






Town of Mammoth Lakes Trail System Master Plan

Adopted: October 19, 2011

Acknowledgements

This Town of Mammoth Lakes Trail System Master Plan (2011) is the result of a multi-partnered and multi-jurisdictional Concept and Master Planning (CAMP) process. The CAMP Process, and the update of the previous Town of Mammoth Lakes Trail System Plan, was initiated by the Mammoth Lakes Trails and Public Access Foundation (MLTPA), a non-profit organization, in the spring of 2007.

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United States Forest Service

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Attachments

Attachment A: Soft-Surface Trail Concepts

Attachment B: Sherwin Area Trails Special Study (SATSS)

Attachment C: Sherwins Area Recreation Plan (SHARP)

Acronyms and Abbreviations

AASHTO	Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
BTA	Bicycle Transportation Account
CA	California
Caltrans	California Department of Transportation
CAMP	Concept and Master Planning
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CIP	Capital Improvement Program
EMS	Emergency Medical Services
ESTA	Eastern Sierra Transit Authority
GIC	GIS Inventory Contract
GIS	Geographic Information Systems
GPS	Global Positioning System
HDM	California Highway Design Manual
Hwy	Highway
MCWD	Mammoth Community Water District
MLTPA	Mammoth Lakes Trails and Public Access Foundation
MLTS	Mammoth Lakes Trail System
MMSA	Mammoth Mountain Ski Area
MOU	Memorandum of Understanding
MPRR	Mobility Plan Resources Report
MTB	Mountain Bike
MUP	Multi-Use Path
MUTCD	Manual on Uniform Traffic Control Devices
NDP	Neighborhood District Plan
NHTS	National Household Transportation Survey
OHV	Off Highway Vehicle
OSV	Over Snow Vehicle
PDF	Portable Document Format
PPA	Point of Public Access
RTP	Recreational Trails Program
SSTC	Soft-Surface Trails Concept

SWITRS	Statewide Integrated Traffic Records System
Temp	Temporary
TOML	Town of Mammoth Lakes
TMO	Trail Management Objective
TrOD	Trail-Oriented Development
TSMP	Trail System Master Plan
UGB	Urban Growth Boundary
USFS	United States Forest Service
UTAP	Universal Trail Assessment Process
XC	Cross County
YARTS	Yosemite Area Regional Transportation System

Executive Summary

The Town of Mammoth Lakes (TOML) 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 Foundation (MLTPA) focused attention on the need to reevaluate 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 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 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 (MMSA) 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.

An initial public draft of the TSMP was released in August 2008. Several hundred comments on the draft were submitted, which were incorporated into a February 2009 Draft TSMP. Work to complete the CEQA-required EIR on the TSMP was begun in mid-2010 and completed in September 2011. In the interim period, since release of the February 2009 Draft TSMP, progress has been made on a number of the items recommended in the Plan. Changes needed to the TSMP to reflect that progress were cataloged as a series of errata and update items which were brought before the Recreation Commission, Mobility Commission and Planning Commission for review prior to adoption of the TSMP.

The Mammoth Lakes Trail System Master Plan (TSMP) is now complete. The document you are receiving 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 plan. 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 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 public lands outside the boundary. The report found in the appendix is very young in its 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 needed to address the issues identified in this section. None of the

recommendations found within Attachment A should be considered ready for implementation.

The implementation of this plan will require a high level of interagency cooperation between the Town of Mammoth Lakes, the United States Forest Service (USFS), California Department of Transportation (Caltrans), and other entities. For example, some existing and future segments of the Town's paved multi-use paths (MUPs) require the issuance of a Special Use Permit from the U.S. Forest Service.

Setting

The Town of Mammoth Lakes, California is a unique destination-resort community located in the Eastern Sierra region of Central California. At 7,980 feet, it is the highest incorporated municipality in the State of California. The community has a tourism-based economy; with recreation, trails and public access playing an integral role in the Town's sustainable economy and quality of life. The existing trails in Mammoth have developed over many years and across multiple jurisdictions. There are gaps in the system, places where access is limited, and challenges in accommodating a wide range of trail uses. The purpose of the Town of Mammoth Lakes Trail System Master Plan is to update the 1991 Trail System Plan, in accordance with the 2007 General Plan.

Vision, Goals and Objectives

The vision of the Mammoth Lakes Trail System Master Plan makes it unique. It envisions an integrated system of infrastructure and programs that support recreation and mobility simultaneously, by seamlessly connecting homes, hotels, businesses, recreation nodes, and backcountry experiences. It is based on the notion that the recreational trail experience begins when you leave your home or hotel, not just when you park your car at the trailhead. For this reason, this plan includes a strong focus on providing facilities that will improve access to trails from all modes of transportation. In addition to new trails, paved pathways, signage and wayfinding and associated amenities—this plan includes suggestions for other improvements such as sidewalks, crosswalks, bus stops, bike lanes, bicycle parking, summer maintenance, and snow removal. The Trail System Master Plan replaces the existing Trail System Plan and is consistent with the Town's 2007 General Plan, the Physical Development and Mobility/Study and the Draft Parks and Recreation Master Plan (April, 2008).

This plan has been developed based on a set of guiding principles to ensure that it is representative of the needs and desires of the Mammoth community. The relationship between the Town of Mammoth Lakes and the United States Forest Service is critical to the success of the Trails Master Plan, as are the various means used to coordinate their efforts, including special use permits and MOUs. These include accessibility, community character, community engagement, cooperation, environmental stewardship and sustainable economics.

This plan recognizes the important innovative public, private and non-profit partnerships to address these needs. Without a coordinated effort, critical points of public access could be at risk. With a broad range of support, and a well-organized program, the public lands surrounding the Town will benefit from the stewardship this community can provide.

Key goals of the plan include:

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 Mountain Bike Park, and the surrounding federal lands overseen by the USFS.

Goal 2: Develop a plan that provides guidance for enhancing year-round mobility in a way that is consistent with the Town's "Feet First" strategy.

Goal 3: Create a plan that clearly identifies the projects and programs necessary for implementation.

The "integrated year-round trail network" described above shall be henceforth referred to as the Mammoth Lakes Trail System (MLTS).

It should be noted that this is only the first phase of what will be an ongoing, multi-phase planning effort for the Trails Master Plan. Chapter 1 provides a more detailed discussion of the vision, goals and objectives of this plan.

The Existing Trail System

The Town of Mammoth Lakes includes three defining land-use boundaries: the Urban Growth Boundary, the Town Boundary, and the Planning Area as represented in the 2007 General Plan. **Map 2-1** (Ch. 2) shows the relevant jurisdictional boundaries. The key element of the proposed trail system is the vision it creates for integrating the human and natural environments across these three land use boundaries. The idea of "trails and public access" as it applies to Mammoth Lakes is comprised of the following elements:

1. A system of sidewalks, on-street bicycle facilities, and paved trails within the Urban Growth Boundary (UGB)—a land area of approximately 4 square miles[1]—forms the nucleus of the trail system. The trails network also includes very limited soft-surface trails within the UGB, including a private foot trail through the Snowcreek Meadow. The recreational trails experience generally begins and ends within the UGB.
2. A system of soft-surface summer trails, winter trails and backcountry recreational opportunities outside the UGB, but within the Town Boundary. The Town Boundary extends beyond the UGB and covers an area of approximately 25 square miles. The area within the Town Boundary, but outside the UGB includes the once proposed Sherwin Ski Area, the Lakes Basin, Shady Rest Area and most of the Mammoth Mountain Ski Area. The majority of the land in this area is administered by the U.S. Forest Service. There is also a smaller non-contiguous area surrounding the Mammoth Lakes Airport that is also within the Town Boundary. The majority of recreational activity in the Mammoth Lakes area takes place within the Town Boundary.
3. Additional recreational opportunities exist beyond the Town Boundary. The Planning Area or "sphere of influence" covers an area of approximately 125 square miles and includes destinations such as Reds Meadow, Devils Postpile National

[1] The UGB is split into two non-contiguous areas. The main UGB surrounds the Town's residential and commercial development and has an area of 4.0 square miles. Another UGB surrounding the airport has an area of 0.3 square miles. Area for all boundaries was calculated using the Town's GIS database.

Monument, the John Muir Trail and the Pacific Crest Trail. The Town of Mammoth Lakes serves as a key point of access and egress for users of these amenities.

Recreation Nodes are a key element of the existing trails network. Recreation nodes are identified and categorized based on the level of amenities provided. The categories are portals, parks, trailheads and access/egress points. This plan provides recommendations for upgrading amenities at some existing recreation nodes as well as creating new recreation nodes.

Another key element of the existing trail system is the **Main Path** "loop" originally envisioned in the 1991 Trail System Plan. This paved multi-use path system is mostly complete and new segments are currently under construction. The key remaining gaps in the system are along Main Street and Old Mammoth Road. This plan provides recommendations to move the Town forward with closing these key gaps.

Issues surrounding existing conditions in the **Shady Rest** area were identified by the community as a key issue for recreational trail use outside of the UGB, especially in winter. This plan provides some options and opportunities for potential modifications at Shady Rest, as well as recommendations for creating recreational opportunities in other areas to alleviate congestion at Shady Rest.

Chapter 2 provides a more detailed discussion of existing conditions.

Analysis of Needs and Benefits

Residents, visitors, and businesses will benefit from a comprehensive trails system. A central issue is ensuring access to the public lands that are among the region's most significant assets. In many ways, the future of Mammoth Lakes depends on having a system of trails and public access that will connect the community and the surrounding natural environment. Local leaders have visited peer resort communities and have seen how trails can be a cornerstone for a destination resort.

Trails are an increasingly important local solution for global issues: fossil fuel costs are fluctuating, there is increased awareness of climate change, our nation is experiencing a physical inactivity epidemic, and there is a growing need for people to spend more time outdoors. Mammoth Lakes has a unique opportunity to turn these issues into an opportunity by becoming a community that represents real solutions. By implementing this plan, Mammoth Lakes will become a leader in creating a green, healthy and sustainable community.

This update of the Trail System Plan is the result of a Concept and Master Planning (CAMP) process, a multi partnered effort initiated by the Mammoth Lakes Trails and Public Access Foundation (MLTPA) in the early months of 2007. In order to better understand the needs and desires of the Mammoth Lakes community, two major outreach efforts were conducted. The efforts were called Concept and Master Planning or CAMP. CAMP: Summer (November 1-4, 2007) focused on summer recreational activities and CAMP: Winter (February 7-12, 2008) focused on winter recreational activities. These outreach efforts included tours, listening sessions with targeted user groups, and open workshops with multiple user groups. Informational displays were available to the general public at Canyon Lodge and the Main Lodge for the duration of each process. User surveys focusing on relevant seasonal activities were developed in advance of each CAMP process and were

made available on-site and through widespread internet distribution. Some of the major recurring themes throughout the summer and winter CAMP processes were pedestrian movement along **Main Street**, user opportunities at **Shady Rest** in winter, the need for a more bicycle-friendly environment in summer, and winter maintenance levels along paved paths and sidewalks.

Chapter 3 provides a more detailed discussion of the outreach efforts and the analysis of needs conducted as part of this plan.

Future Trail System

The Trail System Master Plan includes a variety of recommendations summarized below. Key infrastructure recommendations include (1) completing the Main Path "loop", (2) upgrading and adding new recreation nodes, (3) providing consistent signage and wayfinding throughout the trail system and (4) addressing opportunities at Shady Rest.

It must be emphasized that the development of a complete trail system can only be achieved through a multi-jurisdictional effort and will require a high level of interagency cooperation to succeed.

The following table provides a summary of recommendations that are presented in the plan; a more detailed listing is contained in the complete Trail System Master Plan. A more detailed discussion and maps of recommended projects is provided in Chapter 4.

General Recommendations

General trail system recommendations cover a variety of topics which are not location specific. The full text of each recommendation can be found in Chapter 4, Section 4.1.

Table E-1. Summary of General Recommendations

Recommendation	Description
G1: Consistent Naming Conventions	For recreation nodes, paved paths, on-street bikeways, and soft-surface trails.
G2: Updated Trail Maps	Provide updated trail maps for each season that cover the primary recreational opportunities available in the Mammoth Lakes area.
G3: Uniform Trail Signage	General consistency for signage along multi-use paths and soft-surface trails.
G4: Interpretive Signage	Identify opportunities for interpretive signage and work with local experts to develop content.
G5: Trail-Oriented Development	Make MUPs more viable for both recreation and utilitarian purposes by requiring new development to provide strong connections to adjacent paths.
G6: Pedestrian-Oriented Development	Create seamless transitions between recreational trails and in-town amenities through pedestrian-oriented development.
G7: Data Management	Maintain an up-to-date and accurate multi-jurisdictional trails database.
G8: Design Guidelines	Revise the Public Works Standard Plans as needed to ensure consistency with the design guidelines in this Trail System Master Plan.
G9: Trails and Mobility Needs	Consider mobility-related recommendations in this plan in all future mobility planning efforts.

Recommendation	Description
G10: Future Access Easements	Study the potential to acquire additional easements to improve recreational access to public lands.
G11: Trails Coordinator	Consider creation of a Trails Coordinator position for implementation of the TSMP.
G12: Coordination with Local Non-Governmental Organizations	Seek opportunities to form partnerships with local organizations to assist in trails planning, development and/or maintenance.
G13: Summit Process	Key issues not addressed in the TSMP will be resolved through a collaborative Summit Process, led by the TOML with assistance provided by MLTPA.
G14: Action Plan	Develop a detailed action plan for the implementation of the Mammoth Lakes Trail System.
G15: Trail System Management MOU	Develop a management partnership clearly identifying roles and responsibilities of participating agencies.
G16: Mammoth Lakes Trail System (MLTS)	Recognize and support the development of an integrated regional Mammoth Lakes Trail System that incorporates the components identified in this Trails System Master Plan.

Activity Centers and Recreation Nodes

The recommendations below are intended to address issues specific to activity centers and recreation nodes. The full text of each recommendation can be found in Chapter 4, Section 4.2. **Maps 4-1** and **4-2** indicate the location and recommended type for each recreation node. **Figure 4-1** describes the minimum level of infrastructure provided for each node type.

Table E-2. Summary of Activity Center and Recreation Node Recommendations

Recommendation	Description
N1: Nodal Typing	Formally adopt the following recommended nodal types and their associated definitions: portals, parks, trailheads, and access/egress points.
N2: Naming of Recreation Nodes	Adopt official names for each recreation node.
N3: Uniform Nodal Signage	Install uniform signage at recreation nodes.
N4: Public Transit Access to Recreation Nodes	Provide bus stops near active recreation nodes wherever feasible.
N5: Summer Recreation Nodes	Establish and improve summer recreation nodes as described in Table 4-2.
N6: Winter Recreation Nodes	Establish and improve winter recreation nodes as described in Table 4-3.
N7: Future Nodal Designations	Establish a process for the adoption of new recreation nodes.
N8: Updates to the GIC Database	Regularly update the GIC database to reflect the latest inventory of activity centers and recreation nodes.

Paved Multi-Use Paths

Recommendations for the development of new paved multi-use paths, or infrastructure improvements to existing paths are summarized below. Recommendations relating to crossings and intersection improvements can be found in the following section. The full text of each recommendation described below can be found in Chapter 4, Section 4.3. Existing and recommended MUPs are shown on all Chapter 4 maps.

Table E-3. Summary of Paved Multi-Use Path Recommendations

Recommendation	Description
MUP1: Near-Term Multi-Use Path Projects	Continue with the rapid implementation of near-term MUP projects.
MUP2: Complete the Main Path Loop	In addition to the projects in recommendation MUP1, construct the MUP segments necessary to complete the Main Path loop.
MUP3: In-Town Multi-Use Path Connectors	Develop MUP segments that connect major path segments to key destinations.
MUP4: Multi-Use Paths Outside the UGB	Work with the Forest Service to construct recommended MUP segments outside the UGB.
MUP5: Lighting on Multi-Use Paths	Lighting should be considered for MUP segments based on demand for nighttime use.

Crossing Improvements

Recommendations for crossings and intersection improvements are summarized below. The full text of each recommendation described below can be found in Chapter 4, Section 4.4. Recommended grade-separated crossings (tunnels) are shown on all Chapter 4 maps. Recommended at-grade crossing improvements are shown on **Map 4-5**.

Table E-4. Summary of On-Street Bikeway Recommendations

Recommendation	Description
X1: Design of At-Grade MUP Crossings	The basic design elements of at-grade MUP crossings should be uniform. Additional safety measures should be implemented as needed.
X2: Specific Intersection and Mid-Block Crossing Improvements	Consider at-grade crossing improvements at key locations to improve trail access (listed in Table 4-8).
X3: Grade-Separated MUP Crossings	Use grade-separation for all MUP crossings of arterial streets.

On-Street Bikeways

Recommendations for on-street bikeway infrastructure are provided in Chapter 4, Section 4.5. **Maps 4-3** and **4-4** show on-street bikeways in their summer and winter contexts. Recommendations for maintenance of on-street bikeways can be found in Chapter 7.

Table E-5. Summary of On-Street Bikeway Recommendations

Recommendation	Description
B1: Near-Term Bike Lanes	Continue with rapid implementation of near-term bike lane projects on Main Street, Forest Trail and Meridian Blvd.
B2: Bike Lanes on Major Streets	Implement recommended bike lanes on major arterials.
B3: Bike Lanes on Collector Streets	Implement bike lanes on collector streets as space allows.
B4: Bike Routes	Implement recommended bike routes on local streets. Coordinate with Caltrans on installing or improving bike routes on rural highways.

Interface between Soft-Surface MTB Trails and Paved Facilities

The following table summarizes recommendations relating to the interface between soft-surface mountain bike trails and paved facilities. The full text of these recommendations can be found in Chapter 4, Section 4.6.

Table E-6. Summary of Recommendations on the Interface between Soft-Surface MTB Trails and Paved Facilities

Recommendation	Description
INT1: General Interface Considerations	Develop partnership with TOML, USFS and MMSA to analyze and address all interface areas, including a combination of rerouting, signage, education, alternative facilities and other methods as necessary.
INT2: North Village	Address specific summertime interface issues between Uptown/Downtown mountain bike (MTB) trail and the North Village.
INT3: Canyon Lodge	Address specific summertime interface issues in the Canyon Lodge area, especially with respect to bicyclists descending near Austria Hof and riding down Canyon Blvd.
INT4: Eagle Lodge	Address specific summertime interface issues in the Eagle Lodge area, primarily improvements to signage and wayfinding allowing users to navigate between the Juniper Trial and the Main Path.

Pedestrian Facilities

The following table summarizes recommendations for improvements to pedestrian facilities. Future pedestrian improvements will ultimately be determined through future mobility planning efforts and subsequent updates to the Sidewalk Master Plan. However, public input and analysis have indicated a need for pedestrian facility improvements in order to improve recreational opportunities and access to the trail system. The full text of these recommendations can be found in Chapter 4, Section 4.7. **Maps 4-5** and **4-6** show existing and recommended pedestrian facilities in their summer and winter contexts.

Table E-7. Summary of Pedestrian Facility Recommendations

Recommendation	Description
P1: Sidewalk to Major Roadway Ratio	Achieve a minimum Sidewalk to Major Roadway Ratio of at least 1.6 to 1 over the next five years. This minimum ratio can be achieved by including sidewalks on both sides of all arterial streets and at least on one side of all collector streets.
P2: Sidewalks along Major Roads	Install sidewalks along both sides of all major roadways (Main St, Old Mammoth Rd, Meridian Blvd, Minaret Rd).
P3: Sidewalks along Collector or Local Streets	Install sidewalks along at least one side of all collector streets.
P4: Mid-Block Pedestrian Connectors	As opportunities arise (i.e. new developments and redevelopments), create pedestrian-only shortcuts in strategic locations that shorten the walking distance between residential areas and recreation nodes.

Bicycle Parking

The following table provides a summary of recommended bicycle parking improvements. The full text of these recommendations can be found in Chapter 4, Section 4.8.

Table E-8. Summary Bicycle Parking Recommendations

Recommendation	Description
BP1: Bicycle Parking Requirements	Develop clear guidelines for the design, quantity and location of bicycle facilities on public and private property.
BP2: Bicycle Parking Designed by Local Artists	Implement a program under which local artists design functional bicycle racks or combo bicycle/ski racks that also serve as public art.
BP3: Subsidized Bicycle Parking Program	In order to improve the quality and uniformity of bicycle parking, purchase preferred bicycle racks in bulk and provide to business owners at a subsidized rate.

Soft-Surface Trails

Soft-surface trail recommendations are summarized in the following table. The full text of these recommendations can be found in Chapter 4, Section 4.9. **Map 4-7** shows potential soft-surface trial alignments to the north of the UGB. The development of any trails outside the UGB would require coordination between the Town of Mammoth Lakes and the United States Forest Service. Additional discussion and maps of potential soft-surface trail alignments can be found in Attachments A and B.

Table E-9. Summary Soft Surface Trail Recommendations

Recommendation	Description
SS1: Snowcreek Meadow Trail	Consider a low-impact boardwalk along the TOML drainage easement to ensure sustainable public access to the Snowcreek Meadow area.
SS2: Summer Soft-Surface Trails outside the UGB	Develop new soft-surface trails outside the UGB in the Shady Rest, Knolls and Sherwin areas.
SS3: Shady Rest Winter Trails	Explore options to improve winter trail and trailhead conditions at Shady Rest.

Education, Encouragement and Enforcement Programs

A summary of education, encouragement and enforcement programs is provided in the Table below. The full text of these recommendations can be found in Chapter 4, Section 4.10.

Table E-10. Summary Education, Encouragement and Enforcement Program Recommendations

Recommendation	Description
E1: Publish a Trail Guide for Mammoth Lakes	Create a trail guide that will serve as a single source of information for all trail-related information and resources in the Mammoth Lakes area.
E2: Annual Events / Coordinated Activity Calendar	Host and promote special events, tours and club functions related to the trail system and advertise these events through a paper and web-based calendar.
E3: Safe Routes to School	Work with local schools to develop Safe Routes to School infrastructure and programs.
E4: Trails-Related Education Programs	Work with relevant organizations and individuals to develop trails-related education programs for adults and children.
E5: Trips for Kids	Work with local organizations to develop programs to provide children with moral and material support they need to confidently engage in outdoor recreational activities.
E6: Establish a Trail Patrol	Work with local organizations to establish a volunteer trail patrol to supplement official enforcement and maintenance efforts.
E7: NGO's / Mammoth Trails	Support the development of non-governmental group to serve as a resource providing localized technical knowledge fostering trail-related stewardship.

Accessibility

Recommendations for improving the accessibility of the trail system are summarized in the following table. The full text of these recommendations can be found in Chapter 4, Section 4.11.

Table E-11. Summary of Accessibility Recommendations

Recommendation	Description
A1: Multi-Use Path and Trails Assessment	Perform a full assessment of all access routes, multi-use paths and trails using the Universal Trail Assessment Process (UTAP) to identify potential accessibility improvements.
A2: Pedestrian Assessment	Perform a full assessment of all pedestrian routes and elements in the town using the Sidewalk Assessment Process to identify potential accessibility improvements.
A3: Signage and Information	Include grade and other accessibility information on trailhead signage and user maps.
A4: Pathway Surface Materials	Consider accessibility in the selection of surface materials for MUPs and pedestrian facilities.

Signage and Wayfinding

A report developed by Corbin Design includes a discussion of signage, development of wayfinding logic, and initial design concepts for future signage planning. This report has been inserted as a separate chapter (Ch. 5) in this Trail System Master Plan. It should be noted that trail system signage and wayfinding implementation will need to occur with recognition of a variety of jurisdictions and of other signage systems already in place, including MMSA, USFS, and TOML.

Design Guidelines

Design Guidelines are discussed in Chapter 6 and have been provided to offer potential solutions to specific situations that will be encountered during implementation of the Trail System Master Plan. The design treatments offered include the following:

Table E-12. Summary of Design Guidelines

MULTI-USE PATHS (MUP)
■ Paved Median Paths
■ Typical At-Grade MUP Crossings
■ Signalized At-Grade Crossings of Major Streets (Toucan or HAWK)
■ Signalized At-Grade Crossings of Minor Streets (Cross Alert)
■ At-Grade Cross Country Ski Crossings
■ Grade-Separated Crossings
■ Bicycle 'Scramble' Signals
BIKE LANES
■ Uphill Climbing Lanes
■ Bike Lanes Adjacent to Right-Turn-Only Lanes
■ Bike Boxes
BIKE ROUTES
■ Bike Routes with Wide Outside Lanes
■ Bike Routes with Shoulders
■ Bike Routes with Wide Shoulders and Rumble Strips
■ Bike Routes on Narrow Roadways
■ Shared-Lane Markings
■ Bicycle Detection at Signalized Intersections
BICYCLE PARKING
PEDESTRIAN FACILITIES
■ Promenades
■ Curb Extensions
■ Refuge Islands
■ Pedestrian 'Scramble' Signal
SOFT-SURFACE TRAILS
■ Summer Trails
■ Winter Trails
EASEMENTS

Operations and Maintenance

The Trail System Master Plan (Chapter 7) identifies existing maintenance responsibilities and provides recommendations for future maintenance as well as discussion of how to determine the appropriate level of winter maintenance for facilities maintained by the Town of Mammoth Lakes.

Table E-13. Summary of Maintenance Recommendations

Recommendation	Description
M1: Development of Coordinated Year-Round Maintenance Plan	The Department of Tourism and Recreation and the Department of Public Works should work together to develop a year-round maintenance plan.
M2: Snow Removal and Grooming on Paved Paths (MUPs) and Sidewalks	All segments of paved pathway within the Town of Mammoth Lakes—or under its control through the Special Use Permit with the Forest Service—should be either cleared or groomed for year-round use.
M3: Prioritization of Snow Removal along Individual Paved Path (MUP) Segments	Clear snow from MUP segments preferred for snow removal, as budget allows. Table 7-5 list the segments preferred for snow removal. Segments providing school access would continue to receive priority.
M4: Prioritization of Winter Grooming along Individual Paved Path (MUP) Segments	Groom snow along MUP segments preferred for winter grooming, as budget allows. Table 7-6 list the segments preferred for grooming. TOML should coordinate with local organizations who may be able to provide grooming services.
M5: Preservation of Pavement Markings	Recessed thermoplastic is recommended for pavement markings as surface paint wears quickly and can fade or disappear in a matter of 1-3 years.
M6: Use of Salt, Sand or De-Icing Solution	Sand or de-icing solution should only be used if special circumstances warrant, such as severe ice buildup or freeze thaw cycles on the path surface. Salt should not be used as a de-icing agent.
M7: Clearing of Sidewalks for Winter Use	Ensure that all existing and future sidewalks are cleared within a maximum of 24 hours from end of snowfall. This should be achieved through ordinance or expanded use of assessment districts.
M8: Prioritization of Sidewalk versus Roadway Snow Removal	Sidewalk clearing operations should be increased in priority from 7th to 3rd on the Town of Mammoth Lakes' snow removal priority list.
M9: Prioritization of Snow Removal along Individual Sidewalk Segments	Priority for snow removal along individual sidewalk segments should be determined to make best use of TOML resources and should consider school zones, areas surrounding schools, residential and industrial areas in that order.
M10: Coordination between Roadway and Sidewalk Snow Removal	During plowing operations, a sidewalk snow removal crew should follow roadway plowing to remove snow from designated walkways.

Costs and Funding

Planning level cost estimates and the identification of potential funding sources, including Measure R, a local 0.5% sales tax passed in June of 2008 for the specific benefit of parks, recreation and trails have been provided to assist the Town of Mammoth Lakes in programming funding for future trail system improvements. These costs will vary as detailed design is completed for each project. Cost estimates include improvements at recreation nodes as well as multi-use paths, bikeways, crossing improvements and trail projects.

Benchmarking and Evaluation

Benchmarks and methods of evaluation are provided to monitor the progress of implementation and the benefits provided by an expanding trails network. The following table lists the areas covered by the recommended benchmarking and evaluation measures.

Table E-14. Summary of Benchmarking and Evaluation Measures

BENEFITS OF THE TRAIL SYSTEM
Economic Benefits
Health Benefits
RECREATIONAL TRAILS ENVIRONMENT
Implementation
Trail User Needs and Safety Assessment
Recreational Activity
Trail Safety
Trail User Experience
Accessibility
BICYCLING ENVIRONMENT
Implementation
Bicycling Activity
Bicycling Safety
PEDESTRIAN ENVIRONMENT
Implementation
Pedestrian Activity
Pedestrian Safety

Chapter 9 provides a more detailed discussion of recommended benchmarking and evaluation techniques.

Conclusions

This Trail System Master Plan provides sufficient guidance for the Town of Mammoth Lakes to continue moving forward with the development of a high-quality trail system. It does not, however, provide clear solutions for addressing every issue arising from the complex interactions between humans, trails and the surrounding physical environment. In some cases, further study and outreach will be required before responsible, well-informed decisions can be made on trail-related policies and infrastructure. By providing a combination of a vision for trails and public access as well as methods to guide and evaluate the system's growth, the Town of Mammoth Lakes Trail System Master Plan is the "trail map" for the future.

CHAPTER 1. VISION, GOALS & OBJECTIVES

The purpose of the Town of Mammoth Lakes Trail System Master Plan is to update the 1991 Trail System Plan, in accordance with the 2007 General Plan. This document also carries forward projects from the General Bikeway Plan and the Sherwins Area Recreation Plan (SHARP). Elements of the 2006 Physical Development and Mobility Study, the 2008 Draft Park and Recreation Master Plan and other planning efforts are brought together in order to create the vision of an integrated trails network—the Mammoth Lakes Trail System—that enhances recreation and mobility in the Mammoth Lakes area. This chapter describes guiding principles, vision, goals and objectives that are the foundation for the Town of Mammoth Lakes Trail System Master Plan. By setting the qualitative and quantitative benchmarks for success, these measures will ensure that the community is able to envision the planned system, maintain its safe use, and confirm ongoing success. The vision, goals and objectives described here are intended to guide the development and implementation of the master plan. The primary focus of this plan is the area within the Town's urban growth boundary (UGB). All recommendations for areas outside the UGB require further study by jurisdictional partners and should not be considered formal recommendations.

1.1. Vision

The Town of Mammoth Lakes Trail System Master Plan was conceived as a way to guide the development of an extensive, integrated, year-round trails network for the Town of Mammoth Lakes which will improve mobility and quality of life for residents, and provide the widest range of outdoor experiences for both residents and visitors. The trails network will also support sustainable economic development, allowing Mammoth Lakes to grow its economy while maintaining the desirable characteristics that have brought residents and visitors here in the first place. Every aspect of this planning process is rooted in the following guiding principles:

Table 1-1. Town of Mammoth Lakes Trail System Master Plan Guiding Principles

Accessibility	Cooperation
The trail system shall be accessible to users of all ages, abilities, and socioeconomic status for both visitors and residents.	A sense of cooperation must permeate all levels of the process: between agencies, between government and businesses, between user groups, between residents and visitors.
Community Character	**Environmental Stewardship**
The trails network must be developed in a way that maintains or enhances the small-town character of Mammoth Lakes.	Providing access to the natural environment will be balanced with a respect for the natural environment. Sustainable design principles will guide the development of all recommended projects.
Community Engagement	**Sustainable Economics**
The development of an integrated trail system cannot occur without widespread community support. Community members have had (and must continue to have) access to the planning process through a variety of means including public workshops, surveys, local media, and the distribution of draft documents.	A year-round trail system is essential to sustain Mammoth's recreation-based economy. The funding to build the trail system must come from a variety of sources—private and public (Town, state, and/or federal).

In the early months of 2007, the Mammoth Lakes Trails and Public Access Foundation (MLTPA) initiated an effort to update the Town's then current trails plan ("Mammoth Lakes Trail System Plan – 1991"). MLTPA convened a multi-partnered task force to identify the potential scope and costs of such an effort. The resulting "Planning Proposal" detailed a summary of program goals and objectives for a trails planning process in Mammoth Lakes and was used to attract a variety of partners to a proposed Concept and Master Planning (CAMP) trails planning effort. Three partnership groups were identified: **Jurisdictional Partners** (the United States Forest Service and the Town of Mammoth Lakes); **Funding Partners** (the Town of Mammoth Lakes, Mammoth Mountain Ski Area LLC, MLTPA, and "The Developers" Forum, a joint effort of MLTPA and the Mammoth Lakes Chamber of Commerce); and **Planning Partners** (the Town of Mammoth Lakes, Mammoth Mountain Ski Area, the United States Forest Service, and MLTPA). These partners and other regional agencies, including Mono County and Caltrans, are signatories to the "Mammoth Lakes Trails and Public Access Memorandum of Understanding," an MOU initiated by MLTPA for regional co-operation on trails efforts, including trails planning.

1.2. Goals and Objectives

1.2.1. Trails Network

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, 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 from both public and private property.

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

Objective 1.5: Identify preferred summer and winter uses for each segment in the network.

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

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

1.2.2. Mobility

Goal 2: Develop a plan that enhances mobility in a way that is consistent with the Town's "Feet First" strategy.

Objective 2.1: Identify necessary improvements to improve pedestrian safety, convenience and comfort.

Objective 2.2: Update the General Bikeway Plan and develop an on-street bikeway network that enhances bicyclist safety, convenience and comfort.

Objective 2.3: Ensure that pedestrians and bicyclists can access the public transit system safely, conveniently and comfortably; and that public transit serves all key recreation nodes.

Objective 2.4: Provide the information necessary for residents and visitors to navigate around town on foot, bicycle and transit.

1.2.3. Implementation

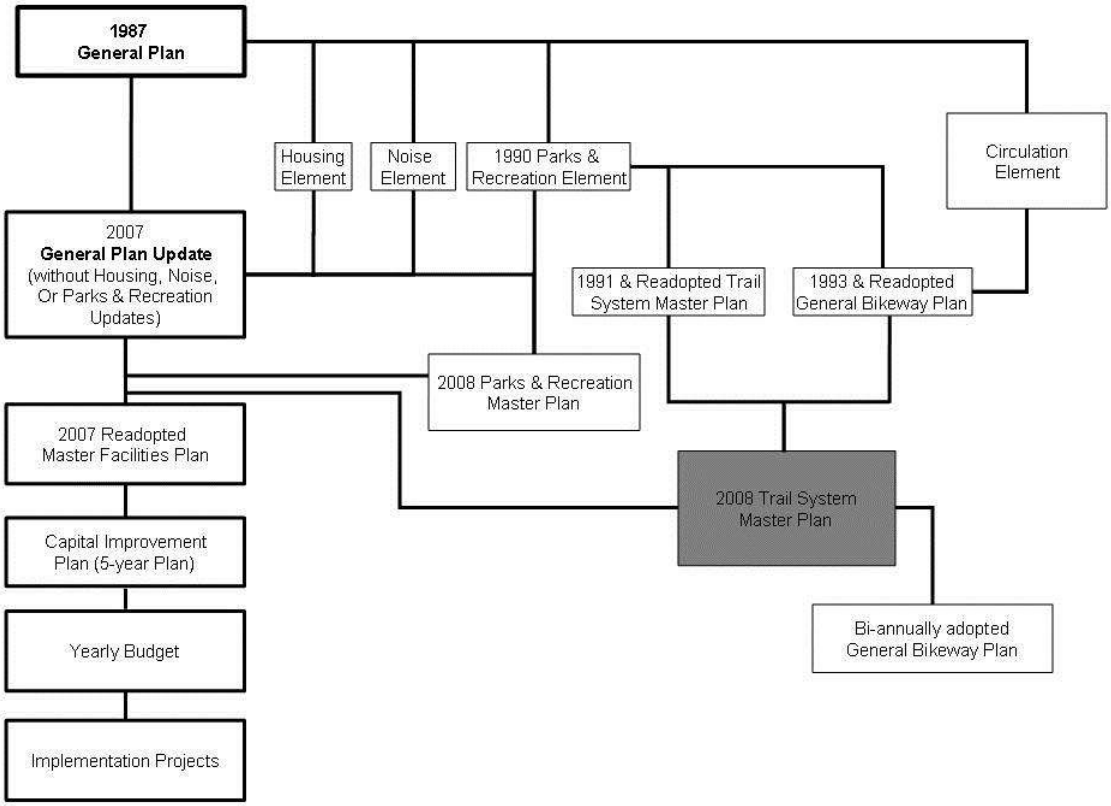
Goal 3: Create a plan that clearly identifies the projects and programs necessary for implementation.

Objective 3.1: Provide specific lists of projects that the Town of Mammoth Lakes can incorporate into the Capital Improvement Program. Complete the near-term projects identified in the Trail System Master Plan in the next two years.

1.3. Existing Plans, Policies and Data Sources

The Mammoth Lakes Trail System Master Plan will build on and conform to existing plans and policies. This section describes the key planning and policy documents and their relationship to the Mammoth Lakes Trail System Master Plan. In summary, the Mammoth Lakes Trail System Master Plan will conform to the Town's Vision Statement and General Plan; carry forward and replace the recommendations from the General Bikeway Plan and the 1991 Trail System Plan; and be informed by the Physical Development and Mobility Study and the Parks and Recreation Master Plan.

Figure 1-1. Relationship of Trail System Plan to other Town Plans and Processes



1.3.1. Town of Mammoth Lakes General Plan (2007)

The General Plan is the key document guiding development and the provision of public services in TOML. It provides a broad community vision and detailed lists of goals and policies to guide development. Many of the goals and policies listed in the General Plan are addressed through this Mammoth Lakes TSMP. Most specifically, the General Plan calls for the development of a "Master Plan for an integrated trail system." **Figure 1-2** shows the General Plan goals that are most directly linked to this effort. The Mammoth Lakes TSMP conforms to these and all other goals and policies of the General Plan.

As a component of the 2007 General Plan Update, the Mammoth Lakes Town Council established land use policies creating a Neighborhood District Planning (NDP) process, a series of land use planning efforts for identified "neighborhood districts" within the Town of Mammoth Lakes. These Neighborhood District Plans were not designed to be coordinated with the CAMP trails planning effort. It was determined that the individual Neighborhood District Plans would provide trail and public access planning within the boundaries of the individual districts and ensure connectivity to neighboring districts, existing infrastructure, and be coordinated with the recommendations of the Trail System Master Plan. The NDP process is described in more detail in section 1.3.7.

Figure 1-2. General Plan Community Vision and Selected Goals

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

To achieve this vision, Mammoth Lakes places a high value on:

1. Sustainability and continuity of our unique relationship with the natural environment. As stewards, we support visitation and tourism as appropriate means to educate and share our abundant resources. We are committed to the efficient use of energy and continuing development of renewable resources.
2. Being a great place to live and work. Our strong, diverse, yet cohesive, small town community supports families and individuals by providing a stable economy, high quality educational facilities and programs, a broad range of community services and a participatory Town government.
3. Adequate and appropriate housing that residents and workers can afford.
4. Being a world-renowned year-round resort community based on diverse outdoor recreation, multi-day events and an ambiance that attracts visitors.
5. Protecting the surrounding natural environment and supporting our small town atmosphere by limiting the urbanized area.
6. Exceptional standards for design and development that complement and are appropriate to the Eastern Sierra Nevada mountain setting and our sense of a "village in the trees" with small town charm.
7. Offering a variety of transportation options that emphasize connectivity, convenience and alternatives to use of personal vehicles with a strong pedestrian emphasis.

Parks, Open Space, and Recreation

Trail System
P.3 GOAL: Create a Master Plan for an integrated trail system that will maintain and enhance convenient public access to public lands from town.
Connected Throughout
P.5 GOAL: Link parks and open space with a well-designed year-round network of public corridors and trails within and surrounding Mammoth Lakes.

Mobility

In-Town Transportation
M.3 GOAL: Emphasize feet first, public transportation second, and car last in planning the community transportation system while still meeting Level of Service standards.
Walking and Bicycling
M.4 GOAL: Encourage feet first by providing a linked year-round recreational and commuter trail system that is safe and comprehensive

1.3.2. Trail System Plan (1991)

The 1991 Town of Mammoth Lakes Trail System Plan outlined the development of a trail system comprised of a paved "Main Path" forming a loop around town and a series of "Future/Alternative" trails extending out from the Main Path into the Mammoth Mountain Ski Area and other National Forest Lands. The plan described the primary uses to be accommodated on the Main Path as walking, jogging, mountain biking, cross-country skiing and road biking. Much of the "Main Path" system described in this plan has since been constructed. The recommendations of the 1991 Trail System Plan will be evaluated and considered for inclusion in the Trails Master Plan. Once adopted, this Trails Master Plan will replace the 1991 Trail System Plan.

1.3.3. General Bikeway Plan (1995-2008)

The General Bikeway Plan was originally developed and adopted in 1995. The plan has since been amended and/or readopted in 1996, 1997, 2002, and 2008. The primary purpose of these amendments and readoptions has been to renew its eligibility for Bicycle Transportation Account funding from Caltrans. The recommendations in the General Bikeway Plan have been evaluated and considered for inclusion in this TSMP. However, due to bi-annual updating requirements, the GBP will not be replaced by this document.

1.3.4. Sidewalk Master Plan (1997/2003)

The Sidewalk Master Plan for the Town of Mammoth Lakes was developed in 1997 and updated in 2003. As part of the 2003 update, the Planning Commission determined that the plan is exempt under the California Environmental Quality Act (CEQA). The plan recommends sidewalks on both sides of most major roadways or areas with high pedestrian activity. The plan recommends sidewalks on only one side of most collector streets or those that provide access to schools or other major destinations. While this Trail System Master Plan discusses sidewalk infrastructure in the context of providing access to the recreational trail system, any recommendations related to sidewalk infrastructure would need to be evaluated and adopted in a future revision of the Sidewalk Master Plan before they can be implemented.

1.3.5. Physical Development and Mobility Study (2006)

Originally the "Physical Development and Mobility Plan", this document started off as a planning effort to coordinate land use and transportation planning with other community goals such as open space, recreation, and environmental sustainability. The document describes the latest planned development, trails and mobility projects. It also provides updated roadway cross-sections and assigns departmental responsibility for each element of implementation. Since the document was never adopted by the Town Council as a "Plan", it retains the official title of "Study". The Town will be initiating a new mobility planning effort for adoption by the Town Council. The relevant recommendations in this TSMP will be considered in the forthcoming mobility planning effort.

Map 1-1. Trail System Plan (1991)

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1.3.6. Draft Parks and Recreation Master Plan (2008)

The Town of Mammoth Lakes Draft Parks and Recreation Master Plan is being developed concurrently with the Mammoth Lakes Trail System Master Plan. It will provide guidance for enhancing existing parks and developing new park facilities for recreation and enjoyment.

1.3.7. Neighborhood District Plans

A Neighborhood District Plan (NDP) is a planning tool used to assist the Town of Mammoth Lakes in the evaluation, analysis and processing of permit applications for Major Land Use Developments. The NDP process is designed to help determine whether a development project is consistent with the goals and objectives of the General Plan and the character of the surrounding district.

A number of Neighborhood District Plans (NDPs) have been completed and accepted since 2007 when the General Plan was adopted. In General, the NDPs reflect the recommendations of the TSMP with regard to trails and related facilities, and articulate similar goals as the TSMP with regard to improved mobility for pedestrians and bicyclists through an enhanced and interconnected trails network.

1.3.8. MLTPA GIC

The "MLTPA GIS Inventory Contract" (MLTPA GIC) is an inventory of significant points of public access to recreation amenities as well as identified points of jurisdictional importance in the Mammoth Lakes area. The origins of the MLTPA GIC lie in a report prepared by MLTPA, the "Mobility Plan Resources Report" (MPRR), presented on July 26, 2006, to a joint meeting of the TOML Planning, Tourism & Recreation, and Public Arts commissions. Recognizing the need for a more robust iteration of the MPRR, TOML Tourism & Recreation Director Danna Stroud worked with MLTPA and subsequently drafted an Agenda Bill for the Town Council meeting of August 16, 2006. The bill requested that Town Council vote to approve a contract for MLTPA to conduct a more thorough, extensive, and technically sophisticated survey of Points of Public Access (PPAs) in the region as were initially identified by the MPRR. Town Council unanimously approved this contract with MLTPA "…for the completion of a comprehensive map and inventory of all trails and points of public access between the Town's urban limit, the Town boundary and the surrounding public lands." The MLTPA GIC Inventory was then created by "point of public access" (PPA) identification, with consideration to the practical implications of a PPA system, seasonal realities including winter and summer, and a scope of work area. The original MPRR PPA information was used as a baseline for the MLTPA GIC Inventory. MLTPA GIC data was collected using analog field sheets created for each PPA, describing the location, outdoor recreation activities accessed from the PPA, special circumstances, and facilities, with photos of each site's condition, location, and signage, prior to the transcription of the collected information into a digital database. The MLTPA GIC currently exists as a "living" PDF document as well as verified GIS data.

1.3.9. GIS Database

Sources of GIS data for the trails planning effort came from a variety of sources including the Town of Mammoth Lakes, the Inyo National Forest, Mono County, Mammoth Mountain Ski Area and MLTPA, which field collected and developed data over the course of the planning effort. However, a reliable combined data source of GIS data from all federal, state, county, municipal and private sources in the Mammoth Lakes region does not currently exist. There is a strong need for data to be combined into a single, central, and reliable resource.

1.3.10. MLTPA MOU

The Mammoth Lakes Trails and Public Access Memorandum of Understanding, or MLTPA MOU, is a non-binding document whose purpose is to '…establish and provide a working public/private cooperative framework, or collaborative planning process, directed toward the establishment and maintenance of a system of public trails providing reasonable access to and enjoyment of public lands that are both within and surround the Town.' The MLTPA MOU further defines the area of influence as follows: 'The Town's Area of Influence consists of approximately 125 square miles of land surrounding the Town. Subject to more precise planning or mapping, that shall become the Area of Influence for the application of this MOU and any agreements among the parties, or any of them, which may come about as a result of this MOU.' As of January 1, 2009, signatories to the MLTPA MOU are as follows: Inyo National Forest, Town of Mammoth Lakes, County of Mono, Mammoth Community Water District, Mammoth Lakes Fire Protection District, Mammoth Mountain Ski Area, California Department of Transportation, the Mammoth Lakes Trails and Public Access Foundation, and Friends of the Inyo.

1.3.11. Sherwins Area Recreation Plan (SHARP) – November 2009

A Sherwins Area Trails Special Study (SATSS) was developed concurrently with the TSMP, and was included in the February 2009 Draft TSMP. The SATSS resulted in a technical report which was then used as a reference document for the Sherwins Working Group (SWG), a citizen based collaborative planning effort formed at the invitation of regional partners the United States Forest Service/Inyo National Forest, the Town of Mammoth Lakes, and MLTPA. The group worked throughout the course of 2009 and 2010 to review and build upon the concepts outlined in the SATTS. The resulting Sherwins Area Recreation Plan (SHARP) is the final deliverable of the SWG process; it was developed for inclusion in the TSMP and intended to serve as a resource document for the USFS, the TOML, private property and real estate development interests, and any other effort with an interest in trails and recreation infrastructure development in the Sherwins region. While a number of the SHARP recommendations are developed to a relatively high level of detail, other concepts are expected to be further refined through additional planning and study. All are subject to review and approval by the US Forest Service, and may be modified through that process. SHARP is included as Attachment C to this TSMP.

1.3.12. Sherwins Egress – October 2009

During the winter of 2005-2006, conflicts between local backcountry skiers/snowboarders, homeowners, and private-property interests threatened to permanently close the safest and most convenient winter egress route from the base of the Sherwin Range to the town of Mammoth Lakes. Today, thanks to a partnership between Snowcreek Investment Company L.P. (developer of Snowcreek VIII), the Town of Mammoth Lakes, and MLTPA, an approved, legal route leading outdoor recreationists home from the base of this well-loved frontcountry ski amenity has been secured and marked with directional signage. The Snowcreek egress route is the result of a two-year decision-making process and is formalized as a component of the adopted Snowcreek VIII Master Development Plan.

