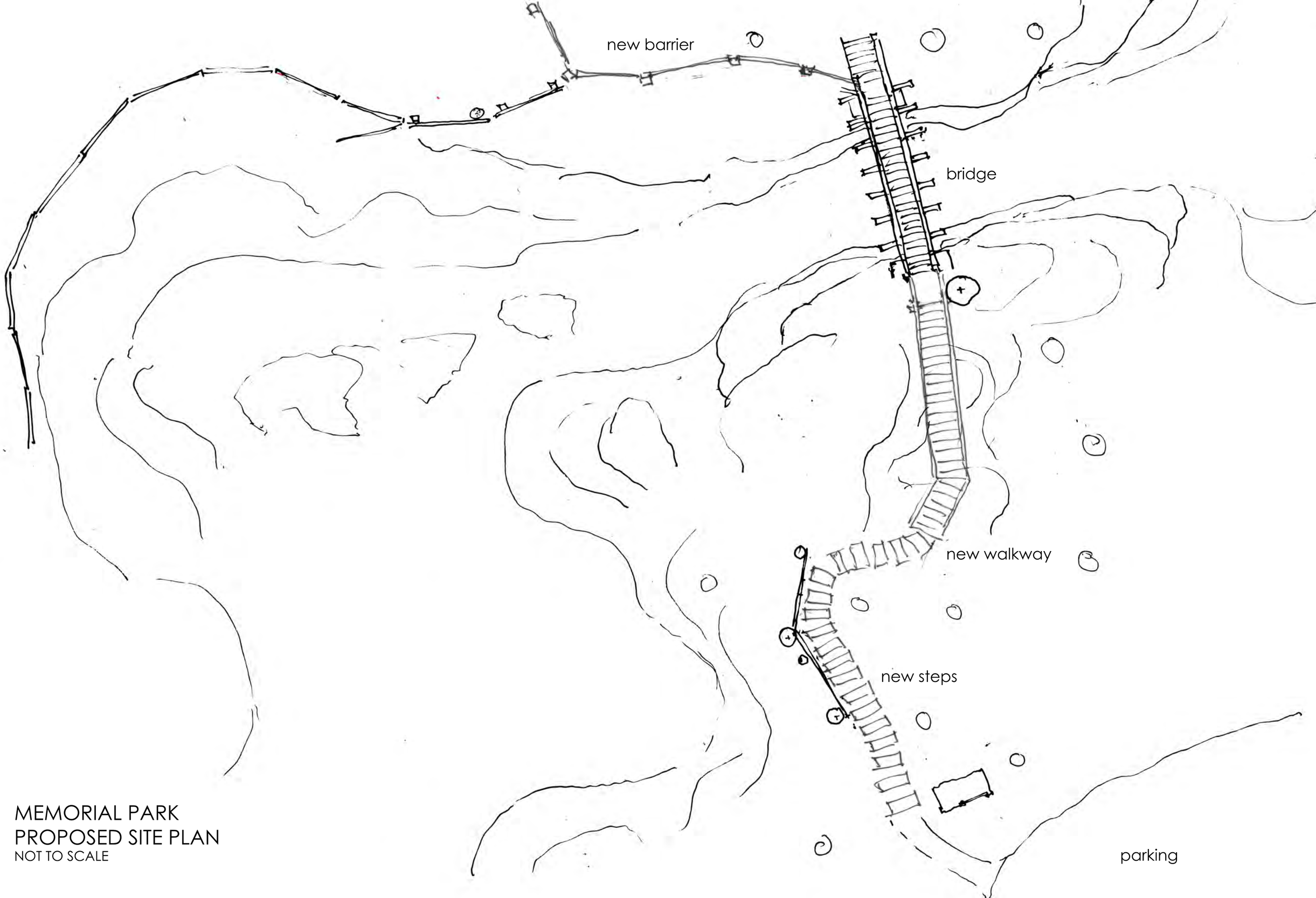
We appreciated the opportunity to provide guidance for the trail upgrades and sincerely hope to be there when the first step is installed.

Respectfully Submitted,

Joshua D. Ryan
Principal
Timber & Stone, LLC



MEMORIAL PARK
EXISTING SITE PLAN
NOT TO SCALE



MEMORIAL PARK
PROPOSED SITE PLAN
NOT TO SCALE

Project: Memorial Park
Location: Bristol, VT

Memorial Park Trail Log

Note: Trail begins at parking area to left of Stone Memorial.

Begin	End	Length	Photo #	Reference Point	Design Directive	Typical #	Design Page
0	23	23	1	Stone memorial on right.	Trail follows existing alignment. Replace existing log steps with 3' wide stone treads. (9 steps at 18" run)	1, 2	C-1
23	51	28	1	14" Ash on left, log check steps in treadway.	Replace existing log steps with 3' stone treads, clear corridor. Low grades (20%) (9 steps at 18" run)	1, 2	C-1
51	87	36	2	10" Hemlock on left	Alignment continues to drop (30%) continue to install stone steps with gargoyles on left. (6 Steps with 18" run)	1, 2	C-1
87	97	10	3	Alignment decends toward water.	Continue to install stone steps.(6 Steps with 18" run)	1, 2	C-1
97	102	5	4	Existing barrier ahead.	Install new barrier on left pinned to stone steps. (10 steps total)	1, 2, 3	C-1, B-1, B-2, B-3
102	128	26	5	Existing barrier on left, water on left.	Replace existing barrier and continue stone steps down slope. (10 steps total)	2, 3	C-1, B-1, B-2, B-3
128	128	0	6	Stream on left, existing log steps in alignment.	Alignment veers right off existing alignment.	3, 4	
128	158	30	7 and 8	Alignment decends slope to right.	Install stone steps on slope. (16-20 steps at 18" run)	1, 2	C-1, C-2
158	183	25	9 and 10	Alignment veers left on cross slope.	Install stone cribbing on right. (30' to 35' of cribbing at 18"-24" height)	3, 4	C-1

Begin	End	Length	Photo #	Reference Point	Design Directive	Typical #	Design Page
183	206	23	11 and 12	Alignment continues to curve across slope, exposed ledge.	Install elevated boardwalk across slope, pin to exposed ledge. (20'-25' structure)		A-1, A-2, A-3
206	214	8	13 and 14	Alignment drops down steep ledge.	Install elevated timber steps decending from boardwalk and landing on bridge. (7-9 steps)		A-1, A-2, A-3
214	224	10	14	18' level span from ledge to beginning of existing bridge.	Install bridge from existing bridge to ledge. (18' structure, 10' usable from base of steps to end)		A-1, A-2, A-3
224	256	32	15 and 16	Alignment crosses existing steel stringer bridge.	Replace existing bridge with new structure (35') within next 2-5 years, per report	Design to be determined as part of next phase	
256	276	20	17 and 18	Alignment veers left after bridge, up slope along existing barrier.	Install stone steps up slope with new timber barrier on left.	1, 2	C-1, B-1, B-2, B-3
276	296	20	19 and 20	Alignment continues to climb up hill along barrier.	Install stone steps up slope with new timber barrier on left.	1, 2	C-1, B-1, B-2, B-3
296	318	22	21 and 22	Alignment continues to climb up hill along barrier, exposed ledge left.	Install stone steps up slope with new timber barrier on left.	1, 2	C-1, B-1, B-2, B-3
318	338	20	23	Final climb up ascent.	Install final stone step and transition to benched tread on cross slope. (35-40 steps total)	1, 2	C-1, B-1, B-2, B-3
338	338	0	23	Flat area in alignment.	Install naturally surfaced overlook area with timber barrier.	3, 4	B-1, B-2, B-3

Memorial Park Trail
Bristol, VT **Photo 1**

Memorial Park Trail
Bristol, VT **Photo 2**

Memorial Park Trail
Bristol, VT **Photo 3**

Memorial Park Trail
Bristol, VT **Photo 4**

Bristol Memorial Park Trail
Bristol, VT Photo 5

Memorial Park Trail
Bristol, VT **Photo 6**

Memorial Park Trail
Bristol, VT **Photo 7**

Stone Steps

Memorial Park Trail
Bristol, VT Photo 8

Stone Steps

Bristol Memorial Park Trail
Bristol, VT Photo 9

Memorial Park Trail
Bristol, VT Photo 10

Stone Crib Wall

Memorial Park Trail
Bristol, VT **Photo 11**

Memorial Park Trail
Bristol, VT **Photo 12**

Timber Boardwalk

Memorial Park Trail
Bristol, VT **Photo 13**

Bridge

Timber Steps

Timber Boardwalk

Memorial Park Trail
Bristol, VT **Photo 14**

Memorial Park Trail
Bristol, VT Photo 15

Bridge

Memorial Park Trail
Bristol, VT Photo 16

Bridge

Memorial Park Trail
Bristol, VT Photo 17

Stone Steps and Timber Barrier

Memorial Park Trail
Bristol, VT **Photo 18**

Stone Steps with Barrier

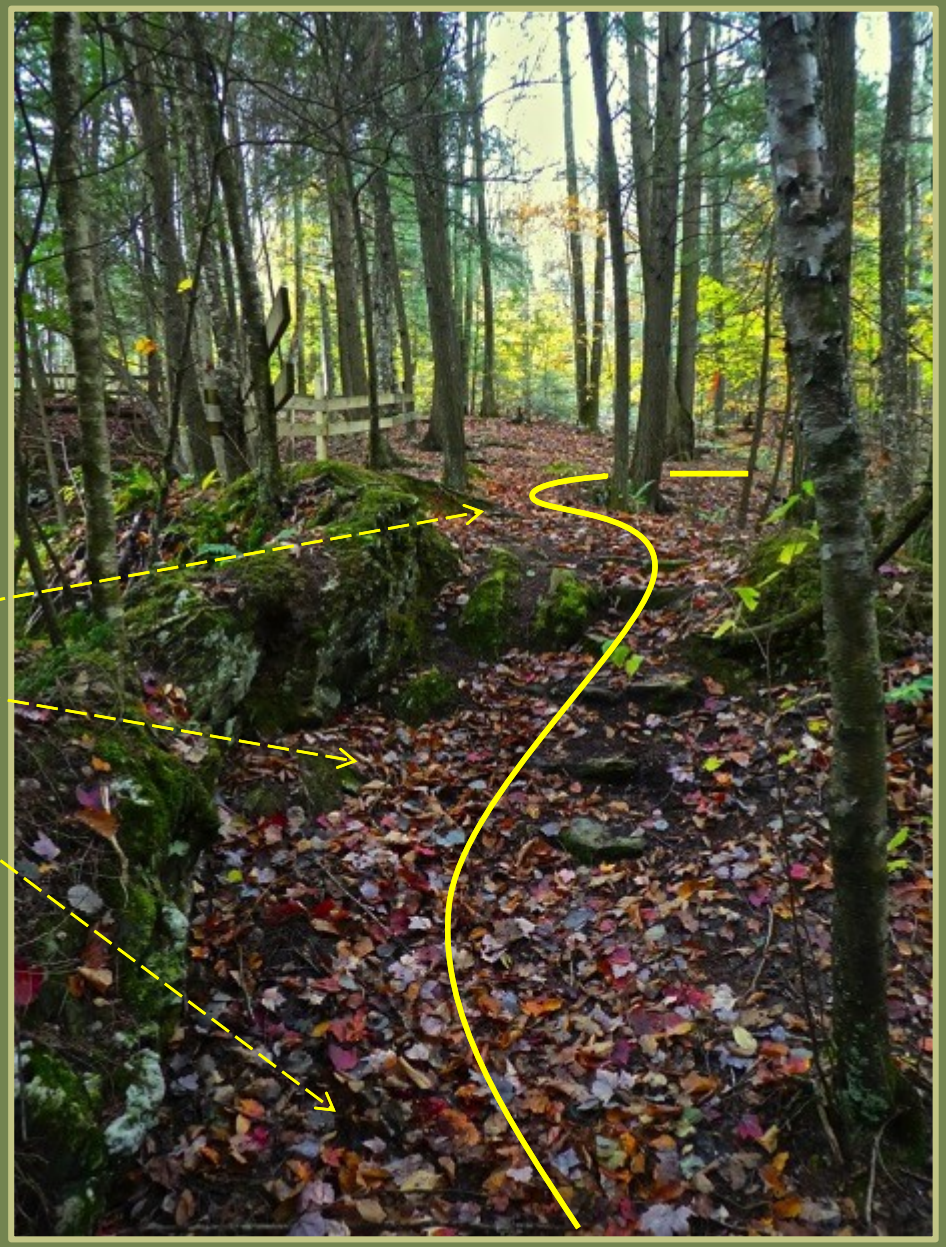
Memorial Park Trail
Bristol, VT **Photo 19**

