TOWN OF MAMMOTH LAKES (TOML)
Soft-Surface Trails Concept

December 2008

With Support from Trail Solutions

1. BACKGROUND & INTRODUCTION

A. Background

The Town of Mammoth Lakes adopted a Trail System Plan in May of 1991. That Plan established the foundation for hard surface trail development (Main Path – paved paths) within the Urban Growth Boundary for the past 17 years. As with any plan, there comes a time for assessing, reviewing and updating. In the fall of 2006 a local non-profit organization, Mammoth Lakes Trails and Public Access (MLTPA) focused attention on the need to re-evaluate and to engage the community in a Concept and Master Planning (CAMP) effort to address the need for a comprehensive trails and public access plan.

The 2007 General Plan established a Parks, Open Space and Recreation Goal (P.3.) that would "Create a Master Plan for an integrated trail system that will maintain and enhance convenient public access to public lands from town." A second Parks, Open Space and Recreation Goal (P.5.) stated the need to "Link parks and open space with a well-designed year-round network of public corridors and trails within and surrounding Mammoth Lakes."

In June of 2007 the Town Council allocated funding, in partnership with Mammoth Mountain Ski Area and MLTPA, for consultant services to aid in the preparation of a comprehensive trails planning effort. By October 2007 the scope of work was defined, the consultant qualifications evaluated and the contracts were executed to begin the planning process. A robust and aggressive public outreach effort, lead by MLTPA and conducted over a six-month period helped the consultant team develop the content of the plan.

The Mammoth Lakes Trail System Master Plan – Final Draft (2009) contains two distinct planning efforts. The first one focuses on the trail system plan within the Town's Urban Growth Boundary (UGB) and is a very mature and well-developed draft. It contains thorough analysis and evaluation of existing conditions, public input/surveys, gap analysis and potential recommendations for future implementation. Several maps are included within this portion of the draft that visually illustrates the recommendations made in the document. There is also a separate chapter within this document that provides signage and wayfinding concepts that can be used for implementation.
The second planning effort is found within this Attachment A and is referred to as the Soft-Surface Trails Concept. The intent of this secondary effort was to help define the interface potential between the UGB and the USFS public lands outside the boundary. This report is very young in development. The potential concepts identified have not been publicly vetted and should be viewed as catalysts for beginning the necessary in-depth analysis and discussions with the USFS needed to address the issues identified in this section. None of the recommendations found within Attachment A should be considered ready for implementation.

B. Document Purpose

The Town of Mammoth Lakes (TOML or Town), and its planning partners, recognized the importance of soft surface trails in enhancing tourism and recreation opportunities. This document is not a formal plan intended for adoption by the Town of Mammoth Lakes, rather the purpose of this document is to begin a dialogue about ways to connect and improve soft surface trail opportunities. This document provides a starting point with a preliminary trails concept and key alternatives or options for specific trails. It does not provide an endpoint, but does provide quality information on identified public desires, existing trail conditions, and trail design concepts.

C. Vision and Goals

The following vision, goal and objectives are adopted from the Town of Mammoth Lakes Trail System Master Plan and relate to the soft surface recommendations:

Community Vision: Surrounded by uniquely spectacular scenery and diverse four-season recreational opportunities, the community of Mammoth Lakes is committed to provide the very highest quality of life for our residents and the highest quality experience for our visitors.

Goal 1: Develop a plan for an integrated year-round trail network that provides for a seamless transition between the Town of Mammoth Lakes, the Mammoth Mountain Ski Area (MMSA) and the surrounding federal lands (USFS).

Objective 1.1: Identify improvements for signage, wayfinding and amenities throughout the existing network.

Objective 1.2: Close gaps in the existing network.

Objective 1.3: Expand the network within the Urban Growth Boundary to provide access to new destinations, activities and experiences.

Objective 1.4: Identify locations for potential recreation nodes and public access easements that will provide connections between Town and surrounding public lands.

Objective 1.5: Identify appropriate existing summer and winter uses for each segment of the network.

Objective 1.6: Provide design guidelines that will minimize user conflicts, provide for sustainable trails, and reduce maintenance needs.

Objective 1.7: Provide uniform signage and wayfinding along the network and at all recreation nodes.

D. Scope

The soft-surface trails planning area was loosely defined as a "donut" around the town's Urban Growth Boundary (UGB) that encompassed those trails and lands that could be easily accessible from the UGB. The planning area did not, however, include the Lakes Basin or any lands managed by Mammoth Mountain Ski Area (MMSA). The physical description of this area could be loosely described as below:

Beginning at the Mammoth Welcome Center the planning area includes the Shady Rest area north to the park edge and then east to the Town limits. The area follows the town limits south to intersect with the base of the Sherwin Mountains, then travels westward to intersect with Tamarack Lodge. The planning area then follows the Mammoth Mountain Ski Area (MMSA) boundary north to connect with highway 203 at the fee boundary limit of Uptown/Downtown trails. The area again follows the edge of the MMSA boundary west along highway 203 to connect with the origin of the Mountain View Trail at 203 and the Minaret Summit.

The northern limit of the planning area follows a circuitous line from the north edge of Shady Rest Park west to encompass the Knolls area, the Earthquake Fault Interpretive Area, and the origin of the Mountain View Trail at Minaret Summit.

2. DATA SUMMARY - Relevant Plans and Policies

Inyo National Forest

The majority of the trails described as "Soft Surface" are located on public lands administered by the Inyo National Forest. Below is a discussion of relevant Inyo National Forest documents that affect the decision-making process.

Inyo National Forest Environmental Impact Statement and Resource Management Plan **(1988)**

Prescriptions in this plan are applied to management areas. Relevant management areas for this study including portions of management area 7- Upper Owens River, management area 8- Mammoth Escarpment, and management area 9- Mammoth. Plan prescriptions for recreation are shown below by section, and page number.

Upper Owens River – pages 182, 183, 184

- *Program and develop support facilities such as parking areas and trailheads for both Nordic and snowmobile access along U.S. 395 and the Scenic Loop Road when opportunities and funding become available. OSV access to the Inyo Craters will be permitted to continue.*
- *Develop a recreation composite plan to inventory, coordinate, and program the full summer and winter recreation development potential west of U.S. 395. Include the area in Prescriptions #10, #12, and #16. Construct program facilities as funds become available.*

Mammoth Escarpment - pages 187, 188

- *Identify and program dispersed trail facilities in the areas in prescriptions #12, #14, and #17. Include hiking and equestrian trail opportunities in all areas and bicycle trails in the area in Prescription #12. Include opportunities for mountain bike trails within the Management Area. Interface trail systems with the community.*
- *Emphasize development of front country trails, particularly those linking Mammoth to the Forest.*
- *Limit Nordic capacity (skiers at one time) in Mammoth Lakes Basin to 1,200 people at one time, unless a special study indicates an increase is socially and environmentally acceptable.*
- *Maintain current use patterns and open space on National Forest System lands adjacent to Valentine Reserve.*

Mammoth – page 194

- *Provide trail interface opportunities with the community of Mammoth Lakes.*
- *Maintain open-space areas adjacent to the Town of Mammoth Lakes for passive recreation use.*
- *Prohibit the development of Shady Rest Park beyond existing perimeter roads, and north of the power line right-of-way.*
- *Allow the development of Mammoth Creek Park by the Town of Mammoth.*
- *Identify and program the expansion potential of the Shady Rest and Sherwin Creek Campground complexes and develop as funds become available.*

As part of the Travel Management planning process, the Inyo National Forest recently completed an inventory of all roads in the Forest. The Inyo identified routes as either existing system roads or non-system roads. Each segment was numbered and is in the process of being analyzed to determine if it will be brought forward as a system road. This creates a potential opportunity to work with the Forest Service to identify road to soft surface trail conversions within this concept study area that may augment existing trails. The completion of the Travel Management Project will inform the conversion possibilities.

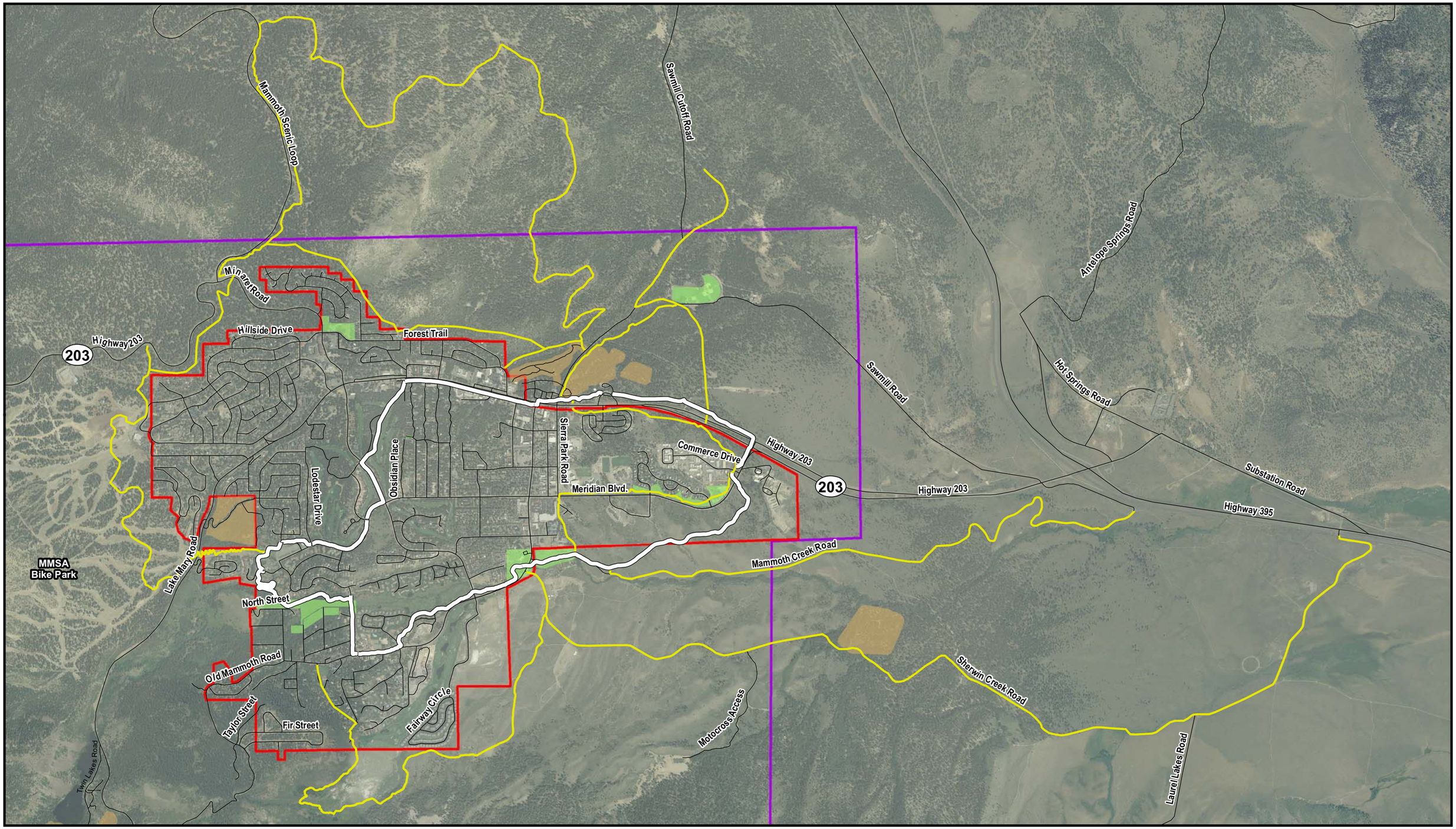
Inyo National Forest Closures and Restrictions

The following Inyo National Forest Service Orders were reviewed.

- *Forest Order 04-92-11 - Over-Snow-Vehicle Use Restrictions – Inyo National Forest-1992, Exhibits A – Interagency Snowmobile Recreation Use Map, North Half, October 1992, and Exhibit B-Interagency Snowmobile Use Map, South Half, October 1992.*
- *Forest Order 04-93-1 – Cross-Country Ski Trails Use Restrictions, 1993, Exhibit C-Sierra Meadows Cross Country Ski Center, and Exhibit D – Shady Rest Ski Trails*
- *Forest Order 04-92-10 – Bicycle Travel Restrictions- Mammoth Ranger District- Inyo National Forest, 1992*

Mammoth Mountain Ski Area (MMSA)

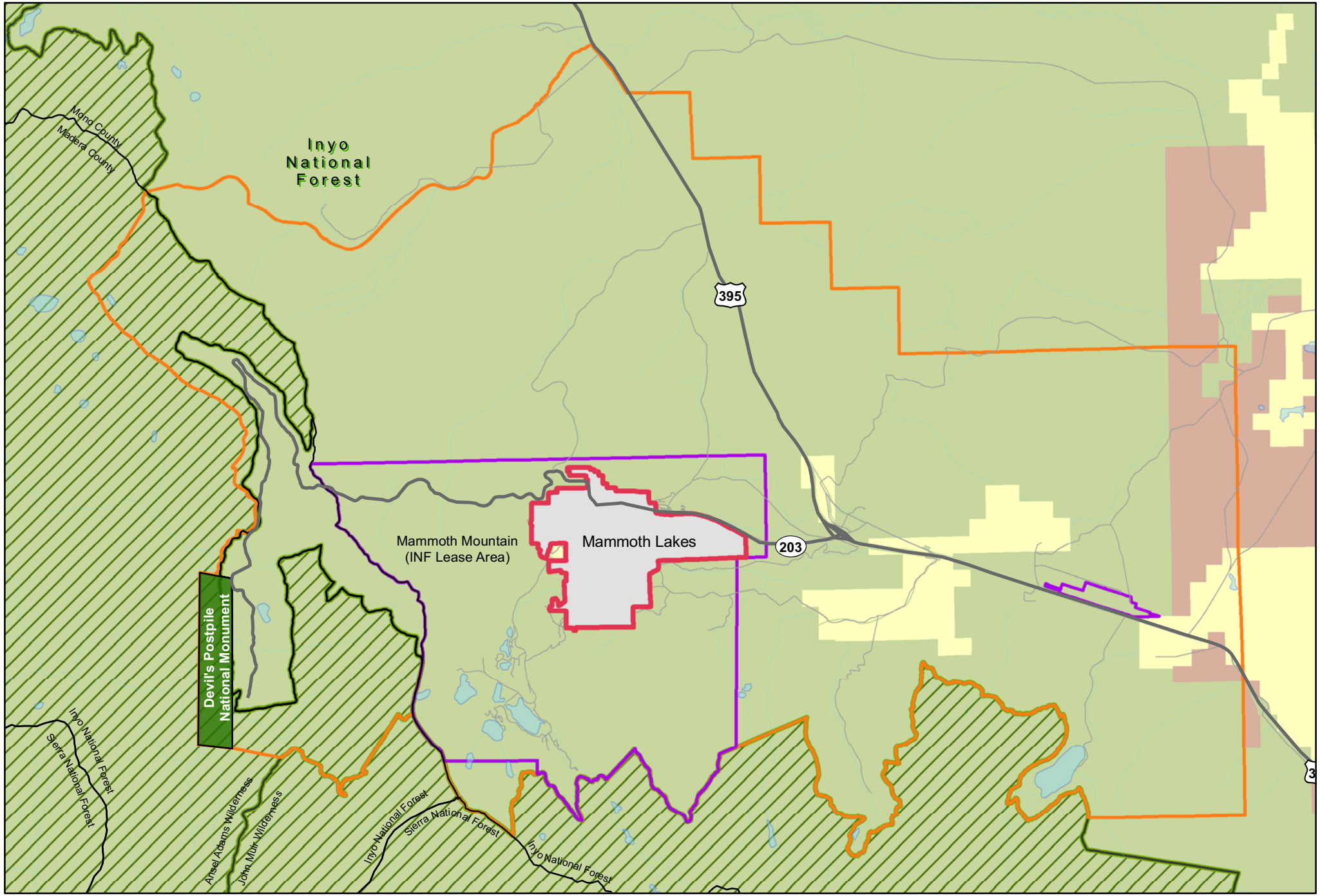
Mammoth Mountain Ski Area operates winter and summer recreation facilities on Mammoth Mountain under a permit from the Inyo National Forest. Several trails open to the public are located on MMSA permitted lands. Any proposed trail routes to be located on permitted and private MMSA lands and will require cooperation with MMSA and approval from the USFS.