1.3.13. Snowcreek VIII Master Plan – January 2010

Snowcreek VIII will be the largest single real estate development project in Mammoth Lakes in coming years; its development, including trails and public access through the project area will play a significant role in defining the interface between the Town of Mammoth Lakes and U.S. Forest Service lands along the Town's southern boundary. The trails and access points identified in the Snowcreek VIII Master Plan are incorporated by reference into the MLTS.

1.3.14. Lakes Basin Special Study (LABSS) – September 2010

Thanks to a grant from the Sierra Nevada Conservancy, the Inyo National Forest (INF) partnered with the Town of Mammoth Lakes (TOML), the Mammoth Lakes Trails and Public Access Foundation (MLTPA), and Friends of the Inyo (FOI) to study mobility and outdoor-recreation patterns in the Mammoth Lakes Basin. As one of Mammoth's most popular amenities, the area sees thousands of visitors every summer who come to experience a wide diversity of recreation experiences. The Mammoth Lakes Basin is also a critical watershed providing water resources to Mammoth Lakes and other downstream communities. Proper planning and management will ensure that the Lakes Basin can continue to provide exceptional recreational experiences while protecting and sustaining the natural resources of the area. Based on public input gathered during 2010 and 2011, the study will identify a series of concepts for the future management of the Mammoth Lakes Basin. The Inyo National Forest will consider these concepts as they develop formal management planning for the area.

1.3.15. Mammoth Scenic Loop Road Reconstruction – October 2010

The Mammoth Scenic Loop project is a 5.847-mile road construction project on the Mammoth Scenic Loop from the Town of Mammoth Lakes north to the intersection with US 395. The project work includes minor grading, drainage, pulverization, aggregate base, hot asphalt concrete pavement, and the addition of Class II Bike Lanes along both sides of the road. Road construction was accomplished in two phases in 2010 with temporary road closures to facilitate construction efforts. Opportunities for new MLTS nodes as well as enhanced recreation opportunities - including snowplay – are outcomes of this project.

1.3.16. Recreation Vision and Strategies for Mammoth Lakes: RECSTRATS – November 2010

The RECSTRATS process was designed to deliver a recreation vision and strategy for Mammoth Lakes while also identifying opportunities that might be realized by formalizing the Town's relationship with the Inyo National Forest. This first phase of the process was completed in November 2010 with the delivery of the vision and seven core strategies for recreation as articulated in the RECSTRATS document to the Mammoth Lakes Town Council, which unanimously accepted the plan. Final delivery of the RECSTRATS project is anticipated for delivery in August of 2011.

1.3.17. Inyo National Forest Shady Rest Motorized Staging Project – March 2011

The Inyo National Forest received an OHV grant from the State of California to support recreation planning efforts for the "Shady Rest" area within the Town of Mammoth Lakes. The planning process is designed to address year round motorized use while considering the needs of non-motorized users in the immediate and surrounding area and the potential impact of proposed geothermal development. The desired outcome of the planning process is to design, review, and approve the development of a new year-round motorized staging area.

1.3.18. Mammoth Lakes Trail System Standards Manual – Draft March 2011

The purpose of the MLTS Standards Manual is to guide the various agencies and organizations with identified roles in the management and/or implementation of the Mammoth Lakes Trail System, and to ensure a consistent experience and level of service for trail users. MLTPA has taken the lead in developing the first draft of this document, which will be a living document that is updated as necessary, and conforms to the needs and expectations of the MLTS management and implementation partners. The Standards Manual includes sections on the design and implementation of recreation nodes, signage and wayfinding, soft-surface trails, multi-use paths, on-street bikeways, easements, trail amenities, and pedestrian facilities. In many cases those standards will tier from, but reflect refinements to, the advisory or guideline design concepts outlined in this Master Plan. The Standards Manual when adopted will be the authoritative document with regard to implementation of specific facilities and improvements within the MLTS.

CHAPTER 2. EXISTING CONDITIONS

This chapter provides a description of existing conditions within the Town of Mammoth Lakes (TOML) relevant to trails and public access. Information is based on field visits, existing planning documents, infrastructure, programs and recreational activity patterns. The chapter presents a description of the following topics in their summer and winter contexts:

1. A description of the Town's setting and regional context
2. Jurisdictional issues
3. Major activity centers and recreation nodes
4. Paved multi-use paths
5. On-street bikeways
6. Pedestrian facilities
7. Interface between mountain bike trails and paved facilities
8. Soft-surface trail facilities
9. Bicycle parking
10. Public transportation and multi-modal opportunities
11. Accessibility issues

2.1. Setting and Context

Mammoth Lakes, California, is a unique destination-resort community located in the Eastern Sierra region of Central California. It covers only 4.5 square miles and is surrounded by the Inyo National Forest. Devils Postpile National Monument as well as the eastern entrance of Yosemite National Park are a short drive from the center of town. Mammoth Lakes sits at an altitude of 7,800 feet. The surrounding mountains rise to elevations approaching 12,000 feet. In summer, temperatures average 75-80 degrees for a high and seldom dip below 40. Winter temperatures average 30-40 degrees for a high and 10-20 degrees for a low with mostly sunny skies. According to the 2010 Census, the Town has a year-round population of 7,789, but with the seasonal influx of second home owners and visitors, the population can increase to around 35,000. The 2007 General Plan establishes a policy of a total peak population of 52,000 residents, visitors and employees. This peak is expected to be reached by 2025. As the community grows, residents, visitors, and businesses are concerned with maintaining a high quality of life[2]. A central issue is ensuring access to the public lands that are among the area's most significant assets. The economic engine of the local economy is tourism and outdoor recreation. Residents and visitors alike are attracted to Mammoth for its outdoor recreational opportunities. In order to strike a balance between economic development and quality of life, the Town of Mammoth Lakes intends to develop a system of trails and public access that will integrate the community with its surrounding natural environment.

[2] "Quality of life" generally refers to the level of overall personal satisfaction (or dissatisfaction) with the physical, cultural or intellectual conditions under which one lives; and the ability to comfortably pursue enjoyable daily activities. The Needs Analysis chapter describes the recreational activities commonly pursued by Mammoth residents and visitors and discusses how their enjoyment of those activities can be enhanced.

2.2. Jurisdictional Issues

The agencies with the most direct jurisdiction over the facilities discussed in this plan are the Town of Mammoth Lakes, the U.S. Forest Service, and Caltrans.

2.2.1. Town of Mammoth Lakes (TOML)

The Town of Mammoth Lakes is the jurisdictional partner with the highest level of control over the development and implementation of this Trails Master Plan. The Town's jurisdictional influence is defined by three boundaries: (1) the Urban Growth Boundary (UGB); (2) the Town Boundary; and (3) the Planning Area.

The Town controls all land use and zoning decisions within the UGB established by the 2007 General Plan. The function of the UGB is to limit urban development to within its boundary. The Town Boundary is the area subject to the Town's regulations and building codes. Most of the land outside the UGB, but within the Town Boundary, is undeveloped land under the jurisdiction of the USFS. By way of example, approximately half of the planned Snowcreek VIII development lies outside of the UGB, but within the Town Boundary. It was acquired though a land exchange with the Forest Service with the condition that the land could only be developed for recreational purposes, as dictated by the covenant. As a result, all residential and commercial development should take place on the area within the UGB and a golf course and recreational facilities may be developed on the portion within the Town Boundary, but outside of the UGB. The Planning Area per the General Plan defines the "sphere of influence" or the area which is likely to be impacted (even indirectly) by the Town's services and development decisions.

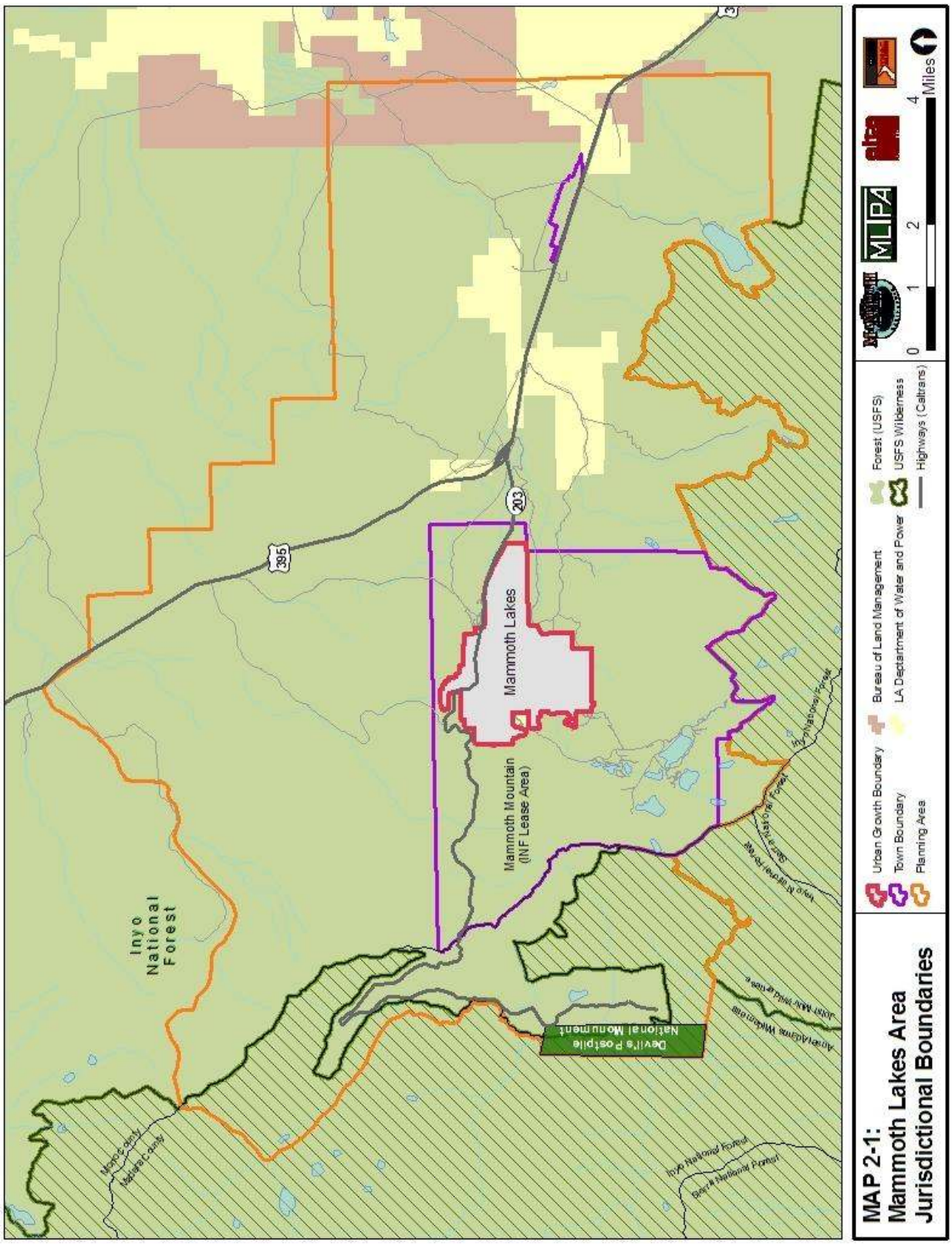
2.2.2. United States Forest Service (USFS)

The United States Forest Service administers most of the land outside the Town's urban growth boundary. These lands are generally open to the public, and many "informal" or "unofficial" trails exist on these lands. The development of any new formal trails or other recreational facilities must be approved by the Forest Service. The discussion of trails on USFS land is not intended to suggest that these trails have been approved by the Forest Service or to create any expectations for levels of service or maintenance. The Forest Service also administers some land within the UGB, primarily on the eastern end. The Mammoth Mountain Ski Area (MMSA) is the use permit holder for the MMSA and for the Tamarack Cross Country Ski Area. All proposals in or connecting to lands under this use permit must be carried out in coordination with MMSA. The Town of Mammoth Lakes currently maintains paved trails on USFS land under a Special Use Permit.

2.2.3. CA Department of Transportation (Caltrans)

Caltrans currently owns and maintains State Route 203 which consists of Main Street and the section of Minaret Road to the north of Main Street leading to the Mammoth Mountain Ski Area's Main Lodge. Caltrans is currently responsible for all roadway maintenance and snow removal on Highway 203. Caltrans does not maintain improvements that have been developed by the Town within the Highway 203 right-of-way such as bus stops and sidewalks. It would be possible for Caltrans to transfer ownership of Highway 203 to TOML if the Town were able to take on maintenance responsibilities.

Map 2-1. Mammoth Lakes Area Jurisdictional Boundaries



2.3. Major Activity Centers and Recreation Nodes

In order to present an organized analysis of the current levels of mobility and recreational access, key geographic locations have been selected and grouped into two broad categories: activity centers and recreation nodes.

Activity centers are locations or areas that attract significant levels of human activity or trips (civic buildings, schools, shopping centers, areas of high employment, etc). The "human activity" taking place at these locations is generally economic or civic in nature. While the activity at these locations may be subject to seasonal fluctuation, their significance does not change and—with the exception of schools—they are unlikely to go dormant at any time of the year.

In addition to traditional activity centers, the Town of Mammoth Lakes (TOML) and Mammoth Lakes Trails and Public Access (MLTPA) have identified a series of summer and winter recreation "nodes". For the purposes of this Trails Master Plan the term "recreation node" is used as a general term to describe a geographic location of existing or potential significance for outdoor recreation. While the recreation nodes identified later in this section may or may not attract economic activity, their commonality lies in their existing (or potential) ability to facilitate recreational experiences. At many of these locations, residents and visitors already congregate (and disperse) in pursuit of recreational opportunities both within and beyond the Town's urban growth boundary. In some cases a node may represent a point where a recreational experience starts (i.e. where you get off the bus or park your car). In other cases, the node may represent a point of transition in an ongoing recreational experience (i.e. from a paved MUP to narrow foot path). Unlike activity centers, seasonality and time of day heavily impact the type and level of activity at recreational nodes. Unlike activity centers, recreation nodes may be very active in one season and dormant in another. Even recreation nodes that function year-round will be strongly impacted by seasonal (summer-winter) changes in terms of activity levels and services provided. **Table 2-1** provides a generalized comparison of activity centers and recreation nodes.

Table 2-1. Characteristics of Activity Centers and Recreation Nodes

Activity Centers	Recreation Nodes
Less seasonal	More seasonal
Less directly impacted by recreational activity	More directly impacted by recreational activity
Generally located within UGB	Generally located on the edge or outside UGB
More consistent levels of activity (day / night)	Less consistent levels of activity (day / night)
Provide employment or other direct economic activity on-site	May or may not generate economic activity on-site*

* Recreation nodes that fall within the sub-category of "portals" typically do generate economic activity on-site either through user fees or the sale of food or lodging. While other recreation nodes do not generate economic activity on-site, it should be emphasized that recreation itself is the single most important component of the Mammoth Lakes economy, and regardless of the level of on-site economic activity, recreation nodes and the trail facilities they serve are an important element of the local economy.

In order to further define recreation nodes and plan for their future development, the following node types have been created: GIC points, access/egress points, trailheads, parks and portals.

GIC points are the basis for selecting recreation nodes and may include any official or unofficial locations where a recreational transition occurs. This transition can include parking a car or disembarking from another mode of transportation in order to engage a recreational activity. The transition may also be between jurisdictional boundaries or between types of experiences (i.e. urban and rural, paved to unpaved). All recreation nodes have at least one associated GIC point, but not all GIC points are recreation nodes.

Access/egress points are locations that have the same characteristics as a GIC point, but have been formalized so that access there is legal and/or regularly maintained by a public or private entity. The basic elements of an access/egress point should include signage and a clear passageway sufficient to accommodate the intended users. These locations may or may not include low-impact amenities such as a source of drinking water or limited parking. Whether or not access/egress points are included on trail maps should be determined by the entity responsible for the maintenance of that location.

Trailheads should provide—at a minimum—automobile and/or bicycle parking facilities, trash/recycling, restrooms and signage. Trailheads within the UGB should be served by public transportation during the seasons in which they are open.

Parks are self-contained recreation facilities that generally include the same amenities (parking, restrooms, trash/recycling) as a trailhead. Since all parks operated by the Town of Mammoth Lakes—except Whitmore Park—currently provide access to existing trails, parks essentially serve as trailheads with the additional amenities unique to each individual park. Whitmore park is currently used as a staging area for road bicycling.

Portals are the most developed form of recreation node and include all the amenities of trailheads plus lodging and restaurants. Because portals will tend to generate significant activity, all portals should be served by frequent public transportation in order to discourage traffic congestion, mitigate greenhouse gas emissions and reduce other forms of transportation-related pollution.

In some cases, locations that have been identified as portals could also be defined as activity centers for their high levels of employment and economic activity. The Main Lodge and the North Village are both examples, but since the North Village is less dependent on—and less directly linked to—outdoor recreational activities, the argument could more easily be made that it is both. For this reason, and the fact that it is clearly within the Town's urban growth boundary, it will be evaluated as both an activity center and as a recreational portal.

(Note: These nodal types and definitions are subject to change and will be defined in more detail in the forthcoming Mammoth Lakes Trail System Standards Manual.)

2.3.1. Activity Centers (Summer and Winter)

Table 2-2 contains a list of major activity centers within the Town of Mammoth Lakes. One of these activity centers is also a recreation portal. While the majority of activity centers on this list have not been identified as recreation portals, connecting trails users to them is vital for "feet-first" mobility and enhancing the recreation experience. Providing access to activity centers from the larger trails network will create possibilities for in-town, short-distance recreation, and linked recreational/utilitarian trip-making. Current access to activity centers varies greatly from one activity center to another. There is also significant variation depending on your mode of transport. Because of their year-round importance and their location within the Town's UGB, activity centers will be evaluated for their current accessibility via walking, bicycling, and transit.

Table 2-2. Major Activity Centers

GIC	Name	Description
191	North Village (MMSA Portal)	Shopping, tourism, employment
None	Main Street Retail Area	Shopping, dining, general services
None	Minaret Village Mall	Shopping, employment, civic
None	Gateway Center Mall	Shopping, employment
None	Industrial Park	Employment
124	Welcome Center	Tourism, employment, civic
None	Hospital and Medical Center	Employment, Health Care
None	Public Schools	Students (elem. middle, high), employment
None	Post Office / Hotels (Main St)	Tourism, employment, civic
None	New Library / Sierra High	Students (high), employment, civic
5	Cerro Coso Community College / Ski Museum	Students (college), employment
None	Snow Creek Athletic Club	Recreation, fitness

Existing access to these centers varies by location and season. Existing bicycle, pedestrian and transit access to these activity centers will be discussed in the following sections of this chapter. Specific projects to enhance "feet first" access to these locations can be found in Chapter 4.

2.3.2. Summer Recreation Nodes

The following tables describe the existing amenities and activities taking place at summer recreation nodes. These nodes are either used as staging areas or access points for summer recreational activities, or have existing potential for summer recreational use.

Table 2-3. Existing Amenities at Summer Recreation Nodes

GIC	Name	Node Type	lodging	restaurant	parking	restroom	lift	bus	trail access	signage
46	Main Lodge (MMSA)	Portal	X	X	X	X	X	X	X	X
191	North Village (MMSA)	Portal	X	X	X	X	X	X	X	X
36	Tamarack Lodge (MMSA)	Portal	X	X	X	X		X	X	X
195	Community Center	Park			X	X			X	
134	Mammoth Creek Park East	Park			X	X		X	X	
152	Mammoth Creek Park West	Park			X	X		X	X	X
97	Shady Rest Park	Park			X	X			X	X
193	Trail's End Park	Park			X	X			X	X
88-90	Coldwater Campground*	Trailhead			X	X			X	X
80	Horseshoe Lake	Trailhead			X	X		X	X	X
86-87	Lake George*	Trailhead			X	X			X	X
124	Welcome Center	Trailhead			X	X			X	X
14	Eagle Lodge – temp (MMSA)	Access/Egress			X			X	X	
41	Lake Mary Bike Path NE Terminus	Access/Egress								
34	Twin Lakes Parking	Access/Egress			X				X	X
38	Austria Hof	GIC Point			X				X	
13	Canyon Lodge (MMSA)	GIC Point			X				X	
64	Sierra Blvd @ Forest Trail	GIC Point							X	
158	Path along Snowcreek V fenceline	GIC Point							X	
163	USFS gravel borrow pit	GIC Point			X				X	

* Not shown on map.

Table 2-4. Existing Characteristics of Summer Recreation Nodes

GIC#	Name	Node Type	Description
46	Main Lodge (MMSA)	Portal	Mountain biking, gondola rides to the top of Mammoth Mountain, Reds Meadow Transit to Minaret Vista & beyond
191	North Village (MMSA)	Portal	Mountain bike trails & MMSA fee bike park via Uptown/Downtown or MMSA bus, access to transit (w/in Town, to Main Lodge, to Lakes Basin), gondola rides, parking
36	Tamarack Lodge (MMSA)	Portal	Parking, restroom facilities, trail access, lodging
195	Community Center	Park	Parking, restrooms, access to mountain bike trails (uptown / downtown)
134	Mammoth Creek Park East	Park	Fishing, walking, access to Main Path, access to transit
152	Mammoth Creek Park West	Park	Fishing, walking, access to Main Path, access to transit
97	Shady Rest Park	Park	Parking, restroom, non-motorized and motorized trail access
193	Trail's End Park	Park	Access to skate park, Main Path and Meridian Path.
88-90	Coldwater Campground*	Trailhead	Parking, restroom, signage, camping, trail access, equestrian access
80	Horseshoe Lake	Trailhead	Parking, restroom, MTB and hiking trail access, bus service, signage
86-87	Lake George*	Trailhead	Parking, restroom, signage, boating, camping, trail access
124	Welcome Center	Trailhead	Parking (car and bicycle), restroom, signage, Main Path access, camping, information
14	Eagle Lodge – temp (MMSA)	Access/Egress	Potential for Mountain Bike Park access, access to Main Path system
41	Lake Mary Bike Path NE Terminus	Access/Egress	Lake Mary Bike Path as access to Lakes Basin and Main Path system, future development site (Mammoth Crossing)
34	Twin Lakes Parking	Access/Egress	Parking, summer trail access
38	Austria Hof	GIC Point	Access point for warming wall. Egress from MMSA Main Lodge via Shotgun Trail.
13	Canyon Lodge (MMSA)	GIC Point	Potential for Mountain Bike Park access and event site
64	Sierra Blvd @ Forest Trail	GIC Point	Trail access
158	Path along Snowcreek V fenceline	GIC Point	Trail access
163	USFS gravel borrow pit	GIC Point	OHV access/staging, mountain bike access, hiking access

* Not shown on map.

Map 2-2. Existing Summer Recreation Nodes and Facilities (UGB & Beyond)

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2.3.3. Winter Recreation Nodes

The following tables describe the existing amenities and activities taking place at winter recreation nodes. These nodes are either used as staging areas or access points for winter recreational activities, or have existing potential for winter recreational use.

Table 2-5. Existing Amenities at Winter Recreation Nodes

GIC	Name	Node Type	lodging	restaurant	parking	restroom	lift	bus	trail access	signage
13	Canyon Lodge (MMSA)	Portal	X	X	X	X	X	X	X	X
14	Eagle Lodge – temp (MMSA)	Portal	X	X	X	X	X	X	X	X
46	Main Lodge (MMSA)	Portal	X	X	X	X	X	X	X	X
191	North Village (MMSA)	Portal	X	X	X	X	X	X		X
36	Tamarack Lodge (MMSA)	Portal	X	X	X	X		X	X	X
195	Community Center Park	Park			X					
134	Mammoth Creek Park, East	Park			X				X	
152	Mammoth Creek Park, West	Park			X	X			X	
193	Trail's End Park	Park			X	X				
186	Shady Rest / Saw Mill Cutoff Road & Parking Lot	Trailhead			X				X	X
124	Welcome Center	Trailhead			X	X			X	X
35	Lake Mary Rd winter terminus	Access/Egres			X				X	X
28	Mill City	Access/Egres			X				X	
42	Earthquake Fault	GIC Point							X	
158	Path along Snowcreek V fence line	GIC Point								
44	Power Plant	GIC Point			X				X	
91	Sherwins Ridge Access at Lake Mary Road	GIC Point							X	
64	Sierra Blvd @ Forest Trail	GIC Point							X	
52	Sledz, snowplay	GIC Point			X	X	X	X		
137	Tamarack St @ UGB	GIC Point							X	
151	Winter terminus of Sherwin Creek Rd	GIC Point			X				X	

Table 2-6. Existing Characteristics of Winter Recreation Nodes

GIC	Name	Node Type	Description
13	Canyon Lodge (MMSA)	Portal	MMSA access MMSA egress; fee based; winter ski lifts
14	Eagle Lodge – temp (MMSA)	Portal	MMSA access MMSA egress; fee based; winter ski lifts
46	Main Lodge (MMSA)	Portal	Recreation portal; fee based; general access point; ski lifts; ski/snowboard; dog sledding; MMSA access; MMSA egress; public ungroomed nordic trails; public; fee-based snowmachine trail; snowmachine open area; snowshoe trail; snowshoe open area; vistas
191	North Village (MMSA)	Portal	Winter recreation portal; gondola; MMSA access/egress
36	Tamarack Lodge (MMSA)	Portal	Recreation portal; fee based; general access point; ice fishing; ice skating; MMSA egress; fee area groomed nordic trails; public groomed nordic trails; public un-groomed nordic trails; pet area and walking; public snowplay; snowshoe trail and open area; vistas; winter camping; groomed and winter hiking/walking
195	Community Center Park	Park	Parking, public meeting room.
134	Mammoth Creek Park East	Park	Winter road closure, public groomed nordic trails
152	Mammoth Creek Park West	Park	Recreation access, trailhead, restroom
193	Trail's End Park	Park	Facilities currently closed in winter.
186	Shady Rest /Saw Mill Cutoff Road & Parking Lot	Trailhead	Winter road closure and recreation trailhead; general access point; public groomed nordic trails; public un-groomed nordic trails; pet area and walking; snowmachine trail and open area; snowshoe trail and open area
124	Welcome Center	Trailhead	Visitor information and ungroomed access to nordic ski trails
35	Lake Mary Rd winter terminus	Access/Egress	Winter road closure; general access point; ski/snowboard access/egress; ice fishing; ice skating; MMSA egress; fee area groomed nordic trails; public groomed nordic trails; public un-groomed nordic trails; pet area and walking; public snowplay; snowshoe trail and open area vistas; winter camping; groomed winter hiking/walking
28	Mill City	Access/Egress	Winter road closure; general access point; kicker zone ski/snowboard; backcountry ski/snowboard access and egress; nordic ungroomed; public pet area; pet walking snowplay; public snowshoe trail; public area vistas winter hiking/walking
42	Earthquake Fault	GIC Point	Trail access
44	Power Plant	GIC Point	Staging area, general access point; OSV trail
91	Sherwins Ridge Access at Lake Mary Road	GIC Point	Access to backcountry skiing opportunities via Sherwins Ridge
64	Sierra Blvd @ Forest Trail	GIC Point	Trail access
52	Sledz	GIC Point	Fee area snowplay
158	Snowcreek V fence line	GIC Point	Backcountry ski/snowboard egress.
137	Tamarack St @ UGB	GIC Point	Private property; easement under negotiation.
151	Winter terminus of Sherwin Creek Rd.	GIC Point	Winter road closure; general access point; kicker zone ski/snowboard; backcountry ski/snowboard access and egress; dog sledding; public un-groomed nordic trails; pet area and walking; snowmachine trails and open area; public snowplay area; snowshoe trail and open area; vistas; winter camping

Map 2-3. Existing Winter Recreation Nodes and Facilities (UGB & Beyond)

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2.4. Paved Multi-Use Paths (Class I)

Often referred to as a "bike path", a multi-use path provides for bicycle and pedestrian travel on a paved right-of-way completely separated from any street or highway. The California Highway Design Manual refers to these facilities as "Class I Bike Paths". While the design of paved multi-use paths in the Town of Mammoth Lakes meets or exceeds the standards for a "Class I" facility, this terminology is purely technical and the term "paved multi-use path" or "paved MUP" will be used throughout this document except when discussing specific design standards.

Paved MUPs are generally desirable for recreational uses, particularly by families and children. Paved MUPs are preferred for corridors where there are few intersections or crossings, to reduce the potential for conflicts with motor vehicles. Paved MUPs can also serve a transportation function where a continuous facility is provided for a long distance or when it provides a connection to a major activity center.

Figure 2-1. Existing Bike Paths / Multi-Use Paths (Class I)



Main Path



Meridian Path



Shady Rest Path

Table 2-7. Existing Bicycle Facilities (Summer)

Facility Type	Mileage / Units
Bike Path (Class I) / Multi-Use Path	8.50 miles (Town Boundary)
	7.33 miles (UGB)
- Lake Mary Road (Near-Term*)	5.3 miles
- Cleared/Groomed Grade-separated crossings / Tunnels	3
- At-grade crossings (MUP to MUP)	16

*Near-term projects are those which are funded, designed, and/or under construction.

The Town's Main Path and other paved paths are built to the Caltrans standard of a Class I Bike Path and have been built in conformance with the 1991 Trail System Plan and the 2008 General Bikeway Plan. Some alignments have changed slightly, but the general concept of a Main Path loop with connections to other paths extending inward or toward the center of town (i.e. Meridian Trail) and outward or away from town (i.e. Shady Rest Park Trail) has been maintained. The "Main Path" as envisioned in the 1991 Trail System Plan is incomplete, but its existing segments still serve as the backbone of the current off-street bikeway network. The Meridian and Shady Rest Park Paths also serve important mobility and recreational needs. The Meridian Path serves schools, "The Trails" residential development, Trail's End Park, and the Industrial Park and is completely cleared of snow in the winter. The Shady Rest Park trail leads from Main Street near the Welcome Center and Forest Service offices, to the Shady Rest Campgrounds and the sports facilities at Shady Rest Park. The Lake Mary Road Path—at 5.3 miles—will be a significant addition when it is completed in 2009.

2.4.1. At-Grade MUP Crossings

The Town of Mammoth Lakes currently has 16 at-grade crossings along existing paved multi-use paths. There is significant variation in the treatments used at these crossings. **Figure 2-2** below shows some of the more typical treatments used at crossings. Some crossings use abundant treatment to enhance safety while others have very limited safety features. The Design Guidelines (Chapter 6) will provide guidance on the consistent application of a minimum combination of safety treatments as well as providing discussion of some additional safety treatments for at-grade crossings.

Figure 2-2. Existing At-Grade MUP Crossings



Trail-sized stop signs, full-sized stop sign for cross traffic, reflective bollards, tactile surface, identified crossing area



Trail-sized top sign, school-zone crosswalk striping, warning signs for approaching motorists



Trail-sized stop sign and painted crosswalk

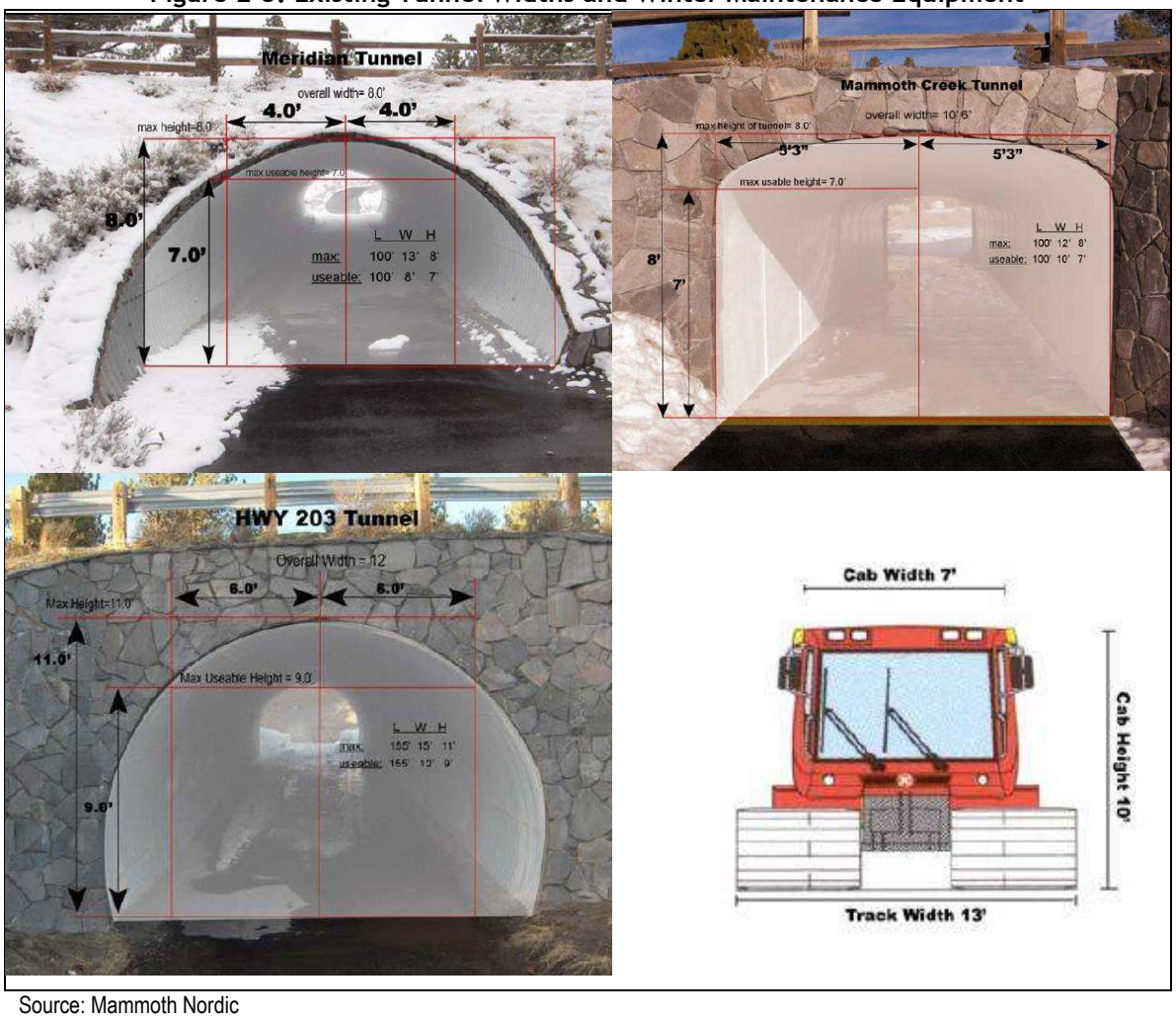


Trail-sized stop sign only

2.4.2. Grade-Separated MUP Crossings

The only grade-separated crossings currently in the Town of Mammoth Lakes consist of under crossings or tunnels. The Town's tunnels vary in width and height. Because some sections of path become cross country ski trails in the winter, Mammoth Nordic developed a memorandum which discussed winter maintenance issues associated with the inability of a standard snow cat to pass through the Town's tunnels. The images below were created by Mammoth Nordic to illustrate the need for wider tunnels in order to accommodate full-sized grooming equipment.

Figure 2-3. Existing Tunnel Widths and Winter Maintenance Equipment



Source: Mammoth Nordic

2.4.3. Winter Conditions on Paved Multi-Use Paths

Winter snow cover creates an entirely different system and set of recreational opportunities and challenges along the paved multi-use path system. The Town's paved multi-use path facilities are either cleared for winter mobility and recreation, groomed for cross-country skiing, or unmaintained (snow-covered) during the winter months.

While recreational bicycling declines to a level approaching zero in the winter, cycling for transportation has the potential to remain high with the appropriate infrastructure and maintenance. Current bike path maintenance levels are not favorable for winter bicycle commuting. However, the Safe Routes to School Program allows students to use MUP facilities to commute to schools from the Trail's End neighborhood and via Chateau Road. Other segments near the Welcome Center and along Old Mammoth Road are also cleared. A continuous section of paved MUP between Main Street and Eagle Lodge is currently un-maintained in the winter. **Table 2-8** provides an inventory of the Town's winter bicycle infrastructure.

Table 2-8. Existing Recreational Trail Facilities (Winter)

Facility Type	Mileage / Units
Cleared MUP	2.62 miles
Groomed MUP / Bike Path (TOML / Mammoth Nordic)*	2.47 miles
Snow-Covered Path (no maintenance)	3.41 miles
Groomed Grade-separated crossings / Tunnels	3 (when eastern portion of Main Path is groomed)
At-grade crossings (XC to XC)	2 (when eastern portion of Main Path is groomed)

*Grooming of the eastern section of the Main Path has been authorized and requires coordination between TOML, the Water District, and Mammoth Nordic. Due to other priorities and difficulties in mobilizing the necessary resources, this section of the Main Path often remains ungroomed for much of the winter season.

Because the Town's paved multi-use paths are a significant community resource and have required significant investment, they should be used to their fullest extent year-round. Because winter is the season when the Town's population is the highest, facilities that increase winter mobility and recreational opportunities should be used to their fullest potential. All pathways should be maintained in the winter (cleared or groomed) unless the cost of doing so outweighs the benefits. Subjective input will have to be considered in order to determine the best and highest use for each existing and future segment of paved multi-use path in Mammoth Lakes. For these reasons, it would be best if a plan for the winter maintenance of the Town's existing paved multi-use paths was created as part of an open and ongoing public process. Preferred maintenance levels on individual MUP segments are provided in Chapter 7.

2.5. On-Street Bikeways

Bicycle facilities play a much larger recreational role in the summer season. The weather is favorable, the MMSA Mountain Bike Park is open and the roadways, bike paths, and trails are generally clear of snow and debris. The existing in-town bikeway network consists of paved on- and off-street bikeways. The following discussion focuses on the Town's existing paved on-street bikeways.

Table 2-9. Existing On-Street Bicycle Facilities

Facility Type	Mileage / Units
Bike Lanes (Class II)	1.78 miles
- Bike Lane Signs*	7
Bike Routes (Class III)	3.61
- Bike Route Signs*	29

*Sign count is per MLTPA signage inventory.

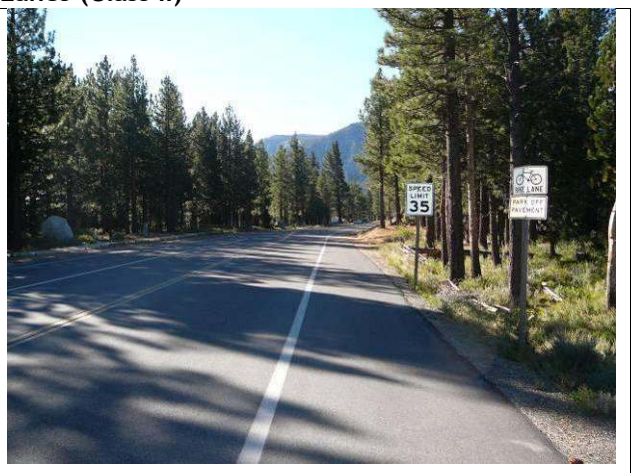
2.5.1. Bike Lanes (Class II)

Referred to in the California Highway Design Manual (HDM) as "Class II" bikeways, bike lanes provide a striped and stenciled lane for one-way travel on both sides of a typical street or highway. When properly designed, bike lanes can help improve the visibility and positioning of bicyclists. In general, bike lanes are highly desirable for bicycle commute routes on major streets, and any urban area where bicycle circulation is desired by local residents in order to access a variety of destinations such as shopping areas, educational centers, and other land uses. The Town has bike lanes on Minaret Road between Main Street and Old Mammoth Road, and shorter segments on Old Mammoth Road between Mammoth Creek Park and Minaret Road.

Figure 2-4. Existing Bike Lanes (Class II)



Old Mammoth Road



Minaret Road

All existing bike lanes in Mammoth are along roadways with soft shoulders. The bike lanes on Minaret Road are significantly wider than the four-foot minimum for bike lanes adjacent

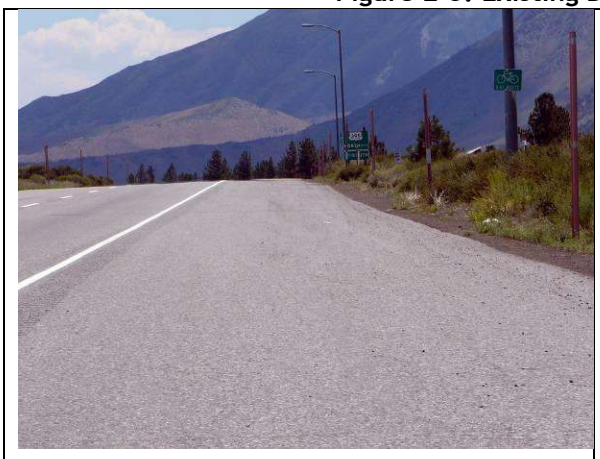
to a soft roadway shoulder. On Old Mammoth Road, however, the lanes are narrower than the minimum standard in at least one location due to fluctuating pavement width.

2.5.2. Bike Routes (Class III)

Referred to in the HDM as "Class III" bikeways, bike routes provide for shared use with bicyclists and motor vehicle traffic and are typically identified only by signing. On streets with low traffic volumes and speeds (under 5,000 vehicles per day, 30 mph), bicycle lanes may not be needed. On low-traffic neighborhood streets, bike routes can serve as important connectors to schools and recreational areas such as parks. Bike routes may also be desirable on certain commute routes where installing bicycle lanes is not possible, provided that additional signage is installed to alert motorists to the presence of bicycles on the roadway.

Bike routes exist on Main Street/Hwy 203, Canyon Boulevard, Forest Trail, Lakeview Boulevard, Majestic Pines Drive, and Meridian Boulevard. The bicycling environment along these routes varies significantly.

Figure 2-5. Existing Bike Routes (Class III)



Highway 203 (Main Street) – Major Highway



Meridian Boulevard – Arterial Roadway



Lakeview Boulevard - Collector



Majestic Pines – Local Street

On Highway 203 east of town, a wide shoulder with a rumble strip is provided. This shoulder can be used by cyclists to provide lateral separation from high-speed motor vehicle traffic, but can also be used by motorists if they need to pull over along the side of the highway. The width of the shoulder makes it suitable for this dual purpose. The rumble strip alerts motorists if they are drifting into the shoulder where bicyclists or stopped motorists may be present.

The bike route along Meridian Boulevard provides a narrower shoulder in a more urban setting. Because the space is designated as a shoulder and not a bike lane, motorists can use that space for stopping and parking. If no cars are parked in the shoulder, it operates much like a bike lane. A bike lane would be a superior treatment in this setting. A bike lane can be developed by either prohibiting parking in the existing shoulder or by restriping the roadway to provide both a parking lane and a separate bike lane. The second option may require removing a travel lane also known as a "road diet".

Canyon Boulevard is designated as a collector street. Land uses along Canyon consist of high and low-density residential and commercial development. Canyon also provides a key connection between Canyon Lodge and the North Village, and is an important point of transition between mountain bike trails and the urbanized area. See the discussion on the interface of soft-surface and paved facilities in section 2.7.

Majestic Pines provides an example of a bike route on a local street. On local streets, shoulders are not necessary as long as traffic volumes are low and speeds are slow. In areas with steep grades, all excess width should be used to provide shoulders in the uphill direction since that is where the speed differential between cyclists and motorists will be greatest. In the downhill direction, cyclists can move at the speed of traffic.

Mammoth's existing summer and winter bicycle networks are shown in **Maps 2-4** and **2-5**. The network consists of both on- and off-street facilities.

Currently, all on-street bike lanes and bike routes are cleared of snow along with the roadways, but hazards such as snow and ice accumulation in the bike lanes or shoulders can be hazardous.

Map 2-4. Existing Summer Bikeways & Trails (within UGB)

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Map 2-5. Existing Winter Bikeways & Trails (within UGB)

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2.6. Pedestrian Facilities

The small scale of the Town of Mammoth Lakes, the existence of an urban growth boundary to prevent sprawling development, and the cultural value placed on outdoor recreation and physical activity all provide Mammoth with the ideal conditions for the type of "feet first" mobility found in many of North America's smaller mountain resort towns. However, despite those physical and cultural characteristics, the Town's built environment lends itself more to the auto-oriented mobility of suburban Southern California. The lack of pedestrian infrastructure, the prevalence and street-side location of surface parking lots, and the width of Mammoth's main thoroughfare (Main Street) present challenges for pedestrians even under the most favorable weather and maintenance conditions. This section will provide an inventory and analysis of existing pedestrian facilities, and a discussion of some of the Town's pedestrian-related urban design and safety issues. However, these issues of urban mobility will ultimately be covered in a Mobility Plan to be undertaken by the Mobility Commission and the Department of Public Works. The following narrative provides recommendations for pedestrian improvements that should be considered in these future mobility planning efforts.

2.6.1. Existing Pedestrian Facilities

Mammoth's pedestrian infrastructure consists of sidewalks, crosswalks, multi-use paths and grade-separated crossings (tunnels). The following tables provide an inventory of existing pedestrian facilities in the Town of Mammoth Lakes. Multi-use paths will be included in the inventory of both pedestrian and bicycle facilities, because they are intended to serve both user groups. All facilities listed here are located within the UGB unless otherwise noted. **Table 2-10** provides an inventory of the Town's existing summer pedestrian facilities. Mileage was determined through the Town's GIS database.

Figure 2-6. Existing Pedestrian Facilities

<table>
<tr><td></td><td>
</td></tr>
<tr><td>Promenade</td><td>Sidewalk</td></tr>
</table>

Table 2-10. Summary of Existing Pedestrian Facilities (Summer)

Facility Type	Mileage / Units
Promenades (10' sidewalks)	0.31 miles
Sidewalks (8' or less)	4.97 miles
- Signalized Crosswalks	17
Multi-Use Path / Bike Path (Class I)	8.50 miles (Town Boundary)
	7.33 miles (UGB)
- Grade-separated crossings / Tunnels	3 tunnels (1 is in Town Boundary, but outside UGB)
- At-grade crossings	16

Pedestrians in the Town face several challenges. Sidewalk infrastructure is very limited even during summer months when the Town's entire pedestrian infrastructure is generally exposed and available for public use. Multi-use paths make up the majority of pedestrian facilities in the summer months, where they are shared with other users such as cyclists and skaters. In several areas the multi-use path is where the sidewalk would traditionally be, directly adjacent to the street. In the winter, conditions change as some facilities become snow-covered and inaccessible, while others are maintained to serve a different purpose (i.e. MUP groomed for Nordic/XC skiing). Currently, 76.5 percent of the Town's sidewalks and 23 percent of the Town's multi-use paths are cleared in the winter. **Table 2-11** provides a summary of pedestrian facilities under typical winter conditions. Sidewalk infrastructure is categorized both by maintenance level and underlying heating infrastructure. For a layout of Mammoth's summer and winter pedestrian facilities, see **Map 2-6** and **Map** 2-7 on the following pages.

Table 2-11. Summary of Existing Pedestrian Facilities (Winter)

Facility Type	Mileage / Units
Sidewalks / Promenades (by Winter Condition)	
Cleared Winter Sidewalks	3.80 miles
- Heated	0.22 miles
- TOML Snow Removal	3.58 miles
Snow-Covered Sidewalks / Promenades	1.48 miles
Sidewalks (by Type of Infrastructure)	
Sidewalks (Heated)	0.22 miles
Sidewalks (Plumbed for Future Heating)	1.50 miles
Sidewalks (No heating, unplumbed)	3.25 miles
Multi-Use Path (Cleared)	1.69 miles (Town Boundary)
	1.45 miles (UGB)
- Cleared or Groomed Grade-separated crossings / Tunnels	3
- At-grade crossings (cleared MUP to cleared MUP)	5
- At-grade crossings (partial / full closure)*	6

*Includes at-grade crossings where the trail is closed on at least one side of the crossing.