Stone Steps with Barrier

Memorial Park Trail
Bristol, VT Photo 20

Stone Steps and Timber Barrier

Memorial Park Trail
Bristol, VT Photo 21



Stone Steps and Timber Barrier

Memorial Park Trail
Bristol, VT **Photo 22**

Stone Steps with Barrier

Memorial Park Trail
Bristol, VT **Photo 23**

Full Bench Cut

Stone Steps with Barrier

Civil & Structural Engineers
DeWolfe
ENGINEERING ASSOCIATES
PROFESSIONAL CORPORATION

December 19, 2018

Josh Ryan
Timber & Stone, LLC
4763 Center Road
East Montpelier, Vermont 05651

Reference: **Bristol Memorial Park Bridge**
Structural Inspection and Analysis

Dear Josh,

As requested, on December 11, 2018, Danielle Franco and I met with you at the above referenced site to complete an inspection of the existing pedestrian trail bridge. The purpose of the inspection was to determine the load capacity and general condition of the structure.

The bridge deck is made up of nail laminated 2x4 pressure treated (PT) decking and is in fair condition. The bridge deck surface is approximately 4'-0" wide by 28'-0" long and is supported by two steel I beams spaced at approximately 3'-0" on center (o.c.). Based upon field measurements, the beams appear to be W10x17. There is a significant amount of rust on each beam and in the worst case it appears that there is a 1/16" circumferential section loss. It also appears that the steel beams have been repurposed at least once before and are likely A7 steel. A 2x6 PT nailer is bolted to the top of the steel beam at 2'-0" o.c. The decking surface continues west for 6'-0" and is supported on three 4x4 pressure treated stringers.

The steel beams are supported at each end by 5'-6" wide by 2'-6" long concrete abutments on ledge. The 4x4 PT stringers are supported by the concrete abutment on east end and the ground on the west end. Concrete abutments appear to be in fair condition. The railing system is composed of PT 4x4 posts at 4'-0" o.c. and PT 2x6 rails. See SSK-1 for a section sketch.

Our analysis and review are based upon our visual inspection, field measurements, accepted structural engineering standards, requirements of the Vermont Fire and Building Safety Code 2015 which incorporates the International Building Code 2015 (IBC 2015), and upon the LRFD Guide Specifications for the Design of Pedestrian Bridges by AASHTO. This AASHTO guide gives a live load recommendation of 90 pounds per square foot (psf) for pedestrian bridges. The recommended design live load for rail system per IBC 2015, is 50 pounds per linear foot or a 200 pound point load.

Based upon our analysis, the existing bridge decking, steel beams, and PT stringers meet or exceed the code recommended live load capacity of 90 psf. The bolted connections of the rail system do not meet code. The code required minimum distance from the bottom edge of the wood to the center of the bolt is 2.5"; the measured edge distance at the existing connection is 1.75". The wood itself is overstressed by 26% based on the 200 pound code recommended point load.

In addition to the railing framing overstress, the existing guardrail does not have balusters and allows the passage of a 4" sphere through the openings between the rails. In addition the stairs at the north end of the bridge are unsafe.

317 River Street
P. O. Box 1576
Montpelier, VT
05601-1576
phone: 802.223.4727
fax: 802.223.4740
www.dirtsteel.com

It is my professional opinion that the stair at the north end of the bridge should be closed and the either the trail rerouted or a safe stair be reconstructed. The existing railing is overstressed and does not meet current code recommended fastener layout or fall protection limitations. The decking is near the end of its life and the steel beams are damaged by rust. Based upon the current condition of the steel and decking, we recommend that bridge be scheduled for repairs with the next two to five years. It is further my opinion that when the repairs are made the decking and railing should be discarded. The steel beams have sufficient capacity to be re-used if desired but will require removal, sandblasting, and repainting or galvanizing. Given their current condition it may be more cost effective to replace the beams rather than re-use them. Reinforcement in the concrete abutments and the abutments attachment to ledge is unknown but the abutments appear to be stable and thus don't require replacement. The ledge itself appears to be stable but should be periodically monitored for changing conditions. It is my professional opinion that the existing abutments are located on the most stable section of ledge in the nearby vicinity of the trail. As discussed at the site, it is our understanding that the rail and decking will be replaced as soon as practical in order to meet rail height and clearance requirements.

If you have any questions concerning this report, our findings, or want to us to proceed with the design of new decking and railing, please call or write.

Sincerely,

Christopher J. Temple, P.E.

Enclosures:

Civil & Structural Engineers
DeWolfe ENGINEERING ASSOCIATES
PROFESSIONAL CORPORATION
317 River Street • P.O. Box 1576
Montpelier, VT 05601-1576
802.223.4727 • fax: 802.223.4740
www.dirtsteel.com

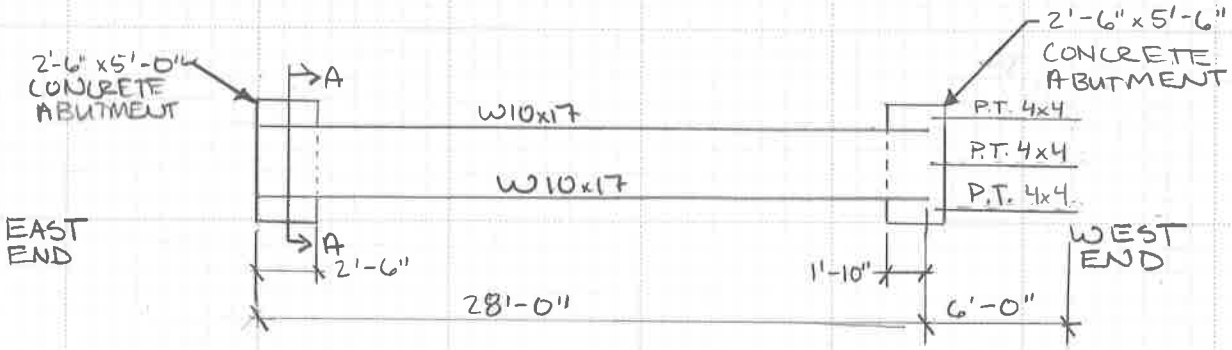
JOB BRISTOL MEMORIAL PARK BRIDGE 18337

SHEET NO. SSK-1 OF

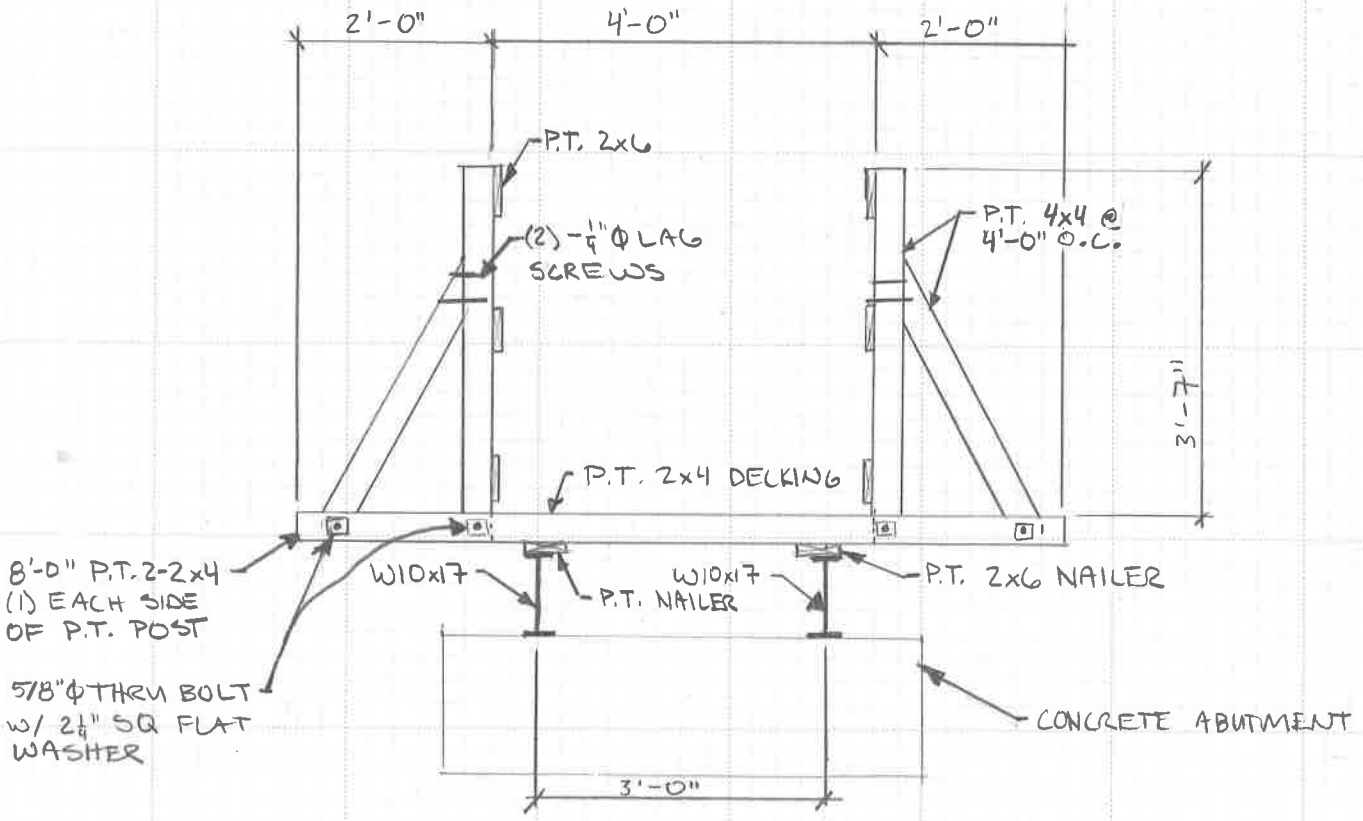
CALCULATED BY DNF DATE 12/19/2019

CHECKED BY DATE

SCALE



EX BRIDGE PLAN VIEW
SCALE: 1/8" = 1'-0"