MAP 1-1:
Trail System Plan (1991)

Trail System Plan (1991) Proposed Main Path
Proposed Future/Alternative Trails
Streets
Parks & Open Space
Campgrounds
Urban Limit
Town Boundary

0 0.5 1 Miles



MAP 2-1:
Mammoth Lakes Area Jurisdictional Boundaries

- Urban Growth Boundary
- Town Boundary
- Planning Area
- Bureau of Land Management
- LA Deptartment of Water and Power
- Forest (USFS)
- USFS Wilderness
- Highways (Caltrans)

0 1 2 4 Miles

3. EXISTING CONDITIONS

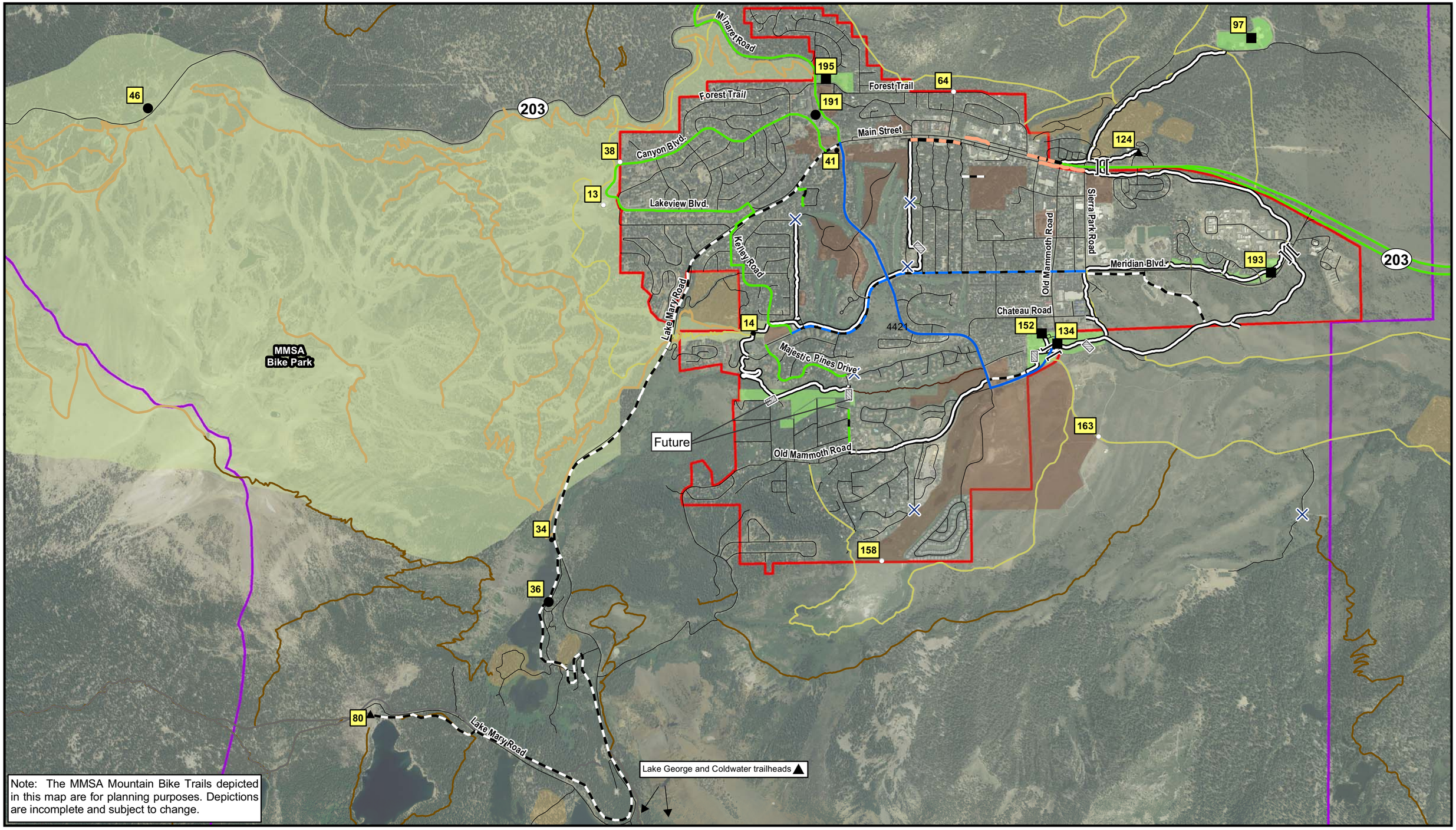
The maps in this section indicate the existing soft-surface trails within the planning area that are popularly recognized - that are either designated by the USFS or listed in publications and guidebooks distributed by the Mammoth Lakes Welcome Center. Key summer and winter nodes used to access these trails (as determined during summer and winter CAMP) are also indicated on the maps.

A. Summer Nodes

Summer nodes were identified during the CAMP: Summer process. Each of the nodes was evaluated by Trails Solutions staff during the weekend of 9/9/07-9/13/07. The evaluators looked at the presence and clarity of signage, experiences available, potential for conflict between uses, and connectivity to nearby soft surface trails. The evaluator's impressions and field notes are provided in appendix A.

Table 3-1 EXISTING CONDITIONS –SUMMER RECREATION NODES

#	Point Name	GIC #	Amenities							
			lodging	restaurants	parking	restrooms	lift	bus	trail access	signage
1	Shady Rest Park	123 + 097			X	X			X	X
2	North Village	021 + 041	X	X	X	X		X	X	X
3	Mammoth CC	192 + 030			X	X			X	
4	Eagle Lodge	014	X		X			X	X	
5	USFS Borrow Pit	163			X				X	
6	Sierra @Forest Trail	064							X	X
7	Mammoth Creek Park	134 + 152			X	X		X	X	
8	Main Lodge	046	X	X	X	X	X	X	X	X
9	Horseshoe Lake	080			X	X		X	X	X
10	Twin Lakes Parking Lot	034			X				X	X
11	Tamarack Lodge	036	X	X	X	X		X	X	X



MAP 2-2: Existing Summer Recreation Nodes and Facilities (UGB & Beyond)

Summer Recreation Nodes
- Portals
- Parks
- Trailheads
- Access/Egress Points
- Key GIC Points

- GIC Numbers
- Gates/Barriers/Closures
- Tunnels
- Bridges

On-Street Facilities
- Existing Bike Lanes (Class II)
- Near-Term Bike Lanes (Class II)
- Existing Bike Routes (Class III)
- Near-Term Bike Routes (Class III)

Paved Off-Road Facilities
- Existing Paved Multi-Use Paths (Class I)
- Near-Term Multi-Use Paths
- Existing Promenade
- Near-Term Promenade

Soft-Surface Trails
- Existing MMSA Mountain Bike Trails
- Existing USFS System Trails
- 1991 TOML Future/Alternative Trails
- Private Dirt Trails

- Campgrounds
- Parks & Open Space
- Planned Developments
- Urban Limit
- Town Boundary

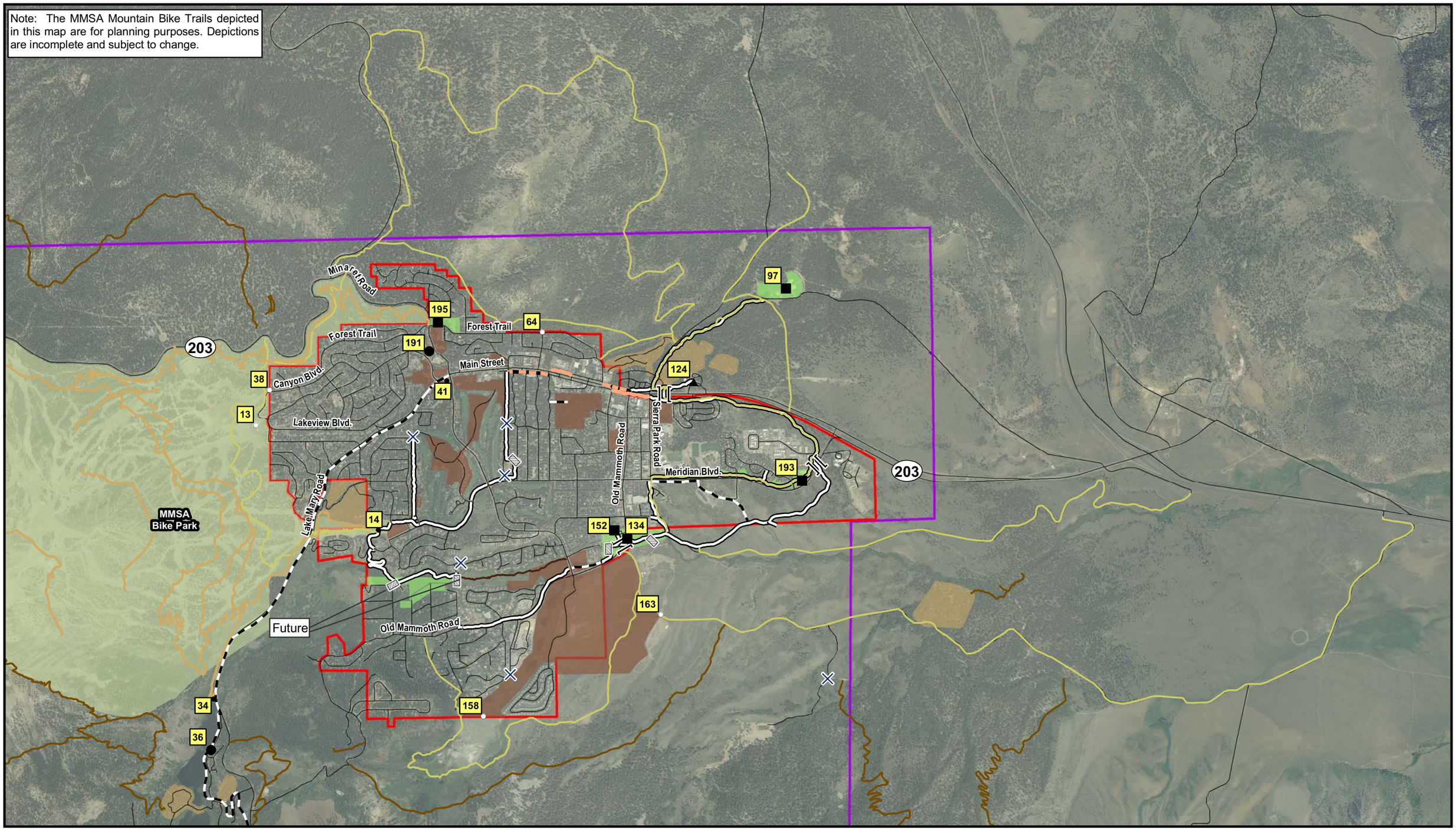
0 0.5 1 Miles

B. Summer Trails

An summary analysis was conducted of summer-time soft-surface trail facilities at or near the urban growth boundary. Trails were identified using the MLTPA GIC, the 1991 Town of Mammoth Lakes Trail System Master Plan, maps of Forest Service designated trails, and available maps and publications from the Mammoth Welcome Center. Only those trails within the planning "donut" are indicated in this section. Furthermore, trails administered by Mammoth Mountain Ski Area (MMSA), except the lower (non-fee) portion of Uptown and Downtown Trails, are not analyzed in this report.

Many of the trails and routes currently used and promoted along the urban interface of the Town of Mammoth Lakes are not USFS designated "system" trails. In addition, many trail segments do not connect to form coherent loops, do not connect to the town's pathway system, or to a major node or portal. An evaluation looking at each trail's current jurisdictional status, environmental sustainability, user satisfaction, potential for conflict between uses, hazards, and connectivity can be found in appendix A.

Note: The MMSA Mountain Bike Trails depicted in this map are for planning purposes. Depictions are incomplete and subject to change.



MAP 2-8: Existing Summer Trail System (UGB & Beyond)

Summer Recreation Nodes
- Portals
- Parks
- Trailheads
- Access/Egress Points
- Key GIC Points

- 9 GIC Numbers
- Gates/Barriers/Closures
- Tunnels
- Bridges

Paved Off-Road Facilities
- Existing Paved Multi-Use Paths
- Near-Term Multi-Use Paths
- Existing Promenade
- Near-Term Promenade

Soft-Surface Trails
- Existing MMSA Mountain Bike Trails
- Existing USFS Sanctioned Trails
- 1991 TOML Future/Alternative Trails
- Private Dirt Trails

- Campgrounds
- Parks & Open Space
- Planned Developments
- Urban Limit
- Town Boundary

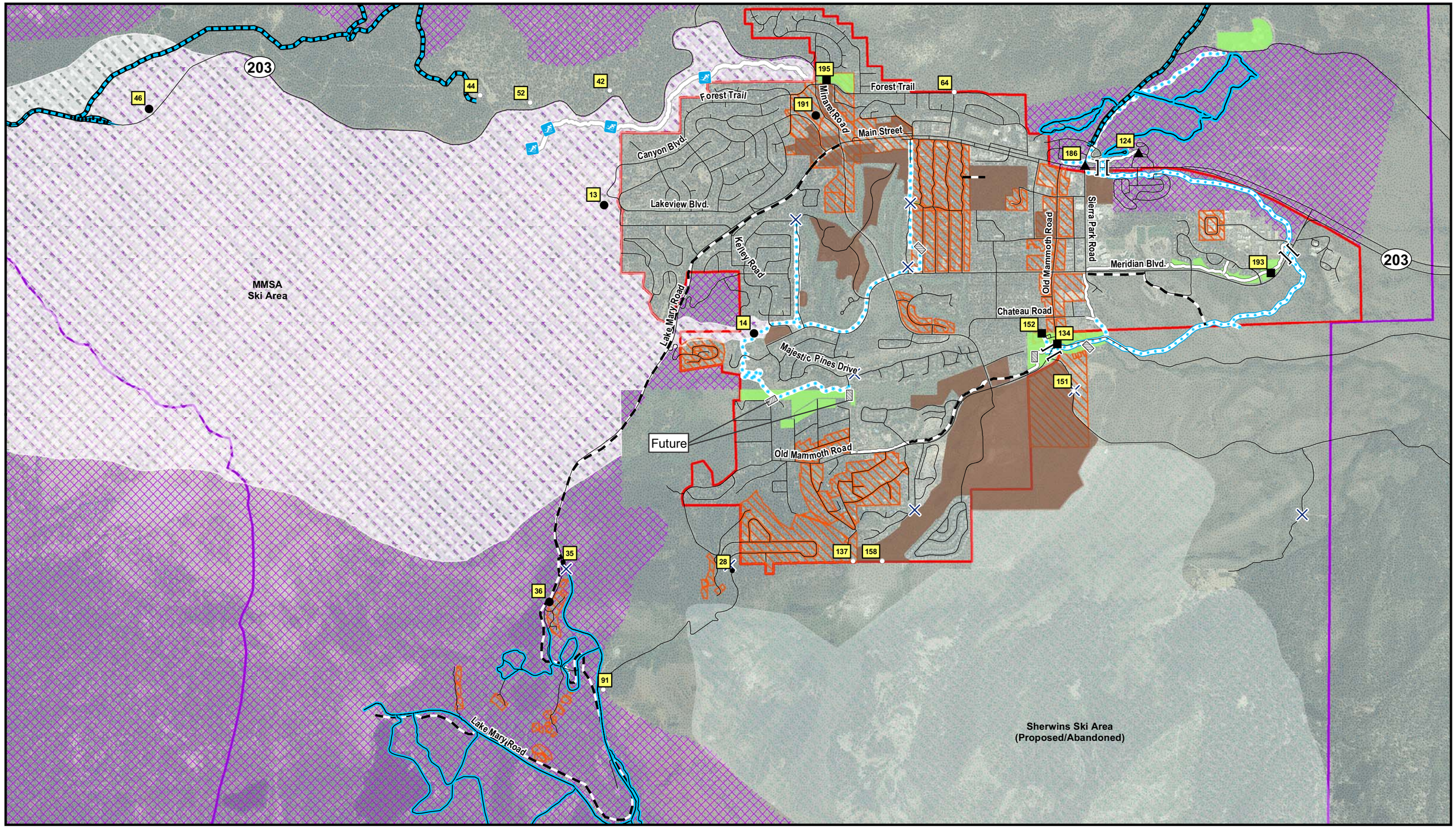
0 0.5 1 Miles

C. Winter Nodes

Winter nodes were identified using information provided by jurisdictional partners and validated through public discussion during the CAMP: Winter process. Field review looked at the presence and availability of facilities/access, signage, experiences available, connectivity and potential for conflict between uses at that node.