Another way to analyze the existing level of pedestrian infrastructure is by calculating the ratio of sidewalk miles to street miles. In communities with high levels of pedestrian infrastructure, the ratio of sidewalk to street mileage generally approaches 2:1 (a sidewalk on each side of every street). **Table 2-12** shows the sidewalk to roadway miles ratio for the Town of Mammoth Lakes and eight other cities with 500 miles of roadway or less.[3]

Table 2-12. Sidewalk to Roadway Ratio in Cities w/ less than 500 miles of Roadway

City/Town	State	Miles of Roadway	Miles of Sidewalk	Ratio
Town of Mammoth Lakes	**California**	**58**	**5**	**0.09 : 1**
Village of Riverside	Illinois	32	64	2.00 : 1
Orem	Utah	283	500	1.77 : 1
Rockville	Maryland	140	240	1.71 : 1
Billings	Montana	463	770	1.66 : 1
Glendale	California	365	600	1.64 : 1
Prairie Village	Kansas	113	153	1.35 : 1
Champaign	Illinois	220	240	1.09 : 1
St. Louis Park	Minnesota	142	104	0.73 : 1

Sources: TOML GIS Data, Nashville-Davidson County Strategic Plan for Sidewalks and Bikeways

In some cases it may be impractical, unnecessary, or even undesirable to install sidewalks on narrow residential streets with low traffic volumes, as doing so could require land acquisition, tree removal, or on-street parking removal. In these cases a more conservative estimate can be used that only considers "major roadways" (arterial and collector streets). This more conservative ratio may be more appropriate for the Town of Mammoth Lakes. The current ratios even using the conservative measure are very low. If we add the 1.53 miles of multi-use path that is directly adjacent to existing arterial or collector streets (0.96 in winter), the ratio improves slightly.

Table 2-13. Mammoth Lakes Sidewalk to Major Roadway Ratio

Season	Miles of Arterials	Miles of Collectors	Major Roadways (Total)	Miles of Sidewalk (w/ MUP)	Ratio
Summer (sidewalks only)	15.7	9.9	25.6	4.97	0.19 : 1
Summer (sidewalks & MUP)*	15.7	9.9	25.6	(6.51)	0.26 : 1
Winter (sidewalks only)	15.7	9.9	25.6	3.80	0.15: 1
Winter (Sidewalks & MUP)*	15.7	9.9	25.6	(5.93)	0.23 : 1
High Target	15.7	9.9	25.6	51.16	2 : 1
Moderate Target	15.7	9.9	25.6	41.30	1.6 : 1

*Only multi-use paths directly adjacent to an arterial or collector were counted.

[3] It should be noted that the cities listed were selected only based on their size and the availability of the data.

The "high target" ratio of 2:1 represents a sidewalk on each side of every arterial and collector street in town. The "moderate target" ratio represents a sidewalk on both sides of every arterial street and on one side of every collector street.

Table 2-14 identifies existing pedestrian facilities adjacent to major activity centers and includes crosswalks, sidewalks and multi-use paths. Chapter 4 will provide recommendations for improving pedestrian access to existing activity centers and provide guidelines for ensuring a high level of pedestrian access in new developments.

Map 2-6. Existing Summer Pedestrian Facilities (within UGB)

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Map 2-7. Existing Winter Pedestrian Facilities (within UGB)

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Table 2-14. Pedestrian Access to Major Activity Centers

Activity Center	Crossings	Sidewalks	Multi-Use Paths or Other Pedestrian Facilities
North Village	Signalized One (1) mid-block on Minaret Rd at The Village (year-round) Four (4) at Minaret and Main Street (year-round) Unsignalized One (1) mid-block on Canyon in The Village (year-round) Three (3) at Canyon and Lake Mary Road (year-round)	Minaret Rd W (year-round) Forest Trail S (year-round) Canyon Blvd E (year-round) Canyon Blvd W (year-round) Hillside Drive E partial (year-round)	Stairs to Westin Hotel
Minaret Village Mall	Signalized Four (4) at Old Mammoth & Meridian (year-round) Unsignalized Three (3) at Old Mammoth & Sierra Park (year-round)	Old Mammoth Rd E (year-round) Old Mammoth Rd W (year-round) Meridian Blvd N (year-round) Meridian Blvd S (summer only) Chateau Rd (none)	MUP runs behind shopping center on East side
Gateway Center Mall	Signalized Two (2) at Main & Old Mammoth (year-round) One (1) at Main and Laurel Mtn. (year-round)	Old Mammoth Rd E (year-round) Old Mammoth Rd W (year-round) Main St S (summer only) Laurel Mtn Rd E (partial, summer only) Tavern Rd S (partial, summer only)	Sidewalk along Main St frontage is 10' wide (summer only). MUP terminates at NE corner of Main St and Old Mammoth Rd (summer only)
Sierra Star Golf Course	Signalized Four (4) at Minaret and Meridian (summer only)	Minaret Road E (summer only)	MUP runs along N side of Meridian Blvd
Industrial Park	Unsignalized MUP Crossing on E end at Commerce Drive	None	MUP connection at E end of Commerce Drive
Welcome Center	Grade-Separated Tunnel at Main Path E of Sierra Park Rd (summer only)	None	MUP connects Visitor's Center to parking lot and Sawmill Cutoff Rd (year-round) Connection to Main Path via tunnel (summer only)
Hospital and Medical Center	None	Sierra Park Rd E (year-round)	None
Public Schools	Unsignalized Three (3) at Old Mammoth & Sierra Park (year-round)	Sierra Park Rd South of Meridian Blvd. (year-round)	MUP on S side of campuses connects to Trails End Park (year-round) and Mammoth Creek Park (summer only)
Post Office / Hotels (Main St)	Signalized One (1) crosses Main St at Mammoth Luxury Outlet Stores (year-round)	None	None
New Library / Sierra High	Unsignalized Three (3) at Old Mammoth & Sierra Park (year-round)	None	MUP on W side of Sierra Park Rd (year-round)
Community College / Ski Museum	None	College Pkwy N (partial, summer only) College Pkwy S (partial, summer only) Wagon Wheel Rd W (summer only)	MUP on N side of Meridian (year-round), no crossing available.

2.7. Interface Between Mountain Bike Trails and Paved Facilities

The transition between backcountry mountain bike (MTB) trails and the urbanized areas of Town can present serious safety hazards if not designed appropriately and thoughtfully. The most common areas of transition are at the North Village, Canyon Lodge and Eagle Lodge. These areas currently present some safety concerns and confusion that should be addressed through coordinated efforts between TOML, USFS and MMSA. See the Town of Mammoth Lakes Soft-Surface Trails Concept (Attachment A) for more discussion on soft-surface trails.

2.7.1. North Village

At the North Village, the transition between the Uptown/Downtown trail and Town streets can be hazardous because the trail ends near the intersection of Minaret Road and Forest Trail without providing any indication of how or where to safely transition onto surface streets or how to reach the bike shuttle pick-up location on Canyon Boulevard. The surface streets at this location do not have bike lanes and there is no dedicated area for mountain bikers to be dropped off or picked up in vehicles. The addition of such an areas would also provide space for cyclists to regroup before continuing into Town.

2.7.2. Canyon Lodge

Mountain bikers who descend into the Canyon Lodge area do not currently have the opportunity to take a lift back up the mountain, so they are required to ride into Town via Canyon Boulevard in order to catch a bus, return to their vehicles or arrive at their in-Town accommodations. The steep grades along Canyon Boulevard encourage downhill cyclists to travel at high speeds which can be dangerous if they attempt to ride on the sidewalk or too close to the edge of the roadway. Because a bike route is a shared-roadway situation and only provides signage, there is currently no clear guidance as to the appropriate positioning of bicyclists in this situation. Riding in the center of the vehicle travel lane and obeying all traffic laws (including speed limits) is the safest way for cyclists to descend to North Village. A bike lane would be most appropriate in the uphill direction since uphill cyclists will be moving much slower than vehicular traffic. Additional signage, striping and pavement markings are required to improve cyclist behavior and overall safety at this location.

2.7.3. Eagle Lodge

The transition between the Juniper Trail and Eagle Lodge provides the only current opportunity for mountain bikers to transition directly from soft-surface MTB trails to a paved multi-use path. From Eagle Lodge mountain bikers can continue east and north toward the North Village and Main Street via the Main Path. Taking the Main Path east will connect them to the bike lanes on Minaret Road and up to the North Village, or they can continue up the path behind Tallus to the south side of Main Street at Callahan Way. Mountain bikers will also have the opportunity to continue on to the south and east via the Main Path and the Waterford connector to Mammoth Creek Park and the Old Mammoth District once the near-term projects are completed to close gaps at Waterford Avenue and along Old Mammoth Road. However, there is currently a lack of signage and wayfinding to let them know of these opportunities.

2.7.4. Twin Lakes

The MMSA Lakes Trail terminates at the Twin Lakes parking lot on the northwest side of Lake Mary Road. The parking lot is currently used as a staging area for hikers and other recreationists. The Lake Mary Path is designed to cross from the northwest to the southeast side of the road at this location and mountain bikers will need to be directed to reach the path safely while avoiding conflicts with motor vehicles and other trail users.

2.8. Soft-Surface Trails

Most opportunities for soft-surface trail development are on Forest Service lands outside the jurisdiction of the Town of Mammoth Lakes. However, access from Town to the trails and backcountry opportunities beyond the UGB are of primary significance to the Town's recreational and economic viability and thus are a major focus of this plan. The following section provides an analysis of existing summer and winter soft-surface trail facilities in and around the Town of Mammoth Lakes.

2.8.1. Summer Trails

The only existing soft-surface trail that falls completely within the urban growth boundary is the walking trail through Snowcreek Meadow. The trail extends from Waterford Avenue near Majestic Pines and follows Mammoth Creek on the North side to Minaret Road. In some sections close to the creek, the footpath will fill with water at times, causing users to walk off the trail and create adjacent paths. This is known as trail braiding (see glossary) and can be addressed through the use of a low wooden boardwalk. The trail is on private property and is currently maintained by the Snowcreek Meadow Committee. The Town of Mammoth Lakes currently has an easement in the area and could potentially construct a low-impact wooden boardwalk and take over responsibility for maintaining a trail segment within the easement.

Figure 2-7. Snowcreek Meadow Trail (private)



Signage at trail entrance makes it clear that only foot traffic is allowed.





Trail segment adjacent to Mammoth Creek

Map 2-8 shows existing summer trails in and around the Town of Mammoth Lakes. Existing trails include paved paths maintained by TOML, mountain bike trails managed by the MMSA Bike Park, USFS-sanctioned "system" of soft surface trails, and the private dirt trail through Snowcreek Meadow. The "Alternative/Future" alignments from the 1991 Trail System Plan are also shown for reference purposes, but do not currently exist. Existing winter trails can be found on **Map 2-9**.

Map 2-8. Existing Summer Trail System (UGB & Beyond)

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2.8.2. Winter Trails

Unpaved facilities currently used as public winter trails are generally located outside the urban growth boundary. Non-motorized trails are concentrated in the Lakes Basin and Shady Rest areas. Tamarack Resort in the Lakes Basin has the most extensive network of groomed cross-country trails near Town and charges a fee for use. Lake Mary Road is groomed and provides public access to the Lakes Basin without a fee. The Shady Rest area is open to the public and consists of motorized and non-motorized trails. Sawmill Cutoff Road is groomed and designated for motorized and non-motorized use and provides access to an extensive network of OSV trails. Groomed cross-country ski trails exist to the east and west of Sawmill Cutoff Road, primarily using the blue diamond system.

Table 2-15. Existing Groomed Soft-Surface Winter Trails

Facility Type	Mileage / Units
Multi-Use OSV Trails	85.96
Cross Country Ski Trails (Shady Rest)	2.57 miles
Cross Country Ski Trails (Tamarack) – fee based	14.50 miles

*Measurements based on regional GIS data.

Map 2-9. Shady Rest Existing Winter Use

2.9. Bicycle Parking

Bicycle parking is an important component in planning bicycle facilities and encouraging people to use their bicycles for everyday transportation. Bicycles are one of the most frequently stolen items in most communities, with components often being stolen even when the bicycle frame is securely locked to a rack. Because today's bicycles are often high-cost and valuable items, many people will not use a bicycle unless they are sure that there is secure parking available at their destinations.

In Mammoth Lakes, short-term bicycle parking facilities such as bike racks are the most common and appropriate type of bicycle parking facility. Higher security bicycle parking facilities such as bicycle lockers would only be warranted at major employment centers with a sufficient number of bicycle commuters to justify their purchase and maintenance. Existing bicycle parking in Mammoth Lakes is installed and maintained by property owners and there are no current design standards to ensure consistency and functionality of design. Unless given clear guidance on the type of racks, property-owners will tend to purchase inexpensive and ineffective bicycle racks.

Various bicycle rack types are currently deployed by businesses and public agencies in the Town of Mammoth Lakes. **Figure 2-8** below provides photos and a discussion of these existing bicycle rack types. The "wave" or "ribbon style" rack is preferred by the Town of Mammoth Lakes for most installations at public facilities. However, the Town has expressed interest in an artistic bicycle rack program which could provide racks that are aesthetically pleasing, consistent, and highly functional by design. This and other potential bicycle parking solutions will be discussed in greater detail in the Design Guidelines chapter.

Figure 2-8. Existing Bicycle Rack Types within the Town of Mammoth Lakes



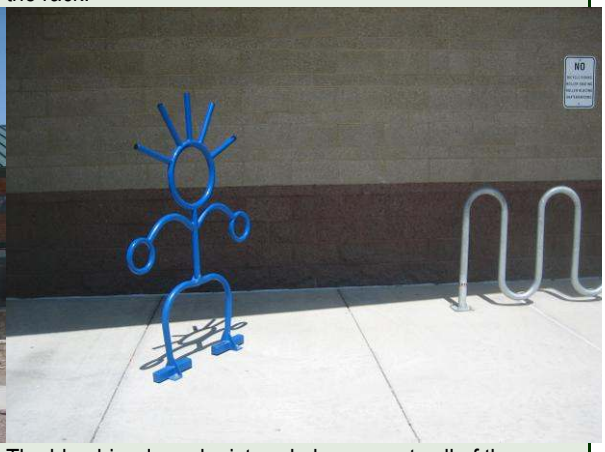
This type of rack does not support the frame of the bicycle and can damage wheels. Also, it does not allow cyclists to lock the frame of the bicycle to the rack using a standard "u-lock". It does not appear to be attached to the pavement, making it insecure.



This bike rack design does not provide sufficient support for the frame of the bicycle. Its placement against the wall of the building may not allow enough room to place the wheel over the top bar and lock the frame of the bicycle to the rack.



The "wave" or "ribbon" racks pictured accept all common lock types and support the frame at one point. The location of the racks adjacent to the entrance of the building is ideal.



The blue bicycle rack pictured above meets all of the criteria for a good bicycle rack. The only problem is that it may not be perceived as a bicycle rack without the addition of a pavement stencil, signage or an educational campaign identifying it as such.

Table 2-16. Bicycle Access to Major Activity Centers

Activity Center	Bicycle Facilities		
	Bicycle Parking*	On-Street*	Off-Street (Class I / MUP)
North Village	Bike / Ski Racks Combo	Bike Route on Canyon Blvd (Class III)	None
Minaret Village Mall	2 Bike Racks	Bike Route on Meridian Blvd (Class III)	MUP runs behind shopping center on East side
Gateway Center Mall	Bike rack at Footloose	None	MUP terminates at NE corner of Main St and Old Mammoth Rd (summer only) NEAR-TERM SEG. UNDER CONST. OMR TO FIRE STATION
Industrial Park	None	None	MUP connection on E end at Commerce Drive
Welcome Center	2 USFS, 1 T&R Office (back)	None	MUP connects Visitor's Center to parking lot and Sawmill Cutoff Rd (year-round)
Hospital and Medical Center	None	None	Connection to Main Path via tunnel (summer only) None
Public Schools	1at Elementary School, 7 at Middle School, None at High School	None	MUP on S side of campuses connects to Trails End Park (year-round) and Mammoth Creek Park (summer only)
Post Office / Hotels (Main St)	1 at Post Office		None
New Library / Sierra High	2 at New Library, 2 at Sierra High, 1 at Office of Education	Bike Route on Meridian Blvd (Class III)	MUP on E side of Sierra Park Rd (year-round)
Community College / Ski Museum	2 at West side of College None at museum	None	MUP on N side of Meridian (year-round), no crossing available.

*All bicycle parking and on-street facilities are year-round. Bicycle racks on private property may be unavailable for extended periods pending private snow removal. On-street bicycle facilities are cleared along with the roadway, but bike lanes may be impacted by ice and debris.

2.10. Public Transportation and Multi-Modal Opportunities

The Town of Mammoth Lakes is embarking on a new mobility planning effort to address issues of public transportation in the area. The Eastern Sierra Transit Authority (ESTA) operates both regional and local bus lines that serve the Town of Mammoth Lakes, including inter-city service along Highway 395 and the Town's intra-city shuttle/trolley service. Other key transit providers in the area are the Mammoth Mountain Ski Area (MMSA) which provides access between the Town and their ski area portals, and the Yosemite Area Regional Transportation System (YARTS) which provides summer shuttle service between the Town and Yosemite National Park.

Public transportation in Mammoth consists primarily of the bus systems operated by ESTA within the TOML and the Mammoth Mountain Ski Area. This coordinated bus system plays an important role in making "feet first" mobility practical. It also provides a means for moving residents and visitors efficiently to and from activity centers and recreation nodes. In the first section of this chapter the existing summer and winter recreation portals were analyzed for their accessibility via public transportation (see **Tables** Table 2-3 and **Table** 2-5). **Table 2-17** provides an analysis of current bus access to the Town's activity centers.

Table 2-17. Transit Access to Major Activity Centers[1]

Activity Center	Summer[2]	Winter[3]
North Village	Yes	Yes
Minaret Village Mall	Yes	Yes
Gateway Center	Yes	Yes
Business Park	None	None
Welcome Center	None	None
Hospital and Medical Center	Yes	Yes
Public Schools	Yes	None
Post Office / Hotels (Main St)	Yes	Yes
New Library / Sierra High	Yes	Yes
Community College / Ski Museum	None	None

1. All bus lines that start and end within TOML are free.
2. Summer transit service typically runs from June – October.
3. Winter transit service typically runs from November – April/May.

Bicycle racks are currently provided on the TOML Trolley system. Bicycle carrying capacity on buses makes bicycling for recreation and transportation more practical for several reasons. For recreational riders it generally provides access from Town to the trailhead. This

trip is often one way and uphill. Bicycle racks on buses also provide bicycle commuters with an alternative way to get home in the event of bad weather, mechanical failure, or lack of desire to pedal uphill all the way home. For year-round bicycle commuters, bike racks on buses are even more important than in summer since weather conditions can change quickly and make cycling more dangerous.

2.11. Accessibility Issues

Peter Axelson of Beneficial Designs participated in the summer and winter public outreach processes described in Chapter 3. Under the current scope and budget of the project, he was unable to perform a detailed assessment of existing conditions. However, he did speak to general accessibility issues, many of which were related to the provision and maintenance of sidewalks, accessibility information related to grade and trail width on signage and/or maps, and the potential to make soft-trails through sensitive areas such as Snowcreek Meadow more accessible and environmentally sound through the creation of a boardwalk. Beneficial Designs recommends undergoing a Universal Trail Assessment Process (UTAP) to identify existing trail-related accessibility issues through the use of advanced data collection tools and processing software.

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CHAPTER 3. NEEDS ANALYSIS

This chapter provides an overview of the trail user needs for trails in and around Mammoth Lakes, California. The need for improved facilities was originally identified through input from local agencies and the public in response to the existing conditions and the potential to increase the viable transportation and recreation opportunities for visitors and residents. Potential improvements identified in this chapter have been carried forward as recommendations where feasible and within the scope of this Trail System Master Plan.

Significant effort was expended to gather robust data regarding existing use patterns and preferences for trail users in the Mammoth Lakes area. Two major outreach efforts were conducted to capture input on how to improve the conditions for summer and winter activities in and around Mammoth Lakes. The outreach efforts were significant components of the Concept and Master Planning (CAMP) process. 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 utilized to create an accurate portrait of the needs of Mammoth residents and visitors regarding both summer and winter trail use. Because traffic-related safety was a common concern, we also conducted an analysis of pedestrian and bicycle collisions or injuries. This combination of information was then used to create the following analysis of user needs. The potential improvements listed in this chapter are intended to directly address the issues that have come to light as part of this needs analysis. Detailed documentation of both CAMP: Summer and CAMP: Winter activities are available as appendices of this plan. The analysis will include the following elements (1) a general discussion of the benefits of trails; (2) a summary of stakeholder input from CAMP: Summer; (3) an analysis of the Summer Trail User Survey results; (4) a summary of stakeholder input from CAMP: Winter; (5) an analysis of the Winter Trail User Survey results; and (6) an analysis of bicycle and pedestrian related collisions/accidents.

3.1. Benefits of Trails

Trails provide considerable benefits to both individuals and the general public, and the expansion and improvement of the Mammoth Lakes trail system will result in increased recreation and mobility options for residents and visitors alike. People who wish to integrate healthy activities into their daily lives will have more opportunities to do so, and in a manner that allows them to enjoy the unique scenic beauty that the Mammoth Lakes region has to offer. Because properly constructed trails have a minimal impact on the environment and are relatively inexpensive to construct they are an excellent investment in the livable future of Mammoth Lakes.

Health & wellness

Widespread concern over sedentary lifestyles and obesity make recreation opportunities increasingly important for individuals, communities, and governmental organizations. Several studies have shown that regular trail users see health benefits from their exercise, and that frequency of trail use is correlated positively to the proximity of a person to trail access points. It logically follows that communities with greater access to trail systems and

recreational opportunities will have healthier populations, as these residents have a lower barrier to entry if they wish to exercise.

Access to the natural environment

There is growing concern among child development specialists that a lack of outdoor activity in undeveloped landscapes is leading not only to obesity but also to a situation where children are becoming disconnected from the natural environment. The result of this isolation from the outdoors is a decreasing appreciation of unique habitats and natural phenomena, and a stunting of any conservation ethic. It is feared that this, in turn, will dissuade future generations from protecting ecologically important lands because they will be unable to appreciate the inherent value of biodiversity.

Because trail systems provide access to natural environments they allow users to better enjoy and appreciate open spaces. Trails provide distinct routes through landscapes, allowing people to safely access areas that they may not otherwise feel comfortable negotiating. A well-designed trail will integrate into the terrain and provide an intimate, unobtrusive, nearly organic immersion into beautiful forests, meadows, and alpine slopes. This ability to access the undeveloped environment will help all trail users, and particularly children, better understand and appreciate the unique wild lands that surround Mammoth Lakes.

Reduced emissions

When people drive "around town" to the store, work, school, or errands, they are contributing disproportionately high amounts of pollutant emissions compared to highway trips. These are precisely the type of trips that can be replaced with walking or bicycling. Since bicycling and walking do not generate air pollution, do not consume fossil fuels, and require reduced infrastructure compared to vehicles, they effectively move people from one place to another with minimal adverse environmental impacts. Trails are an effective and safe method to provide non-motorized transportation and are therefore a critical tool in reducing emissions.

Improved property values and civic pride

More non-motorized trips on trails mean fewer trips by car on roadways, relieving traffic congestion in communities and adding value to properties. A 2005 survey of potential homebuyers by American Lives indicated that 92% wanted low-traffic areas, 79% wanted walking and biking paths, and 78% wanted natural open spaces. This confirmed an earlier American Lives study that ranked "community designs that deliver low traffic and quiet streets" as the most desirable feature in a home, making trails a valuable proposition to any neighborhood.

The preferences expressed in the homebuyer surveys have been acknowledged by studies of residential real estate transactions near trail systems. With regards to the Northern Central Rail-Trail, the Maryland Department of Natural Resources concluded that "if two identical properties are for sale and one is near the trail and the other is not, the trail is used as a selling point and helps many nearby owners sell their property faster."[4] A study conducted by the Seattle Engineering Department evaluated home sales near the city's Burke-Gilman

[4] *Analysis of Economic Impacts of the Northern Central Rail-Trail*, Maryland Department of Natural Resources, 1994.

Trail and determined "property near… the trail is significantly easier to sell and, according to real estate agents, sells for an average of 6% more as a result of its proximity…."[5]

The extent of bicycling and walking in a community has been described as a barometer of how well that community is advancing its citizens' quality of life. Streets that are busy with bicyclists and walkers are considered to be environments that work at a human scale, and foster a heightened sense of neighborhood and community. These benefits are difficult to quantify, but when asked to identify civic places of which they are most proud, residents will frequently name locations where walking and bicycling are common, such as a popular greenways, open spaces, or traditional downtowns.

Improved local economies

Increased real estate values are not the only economic benefit of trails; portions of tourism revenue can be attributed to trails, especially in Mammoth Lakes where the Mammoth Mountain Ski Area has both summer and winter trail recreation opportunities. Although it encompasses a much greater population area, a study analyzing the North Shore communities in British Columbia, Canada, determined that mountain bicycling on natural surface trails brought in $10.3 million (CDN) of tourism revenue during the summer of 2006.[6]

More modest success stories have been documented in a 2006 nationwide online survey of nearly 100 U.S. bicycle retailers whose shops were near newly constructed paths and trails. When asked how these facilities affected their businesses nearly 60% of sports shop owners surveyed said the facilities had a positive impact on equipment sales at their stores, with almost 20% of those saying their sales had increased by 10–25%. It is clear that improving the connectivity, quality, and quantity of local trails will further enhance sustainable tourism opportunities for retail goods and service providers, restaurants, hotels, and others.

Because trails provide alternate transportation opportunities people who walk or bike have disposable income that would otherwise have been used for fuel and vehicle maintenance. Over the course of the year the collective buying power of this money is considerable: in Portland, Oregon, a study by CEOs for Cities estimates that residents save $1.1 billion annually by reducing their automobile miles by 16% below the national average; of that amount, $800 million is spent on local goods and services. Non-motorized transportation facilities such as trails can therefore play a significant role in strengthening a local economy.

3.2. CAMP: Summer

CAMP: Summer consisted of a series of tours, listening sessions and workshops which covered a variety of topics related to summer trail use in and around the Town of Mammoth Lakes. The following pages summarize input received as part of key tours, listening sessions and workshops during CAMP: Summer.

3.2.1. Existing Paved Facilities Tour

The existing paved facilities tour focused on the existing segments of the Main Path "loop". Attendees discussed the need for consistent signage and crossings on the paved multi-use

[5] *Burke-Gilman Trail and Property Values,* Seattle Engineering Department, 1987.
[6] *Sea to Sky Mountain Biking Economic Impact Study,* Western Canada Mountain Bike Tourism Association, 2007.

paths around town. They also discussed the need for a consistent look for all paved multi-use paths. The use of asphalt in some sections and colored concrete in other sections confused some users. Attendees felt that there was a need for improved crossing treatments at schools and the library, and there was a general feeling that most local kids are not using the Town's trails and pathways. Other ideas included more consistent "branding" of each path (i.e. Main Path, Lake Mary Path, etc) through the use of unique naming, signage and/or stencils. Providing better coordination between transit and the Main Path was also brought up as a way to provide families with another option for returning when kids get tired.

3.2.2. Main Path Missing Links Tour

The missing links tour focused on the gaps in the Main Path "loop" system. All attendees agreed that Main Street was the key missing link in the Town's paved bikeway network. There was not a consensus as to whether bike lanes or wide promenades would provide the best solution. A continuous multi-use path was seen as optimal but difficult to implement. Bike lanes and/or sidewalks along Forest Trail were seen as a way to provide backcountry access to the Knolls area. The Waterford crossing of Mammoth Creek was seen as another key missing link and is a project that will be completed in the near-term. Representatives from the Town indicated that upcoming development also provided opportunities to close gaps in the network, especially along Old Mammoth Road. The Town also indicated that the current maintenance budget of $30k/yr will not be adequate as the system expands. A required fire easement providing access to Snowcreek IV from Majestic Pines was seen as a potential opportunity for bicycle access between Eagle Lodge and the Old Mammoth Business District, especially when the Main Path is covered in snow, but it was also noted that the road through Snowcreek IV is private. Snowcreek meadow was seen as an opportunity for a pedestrian-only alternative to the Waterford extension of the Main Path, but the meadow trail is also on private property and currently managed by the Snowcreek Meadow Committee.

3.2.3. Agency Listening Session

The agency listening session provided an opportunity for Town officials to speak directly with the consulting team about issues surrounding trails and mobility in Mammoth Lakes. Town officials provided consultants with information on background documents and upcoming developments and projects that might impact the trails plan. In general, Town officials expressed recognition of the fact the Mammoth Lakes has a recreation-based economy and that every effort need to be made to ensure a high-quality recreational trails network.

Upcoming developments of importance were the Hidden Creek and Snowcreek VIII development and their respective District Plans. An existing unofficial jump park in the Hidden Creek area brought up the need for an official permanent facility. The Town holds a drainage easement through Snowcreek Meadow that could potentially be used for an "environmental trail". While a paved bikeway would not be appropriate through this area, the easement could be developed in a way that will prevent trail 'braiding" (creation of multiple footpaths) while improving access.

The trails plan was also seen as an opportunity to combine fire management with trail access, but the details of how this would be done was not discussed. Concerns—in terms of budget

and manpower—regarding the capacity of the Forest Service to maintain facilities and provide enforcement to reduce potential user conflict at Shady Rest were raised. Signage on the existing paved path segments was seen as a quick way to make a difference.

3.2.4. Seniors/ADA Listening Session

The seniors and ADA listening session was an opportunity to discuss the needs of seniors and persons with disabilities. It was moderated by Peter Axelson (ADA consultant) who made the point that "we are all pedestrians" and that universal access is key to accommodating a very broad range of users including seniors, people with disabilities, parents with strollers, and the general public. He also suggested that accessibility is sustainability because accessibility requires a "feet first" approach to mobility, which benefits all users and the natural environment.

Winter snow and ice were seen as presenting serious hazards and obstacles. Main Street was the location of greatest concern to attendees especially because of the lack of sidewalks, high traffic volumes and speeds, and high snow banks during winter that create blind spots for motorists and snow removal crews. The width of Main Street makes it difficult for seniors and persons with disabilities to cross it, even at signalized crossings. The intersection of Minaret and Main was mentioned as one of the most important intersections for improvements.

A six-foot boardwalk through the Snowcreek Meadow was described as a way to make the meadow trail accessible while improving sustainability. This type of treatment is regularly used in sensitive areas, especially wetlands.

3.2.5. Businesses & Retailers Listening Session

Business owners and retailers were invited to express their concerns about the existing trail system and their hopes for the future network. Attendees were most concerned that the trail plans lead to some quick improvements in order to prevent stakeholders from losing faith in the process. Signage and wayfinding was seen as the most important missing element in the existing network and something that can be done quickly to improve the user experience. One attendee commented that his goal is "to rent bikes to customers and not have them get lost". Another suggested "quick win" project was bike racks at businesses by coming up with a standard design and making that rack available for businesses to purchase. Putting signage kiosks at trailheads was seen as another quick win project. Attendees also felt that regularly updating and distributing maps and providing a wider range of trail options for different user types (adventurous, family-oriented, etc) represented an opportunity. Completing the Main Path loop was seen as a key infrastructure project that should receive attention in the short-term. A safe bikeway connection along Old Mammoth Road was seen as a key gap since many users rent bikes and need to use Old Mammoth Road to complete the eastern loop of the Main Path. A need for more adventure-oriented backcountry trails was also identified as important. The development of events at local businesses was seen as a way to fund the bike rack program or other trail system improvements. Businesses could donate a portion of each purchase to a specific trails plan project. Placing comment cards and survey boxes at trailheads so trail users can provide suggestions when the experience is fresh in their minds, was seen as a way to make sure the Town maintained a high-quality user experience. Also, getting local organizations such as MLTPA and Mammoth Nordic to maintain facilities was

seen as a way to take some of the maintenance burden off of the Town and the Forest Service.

3.2.6. Road Cyclist Listening Session

Bike club members and interested cyclists were invited to attend a listening session that focused on road bicycling issues. The local bike club has 125 members and 1-2 events per month during summer and about 50 participants per organized ride. Providing more bike lanes and shoulders on the roadways in town and in the surrounding areas was seen as a way to generally improve road cycling conditions. Main Street and Old Mammoth Road were suggested as key locations for new bike lanes. Adding bike lanes or wider shoulders to Mammoth Scenic Loop Road was seen as a way to provide safety for cyclists on a key corridor outside of Town. Local cyclists have existing "Century" rides that they would like to see on user maps. They would also like to be able to coordinate with Caltrans so that maintenance operations are conducted along their planned route in advance of scheduled events. Bike routes connecting Mammoth Lakes to Devils Postpile and Crowley were seen as important long-distance connections. Crowley is particularly important because many people reportedly commute by bicycle from Crowley to Mammoth Lakes already. The Devils Postpile shuttle was seen as a way to provide cyclists with a ride back to Mammoth if space were provided for bicycles. If demand for such a service were high enough, bike trailers similar to those used by MMSA Bike Park could be used on the buses to Devils Postpile/Reds Meadow. Local cyclists also saw a need for cyclist education, especially educating local adults and children to ride in the direction of traffic. Regularly replacing missing "Bike Route" and "Bike Lane" signage and resurfacing deteriorated streets were seen as important maintenance issues that have not received enough attention. Paving Sherwin Creek Road with bike lanes was seen as a way to create a loop ride near town and connect to Crowley along one of the only flat corridors in the Mammoth area. Several cyclists also expressed concern about the safety of the Lake Mary Road Bike Path, especially with respect to potential conflicts between uphill and downhill cyclists.

3.2.7. Paved Trails Workshop

The paved trails workshop was a way for everyone who had participated in tours and listening sessions (and those who hadn't) to come together one last time and discuss general ideas for improving the paved trail system. It was reiterated that the key missing links in the paved multi-use path system were the gap in the segment between Main Street and Mammoth Creek Park and Eagle Lodge. Many of the ideas expressed during tours and listening session were also expressed at the workshop. More specific ideas such as consolidating driveways along Main Street and getting Caltrans to relinquish Main Street to the Town also emerged. Funding was seen as the number one constraint to improving and expanding the trail network. Detailed information on available funding sources is provided in Chapter 8.

3.3. Summer Trail Use Survey

3.3.1. Overview

The Summer Trail Usage Survey had 292 respondents. The survey was promoted by the Town of Mammoth Lakes and MLTPA. Computer workstations were made available at CAMP: Summer so attendees could fill out the on-line survey. Each respondent selected up to five of their most common activities and then responded to detailed follow-up questions about each activity. The activities included in the survey were derived from the activities listed in the GIC database and through discussion with the project partners. **Table 3-1** reports on the popularity and frequency of each activity listed in the survey. The popularity of each activity is determined by the number of respondents who selected it as one of their top five. The frequency of each activity is described using the number of respondents who engaged in each activity at least once a week.

Table 3-1. Activities by Popularity and Frequency

Summer Activity	Respondents who selected this activity:		Respondents who engaged in this activity at least once a week:	
	#	%*	#	%**
Hiking (Day Hikes)	245	83.9	132	53.8
Mountain Biking	146	50.0	84	57.6
Dog Walking	106	36.3	89	84.0
Walking (Recreation/Not Dog Walking)	103	35.3	62	60.2
Walking (Work/Errands)	99	33.9	70	70.7
Road Bicycling	87	29.8	44	50.6
Backpacking (Overnight)	82	28.1	6	7.3
Fishing	80	27.4	28	35.1
Trail Running	55	18.8	37	67.3
Bicycle Commuting (Work/Errands)	51	17.5	37	72.6
OHV (Off Highway Vehicle)	47	16.1	15	31.9
Jogging/Running (Paved Surfaces)	36	12.3	25	69.4
Rock Climbing	29	9.9	11	37.9
Bird Watching	21	7.2	10	47.6
Horseback Riding	20	6.8	6	30.0

Note: Survey response rates do not necessarily reflect actual participation rates in each activity.
* Percentage is based on the total number of respondents.
** Percentage is based on the respondents who selected that particular activity.

Hiking (day hikes), mountain biking, dog walking, walking (recreation), and walking (work/errands) were the most popular summer activities. Dog walkers, bicycle commuters, walkers (work/errands), joggers/runners (paved surfaces) and trail runners tended to participate in these activities most frequently.

The user survey results show that lack of time is a primary reason many people do not participate in their favorite Mammoth summer activities. A majority of users in all but two groups identified this as a key constraint. There was only one user group for which this was this not the most significant barrier. Bicycle commuters cited safety concerns as the key barrier. For OHV users, the lack of trail maps was a close second to lack of time.

Many users and stakeholders cited the need for better signage, maps, and general information about facilities. Unlike in winter, not as many comments were directed towards needing signage to modify user behavior. Many different types of summer users mentioned the need for trail maintenance to be performed in order for them to better participate in their activities.

Access to trails and facilities was a common need. Although it was not rated as significantly as other issues, it was fairly consistently rated. Specific stakeholder comments indicated a concern in particular with development precluding existing access options.

Unlike with winter activities (next section), users did not cite a strong need to reduce user conflicts, indicating it may not be as significant of an issue. The notable exception to this was dog walkers who wished to avoid areas with other users out of concern for the safety of their dogs and for those they might encounter (for example, having mountain bicyclists on a trail where dogs are off leash could pose a potential hazard to both parties).

Lack of time is the primary obstacle to significant number of transportation users, but the concern about safety was more prevalent among these user groups. Bucking the trend, safety trumped lack of time for bicyclists wishing to commute or ride to do their errands. Safety concerns were also the second most common reason that walkers did not engage in the activity. Individual comments were focused heavily on the provision of facilities such as sidewalks, paths, and bike lanes. Improving the conditions of the trails was also identified as a significant need for transportation users.

3.3.2. Analysis of Summer Activities

Hiking (day hikes)

Day hiking was the most popular activity overall. It was also the activity that the most respondents (74.7%) wanted to do more of next season. Lack of time (83.1%) was the primary reason for not taking day hikes more often. A lack of trail maps (12.4%) and difficult access to trails (7.9%) were the other top obstacles to day hiking. Some of the most common other reasons given for not taking more day hikes related to the needs for more trails located closer to home, and trails that are suitable for younger children.

When asked how their day hiking experience could be improved, respondents requested better information in all phases of the day hiking process through more/better trail maps (37.1%), better signage and information at trailheads (35.1%), and better signage along trails (39.2%). Other potential improvements included better maintenance (21.6%) and eliminating conflict with other users (21.6%). The most frequently cited sources of conflict were horses/pack animals (14 mentions), mountain bikers (9) and dogs (5). The two most popular locations for day hikes were farther outside of town in the Lakes Basin (73.9%) and the Devils Postpile/Reds Meadow/Rainbow Falls area (54.3%). The third most popular location was the Old Mammoth/Sherwins area (33.1%) with access closer to town. Not surprisingly, 85.2 percent of respondents drive to reach their day hiking location.

Overall, the survey results indicate a need for more day hiking opportunities that are closer to town and provide opportunities for users of all ages and abilities. The results also indicate a strong desire for improved trail maps and better signage at trailheads and along trails. The results also suggest that providing quality day hiking opportunities closer to town could lead to a reduction in summertime motor vehicle trips.

Potential hiking improvements:

- TOML should identify in-town day hiking opportunities close to residences and employment areas.
- TOML should work with the Forest Service to identify new day hiking opportunities on Forest Service lands adjacent to the urban growth boundary.
- New hiking trails should use a stacked loop system to provide a variety of hiking experiences for users of varying abilities.

Mountain Bicycling

Mountain bicycling was the second most popular activity overall after day hiking, and it was also the activity that the second highest percentage of respondents (53.4%) wanted to do more of next summer. As with day hiking, lack of time among respondents (59.6%) was the primary reason for not participating more often. On a lesser scale, poor trail conditions (17.6%) and difficult access to trails (16.2%) were the other main obstacles to mountain bicycling. Slightly less important was a lack of trail maps (14%). Finally, trails that were not suited to the respondent's skill level was noted as an issue (14%); based upon the individual comments it appears this applies to users who desire trails that are easier and to users that desire more challenging trails.

When asked how their mountain bicycling experience could be improved, the responses were grouped rather tightly around four main issues: better signage (38.1%), improvement of trail conditions/maintenance (37.1%), better access (34.3%), and more/better trail maps (29.5%). The two most popular locations for mountain bicyclists were on either end of town at the Main Lodge/Mountain Portal (41.1%) and Shady Rest Park (39.0%). The third most popular location is also associated with MMSA and is the North Village/Bike Park Shuttle/Mountain Portal (22.6%). Mountain bicycling is one of the seven activities where a clear majority of users (72.0%) did not drive in order to participate.[7]

The survey results indicate a need for more access to better-quality mountain bicycle trails and the materials (maps and signage) to make it easier to enjoy the system. Individual comments by mountain bicyclists indicate a variety of skill levels present within the cohort and the need for trails that can accommodate users both new and experienced.

Potential mountain bicycling improvements:

- Improve signage and maps, including information about difficulty rating and loop opportunities.
- Provide increased maintenance on mountain bicycle trails.
- Improve access to trails.
- Mountain bicycle trails should utilize a "stacked loop system" design to provide a variety of riding experiences from beginner singletrack to advanced technical trails.

[7] The activities that most respondents did not drive to included Bicycle Commuting (2.0%), Jogging (8.3%), Walking for Work/Errands (17.7%), Road Bicycling (27.1%), Mountain Biking (28.0%), Walking for Recreation (32.0%) and Dog Walking (37.1%).

Dog Walking

While dog walking was the third-most popular activity overall (36.3%) it was the most frequently performed activity (84.0%), indicating that while dog walkers are not the largest user group, they are dedicated to their activity. Lack of time among respondents (59.1%) was the primary reason for not participating more often. Conflicts with other users (25.0%) was the second most-cited reason; this is noteworthy in that no other user group ranked this factor so highly.

This concern predictably resulted in a desire by a significant percentage of dog walkers to improve their experience by eliminating conflicts with others (47.1%). In a distant second and third place were better access to trails (28.6%) and better signage (27.1%). The Lakes Basin area (50.5%) and Shady Rest Park (43.8%) were the two most popular locations by a clear margin, and most users (62.9%) did not drive to take their dog out for a walk.

With lack of time and user conflicts being the primary issues for dog walkers, the survey results indicate a need for dog-walking facilities that are more accessible and geared towards this group's specific situation regarding use of leashes and deposition of dog feces.

Potential dog walking improvements:

- Provide more opportunities for dog walkers, particularly close in to town.
- Set expectations for all users of dog walking facilities (i.e., removal of feces, signage indicating leash use is to be expected).
- Add dog bag stations to all trailheads used frequently for dog walking.

Walking (Recreation/Not Dog Walking)

Close behind dog walkers in percentage of participants, recreational walking (35.3%) was the fifth most frequent activity (60.2%). A large majority of respondents (74.5%) indicated that a lack of time prevented them from engaging in walking more often. To a lesser degree, poor trail conditions (12.7%) and safety concerns (12.7%) were the other primary obstacles.

When asked how their recreation walking experience could be improved, the responses were similar to those for mountain bicyclists: more/better trail maps (33.3%), better signage (32.0%), improvement of trail conditions/maintenance (22.7%), and better access (22.7%). The two most popular locations for walkers were Old Mammoth Road (35.9%) and the Lakes Basin area (31.1%). The popular Shady Rest Park (22.3%) was the third most frequented location. Nearly two-thirds (65.0%) of this group walked to access their activity location.

The survey results indicate a need for more access to better-quality recreation walking facilities and the materials (maps and signage) to make it easier to enjoy them. A large number of individual comments indicated that the provision of sidewalks—particularly to separate pedestrians from vehicular traffic—were needed to make the system safer and more enjoyable for recreational walkers.

It should be noted that sidewalk improvements are the domain of the Town's mobility planning efforts and sidewalk improvement projects cannot be funded through recreational trail funding sources.

Potential recreation walking improvements:

- Develop a more comprehensive sidewalk and in-town path system.
- Improve trail signage and maps.
- Provide increased maintenance on trails.
- Provide more access to trails.

Walking (Work/Errands)

As the third form of walking-specific activity on the survey, utility walking for errands or work followed closely behind recreation walking in terms of participation (33.9%), but exceed it for frequency (70.7%), making it the third most frequent activity. Lack of time (54.8%) was the primary reason participants did not walk more, with safety concerns (29.0%) second. Individual comments indicated that the concern for safety was due to a lack of pedestrian facilities separate from motor vehicle use.

The safety issue correlated strongly to the desire of utility walkers to have improved safety measures (44.3%) to ameliorate their experience. Better access to trails (34.4%) and improved trail conditions (32.8%) were also identified. Not surprisingly, the two most popular locations were Main Street (68.8%) and Old Mammoth Road (67.7%), which are densely developed and contain destinations for this group. More than three-quarters of users (77.1%) walked in order to participate in this activity.

Users in this group have a need for walking routes that keep them safe from vehicle traffic, which they currently view as threatening. Increased trail access and improved trail conditions were also identified.

It should be noted that sidewalk improvements are the domain of the Town's mobility planning efforts and sidewalk improvement projects cannot be funded through recreational trail funding sources.

Potential walking (work/errand) improvements:

- Develop a more comprehensive sidewalk and in-town path system.
- Provide increased maintenance on trails.
- Provide more access to trails.
- Develop education/signage program to keep drivers alert for pedestrians.
- Increase enforcement to curb hazardous driving activities (speeding, weaving, drunk driving).

Road Bicycling

As the second most popular type of bicycling participated in by the respondents, road bicycling had moderate participation levels (29.8%) and frequencies (50.6%). Nearly mimicking the responses for utility walking, lack of time (52.3%) and safety concerns (29.2%) were the primary reasons preventing people from road biking more. The need for dedicated and/or safer bicycle facilities such as bike lanes figures prominently in the individual comments provided by road bicyclists.

Even more so than utility walkers the issue of safety (50.0%) was of the utmost concern to road bicyclists to improve their experience, followed by improved trail

conditions/maintenance (37.9%). While the most popular location for road riding was the Mammoth Scenic Loop (44.8%), the location that received the second highest rating was "Other," and included a range of responses. Given the mobility of a road bicyclist this is not surprising and points to the diversity of facilities that can be traversed by a user. Other popular specific destinations were the Lakes Basin area (33.3%) and Old Mammoth Road (21.8%). Most riders used their bicycle to access their desired road riding location (72.1%).

Users in this group have a need for road bicycling routes that provide them a measure of safety from vehicle traffic, which they currently view as threatening. While this is one of the few groups that did not identify increased access as an important concern, there is still a stated need for improved trail conditions/maintenance.

Potential road bicycling improvements:

- Provide increased maintenance on trails.
- Provide separated bicycle facilities.
- Provide better shared bicycle facilities.
- Develop education/signage program to keep drivers alert for bicyclists.
- Increase enforcement to deter hazardous driving behavior (speeding, weaving, drunk driving).

Backpacking (overnight)

While moderately popular (28.1%), overnight backpacking has the lowest frequency of participation (7.3%). This is to be expected considering the time commitment necessary to prepare for and execute an overnight camping trip, and respondents indicated that lack of time is the most significant restriction on participation (78.9%). These statistics match the national trend away from backpacking, which has been declining in popularity over the past decade.

While the reason restricting more backpacking activity was clear, the manners in which to enhance the experience were varied. Eliminating conflicts with other users (30.4%) was rated highest, with equestrians in general and pack outfits in particular being primarily cited. Route and wayfinding information was also lacking as indicated by the need for better signage along trails (25.0%) and more/better trail maps (23.2%).

A large percentage of backpackers visited the Devils Postpile/Reds Meadow/Rainbow Falls area (68.3%), as well as the Lakes Basin area (54.9%). The considerable public lands in the vicinity allow many backpacking options and it is therefore understandable that respondents selected "Other" as the third most popular destination. Driving (82.7%) is the most popular method for backpackers to reach the location of their activity.

Decreasing conflicts with equestrians and improving informational materials (maps and signage) were the primary needs of this group. Individual comments indicated that the process to obtain a backpacking permit was cumbersome and that existing injuries were preventing respondents from participating at a higher rate. The availability of parking areas was also noted several times.

Potential backpacking improvements:

- Improve trail signage and maps.

- Manage pack outfits to reduce their impact on other users.
- Improve parking facilities at trailheads.
- Streamline backcountry permit process.

