



# Stream Crossing Infrastructure Planning Guidance

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## Contents

Introduction .....	1
Purpose of this Guide:.....	2
What this Guide will NOT do: .....	2
Key Factors to Consider First.....	3
Is Infrastructure Necessary? .....	5
Range of Potential Solution Alternatives .....	7
Communication and Hiker Education are Key .....	8
The Deep End: More to discuss with management partners .....	9
Non-bridge Infrastructure.....	9
Temporary Bridges.....	10
Bridge Design Considerations .....	10
Approval/Compliance and Funding Processes .....	12
Appendix A: How Many Bridges Are On the A.T.? .....	14
Appendix B: Examples of Recent Projects (2018-25).....	14
Appendix C: Liability, Communication, and Education.....	15
Appendix D: A.T. Experience Analysis Matrix (Desired Condition Zones) .....	16
Appendix E: Accessibility Guidelines.....	19
Appendix F: Additional USFS Resources for a Deeper Dive .....	19
Appendix G: Contributors to the Stream Crossing Infrastructure Planning Guidance .....	19

## Introduction

Stream crossings are a regular, and often desirable, feature encountered by visitors to the Appalachian Trail (A.T.). Many of these stream encounters are welcome attributes as the A.T. was created to provide close contact with the natural world and an opportunity to experience the Trail’s wild and scenic lands by one’s own unaided efforts. With increased visitation and a growing variety of new user groups, A.T. Trail clubs and agencies are increasingly called upon by visitors and local first responders to increase A.T. infrastructure, including bridges, and provide a rationale when infrastructure is or is not provided. As a result, stream crossings are becoming a significant issue for Trail managers. The northeastern United States in particular has seen a

The Northeast has seen a roughly **60% increase in extreme precipitation days**, the largest increase of all U.S. climate regions.

The intensity of these events has also increased. This trend, along with an increased risk of flooding, is expected to continue.

significant precipitation increase in the last century ([Cornell Regional Climate Center](#)). Along with overall higher rainfall, a concurrent continued increase in rainfall intensity during storm events has repeatedly compounded trail management challenges in ATC's Northeast Region. Other Regions are also experiencing challenges from more frequent extreme weather events, and this trend is expected to continue.

Managing stream crossings on the AT is complex. The Trail's experiential values can be compromised by routinely installing bridges at stream crossings that can generally be waded during most of the hiking season. [ATC Policy](#) notes that un-bridged stream crossings may be impassable shortly after a storm or during late winter and spring runoff; others may provide a certain measure of challenge even in low-water conditions. These variable primitive conditions are essential to the A.T. Both the visitor experience and the natural resource itself deserve protection.

## **Purpose of this Guide:**

This Guide will assist managers in submitting an informed proposal for addressing stream crossing infrastructure. Introducing a range of potential strategies for exploration, it also offers a deeper dive into multiple site-specific factors to consider when making decisions about an individual crossing. As a supplement to [ATC's 2011 Stream Crossing Policy](#), it is intended to:

- Prompt questions to help A.T. Managers organize stream crossing assessments and determine what manner of crossing infrastructure--if any--is necessary for resource protection, hiker safety and the appropriate degree of challenge.
- Provide initial guidance to A.T. Managers regarding what may be most appropriate for the type of visitor opportunity and degree of primitiveness and challenge that partners are preserving for a given area.
- Summarize resources regarding risk management responsibility, recreational use liability, and legal protections for trail management partners.
- Before proposing to build, replace or repair a bridge or other crossing infrastructure, provide A.T. Managers with information to develop a fuller picture of the likely design requirements.
- Outline strategies for communicating with and educating Trail visitors who may encounter unbridged crossings.

## **What this Guide will NOT do:**

- Inform or advise visitors when it is safe or not safe to cross any waterway, nor should Trail Clubs attempt to do so. ATC has recently [updated information](#) for trail visitors about how to identify stream crossing hazards and techniques to use when crossing flowing water. However, hikers remain responsible for their own comfort and safety on the Trail.
- Serve as a land-manager policy, or substitute.
- Substitute for engaging with qualified hydrologists, engineers or structural designers.

- Offer construction means and methods.
- Provide a checklist of solutions to apply to all stream crossing locations.
- Provide legal protections for trail clubs, volunteers (beyond current VIP/VIF programs), agency land managers or abutting private landowners.

## Key Factors to Consider First

When there is a question about whether something should be done at a stream crossing, explore the key considerations outlined below with land management partners ***before proposing to install or replace any crossing infrastructure:***

**Land manager policy:** The A.T. traverses across land managed by several different land management agencies, including Federal agencies and state parks and forests. Each land manager may have a different policy on stream crossings and infrastructure (or no policy at all).

