

## COMPLETE STREETS: COST

### PRELIMINARY CONSTRUCTION COST OPINION

The following presents a conceptual cost opinion for the development of Complete Streets for the Town of Sturbridge. This is presented for comparison sake only with the other alternative concepts and is not based in any engineering cost estimation or feasibility analysis. That type of planning is far above and outside the scope of a recreational trails plan, but is presented here because of the opportunity that is present in Sturbridge for this type of full-scale restructuring of the “face” of the Town and the subsequent and related recreational and tourism-related benefits it would provide. The cost opinion expressed here is based upon similar, documented activities in other municipalities. No deductions are made for donations or volunteer efforts.

TRAIL TYPE & LOCATION	APPROX. MILEAGE	APPROX. COST/MILE	TOTAL COST
Commercial Tourist District Sidewalks	3 miles	\$1,000,000	\$3,000,000
Rte. 20 Complete Streets Reconstruction	1.5 miles	\$5,000,000	\$7,500,000
Quinebaug Riverside Paved Trail	1.25 miles	\$1,500,000	\$1,875,000
Safe Routes To Sturbridge Schools	5 miles	\$1,000,000	\$5,000,000
Bike Lanes and Sturbridge Loop	38 miles	\$15,000 (stripe/sign) - \$2,000,000 (reconstruction)	Requires further study
			<b>&gt; \$17,375,000</b>



## SUPPLEMENTAL INFORMATION



## TRAIL IMPACTS/CONFLICTS

The goal to provide satisfying recreational experiences while protecting ecosystem functionality is at the core of well-managed trail systems. It is important to understand and address the impacts of trails on the surrounding environment. Formal or designated trails are generally designed and constructed, which involves vegetation removal and soil excavation. These changes may be considered "unavoidable," in contrast to "avoidable" post-construction degradation from their subsequent use (e.g., trail widening, erosion, muddiness), or from the development and degradation of informal, user-developed trails or open travel corridors that are being employed as trails. While the latter are often considered to have less environmental impact due to the fact that they already exist, in most instances these open corridors have larger long-term resource impacts because they lack design or construction implementation that provides the necessary level of protection and natural hydrologic functionality.

Common environmental impacts associated with recreational use of trails include:

- ***Vegetation loss and compositional changes*** occur when informal spur or parallel trails are created, when muddy conditions lead to trail widening, and when trail corridors are unnecessarily wide and create canopy openings that alter sunlight patterns on the forest floor.
- ***Soil compaction*** occurs normally with trail use, but is most pronounced and problematic when trails are informally developed without excavation to mineral soil. In this situation, "cupping" occurs which holds water and alters natural drainage patterns. Heavy trail use, especially by heavier modes of trail use such as horses, causes more significant soil compaction unless trail surfaces are significantly hardened to resist this force.
- ***Soil Erosion*** occurs when soil particle cohesion breaks down under use and is then transferred, most often by water, to another location. This process increases cupping in the trail bed and the cycle continues until water is moved off the trail.
- ***Soil Deposition/Muddiness*** occurs when the eroded soil/water loses velocity. This unconsolidated soil results in persistent soft, sandy trail conditions when dry and muddy conditions when wet.
- ***Degraded water quality*** is the result of unconsolidated soils reaching a moving water source. Water quality impacts are typically greater where eroded soils have a high amount of fine particles such as clays that suspend freely in the water column and reduce water clarity and clog small pore spaces important to aquatic macroinvertebrates when the particles do settle.
- ***Disruption of wildlife*** occurs when the presence of humans on trails alters the feeding, resting, or travel patterns of animals. This effect is much more pronounced in backcountry settings than in areas where the presence of roads, homes, and significant populations conditions wildlife to these potential intrusions.

## TRAIL IMPACTS/CONFLICTS

All trail users impact the land in some manner. Physical pressure exerted on the trail via boot, tire, or hoof will cause soil to be displaced either vertically or horizontally. Factors influencing the relative amount of soil displacement include:

- Average combined weight of trail user (horse with rider, mountain bike with rider, hiker with backpack)
- Amount of surface area of user in contact with the trail tread (pounds/square inch or psi)
- Relative hardness of the contact area of trail user in relation with trail tread surface (shod hoof, hiking boots, running shoes, mountain bike tires)
- Alternating contact or consistent contact between user and trail surface
- Relative speed of travel modality and consistency of speeds traveled
- Acceleration/Deceleration, speed carried into turns, momentum forces
- Distances traveled
- Relative amount of users in any given user group
- Duration of stay
- Physics of propulsion (how do the different users propel themselves forward on flats and uphill and how do they resist gravity on downhill)

While this complex physical relationship potentially changes for every foot of trail and for each individual trail user, it is enough to state that sustainable grades on trails minimize these impacts across the spectrum of use. When trail users do not remain on the constructed trail, these soil impacts are compounded with trampling impacts to vegetation and subsequent trail widening. Additionally, all trail users have the ability to introduce or spread non-native species to or along the trail corridor.