Fishing

Fishing is moderately popular (27.4%) but rates lower than most activities in frequency of participation (35.1%). Lack of time was the primary reason that respondents did not participate (89.3%), nearly to the exclusion of all other factors. The ways in which the fishing experience could be enhanced, however, was varied. Having more/better trail maps (25.7%) ranked the highest, with better signage along trails (22.9%) and better signage and information at trailheads (22.9%) slightly ahead of better trailhead/facilities (20.0%).

Most respondents selected the Lakes Basin area (73.8%) as their primary fishing location. The "Other" category (38.8%) was also popular, and is consistent with the notion that fishing can be dispersed widely across the landscape. Devils Postpile/Reds Meadow/Rainbow Falls (31.3%) also rated highly. Driving (85.2%) was the primary means for anglers to reach their fishing access points.

People engaged in fishing expressed a need for better maps and more information at trailheads and along trails regarding their activity. Enhanced facilities were also desired.

Potential fishing improvements:

- Include fishing info on trail signage and maps, or produce unique fishing maps.
- Improve trailheads and related facilities.

Trail Running

There is a fairly large drop in participation rates for the remaining activities, starting with trail running (18.8%). Respondents cited insufficient time (74.5%) as the main reason they did not participate more frequently, with lack of trail maps (21.3%) a distant second but still ahead of any remaining factors.

Ways to improve the trail running experience were varied. Better signage along trails (40.4%) led the way, followed by eliminating conflicts with others (29.8%). Improved trail conditions/maintenance (25.5%) and better trailhead/facilities (25.5%) were tied and rounded out the top four issues. The Lakes Basin area (48.4%) Shady Rest Park (44.4%), and Old Mammoth/Sherwins (29.6%) were the most common locations for trail running. Driving (54.7%) was the primary means for runners to access the locations, although walking (35.8%) was also popular.

The survey results indicate a need for better trail information and improved trail conditions and facilities. Regarding the need to mitigate user conflicts it is interesting to note that while the individual comments on the issue were not extensive, nearly every main user group, including other runners, was identified as having conflicted with one of the 13 respondents to the question.

Potential trail running improvements:

- Improve signage.
- Provide increased maintenance on trails and improve trailheads.

- Design trails to better reduce user conflicts and provide opportunities for other users to divert conflicting use.
- Provide facilities specifically dedicated to trail running and high altitude training, away from areas that are crowded with other uses. Whitmore Park is a potential location.

Bicycle Commuting (Work/Errands)

While utility bicycling had a moderate participation rate (17.5%), it had the second highest frequency rate (72.6%) after dog walking. This indicates that although this group is not large, it is dedicated. Safety concerns (52.8%) topped the list, making it one of the only activities where lack of time (27.8%) was not the primary constraint. Poor trail conditions (22.2%) were also a factor preventing use.

The two most important methods to enhance the utility bicycling experience were improved trail conditions/maintenance (41.7%) and improved safety measures (36.1%). Similar to utility walking, the two most popular locations were Old Mammoth Road (66.7%) and Main Street (64.7%), which are densely developed and contain destinations for this group. Given the nature of the activity it is logical that almost all users chose bicycling (96.1%) as the means to access their bicycle commute.

Users in this group have a need for bicycling routes that provide them a measure of safety from vehicle traffic, which they currently view as threatening. There is also a stated need for improved trail conditions/maintenance.

Potential bicycle commuting (work/errands) improvements:

- Provide increased maintenance on trails.
- Provide separated bicycle facilities.
- Provide better shared bicycle facilities.
- Develop education/signage program to keep drivers alert for bicyclists.
- Increase enforcement to deter hazardous driving behavior (speeding, weaving, drunk driving).

OHV (Off-Highway Vehicle)

OHV participation rates (16.1%) make it only slightly less popular than utility bicycling, but it had one of the lowest frequency rates (31.9%). Lack of time (43.9%) was the primary reason people did not participate more often, followed by no trail maps (39.0%) and difficult trail access (29.3%). Better signage along trails (45.0%) more/better trail maps (40.0%), and better access to trails (35.0%) were the top methods identified to improve the OHV experience. Several individual comments identified the need to create and retain singletrack OHV trails, which is likely a reference to minimizing the presence of quads and full-size off-road vehicles.

Mammoth Scenic Loop (54.3%) was the most popular OHV destination, with the "Other" category (47.8%) coming in second and Shady Rest Park (37.0%) completing the top three destinations. Driving (89.1%) was the primary means for OHV users to access their riding opportunities.

Users in this group have a need for increased access to trails and better information (maps and signage) about the trails.

Potential OHV (Off Highway Vehicle) improvements:

- Improve trail signage and maps.
- Improve trail access from town.

Jogging/Running (Paved Surfaces)

Jogging/running participation rates (12.3%) were not particularly high, but had relatively high frequency rates (69.4%). Lack of time (73.3%) was clearly the main reason people did not participate more, with concerns over safety (20.0%) coming in second. Improved trail conditions/maintenance (36.0%) and improved safety measures (32.0%) topped the list of improvements with better signage along trails (24.0%) also being important. Old Mammoth Road (47.2%) was the most popular jogging/running location, with Shady Rest Park (33.3%) and Mammoth Creek Park (27.8%) were also high on the list. The vast majority of users (72.2%) walked (or possibly jogged/ran) to access this activity.

People jogging or running desired safer and higher-quality pedestrian facilities than currently exist. They are therefore similar to other in-town pedestrian users but they can cover more distance for the same amount of time.

Potential jogging/running improvements:

- Develop a more comprehensive sidewalk and in-town path system, particularly to provide loops of varying distances (3 -, 6-, and 10-mile options).
- Provide increased maintenance on trails.
- Improve trail signage to indicate jogging/running routes.

Rock Climbing

Rock climbing had low participation rates (9.9%) and moderate frequency rates (37.9%). As with nearly all activities, not enough time (65.9%) was the primary reason preventing people from climbing; unlike most other users, rock climbers gave lack of equipment (26.8%) as the other main impediment. Having more coordinated events (35.7%) received a higher ranking than most as a way to improve the rock climbing experience, with access to better equipment (28.6%), better access to trails (28.6%), and more/better trail maps (28.6%) rounding out the list.

The Lakes Basin area (55.2%) was popular with rock climbers and the "Other" category (44.8%) came in second, indicating that rock climbing is dispersed throughout the area. Based on the variety of options outside of the listed areas it is understandable that most climbers (82.8%) drove to reach their destinations.

Rock climbers expressed the greatest need for better equipment, organized events, more access to trails, and maps for the trails.

Potential rock climbing improvements:

- Develop trail systems that better serve climbers' needs by providing efficient access from the trailhead to climbing sites.

- Improve trail maps to better convey climbing and access information to interested users.
- Study the potential for rock climbing events in the area to attract rock climbers.

Bird Watching

Similar to rock climbing, bird watching has low participation rates (7.2%) and moderate frequency rates (47.6%). While still the top impediment, lack of time (50.0%) did not rate as highly as with other activities, whereas not having partners for bird watching (25.0%) was more of a concern for this group than any other. It is not surprising, therefore, that having more coordinated events related to the activity (69.2%) was rated extremely high by this group. Obtaining more/better trail maps (38.5%) was a distant second in ways to improve the bird watching experience.

The two most popular locations for bird watching were the Lakes Basin area (47.6%) and the Old Mammoth/Sherwins area (33.3%). The "Other" category (28.6%) was a close third, and a majority of participants (65.0%) drove to these locations.

Bird watchers expressed the greatest need for organized events and better trail maps.

Potential bird watching improvements:

- Improve trail maps to better convey bird watching information to users, or provide stand-alone bird watching guides

Horseback Riding

With the lowest participation rate (6.8%) and the second lowest frequency rate (30.0%), horseback riding is not very popular within the Mammoth Lakes area. Lack of time (56.3%) was the most significant obstacle to riding more often, with better access to trails (41.7%), better trailhead/facilities (33.3%), and better signage along trails (33.3%) listed as the best way to improve the experience. The cost of horseback riding was also cited as an impediment. The Lakes Basin area (50.0%) and the Old Mammoth/Sherwins area (50.0%) were equally popular with equestrians, with most participants (70.0%) driving to their preferred location.

Horseback riders expressed the greatest need for better access and facilities, along with signage.

Potential horseback riding improvements:

- Improve access to trails.
- Improve facilities and signage.

3.4. CAMP: Winter

CAMP: Winter consisted of a series of tours, listening sessions and workshops which covered a variety of topics related to summer trail use in and around the Town of Mammoth Lakes. The following pages summarize key input received from CAMP: Winter.

3.4.1. Forest Service Listening Session

The Forest Service listening session allowed the consultant team to meet directly with Forest Service officials to discuss winter trails issues on USFS-administered lands around Mammoth Lakes. Shady Rest trailhead congestion was seen as a key issue for winter recreation in the area. USFS staff regularly receives complaints about dog feces and unleashed dogs on the trails. Separate dog trails are often seen as a solution by some. USFS staff has asked trail users to keep their dog on a leash and until they get away from the trailhead and to carry a bag for feces. USFS staff say that people are very cooperative once they are informed of the rules, therefore signage and an educational campaign may be at least a partial solution. TOML and MLTPA as well as other local organizations could take part in the educational element. It was also suggested that clearing or grooming more of the in-town paved path would relieve pressure from Shady Rest by providing additional dog walking opportunities closer to people's homes.

The current order of priority for USFS snow removal is (1) the Welcome Center, (2) Forest Service Employee Parking, and (3) Shady Rest. People gravitate to Shady Rest first for winter recreational opportunities, but the Welcome Center provides an alternative staging ground for Nordic skiing access and may be a good short-term solution for congestion at Shady Rest. The provision of alternative staging areas for OSV use could also lead to reduced congestion. USFS staff says that when OSV users are told of other staging areas they often opt to use them instead of dealing with the congestion at Shady Rest. USFS staff indicated that the widening of the Scenic Loop Road in 2010 will create new opportunities for motorized winter recreation. The road will be widened and brought up to sight-line standards and new OSV staging areas could potentially be developed as part of that process.

USFS staff indicated that the snowmobile population has been generally very considerate of other users, per USFS observations and surveys and that some skiers have expectations that cannot be fulfilled on a public multi-use winter trail system.

In general, the creation of new opportunities for OSV, cross-country skiing and dog walking in other areas will relieve pressure on Shady Rest. USFS indicated that they would consider recommendations from the Town of Mammoth Lakes regarding Shady Rest.

3.4.2. Emergency Services Listening Session

Emergency responders were invited to attend a listening session to discuss trail-related safety issues. The major in-town safety issue discussed was winter pedestrian safety, especially during and shortly after storms. The key pedestrian safety issue is a lack of cleared sidewalks that forces pedestrians to walk in the road. Even where sidewalks exist, the roadway is often cleared before the adjacent sidewalk, which forces pedestrians into the roadway. Attempting to clear sidewalks first or simultaneously with roadways was seen as a potential solution. Evening accidents on Main Street are a problem when bars close. Having a dark time for

snow removal crews during rush hour and when bars close could reduce the potential for accidents, especially on Main Street.

The major out-of-town issue was associated with a lack of signage indicating the geographic location for those in need of emergency services. Providing mile marker signage or GPS coordinates on all trail signage could help emergency responders.

Snowmobile adventures go far out and people get in trouble and don't know where they are because of lack of trail markings. Response time takes 5-10 minutes generally, but can sometimes take longer. Snowmobile adventure folks generally have guides with radios. Unguided snowmobilers need to be aware that they need cell phones (and potentially GPS units).

3.4.3. Motorized Listening Session

Motorized trail users were invited to speak with the consultant team to express their concerns about the winter trail system. A major concern is that the motorized users wanted to make sure that Green Sticker funds go to cover grooming only on trails that allow OSV use. They are also worried that the creation of non-motorized trails using motorized funding has created a situation where non-motorized groups are now trying to kick them out of the Shady Rest area.

Access between the Industrial Park, the RV park and the trailhead is important for snowmobilers because many stay in the RV park or store their vehicles at the Industrial Park. Unless they can drive through the tunnel under Highway 203, they have to pull OSVs on a trailer to Shady Rest or other trailheads father from town. Ideally, snowmobilers said, they need a big parking lot, bathrooms, access to gas stations that snowmobiles can drive up to, and access to trails near town.

Snowmobilers say they are willing to do much of the trails work themselves. They created the Orange diamond trail system on their own and the Snowmobile Association maintained restrooms at Shady Rest for 10 years. Snowmobilers want access through the Knolls, but realize that some residents are resistant. Motorized residents of the Knolls would like to be able to access backcountry surrounding the Knolls from their homes (private access only).

The Snowmobile Association would like to see trailhead parking at Shady rest triple in size, allowing for a loop road for snowmobile trailer parking only and interior spaces for smaller vehicles and non-motorized users.

There was a general consensus that out-of-town trailheads were not desirable and that higher gas prices create need for snowmobilers to find trailheads closer to town where they are staying (like the RV park).

Sherwin Creek Road was seen as another potential trailhead close to town that could serve multiple users (snowplay, OSV, dog walking, cross-country skiing, etc.)

3.4.4. Agency Winter Mobility Meeting

Representatives from the Town of Mammoth Lakes and other local agencies gathered to provide input on winter mobility issues. One of the first issues discussed was the need for clarification of scopes between trails and mobility plans. A conflict between roads and sidewalks in terms of clearing and storage was seen as a key challenge to providing safe

pedestrian mobility in the winter. Another issue that presents a maintenance challenge is the fact that TOML has to borrow a snowcat from the Water District to do pre-grooming for Mammoth Nordic along the Main Path.

The fact that bike facilities—particularly the ones parallel to a roadway—are currently used for snow storage eliminates the possibility of using them for mobility or recreational purposes.

A lack of in-town snow storage means that snow would have to be hauled away to better accommodate pedestrians. Heated sidewalks are an option but the current cost of propane is prohibitive. Geothermal energy could be the most cost-effective solution, but it is not currently available.

Main Street was seen as a serious safety concern in the winter. It was suggested that turnouts on Main Street at bus stops would prevent buses from being rear ended and protect people waiting at bus stops.

It was also suggested that snow along Lake Mary Road (and potentially the Lake Mary Bike Path) would be easier to clear or groom. Since there is generally nothing on the immediate downhill side of the path, snow maintenance crews can blow snow over the path.

Providing safe access to bus stops was seen as a goal for the Town. Identifying key walking routes to transit was identified as a potential project, but would likely require an origin and destination survey of bus users to identify the most common routes. This could be undertaken as part of the mobility plan. A survey may determine that users arrive at bus stops from multiple directions, making prioritization difficult. In many places there are no underlying sidewalks to clear. Providing sidewalks throughout town and clearing them all during winter is the best solution, but finding sufficient funding for maintenance would be the key obstacle. It should be noted that sidewalk improvements are the domain of the Town's mobility planning efforts and sidewalk improvement projects cannot be funded through recreational trail funding sources.

3.4.5. Non-Motorized Listening Session

Non-motorized users expressed a desire for general winter mobility and safety. They want to be able to access non-motorized opportunities from their homes without driving and without worrying about dangerous roadway conditions. Connecting to SoCal Edison via the bike path and getting people from the Meridian/Minaret area to Sherwins via non-motorized transportation were seen as important non-motorized connections. Access to the Knolls from Town was also seen as important to provide localized recreational opportunities. A vision of a potential cross-country ski loop around town was seen as a potential goal. While this would require decisions about whether to clear or groom pave paths, attendees wanted to make sure the trails plan did not preclude this option.

A lack of signage was a big concern as was getting people out of their cars and off the roads as much as possible. One user commented that the trail system is excellent now, but has been diminishing due to development and lack of maintenance.

Several attendees expressed a desire for a more uniform and cohesive Nordic trail system, where appropriate, and there was a desire to make sure in-town XC trails are far enough away from roads that they are pleasant to ski on. In-town grooming and grooming of trails near schools were seen as ways to give more people access to recreational activities without

driving. Trail access needs to be provided through new developments so the trail system and access to it isn't lost to new development.

Shady Rest was seen as a key area of user conflict and attendees expressed a desire for greater separation of motorized and non-motorized uses. Separation of users was seen as a key way to have everyone's needs equitably and aesthetically met. Shady Rest Park was described as a potential winter recreation staging area. Motorized recreation could stage at the parks north side, non-motorized to the south side and snowplay could occur on the site of the park. Providing separate trail loops that allow dogs and prohibit dogs was seen as necessary to improve user experience in the Shady Rest area.

Some residents in the Lodestar area expressed the concern that the paved path along Lodestar Drive is not cleared or groomed in the winter. There was no consensus as to whether it should be groomed or cleared. Residents and stakeholders need to determine the best and highest use.

Users feel there is a need for a snow play area. Shady Rest Park, Mammoth Creek Park, the ski back trail and the Sherwin Creek Road area were mentioned as potential localized snow play areas for residents and visitors.

Enforcement of motorized restrictions was seen as key to ensuring the safety of non-motorized users and enhancing the non-motorized trail experience. One user said that Minaret Summit used to be an ideal XC area, but is criss-crossed by motorized users even in OSV-restricted areas.

Snowcreek VIII must provide public access to the Sherwins. Residents in Snowcreek V and VII are concerned about noise from motorized users. Fear of motorized use may make Snowcreek residents wary of providing access in general. Providing a motorized restriction in the areas closest to Snowcreek residents may be a solution. This would allow for non-motorized access only at Tamarack Street and Ranch Road/Snowcreek VIII.

3.4.6. Forecountry Session

Stakeholders interested in backcountry recreational opportunities attended a listening session and expressed their ideas for improving backcountry opportunities. Several specific ideas for winter routes and events were brought forward.

Development of a large local cross-country skiing event was seen as a potential way to reap economic benefits from an expanded winter trails network. The Marcia Longa tour in Italy was seen as a model since it holds events year round—skiing, running, and biking.

The Los Angeles Sierra Club Ski Mountaineers section was interested in Coldwater Creek and access to the Mammoth Crest from Lake George.

It was reported that the Sierra Star Golf Course is interested in programming Winter Nordic on top of its golf course.

North facing Sherwins have better snow than south facing Knolls area, making the Sherwins a key focus for backcountry winter access issues. The Knolls and area NW of Town is desirable for flat xc/backcountry skiing, but snowmobile activity makes it less desirable.

An area near the intersection of 203 and Scenic Loop could provide parking and access points for motorized and non-motorized backcountry users.

Use Lake Mary Road path as part of a winter groomed loop trail that connects to the Village, the ski back trail, Mammoth Scenic Loop and shared snowmobile trail.

Biathlon initiative looking for a place that is safe that will have little impact. Mammoth pack station (stables) already has permit and is already impacted. It is a north facing location with berm and few existing skiers. In summertime it could move to the motocross area (old strip mine). Park City, W Yellowstone, Anchorage, Lake Placid, and parts of Minnesota have biathlon area. Up to 40,000 people show up at events. This could be a boost to the local economy.

There was a need expressed for facilities that provide opportunities for adjacent residents, but are far enough away so as not to impact their quality of life.

3.4.7. Winter Mobility Workshop

The Mobility Workshop was intended to bring together people from different areas of interest to discuss winter mobility issues in the Town of Mammoth Lakes. A key benefit of the workshop was that it allowed people of different interests to interact with each other and Town officials and discuss their concerns. Many of the issues discussed had to do with transit and traffic management and would be most appropriately addressed in the upcoming TOML mobility plan.

There was general consensus that if there are going to be more trails around town, they need to be cleared or groomed during winter when they are needed most. Several attendees felt that clearing existing multi-use paths such as the "Tallus" path was most important for winter mobility, but recognized that grooming was also a legitimate use.

The 203/Main Street corridor came up again as a key area for improving winter mobility. While it was recognized that smaller streets don't necessarily require sidewalks, it was agreed that all major streets need sidewalks on both sides. The need to improve bus stop access and conditions was also mentioned. Some respondents felt that pedestrians walking across streets creates hazard and that bridges or tunnels should be used in key areas, especially along Main Street. Slowing traffic on Main Street was also suggested as a safety measure.

The Lake Mary Road closure was seen as problematic because the snowbank at the end of the road is difficult to climb and practically inaccessible for seniors or parents carrying small children. Steps or a gradual slope were suggested to improve access for people of all abilities.

Creating neighborhood connectors by using existing utility easements or purchasing houses/lots was seen as an important strategy for improving mobility.

Transit was seen as a way to provide general mobility in the winter and summer because it provides an opportunity for users to ride the bus uphill and ski/ride the downhill or flat areas.

Consolidating parking was seen as a way to get folks to park their cars as soon as they get to town. Then they can access all of town's amenities by transit, foot, etc. This concept was partially addressed in 2006 Mobility Study. There was also a feeling that making it easier to get to bus stops, providing more frequent buses, more bus routes, sticking to the timetable, and having real time "next bus" information, would be successful in getting more folks out of their cars.

Providing directional district guide signs coming into town at 203 and Meridian may relieve unnecessary traffic on Main Street as visitors staying on the south side of Town can access their lodging via Meridian. Better signage identifying the public parking areas such as the existing park and ride lot may reduce traffic created by people searching for parking. Large surface parking lots were seen as problematic for "walkability" and budgetary reasons. The cost to clear Minaret Village parking (trucked out) was $20,000.

An efficient snow maintenance process was important to some attendees who suggested that all labor and equipment to plow roads should be ready to go when there is a big snowstorm so there is no delay in snow removal.

One resident was concerned about snow storage in Town. He felt that it posed drainage, health and safety issues. He also recommended that snow be moved out of Town as much as possible, recognizing that the associated cost, noise and emissions generated by trucking snow would be an obstacle. The idea of storing snow at Shady Rest to build a snow play park was presented as consistent with the idea of moving the Shady Rest trailhead to the park.

3.5. Winter Trail Use Survey

3.5.1. Overview

The Winter Trail Usage Survey had 316 respondents. Each respondent selected up to five of their most common activities and then responded to detailed follow-up questions about each activity. The activities included in the survey were derived from the activities listed in the GIC database and through discussion with the project partners. **Table 3-2** reports on the popularity and frequency of each activity listed in the survey. The popularity of each activity is determined by the number of respondents who selected it as one of their top five. The frequency of each activity is described using the number of respondents who engaged in each activity at least once a week.

Table 3-2. Winter Activities by Popularity and Frequency

	Respondents who listed this activity in their top five:		Respondents who engaged in this activity at least once a week:	
Winter Activity	#	%*	#	%**
Nordic Skiing on Groomed Trails	154	54.2	79	51.3
Nordic Skiing on Ungroomed Trails	121	42.6	54	44.7
Dog Walking	109	38.4	89	81.7
Backcountry Ski/Snowboard	101	35.6	28	27.8
Snowshoeing	94	33.1	20	21.3
Winter Walking (recreational/not dog walking)	64	22.5	25	39.1
Winter Walking (work/errands)	58	20.4	45	77.6
Winter Hiking (Day Hikes)	58	20.4	22	38.0
Snow play (sledding, tubing, etc.)	52	18.3	11	21.1
Ice Skating	37	13.0	5	13.5
Snowmobile: on Trails	35	12.3	7	20
Snowmobile: in Open Areas	31	10.9	10	32.3
Bicycling	23	8.1	8	34.7
None of the above	14	4.9	10	47.6
Running	12	50.0	17	50.0
Winter Camping	11	3.9	0	0.0
Dog Sledding	6	2.1	3	50.0
Disabled Recreation & Access	4	1.4	1	25.0
Ice Fishing	4	1.4	0	0.0
Equestrian Activities	0	0.0	0	0.0

Note: Survey response rates do not necessarily reflect actual participation rates in each activity.
* Percentage is based on the total number of respondents.
** Percentage is based on the respondents who selected that particular activity.

Similar to the summer survey, users cited lack of time as the primary reason they do not participate more often in their favorite winter activities. While changing user habits to create more time in their lives to recreate is outside the scope of this effort, analyzing the data indicates that people may benefit by having trail facilities closer to where they live, as proximity would increase usage by decreasing the need for people to transport themselves to a recreation facility or area.

Conflicts among winter recreationists exist in nearly every form, and several unmet needs were voiced by a variety of users. Non-motorized users desire an experience and facilities not shared with motorized users for reasons relating to personal comfort/safety, snow and track conditions, and fumes and noise. Motorized users expressed a particular desire to have more access opportunities close to town to decrease the effort required for them to reach a trailhead.

Regardless of the mix, users expressed a need for more facilities to avoid congestion at popular trailheads and on popular facilities originating from these trailheads. Congestion within parking areas and also on the trails is occurring and was a common concern voiced by stakeholders, particularly at the Shady Rest Campground/Park. This need is also likely expressed in some of the user conflict situations.

The presence of dogs was divisive, and both dog owners and non-owners indicated a need for facilities specifically for dog walkers. This need is considerable in that dog walking is a very popular form of outdoor winter recreation for a significant number of users. The need

therefore exists both for more facilities in general for dog walkers, and for facilities that are separated from other users. Regarding the latter the concerns are for the safety and enjoyment of the dog walkers as well as for non-dog walkers.

Improved connectivity between existing winter recreation facilities was identified by several user groups as being important to increasing their ability to undertake their preferred activity. This need is likely both for recreation and transportation purposes. For the former, it is assumed that providing these connections will allow increased use and a diversity of experience, thus fulfilling multiple needs.

Although not rated highly by any one group, the need for better trail information was identified consistently by not only user groups but by land managers and emergency medical service (EMS) providers, as well. This need encompasses information provided through improved trail maps and signage to allow people to navigate the trail system so they may have a safer and more enjoyable experience. Signage is also needed to provide information about use and behavior, and to assist Emergency Medical Services (EMS) with location and recovery efforts.

The primary transportation need among users is safe pedestrian and bicycle routes during winter, and several user groups and stakeholders identified the current snow removal program as being an impediment to that situation. When streets are plowed the snow banks either cover sidewalks and paths or create walls that prohibit "escape" by cyclists/pedestrians where they are forced to share the road with vehicles.

The survey results indicate that increased safety and better facilities are needed to induce more people to walk and ride their bicycle during the winter. Specific needs included plowing of paths and sidewalks, removal of snowbanks along roadways to increase visibility and mobility, and coordination of plowing activities to ensure that plowed non-motorized facilities are not covered by snow-clearing activities on roadways.

As with recreation users, improved connectivity between existing amenities was identified by stakeholders as being important to increasing livability and activity. Particular needs were identified to connect neighborhoods, existing paths and trails, activity hubs, and transit facilities.

3.5.2. Analysis of Winter Activities

Nordic Skiing on Groomed Trails

Nordic skiing on groomed trails was the most popular activity overall (52.4%) with the second highest frequency rate (51.3%), and classified highly as an activity that respondents wanted to do more of next season (39.4%). Not having enough time (52.4%) was the primary reason for not Nordic skiing more often, with conflict with other trail groups (16.5%) running a distant second. The conflict most commonly cited was with snowmobilers, followed by complaints about dogs.

Nordic skiers' groomed trails experience could be enhanced by improved trail conditions/maintenance (38.0%); having more time (35.2%) was a close second. This points to the need that this group has for improved quantity and quality of facilities in order to enjoy their sport. Eliminating conflicts with other trail users (26.9%) was also an issue. The most popular groomed locations for Nordic skiing were Shady Rest (51.9%) and Tamarack Cross Country Ski Center (51.3%); the Lakes Basin area (18.2%) was third by a wide margin.

The tight grouping of the two most popular locations is not surprising because this activity by definition must take place on a modified surface, and opportunities are therefore limited. This also influences the situation where most users (78.1%) indicated they drove to reach the groomed Nordic skiing area.

Overall, the survey results indicated a need for more groomed Nordic skiing opportunities closer to town to allow people to take better advantage of their favorite winter activity. Providing these trails separately from motorized users, dogs, hikers, and others was strongly emphasized, in part to avoid noise and fumes and also to preserve the quality of the groomed tracks.

Potential Nordic skiing on groomed trails improvements:

- Provide groomed Nordic skiing opportunities close to town. The locations should be dispersed in order to reduce crowding at current sites, potentially by grooming continuous segments of the Main Path, and taking advantage of underutilized winter open spaces such as golf courses and city-owned properties.
- Take measures to separate Nordic skiers from snowmobilers and dog walkers, where possible.

Nordic Skiing on Ungroomed Trails

Nordic skiing on ungroomed trails was the second most popular winter sport (42.6%), and rated relatively high as an activity that respondents wanted to do more of next season (31.3%). It also had a high frequency rate (44.7%). Lack of time (54.3%) was the primary reason for not going skiing more often, and it led by a clear margin, with the second most common reason being conflict with other trail groups (19.8%), specifically snowmobilers.

When asked how their ungroomed trails experience could be improved, Nordic skiers indicated that more time (40.7%) and eliminating conflicts with other trail users (24.7%) were their primary concerns. More/better trail maps (22.2%) and better access to trails (22.2%) also rated highly. The most popular locations for skiing were Shady Rest (34.7%), outside of Mammoth (31.4%), and Mammoth Scenic Loop (28.9%). Given the preference for Shady Rest it is not surprising that this group identified conflicts as an issue, as the area is popular with a variety of users in the winter. The vast majority of users (79.2%) drove to reach their preferred skiing area.

Similar to the previous category, the survey results indicated a need for more ungroomed Nordic skiing opportunities close to town, particularly where they can be provided separately from snowmobile areas. The results also indicate a desire for improved trail maps.

Potential Nordic skiing on ungroomed trails improvements:

- Provide ungroomed Nordic skiing opportunities close to town. These trails should be in areas closed to snowmobiles.
- Develop better trail maps to let users know of the opportunities that exist for Nordic skiing on ungroomed trails, particularly close to the developed areas of Mammoth.

Dog Walking

As with summer, dog walking was the third-most popular activity overall (38.4%) and it was the most frequently performed activity (81.7%) by a large margin. This indicates that while dog walkers are not the largest user group, the nature of their activity requires year-round dedication. Lack of time among respondents (35.7%) was the primary reason for not participating more often, although conflicts with other user groups (33.9%) ranked a close second. Individual responses denoting conflicting user groups showed the divisiveness of this issue: snowmobilers, cross-country skiers, people who don't like dogs, people who let their dogs off leash, and people who don't want dogs off-leash were all mentioned.

These concerns predictably resulted in a desire by a near-majority of dog walkers to improve their experience by eliminating conflicts with others (50.0%). When asked "with which user group" could conflict be reduced, the responses were again diverse: nearly all other snow users (snowmobilers, cross-country skiers, snowboarders, paraskiers), people who are not "dog-friendly," and both off- and on-leash dog walkers. Having more time (26.9%) was the second most popular concern, but it ranked clearly behind the issue of user conflict.

Considering that most dog walkers participate in their activity at Shady Rest (59.6%) it is not surprising that there are conflicts, as this location is heavily used by many winter recreationists. Old Mammoth/Sherwins (27.5%) was the second most common location but was less than half as popular with users. The split was nearly equal between those who drove (46.7%) to those who walked (49.5%) to take their dog out.

More so than with any other winter user group, dog walkers cite trail conflicts as being the primary need to be addressed. Reviewing results and comments from other users indicated that the concern is from both dog walkers and non-dog walkers: for example, Nordic skiers, people out snowshoeing, dog sledders, and backcountry skiers/snowboarders all noted conflicts they have with dogs. The concern is more acutely expressed by those with dogs, however, and appears to be a minor issue with other users.

Potential dog walking improvements:

- Provide more opportunities for dog walkers that allow off-leash travel while regulating/eliminating such use in other situations.
- Set expectations for all users of dog-walking facilities (i.e., signage indicating off-leash use is to be expected).
- Establish a "dog park" or other areas specifically for dog walking around town.
- Grooming or clearing all paved path segments and sidewalks during winter months will help to disperse dog walking activities around town, relieve pressure on Shady Rest, and reduce the need to drive to a suitable dog walking location.

Backcountry Ski/Snowboard

While backcountry skiing/snowboarding (35.6%) was not the most popular activity it was the one that the highest percentage of respondents (43.3%) wanted to do more of next winter. This was reflected in its moderate frequency rates (27.8%) and the ranking of lack of time (53.4%) as the main reason respondents did not participate more often. Safety concerns (33.1%) were also listed and this is probably related to avalanche danger in the backcountry.

When asked how their backcountry skiing/snowboarding experience could be improved, most respondents requested more time (48.7%). The second most popular issue was better access to trails or backcountry opportunities (27.8%) as that may decrease the necessary time commitment to participate in backcountry skiing/snowboarding. Old Mammoth/Sherwins (51.5%) and the Lakes Basin area (42.6%) were the clear favorite locations for this activity, with Outside of Mammoth (38.6%) rounding out the top three choices. Pursuant to the issues of lack of time and access, a clear majority of users (71.6%) drove in order to backcountry ski/snowboard.

The survey results indicated a need for more access to backcountry areas, especially the Sherwins close to town where existing access is limited. This would alleviate some of the time constraints experienced by participants, and would make it easier to reach high-quality backcountry slopes from in town. Comments regarding safety concerns and the provision of improved avalanche conditions information are not necessarily within the scope of this effort, although they are important to note.

Potential backcountry ski/snowboard improvements:

- Improve access to backcountry areas from town. This may take the form of maintaining direct access by placing corridors through private property at the perimeter of town, particularly to the south towards Old Mammoth/Sherwins, which contain the most popular backcountry ski/snowboard areas.

Snowshoeing

Snowshoeing is the last of the most popular winter activities, with relatively high participating rates (33.1%) and moderate frequency rates (21.3%). It also had the third highest percentage of respondents (33.5%) who wanted to do more of next winter. Not enough time (47.7%) was cited by respondents as the primary reason they did not snowshoe more frequently, with lack of equipment (22.1%) and no trails maps (19.8%) also being issues.

Like most winter recreationists, snowshoers indicated that their experience could be improved by having more time (39.4%). Unlike the other top activities, the respondents indicated a variety of other concerns: better signage along trails (28.7%), more/better trail maps (28.7%), and better signage and information at trailheads (24.5%), which are all similar issues relating to orientation and navigation. Snowshoeing was fairly evenly dispersed among three primary locations, and this is perhaps indicative of the relative mobility of the sport as it does not rely on any specific type of terrain or track. Tamarack Cross Country Ski Center (30.9%) was the most popular location, followed closely by Shady Rest (29.8%) and the Lakes Basin area (28.7%). Most users (59.1%) drove to their preferred snowshoe area, although nearly a quarter walked (22.6%).

Snowshoers have a clear need for more information about trails both prior to their excursion and while they are out. The desire to participate in the sport more was also expressed both explicitly and implicitly.

Potential snowshoeing improvements:

- Improve signage at trailheads and on the trail. Trailhead signage should include information about difficulty rating and loop opportunities.

- Improve maps, including information about difficulty rating and loop opportunities.
- Improve access to snowshoe areas from town to decrease time commitment to participate.

Winter Walking (recreational/not dog walking)

Starting with recreational winter walking (22.5%) there is a sharp drop in participation, although the drop in frequency rates (39.1%) is less severe. While not enough time (30.8%) was still the highest scoring issue preventing people from participating more often, poor trail conditions (28.2%) and difficult access to trails (28.2%) were nearly as important.

In keeping with the ranking shown above, winter walkers cited having more time (30.0%) and improved trail conditions/maintenance (30.0%) as being equally important to enhancing their experience. Tightly grouped together were requests for more/better trail maps (27.5%), better access to trails (25.0%), better signage along trails (22.5%), and better signage and information at trailheads (20.0%).

The most popular location for recreational walking was Old Mammoth Road (40.6%), being nearly twice as popular as Main Street (21.9%). Walkers were otherwise fairly dispersed with moderate use at Snowcreek (20.3%), Old Mammoth/Sherwins (20.3%), Tamarack Cross Country Ski Center (18.8%), Mammoth Creek Park (17.2%), Shady Rest (17.2%), Outside of Mammoth (15.6%), and Juniper Ridge/Eagle Lodge/Mountain Portal (14.1%). The diversity of locations is reflected in the fact that most users walked (68.8%) to their desired destination.

Survey results indicate that recreational walkers needed better information about their trail experience, coupled with more and better trail opportunities in general.

Potential winter walking (recreational/not dog walking) improvements:

- Improve signage at trailheads and on the trail.
- Improve trail maps.
- Improve the quality of the walking opportunities and provide better access to walking areas to decrease time commitment to participate.
- Focus on development of sidewalks and multi-use path facilities along Old Mammoth Road and keep them maintained (cleared or groomed) throughout the winter.

Winter Hiking (Day Hikes)

Winter hiking (20.4%) is only slightly less popular than recreational walking and exhibits similar frequency rates (38.0%). Lack of time (37.7%) was the primary constraint on this activity, followed by safety concerns (21.3%), no trail maps (18.0%), and lack of information at trailheads (18.0%). Respondents believed their winter hiking experience could be improved by having more time (39.0%), but also through more/better trail maps (32.2%) and better access to trails (30.5%),

Two locations were tied for the most popular areas for winter hiking: Outside of Mammoth (39.7%) and the Lakes Basin area (39.7%). Shady Rest (24.1%) rounded out the top three choices. In contrast to recreational walkers, winter hikers typically drove (66.7%) to their preferred hiking location.

The general needs of winter hikers were for safer, more opportune options for hiking, coupled with better maps to let people know about the trails.

Potential winter hiking (day hikes) improvements:

- Improve trail maps, including information about difficulty rating and loop opportunities for winter hiking.
- Provide better access to winter hiking trails to decrease time commitment to participate.

Winter Walking (work/errands)

Utility winter walking (20.4%) is as popular as winter hiking but is undertaken at a drastically reduced frequency (7.3%). This is the most popular activity where lack of time is not the predominant barrier to increased use; safety concerns (60.5%) are instead the most significant impediment to utility walking. Poor trail conditions (55.3%) were also an issue. Individual comments indicated that the concern for personal safety in the face of motor vehicles was the major factor, in part because sidewalks are either not plowed or not available.

Related to safety, respondents identified improved trail conditions/maintenance (51.5%) and improved safety measures (51.5%) as the two most important methods to improve their experience. This was augmented by such comments as the need for better snow removal techniques, more careful operation of vehicles on the part of drivers, and more sidewalk connections through town. Better access to trails (33.3%) was also listed as a significant issue. Old Mammoth Road (74.1%) and Main Street (70.7%) saw the vast majority of utility walkers, as these locations are densely developed and contain destinations for this group. Most users (86.4%) walked in order to participate in this activity.

Users in this group needed walking routes that kept them safe from vehicle traffic, which they viewed as threatening. Increased trail access and improved trail conditions were also identified as desirable.

Potential winter walking (work/errand) improvements:

- Develop a more comprehensive sidewalk and in-town path system.
- Provide increased winter maintenance on sidewalks.
- Develop education/signage program to keep drivers alert for pedestrians.
- Increased enforcement to curb hazardous driving activities (speeding, weaving, drunk driving).
- Snow removal program that does not disadvantage pedestrians.

Snow play (sledding, tubing, etc.)

Snow play (18.3%) was moderately popular and undertaken at a moderate frequency (21.1%). Lack of facilities (35.3%) for snow play was the primary reason that people did not engage more frequently in this activity, with individual comments indicating that not having free facilities with adequate parking was a particular concern, as was finding a "safe" area. Lack of time (26.5%) and difficult trail access (23.5%) were also noted.

Better access to trails (29.0%) was identified as the most important way to improve the snow play experience. The request for more parking spaces at popular trailheads (25.8%) was also

noted, and this is the highest ranking that this issue received from any user group. Outside of Mammoth (30.8%) and Mammoth Scenic Loop (23.1%) were the primary specific snow play locations, with the "Other" category (21.2%) close behind. The individual locations listed indicated there is a variety of sites utilized by users, including private residential yards. Although people wanted more parking spaces at trailheads, driving (53.7%) was not emphatically more popular than walking (31.5%) for users to reach their preferred snow play locations.

The survey results indicated that people who engage in snow play needed better, safer sites, particularly where hills do not end in areas trafficked by cars or snowmobiles. Not having to pay for snow play use was also desirable, as was having adequate parking at the sites.

Potential snow play (sledding, tubing, etc.) improvements:

- Provide more access to trails that lead to snow play areas.
- Develop snow play areas that are safer and do not conflict with other users.
- Provide more parking at snow play areas.

Ice Skating

Ice skating (13.0%) was a moderately popular sport in Mammoth but had low frequency rates (13.5%) compared to other activities. It did, however, rate fairly high as an activity that people wanted to do more (22.5%) While lack of time (41.0%) prevented the greatest number of users from ice skating more often, a lack of facilities (32.8%) garnered many individual comments. Some comments noted that the quality of the rink had been upgraded recently but others described needed improvements regarding modulation of conditions. Not having the proper equipment (27.9%) was also a common concern.

Of the issues identified by ice skaters as improving their experience, more time (62.7%), access to better equipment (23.5%), and more coordinated ice skating events (23.5%) are all difficult to address with improved facilities or related programs. Based upon individual comments, providing better trailhead/facilities (19.6%) seemed mostly directed at covering the existing rink to reduce the snowfall onto it. The "Other" category (51.4%) was the most popular location as 8 of the 19 respondents considered it to include the town's ice rink. Outside of Mammoth (37.8%) and the Lakes Basin area (35.1%) were also popular as these locations contain lakes that freeze in the winter. Three-quarters of users drove (75.0%) to access their favorite ice skating site.

Ice skaters needed better facilities to enjoy their sport, with a particular emphasis on improving the town's current ice rink. Users also thought that information about ice skating opportunities and group events would make this activity more popular.

Potential ice skating improvements:

- Cover the public ice rink to reduce impact of snow.
- Increase the number of ice skating events

Snowmobile: on Trails

Riding snowmobiles on trails was a moderately popular (12.3%) sport and close to snowshoeing and snow play in terms of frequency rates (20.0%). It was one of the few

activities where lack of time (42.4%) was not the primary, but secondary, impediment to engagement. Not having the equipment (51.5%) was the primary reason people did not snowmobile on trails, with the remaining issues being of minor consequence. When asked what could improve their experience, however, snowmobilers flipped the important and cited more time (54.5%) over access to better equipment (36.4%). Having better access to trails (24.2%) was a distant third.

Shady Rest (48.6%) and Outside of Mammoth (48.6%) were equally popular spots for on-trail snowmobiling, with Mammoth Scenic Loop (40.0%) and the Main Lodge/Mountain Portal (40.0%) accounting for almost all the remaining riders. Nearly all participants accessed the trail systems by driving (97.2%).

On-trail snowmobilers did not express a strong need for physical or programmatic improvements, with better access to trails being of marginal importance.

Potential snowmobile: on trails improvements:

- Increase/improve access to trails and equipment where opportunities exist.
- Provide more room at staging areas.

Snowmobile: in Open Areas

Snowmobiling in open areas was slightly less popular (10.9%) than on-trail snowmobiling, but was participated in more frequently (32.3%), and also had a higher percentage of people who wanted to do it more often (32.3%). These factors point to a small but fairly dedicated group. Also similar to on-trail snowmobiling, these users cited not having the equipment (54.8%) as their primary impediment, followed by lack of time (52.4%), with the remaining issues being nearly inconsequential compared to the two primary reasons.

When asked what could improve their experience snowmobilers cited more time (56.4%) as most important and tied on access to better equipment (20.5%) and better access to trails (20.5%). Individual comments often focused on the cost to snowmobile in open areas. Outside of Mammoth (61.3%) and Mammoth Scenic Loop (51.6%) were the most popular open area riding sites, with Shady Rest (35.5%) back in third. Most users drove (87.5%) to the trailhead in order to go snowmobiling in open areas.

Based upon the unmet desire for more participation and for better access, open area snowmobilers needed more riding opportunities, preferable in fee-free areas.

Potential open area snowmobiling improvements:

- Provide more access to riding areas, preferably without associated use fees.

Bicycling

The survey results indicated bicycling in the winter was not popular (8.1%) in Mammoth, but people participate in it with moderate frequency (34.7%), and only a small percentage of bicyclists indicated they would like to ride more often (6.7%). Poor trail conditions (47.4%) prevented most people from riding more, followed by weather implications (31.6%), although it is possible that the first issue is related to the second as snow and ice could be creating poor trail conditions for riders.

In keeping with their stated concerns, bicyclists requested improved trail conditions/maintenance (43.8%) to improve their experience, followed by more time (37.5%). The largest percentage of bicyclists listed Outside of Mammoth (43.5%) as their primary riding spot, with Mammoth Scenic Loop (26.1%) and Old Mammoth Road (26.1%) tied for second. Although most users drove (48.0%) to access their winter riding location, a significant number used "Other" means of transportation (36.0%), presumably their bicycles.

Bicyclists have a need for facilities that are maintained to allow them to better enjoy their activity in the winter. Individual comments refined the need by requesting better snow removal from bicycle routes. Only a small number of survey respondents stated that they would like to cycle more often in the winter, but it is important to consider those who require a bicycle for year-round mobility. While the number of year-round bicycle commuters may currently be relatively small, it should be expected that the number will rise as a result of higher gas prices.

Potential bicycling improvements:

- Develop an enhanced snow removal program for streets with bike lanes.
- Consider snow removal on multi-use paths that serve common employment destinations. (Could be used by bicyclists, pedestrians, dog walkers, etc.)

Running

Only slightly less popular than on-trail snowmobiling was running (12.0%), although it has the third highest frequency rate (50.0%), tied with dog sledding. This indicated that although it is not particularly popular, this group is dedicated to their sport. As with on-trail snowmobiling, this group ranked lack of time (34.8%) the second most common reason they did not run more, with the first being poor trail conditions (56.5%). Making its first showing in a while, the category of safety concerns (26.1%) was tied with weather implications (26.1%) in having kept runners from their activity.

Of the issues identified by runners as enhancing their experience, improved trail conditions/maintenance (45.0%) was clearly out front. Individual comments indicated that much of this is related to poor roadway conditions and the presence of motor vehicles in areas clear enough for running. Having more time (30.0%) and better access to trails (30.0%) were also important to runners, with the access issue perhaps related to the request to groom trails for running purposes. Shady Rest (41.2%) was a popular spot with runners as was Old Mammoth Road (38.2%), with preferences for the other locations much lower across the board. The majority of users walked (54.3%) (or possibly ran) to their favorite location, while driving (34.3%) was the second most popular method to access running areas.

Runners needed better facilities with respect to winter conditions, and separation from motor vehicles was desired. This group wanted access to both urban improved facilities (sidewalks, pathways) and groomed snow running areas.

Potential running improvements:

- Develop a more comprehensive sidewalk and in-town path system.
- Provide increased winter maintenance on sidewalks, multi-use paths, and trails.
- Develop education/signage program to keep drivers alert for pedestrians and runners.

- Increased enforcement to deter hazardous driving behavior (speeding, weaving, drunk driving).
- Develop a snow removal program that prioritizes pedestrian safety.

Winter Camping

Winter camping had very low participation rates (3.9%) and was tied with other activities for lowest frequency (0.0%). Lack of time (62.9%) and lack of equipment (25.7%) were the primary impediments to participation, with the request for more time (63.9%) the clear leader in ways to improve the experience. The vast majority of users chose Outside of Mammoth (72.7%) for winter camping, with the Lakes Basin area (36.4%) coming in a distance second. While most drove (75.0%), it is worth noting that some users walked (16.7%) to their winter camping location.

The survey results clearly indicated that users need more time to participate in winter camping and that the most popular winter camping opportunities currently exist outside of the Mammoth Lakes area.

Potential winter camping improvements:

- Create better winter camping opportunities closer to where people live to decrease the effort necessary to participate.

Dog Sledding

Very low participation rates (2.1%) coupled with high frequency rates (50.0%) make dog sledding a unique winter activity that is practiced by a small, dedicated group. Lack of equipment (40.0%) is the critical impediment, although not enough time (33.3%) and not knowing others who dog sled (33.3%) were also factors. Comments by users indicated that skiers associated themselves with this group and they indicated that their sport is poorly understood and not adequately accommodated, which limited their use.