**Frequency and severity of extreme conditions:** Notable changes in weather patterns have resulted in more frequent flooding, higher water levels and faster stream flows during flood events, and can make for formidable crossings of un-bridged streams at times. The severity and duration of these events may depend largely on individual stream characteristics, and may result in new or replacement trail bridges that are wider, taller, longer and stronger to withstand more frequent and severe flood events

It is not practical or desirable to bridge every stream encountered on the A.T. and *there is no expectation that hikers will always be able to cross in adverse conditions*. Given the widely varying and differing levels of hiking skill and experience, not all visitors will be comfortable crossing every stream in any condition. Hiker education about the intended experience and personal risk assessment are critical, along with communication about extreme conditions.

**Visitor Experience--the appropriate degree of primitiveness and challenge to protect experiential values:** The A.T. is maintained for a variety of visitor experiences ranging from primitive or designated Wilderness settings to pastoral, open agricultural land and more urbanized walks through towns.

Crossing decisions should be aligned with and help to support the type of visitor experience that management partners are preserving for a given area. There are sections of the A.T. where bridges are not a desirable feature, and others where bridges are tolerated but designed to be as unobtrusive as possible, given structural requirements. New or replacement bridges, especially the more substantial bridges required by today's engineering standards, could negatively change the setting of the A.T. and the character of the experience.

**Optimal Crossing Location:** Before considering installing or replacing infrastructure, determine if there is an alternative, more optimal crossing location or feasible bypass route that improves both the visitor experience and resource protection.

**Natural Resources:** Depending on the unique characteristics of the stream, surrounding soils and vegetation, aquatic organisms and wildlife, crossing infrastructure may help to concentrate visitor use and reduce impacts to sensitive resources. Managers may need to consider crossings together with complementary strategies (e.g., communication, overnight sites, bypass routes) for minimizing hiker impact on natural resources. Land management agencies must always be consulted about potential presence of sensitive species.

**Cultural Resources:** Land management agencies are always consulted about possible cultural sites at the proposed work location. Further, bridges are considered part of the historic fabric of the A.T. and contribute to its National Register status. Proposals for any removal or modification of existing bridges must be reviewed for Section 106 status.

**Accessibility: Current ADA/ABA (American With Disabilities Act/Architectural Barriers Act):** When accessibility requirements apply to bridges, code specifies certain design criteria and materials such as railing type and height, walking surface width and type and accessible access to the bridge itself. See **Appendix E** for more info.

**Cost and Sustainability:** Bridges are extremely expensive and costs continue to rise. Large trail bridges over wide stream banks can cost up to \$500,000, even as much as \$2,000,000 for large, complex projects. Even modest bridges can typically have a total project cost of over \$100,000 (See **Appendix B**). New or replacement bridges are likely the most expensive and management-intensive projects that will be undertaken on a given segment of Trail. Repeatedly investing in expensive structures that may be damaged frequently is not sustainable; however, larger, more intensive bridges--designed to resist more severe conditions--may not be in keeping with A.T values and/or the desired visitor experience.

Current ATC Policy defines a footbridge as a permanent, artificial structure not in continuous contact with the ground, regardless of length, width, or height above the surface, with a load-bearing free span between abutments, piers or sills, for pedestrian passage over streams, wetlands, or obstacles. Bog bridges/puncheon used for Trail hardening, and fence stiles, are not included in this definition.

Bridges (regardless of length) proposed to be removed, installed or replaced require compliance with NEPA, Section 106 and code requirements. Bridges 20 linear feet in length or longer proposed to be removed, installed, or replaced, in addition to compliance with NEPA, Section 106 and code requirements also require a qualified engineering design.

## Is Infrastructure Necessary?

### Assessing Hazards, Experiential Zones and Resource Damage

The [ATC 2011 Stream Crossing Policy](#) provides a starting foundation for exploring whether crossing infrastructure is necessary and what options might be most appropriate:

*“In general, a bridge should be constructed or replaced only if: 1) It is essential to hiker safety during the snow-free hiking season, recognizing that a stream may not be fordable when flooding occurs; or 2) It is absolutely necessary to protect sensitive resources, such as soils, habitat or wildlife along a riverbank or other wet area.”*

**Frequency and severity of extreme conditions.** If flooding is frequent, high, and long lasting during the peak hiking season, coordinate with land managers to look first for better crossing locations that minimize the need for substantial infrastructure--while preserving critical experiential resources. If rerouting the trail to a better crossing location or establishing a high water bypass route is not feasible, infrastructure may be warranted.

Stream trend data can be gathered from the US Geological Service (USGS) but it is not available for every stream. Best practice is to work with land managers and professional hydrologists to develop a comprehensive picture of historical stream behavior. Most agency partners will have access to qualified staff.