TABLE 3-2 EXISTING CONDITIONS –WINTER RECREATION NODES

Point Name	GIC #	Amenities							
		lodging	restaurant	parking	restrooms	lift	bus	trail access	signage
Main Lodge	46	X	X	X	X	X	X	X	X
Power Plant	44			X				X	
Sledz	52			X	X	X	X		
Earthquake Fault	42							X	
Mammoth CC	195			X					
Sierra @Forest Trail	64							X	
Shady Rest Parking	192			X	X			X	X
Welcome Center	124			X	X			X	X
USFS snow storage road	67								
Winter-Sherwin creek	151			X				X	
Ranch Road gate	16							X	
Tamarack St	137							X	
Mill City closure	28			X				X	
Twin Lakes parking lot	34			X			X		X
Lake Mary Rd gate	35			X				X	X
Tamarack Lodge	36	X	X	X	X		X	X	X



MAP 2-3: Existing Winter Recreation Nodes and Facilities (UGB & Beyond)

Winter Recreation Nodes
- Portals
- Parks
- Trailheads
- Access/Egress Points
- Key GIC Points

- 9 GIC Numbers
- Gates/Barriers/Closures
- Tunnels
- Bridges

Paved Multi-Use Paths
- Snow Removed from Existing Multi-Use Paths
- Groomed Existing Multi-Use Paths
- Snow Covered Existing Multi-Use Paths
- Near-Term Multi-Use Paths

Winter Use
- Groomed : Multi-Use
- Groomed : Non-Motorized
- Ski Back Trail (Proposed)
- Closed to Motorized

- Parks & Open Space
- Planned Developments
- Assessment Districts
- Urban Limit
- Town Boundary

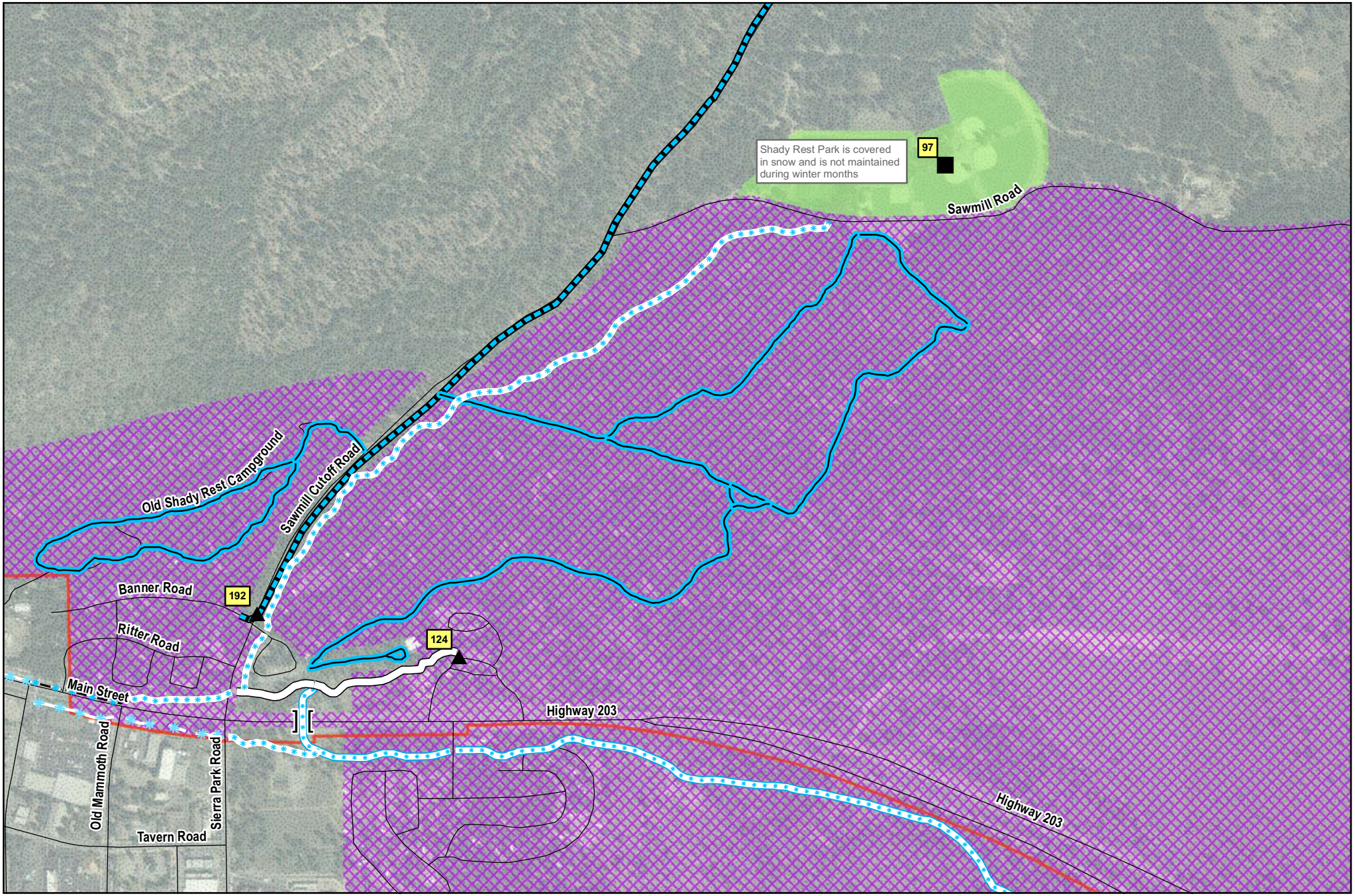
0 0.25 0.5 Miles

D. Winter Trails

Because winter activities center around access to terrain as much as developed systems, both popular off trails activities and the existing developed trails for each of the major systems were considered. There are a number of signed not-groomed blue diamond trails in the concept study area. The Town, MLTPA, and USFS are in the process of identifying the blue diamond sign locations as an inventory for future evaluation.

TABLE 3-3 EXISTING WINTER GROOMED TRAIL SYSTEM

Facility Type	Mileage/Units
Cross Country Ski Trails (Tamarack)	14.50 miles
Cross Country Ski Trails (Shady Rest)	2.57 miles
OSV Trails (In Town Boundary, Outside UGB)	4.74 miles



MAP 2-9: Shady Rest Existing Winter Use

Winter Recreation Nodes
- Parks
- Trailheads
- 9 GIC Symbols

- Tunnels
- Streets
- Parks & Open Space
- Urban Limit
- Existing Non-Motorized Area

Maintenance on Paved Multi-Use Paths
- Groomed (Mammoth Nordic)
- No Winter Maintenance (snow-covered)
- Snow Removed

Existing Winter Use
- Groomed : Multi-Use
- Groomed : Non-Motorized

Miles
0 0.125 0.25

4. PUBLIC PARTICIPATION AND OUTREACH

Two public outreach efforts were conducted to gain insight on how to improve trails for summer and winter activities in and around Mammoth Lakes. The outreach efforts were called Concept and Master Planning (CAMP) Summer and Winter. CAMP: Summer took place in early November of 2007 and CAMP: Winter took place in early February of 2008. Stakeholder interviews, meetings, tours and two detailed user surveys (summer and winter) were used to help create a portrait of the needs of Mammoth residents and visitors regarding both summer and winter trail use.

A. CAMP

Both CAMP: Summer and CAMP: Winter were conducted using the same general format. The sessions began with an introductory presentation by the consulting team followed by tours of existing facilities. Participants discussed the pros and cons of the current system, shared insight on their favorite outdoor activities, and provided anecdotal comments on desired new facilities. These tours were followed by listening sessions by user group, and included meetings with public officials and school children. The third event included public workshops where groups of citizens could brainstorm around maps and share their ideas for the future. The CAMP sessions were concluded with a "next-steps" presentation by the consulting team.
Anecdotal comments received during the sessions are captured in the summaries and User Survey results are found in Appendix D. Major issues discussed during each session are further detailed for summer and winter. The map-related results from the workshops can be found in Appendix D of this concept study report.

B. User Surveys

User surveys were also conducted and are summarized in the Town of Mammoth Lakes Trail System Master Plan, 2008 produced by Alta Planning and Design.

5. USER ANALYSIS

This section summarizes user characteristics and behavior trends of those outdoor recreational trail activities most frequently engaged in by Mammoth residents and visitors. The information was derived both from recent social science and IMBA Trail Solutions staff professional expertise. Although the information is not specific to Mammoth alone, the behavior analysis in this section, combined with information found in the four previous sections, help to form the basis for justifications for the decisions in the *Potential Trails* and *Design Guidelines* sections.

A. USER CHARACTERISTICS

The following descriptions are short summaries of basic user characterizes for general categories. Characteristics and interests will vary from person to person, but these general guidelines will aid in understanding why a person may choose a particular activity and what managers might to enhance opportunities for certain groups around the Mammoth region.

Foot Travelers

Walkers:

Walkers are usually out for a walk of two miles or less. Generally, they prefer to be close to civilization and signs of human presence and may not be knowledgeable in outdoor ethics, although this may not be true of visitors to the Mammoth Lakes area. They are often out for reasons other than trail use: heritage tourism, bird watching, fitness, or family activity. Many may be pushing or pulling wheeled devices such as strollers or wagons.

Hikers:

Hikers are usually familiar with the outdoors and like a more strenuous walk. They can handle difficult terrain and steep grades. They usually stay on trails if they are direct and interesting.

Rock Climbers:

Rock climbers use trails to reach climbing areas. Contour trails may meander too much for their needs. They want direct access - grade and difficulty are not a concern.

Backpackers:

Backpackers prefer backcountry experience, and will travel many miles to attain it. Even though they have an intended destination, they are less apt to short cut because they carry heavy loads that hinder maneuverability. Gentle trail grades linking natural features help keep long distance foot travel interesting.

Trail Runners:

Trail runners enjoy connecting trail loops to add variety to their workouts. They do not like extended steep grades or stairs, and therefore often prefer mountain biking trails to hiking trails because of the undulating flow and spaced obstacles.

Equestrians

Equestrians:

Equestrians make up the heaviest, widest, and tallest non-motorized users. Their trails require a wider corridor and high ceiling. Contour trails with durable tread are the most sustainable. Hoofs can tend to cause divots in softer soils and could pose a danger to foot travelers or cyclists. Horses can spook easily from approaching traffic and narrow crossing devises. Equestrians come at all levels and therefore require a variety of experiences and difficulty levels.

Bikers

Commuters / Novice Cyclists:

Novice cyclists will ride a variety of kinds of bikes and generally stay close to town. They enjoy riding on paths away from the dangers of vehicle traffic, but do not mind other non-motorized traffic. Speeds for these users are comparatively slow, and they usually ride in pairs or groups. They prefer flat, non-technical terrain, with direct routes to places of interest or key nodes in the community such as parks, picnic areas, or scenic overlooks. They sometimes have other goals similar to walkers.

Beginning Cross-Country:

Beginning mountain bikers are casual cyclists who like gentle, relatively short trails with few challenges. As they improve their skills they will seek longer, more difficult trails. Mountain bikers tend to stay on trails if the ride is fun.

Cross-Country:

Cross-country mountain bikers are experienced cyclists comfortable in riding in remoter areas. They are typically self sufficient, and carry tools, water, food, clothing and sometimes a first-aid kit. Avid riders seek trails that let them cover from 10-100 miles in search of solitude, nature experiences and challenge. Desirable trails feature several miles of connecting loops with natural obstacles.

Technical / Downhill Riders:

These mountain bikers have advanced technical skills. They like challenges such as drop-offs, ledges, logs, elevated bridges, sharp exposures, dirt jumps, and seesaws. Some riders want technical features incorporated into their cross-country rides. Others prefer stand-alone experiences that combine skill and speed. These cyclists will gravitate toward downhill mountain parks.

Winter Sports

Walkers:

These folks have the same general characteristics and needs as summer walkers. They may include kids and dogs, and usually prefer snow free or groomed, gentle terrain close to home.

Nordic Skiing:

Nordic skiing (includes many forms) can be divided into two basic categories: groomed and un-groomed.

Individuals engaging in a groomed system prefer loops of varying lengths and degrees of difficulty similar to mountain bikers. The grooming may take the form of inline parallel tracks for Classic XC (cross country) "diagonal stride" skiing or a "corduroy" lane for skate skiing.

Individuals who enjoy ungroomed skiing or ski touring prefer to accesses the backcountry. These trails, if marked at all, may only be marked with assurance markers and may only become visible when the first skier tracks in the route.

Cross Country Skate Skiing:

Skate skiers require a wide groomed lane or trail. They can cover long distances and achieve fast speeds, so their system is usually organized over roads (paved or dirt). They recreate for fitness and challenge as well as a feeling of solitude.

Snowshoeing:

Snow shoeing can be enjoyed on both groomed and ungroomed surfaces. Snow shoes enable a walker to travel more easily across unstable snow surfaces. The benefits of snow shoeing are similar to those of hiking or walking. They recreate for fitness, adventure, and to enjoy the company of others in an outdoor setting.

Backcountry Skiing/Boarding:

These folks prefer alpine terrain away from the crowds of the resort and they are willing to work to get it. They often climb or skin to the top of a mountain and then ski down technical terrain. They are generally more familiar with backcountry dangers.

Winter Variations:

There are many other specialized winter activities such as skijoring, and technical jumping that can all be part of the larger offerings of winter sports. However, these activities in Mammoth tend to attract fewer people, can most often be accommodated on more general-purpose trails, or don't require trails at all.

Motorized Users

Off-highway Vehicles (OHV's):

OHV users operate quads, motorcycles, or trucks that travel off-road. Their needs are as diverse as any non-motorized user. Many users travel in groups , prefer slow trail riding , and enjoy scenery and solitude. Other riders prefer longer, technical trail opportunities and ride for the challenge rather than to access a specific destination. These activities have specific trail design specifications to meet their desired experiences.

Over-snow Vehicles (OSV's):

An OSV trail rider requires a 4-5 foot wide trail that is open and flowing. Trail riders enjoy beautiful scenery and stops with educational opportunities. OSV can travel fast and cover long distances. All-day trips may cover up to 100 miles. Other riders enjoy the technical challenges of cross-country travel off trail, hill climbs and technical hill traversing.

