LEHI CITY

Traverse Mountain Trails

Master Plan

Creative Trails, LLC

Introduction

The recognized value of trails has broadened and evolved in recent years. They are proven to have a positive impact on property values, local economy, and the reputation and overall health of a community. In the past few years, hundreds of miles of trails have been built in Utah. A number of communities in Utah, such as Moab, Park City, and St. George, have gained international recognition and awareness for their trail systems.

Utah is currently the 4th fastest growing state in the United States, with a growth rate of 1.64% and an estimated population of 3.22 million. The increase in population will create demand for more recreational opportunities, especially trail-based activities.

Trails are a cost effective means for providing a range of recreational opportunities for a community. More and more people are taking advantage of trail systems, and the modes of trail use are increasing. Trails provide affordable access for all and influence healthy lifestyle choices and overall fitness. Trails promote communion and immersion into nature, which builds respect and appreciation for nature and open spaces; this in turn helps instill the importance of supporting and maintaining them for perpetuity.

Lehi City owns 900+ acres of open space in the Traverse Mountain area. This City owned property is adjacent to another large tract of open space in Draper. Lehi City intends to program this space with a

system of non-motorized trails. This will provide opportunities to connect to existing trails in the Draper Open Space and expand the trail opportunities in the region.

The overarching goal of the Traverse Mountain Trails Master Plan (TMTMP) is to provide Lehi City with a clear strategy for developing a system of sustainable trails. Exhibit A provides a conceptual plan for the layout of the trails. This plan will provide guidance on types of trails to be built, trail difficulty rating system for the trails, signs for the trail system, funding, liabilities of trails, and phasing of construction.

Definitions

Electric Assisted Mountain Bike (eMTB) – an electric assisted mountain bike as defined by UCA 41-6a-102 (17). eMTb are categorized the same as a bicycle as stated by UCA 41-6a-1115.5 (1) and (2).

Trail –a purposed and constructed route that provides a corridor for non-motorized travel.

Recreational Trail – A non-motorized trail established for enjoyment, amusement, pleasure and sport; includes uses such as, but not limited to: hiking, biking, walking, horseback riding, Nordic skiing, and snowshoeing. Recreation trails can also provide connections with and access to other trails of any type, including trails managed by other agencies and governmental bodies.

Transportation Trail – A non-motorized trail that provides means for people to move from place to place and from destination to destination. Usually constructed with a hardened surface, such as asphalt or concrete, and on average 8-10 feet wide.

Bike Parks - An area set aside specifically for mountain bikes that provides opportunity for skill development, challenges, and measured risks by the way of constructed or natural features for mountain bikes to negotiate. The area can range from as little as 4,000 square feet to many acres. Bike parks can consist of pump tracks, dirt jumps, jump trails, skill and technical areas, or any combination. Bike parks are an integral part to any trail system that provide aspiring mountain bikers an avenue to practice and improve their skills and get more enjoyment out of the sport.

Shared-use Trail – A trail that is planned, designed, and built for a variety of non-motorized uses including hiking, mountain biking, equestrian, trail running, etc. They are generally designed for safe, two-way travel for all users, but can be used in more specific ways such as “for all” use, but uphill only for mountain bikes.

Single-use Trail – A trail planned, designed, and built for a specific, non-motorized use including hiking, mountain biking, equestrian, trail running, etc. They can be designed for a single direction of travel or two-way travel.

Sustainable Trail – A trail that is sensitive to the environment, meet the needs of a diverse group of users, requires little maintenance, minimizes conflict between user groups*, and connects to surrounding trails. Failure to create a sustainable trail system can lead to overcrowding, user conflict, and creation of unauthorized trails**

**(Trail Solutions: International Mountain Bicycling Association's Guide to Sweet Singletrack, 2004)*
***(Guidelines for a Quality Trail Experience; Bureau of Land Management /International Mountain Bicycling Association)*

Trailhead –A specified area(s) along the community trail system purposely designed and constructed for off-street parking. Trailheads provide a place for staging, departure, and return for trail users and can incorporate trail map displays and trail use regulations. Where appropriate, amenities such as benches, pavilions, restrooms, drinking fountains, bicycle racks, and bicycle repair stands may be provided.