The body of scientific study on relative trail user impacts to the land, at least the physical impacts mentioned above, is slowly growing. While this body of knowledge is in no way comprehensive, recent studies have generally corroborated earlier work. A review of the literature is included in the Appendices of this plan.



## TRAIL IMPACTS/CONFLICTS

Along with the aforementioned physical impacts, trail users also have social impacts to the landscape. Litter, graffiti, and the removal of biological, geological, and archaeological materials are somewhat common across the board. Speed differential between different user modalities can introduce social conflict and the potential for accidents. This impact is often more pronounced on paved trails, but also exists at certain locations on natural surface trails. At intersections, on both natural surface and paved trails, user management can become an impacting issue as traffic builds up and right of way or etiquette is not understood or followed.

Most of the potential social conflicts on trails are avoidable or can be managed. In the most cases, social conflict is the stated byproduct of goal interference either between user groups, within use groups, or completely unrelated to other users of the trail. Trail users become frustrated that their desired experience is not being met. Without a satisfying experience, humans typically assign blame for that situation.

The management of both physical impacts and social conflicts is largely ameliorated by competent trail design. Minimizing these impacts depends on balancing the needs of different types of trail users, taking into account the particulars of different modes of travel on different trail surfaces, and designing/constructing trails that mitigate potential problems. Most issues that do arise over time can still be mitigated with small, physical changes within the trail corridor. These types of alterations, accomplished during routine trail maintenance are the simplest and least expensive solutions. In his work on trail user conflict, Roger Moore (1994) recommends the following hierarchy of management responses:

1. Information and Education
2. Trail User Involvement
3. Regulations
4. Enforcement

Informing, educating, and involving trail users (i.e. stewards, docents, etc.) are the least expensive and most effective management responses to conflict. Additional and potentially unnecessary regulations tend to alter trail user attitudes in negative manners and are only useful if they are effectively enforced. As enforcement is expensive in terms of human and political capital, these responses should reflect only last-ditch efforts when physical responses, education, and outreach all continue to fail.

## SUSTAINABLE TRAIL DESIGN

Trail design standards have been published by federal agencies, state agencies, and non-profit trail organizations. This section includes an overview of accepted sustainability standards as described in IMBA's Trail Solutions and Managing Mountain Biking, the U.S. Forest Service Trail Construction and Maintenance Notebook, and the Minnesota Department of Natural Resources guide on trail planning, design and development. Additional references have been included in the appendix.

While the design standards described below have recommendations unique to each organization, the overall recommendations for a sustainable trail are similar across the board. A sustainable trail gets water off the trail while keeping users on the trail. Thusly, a trail's location, alignment, grade, drainage, and soil texture are the most critical factors in maximizing sustainability and minimizing resource impacts.

***Trail Solutions: IMBA's Guide to Building Sweet Singletrack. IMBA, 2004 and Managing Mountain Biking: IMBA's Guide to Providing Great Riding. IMBA, 2007***

IMBA describes the most sustainable trail design as a "rolling contour trail", characterized by a sidehill location, a gentle trail grade, grade reversals, and an outsloped tread that tilts slightly toward the outer edge. IMBA has broken it down into 11 principles that work together as a system (summarized below). "When applied collectively, they create sustainable trails that are low maintenance, fun to use, and that help manage risk, environmental impact, and user conflict."

- Trail location: Sidehill trails are best. The best location for trails is on sidehills, as opposed to flatter terrain like ridgetops, meadows, or valley floors.
- Sustainable trail alignment: Avoid the fall line. Not only should trails be located on sidehills, they should also gently traverse the slope, rather than traveling directly up or down it. Trails that directly ascend the hillside are known as fall-line trails.
- Half Rule: Guides trail alignment. To ensure a sustainable alignment, a trail's grade should never exceed half the grade of the sidehill it is located on.
- Sustainable grade: Follow the ten percent average guideline. Also called overall trail grade, the average trail grade is the slope of the trail for an entire uphill section. Generally, an average grade of 10 percent or less is most sustainable.
- Maximum sustainable grade. Typically, the maximum sustainable trail grade is about 15 percent for a short distance, but it is site-specific and fluctuates based on several factors. It could be as low as 3 or 4 percent or as high as 25 percent.
- Grade reversals: Unbeatable drainage. A grade reversal is a spot at which a trail briefly changes elevation, dropping subtly before rising again. This change in grade forces water to exit the trail at the low point of the grade reversal, before it can gain more volume, momentum, and erosive power.



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## SUSTAINABLE TRAIL DESIGN

- **Outslope:** Ensuring sheet flow. As the trail crosses a hillside, the downhill or outer edge of the tread should tilt slightly down and away from the high side. This tilt is called outslope, and it encourages water to sheet across and off the trail in a gentle, non-erosive manner instead of funneling down the trail's center. IMBA recommends that most trail treads be built with a 5-percent outslope.
- **Adapt trail design to soil texture.** Some soils are durable and drain well while others are fragile and erode quickly. The ability to categorize soil and adjust trail design and maintenance practices accordingly is critical.
- **Minimize user-caused soil displacement.** Proper trail design—gentle grades and sidehill location—can minimize soil movement. But three additional tactics are also frequently called for, especially in loose soils or high traffic: consistent flow, insloped turns, and tread hardening.
- **Prevent user-created trails.** Preventing user-created trails comes down to this: the intended trail must provide a better experience than traveling off-trail or on a user-created route.
- **Maintenance.** All trails benefit from routine maintenance. Foresight, care, and hard work—everything that you put into building a new trail—should also go into maintaining an existing one.