Having more time (38.5%) and coordinated events (38.5%) for dog sledding were the primary methods to improve the experience. The most popular locations for dog sledding were Outside of Mammoth (50.0%), the Lakes Basin area (33.3%), Shady Rest (33.3%), and Mammoth Scenic Loop (33.3%). Most users drove (50.0%) to their favorite location, although the "Other" category (33.3%) was sufficiently represented to perhaps indicate that dog sledding was used as a transportation method.

Dog-sledders need more time and better associations in order to further their sport in Mammoth. A small need existed for skijoring trails/facilities.

Potential dog sledding improvements:

- Study the potential for dog-sledding opportunities and events.

Disabled Recreation & Access

Disabled recreation occurred at very low levels (1.4%) and had moderate participation rates (25.0%). Participants scored three factors equally high in terms of restrictions on their involvement: poor trail conditions (33.3%), not enough time (33.3%), and not knowing others who participate (33.3%). The factors that could improve the user experience were

even more diverse: more time (33.3%), better access to trails (33.3%), more/better trail maps (33.3%), and more coordinated events related to disabled recreation (33.3%).

The Main Lodge/Mountain Portal (50.0%) was the highest scoring location, with eight other locations also having received mention including an individual comment for Chair 2. The majority of disabled recreationists drove (60.0%) to their desired access location.

Disabled recreationists needed better trail opportunities and the maps to accompany them to allow them to enjoy their sport. There was also a desire to network more among this user group to find other interested participants.

Potential disabled recreation & access improvements:

- Provide more trail opportunities for disabled recreationists.
- Provide better trail maintenance.

Ice Fishing

On par with dog sledding for participation (1.4%), no one (0.0%) indicates that they go ice fishing at least once a week. Lack of time (66.6%) scored twice as high as any other impediment to more frequent participation. The same held true for methods to improve the experience, with more time (66.7%) clearly more important than any other issue. The Lakes Basin area (50.0%) was the most popular site for anglers, with driving (83.3%) being the common method for users to access their ice fishing locations.

People participating in ice fishing need more time to better enjoy their activity.

Potential ice fishing improvements:

- Provide ice fishing opportunities closer to town so that people can more readily access their sport.

Equestrian Activities

No respondents indicated that they partook of equestrian activities during the winter (0.0%).

Biathlon

Neither survey captured information on winter biathlon (cross-country skiing and riflery), but it was discussed during the CAMP Winter process as an activity that could potentially be accommodated in the Lakes Basin. It was suggested that sponsored biathlon events could draw significant numbers of visitors. If an appropriate location is established, a variant including cross-country trail running and riflery could be supported in summer months.

Potential biathlon improvements:

- Work with the Forest Service to determine the feasibility of establishing a biathlon facility on USFS land.
- Study the potential economic benefits of hosting biathlon events.

3.6. Safety / Collision Analysis

In our surveys and discussions with users and Town officials, safety discussions consistently revolved around protecting residents and visitors from being struck by motor vehicles. The listening sessions and survey results revealed that residents are most concerned about safety when walking or bicycling on or near roadways. Concerns for pedestrian safety were particularly high in winter when snow, ice and a lack of sidewalks create additional hazards. Main Street was consistently called out as an area of concern by CAMP participants. The Mammoth Lakes Fire Department and the Mammoth Lakes Police Department were not available to participate due to previous commitments.

3.6.1. County of Mono Division of Emergency Medical Services

A memo from Mark Mikulicich – Mono County Paramedic Fire Rescue Chief – was provided as a follow-up to a CAMP: Winter listening session involving local law enforcement and emergency responders. Mr. Mikulicich reviewed statistics from the Mono County Fire/Rescue Department, in order to ascertain information that may identify "hot spots" or areas within the Town roads or trail systems that consistently produce calls for emergency services. The information was based on a five- year period (2003-2007). He determined that the only "hot spot" that can be identified is on the Main Path, between Sherwin Meadows and the exit of the trail at the south end of the industrial park. That area of trail includes steep sections with curves that have—in the past—produced several accidents (2-4) per summer season. However, he felt that the recent addition of warning signs (curve ahead, slow speed, etc.) have proven helpful in reducing both the consistency of accidents as well as the severity of injuries. Other areas of concern were major intersections in general, the lack of sidewalks on Main Street, and the crosswalks at the North Village. He felt that recently improved bus stops and signalized pedestrian crossing on Main Street had improved conditions significantly, but that sidewalks should continue to be expanded on Main Street. He also still had concerns about the crosswalk at the Village; connecting the Village with the parking lot to the east, his feeling was that it has all the makings of a trouble spot (high vehicular and foot traffic, pedestrians with ski/snowboard gear, and lots of driver visual distractions from Village infrastructure).

As another general rule, Mr. Mikulicich noted that pedestrian severity of injury goes up as speed goes up which is an indicator of the importance for sidewalks along major roads; which are busier and carry higher speeds. This is also an indicator of the importance of reducing in-town vehicular speed—especially in areas with high levels of pedestrian activity—through use of traffic calming design and law enforcement.

3.6.2. California Statewide Integrated Traffic Records System (SWITRS)

In order to supplement the safety information we received from stakeholders and local officials, we have obtained information on bicycle and pedestrian collisions from SWITRS. This dataset only includes collisions that have been reported and generally only captures collisions that occur on a public roadway and involve a motor vehicle. Collisions that have not been reported to the California Highway Patrol (CHP) do not show up in the database.

Despite its limitations, this data can help understand basic trends in bicycle and pedestrian safety and identify geographic trouble spots (i.e. Main St and Minaret Road).

The SWITRS data also conforms to public perception that pedestrian safety is a greater concern in the winter. Reported pedestrian/motor vehicle collisions between 2003 and 2007 primarily occurred in the winter months, suggesting that pedestrian safety is a greater issue during winter. This data does not include pedestrian injuries that have been sustained due to slipping and falling, though anecdotal evidence suggests that falling injuries may also be high during these months. While winter is clearly the most hazardous time for pedestrians, pedestrian/motor vehicle collisions have also occurred in July when snow and ice conditions are not present, suggesting that pedestrian safety needs to be addressed year-round.

The only bicycle/motor vehicle collisions reported to the CHP have occurred between May and September. Only one bicycle collision—in May 2003—occurred during "snowy or icy" roadway conditions. This should not be interpreted as evidence that bicycling is safer during winter months. Surveys suggest that concerns about winter bicycle safety lead to significantly reduced levels of on-street bicycle commuting during winter months. In addition to the reduced numbers of winter cyclists, any existing wintertime bicycling will likely be done only by experienced riders and with extreme caution. Since bicycle rentals are available only during summer months, the few cyclists who ride in the winter will also tend to be on familiar equipment, which also reduces the probability of injury.

CHAPTER 4. FUTURE TRAIL SYSTEM RECOMMENDATIONS

This chapter provides recommendations for the Town of Mammoth Lakes that will enhance the in-town network of multi-use paths, trails and bikeways and improve access to trails and backcountry experiences beyond the Town's urban growth boundary. Many of the recommendations are derived from existing plans and studies including:

- Mammoth Lakes Trail System Plan (1991)
- General Bikeway Plan (1995-2008)
- Physical Development and Mobility Study (2006)

Some of the recommendations from the above plans were either modified or not brought forward due to feasibility issues or because there were opportunities for superior projects. Additional recommendations were derived through a needs analysis (Chapter 3), the identification of gaps in the existing system, and the consultant's experience with best practices in trails planning and non-motorized transportation. The future trail system recommendations will fall under the following categories:

1. General Recommendations
2. Major Activity Centers and Recreation Nodes
3. Paved Multi-Use Paths
4. Crossing Improvements
5. On-Street Bikeways
6. Interface between Soft-Surface Trails and Paved Facilities
7. Pedestrian Facilities
8. Bicycle Parking
9. Soft-Surface Trails (also see Attachment A)
10. Education, Encouragement and Enforcement Programs
11. Accessibility
12. Long Term Vision

The recommendations in this plan do not address opportunities that may arise within new developments and Neighborhood District Plans. TOML should aggressively pursue additional opportunities for the further development of multi-use paths, bikeway, trails and trail access easements as they arise. The maintenance chapter will include all operations and maintenance-related recommendations.

A number of the recommendations in this Chapter make reference to standards for naming conventions, design, and management and maintenance of facilities within the MLTS. All such developed standards shall reside in the MLTS Standards Manual, and projects identified in this TSMP implemented in accordance with them.

4.1. General Recommendations

Recommendation G1: Consistent Naming Conventions

In order to ensure that the trails network is navigable and user-friendly, it is imperative that the naming conventions used are consistent, concise and descriptive. This applies especially to the naming of nodes, pathways and trails. The names of nodes should be brief while providing a first-time user with an idea of the geographic features or experiences that can be accessed from that node. Names with descriptors such as "Lake George", "Mill City", "Earthquake Fault", or "Mammoth Creek" accomplish this, while "Sawmill Cutoff Winter Road Closure" and "Barrow Pit/ Kerry Meadow Access at Sherwin Creek Road" do not. Also, the terms "path" and "trail" should NOT be used interchangeably. The term "path" should be used to describe only paved off-street facilities that can be classified as Class I Bike Paths/Multi-Use Paths. Facilities constructed with decomposed granite may also be called "paths". "Trail" may be used generally to describe all paved and unpaved facilities as part of a single system (i.e. "trail system" or "trails master plan"). When used specifically, the "trail" should only describe unpaved facilities using natural or soft-surface materials. "Trail" may also be used to describe wooden boardwalk facilities through environmentally-sensitive areas.

On-street bikeway facilities should be identified using their descriptive terms rather than their technical classifications used in the California Highway Design Manual (i.e. Class I, II, & III). This means using only the terms "bike lanes" and "bike routes", rather than "Class I" and "Class II" facilities. The use of classifications is problematic for many reasons. First of all, the technical bikeway classifications are non-descriptive and provide no clue as to what that facility looks like on the ground. The standard signage for these facilities say "bike lane" and "bike route", not Class I and Class II. Secondly, they infer that some classes of facility are inherently superior to others in terms of level of service to cyclists, when the true level of service can be determined only by context, not facility type. Thirdly, these classifications are only used in the State of California and will be unfamiliar to most other national and international visitors. The classifications are widely misunderstood even in California, and should only be used internally if necessary for engineering purposes.

"Bikeways" is a general term that encompasses all types of bicycle infrastructure. The term is best used when discussing different types of facilities in plurality or at the system level.

A sidewalk should only be called a "sidewalk", unless it has been built to the standards of a Class I Bike Path facility per the California Highway Design Manual, in which case it should be called a "path" or "multi-use path". Also see Signage and Wayfinding (Chapter 5).

Table 4-1. Naming Conventions

CATEGORY / Type	DEFINITION / Suggested Naming Conventions
RECREATION NODES	GENERAL TERM USED TO DESCRIBE A GEOGRAPHIC LOCATION WHERE A TRAIL EXPERIENCE BEGINS OR ENDS, OR WHERE A JURISDICTIONAL OR EXPERIENTIAL TRANSITION OCCURS.
Portal	Facility / location name only or facility / location name (Ex. "Main Lodge")
Park	Official Name of Park; (Ex. "Mammoth Creek Park West")
Trailhead	Short Descriptor + "Trailhead"; (Ex. "Lake George Trailhead")
Access / Egress Point*	Location Descriptor such as street or neighborhood name + "Access"; (Ex. "Tamarack Street Access" or "Mammoth Knolls Access")
GIC Point**	Use GIC naming convention
BICYCLE FACILITIES	GENERAL TERM USED TO DESCRIBE ALL TYPES OF BICYCLE-RELATED INFRASTRUCTURE IMPROVEMENTS INCLUDING ON-STREET FACILITIES, OFF-STREET FACILITIES, AND BICYCLE PARKING.
BIKEWAYS	GENERAL TERM USED TO DESCRIBE LINEAR BICYCLE FACILITIES. INCLUDES MULTI-USE PATHS. DOES NOT INCLUDE BICYCLE PARKING.
Bike Path (Class I) / Multi-Use Path	Descriptor + "Path"; (Ex. "Main Path", "Shady Rest Park Path")
Bike Lanes (Class II)	Road name + "Bike Lanes"; (Ex. "Minaret Road Bike Lanes")
Bike Route (Class III)	Road name + "Bike Route"; (Ex. "Majestic Pines Drive Bike Route")
PEDESTRIAN FACILITIES	GENERAL TERM USED TO DESCRIBE INFRASTRUCTURE IMPROVEMENTS FOR PEDESTRIANS.
Promenade	Descriptor + "Promenade"
SOFT-SURFACE TRAILS	TRAILS DEVELOPED USING SURFACE MATERIALS THAT DO NOT INCLUDE CONCRETE OR ASPHALT PAVEMENT AND ARE GENERALLY "SOFT", ALTHOUGH WOOD OR ROCK ARMORING MAY BE USED IN SOME CIRCUMSTANCES.
All Types	Short Descriptor + "Trail"; (Ex. "Mammoth Creek Trail", "Sherwin Trail")

*Some access/egress points will be intended for local use only and will not be published on public trail maps. In these cases, the access point naming will be relevant only for local signage and/or official operations and maintenance purposes.
**The GIC database should be updated to conform to the public or internal naming conventions used for all official recreation node types including portals, parks, trailheads, and most access/egress points. Official access/egress points that will not show up on public materials may retain the original GIC point name.

Recommendation G2: Updated Trail Maps

User-friendly summer and winter trail maps should be developed and updated annually, if new facilities have been added since the previous printing. The trail maps should include information on trails and bikeways, trail access, safety information, local trail resources, phone number to report hazards or maintenance issues, etc. Because of the greatly differing geographic scales of different activities and groups, it will be necessary to provide different maps to address different activities. For example, some recreational activities can take place almost entirely within the UGB or Town Boundary (day hikes, family bike rides, Nordic Skiing, etc), while other activities cover a larger geographic area (road bicycling, OHV/OSV, backpacking, etc.). Based on issues of scale and survey responses, it appears that the most effective approach would be to produce a series of detailed maps addressing each of the major summer and winter activity categories. In addition, either less detailed consolidated maps can be created for each season; or a booklet with a series of smaller maps dedicated to each activity can be produced to provide visitors and residents with a broad overview of the various trail-related activities in each season.

Recommendation G3: Uniform Trail Signage

All multi-use paths and soft-surface trails should have uniform signage.[8] "Trail guide signs" should be used at all trail intersections or other locations where there may be confusion caused by unofficial trails or where the intended path becomes less apparent. "Assurance markers" should also be developed and placed periodically along all official trails. These markers should have unique identifiers that can be used by emergency responders to locate trail users in need of assistance. Identifiers should be easy to remember –color coding and the use of mileage—would be better than placing more complex information such as GPS coordinates. Once in place, the GPS coordinates for each unique assurance marker can be placed in a database for use by emergency services. The following section on recreation nodes will provide a recommendation for uniform nodal signage. The signage and wayfinding chapter (Ch. 5) developed by Corbin Design provides a more detailed analysis and recommended designs for most recommended signage types. Assurance markers will have to be designed separately. It should be noted that signage and wayfinding programming will be taking place in a multi-jurisdictional environment and that specific and documented buy-in by the various partners will be necessary in advance of an engaged effort for developing and implementing a system.

Recommendation G4: Interpretive Signage

In addition to the uniform trail signage designed to provide wayfinding and trail-specific information, more customized interpretive signage should also be developed for the trail system. The first step in this process should be the identification of locations along trails within the UGB which provide the best opportunities for interpretive signage. Some examples include the bridge in Mammoth Creek Park west, and the northeast terminus of Lake Mary Path. Once the sites and general subject matter of the interpretive installations are identified, the process of designing the interpretive signage installations should begin. The design process should involve the community at large and professionals with expertise in the selected subject matter. The information provided at each interpretive installation should be based on the experiences, knowledge and interests of its expected audience.

Recommendation G5: Trail-Oriented Development (TrOD)

Trail-oriented development is an emerging concept formulated to make trails more useful for transportation and to link them with jobs and typical economic activities. While "trail" is used here as a general term, TrOD tends to focus on development opportunities along paved multi-use paths. It is an alternative to typical auto-oriented development—and similar to pedestrian-oriented development—in that it requires that public access be provided and encouraged between paved pathways and adjacent development.

One way to encourage TrOD is to use overlay zoning or use-permit requirements along a trail corridor that requires property owners to maintain and enhance access between a multi-use path and surrounding land uses. This should include, but not be limited to, connections between the trail and any future roadways and residential developments adjacent to the path. Urban design guidelines for the "trail zone" can require new development to be physically oriented toward the path by providing—at a minimum—a secondary entrance with a

[8] All signage within the Snowcreek Master Plan shall be in accordance with the Snowcreek Master Plan, which is not superseded by the Trail System Master Plan.

connecting footpath and bicycle parking that faces the trail. Guidelines should prohibit developments that "turn their back" to the multi-use path by placing fencing between the path and the development or by placing undesirable elements such as dumpsters on the trailside end of the property.

In the Town of Mammoth Lakes, opportunities for TrOD include the Neighborhood District Planning (NDP) process and upcoming developments. The Community Development Department should require TrOD in NDPs for parcels adjacent to existing for future MUPs. The new Civic Center should encourage non-motorized access by providing entrances with bicycle parking facing the Main Path segment at the northern end of the development. Entrances to the Mammoth Crossing development at the southeast corner of Minaret and Lake Mary Road should be oriented toward the Lake Mary Road Path and provide high quality and visible bicycle parking for summertime path users. Other opportunities are largely situated on the eastern end of Town where the Main Path traverses institutional, public and industrial areas.

Recommendation G6: Pedestrian-Oriented Development

Improving the pedestrian environment can improve overall mobility and create a more seamless transition between the recreational experience and in-town economic activities. Pedestrian-oriented developments have buildings that are situated adjacent to the sidewalk and parking that is situated behind the building and away from the major thoroughfares. Main entrances are sidewalk adjacent and do not require pedestrians to walk through car parking areas to enter a building. Sidewalk-adjacent outdoor seating is another typical element of pedestrian-oriented development. The Village at Mammoth is an example of pedestrian-oriented development. The Minaret Village Mall is an example of auto-oriented development. The General Plan already calls for pedestrian-oriented development and a series of explanatory photos and illustrations are available in the General Plan's appendices.

Recommendation G7: Data Management

Accurate Geographic Information Systems (GIS) and user data is key to the ongoing development and maintenance of the Mammoth Lakes trail system. Currently, several agencies and organizations including TOML, Mono County, USFS, and MLTPA create and maintain trails-related data for the region. At a minimum, the Town/County databases should be updated on a regular basis. However, the development of an integrated, cross-jurisdictional database of trails-related data should be considered to facilitate and promote the inter-jurisdictional cooperation required for the ongoing development and maintenance of the trails network. Legacy data should be developed and archived wherever possible in order to track historical trail alignments.

Recommendation G8: Design Guidelines

The Town of Mammoth Lakes should revise Public Works Standard Plans as needed to ensure consistency with the Design Guidelines described in Chapter 6 of this Trail System Master Plan.

Recommendation G9: Trail and Mobility Needs

The recommended trail system provides both recreational and mobility benefits. However, access to the trail system is part of a larger mobility issue and should be addressed in all

facilities should be considered by the Town Council and its Commissions for inclusion in future mobility planning efforts.

Recommendation G10: Future Access Easements

The Town of Mammoth Lakes should study the potential to acquire additional easements to improve recreational access to public lands. An analysis of land ownership and recreational access potential at all GIC points along the UGB would be an important first step in this process. Consistent with the Municipal Code (Subdivision Ordinance Section 17.32.160) and as supported by the finding made in the adoption of that Code section, the Town may require dedication of easements for public access for trails and other facilities identified in this TSMP or other adopted policy documents as a condition of approval associated with approval of a tentative map.

Recommendation G11: Trail Coordinator

The Town of Mammoth Lakes should consider the creation of a Trail Coordinator position. The Trail Coordinator's responsibilities could include oversight for the implementation of this Trail System Master Plan, ensuring that all future planning and infrastructure development efforts in the area are consistent with this Trail System Master Plan, and coordinating with relevant partner agencies and organizations.

Recommendation G12: Coordination with Local Non-Governmental Organizations

The Town of Mammoth Lakes should seek opportunities to form partnerships with local non-governmental organizations that may be able to assist in the planning, development and/or maintenance of the trail system.

Recommendation G13: Summit Process

Through the public comment process of this plan it became evident there were key issues that could not, and probably should not, be resolved through this document. The concept of summits is being proposed as a means of engaging the community, including users, policy-makers and advocates, in a process to address and resolve these key issues.

Key issues identified for winter summits include pedestrian-friendly snow management of trails and sidewalks, Nordic system development and programming with jurisdictional support, and snowmobile access within the UGB and beyond. Summer summit issues include soft-surface trail development, motorized access within the UGB and beyond, equestrian system trail development and hiking trail development.

The summits intend to address these issues individually. The process will explore perceived conflicts and their reality, review interface issues, identify opportunities for improved experiences and determine resolutions and/or potential policies as needed.

The structure of the summits will include public discussions that will review existing conditions and the identification of issues contained within these conditions, develop concepts for potential resolution to constraints, form consensus and/or agreements to pursue and identify action steps for implementation of resolution.

It is anticipated that the summits will be hosted by the Town with outreach and facilitation support provided by MLTPA. A final list of summits will be developed early winter 2009

with convening of summits to begin shortly thereafter. Results of summits may be incorporated as amendments to the Trail System Master Plan as necessary.

Recommendation G14: Action Plan

Develop a detailed action plan for the implementation of the Mammoth Lakes Trail System. The plan will be integrated and coordinated with the 5-year Capital Improvement Plan (CIP), and will include prioritization and phasing of all MLTS projects and programs, detailed cost estimates of near term projects, identification of funding sources to be pursued for each project, and a description of the roles and responsibilities of each partner in the implementation and management of the trail system.

Recommendation G15: Trail System Management MOU

Develop a management partnership through any appropriate combination of informal and/or formal agreement(s) or other governance structure, e.g., amendment to the MLTPA MOU, clearly identifying roles and responsibilities of each of the participating agencies for the further development and management of the Mammoth Lakes Trail System. The action plan (or sections thereof) identified in Recommendation G14 may be referenced and included as an attachment to any such agreement(s).

Recommendation G16: Mammoth Lakes Trail System (MLTS)

Recognize and support—through technical support, funding, inter-jurisdictional cooperation, and adherence to uniform standards and conventions—the development of an integrated regional Mammoth Lakes Trail System that incorporates the components identified in this Trails System Master Plan. The components and boundaries of this system will be developed in cooperation with the USFS/INF and other relevant jurisdictional partners.

4.2. Major Activity Centers and Recreation Nodes

Many of the projects listed in later sections of this chapter will have a direct impact on access to the Town's activity centers and recreation nodes. This section summarizes those improvements and recommends projects that are specific to individual recreation nodes.

4.2.1. Activity Centers (Summer and Winter)

This chapter provides a series of recommended improvements, many of which will impact activity centers including sidewalks, multi-use paths, bikeways, bicycle parking, and others. The recommended projects have been developed with the understanding that improving non-motorized access to activity centers is necessary to promote "feet-first" mobility and to enhance the recreation experience in the Town of Mammoth Lakes. Providing access to activity centers from the larger trails network will create possibilities for in-town, short-distance recreation, and linked recreational/utilitarian trip-making. Because of their year-round importance and their location within the Town's urban growth boundary, activity centers will be evaluated for their current accessibility via walking, bicycling, transit and/or cross-country skiing. The details of each project are located in the following sections.

4.2.2. Recreation Nodes

The recommended improvements in this section will positively impact recreation nodes in two ways. The addition of bicycle, pedestrian and trail facilities will connect nodes to the Town's network of non-motorized infrastructure and improve "feet first" access to and from nodes. This section focuses on the addition of amenities such as signage, restrooms, bus stops and parking, which will enhance the user experience by making the nodes more user-friendly. **Tables 4-2** and **4-3** show existing and future amenities improvements at each summer and winter recreation node.

Recommendation N1: Nodal Typing

Adopt the nodal typologies of portal, park, trailhead, access/egress point and GIC point as defined in **Figure 4-1**. A process for formal adoption of the nodal system needs to be identified in advance of implementation. This process will require interagency coordination and/or official recognition by the jurisdictional and signatory partners of the MLTPA MOU.

Figure 4-1. Recommended Nodal Typing

Portals are the most developed form of recreation node and include all the amenities of trailheads including lodging and restaurants. Because portals will tend to generate significant activity, all portals should be served by frequent public transportation in order to discourage traffic congestion, mitigate greenhouse gas emissions and reduce other forms of transportation-related pollution.

Parks are self-contained recreation facilities that generally include the same amenities (parking, restrooms, trash/recycling) as a trailhead. Since all parks operated by the Town of Mammoth Lakes—except Whitmore Park—provide access to existing trails, parks essentially serve as trailheads with the additional amenities unique to each individual park.

Trailheads should provide—at a minimum—automobile and/or bicycle parking facilities, trash/recycling, restrooms and signage. Trailheads should be served by public transportation during the seasons in which they are open.

Access/egress points are intended to include locations that have the same characteristics as a GIC point, but have been formalized so that access there is legal and/or regularly maintained by a public or private entity. The basic elements of an access/egress point should include signage and a clear passageway sufficient to accommodate the intended users. These locations may or may not include low-impact amenities such as a source of drinking water or limited parking. Whether or not access/egress points are included on trail maps should be determined by the entity responsible for the maintenance of that location.

GIC points are the basis for recreation nodes and may include any official or unofficial locations where a recreational transition occurs. This transition can include parking a car or disembarking from another mode of transportation in order to engage a recreational activity. The transition may also be a transition between jurisdictional boundaries or between types of experiences (i.e. urban and rural, paved to unpaved). All recreation nodes have an associated GIC point, but not all GIC points are official recreation nodes.

Note: These nodal types and definitions are subject to change and will be defined in more detail in the forthcoming Mammoth Lakes Trail System Standards Manual.

Recommendation N2: Naming of Recreation Nodes

Promptly following the adoption of this plan, the Town of Mammoth Lakes should work with the Forest Service and MMSA to begin adopting official names for each recreation node. These names will be used on all signage and public informational materials. GIC point names should be updated to reflect official names for consistency.

Recommendation N3: Uniform Nodal Signage

Promptly following the adoption of this plan the Town of Mammoth Lakes should work with the Forest Service and MMSA to begin providing uniform signage at all identified recreation nodes. The "Portal Identification Marker" should be used at all portals, parks and trailheads and should be placed on all approaching roadways and paved multi-use paths. These signs are large and oriented toward motorist or paved path users to alert them to the location of major nodes where automobile parking and restroom facilities are provided. The "Trail Information Kiosk" should be used at all portals, parks, trailheads, and access/egress points. However, the "Trail Information Kiosks" are designed at a scale where they can only be viewed by trail users and should be located at the points where trails begin. In some cases there will be multiple trails beginning at different locations around a single portal, park or trailhead. In these cases, "Trail Information Kiosks" should be located at the beginning of each trail.

Figure 4-2. Signage at Recreation Nodes

Portal Identification Marker



To be used at entrances to all Portals, Parks, and Trailheads (oriented toward motorists and paved path users)

Trail Information Kiosk



To be used at the point where a trail begins (oriented toward trail users only)

Images provided by Corbin Design

Other types of signage such as "Trail Guide Signs" and "Assurance Markers" will be used along the trails themselves, but not necessarily at recreation nodes. Many of the recreation nodes—especially portals—have existing unique signage that will need to be maintained. Uniform nodal signage should be sited in such a way that it does not interfere with—or get lost among—existing signage. Detailed designs for all signage types can be found in Chapter 5: Signage and Wayfinding. An inventory of existing trail signage should be conducted in advance of implementation of any new system.

Recommendation N4: Public Transit Access to Recreation Nodes

Bus/trolley stops should be provided at or near all active summer and winter recreation nodes in order to improve mobility, alleviate congestion, and reduce demand for parking.

Bus service may not be feasible at smaller access/egress points such as Tamarack Street. In addition, seasonal demand at some locations may not be justified due if the predominant activities at that location are not well-suited to public transport (i.e. major motorized or equestrian nodes). Given the limited resources for the provision of transit service, transit schedules and routes should be adjusted according to changes in demand at recreation nodes.

Recommendation N5: Summer Recreation Nodes

The following summer recreation nodes should be enhanced through the provision of the amenities described in **Table 4-2**. Existing amenities are marked with an 'X' and recommended future amenities are marked with an 'F'.

Table 4-2. Recommended Amenities at Summer Recreation Nodes

GIC	Name / Description	Node Type	lodging	restaurant	parking	restroom	lift	bus	trail access	signage
46	Main Lodge (MMSA)	Portal	X	X	X	X	X	X	X	F
191	North Village (MMSA)	Portal	X	X	X	X	X	X	X	F
36	Tamarack Lodge (MMSA)	Portal	X	X	X	X		X	X	F
195	Community Center	Park			X	X		F	F	F
134	Mammoth Creek Park, East	Park			X	X		X	X	F
152	Mammoth Creek Park, West	Park			X	X		X	X	F
97	Shady Rest Park	Park			X	X		F	X	F
193	Trails End Park	Park			X	X		F	X	F
88-90	Coldwater Campground	Trailhead			X	X		F	X	F
42	Earthquake Fault	Trailhead			X	X		F	X	F
80	Horseshoe Lake	Trailhead			X	X		X	X	F
86-87	Lake George	Trailhead			X	X		F	X	F
163	Sherwin Creek Road, USFS gravel borrow pit	Trailhead			F	F		F	X	F
64	Sierra Blvd at Forest Trail	Trailhead			F	F		F	X	F
124	Welcome Center	Trailhead			X	X		F	X	F
38	MMSA at Austria Hof parking lot	Access/Egress							X	F
14	Eagle Lodge – temp (MMSA)	Access/Egress	X	F	X	F	F	X	X	F
41	Lake Mary Bike Path NE Terminus	Access/Egress				F		F	F	F
27	Tamarack Street	Access/Egress							X	F
34	Twin Lakes Parking	Access/Egress			X			F	X	F
21	Uptown/Downtown	Access/Egress						X	X	F

X – Indicates an existing amenity
F – Indicates a future (recommended) amenity

Map 4-1. Recommended Summer Recreation Nodes and Facilities (UGB & Beyond)

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The new master plan for **Mammoth Creek Park East** facility should include restrooms and enhanced trail access.

The **Lake George** and **Coldwater Trailheads** are not visible on the map.

The **Trailhead** at **Sierra Boulevard** and **Forest Trail** will benefit from the construction of a sidewalk on the north side of Forest Trail. The curb and gutter will help to prevent unauthorized vehicular parking on the shoulder. While limited vehicular parking may be provided, roadside parking prohibitions in conjunction with bus service will facilitate public access without attracting more automobile traffic to the neighborhood.

Recommendation N6: Winter Recreation Nodes

The following winter recreation nodes should be enhanced through the provision of the amenities described in **Table 4-3**.

Table 4-3. Amenities at Winter Recreation Nodes

GIC	Name / Description	Node Type	lodging	restaurant	parking	restroom	lift	bus	trail access	signage
13	Canyon Lodge (MMSA)	Portal	X	X	X	X	X	X	X	F
14	Eagle Lodge – temp (MMSA)	Portal	X	X	X	X	X	X	X	F
46	Main Lodge (MMSA)	Portal	X	X	X	X	X	X	X	F
36	Tamarack Lodge (MMSA)	Portal	X	X	X	X		X	X	F
191	North Village (MMSA)	Portal	X	X	X	X	X	X	F	F
195	Community Center Park	Park			X	F		F	F	F
134	Mammoth Creek Park, East	Park			X	F		F	X	F
152	Mammoth Creek Park, West	Park			X	X		F	X	F
97	Shady Rest Park	Park			X	X		F	X	F
193	Trails End Park	Park			X	X		F	X	F
42	Earthquake Fault	Trailhead			F	F		F	F	F
44	Power Plant	Trailhead			F	F		F	F	F
192	Shady Rest / Saw Mill Cutoff Road	Trailhead			X	F		F	X	F
163	Sherwin Creek Road, USFS gravel borrow pit	Trailhead			F	F		F	X	F
124	Welcome Center	Trailhead			X	X		F	X	F
35	Lake Mary Rd winter terminus	Access/Egress			X			F	X	F
158	Path along Snowcreek V fence line	Access/Egress							F	F
28	Mill City	Access/Egress			X			F	X	F
64	Sierra Blvd @ Forest Trail	Access/Egress						F	F	F
27	Tamarack Street	Access/Egress							F	F
52	Sledz, fee based	GIC Point			X	X	X	X		

X – Indicates an existing amenity
F – Indicates a future (recommended) amenity

MMSA trail access from the **North Village Portal** is currently available via the gondola. The proposed ski back trail would provide MMSA egress (return to North Village) for winter users. Signage improvements for MMSA portals require coordination between MMSA and TOML.

A restroom facility at the **Community Center Park** currently exists, but is closed in winter. Bus service on Forest Trail could serve the community center in addition to the stop near Minaret Road and Forest Trail.

Many of the amenities recommended for the **Earthquake Fault Trailhead** currently exist, but are closed or inaccessible during winter. Snow removal and winter maintenance are required to provide winter access.

Map 4-2. Recommended Winter Recreation Nodes and Facilities (UGB & Beyond)

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The amenities recommended for the **Power Plant Trailhead** will facilitate trail access and provide additional staging opportunities for snowmobilers and cross country skiers.

At **Shady Rest / Saw Mill Cutoff Road,** restrooms should be open and maintained in the winter. Additional options for modifications in the Shady Rest area can be found in the Winter Trails discussion at the end of this chapter.

Existing signage should be upgraded as part of the upgrades for the trailhead at the **Lake Mary Road winter terminus**.

The development of a year-round trailhead on **Sherwin Creek Road** requires moving the road closure south from GIC 151 to GIC 163 (the Barrow Pit/Kerry Meadow access). Restrooms and parking should be available year-round.

Recommendation N7: Future Nodal Designations

The Town of Mammoth Lakes should work with the Forest Service to adopt a process to assign the recommended designations of existing nodes and for designating new recreation nodes.

Recommendation N8: Updates to the GIC Database

The GIC database should be continually updated to reflect the latest inventory and status of relevant point-based geographic data in the area. Activity centers as defined in the plan should be included and updated and new activity centers are identified by TOML and partner agencies. Destinations should be defined and added to the database for standardized use in all recreation based mapping. Whenever, a GIC point is renamed and/or becomes officially recognized as a recreation node, the GIC should be updated to reflect that change.

4.3. Paved Multi-Use Paths

Mammoth Lakes' unique geographic location and dramatic seasonal variations offer unique opportunities for paved multi-use paths. Winter mobility and recreational activities will require a variety of maintenance procedures tied to desired system outcomes, including winter walking, snowshoeing, and/or Nordic activities. Bicycling is one of a number of popular summertime recreational activities in Mammoth Lakes, and since the Town itself is no more than three miles across and with most in-town trip distances less than two miles, bicycling could also become a practical form of year-round mobility, although the safety and maintenance realities of winter travel on bicycles on paved multi-use paths must be considered. The following recommendations will enhance the in-town environment for recreational and transportation purposes on paved multi-use paths during all seasons. Several of the projects listed below are carried forward from the 1991 Trail System Plan and the 2008 General Bikeway Plan.

Recommendation MUP1: Near-Term MUP Projects

Near-term projects are those which are funded, designed, and/or under construction. Continue to pursue rapid implementation of all near-term MUP bikeway projects as planned or under construction. **Table 4-4** lists near-term projects scheduled to be completed over the next two years, which will add over six miles of multi-use path.

Table 4-4. Near-term Multi-Use Path Projects

Street	Start	End	Length (ft)	Length (mi)
Lake Mary Road Path[1]	Canyon Blvd	Horseshoe Lake	27,984	5.30
Old Mammoth Rd (Main Path 4b)	Ski Trail	Minaret Road	2,521	0.48
Waterford Bridges[2]	Main Path	Main Path	1,499	0.28
Sherwin / North St Bridge	Main Path	Sherwin / North Street	105	0.02
		TOTAL		6.08

1. The Lake Mary Road Path was not identified in the Trail System Plan. The General Bikeway Plan called for bike lanes on Lake Mary Road.
2. Carried forward from the 1991 Trail System Plan. Length calculation for Waterford project.

Figure 4-3. Lake Mary Path under construction



The Lake Mary Path construction included roadway widening. (Note: Uphill bike lane for road bike use will be provided on the shoulder.)

Recommendation MUP2: Complete the Main Path Loop

Completing the Main Path "loop" should be a priority. Two of the near-term projects identified in **Table 4-4** (Old Mammoth Road 4b and the Waterford Bridges) will close key gaps in the Main Path. The final alignment of the loop varies slightly from those identified in the 1991 Trail System Plan, but the Main Path loop will be nearly complete.

The key remaining gap from the 1991 Trail System Plan will be **Main Path Segment 4a** between Mammoth Creek Park and Minaret Road which includes the tunnel under Minaret.

Another key project—though not identified in the 1991 plan—is the **Lodestar Drive Connector** between the northern terminus of the Lodestar Path and Hidden Valley Road, as it will create a connection to the Lake Mary Road Path and from the western end of the Main Path loop.

Table 4-5. Main Path Gap Closure Projects

Name	Start	End	Length (ft)	Length (mi)
Main Path (4a)[1]	Mammoth Creek Park	Minaret Road	921	0.17
Lodestar Extension	Majestic Pines Drive	Hidden Valley Road	441	0.08
		TOTAL	1362	0.25

1. Carried forward from the 1991 Trail System Plan.

Bike lanes are recommended on Main Street in the next section as an interim solution for closing that key gap in the paved path system. The installation of promenades (10' sidewalks) intended to serve both bicyclists and pedestrians will happen in a piecemeal fashion over the medium to long term, but may lead to conflicts and at-grade crossings and driveways with pedestrians, which may be resolved through an overall reconfiguration of the cross-section and improved access management, as envisioned in the Downtown Concept for Main Street..

Recommendation MUP3: In-Town Multi-Use Path Connectors

Multi-use path connectors can reduce the distance of trips while improving mobility and providing enjoyment for non-motorized users. The Town of Mammoth Lakes should pursue opportunities for non-motorized connectors in new development projects, especially in locations that provide shortcuts connecting residential, civic and commercial land uses. Areas where bikeways or low-volume vehicular streets end are generally advisable locations for multi-use path connectors because they will improve non-motorized connectivity without bringing additional vehicular through-traffic to an area.

Table 4-6. In-Town Multi-Use Path Connectors

Name	Start	End	Length (Feet)	Length (mi)
College Connector	Sierra Park Road	Main Path	3,769	0.71
Elementary School Connector	Meridian Boulevard	Main Path	2,275	0.43
Industrial Park Connector	Elementary School Connector	Commerce Circle	426	0.08
Mammoth Creek Park Connector	Meadow Lane	Main Path	602	0.11
Manzanita Connector	Manzanita Road	Hidden Creek Development	480	0.09
MCWD Access	Main Path	MCWD Facility	677	0.13
Additional Long-Range and Conceptual MUP Projects				
Lodestar to Bear Lake Connector	Lodestar Connector	West Bear Lake Drive	1,601	0.30
Hidden Valley to Minaret Connector	Hidden Valley Road	Minaret Road	589	0.11
Center Street to Hidden Creek Connector	Center Street	Hidden Creek Connector	430	0.08
Manzanita to Tavern Connector	Manzanita	Tavern Road	1,140	0.22

Name	Start	End	Length (Feet)	Length (mi)
Manzanita Path	Main Street	Meridian Boulevard	3,044	0.58
North Village to St. Anton Connector	East of Minaret	St. Anton Circle	872	0.17
Eagle Path	Eagle Lodge	Lake Mary Road	3,964	0.75
		TOTAL	19,869	3.76

Connectors should be built to the same standard as Class I bike paths per the Caltrans Highway Design Manual (see Chapter 5). The benefit of these connectors is to provide continuity between on-and off-street bicycle facilities and to provide safe shortcuts to key locations for bicyclists and pedestrians. All multi-use path connectors within the UGB should be cleared for winter mobility, unless they connect directly to a groomed facility, in which case they may be either groomed or cleared.

TOML should also enter into easement discussions with property owners to discuss opportunities for purchasing easements to allow for the development of the following additional MUP connectors not listed in **Table 4-6** or shown on the maps.

A **Sierra Valley East-West Connector** would connect the Sierra Valley sites with Old Mammoth Road and could potentially build on the existing easement used to the Manzanita Connector listed in **Table 4-6**.

A similar connection should also be explored through the Sam's Woods site. This **Sam's Woods Connector** would link Minaret Road to Hidden Valley Road and eventually to Majestic Pines Drive and the existing Lodestar Drive and MUP segment.

A **Camp High Sierra Connector** would convert the existing Camp High Sierra Drive (dirt road) to a multi-use path connecting the Lake Mary Path to Majestic Pines Drive and Pinehurst Road. An alternative to this connection could be made via **Tyrol Lane**.

Additional Long-Range and Conceptual MUP Projects:

Development of the Draft TSMP occurred simultaneously with district planning for some areas of town, or preceded completion of other district planning efforts. Through district planning, a number of conceptual trails alignments were identified, which may be appropriate for inclusion in the TSMP. In all cases, these alignments are considered conceptual, and would be subject to further review and refinement through more detailed planning, design and community discussion to determine their feasibility and priority. A number are also dependent on further site planning in conjunction with specific development applications.

These conceptual alignments key to, and are shown on Map 4-9 through 4-12.[8]

MUP 3-7: Lodestar Drive to Bear Lake Connector
Rationale: Pedestrian connection to be developed in conjunction with Lodestar/Sierra Star Master Plan. Included in Mobility Diagram and South Districts Neighborhood District Plan.

[8] These maps were developed in conjunction with the Trails System Master Plan Environmental Impact report, to show the complete scope of potential future trails projects that could be developed in the future.

This is a conceptual alignment only with precise alignment to be determined with development of Lodestar Master Plan.

MUP 3-8: Hidden Valley to Minaret Road Connector
Rationale: Improved pedestrian connectivity between Hidden Valley residential neighborhood and Minaret Road pedestrian and bike facilities. Included in Mobility Diagram as conceptual connection, and in North Village Neighborhood District Planning Study. This is a conceptual alignment only, with precise alignment to be determined with development of properties in the southwest part of the NVSP Area.

MUP 3-9 and 3-10: Shady Rest Tract Connectors
Rationale: Provide formalized pedestrian connections through Shady Rest Tract to connect future residential development and existing Sierra Valley Sites to Downtown District and to Main Street, via existing connector from Manzanita Road. Included in Downtown Concept for Main Street. This is a conceptual alignment only, with precise alignment to be determined with development of Shady Rest Master Plan.

MUP 3-11: Manzanita Road MUP
Rationale: Improve pedestrian safety along Manzanita by providing a separate ped/bike facility along one side of the street. Included in Mobility Diagram. (Note: This concept may be revised or eliminated pending outcome of Sierra Valley NDP)

MUP 3-12: North Village to St. Anton Connector
Rationale: Create a formal pedestrian/bike connection via Town-owned parcel to connect Community Center Park/Forest Trail to Knolls neighborhood at St. Anton Circle. Included in Mobility Diagram and North Village Neighborhood District Planning Study. (Note: an existing informal path exists through this property, but additional right-of-way would be needed to construct a full width Multi-Use Path in this location).

MUP 3-13: Eagle Path
Rationale: Create summer only pedestrian/bike connection from Eagle Lodge to Lake Mary Road. Included in Mobility Diagram and 1991 TSMP.

Recommendation MUP4: Multi-Use Paths Outside the UGB

The Town, with its partners should implement the following multi-use paths outside the UGB. The following projects were identified in the 1991 Trail System Plan as "Future/Alternative" paths..

Table 4-7. Multi-Use Path Extensions Outside the UGB

Name	Start	End	Length (Feet)	Length (mi)
Shady Rest Park Path Extension	N Terminus of Shady Rest Path	Welcome Center	6,769	1.28
Forest Trail to Shady Rest Connector	Forest Trail	Shady Rest Park Path	2,792	0.53
Knolls Path (south route)	Community Center Park	Shady Rest Path at Sawmill Cutoff Road	14,098	2.67

Name	Start	End	Length (Feet)	Length (mi)
Mammoth Creek Path	Main Path	Eastern Terminus of Mammoth Creek Road*	5,596	1.06
Additional Long-Range and Conceptual MUP Projects				
Sherwin/Snowcreek Connector	Old Mammoth Road	Snowcreek VIII Access/Egress Point	3,964	0.75
		TOTAL	33,219	6.29

The **Shady Park Path Extension** follows an alignment that more closely resembles the original alignment from the 1991 Trail System Plan. The modified route would travel from the current terminus of the paved path and follow the tree line, traveling just north of the proposed staging area at GIC 67, and then turning west to connect back to the Welcome Center for a complete loop. In addition, this new trail would form the proposed modified OSV closure boundary in winter and provide a key loop for the Shady Rest Nordic system.

The **Forest Trail to Shady Rest Campground Connector** was also identified in the 1991 Trail System Plan. It will improve trail access to Shady Rest for the residents living north of Main Street and provide access for a future Knolls/Overlook Trail.

A **Knolls Path (south route)** has been recommended between the Shady Rest Path at Sawmill Cutoff Road and the Community Center Park. The alignment runs just outside the UGB to the north of Forest Trail and around the Knolls neighborhood before connecting into the Community Center parking lot. Identifying the alignment with the most suitable grades will be an important element in the design of this project.

A **Mammoth Creek Path** could be constructed on or adjacent to Mammoth Creek Road. Either of these alignments has the potential to extend the reach of the recreational network and provide an alternative to Highway 203 for long distance road rides and a potential commuter route for Crowley residents. This project would require coordination with the Forest Service and take into consideration environmental issues and the potential impacts to existing users of these unpaved roadways.

MUP 4-5: Snowcreek Public Access Route (Old Mammoth Road to Snowcreek Access/Egress)
Rationale: Per Snowcreek Master Plan, publicly accessible pedestrian/bike connection to be available to connect Old Mammoth Road to access/egress point at south boundary of Snowcreek property. Included in Snowcreek 8 Master Plan. Conceptual alignment only; precise location to be determined with development of Snowcreek 8 project, as dictated by the Snowcreek Master Plan.

This conceptual alignment is also shown in Maps 4-9 through 4-12

Recommendation MUP5: Lighting on Multi-Use Paths

Lighting should be considered for segments of multi-use paths that are not currently illuminated by adjacent street lighting. Due to the cost of installing and maintaining lighting, segments should be prioritized based on their potential demand for nighttime use. For example, a path segment connecting the library and student housing may be considered for

lighting to accommodate students traveling between these facilities after sunset. Other segments that show demand for nighttime use should also be considered.

4.4. Crossing Improvements

The following section provides roadway crossing recommendations intended to ensure the safety of MUP users and enhance access to the trail system as a whole. Recommendations X1 and X3 focus on the design of crossings along existing and future MUPs. Recommendation X2 focuses on providing crossing improvements which will enhance access to the trail system from residential areas and activity centers.

Recommendation X1: Design of At-Grade MUP Crossings

The basic design elements of at-grade crossings should be uniform wherever possible. Particular locations may require additional safety measures and/or unique treatments based on context (see Design Guidelines in Chapter 6). At-grade MUP crossings should be limited to crossings of local or collector streets.

Recommendation X2: Specific Intersection and Mid-Block Crossing Improvements

Conduct an engineering analysis of all pedestrian crossings and identify where improvements are most needed. **Table 4-8** lists locations that are important for existing and future in-town trail access. The engineering analysis should consider the full range of recreational users likely to be active at the specific intersection or mid-block crossing. These locations are important for providing access between trails, recreation nodes, residential areas and activity centers. Raised medians along major roadways could be considered to create refuges for crossing pedestrians and recreation users and to reduce the amount of roadway surface requiring snow removal during winter months. See the Design Guidelines (Chapter 6) for examples of crossing treatments.