Trail Hub – A place where multiple trails converge and disperse. They are an effective way for different trail types to cross and help manage flow of trail use. They are places that allow for directional information/signage.

Signage – An organization of signs for a trail or system of trails that provide direction, points of location, trail names, trail use regulations, interpretive information, etc..

Goals

A trail system is a success when it addresses the desired needs of its users, for instance: solo and group recreation; means for improving mental health and fitness; developing outdoor skills; observing and learning about the natural world; and participating in trail based sports. Through the range of these desired activities the trail user experiences solitude, fun, risk, challenge, curiosity, hope, well-being and a sense of escape or freedom. When a trail system meets the needs of a community its positive impact is widespread.

The overarching goal of the TMTMP is to serve as a guide and reference, and to establish a framework for developing a dynamic and sustainable trail system. The following standards are established to create a sustainable trail system:

1. **Develop trails with sensitivity to environmental impacts:**
    - Avoid sensitive areas, flat ground, and fall line oriented trails
    - Develop trails that contour across side-hills
    - Develop trails that provide the desired user experience preventing the building of unauthorized trails

- Build trails using industry best practices that:
    - Address erosion and sedimentation
    - Limit the disturbance outside the trail corridor
    - Use construction techniques that save and redistribute top soil and organic material
    - Implements appropriate construction techniques for drainage crossings and wet areas
    - Acquire the services of a professional trail contractor for final layout and construction is a good way to ensure these factors are considered, the services could range from performing the work to guiding volunteer groups.

2. Develop trails that will meet the needs of the different users:

- Incorporate a variety of trail types (see Trail Types section) that meet desired user experiences and are inclusive for all ages and abilities:
    - Shared use trails
    - Single use trails
    - Directional trails
    - Special use areas such as: pump tracks, bike parks, and free-ride trails
    - Trails with a progression of difficulty levels
- Create a stacked loop and hub trail system:
    - To give users new or multiple route options
    - Allow user easy return to where they started
    - To provides the opportunity for a progression of trail difficulty levels which appeal to all different skill levels

3. Develop trails in a manner that minimizes long-term maintenance:

- Use industry best practices in design and construction techniques including the following:
    - Implement a rolling contour design
    - Follow the "half rule"—trail grade does not exceed ½ the side hill angle
    - Construct trails with appropriate grades for soil types and trail type, maximum overall grade of 10%
    - Utilize grade reversals as primary drainage
- Use appropriate construction techniques for wet areas and drainage crossings
- Keep users on the trails by design of desired use/experience
- Implement trail maintenance program

4. Minimize user conflict

- Plan and build a variety of trail styles that provide specific user experiences, including trails for shared uses, mountain biking, hiking, trail running, and equestrian
- Utilize trail hubs in the design and layout of the trails

- Plan and build a substantial number of trails anticipating heavy use and allowing users to spread out
    - Provide multiple points of access
    - Connect to Draper's Corner Canyon Trail System
- Establish and post trail rules and regulations
- Keep abreast of trends as the trail system is developed and be adaptable to new methods of construction and maintenance

5. **Connect to neighborhoods and other trails in the region:**
    - Develop multiple trailheads around the perimeter of the trail system where possible
    - Connect to trails in outside jurisdictions to create an extensive, regional trail network—Draper's Corner Canyon trail system is adjacent to the Traverse Mountain Open Space
    - Create trail connections to surrounding neighborhoods, and work with developers to plan access points

Trail Types

To accomplish the goals of the TMTMP, a variety of trail types will be developed. Important factors in considering trail variety include: natural setting, exercise, loops/connectivity, desired experience, challenge, risk, and play.

The trail system will be developed as a "stacked loop and hub system." The stacked loop system provides the opportunity to create a variety of trail types, develop of progression of difficulty levels, and provide a variety of route configurations. It also allows opportunities to create trail connections throughout the system. Hubs help manage the flow of traffic and user conflicts by organizing places for different trails types to cross each other and continue on.

Matching the different terrain and landscapes in the open space with the trail type will optimize the recreation experience. Some landscapes lend themselves better to different experiences. For instance, undulating terrain on moderate side slopes provide great opportunities to create an exciting flow trail experience for mountain bikers and trail runners.