*USFS Trail Construction and Maintenance Notebook. Woody Hesselbarth, Brian Vachowski, and Mary Ann Davies. U.S. Forest Service, 2007*

USFS details their guidelines for trail planning, design, and construction:

**Trail Planning** – In addition to details on creating accessible trails and avoiding trail disasters, USFS recommends planning the route on a map (after initial fieldwork) using the 10-percent guideline (maintaining an average grade of 10 percent for the entire trail system).

**Trail Design** – After scouting the mapped route in the field, USFS recommends checking the grade of each section and maintaining the half rule (detailed in previous IMBA summary). To control surface water, USFS recommends maintaining sheet flow by incorporating grade reversals and outslope on the trail.

**Trail Corridor** – USFS has specific heights and width recommendations for the trail corridor clearing depending on trail user, as well as their recommendations for removing trees.

**Trail Foundation** – USFS details that the construction should be rolling contour and full-bench construction. Full-bench indicates a trail that is completely cut from the sidehill, with all organic material removed so that the mineral soil creates the surface of the trail tread (information on partial-bench included as well for specific problem areas). The tread should be outsloped as well.



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## SUSTAINABLE TRAIL DESIGN

*Trail Planning, Design, and Development Guidelines. Minnesota Department of Natural Resources, Trails and Waterways Division, 2007*

This guide provides information on shared-use paved trails, natural surface trails, winter use trails and bikeways. MN DNR details seven guiding principles for sustainable trails:

- Avoid sensitive ecological areas and critical habitats
- Develop trails in areas already influenced by human activity
- Provide buffers to avoid/protect sensitive ecological and hydrologic systems
- Use natural infiltration and best practices for stormwater management
- Provide ongoing stewardship of the trails and adjoining natural systems
- Ensure that the trails remain sustainable
- Formally decommission and restore unsustainable trail corridors

Applications of these principles will minimize the impact of trails on natural resources. However, MN DNR emphatically stresses that “the strict application of these guiding principles has to be balanced against the need to locate trails where they will be of high recreational value to the targeted users.”



# TRAIL MANAGEMENT

## Organizational Models

Trails, like any municipal facility, will require management. The hierarchy of needs in trail management is as follows:

- Capital investments in the land (existing park/open space land, fee simple purchase, or recreation/trail easement) for trails
- Funding for the design and construction of the trails and attendant facilities such as trailheads and signage
- Ongoing maintenance of the trails and upkeep of the attendant facilities
- Programming and staffing the trail facilities related to education, risk management, regulation, and enforcement
- Management of special events focused on the trails such as tours, festivals, and races
- Marketing of the various opportunities presented by the trail system

Various organizational models exist for accomplishing these tasks. In some cases, the development of the funding, implementation of the design/build process, and ongoing maintenance is undertaken primarily by the municipal parks or open space department. This is typically the case when the vast majority of trails fall under the direct ownership/easement management of the municipality. When trails are managed over multiple land owning jurisdictions, a stand-alone organization is often developed provide the implementation and management of the trails resource. In these cases the organizations are supported to some level with annual budget allocations from the partner land owners. When management of the trails is not the responsibility of the organization, they function as a liaison and partner with the land managing entities. In each case, operating revenue for the organization is supplemented by membership and events revenue, grants, and charitable giving.

Whether trails are developed and maintained solely by a municipal entity or in some formalized partnership with a separate organization, significant trail maintenance assistance is typically provided by local volunteers and nearby trail support organizations. These volunteers can greatly leverage the capacity of a staff member or department, but the development of an efficient and successful program requires the commitment of skills and time. Management of volunteers includes assuring a level of training sufficient to safely implement a specific project, planning and receiving approval for the specific facets of the project, promotion and volunteer

## TRAIL MANAGEMENT

outreach to develop the necessary manpower, leadership during the project, obtaining feedback regarding the volunteer experience, and the recognition of volunteer support.

One of the most important aspects of trail management is the real-time knowledge of trail conditions. Fallen trees, washed out bridges, missing signs and other similar issues cross boundaries of maintenance planning/response, risk management/liability, resource damage, and trail user satisfaction. This can be the sole responsibility of the trail managing organization via a trail manager or ranger or it can be a task shared with volunteers or trail supporting organizations. In any case, it requires regular passage over all segments of a trail system and a coordinated management response related to the issues that develop.