SECTION A-A
SCALE: 1/2" = 1'-0"

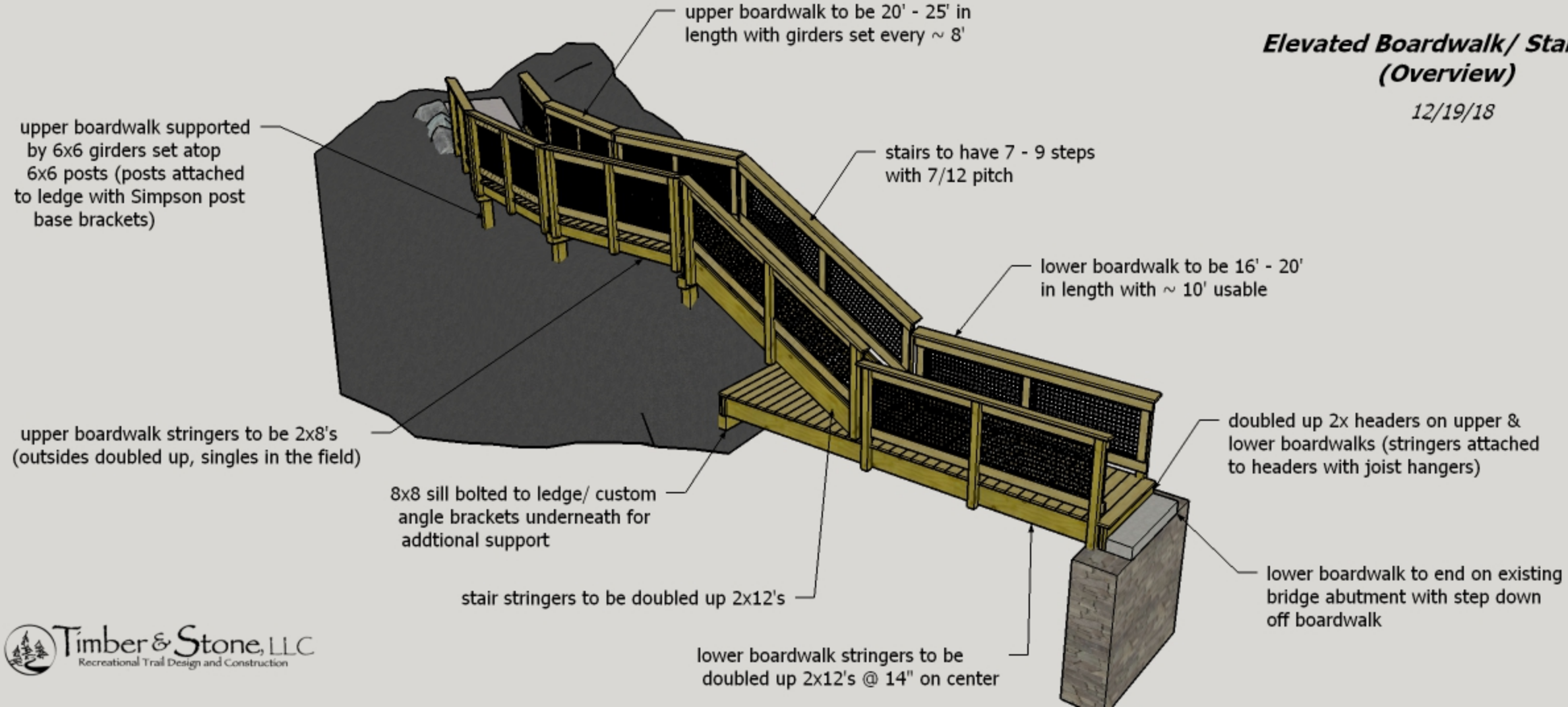
A-1

Bristol Memorial Park

Bristol. VT

Elevated Boardwalk/ Staircase (Overview)

12/19/18



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Recreational Trail Design and Construction

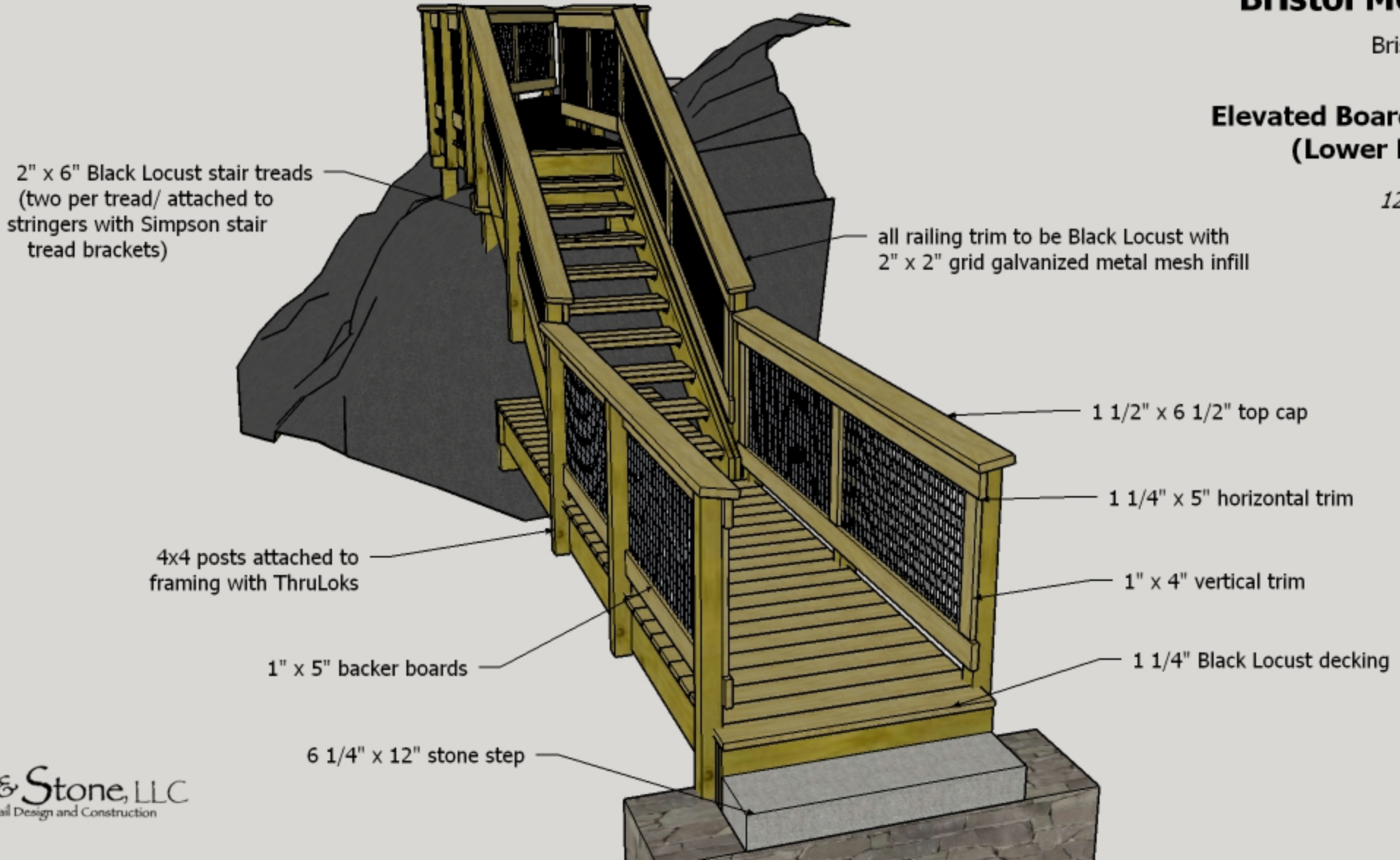
A-2

Bristol Memorial Park

Bristol. VT

Elevated Boardwalk/ Staircase (Lower Elevation)

12/19/18



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Recreational Trail Design and Construction

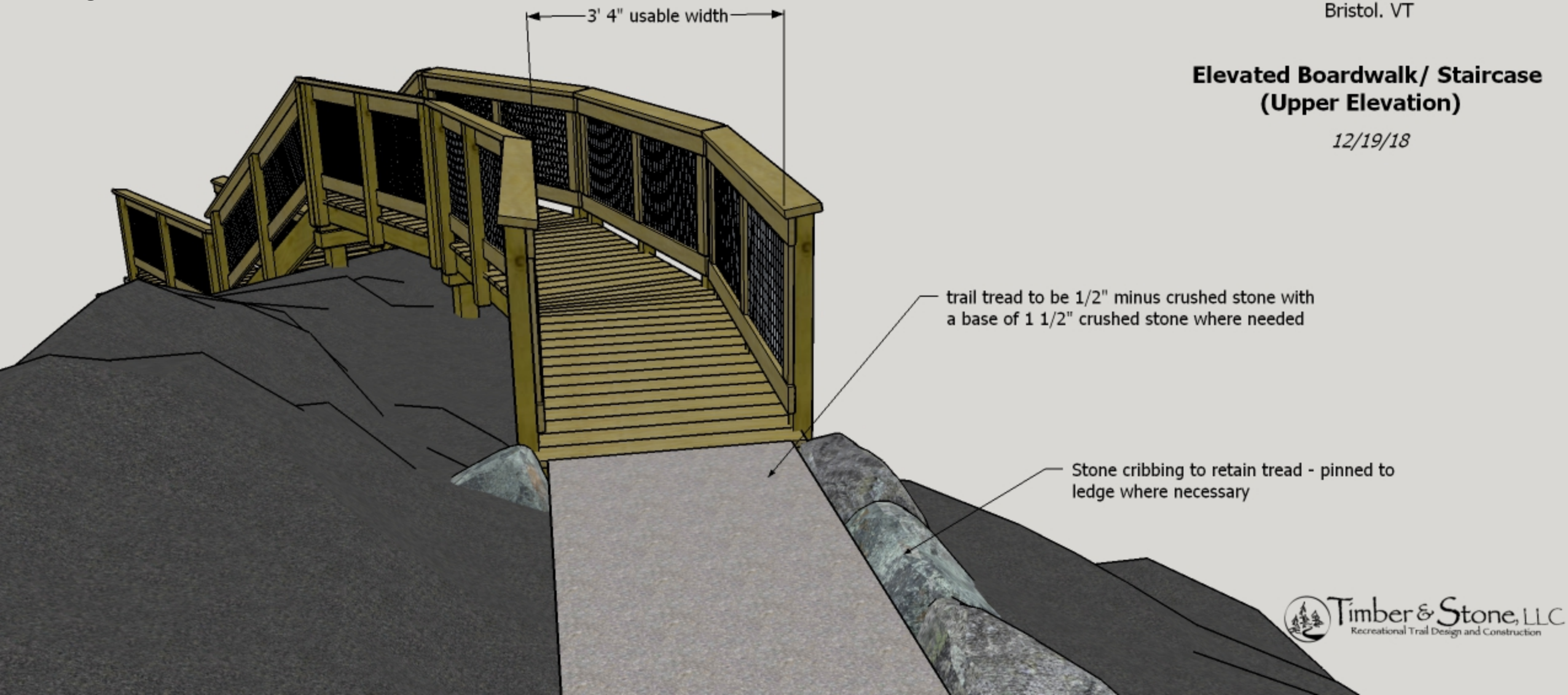
A-3

Bristol Memorial Park

Bristol. VT

Elevated Boardwalk/ Staircase (Upper Elevation)