Other Considerations

Athletes:

Some trail runners, mountain bikers, equestrians, and skiers like to push their limits. These people seek trail networks that are longer, more technical, and unique. Because one size does not fit all, providing a large network is more appealing than multiple laps of a short loop. This also allows more trails to be accessible from one staging area or trail head. If this group is not provided for, they will be the first ones to leave the area or create the experience themselves.

Mobility Impaired Trail Users:

With improved equipment such as off-road wheelchairs, more trail opportunities are being sought by the mobility impaired. Suitable trails have a wide, smooth tread with gentle grades. Proper signage about trail conditions and obstacles will allow users to customize a trip to match their ability. In addition, many disabled users adopt common modes of trail transportation such as mountain bikes, horses, or ATVs. It is important to note that even if trails are not designed as "accessible", trailhead features such as restrooms should comply with ADA standards.

B. USE COMPATIBILITY

Conflict arises when members of one group perceive that the behavior of a second group interferes with their ability to achieve desired experience goals. Compatible uses may be categorized as passive or active. Mountain biking or hiking may be compatible with passive actives such as picnicking, but not with bird watching.

Furthermore, there are two types of user categories within a specified activity: specialists (associate themselves with the sport, intense skill, custom equipment, choose an area for reputation or challenge) and generalists (first timers or beginning skill level, more often participating because of scenic value of place or social values). Preferences may differ and conflict may occur within any specific activity (i.e. hiking, mountain biking) because user group goals and experience expectations may be different. In addition, persons involved in high intensity activities desire fewer amenities and demand a greater degree of solitude. Conflict and management problems occur when these differences are not recognized.

The following matrices depict general and specific compatible uses for Mammoth trails. That means the optimal experience and benefits can be achieved by using the same set of trail design specifications. The matrices consider both direct and indirect conflicts and desired social carrying capacity. For example, an equestrian and a mountain biker may get along just fine in person on a trail, but a horse may produces a churning action that disrupts a compacted tread and makes it difficult to bicycle on. Conversely, downhill mountain bikes can create a washboard effect on trails that make horse riding less pleasant.

These matrices do not mean that incompatible uses cannot share a trail. Incompatibility itself, is not a sign of active conflict, only the potential for conflict. Indeed there are many instances where seemingly incompatible uses share a trail system and have learned to respect each other's interests and need

The first matrix is a general guide to compatibility; the second two are specific to Mammoth summer and winter trails and depict where user experiences are being met and where there may be gaps in opportunities.

Table 5-1 GENERAL USE COMPATIBILITY MATRIX

	Activity									
Summer		**Walking**	**Dog Walking**	**Hiking**	**Mountain Biking**			**Rock Climbing**	**Bird Watching**	**Horse Riding**
					Beginning	***Cross-country***	***Freeride***			
	Walking	x	x	x	x			x	x	x
	Dog Walking	x	x	x	x			x		
	Hiking	x		x				x	x	x
	Mountain Biking									
	Beginning	x	x	x	x	x		x		
	Cross-country				x	x	x			
	Freeride/downhill					x	x			
	Rock Climbing	x	x	x	x			x	x	
	Back Packing			x	x			x		x
	Bird Watching	x		x					x	x
	Horse Riding									x
Winter		**Walking**	**Dog Walking**	**Snow Shoeing**	**Nordic (groomed)**	**Skate Skiing**	**Nordic (ungroomed)**	**Backcountry Skiing**	**Backcountry Boarding**	**OSV**
	Walking	x	x	x			x			
	Dog Walking	x	x	x			x			
	Snowshoeing	x	x	x			x	x	x	
	Nordic (groomed)				x	x	x			
	Skate skiing				x	x	x			
	Nordic (ungroomed)	x		x	x	x	x	x	x	
	Backcountry Skiing			x				x	x	
	Backcountry Boarding			x				x	x	
	OSV									x

The following chart depicts the major uses currently observed in Mammoth at each winter node.

Table 5-2 DESIRABILITY MATRIX : Winter

Point Name	GIC #	Motorized	Non-Motorized							
		OSV	Walking	Dog Walking	Nordic (groomed)	Skate Skiing	Snow Play	Snow Shoeing	Backcountry Access /Egress (ungroomed -various)	MMSA Access/Egress
Main Lodge	46	X			X		X		X	X
Power Plant	44	X								
Sledz	52						X			
Earthquake Fault	42								X	
Mammoth CC	192									
Sierra @Forest Trail	64							X	X	
Shady Rest Parking	195	X	X	X	X	X		X		
Welcome Center	124		X	X	X			X		
FS Snow Storage Road	67									
Winter-Sherwin Creek	151	X	X	X				X	X	
Ranch Road Gate	16		X	X				X	X	
Tamarack St	137		X	X				X	X	
Mill City Closure	28	X limited	X	X			X	X	X	
Twin Lakes Parking Lot	34								X	X
Lake Mary Rd Gate	35	X limited	X	X	X	X		X	X	
Tamarack Lodge	36		X		X	X		X	X	X

There are many existing (X) and future (F) opportunities to expand trails in Mammoth. The following chart shows the potential of additional winter activities at access points and potential new access points. The chart also shows how uses might be dispersed.

Table 5-3 OPPORTUNITIES : Winter

Point Name	GIC #	Motorized	Non-Motorized							
		OSV	Walking	Dog Walking	Nordic Skiing	Skate Skiing	Snow Play	Snow Shoeing	Back-country access	MMSA access
Main Lodge	46	X			X		X		X	X
Power Plant	44	X								
Sledz	52						X			
Earthquake Fault	42						F	F	X	
Mammoth CC	192									
Sierra @Forest Trail	64						F	X	X	
Shady Rest Parking	195	X	X	X	X	X		X		
Welcome Center	124		X	X	X	F		X		
FS Snow Storage Road	67	F								
Winter-Sherwin Creek	151	X	X	X	F	F		X	X	
Ranch Road Gate	16		X	X	F	F		X	X	
Tamarack St	137		X	X	F	F		X	X	
Mill City Closure	28	X	X	X			X	X	X	
Twin Lakes Parking Lot	34								X	X
Lake Mary Rd Gate	35	X	X	X	X	X		X	X	
Tamarack Lodge	36		X		X	X		X	X	X

6. POTENTIAL TRAILS

A. Summer Trails

Getting into nature to recreate provides a quality to everyday life that Mammoth residents cherish. Because the Town is not more than three miles across, open spaces lands and trails are accessible for every citizen. Trails provide direction to that access, they shape experiences, and they channel uses into specific regions of the landscape. The following recommendations may enhance the front-country soft-surface trail opportunities by closing the gaps between existing trails, reducing conflict, and providing key connection to nodes within the UGB. Several of the projects listed below are carried forward from the 1991 Town of Mammoth Lakes Trail System Plan, Future/Alternatives Chapter.

A.1 Segments Brought Forward from 1991 Mammoth Trails Plan

Only those trails proposed in the Future/Alternative Trail Descriptions sections of the 1991 Mammoth Lakes Trails System Plan are considered in this section. Soft surface trail recommendations are considered based on current conditions, feasibility of construction, changes in trail technology, constructability, cost feasibility, and changes in community needs since 1991. Recommendations are broken down into sub-segment, some are discussed as soft surface trails and others are discussed in the Town of Mammoth Lakes Trail System Master Plan (2008) as new additions to the multi-use paved pathways. See section 7 A & B for descriptions of Trail Type and Difficulty Rating.

Table 6-1: Soft Surface Trail Segments Brought Forward from 1991 Plan

Project	Trail Name	Segment Start	Segment End	Trail Type	Difficulty Rating	Length
1	Shady Rest Park Trail Segment 4	Old Shady Rest Campground	Overlook Trail	Type 3	Easy	6,090 LF (1.15 miles)
2	Mammoth Creek Road Trail Segment 1	Main Path/GIC 135	East of Treatment Plant back to GIC 133 &127	Type 3	Easy	6,074 LF (1.15 miles)
3	Mammoth Creek Road Trail Segment 2	Intersection of Mammoth Creek Road and Segment 1	Highway 395	Type 4	Easiest	Undetermined
4	Sherwin Trail Segment 3	GIC 135	Meadow Loop	Type 3	Easy	10,437 LF (1.98 miles)
5	Sherwin Creek Road Trail Segment 4	GIC 135	Sherwin Creek Campground	Type 4	Easiest	9,225 LF (1.77 miles)
6	Knolls Trail – Mid Route Segment 5	Mammoth Community Center	The Knolls Overlook	Type 2	Moderate	20,099 LF (3.81 miles)
7	Knolls Trail –North Route Segment 3	Mid-Route	Overlook Trail	Type 3	Easy-Moderate	15,214LF (2.88 miles)
8	Overlook Trail Segment 4	The Knolls Overlook	Shady Rest	Type 3	Easy-Moderate	9,017 LF (1.71 miles)

Note: The MMSA Mountain Bike Trails depicted in this map are for planning purposes. Depictions are incomplete and subject to change.

Concept Layout

Type 3 - Dirt
Type 2 - Hike - Dirt
Type 3 - Dirt
Type 3 - Dirt
Paved MUP - Asphalt
Type 2 - Dirt
Type 2 - Dirt
Type 2 - Dirt
Minaret Road
Forest Trail
Forest Trail
Paved MUP - Asphalt
Type 3 - Dirt
Main Street
Canyon Blvd.
Lakeview Blvd.
Sierra Park Road
Old Mammoth Road
Meridian Blvd.
Lake Mary Road
MMSA Bike Park
Type 3 - Dirt
Requires Further Study
Future
Old Mammoth Road
Potential Perimeter Path and Access Easement
Refer to SATSS (Attachment B)
Type 2 - Dirt

203

42 21 195 64 97 191 38 41 124 193 14 152 134 163 27 34 36

MAP 4-7: Recommended Trail System

Summer Recreation Nodes
- Portals
- Trailheads
- Parks
- Access/Egress Points
- 9 GIC Numbers

- Gates/Barriers/Closures
- Tunnels
- Bridges

Paved Off-Road Facilities
- Existing Paved Multi-Use Paths
- Near-Term Multi-Use Paths
- Long-Term Multi-Use Paths
- Existing Promenade
- Near-Term Promenade

Soft-Surface Trails
- Existing MMSA Mountain Bike Trails
- Existing USFS System Trails
- 1991 TOML Future/Alternative Trails
- Potential Trails
- Private Dirt Trail
- Recommended Boardwalk

- Campgrounds
- Parks & Open Space
- Planned Developments
- SATSS Study Area
- Urban Limit
- Town Boundary

0 0.5 1 Miles

Shady Rest Park Trail

a. Segment 4. – Old Shady Rest Campground to Overlook Trail

Project Number: 1
Trail Type: Type 3
Preferred Users: All non-motorized users
Difficulty: Easy
Segment Length: 6,090 LF (1.15 miles)

Trail Description
This trail segment is recommended as previously proposed. The trail travels along the west side of Sawmill Cut-off Road from Segment 3 to the beginning of the Overlook trail.
Justification
Providing this option as a natural surface trail allows for a variety of experiences in the Shady Rest vicinity and may help reduce potential for conflict between uses.

Mammoth Creek Road Trail

This trail is recommended with modifications and was introduced as a concept in the 1991 Trails System Plan. The 1991 concept as presented was modified to address the following issues: creation of a loop or link to the existing Class 1 paved trail; connectivity to existing major nodes; and, feasibility of paving several miles of trail.

a. Segment 1. – Main Path/Mammoth Creek Road to east of Treatment Plant back to GIC 133 &127.

Project Number: 2
Trail Type: Type 3
Preferred Users: All non-motorized users
Difficulty: Easy
Segment Length: 6,074 LF (1.15 miles)

Trail Description
The segment would connect the Main Path along the North side of Mammoth Creek Road to GIC 133 and 127. A paved alternative of this route also can be found in the Mammoth Lakes Trail System Master Plan.

Justification
This trail segment provides a short loop, and allows trail users to access Mammoth Creek and connect to other trails in the Main Path system.

b. Segment 2. – East along Mammoth Creek

Project Number: 3
Trail Type: Type 4
Preferred Users: Shared-all users
Difficulty: Easiest
Segment Length: undetermined

Trail Description
This trail segment is recommended as previously proposed in the 1991 plan. Mammoth Creek Road continues as a shared trail to link trail uses to distant recreation opportunities to the east of town.

Justification
This trail segment provides access to Mammoth Creek and an opportunity to connect to future trails opportunities outside the Mammoth Lakes system.

Sherwin Trail

Project Number: 4
Trail Type: Type 3
Preferred Users: All non-motorized users
Difficulty: Easy
Segment Length: 10,437 LF (1.98 miles)

Trail Description
This trail is recommended as a natural surface trail with modifications. As the trail approaches Mammoth Meadow, it should be routed on the side-slopes above the meadow to avoid potential damage to the sensitive vegetation and soils. To create a loop experience and replace the current user-created trails, a new segment is recommended for construction in the vicinity of the north USFS property boundary with Snowcreek V connecting back to the main route at the intersection with the Mammoth Rock Trail connector SS7-s1. This segment will require installation of boardwalks, puncheon or other improvements to mitigate effects on sensitive meadow soils and vegetation.

Justification and Issues
Additional neighborhood connections from Snowcreek V and future Snowcreek phases should be considered to facilitate local resident access to this trail. This concept is consistent with the Town's "Feet First" philosophy and could discourage unneeded car trips from Snowcreek residents driving to other access points in the town.

Sherwin Creek Road Trail

Project Number: 5
Trail Type: Type 4
Preferred Users: Shared, all users
Difficulty: Easiest
Segment Length: 9,225 LF (1.77 miles)

Trail Description
This trail segment is recommended as previously proposed. An alternative could be considered adjacent to Sherwin Creek Road, rather than as recommended.

Justification and Issues

The route is already being used by many different user groups. Adopting it as a formal trail, and adding wayfinding signage will enhance the visitor experience.

Knolls & Overlook Trails

This trail is recommended with modifications. The 1991 plan presents four distinct alignments. Each alignment is recommended.

a. Segment 1. – South Route, Recommended Paved Path.

b. Segment 2. – Mid Route

Project Number: 6
Trail Type: Type 2
Preferred Users: Hikers and Mountain Bikers
Difficulty Rating: Moderate
Segment Length: 20,099 LF (3.81 miles)

Trail Description
This trail segment is recommended with modifications. The route should be extended in length to allow for maintenance of an average grade of less than 8%, and a maximum grade of less than 15%.

Justification and Issues
The 1991 Plan route is not sustainable for mountain bikes as proposed due to grade and stacked switchbacks.

c. Segment 3. – North Route

Project Number: 7
Trail Type: Type 3
Preferred Users: All non-motorized users
Difficulty Rating: Easy to Moderate
Segment Length: 15,214 LF (2.88 miles)

Trail Description
This trail segment is recommended with modifications as a soft surface trail. This new route is suggested to be unpaved. The route follows the North Route identified in the 1991 plan, traversing side slopes to maintain grades and avoid steep road sections. The route may use portions of the existing road where it makes sense and grades and conditions are suitable for trail use. The route would connect to the Mid Route and Overlook Trail.

Justification and Issues
The proposed 1991 Plan route follows an existing road. That route is not recommended for the following reasons.

- Possible conflicts could occur between motorized users and pedestrians.
- It is unreasonable to pave a trail so far out of town.

- The route is not easily maintained in some sections due to steep grades and erosive soil.

d. Segment 4. – Overlook Trail

Project Number: 8
Trail Type: Type 3
Preferred Users: All non-motorized users
Difficulty Rating: Easy to Moderate
Segment Length: 9,017 LF (1.71 miles)

Trail Description
This trail segment is recommended with modifications as a soft surface trail. proposed trails. This new route is suggested to be unpaved. The new route roughly follows the Overlook trail route identified in the 1991 plan, contouring to maintain low grades and avoid steep sections of the road. The recommended route utilizes portions of the existing road where it makes sense and grades and conditions are suitable for trail use. The route connects to the Mid Route and North Route.