**Physical stream characteristics that may present hazards.** Even if flooding is less frequent or deep, infrastructure may still be warranted if there are other crossing challenges present. Examine the key physical features of the crossing area. At crossings located downstream of large drainage areas, or where surrounding features can result in a stream that is deep and fast moving, or precipitation can cause rapid rises in stream level. Uneven bottom conditions and turbid water can make footing challenging or unsafe, as can submerged vegetation, tree parts, improperly discarded fishing tackle, debris, etc. Downstream hazards that may injure hikers swept off their feet include strong rapids, water falls, strainers, snags and culverts that may pin hikers under water.

**Consider what degree of primitiveness and challenge land managers are trying to preserve for a given area.**

*Policy: “Un-bridged stream crossings may be impassable shortly after a storm or during late winter and spring runoff; others may provide a certain measure of challenge even in low-water conditions. These primitive conditions are essential to the Appalachian Trail experience and deserve protection.”*

The A.T. Experience exists on a spectrum that contains six zones, ranging from completely primitive to urban settings. This system categorizes parts of the A.T. by their sense of primitiveness and/or challenge.

In designated Wilderness and areas managed for a more primitive and challenging experience (Zone 1 Primitive and Zone 2 Semi-Primitive), bridge infrastructure is generally undesirable. More intensive infrastructure may be tolerated on a spectrum in more frontcountry settings (Zone 5 Rural and Zone 4 Semi-Natural).

## Visitor Experience Zones

For each trail section, its Experience Zone reflects the desired type of opportunity and degree of challenge - *and thus the level of development that is tolerated* - on a spectrum from 1 (Primitive) to 6 (Urban)

See ATX Zones in **Appendix D**

In developed landscapes (Zone 6 Urban), rivers and streams are often crossed immediately off a trailhead or on bridges shared with vehicular traffic (railroads, highways). The A.T. is usually a secondary feature of these crossings, and design and structural considerations are driven by the requirements for the vehicular traffic.

*Communicating with hikers about the range of opportunities and challenges is an important part of preserving desired conditions.*

If a bridge is determined to be a suitable solution to a stream crossing, increasingly stringent engineering requirements often call for bigger and stronger bridges. Consult with the land managing agency in determining if the size and design of the resulting bridge is appropriate for the setting and helps to protect the area's desired experience.

In popular areas, particularly those adjacent to more primitive zones, more intensive infrastructure may be appropriate. This may include trail sections leading to well-known points of interest, or near well-used parking areas/trailheads. However, this should not be the primary factor in determining the best stream crossing option.

Accessibility requirements may vary by land manager. See **Appendix E** for information on FSTAG (Forest Service Trail Accessibility Guidelines) and related policies and guidelines.

**Hikers who are searching for a place to cross, or waiting for water levels to recede, may damage sensitive resources.** Infrastructure should not be installed to merely protect against wet feet. More importantly, it is vital to understand that visitors searching for a crossing point can extensively trample streamside and riparian areas. A minimum level of infrastructure should be installed, when necessary, to protect sensitive streamside or riparian resources. Hikers can also congregate at stream crossings during high water periods, waiting for waters to recede so they can cross. Unsustainable streamside overnight site expansion can result if there are insufficient camping or high water route alternatives.

## Range of Potential Solution Alternatives

There are a wide range of potential solutions for stream crossings depending on specific circumstances, ranging from no infrastructure to simple step stones to significant lengthy spans and highly visible structures. Streams and the surrounding area (riparian zone) are environmentally sensitive locations. The Trail inevitably impacts every stream it crosses. Be realistic about the amount of visitor use associated with this “simple footpath.” Many A.T. locations are also located high in the water sources of towns and municipalities; therefore, water quality protections are critical.

**As a first step, A.T management partners should consult with land managers to assess the site to determine whether potential action may be necessary, exploring broad conditions as outlined above.** Next, work through the alternatives below, listed from lowest intensity to highest intensity, to determine which approach, or combination, is feasible and may be most appropriate for the site. In most circumstances, lowest intensity solutions should be given strongest consideration.

**No Action:** No change to the current crossing, or removal of existing infrastructure. Hikers may need to wait for conditions to improve. Conditions that prohibit passage are of short duration at peak use times of year, in line with the degree of challenge the site is managed for, and riparian resources are sufficiently protected. Enhanced visitor education is available for crossings that are potentially challenging.

**Create a fording opportunity:** A well-chosen ford or installed step-stones, combined with steps if needed to protect the stream banks from erosion, can be a low-intensive option at current stream crossing location.

**On-Site crossing resources to assist hikers, e.g., pole gauges (staff plates):** There are many ways to help visitors determine the depth of the water while standing on a bank, such as a pole or post, marks on stream banks, or photograph at the crossing. Accurate and obvious blazing or signage can effectively show entry and exit points of the stream.

**Relocate Crossing:** A different crossing point that requires less infrastructure, better protects resources and/or improves visitor experience.

**Alternate or “High Water” Route:** An alternate route bypasses the stream crossing point, then returns to the Trail. Typically making use of existing road bridges or less challenging terrain to cross the watercourse.