Recommendation X3: Grade-Separated MUP Crossings

Grade-separated MUP crossings should be used for all MUP crossings of arterial streets. Tunnels are the preferred form of grade-separation and the design currently used by the Town of Mammoth Lakes should be used for all future crossings with proper width and height for grooming equipment. Retrofit should be considered for existing tunnels that do not allow for snow grooming. See Design Guidelines (Chapter 6) for a more detailed discussion of tunnel design. The only new tunnel recommended in this plan would be located under Minaret Road just north of Old Mammoth Road. In cases where this type of crossing is technically infeasible or cost-prohibitive, signalized at-grade crossings may be considered.

Table 4-8. Intersection and Crossing Improvements

Street	Location	Description
Minaret Road	Forest Trail	Existing unsignalized intersection. Proposed by TOML as roundabout. Connects future bike lanes on Forest Trail and Minaret Road and provides access to the North Village area.
Minaret Road	North Village (Mid Block) [1]	Existing mid-block crossing with flashing beacons. Needs lighting improvements to illuminate pedestrians in the crosswalk. Potentially convert to HAWK signal.[1]
Lake Mary Road	Davison Road	No existing crossing. Provides access to Lake Mary Path from high and low-density residential areas.
Lake Mary Road	Lakeview Road	No existing crossing. Provides access to Lake Mary Path from future bike route/lanes on Lakeview Boulevard.
Lake Mary Road	Canyon Boulevard	Existing signalized intersection. Provides access to Lake Mary Path from future bike lanes on Canyon.
Lake Mary Road	Bridges Lane	No existing crossing. Provides access to Lake Mary Path from a residential and resort area.
Lake Mary Road	Lee Road	No existing crossing. Provides access to Lake Mary Path from a high and low-density residential area.
Main Street	Minaret Road	Existing signalized crossing. Terminus of Lake Mary Path. High pedestrian volumes expected with new development. Bicycle signal head should be considered to allow for diagonal crossing.
Main Street	Mountain Boulevard / Callahan Way	No existing crossing. Connects Mammoth View and Mammoth Heights to Main Path on Callahan Way.
Main Street	Sierra Boulevard / Mono Street	No existing crossing. Provides pedestrian access from high-density Sierra Valley district to proposed Recreation Node on Forest Trail.
Main Street	Forest Trail	No existing crossing. Connects Forest Trail bike lanes with Main Street bike lanes. Full traffic signal may be required, especially with new roadway construction in Hidden Creek.
Main Street (Hwy 203)	Sierra Park Road	No existing crossing. Connects future Sierra Park bike lanes and school zone with Shady Rest. Will be especially important in winter after storm events when tunnel has not been cleared/groomed.
Meridian Boulevard	Minaret Road	Proposed by TOML as roundabout. Connects existing/future bike lanes on Minaret and Meridian.
Meridian Boulevard	Sierra Park Road	Existing 4-way stop with crosswalks and School Zone.
Meridian Boulevard	College Parkway	No existing crossing. Provides connection between college and schools.
Meridian Boulevard	Wagon Wheel Road	No existing crossing. Provides connection between college, residential area and Meridian Path.
Old Mammoth Road	Chateau Road	No existing crossing. Provides access to schools.
Old Mammoth Road	Minaret Road	Existing unsignalized intersection. Proposed by TOML as road roundabout. Connects existing/future bike lanes on Minaret and Old Mammoth Road.
Old Mammoth Road	Ski Trail	No existing crossing. Connects residential area on south side of Old Mammoth Road to Main Path and Athletic Club.
Old Mammoth Road	Waterford Ave	No existing crossing. Connects residential area on south side of Old Mammoth Road to Main Path and Eagle Lodge via Waterford.

Notes:
1 – This existing mid-block crossing already has standard overhead signalization, but because of traffic volumes and distractions for motorists and pedestrians it was identified by Mono County Emergency Services as an area of concern. (See Ch. 3 Needs Analysis section 3.7).

4.5. On-Street Bikeways

The following on-street bikeway projects originated from one of the following sources: the 2008 General Bikeway Plan, the Town's GIS database, or discussions with Town officials.

Recommendation B1: Near-Term Bike Lanes

Continue to pursue the implementation of the following near-term bike lane projects within the next two years.

Table 4-9. Near-term Bike Lanes

Name	Start	End	Length (Feet)	Length (mi)
Main Street (Hwy 203) [1]	Minaret Road	Old Mammoth Road	5,106	0.97
Forest Trail	Minaret Road	Main Street	5,851	1.11
Meridian Boulevard[1]	N Majestic Pines Drive	Sierra Park Road	7,516	1.42
		TOTAL	18,473	3.5

1. Carried forward from the General Bikeway Plan.

Recommendation B2: Bike Lanes on Major Streets (Arterials)

Implementation includes painting, stenciling, and striping. Implement bike lanes on the following major streets. The most challenging bike lanes project will be Old Mammoth Road between Main Street and Mammoth Creek Park, which would require the removal of a center turn lane or widening to accommodate bike lanes. Bike lanes on major streets are necessary to provide separation from high-speed, high-volume motor vehicle traffic, and to provide access to major commercial areas. The North Old Mammoth Road District Study recommends road widening for future bike lanes on Old Mammoth Road.

Table 4-10. Bike Lanes on Major Streets

Name	Start	End	Length (Feet)	Length (mi)
Minaret Road	Mammoth Scenic Loop	Mammoth Knolls Dr	3,096	0.59
Minaret Road	Mammoth Knolls Dr	Main St	2,058	0.39
Lake Mary Road	Davison Rd	Minaret Rd	2,713	0.51
Meridian Blvd.	S Majestic Pines Drive	N Majestic Pines Drive	649	0.12
Meridian Blvd.	Sierra Park Rd	Highway 203	6,936	1.31
Old Mammoth Road	Red Fir Road	Minaret Road	7,419	1.41
Old Mammoth Road	Main Street	Mammoth Creek Park	4,396	0.83
		TOTAL	27,267	5.16

Recommendation B3: Bike Lanes on Collector Streets

Implement bike lanes on all collector streets. Collector streets generally have moderate traffic volumes and provide continuous routing between residential and commercial or civic land uses. Bike lanes on collector streets can provide a more comfortable alternative to using bike lanes along higher volume arterial roadways and can also serve schools and higher-density residential areas. Collector street bike lanes conform to the TOML roadway cross sections for collector streets. Bike lanes are generally not needed or advised on local streets. If any of

these projects require roadways widths that are unwarranted or unsuitable for existing traffic volumes or surrounding land uses, they should be alternatively considered for designation as bike routes (Class III).

Table 4-11. Bike Lanes on Collector Streets

Name	Start	End	Length (Feet)	Length (mi)
Forest Trail	Minaret Road	Hillside Drive	5,599	1.06
Canyon Blvd.	Lake Mary Road	Hillside Drive	5,624	1.07
Lakeview Blvd.	Rainbow Lane	Canyon Blvd	2,635	0.50
Majestic Pines Drive	Silver Tip Lane	Lodestar Drive	1,903	0.36
Chateau Road	Minaret Road	End	2,991	0.57
Sierra Nevada Road	Azimuth Drive	Sierra Park Road	764	0.14
Laurel Mountain Road	Main Street	Sierra Nevada Road	1,826	0.35
Tavern Road	Laurel Mountain Road	Sierra Park Road	1,183	0.22
Sierra Manor Road	Tavern Road	Meridian Blvd	1,716	0.32
Sierra Park Road	Main Street	End	3,190	0.60
		TOTAL	27,431	5.19

Recommendation B4: Bike Routes

Implement the following bike routes on local streets. The Forest Trail local segment is needed to connect the recommended bike lane facilities on Canyon Boulevard and Lakeview Boulevard. The Majestic Pines segment provides a connection between the Majestic Pines bike route and the Lodestar Path. It also provides access to the future multi-use path adjacent to Bear Lake Drive. TOML should also work with Caltrans to improve existing bike routes and add new bike routes on rural roadways leading into Town such as Highway 203 and Mammoth Scenic Loop. Bike routes on these roadways require wide shoulders to allow separation between cyclists and faster moving motorists. Shoulders are most important on uphill segments where the speed differential between cyclists and motorists is greatest.

Table 4-12. Bike Routes on Local Streets

Name	Start	End	Length (Feet)	Length (mi)
Forest Trail	Hillside Drive	Lakeview Blvd	3,115	0.59
Majestic Pines Drive	Silver Tip Lane	Lodestar Drive	1,903	0.36
North Waterford Ave*	Majestic Pines Drive	Old Mammoth Road	1,268	0.24
		TOTAL	6,286	1.19

*A portion of the Waterford Ave project will be non-motorized bridges over Mammoth Creek.

Maps 4-3 and **4-4** show existing, near-term and future multi-use path and on-street bikeway projects.

Map 4-3. Recommended Summer Bikeways & Trails (within UGB)

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Map 4-4. Recommended Winter Bikeways & Trails (within UGB)

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4.6. Interface between Soft-Surface Trails and Paved Facilities

Recommendation INT1: General Interface Considerations

The areas where soft-surface trails and backcountry areas interface with paved facilities and the urbanized areas of Town should be addressed with great care. Efforts should be made to enhance existing interfaces and develop additional ones as the trail system expands. The recommendations below specifically address interface issues involving MMSA mountain bike trails. Other key interface areas that should be evaluated are the connections between Town and both ends of the Mammoth Rock Trail, the interface between the Lake Mary Road Bike Path and Mammoth Rock Trail, and access/egress issues at Shady Rest and the Hidden Lake/Sherwins area. This effort should also include an analysis of all GIC points on the Urban Growth Boundary (UGB) to identify opportunities for easements and their inclusion in the system of nodes as described in other parts of the Trails Master Plan. Additionally, partnerships between TOML, USFS and MMSA should be developed to address safety issues at interface areas through a combination of rerouting, signage, education, alternative facilities and other methods, as necessary. Trail routing and signage should make it clear where and how trail users are expected to safely transition between soft-surface trails and paved trail facilities or roadways. Appropriate warning signage should be added as necessary to alert other trail and roadway users.

Recommendation INT2: North Village

Access between Uptown/Downtown and the North Village should be enhanced through coordination with USFS and MMSA. Several options exist to address this issue. The ski back trail and bridge may provide an opportunity for mountain bikers to enter the North Village without using surface streets. The development of an access/egress point at uptown/downtown (GIC 21) with signage and a gathering area will allow groups of mountain bikers to gather safely before entering the roadway. Mountain bikers should be directed to enter the street network at Forest Trail rather than Minaret through rerouting and the use of signage. Hiker access between the North Village and the Main Lodge via the Uptown Trail has been suggested. This could be achieved either through minimal signing allowing bi-directional hiking and uphill MTB use only, or through the development of a wider tread soft-surface trail (Type 3 – Shared Non-Motorized). The viability of either of these options would require a full evaluation by MMSA/USFS.

Recommendation INT3: Canyon Lodge

Several options exist to improve safety and the overall experience for mountain bikers who descend in the vicinity of Canyon Lodge and Austria Hof via the Shotgun trail or other facilities. The provision of summertime lift service from Canyon Lodge will allow mountain bikers to proceed back up the mountain without descending to the North Village via Canyon Boulevard. Providing bus service to and from Canyon Lodge will allow mountain bikers who have finished for the day to return to their homes, lodging or vehicle via bus instead of using Canyon Boulevard. Rerouting trail access in a way that reduces conflict and improves safety should also be considered. The provision of an on-street bicycle facility on Canyon Boulevard that provides uphill cyclists with a bike lane and encourages downhill cyclists to

ride on the street (rather than the sidewalk) is another option (see Design Guidelines). Each of these options has the potential to improve conditions independently, but the greatest benefits will be achieved if they are all implemented together.

Recommendation INT4: Eagle Lodge

At Eagle Lodge the primary interface issues can be addressed by providing adequate signage and wayfinding to indicate the connection between the Juniper Trail and the Main Path. Summer bus and/or lift service could also improve access to and from this location while enhancing the overall experience.

4.7. Pedestrian Facilities

Pedestrian mobility is the most basic requirement in any transportation network. Every trip, regardless of the primary mode of transportation, begins and ends with a pedestrian trip. Projects that improve pedestrian mobility will increase access to recreation facilities and enhance the overall experience of the Town's residents and visitors. The projects recommended in this section are intended to improve pedestrian safety and make walking and public transportation an attractive alternative to driving for in-town trips. Sidewalks and pedestrian issues have been discussed in this plan because of overwhelming public comment on this issue and the fact that pedestrian mobility is inseparable from recreational activity in the Town of Mammoth Lakes. However, these issues of urban mobility will ultimately be covered in a Mobility Plan to be undertaken by the Mobility Commission and the Department of Public Works. The following narrative provides recommendations for pedestrian improvements that should be considered in these future mobility planning efforts.

Recommendation P1: Sidewalk to Major Roadway Ratio

The Town of Mammoth Lakes should achieve a minimum Sidewalk to Major Roadway Ratio of 1.6 to 1 over the next five years. This minimum ratio can be achieved by including sidewalks on both sides of all arterial streets and at least on one side of all collector streets. Where feasible and desirable, this ratio can be increased by adding sidewalks to both sides of important collector streets such as those serving schools or major activity centers. The construction of mid-block sidewalks where no roads currently exist will allow the Town of Mammoth Lakes to improve this ratio further and will greatly enhance the pedestrian experience and encourage "feet first" mobility. This recommendation is supported by the ones that follow.

Recommendation P2: Sidewalks along Major Roads

Construct sidewalks on all primary and secondary major roads or arterials where they do not already exist. Existing multi-use paths (MUPs) directly adjacent to roadways, may substitute for a sidewalk facility on that side of the road. A sidewalk or MUP should be located on both sides of all major roadways within the UGB except in areas there are significant physical constraints and low-levels of pedestrian activity. This will add approximately 5.6 miles of sidewalk.

Recommendation P3: Sidewalks along Collector or Local Streets

Collector streets should have a sidewalk on at least one side whenever possible. Sidewalks may or may not be feasible or desirable on local streets as they may require tree removal or roadway widening that would significantly impact the character of the roadway.

Recommendation P4: Mid-Block Pedestrian Connectors

Mid-block pedestrian connectors should be considered in areas where pedestrian activity is high and where key destinations are located. These connectors are not roadway crossings, but pedestrian-only shortcuts that exist where vehicular roadways do not. In areas where existing streets end, pedestrian connectors that allow pedestrians to continue through to a nearby roadway or commercial area are highly desirable. These facilities can improve pedestrian mobility in general and shorten the distance between one's home and recreational trail facilities. These should be established as opportunities arise though new developments and the NDP process.

Sidewalk Maintenance Discussion

Sidewalk construction is a significant investment in both mobility and public safety. Mobility is required year-round and the safety benefits of sidewalks are even more important during wintertime when roadway and weather conditions present additional hazards and when the Town's population is highest. These mobility and safety concerns suggest the need for all existing and future sidewalks (including mid-block connectors) to be cleared within a maximum of 24 hours from end of snowfall. This should be achieved through the use of geothermal heating, assessment districts, and/or the assignment of responsibility for sidewalk snow removal to adjacent property owners through the adoption of an ordinance. For a more detailed maintenance discussion and recommendations, please see Operations and Maintenance (Chapter 7).

Maps 4-5 and 4-6 shows all existing, near-term and recommended sidewalks in the Town of Mammoth Lakes. **Map 4-5** show pedestrian facilities and crossing improvements in the context of the summer trail system, and **Map 4-6** shows pedestrian facilities and crossing improvements in the context of the winter trail system. The proposed sidewalk network is recommended to be available year-round. These recommendations are generally consistent with the 1997/2003 Sidewalk Master Plan. This Trail System Master Plan is also recommending a sidewalk on the south side of Old Mammoth Road, west of Sherwin Creek Road. This segment is necessary because of upcoming development in the area that will generate additional pedestrian activity and the lack of safe crossing options for residents on the south side of Old Mammoth Road. This recommendation is also based on public input about poor walking conditions in that area.

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Map 4-5. Recommended Summer Pedestrian Facilities (within UGB)

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Map 4-6. Recommended Winter Pedestrian Facilities (within UGB)

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4.8. Bicycle Parking

Safe, convenient bicycle parking is needed to promote bicycling for transportation and to make it easier for recreational cyclists to patronize local businesses before, during or after a recreational bike ride. Consistency of design is important to ensure that bike racks are universally functional (i.e. accepting all common types of locking devices and supporting all common types of bicycles).

Recommendation BP1: Bicycle Parking Requirements

Currently there are several different types of bicycle parking facilities used in Town, and the types of racks used on private property often differ from the types of racks used at public facilities. Private businesses may or may not provide bicycle parking, and the bicycle parking that is provided is often of less-than-optimal design. The Town should develop bicycle parking requirements based on local land uses and square footage that require bicycle parking at all new development and redevelopment sites. The bicycle parking requirement should be enforced through the design review process based on clear guidelines for the design, quantity and location of bicycle facilities. The Design Guidelines section provides sample requirements for bicycle parking based on land uses and square footage.

Recommendation BP2: Bicycle Parking Designed by Local Artists

Cities around the country have hosted competitions or contracted with local artists to design bicycle racks that are also public art. The Town should implement a similar program with local artists. In order to ensure the functionality of the racks, artists should be required to follow the design guidance for bicycle parking provided in section 6.4. To see examples from a similar program, visit www.ldmd.org/streetscape/bikeracks.aspx.

Recommendation BP3: Subsidized Bicycle Parking Program

In order to encourage property owners to install quality bicycle parking at existing businesses or replace inadequate bicycle parking, the Town should implement a subsidized bicycle parking program under which the Town purchases bicycle racks in bulk and provides them to businesses at lower rate than if the business purchased them on their own in smaller quantities. An additional subsidy (other than the financing of the original purchase) should be considered in order to encourage widespread installation of bicycle racks on private property. The distribution process should be simple so that the time cost of acquisition does not outweigh the discount achieved through bulk purchase. This program will help to improve the quality and uniformity of bicycle parking facilities throughout the Town of Mammoth Lakes.

4.9. Soft-Surface Trails

Trails Solutions has produced a report (Town of Mammoth Lakes Soft-Surface Trails Concept) with potential options for soft-surface trails. This report will be included as a reference to this document. The report mostly provides options for soft-surface trail facilities located outside the UGB on land administered by the U.S. Forest Service. Many of these options are shown in the maps in this chapter. **Map 4-7** shows potential summer trail alignment options outside the UGB and **Map 4-8** shows potential winter alignment options in the Shady Rest area.

Recommendation SS1: Snowcreek Meadow Trail

The Town should evaluate the potential to use its 40-foot drainage easement to install a six-foot-wide low-impact boardwalk through the Snowcreek Meadow. This project will reduce opportunities for trail braiding and the associated damage to vegetation. It will also provide accessibility for users of wheelchairs.

4.9.1. Summer and Winter Trails outside the UGB

Recommendations for new summer and winter trails were based on public input and an analysis of the 1991 Trail System Plan's "Future/Alternative" trails as well as a sustainability analysis of the existing formal and informal trails around Mammoth Lakes. **Map 4-7** provides an overview of all paved and unpaved pathways and trails that will form the recommended trail system for Mammoth Lakes. **Map 4-8** provides recommendations for improving the winter trails experience in the Shady Rest area.

Recommendation SS2: Summer Soft-Surface Trails outside the UGB

Implement the soft-surface trails outside the UGB shown in **Map 4-7**. Many of these trails are carried forward from the 1991 Trail System Plan and are described in more detail in Attachment A. Others have been modified slightly to provide a more desirable or environmentally-sound conceptual alignment. All soft-surface trail alignments are conceptual and subject to change based on feasibility. Also, consider implementation of trail options described in the Sherwin Area Trails Special Study, included as Attachment B to this report.

Recommendation SS3: Shady Rest Winter Trails

Consider the options shown in **Map 4-8** to help mitigate congestion and user conflict at Shady Rest. Option 1 is to maintain the status quo. Option 2 includes creating a preferred non-motorized trailhead at the Welcome Center. Motorized users would continue to stage from the existing parking lot at the winter terminus of Sawmill Cutoff Road. Option 3 involves converting the non-motorized trails to the west of Sawmill Cutoff Road to preferred dog walking trails. Option 4 is a longer term option that includes clearing Sawmill Cutoff Road and the paved parking area at Shady Rest Park to allow for motorized staging at the north end of the lot and non-motorized staging at the south end of the lot. The trail alignments and staging area options in **Map 4-8** are conceptual and subject to further review by the community, the Town of Mammoth Lakes and the Forest Service.

Map 4-7. Recommended Summer Trail System (UGB & Beyond)

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Map 4-8. Shady Rest Winter Recommended Winter Use

4.10. Education, Encouragement and Enforcement Programs

Recommendation E1: Publish a Trail Guide for Mammoth Lakes

An 'early win' for Mammoth Lakes would be to provide literature, web sources and trail maps for public use. Opportunities for the web-based articulation of the Mammoth Lakes Trail System are numerous and quickly evolving. A strategic effort to integrate resources such as GIS data, web-based mapping platforms such as Google Earth, the VisitMammoth web site, user group sites maintained by members of Mammoth Trails, the MLTPA GIC data set, and user data being generated by existing out of area user group sites will need to be undertaken. This effort will ensure that the web-based definition of trails and recreation amenities in Mammoth Lakes is available to the Mammoth Lakes community. This effort will add to the quality of analoge deliverables as well. A trail guide would provide information on access points, existing trails, rental equipment locations, and other information for residents and visitors. The data being collected and managed could be provided in electronic format online, or could be published and made available in hard copy form as well.

Recommendation E2: Annual Events / Coordinated Activity Calendar

There are numerous opportunities for Mammoth Lakes to promote special events, tours and club functions related to the trail system through a paper and web-based event calendar. This can include ongoing local events such as the Century Bike Ride, guided hiking tours, Marathon/Triathlon events and trail clean-up days as part of the National Trails Day celebration. These types of events can provide public awareness, visibility for sponsors and fundraising opportunities for the trail system.

Recommendation E3: Safe Routes to School

Work with elementary, middle and high school students to develop Safe Routes to School infrastructure and programs. Opportunities exist to connect the trail system so that more children, faculty and staff will have the opportunity to get to school with a smaller carbon footprint and increase physical activity and outdoor recreation. Infrastructure and education/encouragement program funding is available through both the federal and state Safe Routes to School sources.

Recommendation E4: Trails-Related Education Programs

The Town of Mammoth Lakes should work with the Forest Service, the Wilderness Society, the Valentine Reserve, local non-profit organizations, schools, other organizations and individuals to develop trail-related educational programs for children and adults. The programs should include organized tours and activities led by docents. Programs should also make full use of popular technological advances in order to attract the attention of children. Tours could be made available over the internet through the posting of tour descriptions and printable maps as well as audio narrations available for download to personal audio devices. The Town could also work with the school district to develop supervised educational programs where children can engage in GPS-based "treasure hunts", also known as

"geocaching".[9] Active Living Research and the No Child Left Inside Coalition may also serve as important resources in the development of these programs.

Recommendation E5: Trips for Kids

Work with local businesses, organizations to encourage the development of programs to provide moral and material support to children so that they may confidently participate in any of the numerous summer and winter activities commonly practiced in and around the Town of Mammoth Lakes. One potential model is the Trips for Kids program. Trips for Kids provides the materials, moral support and inspiration that an individual or group needs to help disadvantaged kids discover the joy of mountain biking. Operating in the United States and Canada, they open the world of cycling to at risk youth through mountain bike rides and Earn-a-Bike programs. The more than forty Trips for Kids chapters combine lessons in personal responsibility, achievement and environmental awareness through the development of practical skills and the simple act of having fun on a bike. Additional information is available at the organization's website, www.tripsforkids.org.

Recommendation E6: Establish a Trail Patrol

Mammoth Lakes can establish a volunteer-based trail patrol through MLTPA, the Mammoth Snowmobile Association, Mammoth Nordic, or other local organizations to supplement official law enforcement and maintenance efforts. IMBA provides training for both law enforcement officers and volunteers to use mountain bikes for these activities. Patrol services can range from general public assistance to trained backcountry search and rescue operations. Mammoth Lakes could also reactivate the existing "Adopt-a-Trail" program for paved paths and Nordic trails for litter control and limited light maintenance purposes.

Recommendation E7: NGO's / Mammoth Trails

Support the development of an ongoing, organized, "local knowledge" based resource group(s), with expert technical knowledge on a variety of recreation activities, event coordination/promotion, and the long term stewardship commitment to inform all aspects of the Mammoth Lakes Trail system. An emerging Non-Governmental Organization (NGO) known as Mammoth Trails is a confederation of "… structured, sports and recreation-based organizations willing to share resources and engage collaboratively…", formally established by charter in April of 2008, and represents this kind of engagement effort. The mission of this unique and regularly convening collection of local user groups, agencies and enterprises is to inspire and create exceptional recreation experiences. Mammoth Trails can serve as a key resource for local user knowledge for the Mammoth Lakes trail system.

[9] A search on geocaching.com using the 93546 zip code turned up 462 "geocaches", which generally consist of a container and log book in a wilderness locations that can be found using GPS coordinates (5/2/08). This indicates that there is a base of local "geocaching" expertise in the Mammoth Lakes area.

4.11. Accessibility

An accessibility assessment of the Mammoth Lakes Trail system should be undertaken in anticipation of and during implementation of this trails plan. While initial efforts were undertaken by Beneficial Designs as part of the CAMP trails planning effort, a fully engaged and robust effort should be anticipated as the TSMP, once adopted, begins implementation.

Recommendation A1: Multi-Use Paths and Trails Assessment

Perform a full assessment of all access routes, multi-use paths and trails using the Universal Trail Assessment Process (UTAP) to identify potential accessibility improvements.

Recommendation A2: Pedestrian Assessment

Perform a full assessment of all pedestrian routes and elements in the town using the Sidewalk Assessment Process to identify potential accessibility improvements.

Recommendation A3: Signage and Information

Include grade and other accessibility information on trailhead signage and user maps. Error! Reference source not found. provides an example.

Recommendation A4: Pathway Surface Materials

Accessibility concerns should factor into the selection of surface materials for all multi-use paths and pedestrian facilities. If surface materials other than concrete or asphalt are used, TOML should ensure that these surfaces are stabilized in order to maintain a smooth, firm surface. For example, decomposed granite should be stabilized wherever used.

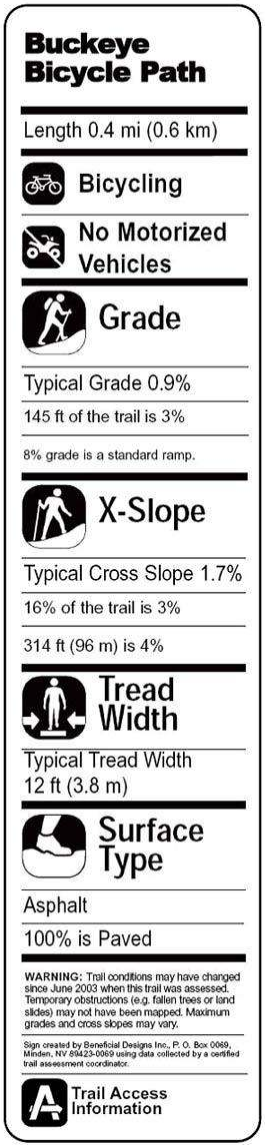


Figure 4-4: Sample Trail Access Information Sign

4.12. Long-Term Vision

The creation of the proposed system of trails and recreation nodes will be a major accomplishment for the Town of Mammoth Lakes. The proposed system provides is a visionary project that will add to this unique community which will require an extensive multi-partnered and multi-jurisdictional effort. Developing strong connections between the Town of Mammoth Lakes and surrounding federal lands is the most significant priority of the trail system in the short term. At the same time, there have been new visions expressed during the planning process that include longer-term ideas that will require additional study, public outreach and interagency collaboration. This section describes two longer-term projects: the Mammoth Creek Path and Sherwin Creek Road bike lanes, that will require additional study before they can be formally adopted for implementation.

4.12.1. Sherwin Creek Road Bike Lanes

Paving Sherwin Creek Road would provide an opportunity to provide a more scenic alternative to Highway 203 for road bicycling and potentially for long-distance commuting from out-of-town locations such as Crowley Lake. Road bicyclists expressed a desire for such a route during the CAMP: Summer process, stating that it had potential recreational and commuter benefits. Further study in partnership with the Forest Service would be required to determine the feasibility of this project. Impacts to OHV/OSV users in the area would have to be addressed as well as consistency with other potential recreational infrastructure options in the area (see Attachment B).

4.12.2. Mammoth Creek Path

A paved multi-use path using the Mammoth Creek Road right-of-way could be developed to expand the network of paved MUPs. Mammoth Creek Road could also be maintained as a dirt/gravel trail for use by mountain bikers and/or equestrians.

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Map 4-9. Existing and Future Trail System Summer (From TSMP EIR)

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Map 4-10. Existing and Future Trail System Summer: Lakes Basin Detail (From TSMP EIR)

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Map 4-11. Existing and Future Trail System Winter (From TSMP EIR)

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Map 4-12. Existing and Future Trail System Winter: Lakes Basin Detail (From TSMP EIR)

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CHAPTER 5. SIGNAGE & WAYFINDING

The following chapter details Corbin Design's analysis of the existing conditions, challenges and requirements of the Town of Mammoth Lakes trail system signage. As the Town of Mammoth Lakes undergoes substantial development, use of the extensive trail system is growing, and the Town has made a significant commitment to work to connect its visitors and residents with nature through signage and wayfinding. It should be noted that trail system signage and wayfinding implementation will need to occur with recognition of a variety of jurisdictions and of other signage systems already in place, including MMSA, USFS, and TOML Municipal.

Note: The design guidance provided in this chapter is considered subject to change. It will be incorporated into the Signage and Wayfinding section of the Mammoth Lakes Trail System Standards Manual and/or the Town of Mammoth Lakes Public Works Standards Manual, as appropriate, and available for use by the USFS if determined appropriate by that agency. The Standards Manual will be a living document intended to provide uniform guidance for the development of the Mammoth Lakes Trail System.

5.1. Signage

The Town of Mammoth Lakes, in partnership with Mammoth Lakes Trails and Public Access (MLTPA), Alta Planning + Design and Trail Solutions, has asked Corbin Design to analyze trail wayfinding and make recommendations for an attractive, consistent and expandable wayfinding and signage system. Our analysis is the result of our participation in CAMP: Winter, site tours, and discussions with various stakeholders. Our recommendations consider the development of design standards that address all types of users, as well as the objectives of the various jurisdictional entities.

The majority of Mammoth Lakes residents and visitors are outdoor enthusiasts with a range of interests and needs. The area boasts beautiful scenery in wooded and mountainous settings, combined with challenging venues for skiing, mountain biking and other sports. The Town of Mammoth Lakes competes with other resort towns for tourism dollars, and so desires to set itself apart from the rest, just as its geographical features distinguish it from other areas. A priority is making the connection between people and the environment a simple one.

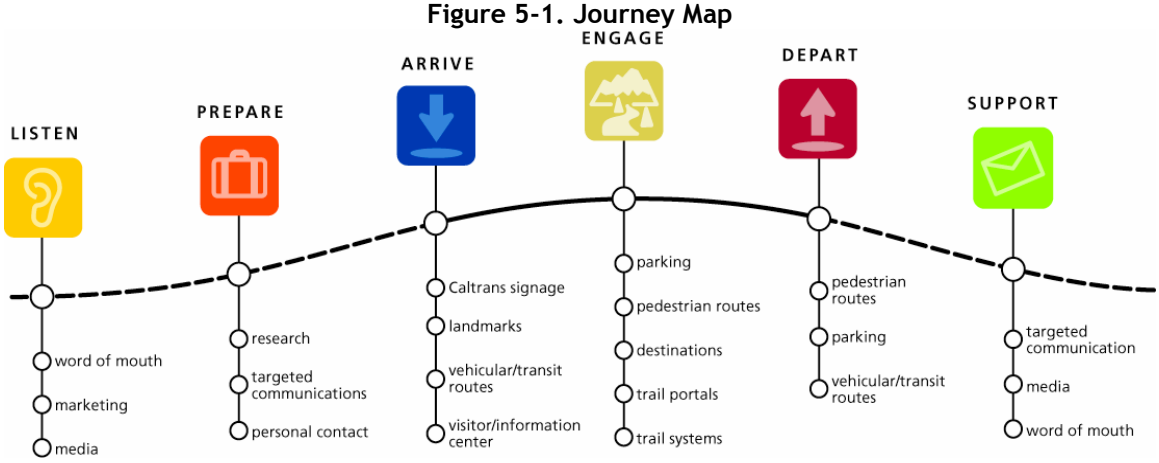
Signage and Wayfinding is identified as a key component in the Trail System Master Plan. Visitors who feel comfortable and empowered will keep coming back to an area, and an effective wayfinding system is key to creating that comfort level. Wayfinding also plays an important role in trail use safety, connecting users with emergency services.

The challenge is to create a system that is consistent at every point in the user's experience. It is our recommendation that signage and wayfinding for the trail system, the Town of Mammoth Lakes, and Mammoth Mountain Ski Area (MMSA) all be considered elements of an overall wayfinding system, so that users will have a consistent experience as they move between the venues. Consistency facilitates a system with anticipatory value, which breeds comfort, which enhances the visitor experience. This will require a careful blending of the objectives of all of the jurisdictional partners.

A comprehensive system should consider every point along a visitor's journey where they will connect with the Mammoth "brand"—whether through the Town, the Mountain, or the trails. The following page illustrates our vision of the "Journey Map," and describes those touchpoints. As part of a larger scope of work, we recommend analyzing each of these points in detail with respect to an overall wayfinding system for the trails, the Town, and the Mountain.

The current scope includes analysis and recommendations for the trail system, including an initial design concept. The term "trail system" refers to all types of trails including Sustainable Trails, Natural-Surface Trails, Multi-Use or Shared-Use Trails, Bike Paths and all winter trail types as defined in the Terms and Definitions document. As part of our future work, and as a result of an analysis of an overall wayfinding system, we recommend revisiting the concept as an element of an overall system, and undertaking a thorough review and approval process involving the various jurisdictional partners to arrive at an approved comprehensive design standard adaptable to various Mammoth venues.

Figure 5-1. Journey Map



This map depicts each potential point of contact with a given visitor. We believe that in order for a wayfinding system to be most effective, visitors must create a picture of the physical environment "in their mind's eye" prior to arrival. In this way, the signs in the environment reinforce what they already know about the area.

Communication across this continuum must be consistent. We know that a diverse audience uses many different resources to navigate an environment, so the verbal and visual landmarks expressed must be consistent across media. Web, broadcast, print and signage elements will speak in the same voice as the visitor learns about the environment.

Educated, empowered visitors feel confident and capable as they move toward their destinations, and are more likely to return.

5.2. Analysis

The following section details Corbin Design's analysis of the existing conditions, challenges and requirements of the Town of Mammoth Lakes trail system, specifically the Main Path. The Main Path is a Class 1, paved and non-motorized trail system that loops around the

urban growth boundary of Mammoth Lakes. The alpine views from the southern section of this path earned the trail the highest rating possible from the California Inline Skating tour website. As the Town of Mammoth Lakes undergoes substantial development, use of this extensive trail system is growing, and the Town has made a significant commitment to work to connect its visitors and residents with nature.

5.2.1. Audiences

The trail system serves activities in all seasons for a variety of users, both non-motorized and motorized. These users—hikers, runners, snowshoers, bikers, cross-country skiers, motorbikers, snowmobilers, etc.—approach the trails with a multitude of different needs and equipment. The users bring with them many different levels of experience and physical ability, together with different wayfinding needs and expectations.

First-time Users

First-time visitors have unique requirements when it comes to trail system wayfinding: their perceived safety and comfort while venturing onto the trail system will impact their impression of the experience and their desire to return. The first-time visitor experience must be a positive one to keep them coming back. Likewise, frequent trail users may at some time become first-time visitors to trail sections in the system that they have not visited before; consistent wayfinding standards will make the experience more understandable, comfortable and enjoyable. It should be easy for users to match the trail with their experience level and ability, as well as their desired experience relative to other trail users.

Casual Users

Many people use the Main Path for walking, dog-walking and other casual activities. Casual visitors are likely repeat users who encounter a trail close to their home, school or workplace. While these visitors are generally comfortable with the trails, effective wayfinding signage can encourage them to explore further along their familiar trail or venture to new ones. Signage can identify destinations near or along the trail that they may not have otherwise encountered. It can also help them identify amenities they may access from time to time, such as parks with picnic tables, skating parks and the like.



Figure 5-2. Snow Blocking Signage

Athletes

Runners, joggers, bikers, inline skaters and cross-country skiers are specialized trail users who demand more from the trails than casual users. Due to the competitive nature of their activities, details such as distance tracking are important to them. Consistently communicated guidelines for trail use will help athletes understand their rights and obligations when sharing the trail with other users, and will help them feel comfortable in doing so.

Commuters

Commuters typically cover only a certain section of the trail that will allow safe passage between their home and work. They may require information regarding distance, amenities along the way, and guide information. Seasonal conditions and ease of accessibility play a large part in whether the Main Path will become a commuter route for these users.

Special Users

The trail system presents special challenges to older adults, children and users of varied physical abilities. Highly readable, visible and simple messages will allow for easier, quicker comprehension. Clear safety, accessibility and regulatory information help special users to avoid hazards, and help all users avoid collisions and injury. Consideration should be given to the use of Trail Access Information labels on signage, to help users understand the types of terrain and obstacles they will encounter along the way.



Figure 5-3. Potential for Consolidation of Signage

5.2.2. Subject Area

The Town of Mammoth Lakes Trail System consists of a series of paved and unpaved trails, pathways, staging areas, and trailheads currently in place, as well as projects that are planned for implementation in the near future, including the Lake Mary Road Bike Path. The system provides the users with several miles of trails that support easy access to town while providing connections to other local, state and federal properties.

Due to the undeveloped soft-surface trails that pass through private lands to connect with public trails, intersections through roadways and connections with developments and destinations can be difficult to recognize. It may be difficult for users to understand their location within the larger trail system. Winter snow depth creates many access issues. Accessibility and wayfinding is also affected by jurisdictional concerns, particularly over the issue of snow removal; Caltrans has jurisdiction on the right-of-way off Main Street and prohibits snow removal on sidewalks located within the right-of-way to avoid potential conflicts between pedestrians and snow removal equipment. Many of these sidewalks are dedicated to or connect with Main Path trails.

Signage on the trails is minimal and inconsistent. Critical information at intersections and roadway crossings is not present. Trailhead signage varies in style, size and function. Sometimes trail access falls within a park, but there is no indication on the park signage that a trail is accessible there.

Signage is inconsistent at both trail entrances and exits. Some signage includes incorrect or outdated information, and may incorrectly promote an activity that is not supported on the trail, e.g., a sign denoting a groomed cross-country trail that is no longer maintained.

Existing signage materials are not designed to withstand the abuse of harsh winters, deep snow, and snow removal equipment. Many signs are severely damaged, or are missing altogether. Others are buried in snow, and so are ineffectual for winter users.

On some trailheads, trail maps have been posted to give users "You Are Here" information. These are generally not constructed from materials that hold up to the elements and are in disrepair. They are also not oriented relative to the viewer's position (i.e., with the top of the map showing the direction that the viewer is facing), and are difficult to interpret.

The trail system does not clearly support tracking distances with mile markers to help users gauge how far they have traveled.

Vehicular regulatory signage on roadways that intersect with trails is not standardized, or is not present at all. Drivers are not provided with sufficient warning, and may not always stop for crossing trail users. This can create a dangerous situation along particularly busy roadways with higher rates of speed.

Regulatory signage appears to be posted randomly. Signs appear in many sizes, colors and formats, and the font size is often too small to be read from a distance. For these reasons, regulatory messages lack authority and are often ignored.

5.2.3. Wayfinding Logic

After considering the wayfinding challenges for the trails, the following section details Corbin Design's recommended wayfinding logic. These cover information organization, physical signage, presentation and suggestions to make trail system wayfinding more effective.

Essential Steps for Effective Wayfinding

Design for the First-Time Visitor

It is important to welcome the visitor, clearly define trail networks and accessibility, and provide understandable guide information. It should be easy for visitors to understand their position within the trail system, to give them a sense of safety and comfort.

Philosophy of Positive Signing

There is a fine balance between establishing rules and regulations and setting a negative signage tone. Signs should first focus on establishing the correct behaviors before correcting a negative one. Always show approved users on a trail and approved behaviors. When working with Jurisdiction partners, encourage them to do the same. This creates the "language" of the signage system that visitors and residence will learn to understand.

Ensure User Participation

Accurate information is key to the program's success. The use of Geographic Information Systems (GIS) to generate accurate maps and data is essential. Encourage participation of key representatives from the various jurisdictional entities to ensure that appropriate objectives are agreed upon and met.

Structure Information

Develop an information hierarchy to organize the messages that will be imparted by the wayfinding system. The hierarchy should establish a layered system of disseminating information, so that users are getting only the information they need at any given point, rather than becoming overwhelmed by too much information too soon. An effective

wayfinding system leads rather than points the way. Certain sign elements will display maps, jurisdictional information, and trail identification; others will display mile marking and guide information.

5.2.4. Signage for the Trail System

The challenge of a comprehensive trails signage system is to represent a wide variety of information clearly, consistently and attractively. Identification information, orientation devices, safety and regulatory messages and a unifying identity element or elements (to serve as a visual "brand") will all be part of the system.

Further, it is important to respect the natural environment by avoiding sign clutter and unnecessary messages. A wayfinding system should be apparent when you need it and transparent when you don't. The system must be designed to work year-round to support four-season public access. Signage elements must be designed to remain effective through winter conditions and significant snowfall.

Finally, the system should be adaptable to all trail projects within the Town of Mammoth Lakes, including private developments, United States Forest Service (USFS) projects, and other local, state and federal projects.

5.2.5. Information Categories

The wayfinding system needs to convey five categories of information:

- Category 1: Identification
- Category 2: Orientation
- Category 3: Safety and Regulatory
- Category 4: Brand Identity
- Category 5: Interpretive or Desired

Each wayfinding element will serve a specific function, but they should all be visually integrated to present a seamless system to users.

Category 1: Identification

- Portal and trailhead entrances
- Parks that include trail access
- Neighborhood and resort exits/entrances
- Indication of transitions between Town and/or private, state or federal land ownership
- Underpasses and cross streets
- Seasonal trail types
- Landmarks, historical sites or other points of interest along the trail



Figure 5-4. Identification Sign

Category 2: Orientation

- "You are Here" maps placed at trailheads and major entrances to the trail
- Maps placed along the path to help users gauge their progress along the trails
- Signs pointing to major destinations
- "Distance to…" and length of trail information
- Mile and/or Kilometer markers
- Cardinal directions and GPS coordinates



Figure 5-5. Orientation Sign

Category 3: Safety and Regulations

- Stated rules and regulations
- Trail Access Information label
- Signage on trails warning users of upcoming roadway crossings
- Roadway signage to inform drivers of an upcoming trail crossing (handled through the Town and Caltrans)
- Signage to inform users when the trail ends, possibly also indicating distance
- Vehicular guides on surrounding roadways directing to parking areas (handled through the Town and Caltrans)
- All regulatory signs shall conform to the Manual on Uniform Traffic Control Devices (MUTCD).



Figure 5-6. Safety and Regulation Sign

Category 4: Brand Identity

- Unifying identity element or elements serve as the "brand"
- Consistent aesthetic standard communicates brand
- Private or organizational sponsorship information where needed

Category 5: Interpretive

- Provide visitors with historic, scenic or interesting information along the trail
- Design should coordinate visually with the wayfinding signage



Figure 5-7. Wayfinding Sign with

5.2.6. Sign Placement and Hierarchy

As previously stated, wayfinding signage should be apparent when you need it and transparent when you don't. In an effort to keep the trail as natural and uncluttered as possible, we propose locating signage in clusters at intersections, rather than placing sign elements randomly along the trail. This would concentrate signage locations at portal and trailhead entrances/exits and intersections (decision points).

Exceptions to this rule include mile/kilometer markers and accompanying regulatory information. As these will occur every quarter mile or kilometer, they should be designed at a small scale to avoid disrupting the trail experience.

5.2.7. The Sequence of Encounter

The diagram to the right lays out a simplified version of the order that a typical trail user will encounter the various sign types in the system. This sequence plays a large role in determining the type and amount of information that will be included on each sign type.

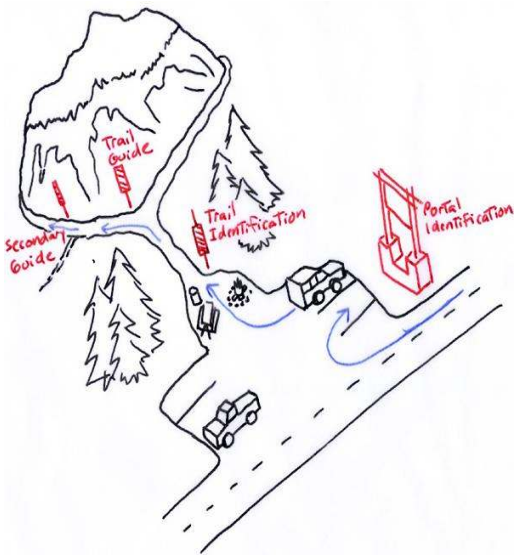


Figure 5-8. Sequence of Encounter

5.2.8. Use of Symbols

Throughout the system, many recreational opportunities, amenities, regulatory messages and safety warnings must be conveyed. A comprehensive vocabulary of symbols will allow much of this information to be conveyed through the use of single images as needed. Symbols offer quick recognition, are cross-cultural and, when used throughout the system, will offer character and consistency. Symbols should be consistent with MUTCD standards.

5.2.9. Recreation Amenities

Standard recreation symbols typically used by federal agencies identifying the variety of trail activities and other resources would be displayed on main identification signage at trailhead entry points. This will inform visitors that, although they are entering a trail system, recreation opportunities like parks, soccer fields or picnic areas can be found along the way. These symbols may also be used on maps and guide signs.



Figure 5-9. Recreation Symbols

5.2.10. Regulatory and Safety Symbols

Abstract concepts such as rules and regulations can be difficult to convey in the form of a symbol and may ultimately confuse rather than inform. Short, easily remembered messages combined with simple symbols will more clearly convey this type of information. These messages could accompany the mile marker signs along the trail as a repeated reminder. Similar messages conveying safety and warning information should be placed along the trail where necessary. The combination of symbols and short messages will allow users to quickly interpret and comprehend the information, including those who are not proficient in English.

Reducing the number of messages that must be repeated will allow signs, symbols and messages to be used sparingly. Regulatory messages that do not have safety implications should be posted at relevant entrances only, rather than being repeated along the trails.

5.2.11. Distance Markers

Mile markers are important to visitors who use the trails for athletic and therapeutic purposes; they also have important safety purposes, and need to be placed regularly and accurately. We recommend placing the zero point (labeled 'zero') at the main portal or trailhead of each existing trail, counting upward along the trail; it may be advisable to always number trails up heading in a north or east direction, so users understand that if the numbers are going down, they are generally headed south or west. Any trails that branch off of the main trail can be numbered starting at zero as well and working upward as they progress away from the parent trail, or according to the cardinal direction. For example, trails that are located within a parent trail such as the Meridian Loop connecting with the Main Path need to be identified by name and be marked with a zero point at the intersection connecting the trails. The mile marker system on the connecting loop should count upward along the trail. A Trail Guide sign would be positioned at the intersection to identify the loop and provide directions together with total miles of the loop and other primary destinations from that point.

When new sections of trails are added, mile marking will continue up the trail in this fashion, or they may need to be readjusted if existing sections of trail are newly connected. The challenge will be determining where they begin, how to handle intersections and breaks in the system, and how the system can accommodate organic trail growth.

5.2.12. Americans with Disabilities Act (ADA)

Our strategic approach for marking accessibility will be to label those areas that are not accessible. This will be particularly important where there may be steep slopes at sections of the trail, or terrain that may be impassable for users of limited physical ability. Warning signage should be placed so that users do not start down a steep slope and find themselves in a compromised position. Trail Access Information symbols posted at trailheads will help match users with trail sections that suit their experience and ability.