Justification and Issues
The proposed 1991 Plan route follows an existing road. The 1991 route is not recommended for the following reasons.

- Possible conflicts could occur between motorized users and pedestrians.
- It is unreasonable to pave a trail so far out of town.
- The route is not easily maintained in some sections due to steep grades and erosive soils.

Grades exceed those recommended for mountain bikes.

Meridian Trail

This Trail is not considered. It is inside the urban growth boundary and paved.

Mammoth Mountain Trail

This trail is not recommended as proposed in the 1991 plan.

Trail Description
The route described in the 1991 Trails Master Plan connects Eagle Lodge with the Village using a route that traverses steep terrain. Downtown and Paper Route trails, managed by MMSA, currently provide this connection for Mountain Bikers.

Justification and Issues
The proposed 1991 route crosses existing downhill mountain bike trails and traverses steep side slopes.

An alternative alignment is explored further in the Future Alternatives section C below.

A.2 New Soft Surface Trail Segments

Based on input during the CAMP: Summer sessions, the public survey, and meeting with jurisdictional partners, the following conceptual recommendations are offered as a means to enhance existing soft surface trail opportunities. All recommended new soft surface trail concepts are located on USFS lands. Any new trail or trail segment will require additional environmental review and consideration. Implementation of any new soft surface trail will require USFS process, review and approval.

Table 6-2: New Soft Surface Trail Concepts

Project	Trail Name	Segment Start	Segment End	Trail Class	Length
9	Shady Rest Nature Trails	Welcome Center	Welcome Center	Type 3	6,590 LF (1.25 miles)
10	Mammoth Rock Drop Trail Segment 1	Sherwin Bench	Sherwin Trail	Type 2	2,420 LF (0.46 miles)
11	Mammoth Rock Extension Trail Segment 2	Sherwin Bench	GIC # 133	Type 2	12,583 LF (2.38 miles)
12	Mammoth Rock Trail Segment 3	Sherwin Bench	Sierra Meadows Ranch	Type 3	4,100 LF (0.78 miles)
13	Panorama Vista Trail Segment 1	East end of Panorama Vista Trail	West End of Mammoth Rock Trail	Type 2	971 LF (0.18 miles)
14	Panorama Vista Trail Segment 2	1/4 mile east of Lake Mary Road	Intersection of Lake Mary Road and Lake Mary Path	Type 2	1,348 LF (0.25 miles)
15	Mountain Vista Trail Segment 1	End of Mountain Vista Trail	Earthquake Fault Parking Area	Type 2	393 LF (0.075 miles)
16	Mountain Vista Trail Segment 2	Earthquake Fault Parking	Scenic Road	Type 2	5,302 LF (1.01 miles)
17	Knolls Trail	GIC 64	Knolls Overlook	Type 2	9,578 LF (1.81 miles)

Shady Rest Nature Trails

Project Number: 9
Trail Type: Type 3
Preferred Users: Walkers
Difficulty: Easy - Green
Segment Length: 6,590 LF (1.25 miles)

Trail Description
This recommended nature trail is comprised of a series of connecting loops linking to the Welcome Center and various locations along the paved Main Path loop. This trail system could also become the core of the Nordic system in the winter (see Winter Trails).

Justification and Issues
The Shady Rest Area is one of the most popular areas in town for walking and often the first stop for visitors after gathering information at the Welcome Center. Providing a formalized nature trail will allow visitors and locals to enjoy an easy walking system close to town.

Mammoth Rock Drop Trail

a. Segment 1. Mammoth Rock Trail to the Sherwin Trail

Project Number: 10
Trail Type: Type 2
Preferred Users: Hikers, Mountain Bikers
Difficulty: Difficult - Black
Segment Length: 2,420 LF (0.46 miles)

Trail Description
This recommended new trail segment "drops" from the existing trail bench and connects with the Sherwin trail just east of the Mammoth Meadow. This trail is not recommended for equestrians but should be designed for hikers and mountain bikers.

Justification and Issues
By looping off the Mammoth Rock trail to connect with the Sherwin trail, a more direct link to town is provided.

b. Segment 2. Mammoth Rock Extension Trail at Sherwin Bench to the Main Path/GIC 133

Project Number: 11
Trail Type: Type 2
Preferred Users: Hikers, Mountain Bikers
Difficulty: Moderate - Blue
Segment Length: 12,583 LF (2.38 miles)

Trail Description
This is recommended conceptual re-alignment of the Mammoth Rock Trail is needed to address erosion concerns on steeper portions of the existing trail. The recommended new extended route would stay on the natural terrain contour and connect with the future paved Main Path extension at GIC 133. Implementation would require construction of a bridge (west of the MCWD bridge) suitable for pedestrians and bikes over Mammoth Creek.

Justification and Issues
The soils on the lower portions of the Mammoth Rock Trail are loose and sandy. Trail conditions and tread are difficult to maintain on steeper sections. Users have created spur trails to bypass eroded sections of the existing trail. Construction of a new trail extension connecting to the future Main Path provides an alternative experience from recommended Trail Project #10, and provides an other alternative connection back to town.

c. Segment 3. Mammoth Rock Trail at GIC #68 to Sierra Meadows Ranch.

Trail Number: 12
Trail Type: Type 3
Preferred Users: Equestrians
Difficulty: Easy - Green
Segment Length: 4,100 LF (0.78 miles)

Trail Description
This recommended new trail segment connects the existing Mammoth Rock Trail back to town via the Sierra Meadows Ranch. Implementation would allow users to continue over the existing bridge by the Hayden Cabin crossing Mammoth Creek to access the existing paved Main Path.

Justification and Issues
The soils on the lower portions of the Mammoth Rock trail are loose and sandy. Trail conditions and tread are difficult to maintain on steeper sections. Users have created spur trails to bypass eroded sections of the existing trail. Construction of a new trail provides an alternative experience from recommended Trail Projects 10 and 11, as well as an alternative connection back to town.

Panorama Vista Trail

a. Segment 1. to Mammoth Rock

Project Number: 13
Trail Type: Type 2
Preferred Users: Equestrian, Mountain Bikers
Difficulty: Moderate - Blue
Segment Length: 971 LF (0.18 miles)

Trail Description
This recommended new trail connects the Mammoth Rock Trail with the Panorama Vista Trail, by-passing the use of Old Mammoth Road. The recommended alignment re-aligns the end segment of the Panorama Vista trail to travel below Old Mammoth Road to a point directly across from the Mammoth Rock Trail.

Justification and Issues
The short piece of Old Mammoth Road currently needed to connect the two trails is potentially dangerous due to poor site lines at intersections a relatively high vehicle speeds. The proposed route provides a better alignment for sightlines for all trail users (hikers, bikers, and horseback riders) crossing Old Mammoth Road. This trail segment could also be connected to a hiking/biking trail leading to the historic Mill Site.

b. Segment 2. to Lake Mary Bike Path

Project Number: 14
Trail Type: Type 2
Preferred Users: Hikers, Mountain Bikers
Difficulty: Moderate -Blue
Segment Length: 1,348 LF (0.25 miles)

Trail Description
This recommended new trail segment connects Panorama Vista Trail with the new Lake Mary Bike Path eliminating the need to travel in Lake Mary Road traffic lanes. The route parallels Lake Mary Road on the east side to connect with the Panorama Vista Trail.

Justification and Issues
The area between Lake Mary Road and the road to Tamarack Lodge can be congested with traffic during the summer season. An alternative trail that allows users to stay out of traffic will enhance both their safety and provide a more enjoyable experience.

Mountain View Trail

a. Segment 1. to Earthquake Fault

Trail Number: 15
Trail Type: Type 2
Preferred Users: Mountain Bike
Difficulty: Moderate - Blue
Segment Length: 393 LF (0.075 miles)
Trail Description
This recommended new trail segment connects the east end of the current Mountain View Trail with the parking lot for the Earthquake Fault Interpretive Area.

Justification and Issues
Addition of a new segment will connect the trail to an existing node and provide trail users with access to additional amenities.

b. Segment 2. to Scenic Loop Road

Project Number: 16
Trail Type: Type 2
Preferred Users: Mountain Bike
Difficulty: Moderate-Blue
Segment Length: 5,302 LF (1.01 miles)

Trail Description
This recommended new trail follows the natural terrain contour and connects the Earthquake Fault with the Mammoth Scenic Loop Road (across from the recommended Knolls Trail-Mid Route) where sightlines are good for crossing the road.

Justification and Issues
Currently bike riders have to take Highway 203 back to the North Village. This trail segment provides a safe connection between the Mountain Vista Trail and the North Village.

GIC 64 to Knolls Overlook

Project Number: 17
Trail Type: Type 2
Preferred Users: Hikers
Difficulty: Moderate - Blue, Difficult - Black
Segment Length: 9,578 LF (1.81 miles)

Trail Description
This recommended new trail segment replaces the network of informal trails behind the Forest Trail and Knolls area. This trail is a single route for a short distance then splits to connect with the Mid-Route and Overlook trails to carry hikers to the viewpoints above the Forest Trail and Knolls neighborhoods. It is recommended that GIC 64 not remain a neighborhood access point but be developed as a public summertime trailhead for use by residents and visitors.

Justification and Issues
Allowing continued uncontrolled use will begin to erode the steep hillsides, leading to both visual and environmental degradation. Providing established routes will mitigate any future trampling of the hillsides.

A.3 Special Systems/Terrain or Skills Park

The Mammoth Lakes General Plan (2007) references the need for a facility for dirt BMX bikes of similar design to the Mammoth Skate Park which is constructed of concrete. The Parks Master Plan Draft (4-08, pg 51) mentions the Hidden Creek development area (Shady Rest tract) and Mammoth Creek Park West as potential BMX/terrain park locations. The Hidden Creek area is where unofficial jumps are currently located. Other suitable locations were not identified. BMX parks are generally not consistent with USFS policies and USFS lands were not considered.

A.4 Trail Linkage Opportunity

There is an opportunity to link the Mountain View Trail and the MMSA Uptown/Downtown (non-fee) trails in the vicinity of the Earthquake Fault access road (GIC #42 & #43). The installation of directional and informational signage, limited trail improvements, and a dedicated crossing of Highway 203 would be required to implement this opportunity.

B. Winter Trails

Shady Rest Winter System

There is potential to respond to user preferences related to the use and layout of the existing Shady Rest Winter System. Revisions to the existing system should aim to expand options for users. Various options and ideas were considered for the staging and management of the Shady Rest Winter System.

Option 1: OSV Staging at GIC #186 & #192

This option would maintain current uses and management for OSV staging and operations. OSV closures would be unchanged. Adoption of the options for trail system in Table 6-3 would still be suggested, with trail W6 being a paved Multi-Use Path (MUP)with winter grooming. The MUP would be discouraged from winter dog use in an effort to avoid user conflict.

By maintaining the OSV staging at the current location, the requirement for newly constructed facilities is eliminated. However, improved regulatory signage and law enforcement would be needed to increase user education and etiquette.

Option 2: Nordic Staging at the Welcome Center GIC #124

There is an opportunity to utilize the existing Welcome Center parking lot for a preferred winter Nordic staging area and trailhead. The Welcome Center has existing facilities which include a cleared parking lot, local information distribution, restrooms, and is adjacent to existing groomed trails and a cleared Multi-Use Path. Very little additional work beyond signage and education would be required to implement this option.

Option 3: Preferred Usage

As described in Table 6-3, the non-motorized Nordic area could be divided into two systems, a smaller system to the west preferred for dog walkers, and a larger, more comprehensive system to the east preferred for Nordic and skate skiers. The eastern segment would use the future Shady Rest

Pathway extension (MUP) as the outer boundary for this system. The existing connection with the existing "A" trail of the USFS Snowmobile system to the north of Shady Rest Park would be unchanged. The new winter trails would create additional Nordic options on the eastern side of Sawmill Ct-off Road. Dog walkers would be encouraged to use only the area to the west of the current staging area off Sawmill Cut-Off Road and Highway 203.

Option 4: OSV Staging at GIC #97 & #123 – Shady Rest Park

This option would move both the OSV staging area and the winter Nordic trailhead to Shady Rest Park, GIC #97 and #123. The staging areas for different winter uses would be separated (Motorized to the east, non-motorized to the west), the current parking and restroom facilities at the park could be utilized. This option would not require a change to the current OSV closure area boundaries.

This option does require the plowing of Sawmill Cut-off Road and the parking lot of Shady Rest Park for vehicles. By doing so, the preferred Nordic and preferred dog walking areas would be physically divided by the plowed road. The opportunity for new trails and staging area division of non-motorized uses (see Table 6-3) would be considered in this option, except trail W6 would be eliminated, reducing the length of trails by 3,041 LF.

Once the road is cleared of snow and open to vehicle traffic, USFS equipment operators and Mammoth Nordic could access the various trails through either the Nordic or existing MUP trail systems. The paved main path (MUP) segment connecting the existing winter trailhead to Shady Rest Park (@ GIC #123) could be widened through minor tree removal to allow for grooming, thereby providing a relatively quick alternate route for grooming equipment and administrative OSV access to the OSV trail system.

Option 5: OSV Staging at GIC #67

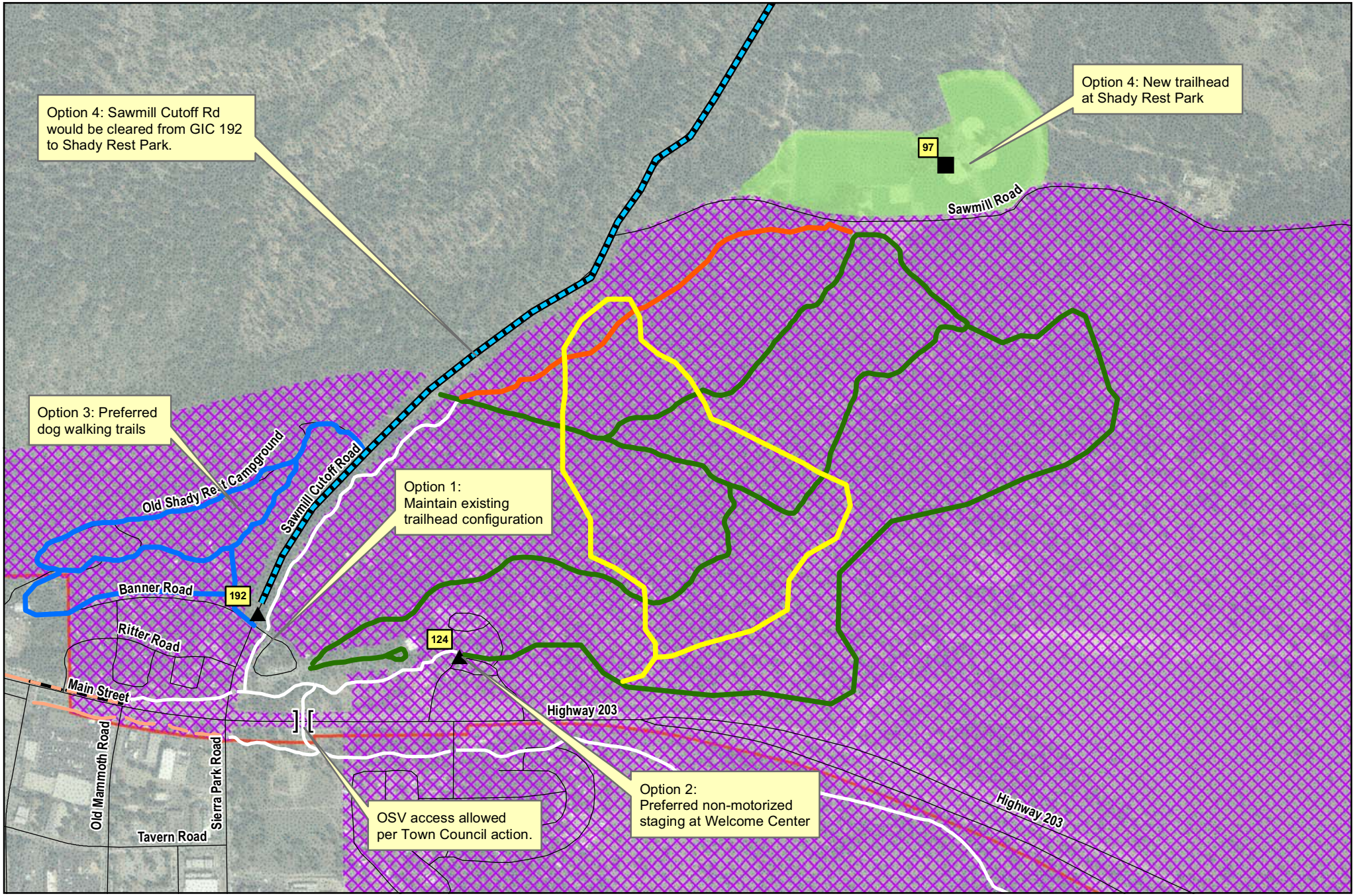
In this option the OSV trailhead would be moved to GIC point #67 and a new trailhead staging area designed and created specifically for OSV users. This includes a reconfiguration of the USFS OSV Closure to provide a smaller, but contiguous area of closure and eliminates the use of Sawmill Cut-off Road for OSV users. The closure would be moved north to include Shady Rest Park (GIC #97) and additional lands west of Sawmill Cut-off Road.