12/19/18



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Recreational Trail Design and Construction

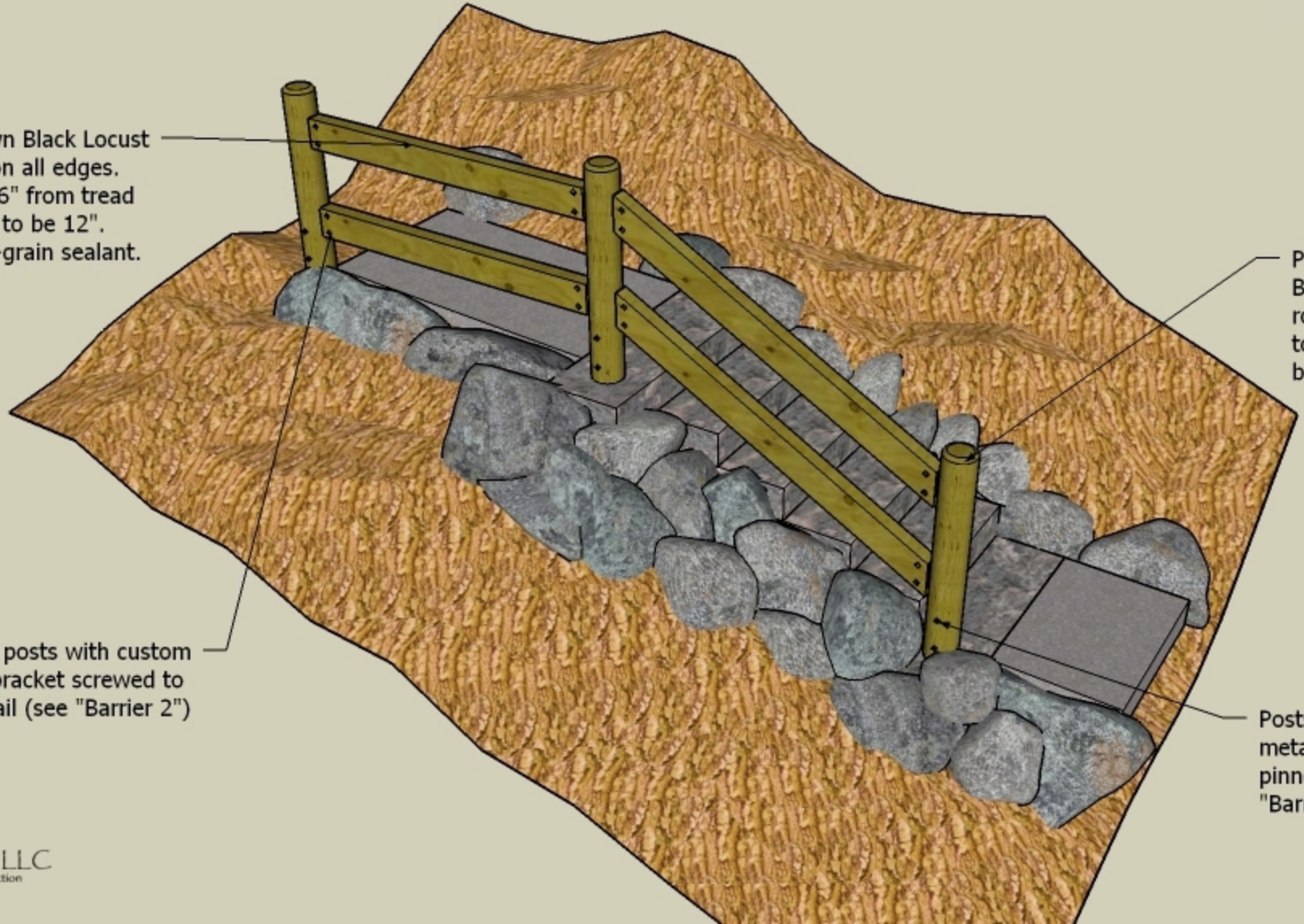
Memorial Park Trail
Memorial Park

Bristol, VT

Barrier 1

12/17/2018

B-1



Rails to be 3" x 6" roughsawn Black Locust with 1/2" radius roundover on all edges. Top edge of top rail to be 36" from tread height/ space between rails to be 12". Ends to be treated with end-grain sealant.

Posts to be 6" diameter natural-form Black Locust with 3/4" radius roundover on top edge. Top of post to be 42" from tread height. Ends to be treated with end-grain sealant.

Rails attached to posts with custom metal bracket - bracket screwed to post/ bolted to rail (see "Barrier 2")

Posts attached to stones with custom metal bracket - bracket drilled and pinned to stone/ bolted to post (see "Barrier 3")

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Recreational Trail Design and Construction