### **Project Implementation**

Trail project planning, phasing, and implementation is often a somewhat moving target. Prioritization of projects by importance, feasibility, and available resources is vital to seeing a plan to fruition, but grant programs and cycles, charitable giving priorities, regulatory approvals often require a flexibility on the part of a trail managing entity to take advantage of opportunities and shift focus when delays are experienced. When the trail managing entity has a quality plan for implementation, an overload of project potential is more typically the problem that taxes human resources of staff and volunteer capacity.

When funding is available and regulatory approvals are received there are multiple avenues for the successful implementation of a trail project. For large projects (generally projects over \$100k) that have a heavy engineering focus, such as greenway paving, large trailhead development, or major bridge construction, a contracting company with demonstrated experience in the task is the ideal contractor. For smaller trail bridges and structures and significant trail construction/maintenance projects (generally projects between \$25k and \$500k), specialized trail contractors usually have skills and experience that cannot be matched by more traditional road, grading, utility, or landscape contractors. These contractors are spread throughout the country but routinely mobilize significant distances for projects. The contractors are most often members of the Professional Trailbuilders Association, PTBA ([www.trailbuilders.org](http://www.trailbuilders.org)), and bid meetings and requests for quotes (RFQs) can be announced directly through the organization's website to all member contractors. Small, relatively simple projects (generally less than \$25k) or those requiring immediate attention such as gravel spreading or sawyer work are often most efficiently handled by qualified local contractors.

Many PTBA contractors are willing to work cooperatively with local contractors and volunteers to increase efficiency and make funding go further. Local contractors often have equipment and materials that would otherwise be costly to mobilize. Local volunteers or youth corps', when properly trained and supervised, can

## TRAIL MANAGEMENT

often provide basic manual trailbuilding labor that reduces the contractor's need to use more highly trained and paid staff to accomplish relatively simple tasks.

Significant trailbuilding projects are not ideal for agency/organization staff or volunteers to undertake unless those entities have incredibly high capacity. For instance if the department is planning on constructing five to ten miles of trail each year for a ten-year cycle or a volunteer group can annually commit to more than 2,500 hours of assistance, then significant projects are feasible to accomplish on an annual basis. This is not often the case and therefore alternative methods of project implementation are a better option. Small or special interest projects are ideal for these groups to undertake without the assistance of a contractor. In order to retain and build volunteer interest, these projects should have discreet results and should not stretch over too many volunteer events.

### **Risk Management**

Managing risk on trails spans a number of different areas of trail management, from signage and maintenance programs to trail specification development and volunteer/event waivers. Recognition that risk management is necessary, then creating and implementing a defensible program is vital to responsible trail management. The following information provides an overview of trail-related risk management, but should not be considered legal advice. A formal plan should be developed and filed with the Town's risk manager or attorney responsible for these issues.

The two goals of a risk management program are to 1) manage risks and prevent injuries as is practical on the Town's trail system and 2) build the Town's "defendability" to curtail lawsuits from gaining traction and 3) minimize losses from any lawsuits that do arise due to an incident on the trail system. These goals are largely met by:

Designing and constructing trails in accordance with the approved specifications  
Maintaining the trails consistently and in accordance with a written maintenance plan  
Addressing hazards that are unreasonable and taking action to warn trail users of that condition  
Assuring the state-required duty to warn language is in place at common public trail entrances and on any waivers required for volunteer work or events.

Risk on trails cannot be avoided or eliminated due to changing environmental conditions that may alter the trail (i.e. windfall, flooding, etc.). With this common knowledge of "use at your own risk", trail users are voluntarily taking on the risk of traversing a trail and removing the Town from a position of potential liability. Hazards, however, are issues that the Town could reasonably identify that are at least somewhat hidden or

## TRAIL MANAGEMENT

unidentifiable by a trail user. The Town has a Standard or Duty of Care to maintain trail or facility to a certain acceptable standard or a Duty to Warn trail users when this standard is not being met. If those duties are breached in some way and a litigant can demonstrate that the lack of reasonable management is the cause of an injury or property loss, then the Town could be considered negligent.

With Recreational Use and Government Immunity quite strong, most trail use requires an individual's assumption of risk that moving about in nature is an inherently dangerous activity. This does not provide protection from negligence, where a land manager could reasonably ascertain that a condition represents a hazard, has knowledge of that condition, and has chosen not to take any action. It is for this reason that specifications for construction, trail difficulty level, and maintenance need to be created and implemented. When the Town can demonstrate that trail conditions are reasonable in relation to these developed specifications and regular and effective maintenance is occurring, it is increasingly difficult for a trail-related lawsuit to gain traction. Even when conditions degrade to a level that is potentially hazardous, the Town is not required to take immediate action to a greater extent than warning visitors of that potential hazard.

Finally, in situations activity of trails that is substantially different than regular trail use for recreation, such as volunteer trail construction/maintenance or special events/programming, a waiver of liability should be signed by all participants. These types of activities have different types of risks and place participants in conditions that are not typically accounted for by a risk management program. Waivers should be written in plain rather than legal language.



# SIGNAGE

A well-developed signage system is vital management tool in the 21<sup>st</sup> century land management context. Especially with a large, diverse trail system, a human management presence such as park rangers and law enforcement officers will be dispersed. Consistent, clear, well-placed signs often must take the place of humans in providing 1) information and directional assistance, 2) regulations and hazard warnings, and 3) educational and interpretive information.