This idea for consideration would allow USFS and Mammoth Nordic snow removal and grooming machines to continue to operate directly out of the USFS snow shed located off Banner Road. Non-motorized trail users could also have a direct connection from town to the system via the Main Path. Other improvements that may be needed or required would include improved right-turn lanes exiting and entering the Town of Mammoth Lakes snow storage access road off Highway 203, road widening and repaving, construction of a parking area and associate facilities (restrooms, information kiosks etc.).
Due to estimated cost, Highway 203 access issues, and potential low snow concerns this idea may not receive much support and was not included on the maps.

The table below shows potential trails and the preferred use for each; see Table 7-6 for Trail Type description.

Table 6-3: Potential Winter Trails at Shady Rest (No change in existing Motorized Trails)

Project	Trail Name	Preferred Dog Trail	Winter Trail Type	Users	Length
W1	Old Shady Rest	X	TYPE 3	Non-Motorized walk and ski	3,277 LF
W2	Old Shady Rest	X	TYPE 3	Non-Motorized walk and ski	539 LF
W3	Old Shady Rest	X	TYPE 4	Non-Motorized walk and ski	1,514 LF
W4	Old Shady Rest	X	TYPE 3	Non-Motorized walk and ski	1,666 LF
W5	Old Shady Rest	X	TYPE 3	Non-Motorized walk and ski	198 LF
W6	New Shady Rest		TYPE 4 or Class I	Non-Motorized walk and ski	3,041 LF
W7	New Shady Rest		TYPE 3	Ski and skate	656 LF
W8	New Shady Rest		TYPE 3	Ski and skate	2,807 LF
W9	New Shady Rest		TYPE 3	Ski and skate	125 LF
W10	New Shady Rest		TYPE 3	Ski and skate	1,672 LF
W11	New Shady Rest		TYPE 3	Ski and skate	720 LF
W12	New Shady Rest		TYPE 3	Ski and skate	901 LF
W13	New Shady Rest		TYPE 3	Ski and skate	1,863 LF
W14	New Shady Rest		TYPE 3	Ski and skate	801 LF
W15	New Shady Rest		TYPE 3	Ski and skate	2,373 LF
W16	New Shady Rest		TYPE 3	Non-Motorized walk and ski	6,921 LF
W17	New Shady Rest		TYPE 2	Ski only	5,699 LF



MAP 4-8: Shady Rest Recommended Winter Use

Winter Recreation Nodes
- Parks
- Trailheads
- 9 GIC Numbers

- Tunnels
- Streets
- Parks & Open Space
- Urban Limit
- Closed to Motorized

Winter Use (Potential)
- Type 2 (Ski only)
- Type 3 (Non-motorized walk/ski; Dogs Allowed)
- Type 3 (Ski and skate)
- Type 4 (Non-motorized walk and ski)
- Type 4 (Motorized/Non-Motorized)

Multi-Use Facilities (Maintenance TBD)
- Existing Paved Multi-Use Paths
- Existing Promenade
- Near-Term Promenade

Miles
0 0.125 0.25

Sherwin Backcountry System

As described in the *Existing Conditions* section, the Sherwin Range offers highly valued backcountry skiing and boarding opportunities. Access to and from the most desired terrain should be maintained and managed. Recommendations for an improved system are as follows:

- Evaluate options for public access across Snowcreek golf course and through future Snowcreek projects during the Neighborhood District Planning and Master Planning processes.
- Improve public transportation options between ingress and egress points to discourage vehicle shuttling.
- Provide signage at access points to inform users of conditions, dangers, and resources for avalanche information.
- Evaluate options for public access across and through the existing patent mining claim on the Sherwin ridge.
- Place a beacon check point at the departure point from Lake Mary Road (GIC #91).

See Attachment B for a more in-depth representation of the existing conditions, opportunities & constraints, and various alternative ideas for providing trails and facilities in the area (Sherwin Area Trails Special Study).

C. Future Alternatives Considered but not Brought Forward

The following trail alignments were identified during the outreach process, but due to priority, feasibility, cost, topographical constraints, or the fact that they were outside the scope of this project, are not being brought forward for consideration at this time. However, they are being listed here for future study .

C.1 Summer Trails

Mammoth Mountain Trail

Even though the 1991 Mammoth Lakes Trails Plan alignment for this trail may not be feasible, there is still a need to connect the major nodes with town trails and other key nodes (GIC #42, #38, to #112 to new Lake Mary Bike Path). A future option should explore the possibility of a new compressed route along the USFS permit boundary that can connect nodes. There may be topographic challenges difficult to overcome, especially in the vicinity of the Canyon Lodge. In addition, the previously recommended path dimension (5' dirt) needs to be re-evaluated. A future alignment could possibly utilize a combination of on-street connectors with a future pathway or trail. Further studies need to be coordinated with the Planning Partners.

Earthquake Fault to the Main Lodge

It was suggested by CAMP process participants that a public USFS trail be constructed along the north side of highway 203 to replace Uptown/Downtown, especially during the construction of the ski-back trail. This route is out of the scope of this project to consider.

C.2 Winter Trails

Sierra Meadows Nordic System

In the past the Sierra Meadows Nordic System was operated, groomed and maintained by a concessionaire. There is strong community interest to bring back a Nordic system in the Sierra Meadow & Sherwin's area. The Sherwin Area Trails Special Study (SATSS) has addressed this and other access and activity issues (see Attachment B).

Lakes Basin Nordic Systems

During the existing conditions analysis it was determined that the current method of parking cars along Lake Mary Road next to the winter closure might be working presently but should be studied further by the USFS as use increases. A new staging area in the vicinity of Tamarack Lodge could benefit both the winter and summer systems. It was felt that the best time to evaluate this is during a Lakes Basin Study process to be conducted by the Inyo National Forest at a later time.

D. Estimated Costs and Phasing

Cost estimate are based on average prices for trail design and construction in the western United States during the 2008 season.

D.1 Trail Design Costs

Terrain	Unit	Cost per Unit
Easy terrain:	Miles	$600
Moderate terrain:	Miles	$1,000
Difficult terrain:	Miles	$1,800
Extreme terrain:	Miles	$2,300

* Cost assumes obtained land rights for a corridor. Costs do not include mobilization or travel expenses.

D.2 Trail Construction Costs

Many factors influence construction cost. It is difficult to provide accurate costs for hypothetical trails because many details are yet to be decided. Some factors that would affect construction cost include: mechanized vs. hand construction, engineering fees, bridges and abutments, environmental permits, riparian issues, blasting and rock breaking, mobilization of crew and equipment, remote location, final trail design, trail width, soil type, excavated material dispersal technique, retaining wall/ structure specs, material availability such as rocks for walls, etc.

Full bench trail, machine built w/ hand finish, 24-36" wide

Terrain	Unit	Cost per Unit
Easy terrain:	Foot	$3.00
Moderate terrain:	Foot	$4.50
Difficult terrain:	Foot	$6.00
Extreme terrain:	Foot	$20.00

Switchbacks/climbing turns:

Terrain	Unit	Cost per Unit
Easy terrain:	Each	$1,000
Moderate terrain:	Each	$3,000
Difficult terrain:	Each	$5,000
Extreme terrain:	Each	$7,000

Tread Armoring/Rock Retaining Walls:

Terrain	Unit	Cost per Unit
Any Terrain	Square Feet	$30

D.3 Special Systems Parks

There are no generic prices for bike parks, and there is a major price difference between a "terrain park" built from dirt and rock vs. man-made technical features built of wood, steel or concrete.

Skill Park:

Timber construction: $25 per square foot multiplied by every foot of height. Estimated prices would start at $5,000 for a very small area to $25,000 for a 1-2 acre park.

Terrain Park:

Dirt jumps/pump track 5,000 sq feet @ +/- $10,000
Average would be about $25,000 for a grassroots style vacant lot type of park. Other types are estimated at about $100,000 for the design and construction of a professional terrain park.

Composite Park:

The cost for a composite type park could be literally millions of dollars for a full city park with parking, roads, utilities, and facilities; especially if facilities are constructed of concrete.

D.4 Phasing

Because environmental review process have been completed on those trail sections brought forward from the 1991 Town of Mammoth Lakes Trail System Plan, it is suggested that those sections be given a higher priority. Further, several potential trail segments are short and will provide much needed connections within the town system. These small segments can be completed quickly and at a relatively low cost, providing a sense of accomplishment.

7. SOFT SURFACE TRAIL DESIGN GUIDELINES

The successful design, construction, and management of natural soft-surface trails is critical to the pursuit of making Mammoth a year-round destination resort community, as the trails offer a significant recreational amenity to both residents and visitors. The community is fortunate to have the winter and summer trail facilities at Mammoth Mountain and it is important that future offerings complement, not duplicate, what is already offered in order to maximize resources and best meet the needs of trail users.

The following guidelines are not a “how-to” for building and maintaining trails, rather they offer a framework for management and decision making to help build a premier trail system in and around the Mammoth Lakes region. In addition, this guide establishes standard terms and definitions that can aid communication with planning partners about trail needs, design standards and environmental issues.

A. Soft Surface Summer Trails

A.1 Trail Type Classifications:

Type 4 – Shared Multi-Use

- Suitable to share non-motorized or motorized
- Tread 8' to 12'
- Allowance for passing
- Native or imported material
- Minor obstacles in trail
- Grades less than 5%
- Good sightlines throughout

Type 3 – Shared Non-Motorized

- Tread narrow – up to 48"
- Allowance for passing
- Native materials
- Obstacles occasionally present
- Blockages cleared to define route and protect resources
- Grade to 10%
- Clearances and turning radius to accommodate all uses

Type 2 – Preferred Mountain Bike

- Tread narrow – less than 36"
- Minimal allowance for passing
- Native materials
- Overhead obstacles may be present over 6'
- Grades may occasionally be steeper than 8%
- Obstacles and challenge to be expected
- Climbing turns will be incorporated
- May not be suitable or enjoyable for horses
- In sloped turns and tread allowed where adequate drainage exists

Type 2 – Preferred Equestrian

- Tread narrow – less than 30"
- Minimal allowance for passing
- Native materials
- Head clearances over 12'
- Grades may occasionally be steeper than 10%
- Obstacles and challenge to be expected
- Turns will be switchbacks or climbing turns
- May not be suitable or enjoyable for bikes

Type 2 – Preferred Hike

- Tread narrow – less than 36”
- Minimal allowance for passing
- Native materials
- Overhead obstacles may be present
- Grades may occasionally be steeper than 10%, including stair steps
- Obstacles and challenge to be expected
- Turns will be switchbacks
- May not be suitable or enjoyable for horses or bikes

Type 1 – Route Only

- Narrow trail or route
- Narrow single-file travel
- Natural tread
- Obstacles frequent or continuous
- Overhangs, water, or steep exposure may be present
- Boulders or tunnels may be present
- Route may not be constructed
- Grades may be steeper than 25%

Table 7-1 Trail Type Classifications

TRAIL TYPE	TREAD WIDTH	TRAIL CORRIDOR	SURFACE	*AVERAGE GRADE-	*MAX. GRADE-	OUTSLOPE (SOIL)	TURN RADIUS	
							CLIMBING	SWITCHBACK
Type 4 Shared Multi-use	1-way: <8’ 2-way: 12-20’	12-16’ (w) 12’-15’ (h) 22’ (w) 12-15’ (h)	Native soil and rock	</= 5%	10%	2-5%	15-20 ft?*	>/=10 ft
Type 3 Shared NM	24”-48”	4-8’ (w) 10-15’ (h)	Native soil	</= 5%	15%	3-8%	7-15 ft	3-8 ft
Type 2 Bicycle	12”-36”	2-6’ (w) 6-8’ (h)	Native soil and rock	</= 10%	25%	3-8%	> 7 ft	2-8 ft
Type 2 Horse	8”-30”	4-8’ (w) 12-15’ (h)	Native soil	</= 5%	15%	3-8%	> 10 ft	3-8 ft
Type 2 Hike	18”-36”	3’-5’ (w) 7-8’- (h)	Native soil and rock	</= 8%	25%	3-8%	> 7 Ft	2-8 ft
Type 1 Route or Foot path	6”-30”	Varies by terrain	Native soil and rock	varies	25%	N/A	N/A	N/A

A.2 Mountain Bike Difficulty Range Classifications

Ratings are based on the IMBA Trail Difficulty System and symbols adopted from the National recreational symbol standards used on most federal lands. The ratings categorize the technical challenge as well as the physical exertion of a trail user. Ratings are relative to the Mammoth region and may not represent similar ratings in other areas where soils and terrain differ.

Symbol: White Circle **Rating**: Easiest

Semi-improved (i.e., compacted gravel) or natural surface that is generally firm and stable. Trail grades average 5% or less with a maximum trail grade of 10%. No unavoidable obstacles should be present. Typically associated with Trail Types 4 and 3

Symbol: Green Circle **Rating**: Easy

Semi-improved (i.e., compacted gravel) natural surface that is generally firm and stable. Trail grades average 5% or less with a maximum trail grade of 15%. May have unavoidable obstacles three inches tall or less and taller avoidable obstacles. Typically associated with Trail Types 4 and 3

Symbol: Blue Square **Rating**: Moderate

Stable natural surface that has some avoidable rocks and roots embedded. Soils may be loose around corners. Trail grades average 10% or less with a maximum trail grade of 20% or greater. Unavoidable obstacles eight inches tall or less and taller avoidable obstacles may be present. All obstacles are rollable. Typically associated with Trail Types 3 and 2

Symbol: Black Diamond **Rating**: Difficult

Widely variable natural surface trail with roots, rocks, or built features. Soils may be loose around corners and at grades steeper than 8 %. Trail grades average 10-15% or less with a maximum trail grade of 20% or greater. There can be unavoidable obstacles fifteen inches tall or less and taller avoidable obstacles. Steep drop-offs, tight turns, low over-hangs, and other conditions may exist. Trail Type 2 only.

Symbol: Double Red Diamond **Rating**: Extreme

Widely variable natural surface trail with obstacles and hazards such as roots, rock, build features, steep drop-offs, tight turns, and over-hangs. Soils may be loose and rutted. Trail grades average 15-20% or more with a maximum trail grade of 25% or greater. Risks exceed difficult due to height, narrow widths, and exposure. Trail Type 2 or 1.