A. Transportation trails

Transportation trails play an integral part in providing access for people living in nearby neighborhoods. Existing and future transportation trails in Lehi City should be considered to create access points to the Traverse Mountain Trails.

B. Shared Use Trails - approx. amount of trails proposed: 89.5 miles.

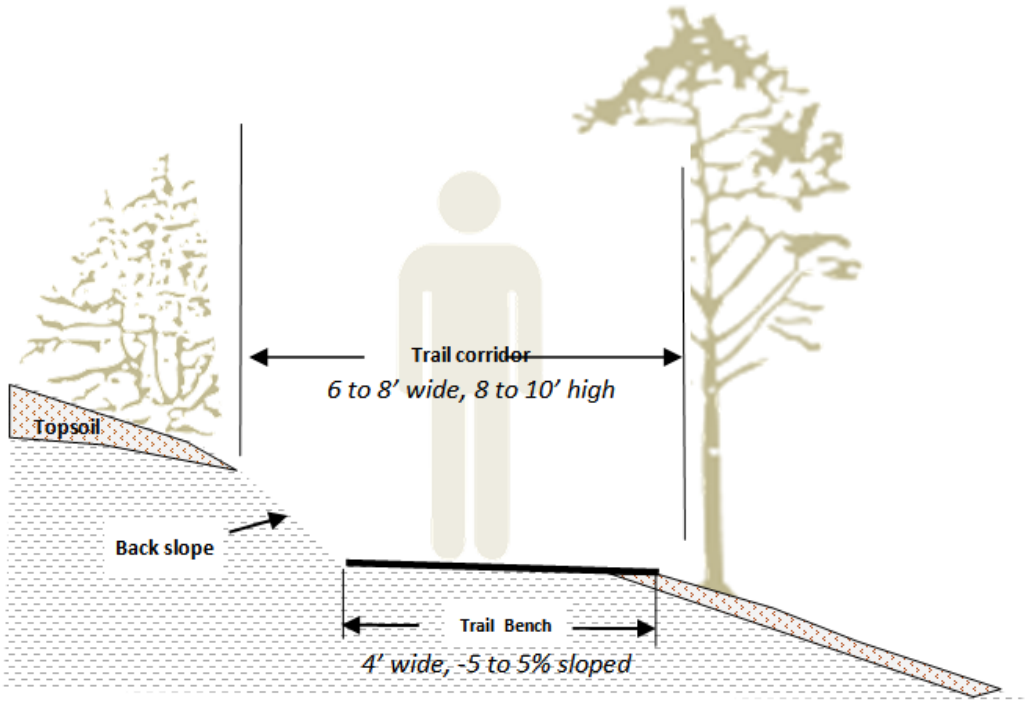
Shared use trails will be the backbone of the Traverse Mountain Trail System. They connect users from one location to another, play a major part of longer mountain bike rides and hikes, and are open to a variety of trail users.

Advantages of shared use trails include:

1. Accommodate the broadest spectrum of user groups
2. Provide the most efficient use of available space
3. Facilitate building a trail community
4. Cost effectiveness

Disadvantages of shared use trails can include:

1. Potential user conflict
2. Overcrowding
3. Not providing specific experiences for some users.

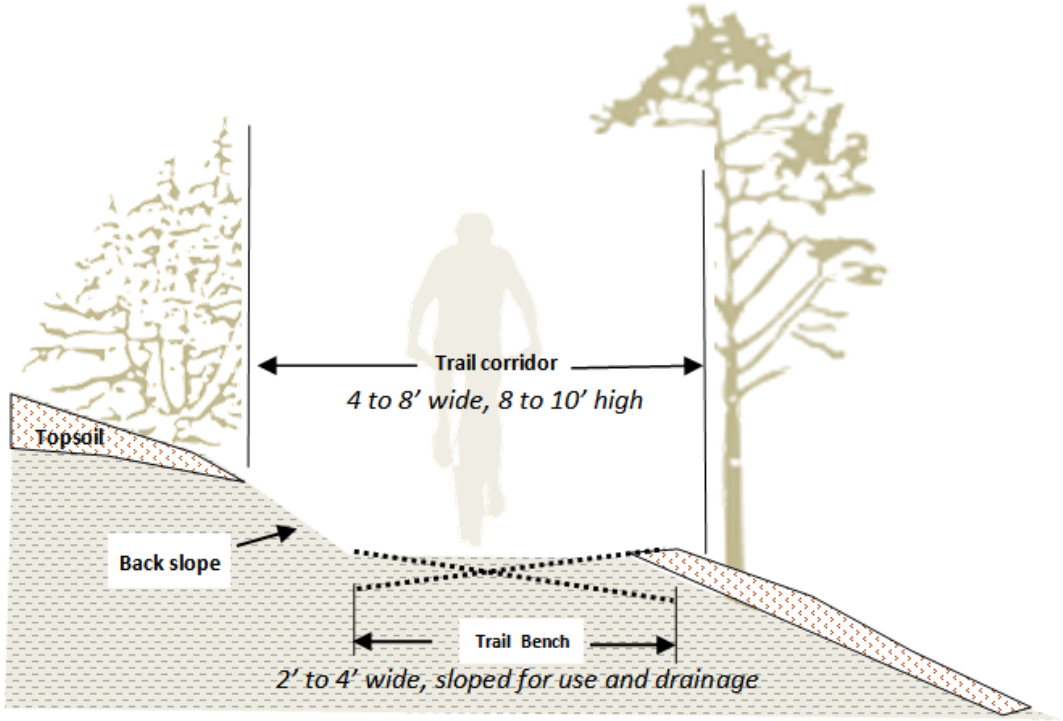


Typical Cross Section : Shared Use Trail

C. Single Use Trails - approx. no. of trails proposed: mtn bike - 35.3 miles,
hiking & equestrian - 25.9 miles;

Not all trails can provide everything to all users, which is why it is important to provide a variety of trail types in a trail system. Single use trails provide more distinct user experiences, reduce user conflict and congestion, provide a more secluded or private experience, and can provide challenges and features specific to particular user groups.

- **Hikers** tend to focus on the setting of the trail and having a unique destination for their trail experience. They are the most mobile and capable group, being able to access places other users cannot. Opportunities for hiking only trails should be available close to trailheads and throughout the system. Hiking loops and trails to destinations will be included.
- **Equestrians** tend to prefer loops, prefer access to water, and require longer distances than hikers for a valued experience. Equestrian use is most compatible with hiking and sharing these uses is an efficient use of trails. The property may not provide valuable equestrian experience as it lacks sources of water and parking accommodations may be difficult; however, there are sections of existing jeep trails that may lend themselves to good equestrian experiences.
- **Trail runners** look for similar trail experiences as mountain bikers; the experience of the trail itself, how it flows, and the distance and speed are just as important as the exercise itself.
- **Mountain bikers** are the most diverse group. Mountain bike technology has drastically changed in the past few years and continues to evolve. Mountain bikes have become more capable of handling rougher terrain, higher speeds, and varied styles of riding. There is a wide range of experiences this group looks for, but the trail itself is the primary focus rather than a destination or setting. They look for play, technical challenges, flow, skills progression, endurance, loops, etc. Electric assisted mountain bikes are the newest category to this group. They look for the same experiences as mountain bikers but with greater distances. They are also more capable of negotiating technical uphill sections.



Typical Cross Section : Single Use Trail

There are a number of existing jeep trails in the area. Some are planned as limited access to existing utility infrastructure, but the majority are unplanned remnants from years past. A large portion of the jeep trails are not sustainable and are limited in the trail experience they can provide. The jeep trails will be looked at and incorporated into the trail system when it makes sense. There are short sections that can be useful to make short connections between the new trails. Certain sections of jeep trails may make sense to use as a “road to trail conversion”, where appropriate, providing an effective way to minimize new disturbances in the open space. Other jeep trails may make good equestrian trails. Remaining jeep trails should be considered to be abandoned and re-vegetated.