## *Roadside Signs*

A positive experience on a trail begins by easily finding the desired location, be it a developed trailhead, boat launch, or brick and mortar facility. This gross level navigation requires roadside signage prior to the developed facility. With a suite of trail facilities as broad and diverse as can be presented in Sturbridge, a universal symbol should be combined with short verbiage and mileage to provide information that can be recognized and comprehended at driving speeds. These clear, roadside signs help encourage trail use and dissuade visitors from creating unauthorized access routes.



## *Trailhead Signs*

Upon entering a developed trailhead facility, large signs with a complete map and description of all the nearby trails and facilities, local regulations, emergency contact information, and educational messages should be located to funnel visitors to the developed facilities such as rest rooms, trails, launch, etc. This main trailhead kiosk is an ideal place to describe trail length and relative difficulty, allowing visitors to make informed decisions about their recreational experience. Trailhead kiosks can incorporate interpretive, programming, volunteer, and printed information such as maps. The total amount of information provided should mesh with the level of facility development. Major trailheads with significant parking should creatively incorporate most information, while striving not to reach “information overload”, while smaller trailheads may only require a map board (with location), emergency contact, and basic regulations.



# SIGNAGE



## *Trailside Signs*

Signs at trail intersections should provide clear, concise directions for how to stay on the trail or return to a trailhead. This navigation assistance is best provided on wooden or fiberglass posts at heights easily read by trail users, typically 60 – 84 inches from ground level, with standard iconography for allowed uses and difficulty level. Intersection signs can post location identification information to aid in emergencies. Outside of trail intersections, little signage is required on trails. Trails longer than a few milestrails may necessitate waymarking, “confidence” signage, also placed on posts. Blazes on trees are not sufficient for modern navigation and signs nailed into trees may damage the tree and certainly send a conflicting message regarding forest stewardship.

## *Warning and Regulatory Signs*

Signs play a vital role in managing risk. These signs alert the public to known hazards and the potential hazards of changing environmental conditions. Warning signage will be paramount in Sturbridge with the number of potential road intersections where infrastructure for pedestrian and bicycle safety is not yet present. Without this infrastructure, traditional yield signs, painted crosswalks, stop signs and traffic signals are necessary. Along the trail approaching a road crossing, both “slow” and “stop” signs should be considered. Position them well in advance of the hazard or risk so that visitors have enough time to read the sign and react. Also consider adding signs before unexpected challenging technical trail features, like drop-offs, narrow bridges, or other elements of increased risk. Additionally, consider placing information signs, such as trail name and allowed uses, on either side of a road crossing, as these are trail-system access points.



# SIGNAGE

## *Regulatory Signs*

Human management of delineated rules will be difficult except in spot locations, such as trailheads and parking areas. While it is simple to list dozens of prohibited activities, the success of regulatory signage is usually dictated by its practicality, ease of comprehension, and attitude. Fewer, more practical rules and explanations about responsible use and trail etiquette almost always achieve higher compliance rates. Internationally recognized images and simple, short phrases are much easier for a broader segment of the public to take note and understand, especially for a location like Sturbridge that draws significant international tourism. Positive phrasing of rules engenders a spirit of cooperative management with the public.

## *Emergency Signs*

No matter how well-signed and maintained, there are likely to be incidents that require immediate maintenance or emergency response. With the duty to warn the public of potential hazards upheld, the ability of signs to help direct a timely incident response helps to demonstrate an ability to minimize the severity of incidents. To facilitate emergency services access, each trailhead or access point could be assigned a physical address by an appropriate local agency and mapped by GPS. This physical address should be included on trailhead signs along with emergency contact information. Trail intersections should be marked in accordance with local emergency management protocols and those departments, as well as park maintenance and volunteers docents should have complete map sets and sufficient training to mobilize to any location in the trail system in the most efficient manner practical.



# SIGNAGE



## *Interpretive Signs*

Interpretive signs provide information about points of interest along the trail, helping to make an experience interactive for visitors. Often keying on natural, cultural, or historical facets, these signs help frame a larger context for a recreational experience. Recently, interpretive signs have expanded in scope to include skill development contexts that promote safer trail use or are integrated into self-paced park programming such as play areas, scavenger hunts, seasonal changes, or art-based activities. The keys for types of signs and their density in placement revolve around matching the development level of nearby facilities with the signage. Additionally, in areas where higher speed differentials are expected such as paved trails, interpretive signs and associated activities should be removed from the immediate trail corridor and proper ingress/egress planned.

Interpretation of land ownership, management focus, and the unique qualities of conservation and environmental protection in Sturbridge will be a key facet of setting the Town apart as a natural destination.

# TRAIL SURVEY RESULTS





















Please rate the following statements regarding trails in general (natural surface, singletrack, hiking, greenways, paved, winter, etc.).