**Permanent Bridge:** Construct a sustainable, long term bridge at the desired crossing, sufficiently above the stream to provide clearance for all likely flood levels, and the approaches are still reasonable. The costs of this solution may be affected by engineering and permitting requirements, the site location and length of span.

**Alternative Options** such as Assistive Ropes/cables and Cable Cars may be a viable option to support crossings in specific circumstances where hikers need assistance in crossing challenging locations. *No engineering standards have been developed or approved by any A.T. land managers. Any proposed installations of this nature must be submitted to land managers well in advance for review.*

## Communication and Hiker Education are Key

Visitor communication and education efforts are key companions to all decisions made regarding stream crossings.

### Summary of Liability Concerns

Hikers accept the risk of traveling on the Trail.

Volunteers and landowners are generally not liable for the inherent risks of conditions present in nature.

However, managers are liable for not properly maintaining bridges and other infrastructure.

Managers can communicate about conditions but should not convey a crossing is “safe.”

*See more in **Appendix C***

Particularly for un-bridged crossings, information on how to assess conditions and techniques that can be used for a successful crossing should be accessible to trail visitors. Share stories of hikers who turned back or waited, but eventually made a successful crossing. Disseminate accurate and reviewed information on Trail manager bridge policies and visitor experience values. Provide information so visitors can evaluate stream conditions in the field and are aware of effective techniques for crossing un-bridged streams. Consider posting informational signage at some unbridged crossings. If high water bypass options are available, inform hikers at trailhead kiosks and/or at bypass intersections.

ATC offers [stream crossing guidance](#) for hikers. This information can be passed on through a variety of channels including signs at trailheads and on trail, in printed or online material, at Trail visitor centers and

hostels and other locations where visitors congregate. It can also be made available for distribution by trail clubs and other trail managing partners. Agency-approved signage for visitors regarding assessment and crossing of streams is available from ATC.

Visitors should be encouraged to observe and follow National Weather Service (NWS) flood advisories for the section of trail they are traveling on.

*Additional Questions to Consider:* Are there resources available for posting and maintenance of informational signs in remote locations (which are more likely to have unbridged crossings)? Are there off-trail sites that will accept and post information? When arriving at a challenging crossing, is information available and accessible (on location or online) to guide hikers’ crossing decision? Clubs and land managers are not expected to provide real-time information on conditions. Is there sufficient wireless coverage that apps such as *FarOut* may be able to share current conditions within their user group?



## The Deep End: More to discuss with management partners

If infrastructure creation seems to be the agreed upon option after working through the sections above with the land managing agency, the following provides further guidance to develop your infrastructure solution.

### Non-bridge Infrastructure

**Pole gauges** (staff plates) or other on-shore or in-stream depth indicators can be a low-tech, low-cost way to provide hikers with additional information to assess real-time conditions.

*Considerations:*

- Do they need to be re-established every spring or after high water events?
- Equating a specific water depth with “safe passage” is a liability.
- Depth indicator in feet or perhaps indicating “normal” or “high” levels is information, not assurance that a condition is safe.

A well-designed **ford or step-stones**, combined with bankside steps if needed to protect from erosion, may be a minimally intrusive option for when there is a low possibility of long lasting high water events and scouring stream flows.

*Considerations:*

- What are the relevant construction and resource protection criteria? Constructed fords, stepstones, bankside staircases--even though they may be relatively modest in terms of design, construction and funding compared to a full bridge--still require full land manager consultation and compliance review to protect riparian zone resources.
- Can these be sufficiently installed/inspected/maintained with volunteer resources in a backcountry environment?
- Is there a water level or flow condition where they should not be used?
- Are they appropriate in Zone 1 or Wilderness Areas?

**Alternative options: Assistive ropes/cables** can be a viable option to support crossings in specific circumstances where hikers need assistance to cross swift flowing water. **Cable Cars** (one- or two-person human powered carts) suspended on cables have been installed in other parts of the world to assist hikers crossing challenging locations. Any rope, cable and anchor points must be professionally engineered since forces on them can be quite high, especially if multiple hikers are crossing at the same time. Equipment must be regularly inspected by a competent person and be able to be maintained in the backcountry. *While there are some international trails that make use of these options, at present there are no officially installed or sanctioned stream crossings of this type on the A.T. or other National Scenic/Recreation trails. No engineering standards have been developed or approved by any A.T. land managers. Any proposed installations of this nature must be submitted to land managers well in advance for review.*

### *Considerations:*

- What are the relevant structural and resource protection criteria?
- Can these be sufficiently inspected/maintained with volunteer resources in a backcountry environment?
- Is there a water level or flow condition where assistive cables should not be used?
- Have exceptions to ABA/ADA been awarded?
- Are they appropriate in Zone 1 or Wilderness Areas?