Where trails intersect roadways, Caltrans signage should warn drivers to yield to users in crosswalks. Crosswalks should be accentuated for driver visibility with pavement markings, yellow yield signs (which may also incorporate flashing lights), and possibly rumble strips as well; the signage will be most important for winter users. From the user's perspective,

roadway crossings should be highlighted with yellow striping on school routes and white striping on non-school routes, and warning signage that is visible in all seasons.

As part of our future scope of work, we can provide recommendations for roadway signage (designs, messaging and locations) following MUTCD standards that can be presented to Caltrans, along with an executive summary supporting implementation.

5.2.13. GIS/GPS

Geographic Information Systems (GIS) and Global Positioning Systems (GPS) play a central role in the trails planning process; the possibility of delivering wayfinding system information to handheld device users on the trail system should be explored.

These systems offer a number of advantages, the foremost being safety. In the event of an accident or injury, stated GPS coordinates can allow users to call for help and provide their exact location to emergency responders.

5.2.14. Trail Naming

Trails are easier to find if the name of the trail is carefully defined. Aligning trail names with an existing vernacular that is comfortably used for either a nearby road that supports primary access to the trail or a famous landmark in or near the trail will help users develop a mental map that locates the position of the trail within the environment. Also see **Recommendation G1: Naming Conventions**.

5.2.15. Strategic Implementation Plan

To successfully implement the new wayfinding system along a section of trail, the following schedule of activities/tasks should be completed:

- Inventory of existing and legacy signage systems(s) and analysis as to their desirability for potential inclusion in a new system or removal from field.
- Confirmation of circulation patterns and access points
- Development of a destination list with nomenclature recommendations
- Approval of all information aspects of the program
- Development and review of initial design concepts
- Design direction selection and further development
- Development and refinement of a Sign Message Schedule and Sign Location Plans
- Complete inventory of existing signage
- Discussion with all participating jurisdictions and agencies concerning the implementation of the plan

Once approvals have been given on the above, the following activities are required to complete the implementation of the complete wayfinding system:

- Documentation of the signage system for pricing and fabrication
- Bidding
- Fabrication period
- Installation period

- Preparation of the final signage reference document

Exact timing would be determined by the progress and complexity of the project as it develops along with scheduled reviews by the project team. Typically, the bidding, fabrication and installation activities take thirteen to fifteen weeks.

5.3. Wayfinding

The wayfinding system's intent is to provide necessary information to users without disrupting the natural experience that the trails provide. For this reason, the design should avoid bright colors and decorative elements. The signs should appear utilitarian but friendly, in keeping with the overall physical environment. Using different shades of the same or similar colors to create a visual hierarchy among different sign categories, rather than a selection of brighter colors, can achieve this goal. Certain safety and hazard messages should employ bright colors to create contrast and command attention.

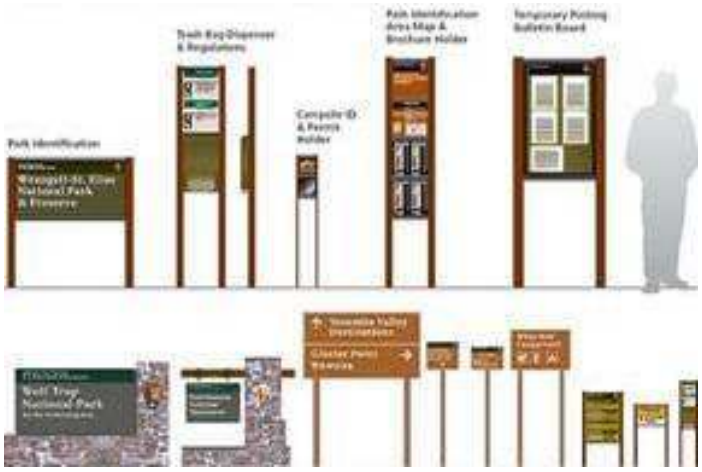


Figure 5-10. UniGuide Sign Program

The system should be unique, both in function and in design, and reflect the character of the area. Select native and natural materials should be applied as both aesthetic and functional elements. The National Park Service's UniGuide Sign & Information System sets standards to which the USFS seeks to adhere; we will use these standards as the benchmark for our design standards, either equaling or surpassing the standards.

The system should be designed so that all components are equally appropriate and effective on all trail sections, as well as on future trails. The system would not be tailored to fit particular conditions on a specific section of trail, but instead would be a "kit of parts" that could be reconfigured depending on specific trail conditions. These standards should address the majority of conditions experienced on the trails; given exceptions, certain special conditions may require the design of custom elements.

Flexibility is to be built into the system. It is important that the post and panel system be able to accommodate various panel sizes that will be appropriate to certain applications.

Performance requirements are multi-dimensional. The signs must be simply constructed, easy to install and update, yet extremely durable and resistant to vandalism. They must also

be designed to be adaptable to changing environmental conditions, most notably snow depth. Consideration must also be given to snow removal equipment that will operate in close proximity to signs. Another consideration is the environmental impact of the materials and construction methods. "Green" materials will be used whenever practical, keeping in mind that the longevity and durability of a sign is often as important as its material construction. Posts and sign panels should be made of recycled materials (not wood) where practical.

Various design considerations, including jurisdictional indicators, may affect the design direction dramatically. Following is a brief exploration of those effects.

5.4. Pros and Cons of Design Considerations

5.4.1. Design all wayfinding elements for the trails to reflect USFS or National Park Service system standards.

a. Pros

i. The Town of Mammoth Lakes trail system connects to the USFS trail system

ii. The USFS visual style is "established" and contributes to a sense of familiarity and anticipation for users

iii. Fabrication is simple, and can be handled by most sign fabricators

iv. Management and replacement of damaged parts is inexpensive

b. Cons

i. Would give the impression to the public that non-USFS trails are controlled by the Forest Service

ii. Requires the addition of site-specific branding elements for trails outside the USFS system

iii. The future development of a Town of Mammoth Lakes wayfinding system could result in an aesthetic disconnect, making it difficult to build a consistent experience and anticipatory value between the two systems

iv. Would not provide the dynamic look and feel of a more unique system that could help separate the Town of Mammoth Lakes from its peers in the outdoor recreation field

5.4.2. Design a completely new and original wayfinding system that incorporates historic elements and local materials, for a system specific to the Town of Mammoth Lakes.

a. Pros

i. Could include a single, well-designed icon that would "brand" the partnership of the jurisdictional entities and be used throughout the trail system

ii. Could eliminate the visual disconnect from the future Town of Mammoth Lakes wayfinding system, if the future system incorporates elements from the standard

iii. Choosing the right natural materials will allow the system to fit better within its surroundings, and to better reflect the character of the area

iv. A custom system will allow for built-in functional adjustments that overcome the challenges of sign visibility and maintenance caused by winter conditions

b. Cons

i. The initial investment could be higher than a system modeled after the USFS system

ii. Development of a system that incorporates the interests of the various stakeholders is a longer process, and will not result in an immediate design

Rather than limiting the wayfinding and signage system to one approach or the other, we propose a hybrid system based on the positive aspects of both—using aspects of the established USFS visual style and simple fabrication methods, and incorporating them within a unique framework that better fits with the surroundings and responds to the changing seasons.

5.5. Signage Vocabulary

Trail Identification Markers

These signs identify the trail. They should be large enough to be visible and readable for drivers, with appropriately sized typography. Information to be displayed could include the name of the portal, a jurisdictional branding element, parking information and whether the trail is accessible for motorized and/or non-motorized users.

Trail Information Kiosks

These provide the universe of information including a trail map, distances to destinations, trail conditions, trail experiences, connection with area amenities, and regulatory and safety information (hours of operation, rules, etc.). The size of these directories (small or large) will depend on the type and popularity of the particular trail.

Secondary Trail Identification Markers

These are placed at regular intervals along the trails to assure users that they are on the correct trail. International activity symbols would be posted here together with trail access information.

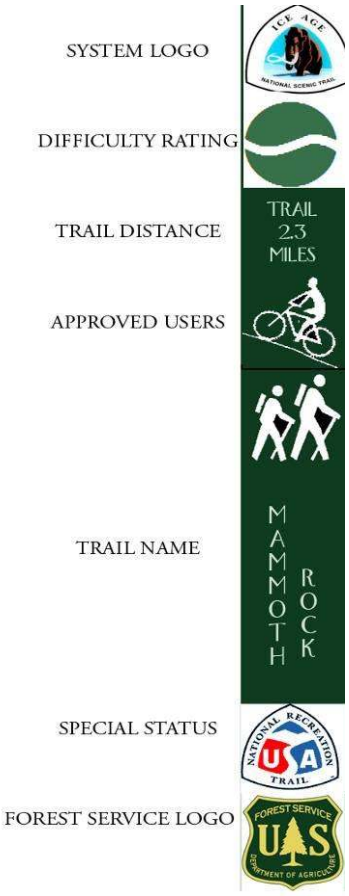


Figure 5-11. Typical Trail Marker on Public Land

Directional Signs

These are typically placed at road and trail junctions (decision points) to guide trail users toward a destination or experience.

Assurance Markers

These are typically placed along a road or trail corridor to assure the trail user they are still traveling in the correct direction. Assurance markers are typically a single symbol, or trail name, with no other information. They should be placed at regular intervals between junctions.

Distance Markers

These function as smaller versions of the Secondary Trail Identification Markers. They provide distance traveled, symbols of allowable activity and GPS coordinates.

Interpretive Signs

These provide educational information to trail users to help establish not only knowledge of the area, but a relationship with the trail experience. The ultimate goal is to convey stewardship in the minds of the users.



Figure 5-12. Trail Signage Concept Array

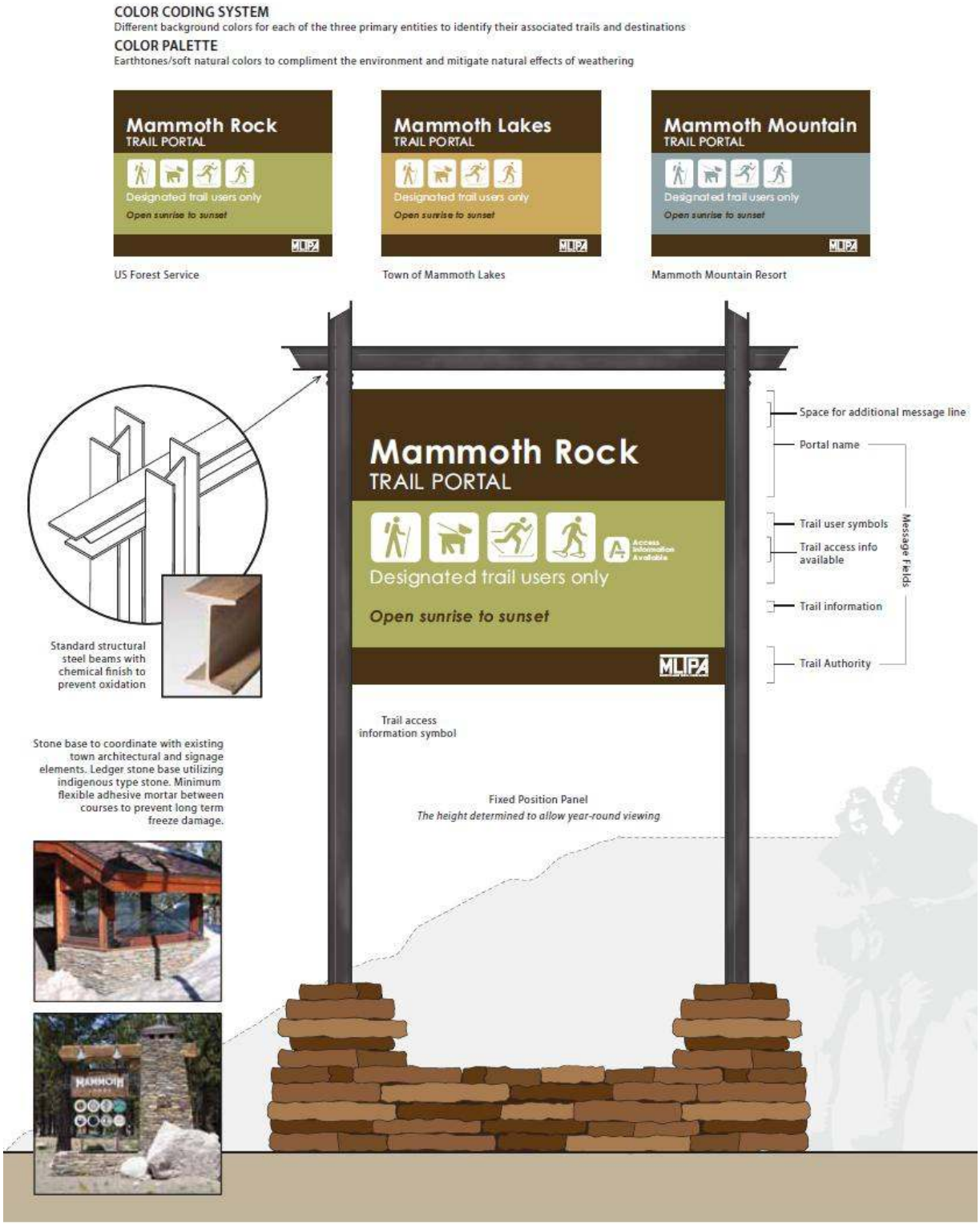


Figure 5-13. Portal Identification Marker

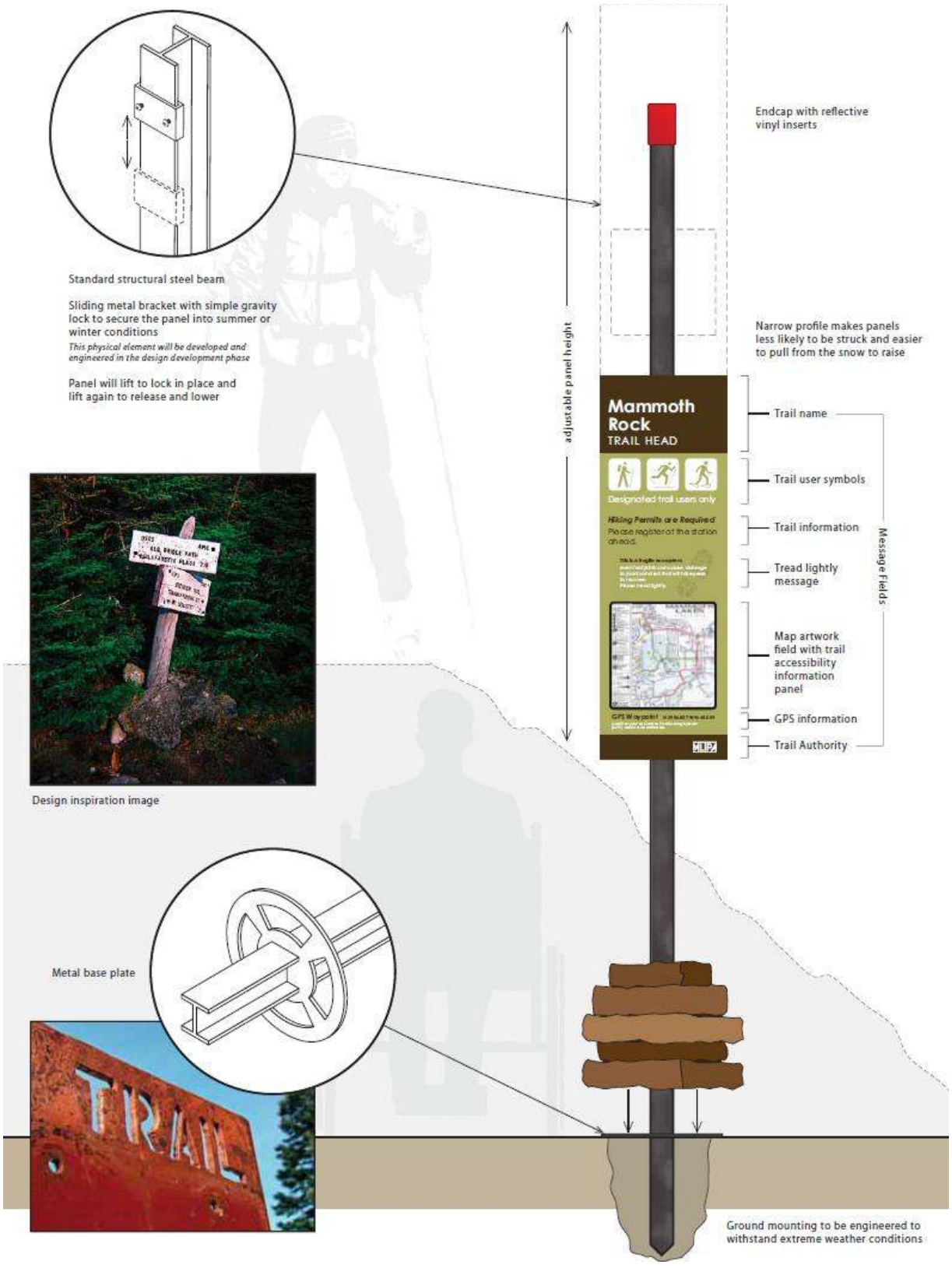


Figure 5-14. Trail Information Kiosk

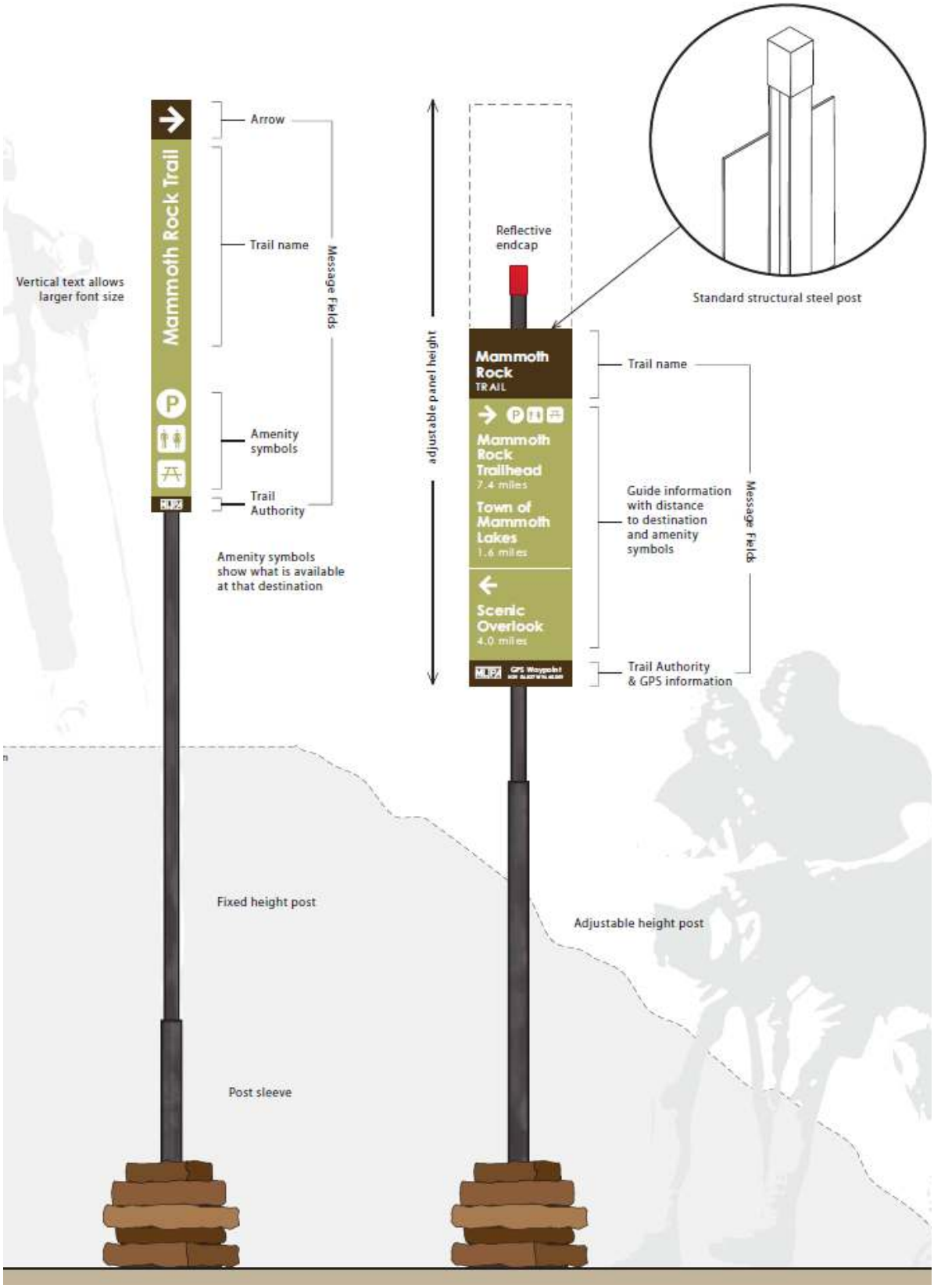


Figure 5-15. Trail Guide Signs

5.6. Conclusion

The challenge is to create a comprehensive system that will convey a wide range of information clearly, consistently, and attractively at all points along a visitor's journey. Further, it is important to respect the natural environment by avoiding sign clutter, unnecessary messages, and design elements that may disrupt the natural experience. Finally, we understand that the objectives and interests of multiple jurisdictional partners must be considered throughout the process. In order to fully realize these goals, we recommend that a full process of design development be undertaken.

This involves creation of a Core Working Team, made up of representatives from all appropriate partners, who will review and respond to design concepts, working toward development of a full system of sign types. It is most important to consider the creation of a single, comprehensive system with elements that are adaptable to the various experiences, rather than to view each jurisdictional partner as having its own unique signage system. Corbin Design is prepared to bring the various interests together to achieve this unified system.

5.7. Updated Framework

Corbin Design has been retained by the Town of Mammoth Lakes (TOML) to continue the development of a wayfinding program for the Town and the Mammoth area. The focus of this effort will result in the incorporation of additional site analysis and design recommendations into the Trail System Master Plan document. To help encourage adoption of the trails wayfinding and signage system by local stakeholders, the Town will implement a demonstration project at the Welcome Center and along a segment of the Main Path. Corbin Design will incorporate additional system refinements into the final Trail System Master Plan as needed based on inspection, review and comments of the demonstration project prototypes.

5.7.1. Winter 2008/2009 Phase

- Representatives from the TOML, MLTPA and Corbin Design performed a site inspection Nov. 8-9. Various trail system nodes were surveyed to determine their wayfinding needs. Five types of nodes were surveyed: Parks, Recreation and Activity Centers, Portals, Trailheads, and Access and Egress points.
- The goal of the site inspection was to establish a pattern for applying the various wayfinding elements at each site. The inspection also provided more details about the information needed to inform the users at each particular site.
- It was determined that the various destinations listed as GIC points should not be labeled as official node types until further discussions are held with the jurisdictional partners for each GIC point. It was agreed that the node designations would be treated as future projects for wayfinding application once the jurisdictional partners agree and grant permission.
- The Welcome Center will be used as a demonstration site for testing full-size prototype signs for the trails wayfinding and signage system. A comprehensive system will be planned for the Welcome Center site together with select section of the Main Path. The myriad of existing signs on the Welcome Center grounds will be evaluated and some will

be replaced with the new wayfinding system while all unnecessary signage will be removed.

- The implementation and manufacturing cost estimates for the prototype signs will be pursued through a qualified fabricator.

5.7.2. November 8th & 9th Site Inspection Results

- Corbin Design will add four new sign type designs to the system array. The full sign type family includes the following:
  - Type 1 - Portal Identification Markers
  - Type 2 - Trail Information Kiosks
  - Type 3 - Parks Identification Markers
  - Type 4 - Access/Egress Information Signs
  - Type 5 – Vehicular Guide Signs
  - Type 6 - Trail Guide Signs
  - Type 7 – Interpretive Kiosk (sample only)
- The system will be value engineered so that the final products will be affordable and changeable, and can be adjusted as needed to respond to seasonal conditions.
- A project goal is to have the demonstration signs be built by a local fabricator. Local fabricators will be researched and contacted for qualifications and pricing.

5.7.3. Other Important Issues

Rescue Indicator

Corbin recommends that a locator ID number designed to provide trail users with reliable locating information be applied to all trail-related signs. User safety is critical, and a rescue indicator number that is unique to each sign will become the reference point for any needed rescues. The system numbering will need to be discussed with emergency services personnel throughout the Mammoth area, and approved locator numbers need to be recorded in the TOML trail system database.

GPS Reference Point

Update the GIS program with the GPS position for each sign location. MLTPA has expressed the capacity to perform the task of collecting and documenting the GPS position of each wayfinding signage element as the system is installed.

Topography Mapping

As a design element for the interpretive sign background, a topographic pattern of the area could be used as the standard. TOML GIS Coordinator would be the contact person for accessing the topographic artwork.

Interpretive Story

The information for the prototype interpretive sign will focus on the trails wayfinding and signage system. The story will explain the system's purpose, function, highlights, and act as the system "owner's manual" for trail users. This unit will be placed adjacent to the Tourism and Recreation building near the trailhead of the Main Path.

Solar Lighting

The possibility of using solar power to provide limited external illumination for Trail Information Kiosk signs (type 2 above) will be explored. This would make the kiosks more visible at night and improve safety.

CHAPTER 6. DESIGN GUIDELINES

This chapter contains Design Guidelines for the application of bicycle, pedestrian and trail facilities. These are not engineering specifications and are not intended to replace existing applicable mandatory or advisory standards, nor the exercise of engineering judgment by licensed professionals. The document provides information and concepts relevant to the design of bicycle, pedestrian and trail facilities in the Town of Mammoth Lakes. Where applicable the existing relevant standards and specifications have been referenced. In certain cases some material and recommendations contained herein fall outside current standards but are of sound principle and have been employed successfully in many communities throughout the United States and abroad. Other treatments are purely conceptual and were developed to address specific local issues. These conceptual treatments should be implemented on an experimental basis. Any facilities to be built that fall outside the applicable state and local standards will require the approval of the Director of Public Works.

This chapter is organized in the following sections:

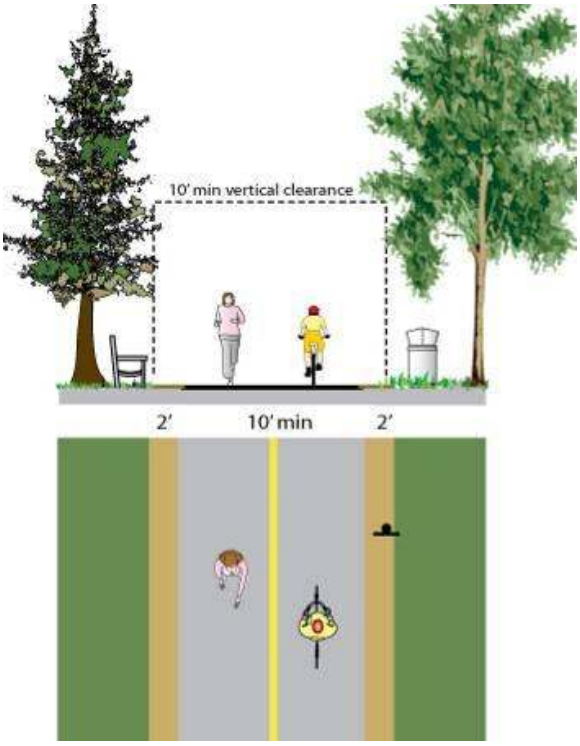
- Multi-Use Paths
- On-Street Bicycle Facilities
- Bicycle Parking
- Pedestrian Facilities
- Soft-Surface Trails
- Easements

Each section discusses the standard facility design as well as variations on that design that may be applicable to the Town of Mammoth Lakes. Ancillary features and supporting design elements such as crossings, signage and signalization treatments are also provided.

Note: The design guidance provided in this chapter is considered subject to change. It will be incorporated into the appropriate section of the Mammoth Lakes Trail System Standards Manual, and/or the Town of Mammoth Lakes Public Works Standards Manual, as appropriate, and available for use by the USFS if determined appropriate by that agency. The Standards Manual will be a living document intended to provide uniform guidance for the development of the Mammoth Lakes Trail System.

6.1. Multi-Use Paths (MUP)

Also known as Class I Bike Paths, multi-use paths facilitate two-way off-street bicycle and pedestrian traffic, which also may be used by skaters, wheelchair users, joggers and other non-motorized users. Given the unique and varied recreation opportunities in Mammoth Lakes, multi-use paths in Mammoth Lakes anticipate the potential to serve as winter recreation facilities, with the potential for a full complement of winter maintenance and use options. Multi-use paths are frequently found in parks, along rivers, and in greenbelts where there are few conflicts with motorized vehicles. In Mammoth Lakes, multi-use paths can potentially offer access to unique wilderness destinations. The guidelines for Town of Mammoth Lakes multi-use path facilities reflect the full complement of recreation opportunities unique to Mammoth Lakes.

Existing Design	**Figure 6-1. Multi-Use Path Design**
	**Existing Guidance:** - AASHTO Guide for the Development of Bicycle Facilities - Caltrans Highway Design Manual (Chapter 1000) - TOML Public Works Standards **Local Issues:** Minimum design width under existing standards is eight feet. This may not be sufficient if user volumes are high or in steep sections where higher speeds necessitate greater separation. MUP design width also needs to consider potential winter use.
Recommended Design	
	**Width:** 10 feet is required by the Town of Mammoth Lakes as the minimum width of new multi-use paths. This requirement exceeds existing standards and will be adequate for moderate to heavy use. This provides an unobstructed right-of-way wide enough to accommodate typical trail grooming equipment. However, shoulders wider than two feet should be considered in areas that will receive regular winter grooming. 12 feet is recommended for heavy use areas with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and dog walkers. May also be appropriate for safety reasons in areas with limited sight lines or where speeds may be high (steep grades). The 10' minimum clearance should be exceeded as necessary to account for winter snow pack. **Striping:** Striping on multi-use paths is optional, and may be desired in steep or high-use locations where proper lane positioning could reduce conflicts. Striping is also useful in areas where MUPs intersect a roadway (see "Typical At-Grade Crossing"). Standards for MUP striping can be found in Caltrans Chapter 1003.1.
Applicable Locations: Existing and future MUPs.	

Other Design Considerations for Multi-Use Paths:

Multi-use paths can provide a good facility, particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. As previously identified, the opportunities for multi-use paths in Mammoth Lakes span a vast array of recreation and seasonal opportunities consistent with a recreational based resort economy. Multi-use path design guidelines for Mammoth Lakes should anticipate the unique needs and environmental and seasonal conditions for which the multi-use paths may be reasonably expected to be employed. Multi-use paths should generally provide directional travel opportunities not provided by existing roadways, and can potentially provide safe alternatives for winter pedestrian travel. Some of the elements that enhance multi-use path design include:

- Implementing frequent access points from the local road network; if access points are spaced too far apart, users will have to travel out of direction to enter or exit the path, which will discourage use.
- Placing directional signs to direct users to and from the path.
- Building to a standard high enough to allow heavy maintenance equipment to operate on the path without causing it to deteriorate.
- Limiting the number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the end of a local street. Paths should not terminate at major roadways without pedestrian and bicycle facilities.
- Taking special care to provide clear and direct transitions between the MUP and bike lanes or sidewalks.
- Identifying and addressing potential safety/security problems up front.

Both the California Highway Design Manual and the AASHTO Guide for the Development of Bicycle Facilities generally recommend against the development of multi-use paths directly adjacent to roadways. The realities of snow removal and snow storage in Mammoth Lakes only compound the inherent and problematic nature of these alignments. Also known as "sidepaths" these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in bicyclists going against traffic when either entering or exiting the path. This can also result in an unsafe situation where motorists entering or crossing the roadway at intersections and driveways do not notice bicyclists or other trail users coming from their right, as they are not expecting traffic coming from that direction. Stopped cross-street motor vehicle traffic or vehicles exiting side streets or driveways may frequently block path crossings. Even bicyclists or other fast moving trail users coming from the left may also go unnoticed, especially when sight distances are poor.

Multi-use paths may be considered along roadways under the following conditions:

- The path will generally be separated from all motor vehicle traffic.
- Bicycle and pedestrian use is anticipated to be high.
- In order to provide continuity for an existing path through a roadway corridor.
- The path can be terminated at each end onto streets with good bicycle and pedestrian facilities, or onto another safe, well-designed path.

- There is adequate access to local cross-streets and other facilities along the route.
- The total cost of providing the proposed path is proportionate to the need.
- Any needed grade separation structures do not add substantial out-of-direction travel.

As bicyclists gain experience and realize some of the advantages of riding on the roadway, many stop riding on paths placed adjacent to roadways. Bicyclists may also tend to prefer the roadway as pedestrian traffic on the multi-use path increases due to its location next to an urban roadway. When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced cyclists and those who are cycling for transportation purposes. Providing a comfortable option for cyclists on the roadway, can improve safety on the path by luring faster cyclists off the MUP where conflict with other users could arise. In fact, bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible. Bike lanes on the adjacent roadway will serve as an important alternative for (1) faster bicyclists, (2) bicyclists who need to access destinations on the other side of the roadway, (3) when pedestrian traffic levels on the MUP are high, and (4) when the MUP is snow-covered and inaccessible or groomed for winter recreation.

Surfacing:

Asphalt and concrete are the most common surface treatment for multi-use paths, however the material composition and construction methods used can have a significant determination on the longevity of the pathway. Thicker asphalt sections and a well-prepared sub-grade will reduce deformation over time and reduce long-term maintenance costs.

Off-street paths should be designed with sufficient surfacing structural depth for the sub-grade soil type to support maintenance and emergency vehicles. If the path must be constructed over a very poor sub-grade (wet and/or poor material), treatment of the sub-grade with lime, cement or geotextile fabric should be considered.

Alternative surface materials such as decomposed granite may be appropriate in some circumstances. The Town would need to consider durability and snow removal needs (grooming vs. clearing) when selecting an alternative surface material such as decomposed granite. Surface selection should take place during the design process.

Snow Removal/Grooming:

Many of the multi-use paths in the Town of Mammoth Lakes serve non-motorized uses year-round. In the winter months these paths can be cleared of snow for pedestrian and bicycle use, or groomed to serve as cross-country ski routes. During these months it is important that snow removal and grooming equipment have ease of access to these paths. Any gates, bollards, or other access control measures that restrict access to the paths should be removable for winter maintenance equipment. Path access points and at-grade crossings should be kept clear of snow accumulations and berming from adjacent on-street snow removal operations. In times of heavy snow accumulations, snowblower vehicles should be employed to move the snow as far from the multi-use path as possible. Where large snowpack elevation differentials exist, effort should be made to provide a smooth transition.

Pavement Markings:

Directional pavement markings on multi-use paths are optional, and may be desired for higher-use locations where providing directional markings could reduce conflicts. Pavement markings can also be used to mark mileage and customized stencils can be created to "brand" each path with a unique identity.

Multi-Use Path Amenities

Trail amenities for multi-use paths can enhance the experience for the user and increase the functionality of the trail. Amenities include signage, benches, lighting, shaded areas, and dog-bag dispensers. There are some existing guidelines and standards found in the existing Town of Mammoth Lakes Design Guidelines. These are referenced below with recommended additions.

User Conflicts along Multi-Use Paths

Typical user groups for multi-use paths include cyclists, rollerbladers, skateboarders, and several pedestrian-oriented groups consisting of walkers, joggers, dog walkers, and families with strollers. Each of these user groups have varying travel speeds, special requirements, and levels of trail awareness as they use the multi-use paths. On multi-use pathways with heavier use, conflicts between user groups can occur. It is recommended that multi-use pathways in the Town of Mammoth Lakes have custom signage installed to guide trail users on proper trail etiquette (see **Figure 6-2** below), especially in areas where conflicts are likely to occur. The sign below on the left provides an for use example on multi-use path segments where bicyclists, walkers and roller bladders would be the predominant user groups. The sign on the right provides yielding procedures for multi-use paths where equestrian may be present. Both are primarily applicable only to MUPs in their summer condition, or MUPs that are cleared and see significant use in the winter. Custom signage may need to be developed to address yielding procedures for winter conditions.



Figure 6-2. User Etiquette Signs along Multi-Use Paths

6.1.1. Paved Median Paths

Example #1 (non-local)	Figure 6-3. Median Bike Paths
	**Existing Guidance:** Current bike path design guidelines and standards apply. Local Issues: Main Street is consistently seen as the area of greatest concern for bicycle and pedestrian safety. It is also the most important gap in the Main Path loop. Providing bike lanes on Main Street will be an important improvement. Providing wide sidewalks or 'promenades' will be good for pedestrians, but may present conflicts at driveways and between faster moving bicyclists and pedestrians. A median path will require significant planning and investment, but will provide multiple benefits for bicycle safety, pedestrian safety and snow removal.
Example #2 (non-local)	
	**Design Discussion:** Median bike paths should only be used in situations where they can provide a superior level of experience and reduce conflicts and safety concerns associated with other options. Median paths generally have an advantage over bike lanes and sidewalk paths because there are less conflict points associated with driveways and with buses pulling in and out of bus stops. These conflicts can be easily managed by experienced riders using bike lanes, but are more difficult for less experienced riders. Wherever possible, median paths should be used in conjunction with bike lanes because bike lanes will provide connections to adjacent land uses where median paths cannot.
Applicable Locations: Main Street is a potential location.	

6.1.2. Typical At-Grade MUP Crossings

When a grade-separated crossing cannot be provided, the typical at-grade crossing occurs at a location with light traffic. A trail-sized stop sign (R1-1) should be placed about 5 feet before the intersection. Direction flow should be treated either with physical separation or a centerline approaching the intersection for the last 100 feet.

Existing Design

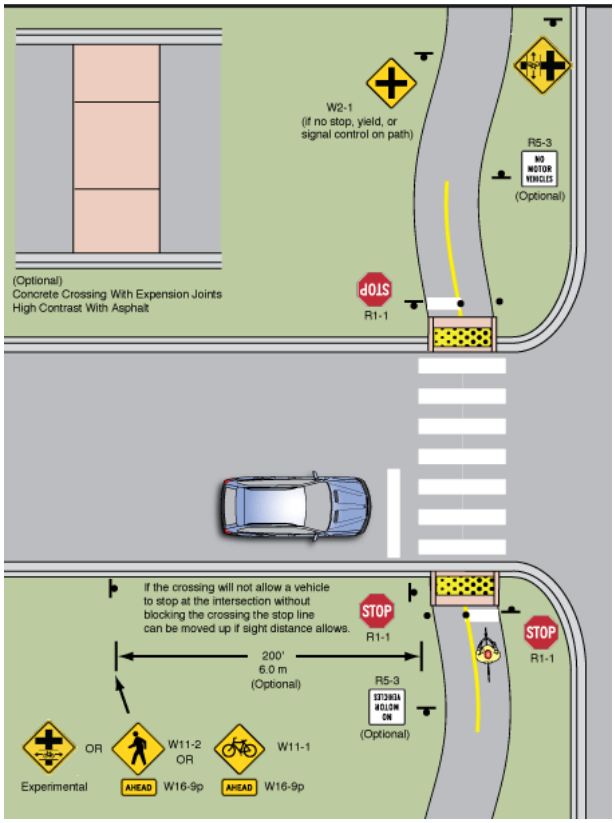
Figure 6-4. Typical At-Grade MUP Crossing



Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)

Local Issues:
While most at-grade crossings traverse minor streets or driveways, they generally occur on multi-use paths that are located directly adjacent to major roadways. The traffic turning from the major roadway onto the minor street is not required to stop and may not see or anticipate a bicyclist entering the crossing.

Recommended Design



The recommended "typical" at-grade crossing includes all of the current treatments shown in the above photo (ADA-compliant ramps, removable bollards, trail-sized stop signs, etc.)

Recommended additional treatments should include—at a minimum—advance warning signs for motorists and centerline striping on the MUP as it approaches the intersection.

Other optional features include:

Speed reducing features for vehicles:
- Transverse rumble strips approaching the trail crossing
- Sinusoidal speed humps (compatible with slow speed snow removal operations)
- Advance warning signs for motorists
- Colored, textured, and/or high visibility crosswalks (can be raised as part of a speed hump if crossing is mid-block)

Speed reducing features for bicyclists:
- Chicane, or swerve in multi-use path approaching the crossing

Applicable Locations: Existing and new at-grade crossings parallel to Old Mammoth Road and Meridian Boulevard.

Other Design Considerations for Typical At-Grade Crossings:

Guidance for at-grade crossings can be found in Section 1003 of the Caltrans HDM and the AASHTO Guide for the Development of Bicycle Facilities. These documents relay standard treatments which many jurisdictions typically exceed with a combination of many of the features outlined above.

If the street is above four or more lanes or two/three lanes without adequate gaps, a median refuge should be provided in the middle of the street crossed (see Toucan Crossing). The refuge should be 8 feet wide at a minimum, 10 feet is desired. If a signal is provided, signal loop detectors may be placed in the pavement to detect bicycles if they can provide advance detection, and a pedestrian-actuated button provided (placed such that cyclists can press it without dismounting.)

While some optional treatments may be necessary only in some areas, it is important for the basic overall design of each crossing to be consistent so that motorists and trail users are able to easily recognize and assess at-grade crossing situations.

6.1.3. Signalized At-Grade Crossings of Major Streets (Toucan or Hawk Crossing)

A Toucan crossing (derived from: "two can cross") is used in higher traffic areas where pedestrians and bicyclists are crossing together. A Hawk (**H**igh-Intensity **A**ctivated Cross**w**al**k**) signal is a combination of a beacon flasher and traffic control signaling technique for marked crossings.

Example #1: Toucan Crossing (non-local)	**Figure 6-5. At-Grade Crossing of Major Street (Toucan or HAWK Crossing)**
	**Existing Reference:** - ITE – Alternative Treatments for At-Grade Pedestrian Crossings **Local Issues:** Grade-separated crossings are typically used in Mammoth where a multi-use path crosses a major street. However, a treatment similar to the one pictured here may be applicable in a situation where both bicyclist and pedestrians need to cross a major street in order to access a multi-use path. Because the Lake Mary Road Path is on the south side of the road, bicyclists and pedestrians coming from the north will have to cross Lake Mary Road in order to access the path. This configuration shown left also functions well in a mid-block crossing situation such as may be necessary with the proposed median path along Main Street.
Example #2: HAWK Crossing (non-local)	
	**Design Guidance:** A traffic engineering analysis should precede the installation of either treatment. Toucan crossings are generally used only when significant volumes of bicyclists and pedestrians are anticipated, and the crossings are generally at least 14 feet wide. Hawk crossings are typically used in both bike/ped and pedestrian-only situations. Accompanying signage can be adapted as needed.
Applicable Locations: At intersections or mid-block where bicyclists and/or pedestrians need to cross a major street in order to access a multi-use path on the other side (i.e. Lake Mary Road, Meridian Boulevard).	

Additional Guidance for Toucan and Hawk Crossings:

Typically, Toucan crossings have both bicycle and pedestrian signal heads on both sides of the crossing and is button or sensor actuated (bicycle loop detectors are often implemented with Toucan crossings). Toucan crossings are usually used with multi-use trail crossings of higher traffic roadways. Refuge islands, curb extensions or other crossing treatments can be used in conjunction with a Toucan crossing. Crossings can be at intersections, or occur mid-block. If the crossing occurs mid-block vehicle stop lines should be provided 20' minimum in advance of the crossing.

If a refuge island is used with a Toucan crossing, it should be 8 feet wide at a minimum and 10 feet is desired. If a signal is provided, signal loop detectors may be placed in the pavement to detect bicycles if they can provide advance detection, and a pedestrian-actuated button provided (placed such that cyclists can press it without dismounting.)

On Hawk crossings, the beacon signal consists of a traffic signal head with a red-yellow-red lens. The unit is normally off until activated by a pedestrian or bicyclist. When bicyclists/pedestrians wish to cross the street, they press a button and the signal begins with a flashing yellow indication to warn approaching motorists. A solid yellow, advising motorists to prepare to stop, then follows the flashing yellow. The signal is then changed to a solid red, at which time the user is shown a WALK indicator. The beacon signal then converts to an alternating flashing red, allowing drivers to proceed after stopping at the crosswalk while the bicyclist/pedestrian is shown the flashing DON'T WALK signal. The HAWK signal is still considered experimental by the Federal Highway Administration, but the concept is gaining acceptance quickly.

6.1.4. Signalized At-Grade Crossings of Minor Streets (Cross Alert System)

The Cross Alert system enhances visibility at multi-use path (or other recreational path) and public road intersections. This device is ideal for mid-block crossings and rural scenarios with light to moderate traffic and no intersection signalization.

Cross Alert Crossing (non-local)	Figure 6-6. Signalized At-Grade Crossing (Cross Alert System)
	**Existing Reference:** - www.crossalert.com **Local Issues:** Some at-grade crossings may require additional safety features to encourage compliance and alert motorists to the presence of cyclists and other trail users. Some crossings may require only seasonal signalization. Cross Alert System can be seasonally removed and reinstalled as necessary.
	**Specifications:** The Cross Alert system consists of a red LED light and stop sign which are presented to path users and an amber LED light and warning sign which are presented to vehicular traffic. The sign is powered by a solar panel, which is backed up by a battery. The system is activated by path activity via an infrared motion sensor. The companion sign on the other side of the road is activated via radio signal when the first sign detects motion on the path. This system includes an integrated trail counter to provide a count of trail users who cross the intersection.
Applicable Locations: Currently unsignalized intersections or mid-block at-grade crossings with safety concerns.	

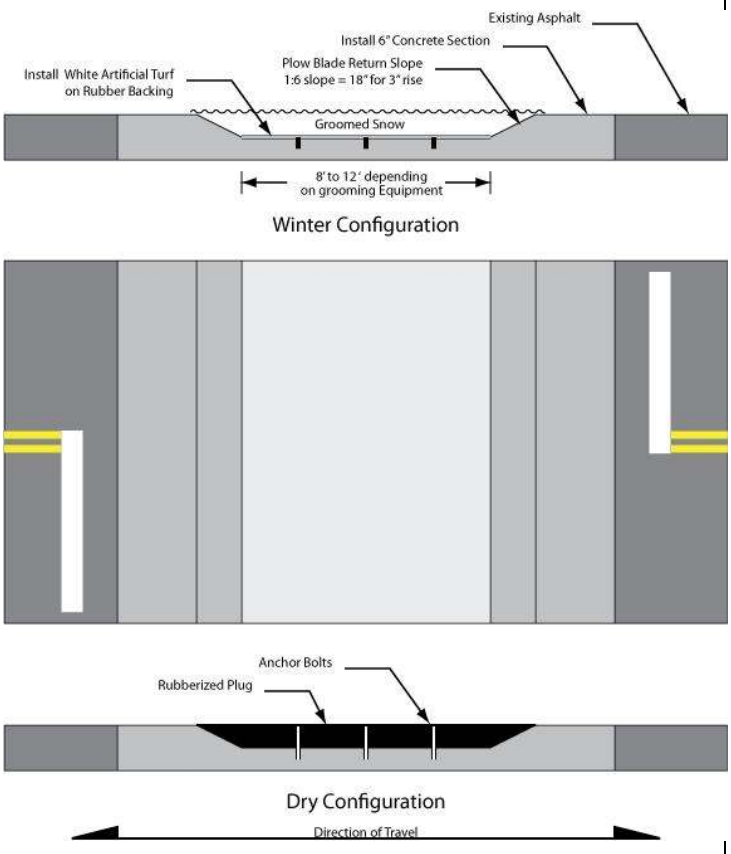
6.1.5. At-Grade Cross-Country Ski Crossing

Figure 6-7. Concept for At-Grade Cross Country Ski Crossing

Existing Guidance:
There are currently no official federal, state or local design standards that deal specifically with at-grade cross-country ski crossings. The design described below is conceptual and has not been tested.

Local Issues:
Winter cross-country ski trails can require skiers to remove ski equipment and walk across road crossings. An innovative crossing that is designed to hold more snow and is friendly to all users would be a great benefit to local and visiting skiers.