	Strongly Agree	Moderately Agree	Neutral	Moderately Disagree	Strongly Disagree	Rating Average	Response Count
Trails promote a healthy lifestyle and higher quality of life.	73.6% (299)	17.7% (72)	6.9% (28)	1.0% (4)	0.7% (3)	1.37	406
Trails are an important piece in addressing childhood obesity.	42.6% (172)	28.7% (116)	16.6% (67)	8.2% (33)	4.0% (16)	2.02	404
Trails allow users to connect with nature.	74.4% (302)	19.2% (78)	5.2% (21)	1.2% (5)	0.0% (0)	1.33	406
Trails tourism is an important tool for economical development in Sturbridge.	44.1% (179)	25.6% (104)	14.0% (57)	10.1% (41)	6.2% (25)	2.09	406
Trails are central to recreation.	49.8% (202)	27.1% (110)	11.8% (48)	9.1% (37)	2.2% (9)	1.87	406
Trails are important for transportation means.	15.6% (63)	23.0% (93)	31.6% (128)	16.0% (65)	13.8% (56)	2.90	405
Trails provide an important venue for learning about history and culture.	31.9% (129)	37.1% (150)	19.3% (78)	9.7% (39)	2.0% (8)	2.13	404
Trails provide an important venue for learning about ecology and nature.	62.0% (250)	29.5% (119)	5.0% (20)	2.5% (10)	1.0% (4)	1.51	403
Other (please specify)							18
answered question							407
skipped question							0



## TRAIL SURVEY RESULTS

Which of the following outdoor recreational activities did you and/or your family participate in at least FOUR times in the last year? Please check all that apply.

		Response Percent	Response Count
Horseback Riding		6.5%	26
Hiking		72.3%	290
Trail Running		23.2%	93
Backpacking		13.2%	53
Mountain Biking		31.2%	125
Road Biking		36.4%	146
Fishing		37.2%	149
Hunting		12.7%	51
Riding ATVs		8.7%	35
Off-road motorcycling		3.2%	13
Camping		29.4%	118
Wildlife/Bird watching		33.7%	135
Power boating		19.7%	79
Canoeing/Kayaking		45.9%	184
Rock climbing		6.7%	27
Snowmobiling		5.0%	20
Alpine Skiing/Snowboarding		20.0%	80
Nordic/Cross-Country Skiing		14.0%	56
Snowshoeing		24.2%	97
Walking		89.5%	359



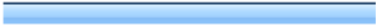

KAY-LINN  
enterprises







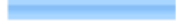

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Applied Trails  
RESEARCH







## TRAIL SURVEY RESULTS

Do you use any of the trails in Sturbridge?			
		Response Percent	Response Count
Yes		78.0%	316
No		22.0%	89
answered question			405
skipped question			2

If yes, how often do you use trails?			
		Response Percent	Response Count
Daily		2.8%	9
4-6 times per week		5.3%	17
2-3 times per week		10.9%	35
Once a week		13.7%	44
Twice a month		19.0%	61
Once a month		16.5%	53
Four times per year		25.9%	83
Once a year		5.9%	19
answered question			321
skipped question			86



## TRAIL SURVEY RESULTS

If you do NOT use the trails in Sturbridge, why not? Choose all that apply.			
		Response Percent	Response Count
I do not know where the trails are		64.5%	80
I'm looking for a different type of trail		12.9%	16
There are not enough miles of trails		9.7%	12
The trails are hard to navigate		8.9%	11
I don't want to drive to recreate		13.7%	17
I don't use any trails for recreation or exercise		16.9%	21
answered question			124
skipped question			283





# TRAIL SURVEY RESULTS

How highly do you value recreation on the following trails, depicted above?							
	Extremely Desirable	Very Desirable	Moderately Desirable	Slightly Desirable	Not at all Desirable	Rating Average	Response Count
Bikeway (4-8' wide shoulder on roadways)	26.4% (106)	13.2% (53)	25.9% (104)	18.7% (75)	15.7% (63)	2.64	407
Greenway/Paved Trail (10-12' wide)	36.6% (144)	20.1% (79)	16.8% (66)	12.5% (49)	14.0% (55)	2.47	395
Stone-surfaced Greenway Trail (10-12' wide)	33.5% (133)	29.5% (117)	18.9% (75)	8.6% (34)	9.6% (38)	2.31	395
Stone-surfaced Woodland Trail (4-6' wide)	38.2% (152)	30.4% (121)	17.8% (71)	7.5% (30)	6.0% (24)	2.13	395
Narrow Natural Surface Trail (2-4' wide)	45.9% (183)	23.3% (93)	16.5% (66)	7.5% (30)	6.8% (27)	2.06	395
Water Trails/Access to Water	42.4% (168)	29.5% (117)	13.1% (52)	8.6% (34)	6.3% (25)	2.07	395
answered question							407
skipped question							1

# TRAIL SURVEY RESULTS

Please rank your opinion on the need of the following aspects of BIKEWAY/WALKING FACILITIES in Sturbridge (Picture 1).