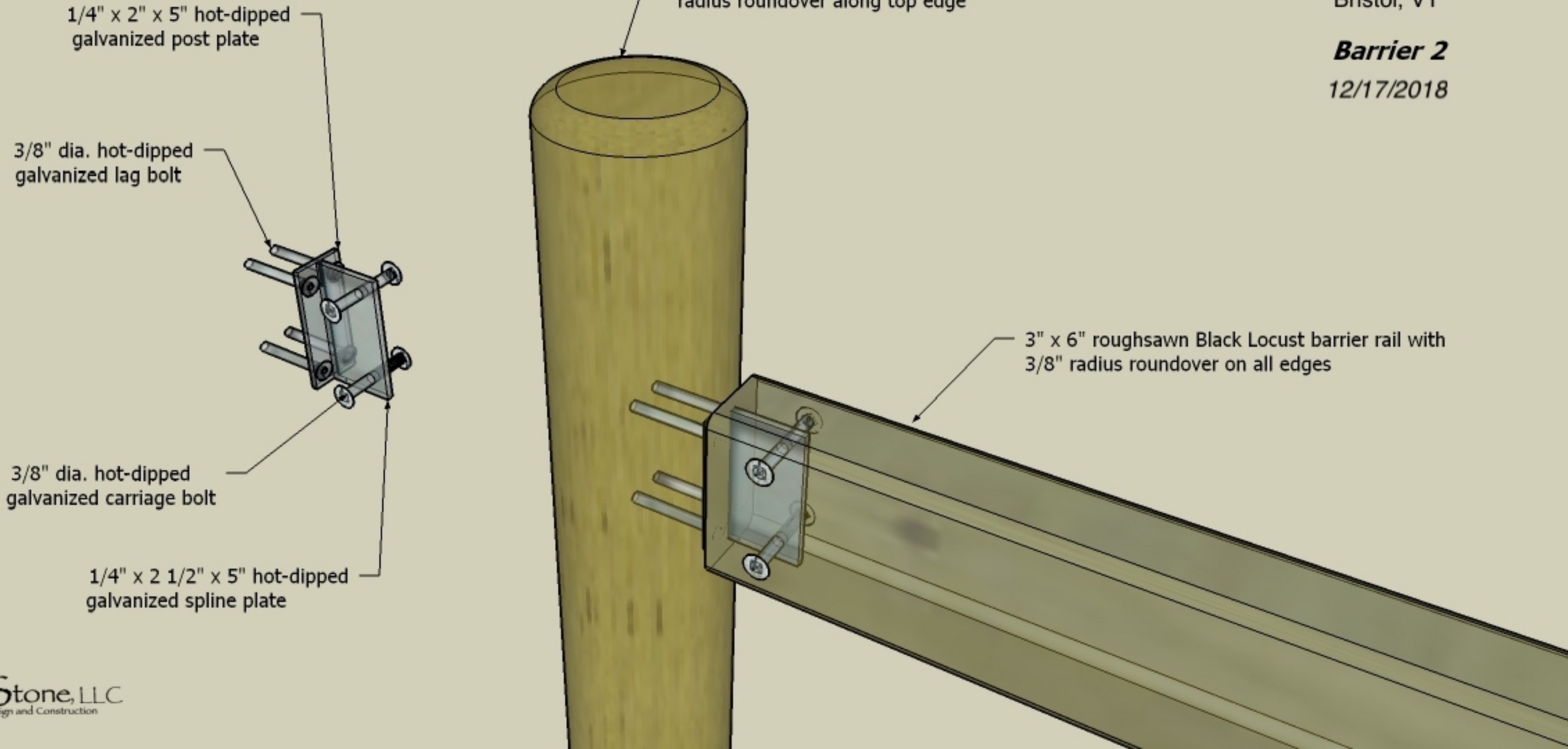
B-2

Memorial Park Trail
Memorial Park

Bristol, VT

Barrier 2

12/17/2018



Timber & Stone, LLC
Recreational Trail Design and Construction

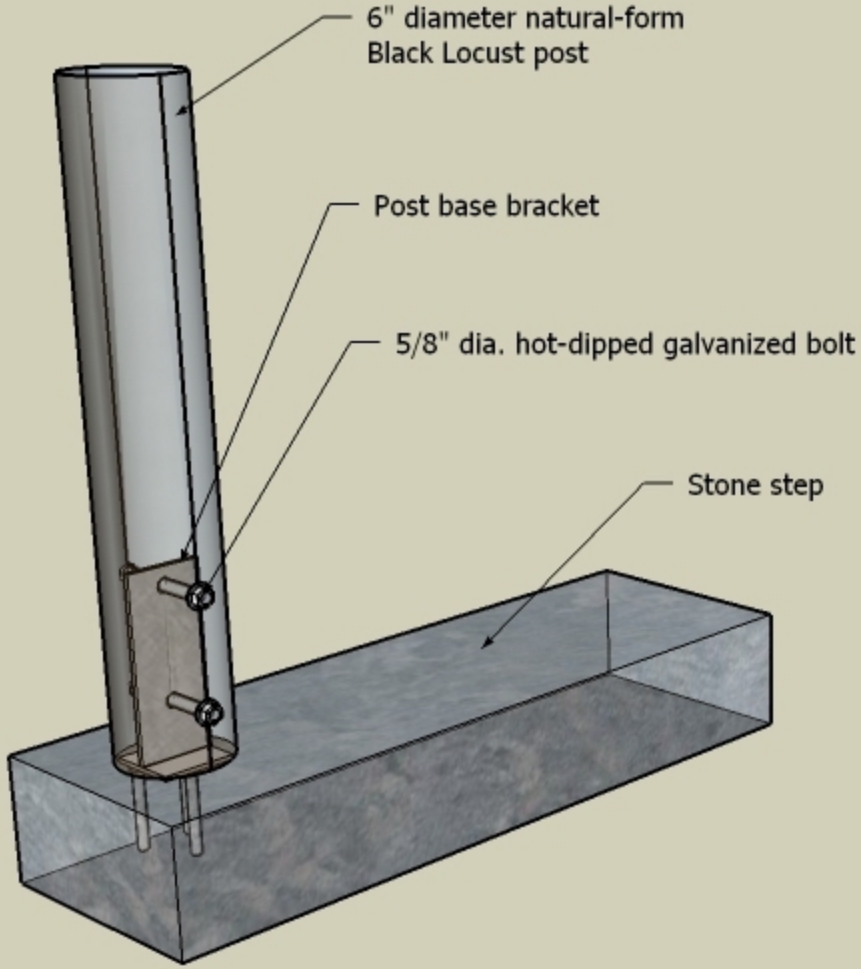
B-3

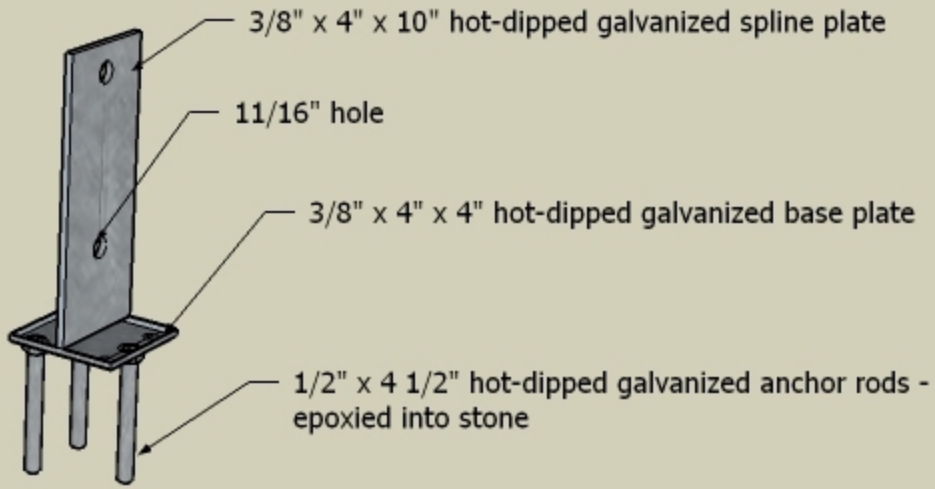
Memorial Park Trail
Memorial Park

Bristol, VT

Barrier 3

12/17/2018





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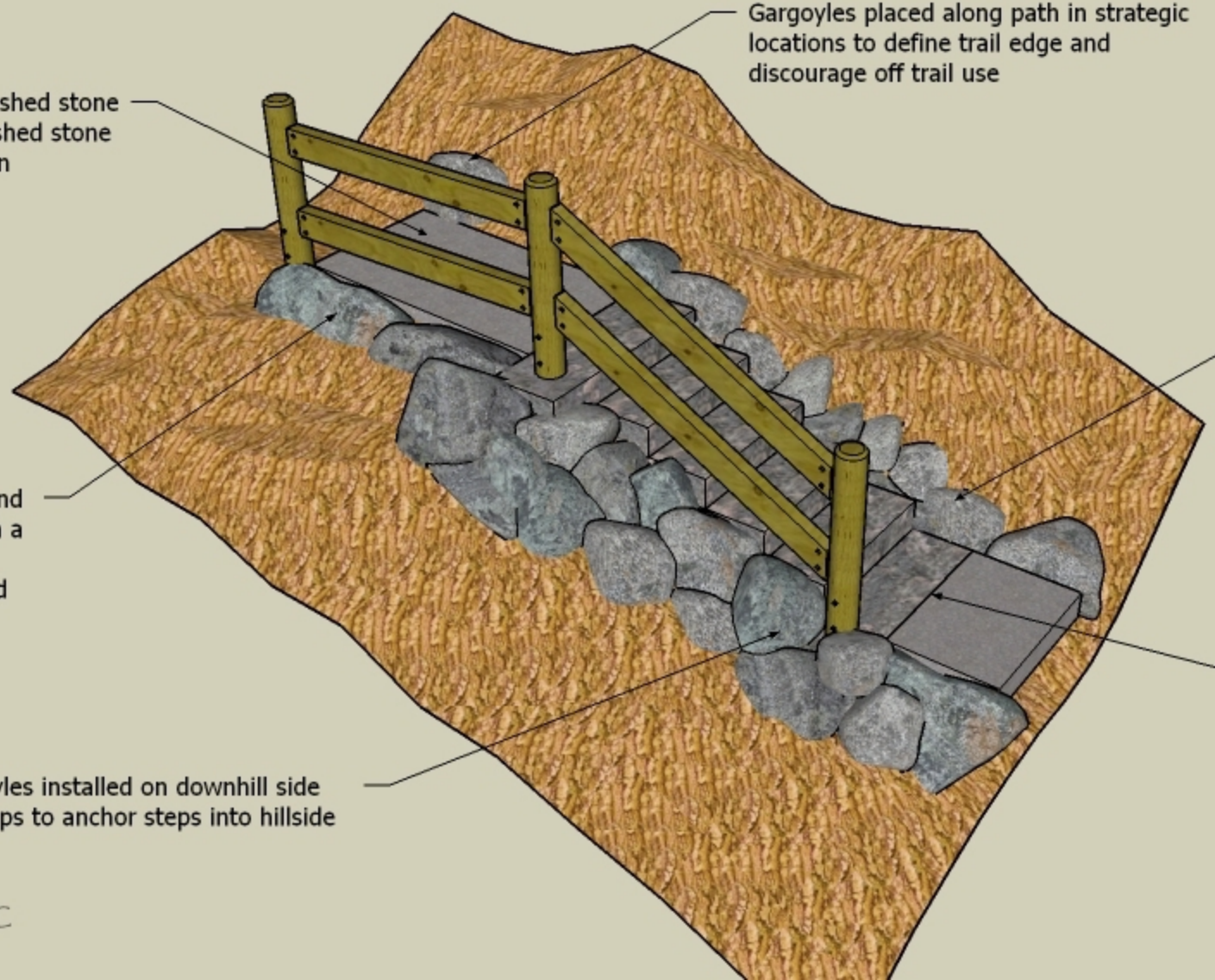
Memorial Park Trail
Memorial Park