A.3 Range of Difficulty Specifications by User

Not all rating categories are specified by user. The Easiest category is easiest for all users.

Table 7-2 Trail Type Specifications-Bicyclist

SKILL LEVEL	TREAD WIDTH	TRAIL CORRIDOR	*AVERAGE GRADE-	*MAX. GRADE-	OBSTACLES‡	OUTSLOPE (SOIL)	TURN RADIUS *
Easy	30" or more	4' (w) 8' (h)	</= 5%	8%	</= 2"	3-5%	>/=5'
Moderate	18" or more	3' (w) 8' (h)	</= 8%	10%	</=8"	3-8%	>/=3'
Difficult	12" or more	3' (w) 6' (h)	</= 8%	12%	</=15"	3-8%	>/=2'
Extreme	6" or more	2' (w) 6' (w)	</=10%	20%	>/=15"	3-8%	>/=2'

Table 7-3 Trail Type Specifications-Equestrian

SKILL LEVEL	TREAD WIDTH	TRAIL CORRIDOR	*AVERAGE GRADE- SOIL	MAX. GRADE	OUTSLOPE	TURN RADIUS
Easy	36" or more	6' (w) 12' (h)	</= 5%	10%	3-5%	>/=6'
Moderate	18" or more	6' (w) 12' (h)	</= 8%	10%	3-8%	>/=5'
Difficult	12" or more	4' (w) 10' (h)	</= 8%	12%	3-8%	>/=5'

Table 7-4 Trail Type Specifications-Hikers

SKILL LEVEL	TREAD WIDTH	TRAIL CORRIDOR	*AVERAGE GRADE- SOIL	*MAX. GRADE-SOIL	OUTSLOPE (SOIL)	TURN RADIUS*
Easy	30" or more	4' (w) 8' (h)	</= 5%	8%	3-5%	>/=3'
Moderate	24" or more	3' (w) 8' (h)	</= 8%	15%	3-8%	>/=2'
Difficult	12" or more	3' (w) 7' (h)	</= 12%	25%	3-8%	>/=2'

* Grades may exceed recommendation over rock surfaces.

A.4 Trail Routing Specifications by Soil Type

The Mammoth region has unique soil characteristics that present particular trail development challenges. To mitigate potential undesirable environmental impacts additional guidance is necessary to assure that each trail is located in the correct soil to sustain proposed trail maintenance objectives.

Pumice, which acts similar to sand in that it is more stable when wet than dry, is dominant in much of the local soil profile. Because Mammoth is a dry region, close attention to trail placement and routing will be required to assure trail maintenance objectives are met. The presence of pumice can make even gentle grades difficult for all users to navigate in dry conditions. The guidelines and chart below should be used in conjunction with Trail Type and Difficulty Classifications to place the correct trail in the proper location. Note that only dominant and relevant soils are analyzed in this section.

- Average and Maximum Grade

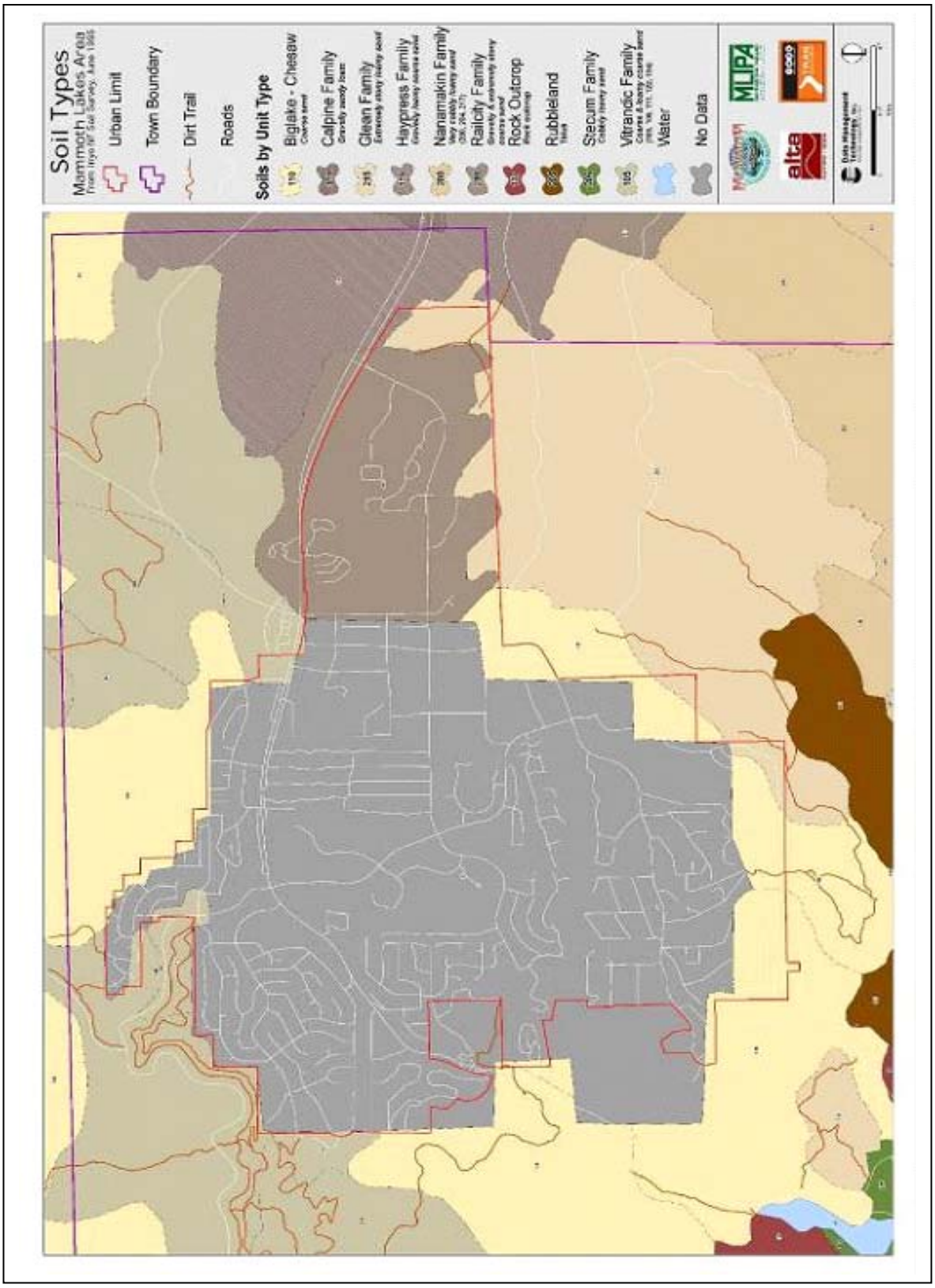
Understanding average and maximum trail grades is critical to developing sustainable trails, as it provides the basis for a trail alignment that will minimize maintenance and meet the needs of users for a predictable tread. For this section, average and maximum grades refer to the sustainability of soil-based trails, both in their resistance to user- and water-based erosion.

The first component of determining an appropriate trail grade is "The Half Rule". This concept states that for most soils the trail grade should not exceed half the grade of the sideslope that it traverses. Any alignment that does not conform to this standard is considered to be a fall-line trail and will funnel water down the tread, resulting in accelerated water-based erosion. On well-draining soils (such as sand), it is acceptable to create a trail that does not abide by this alignment criterion, but only in situations where the terrain is flat or nearly flat. Trails that travel through flat terrain with well-draining soils should incorporate frequent gentle turns, to slow speeds and provide a more stimulating user experience.

The Average Grade Guideline is the sum elevation gain/loss over the entire length of a climbing or descending trail segment, divided by the length of the segment. This average should not exceed the recommended average grade per soil type.

The Maximum Sustainable Grade is the steepest individual section of trail on the native soil. This grade will vary by soil type, with more cohesive soils, such as clay, sustaining steeper maximum grades while less cohesive soils, such as dry pumice, sustaining only the shallowest of grades. To minimize trail erosion the maximum grade for a trail segment on native soil should not exceed 200 linear feet.

Map 7-1 Mammoth Lakes Regional Soils



Map provided by TOML GIS Department

Table 7-5 Trail Specifications by Soil Type

USGS Soil Type	Soil Properties	Average Grade	Maximum Grade	Grade Reversals	Armoring Requirements
105/106/111/122/154 Vitandic Family	Course and loamy sand, weak structure, rapid permeability, high erosion hazard	5%	15%	Knick	▪ Armor all turns using composite technique ▪ Surface all grades over 7%
110/108 Biglake-Chesaw	Course sand, weak structure, very rapid permeability, moderate erosion hazard	7%	20%	Rolling grade dip	▪ Flagstone armor grades over 15% ▪ Stone pitch grades over 25%
117 Rock Outcrop-Rubble Land Complex	Continuous bare bedrock and detached rock talus. Talus is weak and subject to landslides	▪ Construction not advisable on talus slopes. ▪ No max grade for rock. May route on fall line.			
116 Haypress Family	Gravelly loam course sand, moderate structure, rapid permeability, low erosion hazard	10%	25%	Rolling grade dip	▪ Flagstone armor grade dips with an entry greater than 15% Stone pitch grades over 25%
205 Rubbleland-Nanamkin	Talus slopes and moraine sideslopes, weak-loose blocky structure, rapid permeability, moderate to high erosion hazard	5%	15%	Knick	▪ Armor all turns using surfacing and grade reversal approach
215 Glean Family	Extremely stony loamy sand, loose, moderate permeability, low-moderate erosion hazard	10%	25%	Rolling grade dip	▪ Flagstone armor grade dips with an entry greater than 15% ▪ Stone pitch grades over 25%
216 Railcity	Gravelly and extremely stony course sand, weak structure, rapid permeability, low erosion factor	10%	25%	Rolling grade dip	▪ Flagstone armor grade dips with an entry greater than 15% ▪ Stone pitch grades over 25%

A.5 Trail Design Considerations

- **Sustainable Trails Discussion**

A sustainable trail balances many elements. It has very little impact on the environment, resists erosion through proper design, construction, and maintenance, and blends with the surrounding area. A sustainable trail also appeals to and serves a variety of users, adding an important element of recreation to the community. It is designed to provide enjoyable and challenging experiences for visitors by managing their expectations and their use effectively.

Adhering to the following trail design and construction guidelines for the Mammoth region will allow for a high-quality recreational experience for trail users while protecting the natural beauty and environmental integrity of the region.

- **Preferred Use**

While many trails are managed as open to a variety of user types, construction and maintenance guidelines should follow those specified for the preferred use. Typically, the preferred use for a trail will be the use type that requires the highest level of construction and maintenance.

- **Trail Management Objectives (TMO)**

Establishing a TMO prior to designing or constructing a trail will assure that it meets the overall goals of the plan and adheres to the highest principals of sustainability.

- **Best Routing Location Principals**

BRL for the preferred user(s) and environmental sustainability are as follows:

a. Environmental Considerations

- Avoid wet meadows and wetlands.
- Avoid hazardous areas such as unstable slopes, cliff edges, faults crevasses, embankments and undercut streams, and avalanche prone zones (in the winter).
- Avoid sensitive or fragile historic sites.
- Avoid trail routing that encourages shortcutting. Use natural topography or features to screen short cuts.
- Avoid routing trails too close to other trail systems to minimize trail proliferation and user conflict.

b. Mountain Bike Trails

- Type 2 trails should be located in steep and rugged terrain or in remote areas of varied topography.
- Type 3 and 4 trails may be located on existing or old road grades where standards are not exceeded.

c. Equestrian Trails

- Type 2 equestrian trails in the Mammoth region should be located on primarily flat loose soils, where user impacts will be lessened and encounters with incompatible users can be minimized through reduced speeds and good sightlines.
- Equestrian use should be supplemented with connecting Type 3 and 4 trails located on existing or old road grades where standards are not exceeded.

d. Hiking Trails

- Type 1 trails should be located in drainages where terrain is not suitable for other uses.
- Type 2 trails should be located on sideslopes and in canyons where there is the greatest opportunity for elevation gain.
- Hikers are drawn by destinations (views, peaks, interpretive sites) so focus trail routes on these special landscape features.
- Type 3 and 4 trails should be located to provide short walks to a main destination accessible by users of all abilities.

A.6 Trail System Configurations

- **Out-and Back Trails**

Wherever possible, trails should be designed as loops, or connect with other segments to provide a looping experience. Out-and-back trails are appropriate to sensitive interpretive sites or short distances to other key destinations. Hikers, more than other groups, enjoy out and back trails. These trails are best when managed as preferred for hiking only and routed in areas where topographical constraints prohibit looping, such as in a drainage or canyon.

- **Open Connecting Trails**

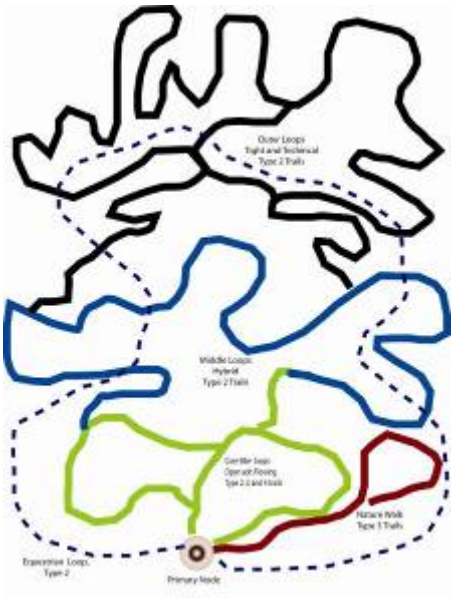
This type of trail is most suited to Mammoth's current trail management practices. This system works to assure that various trail types and styles connect at key nodes so that a trail user can "mix and match" various pieces to create their own experience. This system works well when the management goal is to get the most use out of a few trails in a limited region.

- **Closed System Trails**

A closed system is one that utilizes one primary node, usually a major trailhead or portal to access a system of trails that all loop back to that primary node. This system usually has topographic, land ownership, or jurisdictional constraints that confine it one specific region. To maximize a trail system, trail segments should be intersecting and progressive. The easiest trails should be located near trailheads and the most difficult trails should be located in the more remote regions. More difficult trails may be longer in distance or more rugged. Technically challenging Type 2 trails should be bisected by Type 3 to 4 trails every three to five miles whenever possible for emergency access or egress. These systems work best for bike and equestrian trails, but can have a secondary nature walk or long distance hike that begins at the same node.

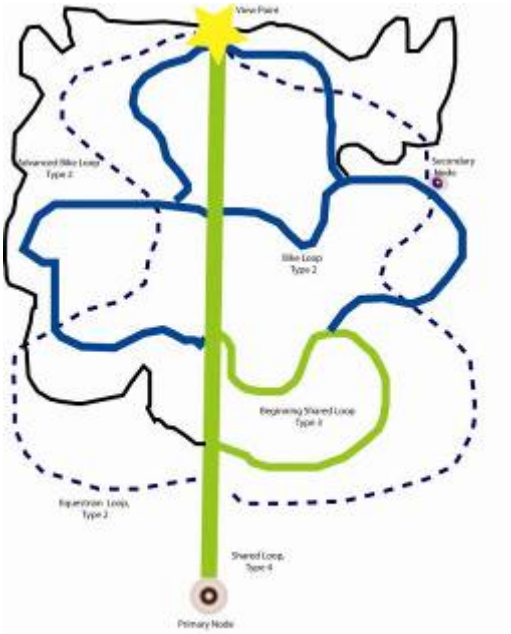
a. Stacked Loop System

A stacked loop system is a series of interconnecting loop trails that get progressively harder as the trail moves away from the primary node. This system also works well for separating uses that share the same primary node. A great example of this type of system is Fantasy Island Trail in Tucson, Arizona.



b. Inter-Connecting Loop System

An inter-connecting loop system usually starts with a shared use Type 3 or Type 4 trail as its backbone. Small loop trails branch off and interconnect with the spine of the primary trail at various points along the way. This system usually has a primary node and one or more secondary access points. This type of system allows for users to customize their outing to their ability, energy level, and timeframe. The layout and design of this system usually aims to get all users to a common node, viewpoint, or special feature. A great example of this type of system is Utah's Gooseberry Mesa National Recreation Trail.