	Very Positive	Somewhat Positive	Neutral	Somewhat Negative	Very Negative	Rating Average	Response Count
Safe Bike Lanes (striped and signed)	50.5% (203)	22.6% (91)	16.7% (67)	6.0% (24)	4.2% (17)	1.91	402
Connected Sidewalks (used for transportation)	47.1% (188)	28.6% (114)	17.0% (68)	4.5% (18)	2.8% (11)	1.87	399
Car-Free Route to School (combination of trails, sidewalks, bike lanes)	34.6% (139)	23.9% (96)	24.6% (99)	9.2% (37)	7.7% (31)	2.32	402
Wide Street Shoulders for Bikers	46.4% (187)	28.3% (114)	15.6% (63)	6.2% (25)	3.5% (14)	1.92	403
Designed pedestrian/bike crossings (striped, signed, cross-walks)	61.8% (249)	22.1% (89)	12.7% (51)	2.2% (9)	1.2% (5)	1.59	403
answered question							405
skipped question							2

## TRAIL SURVEY RESULTS

Please rank your opinion on the need of the following aspects of a GREENWAY in Sturbridge. A GREENWAY is defined as a wide trail (2 or more people side by side) that is either PAVED or STONE SURFACED and is not steep (Pictures 2 & 3).

	Very Positive	Somewhat Positive	Neutral	Somewhat Negative	Very Negative	Rating Average	Response Count
A wide trail to safely walk side by side with friends	61.7% (246)	21.1% (84)	11.0% (44)	4.0% (16)	2.3% (9)	1.64	399
Non-strenuous exercise opportunity that is car-free	55.2% (219)	24.9% (99)	13.4% (53)	4.0% (16)	2.5% (10)	1.74	397
Easy access to interesting natural and cultural areas	57.6% (228)	27.3% (108)	9.1% (36)	4.3% (17)	1.8% (7)	1.65	396
Safe scenic trail along the river	69.1% (275)	19.3% (77)	7.0% (28)	2.5% (10)	2.0% (8)	1.49	398
Family friendly, car-free, biking opportunity	63.7% (253)	22.4% (89)	7.3% (29)	4.0% (16)	2.5% (10)	1.59	397
answered question							399
skipped question							8

## TRAIL SURVEY RESULTS

Please rank your opinion on the need of the following aspects of a **STONE SURFACED WOODLAND TRAIL** and a **NARROW NATURAL SURFACE TRAIL** in Sturbridge. A **STONE SURFACED WOODLAND TRAIL** is in the woods and wide enough to walk side by side (Picture 4). A **NARROW NATURAL SURFACE TRAIL** is defined as a narrow trail (singletrack) that has a natural dirt surface (i.e. hiking/mountain biking trail) (Picture 5).

	Very Positive	Somewhat Positive	Neutral	Somewhat Negative	Very Negative	Rating Average	Response Count
Access to nature	<b>68.3%</b> <b>(271)</b>	20.9% (83)	7.3% (29)	2.3% (9)	1.3% (5)	1.47	397
Bird/wildlife viewing	<b>52.2%</b> <b>(206)</b>	23.8% (94)	18.7% (74)	3.5% (14)	1.8% (7)	1.79	395
Vigorous trail-based exercise	<b>51.6%</b> <b>(204)</b>	25.8% (102)	14.7% (58)	5.6% (22)	2.3% (9)	1.81	395
The opportunity to test your skills (hiking, running, or biking)	<b>47.1%</b> <b>(186)</b>	27.8% (110)	15.2% (60)	5.3% (21)	4.6% (18)	1.92	395
An educational opportunity through signage and interpretation	<b>41.1%</b> <b>(161)</b>	30.1% (118)	21.2% (83)	5.4% (21)	2.3% (9)	1.98	392
An opportunity for solitude	<b>50.3%</b> <b>(198)</b>	24.4% (96)	19.5% (77)	3.8% (15)	2.0% (8)	1.83	394
<b>answered question</b>							<b>397</b>
<b>skipped question</b>							<b>10</b>

## TRAIL SURVEY RESULTS

Please rank your opinion on the need of the following aspects of **WATER TRAILS** and **ACCESS TO WATER** in Sturbridge. **WATER TRAILS** are defined as a river or across a body of water such as a lake for people using kayaks, canoes, or small boats including launch and landing sites and fishing areas (Picture 6).

	Very Positive	Somewhat Positive	Neutral	Somewhat Negative	Very Negative	Rating Average	Response Count
More and easier access to the Great Ponds of Sturbridge	53.8% (213)	26.8% (106)	11.1% (44)	4.5% (18)	3.8% (15)	1.78	396
Canoe and kayak access to the Quinebaug River	60.9% (241)	24.2% (96)	10.1% (40)	4.3% (17)	0.5% (2)	1.59	396
Riverside Parks/Gathering Areas	55.1% (218)	27.5% (109)	11.4% (45)	4.5% (18)	1.5% (6)	1.70	396
More fishing opportunities and fishing access along the shore of area streams	37.5% (148)	23.0% (91)	30.6% (121)	5.3% (21)	3.5% (14)	2.14	395
answered question							396
skipped question							11