Bristol, VT

Cribbing 1

12/17/2018

C-1



Timber & Stone, LLC
Recreational Trail Design and Construction

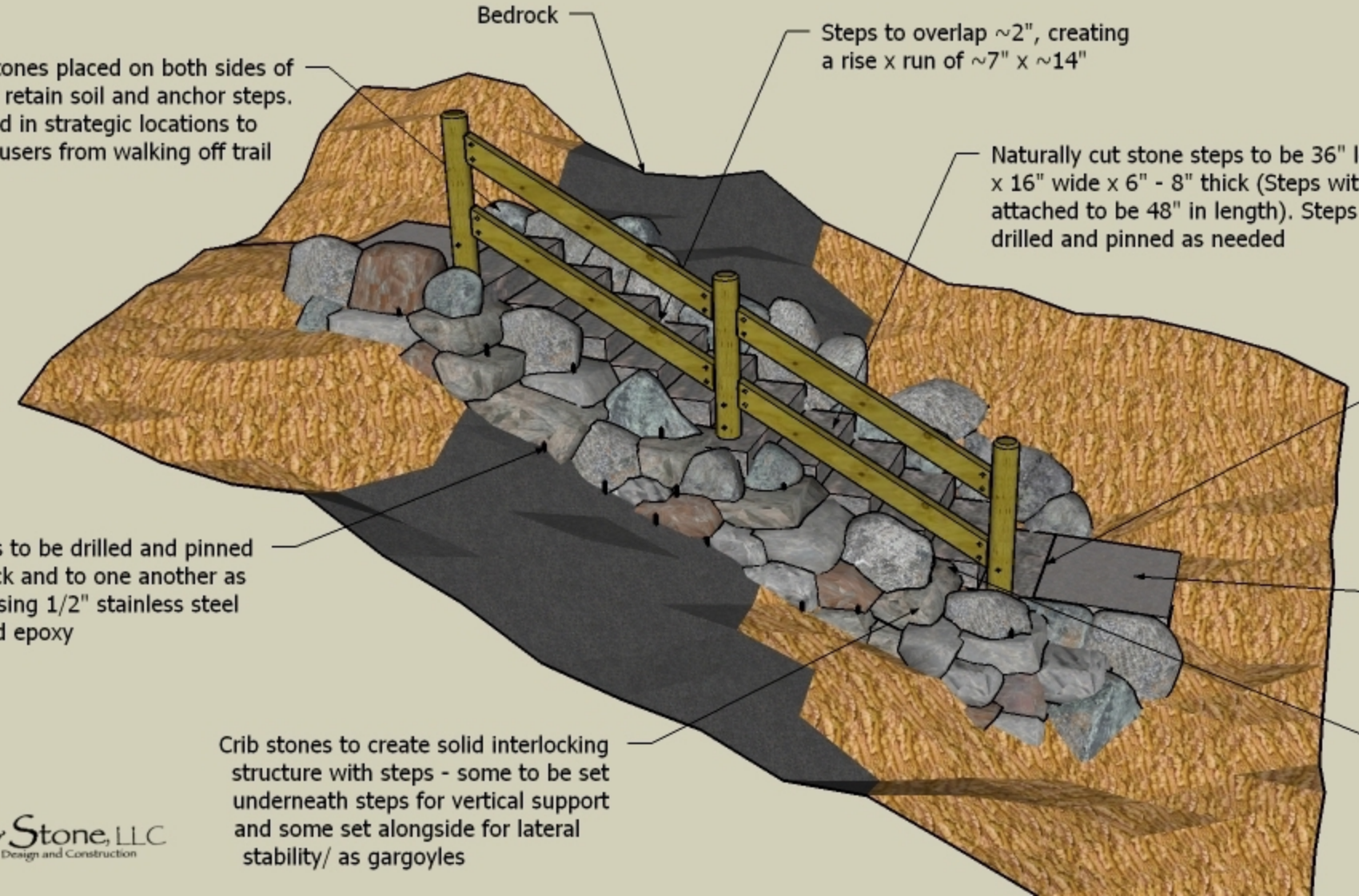
C-2

Memorial Park Trail
Memorial Park

Bristol, VT

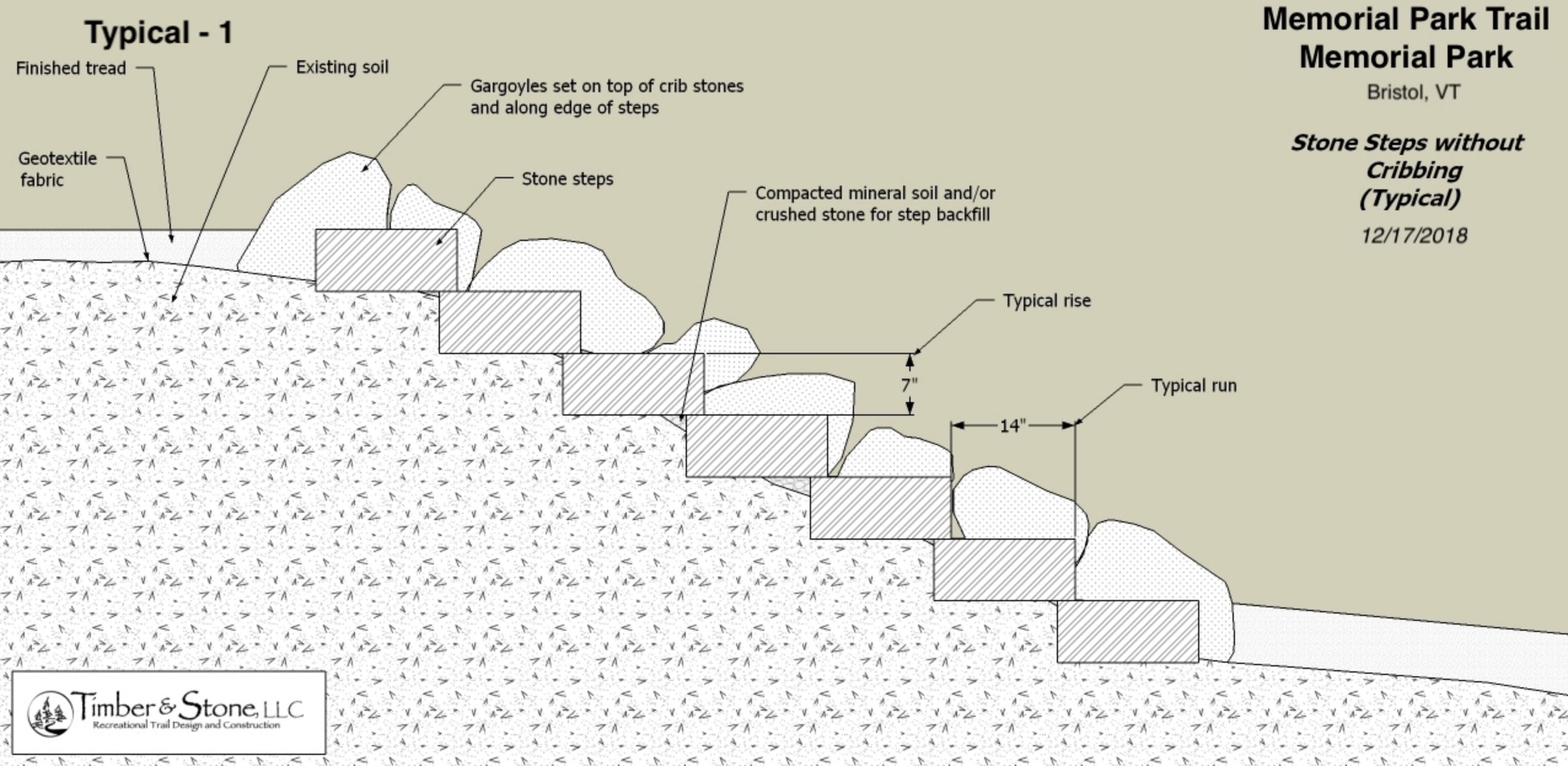
Cribbing 2

12/17/2018



Timber & Stone, LLC
Recreational Trail Design and Construction

Typical - 1



Memorial Park Trail
Memorial Park
Bristol, VT

Stone Steps without Cribbing (Typical)

12/17/2018

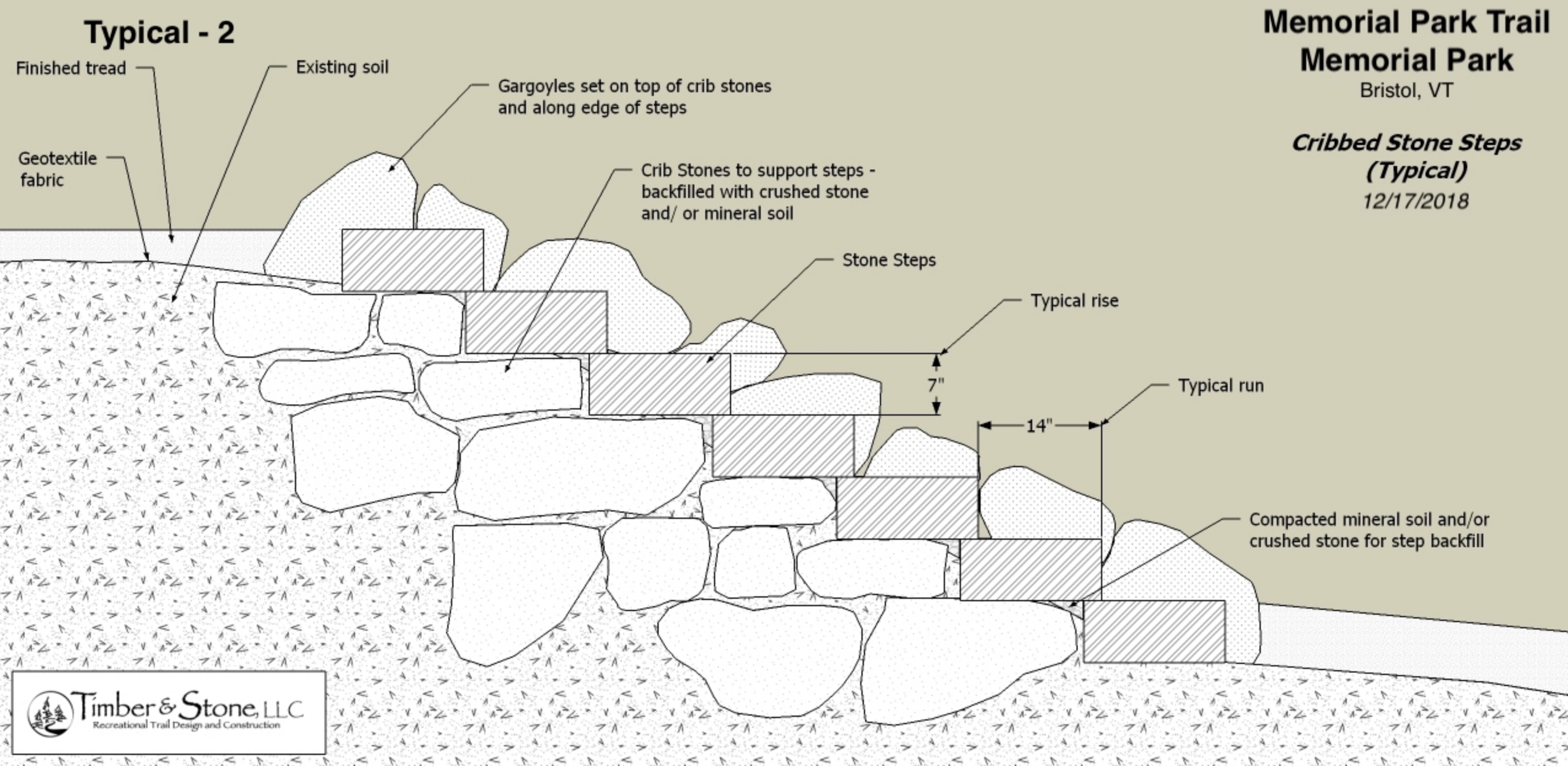
Timber & Stone, LLC
Recreational Trail Design and Construction

Typical - 2

Memorial Park Trail
Memorial Park
Bristol, VT

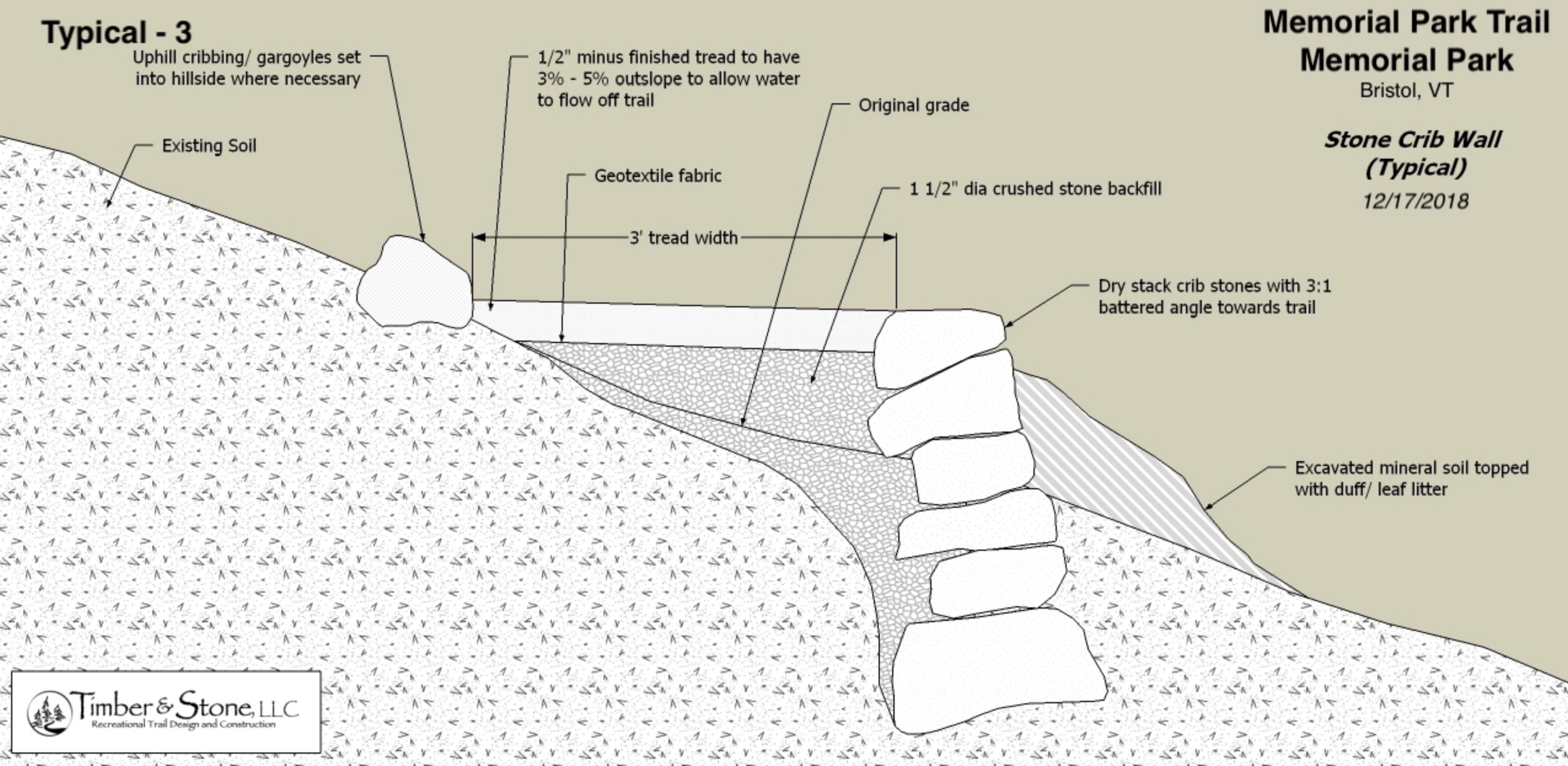
Cribbed Stone Steps (Typical)