- **Special Systems**

Special-use bike parks, also known as terrain parks, skills parks, or challenge parks, can provide a new riding experience in a central, easily managed location. While bike parks come in different shapes and sizes, they share the common thread of helping make mountain biking more readily available to the public—especially kids. These parks usually accommodate a wide range of abilities, with opportunities for skill building and progressively difficult challenges. Bike parks typically include natural and man-made terrain and a compact trail system.

Bike parks do much more than mimic terrain found in nature. They also offer unique obstacles that stretch the imagination. They're typically not a replacement for traditional trails. Rather, they serve as an additional place to ride that is more convenient and controlled. The following guidelines are not a substitute for a professional bike park design, but provide ideas to help the Town decide which type(s) of these special parks are most appropriate to pursue.

a. Terrain Park

Terrain parks utilize soil to build obstacles in various sizes and shapes, including dirt jumps and pump tracks, with a predictable layout that still provides an exciting and challenging experience. Features frequently include all types of jumps, including tabletops, semi-tabletops, step-ups, and hips. The park should be designed on a slight downhill grade or with a roll-in ramp so that riders will not have to pedal excessively or brake between jumps. Sufficient space should be provided to allow a clear, smooth area to the sides of jumps for missed landings, and also for a corridor for riders to return to the beginning without riding too close to the jumps.

Because the park is constructed of soil the cost of development can be low, although a soil amendment may needed depending on local conditions. The ease with which the soil can be worked also means that features and challenges can be changed each year as the sport progresses. This type of park could also serve as a snow play park for young children in the winter.

b. Skills Park

Skills Parks incorporate engineered structures like ladder bridges, wooden ramps, skinnies, teeters, and drops. These structures often require artificial materials such as processed lumber and fasteners. Aim for linking features so riders flow immediately from one feature to the next. For many mountain bikers, skill improvement is a big reason they ride. Managers should try to provide stunts of various difficulty levels. Riders love multiple stunts of different difficulty in the same park and they'll return many times to master their skills. These parks can be developed in a relatively small parcel of land or at a trailhead for a larger trail system.

- Skills Park Considerations:
  - Each feature should be designed and constructed to withstand the assumed forces placed upon it by a user. Horizontal and lateral loads should both be considered.
  - Features should have a clear fall zone around them.
  - Materials and construction practices should be employed that will minimize the likelihood of rot and subsequent structural failure.
  - An inspection and maintenance policy should be employed to ensure that features remain free of hazards.
  - Routine modifications ensure that the design of the park is upgraded to keep it interesting.

c. Challenge Parks

Challenge parks mix natural and built features in a large area to create a truly unique experience for riders to develop their skills. Challenge Parks require a greater amount of land to form various loops that progress in difficulty.

A.7 Trail Construction Guidelines and Standards

- Basic Terms and Definitions

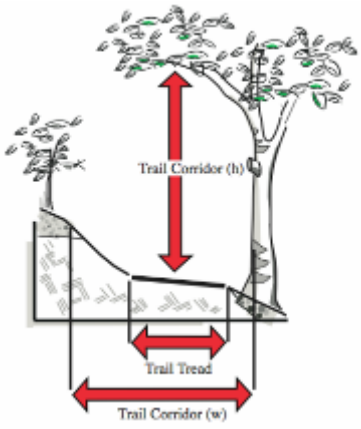
  - **Contour Trail**
    A trail designed in a manner where its grade does not exceed half the grade of the surrounding sideslope. This is counter to a fall-line trail (see below).

  - **Fall-Line Trail**
    Any trail where the grade of the trail exceeds half the grade of the sideslope of the surrounding terrain (for example, a 25% trail grade on a 30% sideslope). On a fall-line trail water travels the length of the trail instead of sheeting across the tread, accelerating erosion.

  - **Grade**
    The steepness of a trail, measured by rise-over-run.

  - **Natural-Surface Trail**
    A tread made by clearing, grading, and compacting the native soil with no outside foreign material imported for stabilization.

  - **Trail Corridor**
    An area that is maintained clear of obstacles and debris to allow users to travel freely and safely. Dimensions vary based on the anticipated user. The width includes the tread, the out-slope, the back-slope, and any additional clearance requirements. The height dimension is measured from the ground surface upwards.



- **Tread**
  The actual portion of a trail upon which users travel.

- **Technical Trail Feature (TTF)**
  An obstacle placed on the trail specifically to enhance technical challenge. The feature can be either man-made or natural, such as an elevated bridge or a rock face. Also referred to as "technical features" or "features."

- Grade Reversals

  - A grade reversal is an undulation within the trail tread: a short dip followed by a rise. This grade change in the tread catches water at the low point and diverts it off the trail. Grade reversals are the preferred erosion prevention technique. They are friendly to all users and require little maintenance once installed. When not incorporated into the original construction of the trail, there are two techniques available to retrofit them into the tread:

  - **Knick:**
    In soils with a high displacement factor, a grade reversal should be accomplished by removing a wedge of soil to create a dip in the tread.

  - **Rolling Grade Dip:**
    This technique uses the soil excavated from the low section of a trail to build up the entrance and exit to the dip. Ideally dips use natural features, such as trees or rocks, as landscape anchors.

  - **Water Bars:**
    Water bars are an old fashioned technique for preventing soil erosion. They are usually installed to correct erosion problems on a trail that is traveling the fall line. This technique needs a lot of maintenance, causes trail hazards for all users, and requires a lot of labor to install. With proper trail design and the use of grade reversals, this technique should rarely be needed in the Mammoth region.

- Elevation Gaining Techniques

  - **Climbing Turn:**
    A turn used to change direction that does not have a constructed platform or landing. The upper and lower legs of a climbing turn are joined by a short section of trail (the apex) that lies in the fall line. Water is shed to the inside of the trail turn. Climbing turns may be used where sideslopes are moderate and foot traffic will be minimal. Berming of turns may be appropriate on preferred mountain biking trails where there is adequate drainage control prior to the turn.

  - **Stairs:**
    Stairs built of rock or wood are used to gain elevation quickly or where a contour trail is not possible because of environmental constraints. Stairs should be used only when all users are expected to travel by foot.

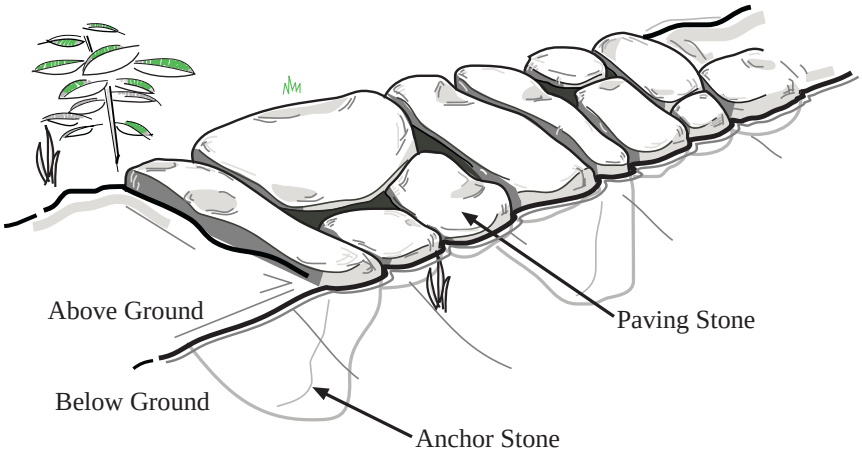
- **Switchback:**
  A technique for moving a trail up steep sideslopes. The transition is made by way of a flat landing or pad. A correct switchback will shed water off the back of the landing, and there is an immediate separation of trail segments.

- Stabilizing Techniques

These techniques can be employed to address several situations:

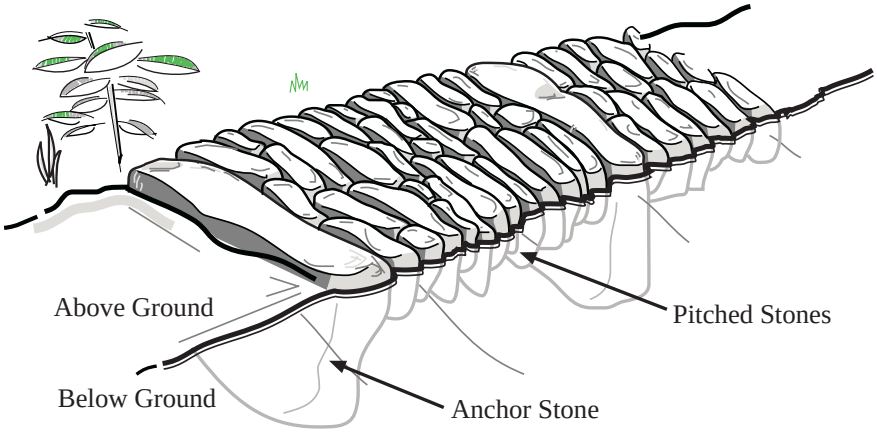
-To reduce erosion along trail segments where alignment exceeds guidelines
-To stabilize tread that is routed on unstable pumice soils
-To provide technical challenge
-To slow riders before an intersection, technical challenge, or other situations of flow transition.

- **Flagstone Paving**
  Large, flat-faced stones are placed directly on a mineral soil base or an aggregate foundation (a mixture composed of sand, gravel, pebbles, and small rocks, which is devoid of organic material). Each stone's largest and smoothest face is placed up, at grade, to form the tread surface. This is the most common and simple armoring technique. Rocks may need to be imported from outside the area to make this technique viable.



- **Stone Pitching**
  This is an ancient road-building technique in which medium-sized rocks are set on end, or "pitched" up on their side. The stones are hand-fitted tightly together, with aggregate packed into the gaps to tighten the construction. Think of a book in a bookshelf—only the spine is showing and the rest of the book is hidden. Small rocks for this technique should be locally available, however they may have to be collected and transported from an area away from the project site.

Stone Pitching



- **Surfacing**

  Surfacing is a technique where stabilizing soils or additives are brought in to give a trail better cohesion. Surfacing can be done on a whole trail or on a select part that is more prone to erosion, such as turns and corners. Bringing in heavy clays mixed with stones can help to stabilize Mammoth's pumice soils.

- **Reinforcement of Turns**

  Mammoth soils are particularly susceptible to erosion in climbing turns. Reinforcement needs are directly associated with the speed of the rider and the displacement factor of the soil. Reinforcing a turn should be done by combining grade reversals and armoring techniques through the turn. In the worst soils armoring should be employed both in the approach and exit of the turn. Using a surfacing technique combined with in-slope berming at the apex of the turn should be utilized to avoid displacement of soils.

B. Winter Trails

B.1 Winter Trail Types:

The major winter trail types found in the Mammoth region are listed below. Not all trail types are feasible for the Town or the USFS to manage, but the following descriptions can aid in deciding which trails are most suitable for Town management and which are better managed by others (USFS or non-profits).

Ungroomed/Unmarked

- Users: Backcountry skiers, backcountry boarders, Nordic skiers, snowshoers, sledders, hikers, snowmobilers
- Terrain: Varied
- Evidence of management: Minor
  -Portal signs, place markers
- Infrastructure: Minimal
  -Portal access
- Maintenance: None

Groomed

- **Nordic / Skate Ski**

- Users: Traditional cross-country skiers and skate skiers
- Terrain: Gentle and rolling
- Evidence of management: Moderate to heavy
  -Portal signs, place markers, assurance signs, directional signs, regulatory signs, fees and passes
- Infrastructure: Moderate
  -Trailhead parking, existing roads and trails
- Maintenance: Grooming, track setting, signage

- **Alpine**

- Users: Downhill skier, snowboarders
- Terrain: Sloping to steep
- Evidence of management: Heavy
  -Portal signs, place markers, assurance signs, directional signs, regulatory signs, fees and passes, patrols
- Infrastructure: Major
- -Parking lots, lifts, lodges, medical facilities
- Maintenance: Grooming, signage, snowmaking, lifts, facilities

Over-Snow Vehicle

- Users: Snowmobilers
- Terrain: Gentle and rolling
- Evidence of management: Moderate to heavy
  -Portal signs, assurance signs, directional signs, regulatory signs, fees and passes
- Infrastructure: Moderate

-Trailhead parking, existing roads open to motorized travel

- Maintenance: Grooming, signage

Shared Multi-Use

- Users: Walkers, dog walkers, nordic skiers, snowmobilers, snowshoers
- Terrain: Flat to rolling
- Evidence of management: Minor to moderate
  -Portal signs, assurance signs, directional signs, regulatory signs
- Infrastructure: Minimal
  -Trailhead parking, existing roads
- Maintenance: Plowing, signage

B.2 Nordic System Classifications

These standards and guidelines were developed in cooperation with Mammoth Nordic and apply directly to current and future winter trails grooming in the Mammoth region.

Type 4 – Shared Multi-Use

- Suitable to share non-motorized or motorized
- Tread 15' to 20'
- Can provide two-way groomed tracks
- Groomed trail with corduroy and Nordic tracks
- Grades less than 5%
- Good sightlines throughout
- Clearances and turning radius to accommodate all users

Type 3 – Shared Nordic/Skate

- Tread 9' to 12'
- Allowance for passing
- Groomed trail with Nordic tracks on right side
- Best if managed for preferred use of skiers
- Grades less than 5%
- Clearances and turning radius to accommodate novices and children

Type 2 – Preferred Snowshoe/Hiking

- Tread 24' to 36"
- Machine groomed corduroy
- Packed surface
- Supports dog walking
- Grades may occasionally be steeper than 10%

Type 2 – Preferred Nordic

- Tread 12” to 18”
- Corridor width 5’ to 6’
- May be machine groomed or user-tracked
- Grades may occasionally be steeper than 10%
- Supports more advanced trails

Type 1 – Route Only

- Narrow trail or route
- Single-file travel
- User created tread
- Tread 6” to 30”
- Route may not groomed or maintained
- No removal of trees to create route
- Grades may be steeper than 25%
- Minimally signed with assurance markers only

Table 7-6 Winter Trail Type Classifications

TRAIL TYPE	TREAD WIDTH	TRAIL CORRIDOR	SURFACE	*AVERAGE GRADE-	*MAX. DESCENDING GRADE-	*MAX. CLIMBING GRADE-	TURN RADIUS
Type 4 Shared Multi-use	1 or 2-way Nordic: 15-20’	18-25’ (w) 10’ (h)	Groomed Tracks and Corduroy Snow	</= 5%	10%	8%	>/=20 ft
Type 3 Shared Nordic/Skate	1-way Nordic: 9-12’	12-15’ (w) 7’-9’ (h)	Groomed Tracks and Corduroy Snow	</= 5%	15%	10%	>/=15 ft
Type 2 Snowshoe/Hiking	36-48 ”	5-6’ (w) 6-8’ (h)	Groomed Corduroy or Packed Snow	</= 10%	20%	20%	2-8 ft
Type 2 Classic Nordic	12”-18”	5-6’ (w) 6-8’ (h)	Groomed or Trekked-in Tracks	</= 10%	15%	20%	8-15 ft
Type 1 Route	12”-30”	2-4’ (w) 6-8’ (h)	Power or packed Snow	varies	N/A	N/A	N/A

END OF SOFT-SURFACE TRAILS CONCEPT

APPENDICES TO FOLLOW