## **Temporary Bridges**

So-called “temporary” or “semi-permanent ” designs may trade impermanence for lower cost. A smaller (shorter/lower) bridge can be built relatively inexpensively, but runs the risk of more frequent washouts. While not official land manager policy, practically speaking, a lower (and likely shorter and less expensive) bridge on substantial abutments may be more cost effective than a longer bridge--depending on the interval between washout. A cost/benefit analysis of this option may be a productive undertaking.

For smaller bridges, consider a chain or cable between one end of the bridge and an anchor point on shore. This allows the bridge to be lifted from its abutments by high water, while one end of the structure remains attached to the bank allowing the bridge to be recovered, inspected and re-installed when conditions permit. Note that there is still a time span between the wash out and replacement with this design--and there is no guarantee that the recovered bridge has not sustained critical structural damage from being washed out.

*At present, there are no land-manager approved designs for this type of crossing structure.*

## **Bridge Design Considerations**

### **Engineering requirements**

Agencies and land-managers often have little institutional flexibility regarding clearances above high water or load bearing capacity--and requirements for these elements continue to increase. If considering a bridge, get a rough sense of the size, cost, construction access, and how often the structure may be damaged before diving in. See **Appendix B** for cost examples of recently constructed bridges. Agencies are reluctant to fund large, long-term infrastructure projects that may be at risk from more frequent and intense severe weather events. This makes choosing the best means to cross a stream a critical part of the planning process.

Historical streamflow data evaluated by qualified professionals is critical in determining the necessary height and length of a bridge.

A.T. trail bridges should be built for pedestrian use only unless the A.T. is coincident with another multi-use trail or road. Building code and accessibility requirements as adopted by land managers may be included in the design criteria.

## Accessibility requirements and exemptions

Below is a summary of compliance requirements from FSTAG ([Forest Service Trail Accessibility Guidelines](#)). While there are differences in land manager approaches, the US Forest Service (USFS) FSTAG, applies only to the National Forest System. However, other land managers often look to these as standards. See **Appendix E** for further information on [ABA Outdoor Accessibility Standards](#), ADA (Americans with Disability Act) and FSTAG for trail structures.

A trail is a pedestrian (hiker) route developed primarily for outdoor recreational purposes, taken for pleasure.

Compliance with FSTAG is required when a project involves **all** of these criteria:

1. New or altered trail
2. Is designed for hiker/pedestrian use
3. Connects directly to a trailhead or connects directly to a trail which meets accessibility guidelines.

These are possible exemptions to compliance with FSTAG. *The land manager determines if a project meets these exemptions and secures approval.*

1. Not practicable to meet running and cross slope requirements due to terrain.
2. Not possible to build/modify the trail without fundamentally altering the nature of the setting.
3. Cannot be accomplished through prevailing construction practices (as defined by USFS standards).
4. Significant cultural, historic or natural features would be damaged or lost by meeting accessibility standards.

Other criteria may also create an exemption:

1. Congressionally designated wilderness areas. *The condition applies if work that is necessary to comply with a specific provision in the technical requirements can't be accomplished using hand tools*, because motorized equipment is prohibited by law in Congressionally designated wilderness areas.
2. Designated wetlands or coastal areas where construction methods and materials are limited.
3. Tribal sacred sites where the physically undisturbed condition of the land is an important part of the sacred observance.
4. Areas where water crossings are restricted to safeguard aquatic features protected under Federal or State laws.

**Maintenance:** Trail maintenance work isn't covered by FSTAG. It is not considered alteration and is defined as routine or periodic repair of existing trails or trail segments to restore them to the standards or conditions to which they were originally designed and built. Maintenance does not change the original purpose, intent, or function for which the trail was designed.

## Implications for bridge decisions

Accessibility requirements may affect the width and slope of the bridge, handrails and guardrails, surface of the bridge deck, and approaches to the bridge from the adjacent land. These and other requirements may increase the size of the structure and scope of work regardless of other considerations such as visitor experience or opportunity experiential zone (ATX) values and funding resources. Note that for most land managers, increased cost *does not* qualify for an exemption to FSTAG (see above).

Land Managers may have existing standard trail bridge design templates for different types of bridges that specify the size and type of structural members for given spans and loads. This simplifies the design process, but may limit finding the best combination of strength, durability and appearance that best fits a particular crossing. Additionally, the design of abutments/substructure for any bridge is dependent on soil type and condition, slope of the bank, stream flow at the bridge's location as well as the span of the bridge and its designed carrying capacity. Well-designed abutments may survive high flow conditions that damage or wash out the bridge--which can be rebuilt on the surviving supports.

Construction costs are also affected by the location of the bridge. If it is far from road access, moving materials, equipment and workers to the location may form a considerable percentage of the total project cost. See **Appendix B** for a sample of recent stream crossing project costs (2018-2023)

Building complex (typically large, long span) bridges requires extensive project management, from initial design to final completion. Trail clubs, ATC staff, and land-managers may not have the resources in time or expertise to manage large projects that may be conducted over several seasons. Consequently, contracted project managers must also be hired and included in the design and construction costs.