12/17/2018



Timber & Stone, LLC
Recreational Trail Design and Construction

Typical - 3



Memorial Park Trail
Memorial Park
Bristol, VT

Stone Crib Wall (Typical)
12/17/2018

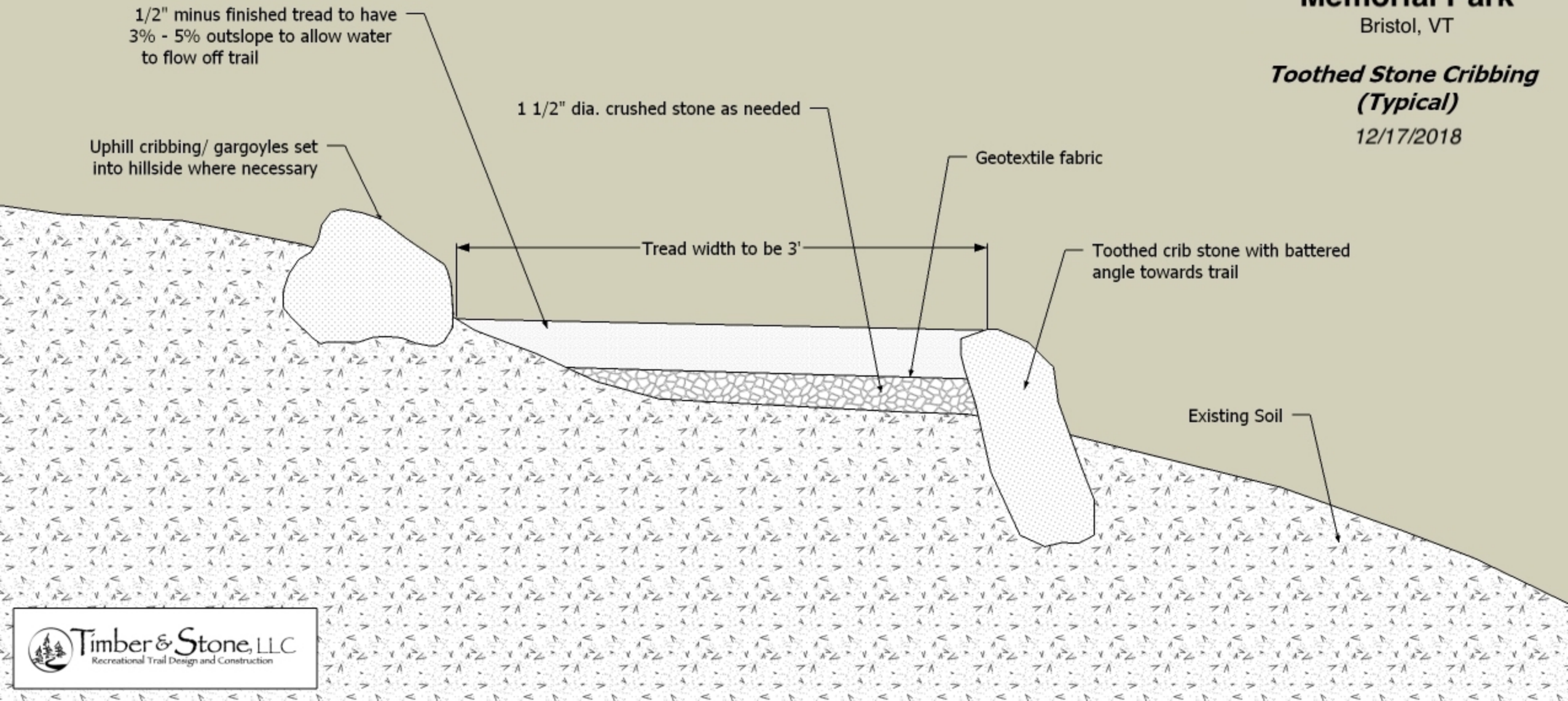
Timber & Stone, LLC
Recreational Trail Design and Construction

Typical - 4

Memorial Park Trail
Memorial Park
Bristol, VT

Toothed Stone Cribbing (Typical)

12/17/2018



Timber & Stone, LLC
Recreational Trail Design and Construction

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TIMBER & STONE, LLC

Firm Overview

Since 2004, Vermont based Timber & Stone, LLC has provided technical advice and construction expertise to land managers seeking to build or improve recreational trails. Conservation Minded Construction is the adage that guides our work.

Our goal—sustainably built, multi-use trails that provide users with a safe and enjoyable outdoor experience. We work with a variety of clients and project sponsors—from municipalities to private landowners—on projects throughout the Northeast.

Timber & Stone, LLC is dedicated to providing clients with professional, customized trail design and quality, conservation-minded construction. Whether working independently or alongside volunteers, Timber & Stone, LLC is committed to making the trail construction process, from initial consultation to the final ribbon cutting, a rewarding experience for the entire community.

WHAT WE BELIEVE

Trails provide people with opportunities to recreate, educate, and contemplate.

They are an essential component of our culture. Trails offer a safe and sustainable way to access wild areas. They are also a vital part of building vibrant community; offering a recreational outlet to the public. With thoughtful, informed consideration paid to design and construction, trails enhance the intrinsic value of natural areas to the human community.

WHAT WE DO

Trail Design. Construction. Education.

For the last fourteen years, Timber & Stone, LLC has assisted clients—from municipalities to private landowners—in transforming their trail aspirations into reality. Our goal is to build safe, appropriately designed trails and pathways in a sustainable and efficient manner; trails that balance recreational needs while preserving the character and sanctity of the natural landscape.

Simply put, we build trails that stand the test of time.

Founded and based in Central Vermont, Timber & Stone, LLC has completed projects throughout the Northeast. We are available to work as a contracted crew or alongside volunteers, students, and stewards. With a keen eye to safety, we empower groups of volunteers by building skills and camaraderie while effectively managing the worksite to attain a high quality product.

Timber & Stone, LLC
Recreational Trail Design and Construction

WHO WE ARE

In addition to our team of employees, Timber & Stone, LLC is comprised of 3 dedicated trail designer/builders.

Josh Ryan

Principal Trail Designer and Builder

Josh has been recreating on and caretaking trails since the day his parents first laced up his hiking boots.

For over twenty years, Josh has worked on trails with a wide array of students, volunteers, and fellow trailbuilders both as a Crew Leader and as an independent contractor. Previous to founding Timber & Stone, LLC, Josh worked for the Vermont Youth Conservation Corps, Maine Conservation Corps, Student Conservation Association, US Forest Service, and completed his graduate coursework in Environmental Education at Antioch University in Keene, NH.

Josh makes his home in East Montpelier, Vermont with his wife, two daughters, and one gigantic Newfoundland pup. In addition to constructing trails, Josh has also taught courses in Trail Design and Construction at local Universities and Graduate Schools. He is an active member of the Professional Trailbuilders Association and the local East Montpelier Trails Committee. Josh also serves as a Committee Member for the annual Vermont Conference on Recreation and was appointed by VT Governor Phil Scott to serve on the Vermont Outdoor Recreation Economic Collaborative task force.

Gordon Adams

Trail Designer and Builder

After a two-year hiatus, we were pleased to welcome Gordon back to the trailbuilding team in 2015. Gordon was instrumental to the completion of numerous, multi-faceted trail projects during the 2011/2012 trail season.

Since last working for Timber & Stone, LLC in 2012, Gordon traveled extensively through the United States, taking time to work on various farms through the WWOOFer (Willing Workers on Organic Farms) program and thru-hiking the Appalachian Trail with his brother and his trusty dog companion, Jack.

Gordon brings a strong set of skills in fine woodworking, carpentry, traditional trailwork, and ecological inquiry to his work with Timber & Stone, LLC. In the past, Gordon has worked for Stauffer Woodworking, Vincent L. Adams Cabinetmakers, and Maine Coast Heritage Trust and pursued studies at the Dutchess Academy of Environmental Studies in Staatsburg, New York and Sterling College in Craftsbury, Vermont. A native of upstate New York, Gordon currently makes his home in East Montpelier, Vermont.

Pete Hiser

Trail Designer and Builder

Pete Hiser joined the Timber & Stone, LLC crew in 2016.

Pete graduated from the University of New Hampshire in 2014 with a B.S. in Environmental Conservation and Sustainability. This academic background combined with his many years of work in the landscaping industry are the perfect fit for the projects we have on tap for this season. Pete brings a variety of transferable skills from his experience working in the landscaping industry including: equipment operation and maintenance, site planning and layout, and technical stonework. A born and bred Vermonter, Pete's professional and personal aspirations give him ample time to adventure in the natural surroundings. He is an avid fly fisherman and enjoys camping, hiking, and skiing whenever he can. Pete currently resides in Burlington, Vermont.

Joshua D. Ryan

4764 Center Road
East Montpelier, VT 05651

802-522-9856
timberandstonellc.com

Education

Antioch New England Graduate School, M.S. Environmental Studies, May 2005

University of Maine, B.S. Recreation and Park Management

University of Idaho, Resource Recreation and Tourism, Semester Exchange

Work Experience

Timber & Stone, LLC

Principal Trail Designer and Builder, 2003-Present

- Consult with land managers to develop trail design and management plans
- Facilitate trail design workshops for public, private, and non-profit land managers
- Design and build trail projects located in VT, NH, ME, MA, CT, NY, IL, MD, PA, NM
- Specialize in low impact and sustainable construction of timber and stone structures

Antioch New England Graduate School

Adjunct Faculty, 2005

- Created and instructed a weekend course entitled "Trail Design and Construction"
- Co-created and instructed a residential week-long course entitled "The Conservation Challenges of the Northern Forest"

Teaching Assistant, 2004

- Developed and taught lesson plans focused on interpretive trail design and construction

Peter S. Jensen & Associates, LLC

Professional Trailbuilder, 2000-2004

- Designed and constructed multiple-use recreational trails throughout Eastern US

Vermont Youth Conservation Corps

Conservation Program Manager, 1999-2004

- Responsible for the development and coordination of a summer youth development and conservation work program that served over 350 individuals
- Trained and supervised Crew Leaders and Crew Supervisors on technical trail construction skills, group leadership techniques, and backcountry living skills

Conservation Crew Leader, 1997-1999

- Co-led eight wilderness based and community based trail maintenance crews
- Taught community living, teambuilding, and conservation work skills to groups with diverse age, education, and socioeconomic backgrounds

Sugarloaf Outdoor Center, ME

Trailbuilder and Cross Country Ski Instructor, 1997-1998

- Constructed backcountry bridges and trails for use by cross country skiers

Maine Conservation Corps / Outward Bound, ME

Trail Crew Member, 1995

- Served on a 10 person backcountry trail crew over eight weeks

Student Conservation Association / United States Forest Service, NH

Resource Assistant, 1994

- Patrolled and maintained backcountry trails
- Developed environmental education programs for public staying at USFS campground

Volunteer Experience

Professional Trailbuilders Association - *Member, 2010 - Present*

Vermont Outdoor Economic Collaborative - *Task Force Member, 2017 - Present*

Vermont Recreation and Parks Association - *Committee Member, 2012 - Present*

East Montpelier Trails Committee - *Board Member, 2015 - Present*

"A mind that is stretched by a new experience can never go back to its old dimensions."
- Oliver Wendell Holmes

Timber & Stone, LLC
Recreational Trail Design and Construction

Project Portfolio: Multi-Use and Universally Accessible Trail Design and Construction

Rock Point Trail Improvements (2018)
Rock Point, Burlington, VT

Overview:
-Completed Phase I of trail improvements intended to improve safety and water access at this popular trail network, including: barrier system at overlook, installation of bridges, timber box steps, and stone staircases

Contact:
Craig Smith, Director of Operations and Program
Rock Point
csmith@diovermont.org or (802) 652-0908

Barnes Camp Accessible Boardwalk (2017)
The Long Trail, Stowe, VT

Overview:
-600 foot elevated wetland boardwalk on a helical pile foundation system
-Multiple viewing platforms installed along this scenic section of the Long Trail

Contact:
Tasha Wallis, Executive Director
Lamoille County Planning Commission
tasha@lcpcvt.org or (802) 888-4548

Bomoseen State Park Accessible Boardwalk (2016)
Bomoseen, *VT*

Overview:
-200 foot boardwalk supported by helical pile foundations and located within a sensitive wetland environment
-Decking and railing constructed of naturally rot resistant Black Locust and White Oak

Contact:
Frank Spaulding, Parks Project Coordinator
Vermont Department of Forest, Parks & Recreation
frank.spaulding@vermont.gov or (802) 522-0798