# TRAIL SURVEY RESULTS

Please rate the following statements about the vision of trails in Sturbridge.							
	Strongly Agree	Moderately Agree	Neutral	Moderately Disagree	Strongly Disagree	Rating Average	Response Count
Trails tourism in Sturbridge can have a positive economic impact to our community.	<b>52.8% (211)</b>	24.3% (97)	10.5% (42)	6.8% (27)	5.8% (23)	1.89	400
Continuous sidewalks, Bikeways/greenway/trail access, and a focus on the Quinebaug River along the Fiskdale/Rte. 20 shopping district would make Sturbridge a more liveable community.	<b>58.1% (232)</b>	26.8% (107)	7.3% (29)	5.0% (20)	2.8% (11)	1.67	399
Sturbridge could be a regional destination for trail-based outdoor recreation.	<b>50.5% (202)</b>	25.0% (100)	11.5% (46)	5.8% (23)	7.3% (29)	1.94	400
A new Sturbridge trail system could draw visitors from both MA and CT.	<b>51.5% (206)</b>	23.3% (93)	12.0% (48)	8.0% (32)	5.3% (21)	1.92	400
Sturbridge has enough safe and accessible walking and biking opportunities.	10.1% (40)	12.6% (50)	20.7% (82)	<b>30.5% (121)</b>	26.2% (104)	3.50	397
Sturbridge needs a plan to bring in more tourists and highlight the area's natural resources.	<b>46.6% (184)</b>	27.6% (109)	13.7% (54)	6.8% (27)	5.3% (21)	1.97	395
Car-free access/safe bike access (i.e. sidewalks, lighted crosswalks) to Burgess Elementary School would lead to many more children walking or biking to school	<b>25.4% (101)</b>	20.7% (82)	22.4% (89)	16.9% (67)	14.6% (58)	2.75	397
Car-free access/safe bike access (i.e. wide, striped road shoulder, lighted crosswalks) to Tantasqua Regional High School would lead to many more children walking or biking to school.	<b>23.7% (94)</b>	20.2% (80)	20.7% (82)	19.4% (77)	16.1% (64)	2.84	397
answered question							400



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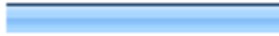
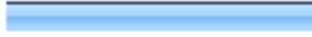
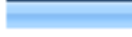
Trail Dynamics  
art & science of trails



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RESEARCH

## TRAIL SURVEY RESULTS

Would you be willing to pay for improved trail facilities? Select all that apply.

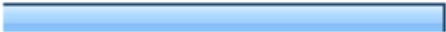




		Response Percent	Response Count
Use Betterment and/or Community preservation funds		66.5%	264
Trail use fee- daily fee or annual pass		31.0%	123
Proposition 2 1/2 debt exclusion		17.9%	71
Vote to providing the 20% match required for most grants		41.8%	166
Donation to Trek Sturbridge volunteer trail stewardship group		46.9%	186
No, I would not be willing to pay for improved trail facilities		19.1%	76
answered question			397
skipped question			10










## TRAIL SURVEY RESULTS

### How fast do you want to fund/build trails?

		Response Percent	Response Count
5 years		68.6%	267
10 years		14.7%	57
15 years		0.8%	3
20 years		2.1%	8
Not interested in new trails		13.9%	54
answered question			389
skipped question			18

### How important is it to have a trail to provide connection from your home to the trail network?

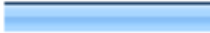




		Response Percent	Response Count
Very Important		18.8%	73
Somewhat Important		18.3%	71
Moderately Important		11.9%	46
Slightly Important		12.1%	47
Not Important		38.9%	151
answered question			388
skipped question			19







## TRAIL SURVEY RESULTS

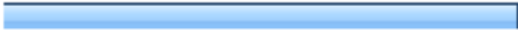




### Would you be willing to volunteer to improve the trail facilities in Sturbridge?








		Response Percent	Response Count
4-8 volunteer hours per year		31.6%	123
8-24 volunteer hours per year		24.9%	97
24-40 volunteer hours per year		9.0%	35
40+ volunteer hours per year		9.3%	36
No, I would not be willing to volunteer		25.2%	98
answered question			389
skipped question			18

### Do you live or own property in Sturbridge?

		Response Percent	Response Count
Yes		88.8%	350
No		11.2%	44
answered question			394
skipped question			13

# TRAIL SURVEY RESULTS

Please best describe yourself/your household?			
		Response Percent	Response Count
Primary Resident		88.7%	352
Second home/Condo owner		3.5%	14
Frequent Visitor (more than 6 times per year)		5.0%	20
Visitor (less than 6 times per year)		0.5%	2
Other		2.3%	9
answered question			397
skipped question			10

Which of the following age groups live in your household? Select all that apply.			
		Response Percent	Response Count
Under 5		17.2%	68
5-12		28.8%	114
13-17		19.2%	76
18-24		11.9%	47
25-45		43.7%	173
46-65		49.5%	196
Over 65		12.6%	50
answered question			396
skipped question			11