## Approval/Compliance and Funding Processes

Bridges are costly and time consuming to build. The [APPA Project Planning Flowchart](#) provides an overview of the process required for a typical trail project to meet National Environmental Policy Act (NEPA) requirements. Bridge construction or replacement projects add multiple internal steps to this already lengthy process as well as considerations not detailed in that document. Bridges incur future costs for inspection and maintenance.

The A.T. is on the National Register of Historic Places. Removal or alteration of existing bridges, must be reviewed for historical significance in that context.

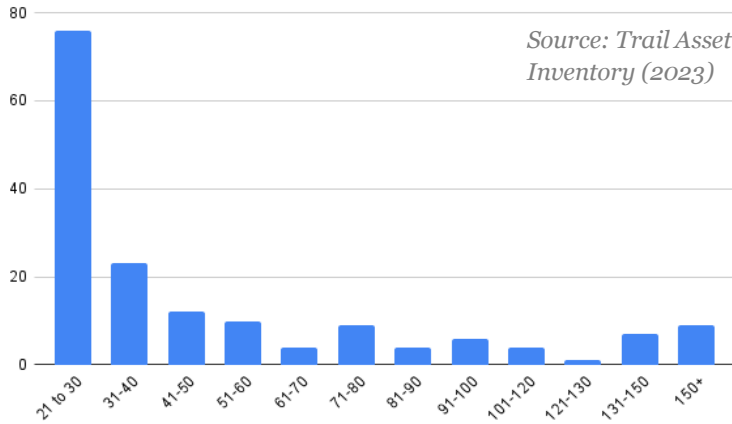
From local conservation commissions to Federal agencies, there are regulations specifically intended to protect the environmental health of riparian zones and maintain the quality of water resources in addition to standards that apply to treadway projects away from stream areas.

Any work that will disturb the stream bed or surrounding bankside will require NEPA and/or state environmental compliance reviews and approval from the public land manager and local permitting agencies.

The planning, compliance, and permitting phase can take up to two to three years to complete. Projects with Federal funding can have a 5 year planning/funding timeline. Construction or replacement of a bridge can extend over multiple trail seasons. Best practice is to plan ahead and work through the ATC Regional Office to coordinate the review, planning and funding process.

Because of this timeline, robust and regular inspections of bridges and other stream crossing infrastructure is essential in planning for repair and potential replacement of structures. Contact your land manager for training opportunities. At a minimum, trail clubs should consult with the land manager to inspect, or arrange for inspection, of critical stream crossing infrastructure every 5 years, and document and share the results with all partners.

## Appendix A: How Many Bridges Are On the A.T.?



Bridges in total: 414  
 Bridges over 20ft: 185  
 Greater than 150ft: Some highway bridges  
 James River (Foote) Bridge: 632 ft  
 Thundering Falls VT (Boardwalk): 845ft

## Appendix B: Examples of Recent Projects (2018-25)

Name	Year	Location	Span	Type	Cost <sup>(3)</sup>
Barnard Brook bridge	2022	Pomfret, VT	55'	Glulam stringer, wood deck	\$73,000
Straight Branch	2018	Damascus, VA	60'	Glulam stringer, wood deck and railings	\$130,000
Fox Creek	2025	Troutdale, VA	80'	Glulam stringer, wood deck and railings	\$236,000 (1)
Brown Mountain Creek	2025	Amherst, VA	42'	Single log stringer, wood railings	Under \$200,000 (2)

(1) Materials and construction only; USFS provided design and compliance

(2) Project underway, expenses TBD; USFS design & compliance; construction completed in-house

(3) Costs presented here are construction costs. They do not include costs for engineering, compliance/permitting, project management or construction administration either by agency or ATC staff or outside contractors.

## Appendix C: Liability, Communication, and Education

Trail clubs and volunteers have concerns that they may be exposed to legal action if Trail visitors are injured or lose their lives crossing unbridged streams or streams where bridges have been deliberately removed to support desired conditions for a specific trail segment. While anyone may be sued for almost any reason, there are laws, regulations and best practices that protect trail clubs and volunteers working within their assigned duties.