Construction and Revegetation

Trailheads and any utility work shall be in accordance with Lehi City standards and BMPs. Trails shall be constructed according to sustainable trail development standards established by the International Mountain Bicycling Association (IMBA) and Bureau of Land Management (BLM). Any new trail routes shall be flagged and approved in-person by Lehi City Parks Division or designated representative prior to construction. Trail construction shall be performed in a manner minimizing impacts and disturbance to surrounding natural vegetation and landscape features. Disturbed slopes greater than 3:1 shall be revegetated with the Traverse Mountain Seed Mix or comparable.

Trail Difficulty Rating

The trail system will incorporate a progression of difficulty—easiest, easy, more difficult, very difficult, and extremely difficult. This will ensure the trail system is inclusive to a wide range of users and ability levels, so all can have a good experience. Lehi City will adopt the International Trail Marking System used by ski areas throughout the world. The criteria for difficulty is based on tread width, trail surface, trail grade, features, obstacles, or challenges in the trail. See IMBA's Trail Difficulty Rating System below as a method to rate trail difficulty.

IMBA Trail Difficulty Rating System

	EASIEST WHITE CIRCLE	EASY GREEN CIRCLE	MORE DIFFICULT BLUE SQUARE	VERY DIFFICULT BLACK DIAMOND	EXTREMELY DIFFICULT DBL. BLACK DIAMOND
TRAIL WIDTH	72" (1,800 mm) or more	36" (900 mm) or more	24" (600 mm) or more	12" (300 mm) or more	6" (150 mm) or more
TREAD SURFACE	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
AVERAGE TRAIL GRADE	Less than 5%	5% or less	10% or less	15% or less	20% or more
MAXIMUM TRAIL GRADE	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
NATURAL OBSTACLES AND TECHNICAL TRAIL FEATURES (TTF)	None	Unavoidable obstacles 2" (50 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 36" (900 mm) or wider	Unavoidable obstacles 8" (200 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 24" (600 mm) or wider TTF's 24" (600 mm) high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or wider TTF's 48" (1,200 mm) high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or narrower TTF's 48" (1,200 mm) high or greater, width of deck is unpredictable Many sections may exceed criteria

(Trail Solutions; IMBA's Guide to Building Sweet Singletrack, 2004)

Signs

Signs are a key factor in a trail system's success. A well-implemented sign plan will incorporate informational and directional signs, maps, and information on trail etiquette, rules, and regulations.

Each trail will have a marker that identifies its name, difficulty level, length, average grade, and use designation. Trail intersections and hubs will have trail markers for each trail.

Trail Marker Examples

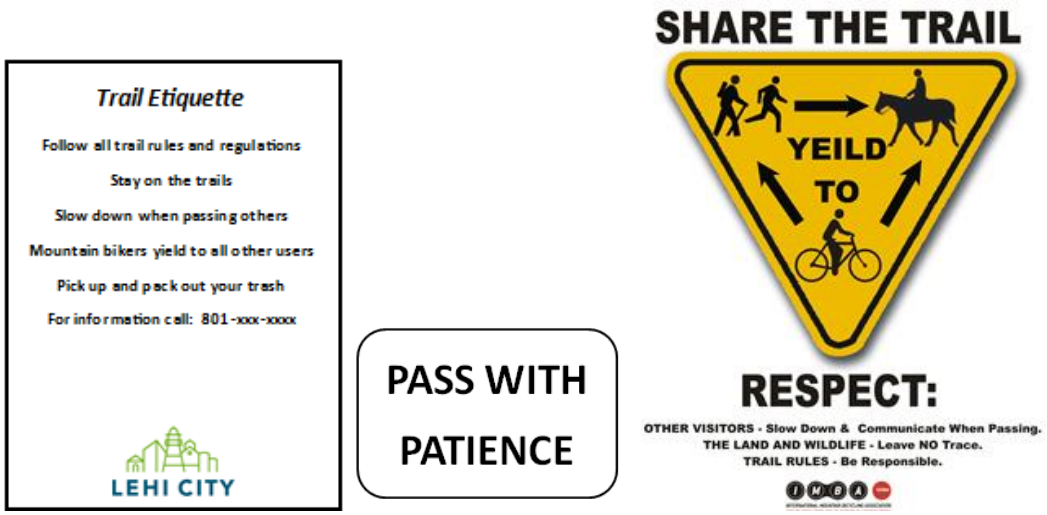
Warning signs should be placed to mark hazards and technical trail features.