Mount A Accessible Trail (2014-2016)
Mount Agamenticus Conservation Area, York, ME

Overview:
-Design and construction of a one mile accessible trail that navigates granite ledges and rock outcroppings
-Installed multiple boardwalks, bridges, and a 30' circular observational platform

Contact:
Robin Kerr, Conservation Coordinator
Mount Agamenticus Conservation Region
robin@agamenticus.org or (207) 361-1102

Eshqua Bog Accessible Trail and Boardwalk (2014-2015)
Eshqua Bog Natural Area, Hartland, VT

Overview:
-Design and construction of a 460 foot accessible boardwalk supported by helical pile foundations
-Multiple viewing platforms allows for photography and appreciation of rare wetland flora

Contact:
Lynn McNamara, Director of Stewardship
The Nature Conservancy in Vermont
lmcnamara@TNC.org or (802) 229-4425

Shaftsbury State Park Accessible Trail (2015, 2017)
Shaftsbury, VT

Overview:
-Design and construction of 100' accessible boardwalk supported by helical pile foundations
-Upgrade of existing boardwalk to comply with accessible trail guidelines

Contact:
Lisa Thorton, Stewardship Forester
Vermont Department of Forests, Parks, & Recreation
lisa.thorton@vermont.gov or (802) 777-7480

Entrance Bridge (2015/2016)
Birds of Vermont Museum, Huntington, VT

Overview:
-Design and construction of 100' accessible boardwalk and bridge supported by helical pile foundations
-This custom built structure serves as the main entry point to the museum facilities

Contact:
Erin Talmage, Executive Director
Birds of Vermont Museum
museum@birdsofvermont.org or (802) 434-2167

Spruce Peak Pathways (2015/2016)
Spruce Peak Resort, Stowe, VT

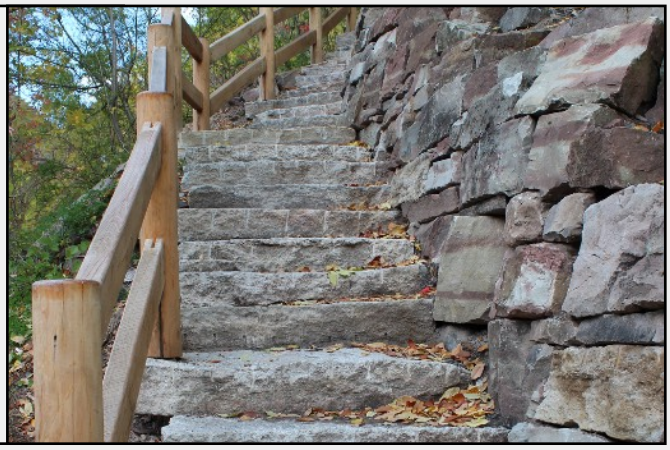
Overview:
-Design and construction of 1.5 miles of 3 foot wide, naturally surfaced trail system at base of Spruce Peak Resort
-Trail structures include; bridges, timber box steps, and 40 foot covered bridge at entrance.

Contact:
Jeff Nichols, Spruce Peak Realty, LLC
(802) 760-4628

Art Park Trails (2012)
Niagara Falls Gorge, Lewiston, NY

Overview:
-Installation of series of 388 stone steps, including retaining walls, to allow for river access.
-Design and installation of custom Black Locust and stainless steel barrier system.

Contact:
Stephen Schoenweisner, Licensing Manager
New York Power Authority
Stephen.Schoenweisner@nypa.gov or (914) 287-3457



Front Bay Park (2012)
Wolfeboro, NH

Overview:
-Design and construction of a one mile accessible trail system that borders Lake Winnipesaukee
-Design, construction, and installation of an accessible timber framed gazebo

Contact:
Rob Houseman, Former Wolfeboro Town Planner
robert.houseman@hanovernh.org
(603) 640-3212

Bear Mountain State Park (2006-2010)
Appalachian Trail, Bear Mountain, NY

Overview:
-Construction of stone staircases and retaining walls at this high use destination
-Trained volunteers on stone building and backcountry hiking trail construction skills

Contact:
Eddie Walsh, Principal
Tahawus Trails, LLC
tahawustrails@gmail.com or (845) 591-1937

Timber & Stone, LLC
Recreational Trail Design and Construction

Project Portfolio: Trail Assessment, Planning and Design

Overview: For over a decade, Timber & Stone, LLC has prepared comprehensive trail design plans and reports for dozens of organizations and municipalities for properties throughout the Northeast.

Each of the document titles below indicates the completion of extensive field work. Foot-by-foot analysis of a trail is required in order to generate thorough construction and/or maintenance specifications for each site.

Enders Falls Trail Design
Prepared for: Connecticut Department of Energy and Environmental Protection
Granby, CT (2018)

Raven Ridge Natural Area Accessible Boardwalk and Trail Design
Prepared for: The Nature Conservancy
Hinesburg, VT (2017)

Norwalk River Valley Trail Layout and Design
Prepared for: Friends of the Norwalk River Valley Trail (NRVT)
Ridgefield, CT Section (2018), Norwalk, CT Section (2017),
Redding, CT Section (2016) and Wilton, CT Section (2013)

Rock Point Trail Assessment and Design
Prepared for: The Rock Point Center
Burlington, VT (2017)

Pine Island Cemetery Trail Design
Prepared for: Norwalk Redevelopment Agency
Norwalk, CT (2017)

Ossipee Pine Barrens Accessible Trail Design
Prepared for: The Nature Conservancy
Ossippee, NH (2017)

Lubberland Creek Accessible Trail Design
Prepared for: The Nature Conservancy
Newmarket, NH (2017)

Marshall Conservation Area Trail Master Plan
Prepared for: Town of Conway, NH (2016)

Hawkins Brook Nature Trail Accessible Trail and Boardwalk Design
Prepared for: Town of Meredith, NH (2016)

> "The trail layout and design document Timber & Stone, LLC prepared was thorough; sufficiently so, that is has given funders the confidence to make substantial contributions and was used to successively support permit applications."
>
> -Pat Sesto, Chairperson
> Norwalk River Valley Trail

North Branch Cascades Trail Assessment and Design
Prepared for: The Vermont River Conservancy
Worcester/Elmore, VT (2016)

Mills Riverside Park Trail Assessment Plan
Prepared for: Jericho/Underhill Park District
Jericho, VT (2016)

Black Mountain Trail Assessment and Design
Prepared for: The Nature Conservancy
Dummerston, VT (2015)

Wiessner Woods Trail Management Report
Prepared for: Stowe Land Trust
Stowe, VT (2015)

Birds of Vermont Museum Accessible Trail
Prepared for: Birds of Vermont Museum
Huntington, VT (2014)

Shoreline Greenway Trail Maintenance Plan
Branford, CT (2014)

Eshqua Natural Area Accessible Trail Design
Prepared for: The Nature Conservancy
Hartland, VT (2013)

Burlington Multi-Use Trail Design
Prepared for: Burlington Parks and Recreation
Burlington, VT (2013)

Sustainability Academy Multi-Use Trail
Prepared for: Burlington Sustainability Academy
Burlington, VT (2012)

Front Bay Park Accessible Trail Design
Prepared for: Town of Wolfeboro
Wolfeboro, NH (2011)

Maple Street Park Multi-Use Trail Design
Prepared for: Essex Junction Recreation and Parks
Essex Junction, VT (2011)

Indian Brook Reservoir Trail Maintenance and Management Plan
Prepared for: Town of Essex
Essex, VT (2010)

"Timber & Stone, LLC has been helping us to make our trail networks more durable, accessible, and enjoyable for the past decade. Their work is high quality and well designed. It reflects a clear understanding of what makes for a positive and memorable recreational experience for the range of user groups and abilities that frequent our trails. "

-Kristen Sharpless,
Conservation Program Manager
Stowe Land Trust

Timber & Stone, LLC
Conservation Minded Construction

Joshua D. Ryan
4764 Center Road
East Montpelier, VT 05651

Phone: 802-522-9856
Email: joshryan@timberandstonellc.com
Web: www.timberandstonellc.com

Project Estimate: December 22, 2018

To:
Porter Knight
Bristol Trail Network/Bristol Recreation Club
PO Box 411
Bristol, VT 05443

Bristol Memorial Park Trail
Bristol, VT

Work Description –		
Priority I – Remove Existing Elevated Staircase		
To be Accomplished by Volunteers	$	0.00
• Assumes no oversight by Timber & Stone, LLC		
• All material to be hauled off site and disposed of properly		
Priority II – Construct Trail Reroute from Trail Log 128-224		
Construction Materials		
• 20 stone steps, imported from Sharon Quarry, 6-8" rise x 18" run x 3' width, including gargoyles along the side of each step	$	3,500.00
• 52 square feet of cribbing	$	1,175.00
• Pressure treated framing material, Black Locust railing material, galvanized railing infill, galvanized fasteners and hardware	$	8,694.00
Equipment Rental	$	2,369.00
• Canycom BFP602 Power Wheelbarrow		
• Ditch Witch Sk650 Mini Skid Steer		
• Stone Drill and Generator		
Construction Labor – (Mobilization, Construction, Cleanup, and Demobilization)	$	19,800.00
Additional Expenses		
Mobilization – (delivery of machines to site and pick up at end of project)	$	500.00
Project Total =	**$**	**36,038.00**

This quote is relevant to the 2018/19 Construction Season and includes the following:
Professional Trail Construction Labor
Timber & Stone, LLC Liability Insurance and Administrative Overhead
Crew Mobilization, Specialty Tools, and Equipment Expenses

This Quote is Design/Build Based and is Subject to Change Based on the Following:
Change in Trail Design Before Start of Construction
Change Order of Trail Design After Start of Construction

Timber & Stone, LLC
Conservation Minded Construction

Joshua D. Ryan
4764 Center Road
East Montpelier, VT 05651

Phone: 802-522-9856
Email: joshryan@timberandstonellc.com
Web: www.timberandstonellc.com

Project Estimate: December 22, 2018

To:
Porter Knight
Bristol Trail Network/Bristol Recreation Club
PO Box 411
Bristol, VT 05443

Bristol Memorial Park Trail
Bristol, VT

Work Description –	
Priority III – Construct Entrance Stone Steps from Trail Log 00-128	
Construction Materials	
• 80 stone steps, imported from Sharon Quarry, 6-8" rise x 18" run x 3' width, including gargoyles along the side of each step	$ 14,000.00
• 31 Linear feet of Black Locust Barrier	$ 1,241.00
Equipment Rental	$ 2,369.00
• Canycom BFP602 Power Wheelbarrow	
• Ditch Witch Sk650 Mini Skid Steer	
• Stone Drill and Generator	
Construction Labor – (Mobilization, Construction, Cleanup, and Demobilization)	$ 15,500.00
Additional Expenses	
Mobilization – (delivery of machines to site and pick up at end of project)	$ 500.00
Project Total =	**$ 33,610.00**

This quote is relevant to the 2018/19 Construction Season and includes the following:
Professional Trail Construction Labor
Timber & Stone, LLC Liability Insurance and Administrative Overhead
Crew Mobilization, Specialty Tools, and Equipment Expenses

This Quote is Design/Build Based and is Subject to Change Based on the Following:
Change in Trail Design Before Start of Construction
Change Order of Trail Design After Start of Construction