The authors of this document have consulted with land managing agency staff and legal experts to provide the information below. This information is provided as an overview of the interaction and interpretation of relevant law and policy **but it is not a substitute for professional legal guidance.**

- The visitor assumes the risk of traveling on the AT. The *Comprehensive Plan for the Appalachian Trail* says in Section II paragraph 5: *Hikers along the Appalachian Trail must be responsible for their own safety and comfort. Further, it says Trail design, construction and maintenance should reflect a concern for safety without detracting from the opportunity for hikers to experience the wild and scenic lands by their own unaided efforts, and without sacrificing aspects of the Trail which may challenge their skill and stamina. Attempts to provide protection for the unprepared lead to a progressive diminution of the experience available to others.*
- Open and obvious hazards (surrounding natural conditions, weather, distance from medical care, etc) are not a liability exposure.
- There is no “duty to warn”, and information regarding conditions is not a liability exposure. Communication with visitors can describe conditions, but not offer assurance that a condition is “safe”.
- Backcountry travel is inherently risky--risk does not equate with liability.
- Not following required or mandatory management procedures, such as timely maintenance on an installed bridge, is an exposure to liability.
- Following documented best management practices reduces exposure.
- VIP/VIF programs protect individual volunteers performing their assigned duties, but do not cover organizations such as Trail Club officers--note that this depends highly on each club’s organizational structure and procedures. Consult with your club leadership.
- Hazards hidden to visitors (“man traps”)--known by managers, but unaddressed--are an exposure. A bridge deck that contains weak or rotting boards that are not replaced, for example.
- Recreational liability is defined by individual state statutes, but they are generally similar to one another.
- A land manager may choose to provide for the safety of visitors (or to protect a resource) by creating a facility--by specifying the strength/size/location of a bridge, for example--at which point that facility must be maintained in working condition and not present a hidden hazard to visitors.

## **Appendix D: A.T. Experience Analysis Matrix (Desired Condition Zones)**

ATC, trail clubs and many agency partners have evaluated desired visitor experience opportunities for nearly all segments of the Trail. Cooperatively, they have established a range of desired conditions in three key areas: Natural Resource Conditions, Social Conditions, and Management Conditions. These are expressed in a continuum of Zones from 1 (Primitive) to 6 (Urban) and reflect the degree of development that is tolerated in that range from more primitive to more front country settings. The images below compactly display desired definition characteristics for each Experiential Zone.

Stream crossings should reflect the desired conditions for the Zone they are a part of. Generally, bridges are not favored in Zone 1 and in Federally Designated Wilderness Areas.





**Step One: A.T. Section Current and Desired Defining Characteristics of the A.T. Experience**

Appalachian Trail Experience Defining Characteristics v.8						
SETTING	Primitive	Semi-Primitive	Natural	Semi-Natural	Rural	Urban
<b>Natural Resource Conditions</b>	<b>Zone 1</b> (may also include Federally designated Wilderness)	<b>Zone 2</b>	<b>Zone 3</b>	<b>Zone 4</b>	<b>Zone 5</b>	<b>Zone 6</b>
Contact with developed environments	Little visual and/or aural evidence of human development or management of the A.T. greenway, except for the Trail, entry/exit points, and overnight sites. The A.T. is remote - no road crossings; no vegetation mgt., except invasives. Internal road crossings and access points are rare and widely spaced. Night skies are dark, with very little non-natural light.	Little visual and/or aural evidence of human development or management of the A.T. greenway, except for the Trail, entry/exit points, and overnight sites. Mitigated impacts adjacent to the Trail management corridor (forestry), but little development, may be visible in middle ground. Infrequent open areas. Road crossings and access points are infrequent. Night skies are typically dark with little non-natural light.	Natural appearing. Some visual and/or aural evidence of human management within and without the A.T. greenway (e.g. open areas). Views of rural landscapes in middle ground likely. Road crossings and access points may be infrequent. Night skies are mostly dark, some distant non-natural light may be visible.	Mostly natural with obvious and occasionally significant visual and/or aural evidence of human development adjacent to the trail management corridor. Road crossings and access points may be frequent. Night skies may be dark, with peripheral evidence of non-natural light and light sources.	Moderately natural with frequent evidence of human development. Natural areas and the treadway are often adjacent to developed landscapes and infrastructure. Road crossings and access points are frequent. Non-natural light is often visible in night skies. Non-natural light sources are sometimes visible.	Abundant evidence of human development. Natural areas are surrounded by or outside developed landscapes and infrastructure. The A.T. coincides with roads and/or sidewalks. Non-natural light obscures night skies and light sources are numerous.
<b>Social Conditions</b>	<b>Zone 1</b>	<b>Zone 2</b>	<b>Zone 3</b>	<b>Zone 4</b>	<b>Zone 5</b>	<b>Zone 6</b>
Contact with other visitors	Highest possibility of experiencing isolation from sights and sounds of other humans, except during seasonal high use periods.	High possibility to experience isolation from sights and sounds of other humans. Opportunities for interaction are infrequent, but more likely at overnight sites, and during periods of increased visitation.	Moderate possibility to experience isolation from sights and sounds of other humans. Opportunities for interaction occur, particularly during periods of increased visitation. Often at overnight sites.	Frequency of interaction between visitors often high, particularly at congregation areas, and there is regular evidence of other users. Visitors may still find opportunities to experience isolation from the sights and sounds of other humans during off-peak times and seasons.	Encountering other visitors is likely and interaction is frequent. Most visitors are day hikers.	Most people encountered are local residents not intentional A.T. hikers, and interaction is frequent.
Effort/Expertise to gain access	Likely to be high	May be high	Moderate to occasionally high.	Moderate	Moderate to Low	Low