Warning Sign Examples

Trail regulations should be placed in appropriate locations.

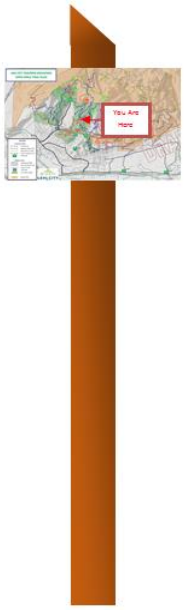
Regulatory Sign Examples

Signs providing information on trail etiquette should be placed in appropriate locations, distributed throughout the trail system.



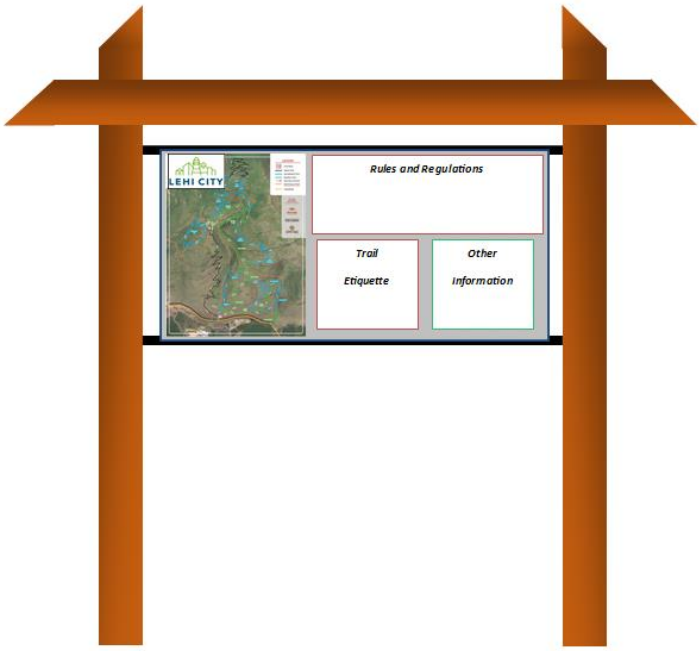
Trail Etiquette Sign Examples

A system of “You Are Here” maps may be implemented throughout the network to help users navigate the trail system. These will be located at the trail hubs.



“You Are Here” Map Example

Sign kiosks will be located at major trailheads and access points. Kiosks are a great place for maps of the trail system, rules and regulations, education on trail etiquette, and interpretive information.



Trailhead Kiosk Example

Funding

Funding the construction of the trail system will come from several sources, including:

- Grant opportunities
- Lehi City Capital Improvements Budget
- Impact fees
- Corporate and private donations

Liability of Trails

A common concern of private landowners is the liability of allowing public use on their land. The State of Utah has provided land owners protection from liabilities for those who allow public on their property for recreational use through Utah Code Annotated §§57-14-101 through 203 (Limitations on Landowner Liability – Relating to Recreational Use) and UCA §§57-14-401 and 78B-4-509(2) and (3) (Inherent Risks of Certain Activities).

In addition to the legal protections afforded by Utah Code Ann. 57-14-101 et seq. to property owners, Lehi City enjoys immunity pursuant to Utah Code Ann. 63G-7-201(4)(n) for certain trails along ditches, canals, streams, or rivers. For other issues regarding liability, the City relies on its general plan, safety designs, including building its trails to recognized standards such as those set forth by the International Mountain Bicycling Association and the Bureau of Land Management, and developing and carrying out a maintenance plan.

Phasing of Construction

The TMTMP has trails planned across Lehi City owned property, private property, and property in neighboring municipalities. Implementation of the trails will need to be phased over multiple years. Phasing of trail construction will depend on factors such as funding, property owner permissions, and private or public property development. Trails planned on Lehi City property can be constructed as soon as funding sources are identified for individual trail projects and in alignment with the TMTMP.

Exhibit B provides an outline of priority trails, as identified by City staff, to be considered for completion in the early phases of development of the plan. Some of these will provide key connections, loops, or trail experiences. Order of these trails is tentative and serve to guide the implementation of key components of the trail system.