Managerial Conditions	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Treadway & Signage	Treadway may be minimally or infrequently cleared, but is distinguishable. Blazing is likely less than standard. May be rough. Trail structures, blazing and signage are minimum necessary. Trail structures always use in situ material.	Treadway is continuous, obvious and easily discerned. May be blazed to A.T. standard. May be rough. Structures installed to protect natural resources using native materials, step stones preferred to bridges, viewpoints are maintained. Only basic wayfinding signage.	Treadway is continuous, obvious and easily discerned. Blazed to A.T. standard. May be rough. Structures installed to protect natural resources. Native materials preferred, bridges and puncheon are infrequent and of simple design. Signage may include wayfinding, regulations and site-specific information.	Treadway is continuous, obvious and easily discerned. Blazed to A.T. standard. May be rough. Structures installed to protect natural resources. May be extensively hardened with native or imported materials. Signs are prevalent and provide directional, visitor safety, wayfinding and educational information.	High visitor use areas may have extensively modified treadway. Treadway may be wider than A.T. standard to keep visitors on Trail. May require more frequent maintenance and higher standard structures using imported materials. Comprehensive signage present.	The route of the A.T. utilizes infrastructure designed for urban pedestrian or vehicular use.
Contact with Rangers, RRs or Trail Ambassadors	Minimal	Infrequent, higher during periods of increased visitation. Onsite controls subtle. May have use restrictions	May occur during periods of increased visitation. Onsite controls harmonize with area. May have use restrictions	Likely during periods of increased visitation. Onsite controls obvious. Use restrictions likely.	Often patrolled. Onsite use restrictions obvious..	Local police provide patrol.

**Non-Conforming Areas**

Intensively visited or developed areas contained in a zone may not conform to the desired condition. Typically small in extent, with highly localized impacts. May predate the present location of the Trail. Specific management goals often found in the Local Management Plan and/or existing Agency policies. May be managed to minimize impacts to adjacent zones, but management of the A.T. is not the main priority of the agency managers.

**\*Wilderness Act (1964)**

*[A Wilderness Area]... "has outstanding opportunities for solitude or a primitive and unconfined type of recreation; ...is of sufficient size as to make practicable its preservation and use in an unimpaired condition; ... generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable."* Land managers of Wilderness zones have A.T.- specific management policies to conform with the principles of the 1964 Wilderness Act.

Format Based On: Marion, "Camping Impact Management on the Appalachian National Scenic Trail", 2003 and Cahill, unpublished work, 2002.



A.T.

Zone:

1 2 3 4 5 (6)  
Wilderness Moderately Natural Urban

## Appendix E: Accessibility Guidelines

2024: [USFS Accessibility Guidance for Trail Bridges](#). See complete documentation in the links in Section V, Accessibility.

## Appendix F: Additional USFS Resources for a Deeper Dive

[USFS Standard Trail Plans and Specifications Homepage](#)

[Combined Standard Trail Bridge Plans](#)

[Trail Bridge Inspection Matrix](#)

[Trail Bridge Operation Handbook \(Forest Service Manual 7709.56b, Chapter 100\)](#)

[Trail Bridge Inspection Guide](#)

[Locating your Trail Bridge for Longevity](#)

## Appendix G: Contributors to the Stream Crossing Infrastructure Planning Guidance

Below are the active members of the ATC Trail Management Committee's Stream Crossing Task Group. These and other participants have generously shared their time and expertise with the group.

**Tyler Beach**, USFS Civil Engineer, George Washington & Jefferson National Forests

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**Cosmo Catalano**, Stewardship Council Trail Management Committee Member, AMC Western Mass AT Volunteer

**Rob Cusimano**, ATC, Maine Trail Supervisor

**Tom Gorrill**, President, Maine Appalachian Trail Club (MATC)

**Matt Helt**, USFS Dispersed Recreation Program Manager, George Washington & Jefferson National Forests

**Dan Hippe**, PATC Volunteer, Hydrologist, USGS (retired)

**Carrie Hollis**, Stewardship Council Trail Management Committee Chair

**Josh Kloehn**, ATC Senior Trail Operations Manager

**Roger Merchant**, MATC Volunteer

**Hawk Metheny**, ATC Vice President of Trail Management

**Caitlin Miller**, ATC Information Services Manager

**Keith Stegall**, Chief of Facilities Maintenance (APPA)

**Matt Stevens**, ATC Regional Manager, North East Regional Office

**Mark Wenger**, TATC Volunteer, Mark J Wenger Architects

**Carl Wilcox**, MATC Volunteer, Club Agency Liaison

**Tara Wu**, Engineering Technician IV, USFS