Potential Design



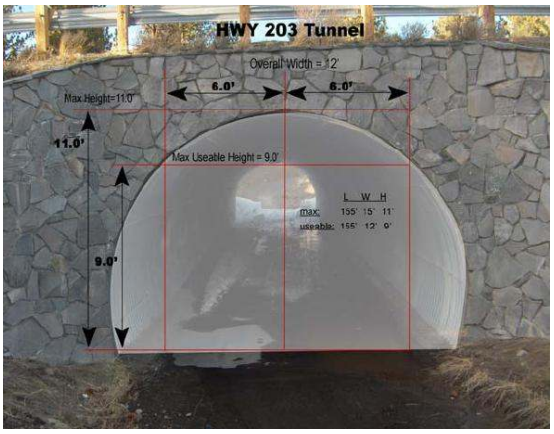
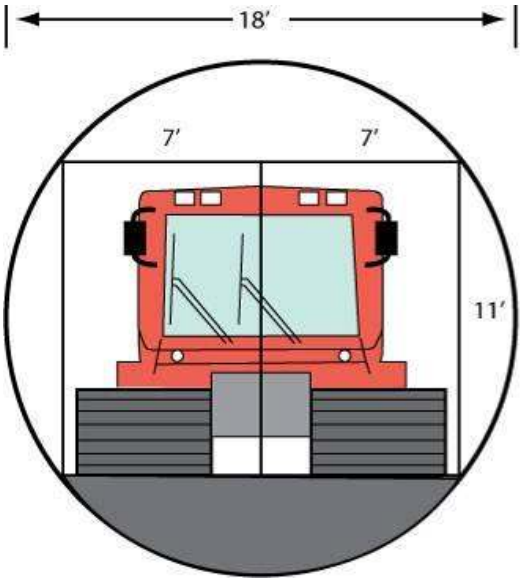
Design Guidance:

- Crossing should be cross-sloped to adequately drain any melted water away from the roadway. Small channels could be added to facilitate drainage if necessary.
- Snow removal crews should be directed to not plow the crossing closely or sand, salt, or gravel the crossing.
- Light colors, such as concrete and white artificial turf are recommended to reduce solar heat gain and faster melt out.
- This design is conceptual and would have to be tested as a pilot project before widespread implementation.
- Because of the approximately 3" drop, this should only be used in areas with stop signs where motorists are forced to come to a full stop before the crossing.
- Durable hard plastic rails could be attached to anchor bolts to reduce the downward movement of automobiles, but would have to be tested to determine their resistance to damage by snow removal equipment. Spacing between rails would have to be wide enough to accommodate common ski widths.
- A variation on this concept using a cast concrete speed table may be considered at mid-block crossing location.

Applicable Locations: Intersections or mid-block locations where groomed cross-country ski trails cross cleared asphalt roadways.

6.1.6. Grade-Separated Crossings

When the decision to construct an off-street multi-use path has been made, grade separation should be considered for all crossings of major thoroughfares. For the Town of Mammoth Lakes the preferred type of grade-separated crossing is an undercrossing due to weather and visual considerations.

Existing Design	**Figure 6-8. Design of Grade-Separated Crossings**
	**Existing Reference:** - AASHTO Guide to the Planning and Design of Pedestrian Facilities - TOML Public Works Standards **Local Issues:** Several grade-separated crossings currently exist in Mammoth Lakes including the Highway 203, Meridian, and Mammoth Creek tunnels. Current undercrossings do not accommodate a full-size snow cat for efficient tunnel clearing or grooming.
Recommended Design	
	**Design Guidance:** The graphic to the left shows the recommended design of a corrugated tunnel using an 18-foot diameter pipe. Alternately, the tunnel should be designed to accommodate the snow cat based on the design vehicle dimensions above. The wider tunnel will also allow more light to enter the tunnel and provide for greater horizontal separation as users pass each other in the undercrossing.
Applicable Locations: All multi-use path tunnels where winter grooming is desirable.	

6.1.7. Bicycle 'Scramble' Signals

Bicycle signal heads are standard signals fitted with red, yellow, and green bicycle indicators installed at intersections or mid-block crossings where there is heavy bicycle use, special circumstances, or intersection geometry where the use of a bicycle signal head would be beneficial. Bicycle signals should be combined with bicycle detection sensors or convenient push buttons.

Recommended Design	**Figure 6-9. Bicycle 'Scramble' Signal Design**
	**Existing Guidance:** - Section 4D.104(CA) of the California MUTCD **Local Application:** The eventual terminus of the Lake Mary Road Path at the southwest corner of Minaret and Main may leave some cyclists confused as to how to proceed safely through the intersection. The use of a bicycle signal with accompanying signage will clarify this situation and allow eastbound bicyclists to easily continue north on Minaret Road toward the North Village or east on Main Street via bike lanes or a median bike path. Without this treatment, bicyclists will have to use crosswalks in an area with potentially high pedestrian activity. Use of crosswalks will also tend to lead cyclists onto crowded sidewalks rather than the street.
Recommended Design	
 	**Description:** Portland, Oregon and San Luis Obispo, CA have introduced a concept of a 'Bicycle Scramble' where a bicycle only signal was given a dedicated signal phase to allow bicycles to enter and exit a popular bicycle trail that terminated at one corner of an intersection. During winter months, the bicycle signal phase could be deactivated or converted to a "pedestrian scramble" phase as new developments such as Mammoth Crossing bring significantly higher levels of pedestrian activity at that intersection. **Features:** Diagonal breaks in the crosswalk striping help direct bicyclists through the intersection in conjunction with the dedicated signal phase. Additionally, special sensors, with accompanying pavement markings detect bicycles and trigger the special phase. Conveniently-located push buttons or video detection could substitute for in-pavement sensors.
Applicable Locations: Lake Mary Road Path Terminus, a future Main Path crossing at Main Street and Old Mammoth Road would be another location if a median bike path is installed along Main Street.	

6.2. Bike Lanes

Bike lanes (Class II bicycle facilities – Caltrans) are defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bicycle lanes are generally found on major arterial and collector roadways and are five to six feet wide.

Existing Design

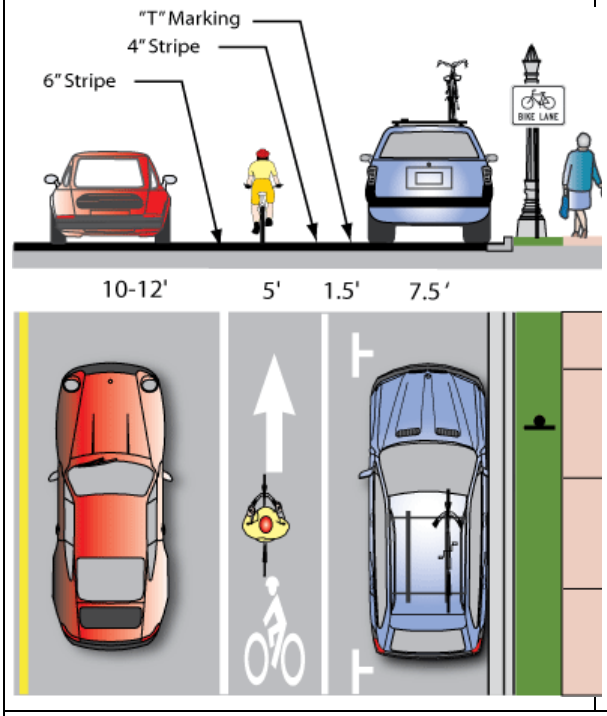


Figure 6-10. Bike Lane Design

Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)
- TOML Roadway Cross Sections

Local Issues:
The Town's only existing bike lanes are located on roadways without curbs, gutters or parking. As development increases and new bike lanes and sidewalks are installed, the typical bike lane section will likely include these elements.

Recommended Design



Width:
6 feet is recommended for bike lanes without on-street parking. This width will allow for added separation between bicyclists and vehicles and will allow for increased snow storage capacity in winter.

Bike lanes should be cleared when possible to keep the facility open for bicycling (see Operations and Maintenance Chapter). Bike lanes in the Town of Mammoth Lakes should adhere to the following standards:

6' (1.8 m) minimum if no gutter exists, measured from edge of pavement

6' (1.8 m) minimum with normal gutter, measured from curb face; or 3' (0.9 m) measured from the gutter pan seam

5' (1.5 m) when parking stalls are marked

Applicable Locations: Arterials or collector streets with traffic volumes to justify bike lanes and sufficient width to provide them.

Additional Guidance on Bicycle Lanes in TOML

Existing typical sections for roadways such as Old Mammoth Road, Laurel Mountain Road, Tavern Road, and Sierra Nevada Road have many good design principles incorporated, including narrow travel lanes, five-foot bike lanes, and appropriate turning lanes and parking. The Town of Mammoth Lakes has recognized an issue with bike lanes adjacent to on-street parking and has made an attempt to increase the distance between parked cars and cyclists to reduce the potential for a 'dooring' accident by specifying a nine-foot parking lane. Studies have shown that narrow parking lanes produce tighter parking behavior with drivers positioning their vehicles closer to the curb. It is recommended that the proposed roadway sections for Old Mammoth Road, Laurel Mountain Road, Tavern Road, and Sierra Nevada Road maintain the nine-foot space between parking and the bike lane, but create 7.5-foot parking stall within that lane by using parking 'tics' as shown in **Figure 6-10**. The 1.5 feet of buffer space left over will produce the following benefits:

- Buffer area for cyclists to decrease the chance of dooring accidents
- Buffer area for drivers to enter or exit the vehicle without being in the bike lane
- Narrower parking lane to improve parking performance and maximize road space
- Narrower parking lane to discourage parking by large vehicles such as RVs
- Parking 'tic' striping defines each space and can improve overall parking capacity by optimizing spacing between parked cars

Bike Lanes and Drainage Grates:

Installing bike lanes may require more attention to continuous maintenance issues. Bike lanes tend to collect debris as vehicles disperse gravel, trash, and glass fragments from traffic lanes to the edges of the roadway. Striping and stenciling will need periodic replacing. Good examples of bicycle-friendly drainage grates within TOML can be found along the recently paved portions of Lake Mary Road.

Poorly designed or placed drainage grates can often be hazardous to bicyclists. Drainage grates with large slits can catch bicycle tires. Poorly placed drainage grates may also be hazardous, and can cause bicyclists to veer into the auto travel lane.

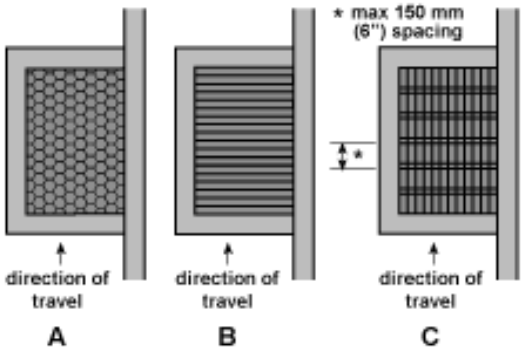
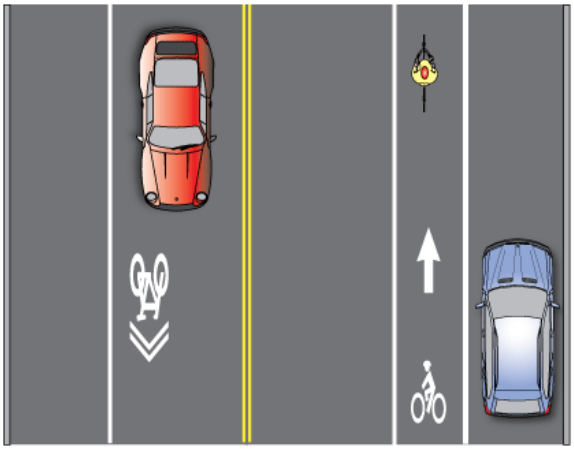


Figure 6-11. Examples of Bicycle Friendly Drainage Grates

6.2.1. Uphill Bicycle Climbing Lanes

Short sections of bicycle lane may be applied to steep grades on otherwise shared roadway (Class III) situations. These uphill climbing lanes get slow moving cyclists out of the travel lane and should be six feet wide to provide extra room for maneuvering. At downhill grades where cyclists will move at speeds approaching those of automobile traffic, bike lanes in the downhill direction are not needed or advised.

Existing Design (non-local)	**Figure 6-12. Uphill Bicycle Lane Design**
	**Existing Guidance:** - AASHTO Guide for the Development of Bicycle Facilities - Caltrans Highway Design Manual (Chapter 1000) **Local Issues:** On streets with steep grades it may be most appropriate to provide a bike lane only in the uphill direction. This configuration also requires less right-of-way than installing traditional bike lanes on both sides of the street.
Recommended Design	
	**Design Guidance:** Uphill bike lane should be 5 or 6 feet wide (6 is preferable since extra maneuvering room on steep grades can benefit bicyclists) Can be combined with Shared Lane Markings for downhill cyclists who can match prevailing traffic speeds. Shared Lane Markings are discussed in section 7.3.5. Placing the shared-lane marking in the center of the travel lane has advantages of being more visible to motorists and lasting longer since it goes between tire tracks.
Applicable Locations: Canyon Blvd, Forest Trail, Old Mammoth Road (between UGB and Lake Mary Rd) and other streets designated for bike lanes that have steep or persistent grades.	

6.2.2. Bike Lanes Adjacent to Right-Turn-Only Lanes

Right-turn only lanes present challenges for through-cyclists who must merge to the left to position themselves in the through travel lane. Jurisdictions will sometimes stripe bike lanes on the right-side of right-turn only lanes, which places the through-cyclist in direct conflict with a right-turning vehicle.

Existing Design (non-local)

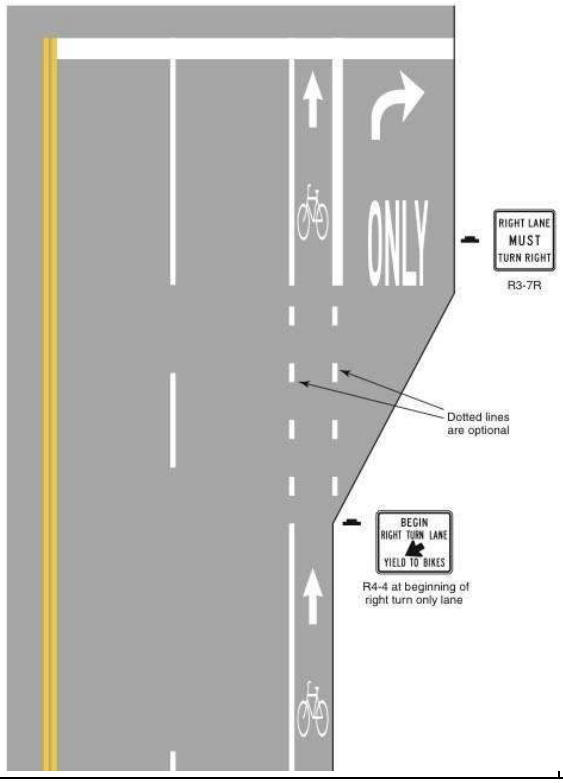


Figure 6-13. Bike Lane Adjacent to Right-Turn-Only Lane

Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)
- Manual of Uniform Traffic Control Devices – California Supplement Chapter 9C-3

Local Issues:
In the TOML Public Works Standards, Mammoth exceeds Caltrans and AASHTO guidance by requiring 5' minimum in the recommended typical sections.

Recommended Design



Design Guidance:
The appropriate treatment for right-turn only lanes is to either drop the bike lane entirely approaching the right-turn lane, or to place a bike lane pocket between the right-turn lane and the right-most through lane. The design at left illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the merge area.

Applicable Locations: All bike lanes adjacent to designated right turn lanes or pockets.

6.2.3. Bike Boxes

Bike boxes, also known as 'advance stop lines', are being used on American roadways with increasing frequency. Bike boxes are intersection safety treatments that help reduce bicycle/car collisions, especially those between right turning vehicles and cyclists going straight.

Existing Design (non-local)

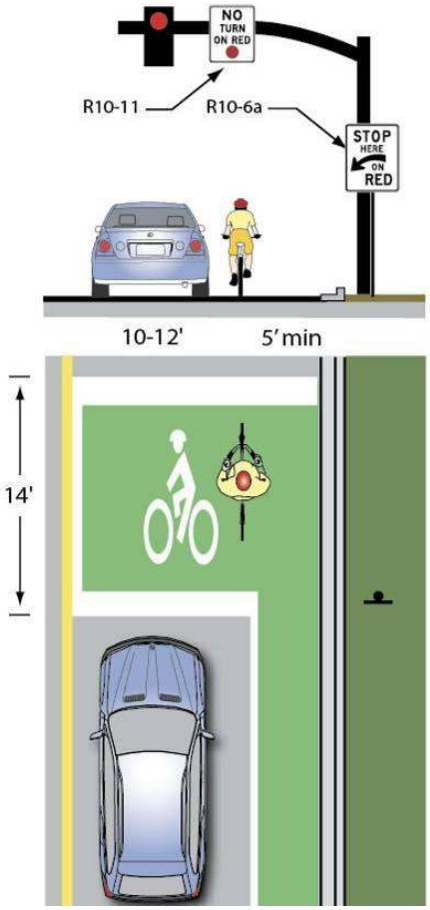


Figure 6-14. Bike Box Design

Existing Guidance: None

Local Issues:
As more bike lanes are developed and the level of on-street cycling increases the Town of Mammoth Lakes may want to consider installing bike boxes at key intersections to improve intersection safety. At a red light, cyclists are more visible to motorists by being in front of them rather than at the side in the vehicle's blind spot. Vehicles must stop behind the white stop line at the rear of the bike box.

Recommended Design



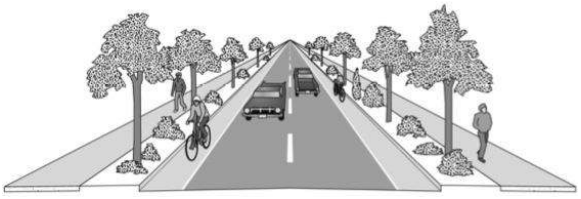
Design Guidance:
Bike boxes can be combined with dashed lines through the intersection for green light situations to remind vehicles to be aware of bicyclists traveling straight. Bike Boxes have been installed with striping only or with colored treatments to increase visibility.

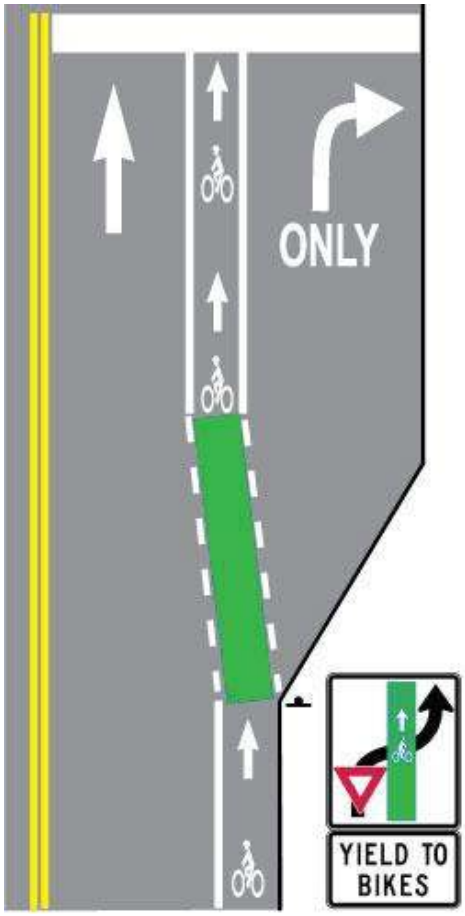
Bike Boxes should be located at signalized intersections only, and right turns on red should be prohibited. A bike box should always be to the left of right-turn only lanes as shown in the first photo (above). An engineering analysis should be conducted

Applicable Locations: At intersections on streets with bike lanes.

6.2.4. Colored Bike Lanes

Colored bike lanes are increasingly being used across the United States and are typically found with two distinct methodologies. The first involves coloring being added to the bike lane in conflict or merging areas with the second involving coloring the entire bike lane.

Existing Design	**Figure 6-15. Colored Bike Lanes**
	**Existing Guidance: None** **Local Issues:** In Fall 2009 the Town of Mammoth Lakes installed its first colored bike lane at the corner of Old Mammoth Road and Minaret Road. Pending satisfactory evaluation of the durability of the installation method and material, other locations should have this treatment installed. This treatment would be most effective when provided 100' in advance of a merging area or intersection (preferably in conjunction with the guidance on the previous page), and 50-100' after the intersection. The Town of Mammoth Lakes may also choose to color entire bike lanes to take advantage of the benefits below.
Recommended Design	
 Before  After	**Design Guidance:** A contrasting color for the paving of bicycle lanes can also be applied to continuous sections of roadways. These situations help to better define road space dedicated to bicyclists and make the roadway appear narrower to drivers resulting in beneficial speed reductions. Colored bike lanes require additional cost to install and maintain. Techniques include: • Paint – less durable and can be slippery when wet (currently under evaluation in TOML) • Colored asphalt – colored medium in asphalt during construction – durable. • Colored and textured sheets of acrylic epoxy coating. May not be compatible with snow removal operations.
Applicable Locations: Any existing or planned bike lane.	

Existing Design (non-local)	**Figure 6-16. Colored Bike Lanes – Conflict Areas**
	**Existing Guidance:** Portland's Blue Bike Lanes Study **Local Issues:** Certain merging/conflict/or intersections may benefit from having the bike lane made more visible to motorists while aiding bicyclist positioning.
Recommended Design	
	**Design Guidance:** Many cities in the United States use colored bike lanes to guide cyclists through major vehicle/bicycle conflict points. These conflict areas are locations where motorists and cyclists must cross each other's path (e.g., at intersections or merge areas). Cyclists are especially vulnerable at locations where the volume of conflicting vehicle traffic is high, and where the vehicle/bicycle conflict area is long. Colored bike lanes typically extend through the entire bicycle/vehicle conflict zone (e.g., through the entire intersection, or through the transition zone where motorists cross a bike lane to enter a dedicated right-turn lane. Although colored bike lanes are not an official standard in California at this time, they continue to be successfully used in other cities. Portland, Oregon, Philadelphia, Pennsylvania, Cambridge, Massachusetts, Toronto, Ontario, Vancouver, British Columbia and Tempe, Arizona uses colored bike lanes in select locations. This treatment typically includes accompanying signage alerting motorists of vehicle/bicycle conflict points. Portland's 'Blue Bike Lane' report found that significantly more motorists yielded to bicyclists, and slowed or stopped before entering the conflict area after the application of the colored pavement.
Applicable Locations: Before intersections in merge areas and/or in conflict areas.	

6.3. Bike Routes

The following recommendations provide several design options for the existing and future Class III bike routes. These designs meet Caltrans requirements but are not required as elements of a Class III facility and are provided for information only.

6.3.1. Bike Routes with Wide Outside Lanes

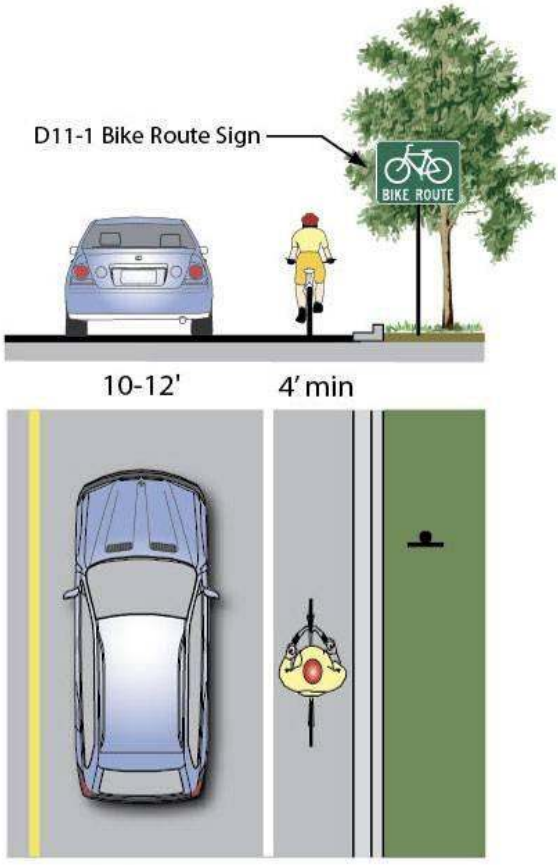
Signed Bike Routes are shared facilities with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or with shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

<table>
<tr><td>Existing Design</td><td>Figure 6-17. Bike with Wide Outside Lane</td></tr>
<tr><td colspan="2">Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)</td></tr>
<tr><td>Recommended Design</td><td></td></tr>
<tr><td>
</td><td>Local Issues:
If recommended bike lanes are determined to be infeasible because of insufficient right-of-way or operational concerns, providing a wide outside lane and bike route signage should be considered. This can also be used as a short term solution or a gap closure measure in constrained areas. Additional warning signage and/or pavement marking should be considered as necessary.

Design Guidance:
If bike lanes are infeasible on a roadway because of insufficient width or operational concerns, a wide outside lane can be provided. A curb lane of 14 feet generally provides enough space for bicyclists and motorists to safely ride side-by-side within the lane. Generally if the outside lane is consistently wider than 15-16 feet, bike lanes should be provided unless operational concerns make them impractical.</td></tr>
<tr><td colspan="2">Applicable Locations: Where sufficient width exists and bike lanes are infeasible or impractical</td></tr>
</table>

6.3.2. Bike Routes with Shoulders

<table>
<tr><td>Existing Design</td><td>Figure 6-18. Bike Route Design</td></tr>
<tr><td></td><td>Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)

Local Issues:
The combination of ‘Bike Route’ signage with a shoulder stripe provides many of the same benefits of a bicycle lane with less infrastructure investment and maintenance requirements. This type of Class III facility works well in areas with existing shoulders and low demand for on-street parking.</td></tr>
<tr><td>Recommended Design</td><td></td></tr>
<tr><td>
</td><td>Width:
4’ suggested minimum. If sufficient space is available (5’ min) a bike lane is preferred.</td></tr>
<tr><td colspan="2">Applicable Locations: Roadways where bike lanes cannot be implemented due to insufficient or inconsistent width, or on roadways where shoulder use by motor vehicles is necessary, but infrequent.</td></tr>
</table>

6.3.3. Bike Routes with Wide Shoulders and Rumble Strip

Rumble strips are an effective safety treatment on many rural roadways and state highways but can be unpleasant for bicyclists. The rumble strip design and placement are also important; placing the rumble strip as close to the fog line as possible leaves the maximum shoulder area available for cyclists. Certain rumble strip designs are safer for bicyclists to cross, and still provide the desired warning effect for motorists. Because rumble strips can disrupt air flow from passing vehicles that often blows debris toward the edge of the roadway, regular sweeping operations should be conducted on this type of bike route.

Existing Design

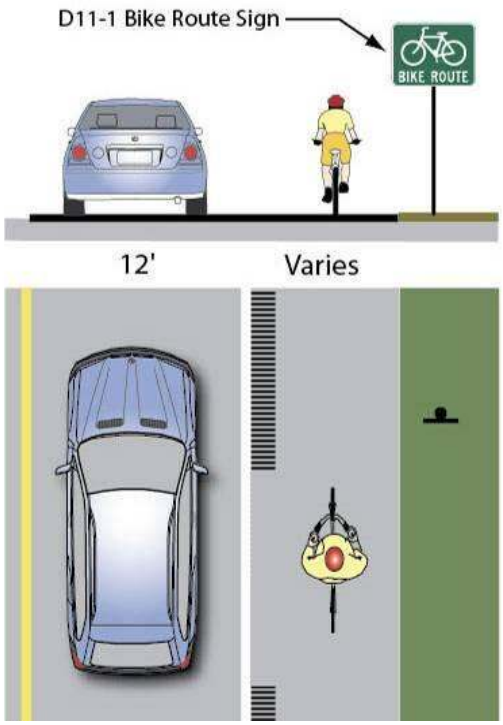


Figure 6-19. Rumble Strip Design

Existing Guidance:
- Caltrans Highway Design Manual

Local Issues:
Many of the major highways and rural roads accommodate high speed motor vehicle travel but are not suitable for bike lanes because motorists need to be able to legally use the shoulder to pull off the highway and in emergency situations.

Recommended Design



Design Guidance:
In 2001, Caltrans performed a study of various rumble strip designs involving 6 test vehicles and 55 bicyclists of various skill levels. The recommended design resulting from the study constituted a milled rumble strip design that is 1 foot (300mm) wide with 5/16 ± 1/16 in (8 ± 1.5 mm) in depth.

Rumble strips are recommended to be installed only on roadways with shoulders in excess of 5 feet (1.5 m). A shallow depth of the milled portions of the rumble strips are preferred by bicyclists. A skip (or gap) in the rumble strip may be provided to allow bicyclists to cross from the shoulder to the travel lane when preparing to make a left turn or when encountering debris. This skip pattern is recommended to be 12 feet (3.7 m) in length with intervals of 40 or 60 feet (12.2 or 18.3 m) between skips.

Applicable Locations: Highways and other rural roads with wide shoulders that will need to be used occasionally by motorists.

6.3.4. Bike Routes on Narrow Roadways

<table>
<tr><td>Existing Design</td><td>Figure 6-20. Bike Route Design</td></tr>
<tr><td></td><td>Existing Guidance:
- AASHTO Guide for the Development of Bicycle Facilities
- Caltrans Highway Design Manual (Chapter 1000)

Local Issues:
This example of a bicycle route can be applied to most narrow residential and local streets.</td></tr>
<tr><td>Recommended Design</td><td></td></tr>
<tr><td>
</td><td>Width:
Bike Route signage should be applied more frequently to indicate to motorists that bicycles may be present. A combination of engineering and enforcement efforts to slow motor vehicle speeds on these roadways should also be considered for increased safety.</td></tr>
<tr><td colspan="2">Applicable Locations: Majestic Pines, Kelley Road, Lakeview Boulevard and other bike routes on narrow roadways.</td></tr>
</table>

6.3.5. Shared-Lane Markings

Recently, Shared Lane Marking stencils (also called "Sharrows") have been introduced for use in California as an additional treatment for Class III facilities. The stencil can serve a number of purposes, such as making motorists aware of bicycles potentially in their lane, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent "dooring" collisions. **Figure 6-18** illustrates recommended on-street Shared Lane Marking stencil placement. The "Chevron" marking design recommended by Caltrans is also shown in **Figure 6-18**. The following pavement markings were adopted for official use by Caltrans on 9/12/2005 as MUTCD 2003 California Supplement Section 9C.103 and Figure 9C-107. Guidance language provided by Caltrans for use of the Shared Lane Marking is as follows:

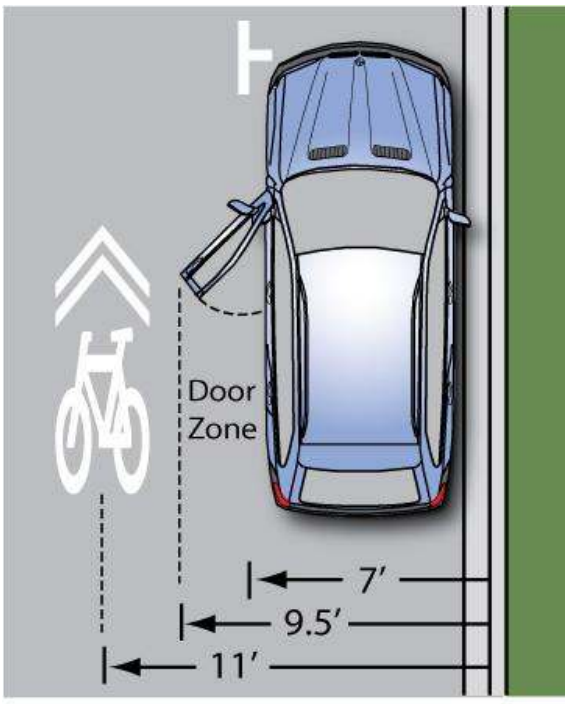
Existing Design	**Figure 6-21. Shared-Lane Markings**
Existing Guidance: - Manual of Uniform Traffic Control Devices Chapter 9 – 2008 draft - Caltrans Highway Design Manual (Chapter 1000) **Local Issues:** Shared Lane Markings may be useful in areas with on-street parking where bike lanes cannot be implemented. They will be especially useful in downhill situations where cyclists are traveling at speeds similar to those of motor vehicle traffic. In these situations bicyclists should be encouraged to move more toward the center of the travel lane to prevent dangerous passing and to avoid roadside hazards such as debris and parked cars.	
Recommended Design	
	**Design Guidance:** CA MUTCD recommends a minimum width from the curb of 11' feet (see figure on next page). This minimum may be insufficient where wide vehicles use on-street parking or where motorists tend to park farther from the curb. Exceeding the minimum width from the curb and placing the marking closer to the center of the travel lane has several potential benefits. These may include: - May encouraging cyclists to ride farther from parked cars and avoiding "dooring" injuries, as well as making cyclists more visible to motorists pulling out of driveways. - May be more clearly visible to motor vehicle operators since drivers are on the left side of the vehicle and tend to look at the road ahead. - Durability may be increased since the markings will pass between tire tracks. This may be particularly beneficial where vehicles use snow chains.
Applicable Locations: Streets with on-street parking and insufficient room for bike lanes. (Minaret Road at North Village, Canyon Boulevard).	

Figure 6-22. Shared Lane Marking Guidance (CA MUTCD)

Design Guidance (from California MUTCD):

Section 9C.103 Shared Roadway Bicycle Marking

Option:

The Shared Roadway Bicycle Marking shown in Figure 9C-107 may be used to assist bicyclists with positioning on a shared roadway with on-street parallel parking and to alert road users of the location a bicyclist may occupy within the traveled way.

Standard:

The Shared Roadway Bicycle Marking shall only be used on a roadway which has on-street parallel parking. If used, Shared Roadway Bicycle Markings shall be placed so that the centers of the markings are a minimum of 3.3 m (11 ft) from the curb face or edge of paved shoulder. On State Highways, the Shared Roadway Bicycle Marking shall be used only in urban areas.

Option:

For rural areas, the SHARE THE ROAD (W16-1) plaque may be used in conjunction with the W11-1 bicycle warning sign (see Sections 2C.51 and 9B.18). Information for the practitioner regarding classification of rural versus urban roadways can be found at the following California Department of Transportation website:

http://www.dot.ca.gov/hq/tsip/hpms/Page1.php

Guidance:

If used, the Shared Roadway Bicycle Marking should be placed immediately after an intersection and spaced at minimum intervals of 75 m (250 ft) thereafter. If used, the Shared Roadway Bicycle Marking should not be placed on roadways with a speed limit at or above 60 km/h, (40 mph).

Option:

Where a Shared Roadway Bicycle Marking is used, the distance from the curb or edge of paved shoulder may be increased beyond 3.3 m (11 ft). The longitudinal spacing of the markings may be increased or reduced as needed for roadway and traffic conditions. Where used, bicycle guide or warning signs may supplement the Shared Roadway Bicycle Marking.

Support:

The Shared Roadway Bicycle Marking is intended to:

- Reduce the chance of bicyclists impacting open doors of parked vehicles on a shared roadway with on-street parallel parking.
- Alert road users within a narrow traveled way of the lateral location where bicyclists ride.
- Be used only on roadways without striped bicycle lanes or shoulders.

6.3.6. Bicycle Detection at Signalized Intersections

Traffic detectors for traffic-actuated signals including video or embedded loop detectors should be set to detect bicycles. Loops should be located in bicycle lanes in the bicyclist's expected path. All signalized locations with vehicular actuation and without bicycle lanes for the left turn and outside through lanes should have pavement markings to indicate to bicyclists where they should be to activate signal detection. If the loop is invisible, the pavement marking should be installed; if the loop is visible and bicycle use anticipated to be low (e.g., in a remote location), a pavement marking may not be necessary.

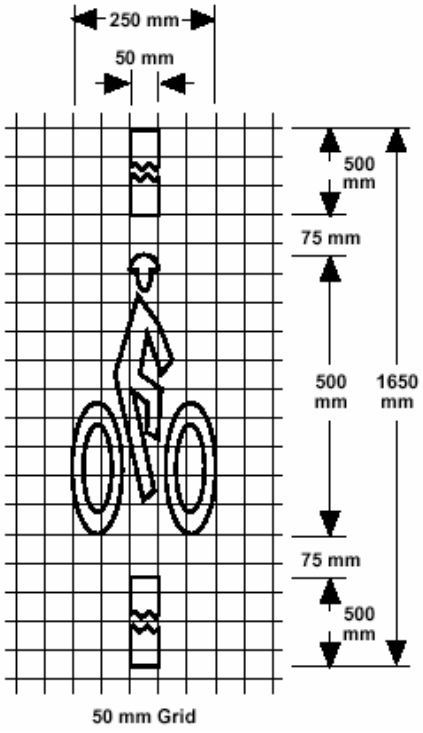
In some cases, the use of pedestrian-actuated buttons may be an alternative to the use of detectors, provided the button can be pushed by a cyclist from the street.

Figure 6-23. Bicycle Detection at Intersections

Existing Guidance:
- Caltrans Highway Design Manual (Chapter 1000)
- AASHTO Guide for the Development of Bicycle Facilities

Local Issues:
If bicyclists arrive at a roadway intersection with an actuated traffic signal that uses loop detectors, they may not get a green light unless (1) the loop detectors are bicycle sensitive and (2) the bicyclist can identify and stop their bicycle over the sensitive portion of the loop.

Recommended Design

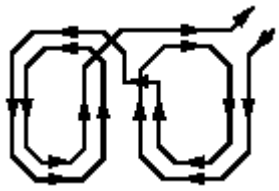


Design Guidance:
Any signalized intersection should be able to detect the presence of a bicyclist. In certain circumstances the positioning of the bicyclist is crucial to accurate detection. In such cases the figure to the left illustrates the standard pavement stencil to indicate proper positioning.

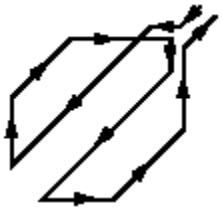
Applicable Locations: All intersections using loop detector where bicyclist can be expected.

Additional Guidance for Bicycle Loop Detectors

The purpose of bicycle loops is to detect bicyclists waiting at intersections, and to give cyclists extra green time (e.g. five seconds) before the light turns yellow to make it through the light. Traffic signal actuators unable to detect bicycles may cause delays for bicycle and even motor vehicle traffic (in situations where the cyclists is occupying the area above the signal actuator). Current and future bicycle detection loops should use the Caltrans Standard bicycle detection stencil shown in **Figure 6-21** to indicate to cyclists where to position themselves over the loop. Two loop detector types appropriate for bicycle detection, Type "C" (quadruple) and Type "D" (diagonal slashed), are shown in the figure below. Details of saw cuts and winding patterns for inductive detector loop types appear on Caltrans Standard Detail ES5B. Loop types B (5' square diamond), C (quadruple), D (diagonal-slashed), Q (figure-8) and modified Type E (circle with a slash) can reliably detect bicycles across their full width. Type D loop is preferred as it has a good, fairly uniform response to bicycles across its area. Types A (6' square) and E (unmodified circle) are not bike-sensitive in their center.



Quadruple Loop – Type "C"
Detects most strongly in center
Sharp cut-off sensitivity
Used in bike lanes



Diagonal Quadruple Loop – Type "D"
Sensitive over whole area
Sharp cut-off sensitivity
Used in shared lanes

Figure 6-24. Bicycle-Sensitive Loop Detector Types

6.4. Bicycle Parking

The Town of Mammoth Lakes currently uses the 'Wave' or 'Ribbon' type bicycle racks as a standard, with additional encouragement to designs that serve both as functional bicycle parking and attractive public art. Wave racks are not the optimal design for high traffic bicycle parking areas as they only support the bicycle frame at one point creating the potential for bicycles rotating, or tipping and becoming entangled with surrounding bicycles. Additionally, many cyclists use the wave rack in a sideways configuration to get a more stable interface; this limits the capacity of the rack. The theoretical capacity of a wave rack is usually much higher than the practical capacity.

Existing Design

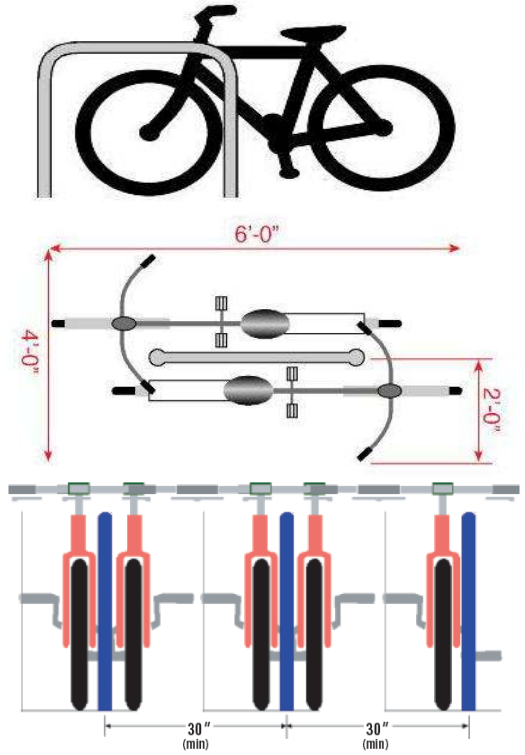


Figure 6-25. Bike Parking Design

Existing Guidance:
Town of Mammoth Lakes Design Guidelines -5.3.9

Local Issues:
Bicycle parking in Mammoth needs to be functional, usable throughout the year and if possible, incorporate additional artistic features, or dual-use features with ski/snowboard equipment. Existing "wave" or "ribbon" racks are adequate for existing installations, but "inverted-u" racks should be considered for future installations especially for single installations.

Recommended Design



Design Guidance:
Bicycle racks should be designed so that bicycles may be securely locked to them without undue inconvenience and will be reasonably safeguarded from accidental damage.

Bicycle racks must hold bicycles securely, and meet the following criteria:

- Support the frame of the bicycle and not just one wheel
- Allow the frame and one wheel to be locked to the rack when both wheels are left on the bike
- Allow the frame and both wheels to be locked to the rack if the front wheel is removed
- Allow the use of all common lock types (u-locks, chains, and cables).
- Be securely anchored
- Be usable by bikes with no kickstand
- Be usable by bikes with water bottle cages
- Be usable by a wide variety of bicycles

The images to the right show the inverted-u rack in single and multiple installations.

Applicable Locations: Public sidewalks fronting commercial developments (single installations) and for businesses and shopping centers with demand for bicycle parking (multiple installations).

Additional Guidance for Bicycle Parking

Bicycle Rack Design and Installation

Bicycle racks and the area required for parking and maneuvering must meet the standards below.

Bicycle Parking Space Dimensions

Bicycle parking spaces must be at least 6 feet long and 2 feet wide, and in covered situations the overhead clearance must be at least 7 feet.

An aisle for bicycle maneuvering must be provided and maintained beside or between each row of bicycle parking. This aisle must be at least 5 feet wide.

Each required bicycle parking space must be accessible without moving another bicycle.

Areas set aside for bicycle parking must be clearly marked and reserved for bicycle parking only.

Parking Location

Bicycle parking must be located within 50 feet on an entrance to the building. Bicycle parking should be permanently secured to a paved surface and be located such that it will not become buried by snow removal operations. Covered bicycle parking is recommended wherever possible.

Bicycle parking may be provided within a building, but the location must be easily accessible.

Bicycle Parking Signs

Bicycle parking signs should be used where bicycle parking is not viewable from the street or building entrance. The Manual on Uniform Traffic Control Devices specifies a bicycle parking guide sign (D4-3) which can be used to inform bicyclists of parking areas.

Combination Bicycle-Ski Racks

In the Town of Mammoth Lakes, it makes particular sense to employ bicycle parking in certain locations as dual-purpose devices capable of holding bicycles in the summer months and skis/snowboards in the winter. As bicycle storage devices these racks should meet the guidelines outlined above in addition to considerations for skis and snowboards. A rubberized surface or other device capable of reducing wear to the metal edges of skis or snowboards is also recommended. Artistic racks are encouraged provided they are functional and meet the above guidelines.



Figure 6-26. Existing Bicycle/Ski Rack (left) & Concept Bicycle/Ski Rack (right)

Figure 6-26 above shows an existing and conceptual bike/ski rack. The existing rack is aesthetically appropriate and functions for skis, but does not work as a bike rack if the user intends to use a typical locking device to secure the bicycle. In addition the existing rack does not support the frame of the bicycle and may have some difficulty accommodating wider skis or snowboards. The image on the right portrays a rack that would provide a better balance of functionality between bicycles, skis, and snowboards, but would require further refinement in both in terms of aesthetic design and functionality.

Artistic Rack Design

This discussion above should be used as a starting point for a bicycle/ski rack design competition involving local artists and designers. The competition could be divided into categories for best bike-only rack, best ski/snowboard rack, and best multipurpose/all-season rack. Racks should be judged on functionality and aesthetics based on the Town's Design Guidelines document and the bike rack design discussion in this chapter.



Figure 6-27. Examples of Newer 'Artistic' Style Bicycle Racks

Recommended Bicycle Parking Requirements

Bicycle rack design standards should be applied to both public and private installation to ensure consistency and quality of bicycle parking throughout town. **Table 6-2** provides an example of bicycle parking requirements for residential and commercial developments. The installation of bicycle parking shall be mandatory for any new commercial or multi-family residential development. Sample Short Term Bicycle Parking Requirements are based on existing requirements in Portland, Oregon and can be customized to conform with local land use designations. Racks installed in accordance with Multi-Family residential developments should be covered to provide service year-round if enclosed private garages do not exist.

Table 6-1. Sample Short-Term Bicycle Parking Requirements

Category	Minimum Req Bicycle Spaces
Residential Categories	
Multi-Family	The greater of 2, or 1 per unit
Single Family	None
Commercial Categories	
Retail sales and services	The greater of 2,or 1 per 5,000 ft^2 floor area
Office	The greater of 2,or 1 per 10,000 ft^2 floor area
Entertainment uses	The greater of 10,or 1 per 40 seats
Religious Institutions	The greater of 2,or 1 per 2,000 ft^2 floor area

Additional Discussion on current guidance and installations

The 'Inverted-U' rack and variants with similar characteristics are generally considered superior to the wave rack. Snow removal around a single Inverted U rack requires no additional effort over the wave rack, but an array of racks could make snow removal more difficult since the spaces between each rack would have to be cleared. The photo below from Jackson Hole, illustrates the need for bicycle parking to be covered wherever possible in order to ensure that bicycling remains an option for winter mobility while minimizing the additional labor required for snow removal around bicycle racks. Likewise, bicycle parking should not hamper snow removal efforts. During winter months, the Town of Mammoth Lakes may want to consider removal of bicycle parking in some locations as a part of routine

seasonal maintenance efforts. Bicycle racks intended for winter removal would need to be designed and installed in a manner that facilitates this process.



Figure 6-28. These Inverted U Racks Are Not Maintained in Winter

The "inverted-u" or "staple" rack is universally recognized as the best bike rack design and is recommended by the Association of Pedestrian and Bicycle Professionals, but other rack types may be adequate for the Town of Mammoth Lakes in certain locations. It is recommended that 'Inverted U' rack become standard for single installations, covered areas, or areas with heated sidewalks or plazas. The preceding guidelines provide more information and standards for bicycle rack selection and placement than existing TOML Design Guidelines. Any rack may be used provided it meets the recommended guidelines and standards for bicycle parking above.

6.5. Pedestrian Facilities

The design of the pedestrian environment will directly affect the degree to which people enjoy the walking experience. If designed appropriately, the walking environment will not only serve the people who currently walk, but also be inviting for those who may consider walking in the future. Therefore, when considering the appropriate design of a certain location, designers should not just consider existing pedestrian use, but how the design will influence and increase walking in the future. Additionally, designers must consider the various levels of walking abilities and local, state, and federal accessibility requirements. Although these types of requirements were specifically developed for people with walking challenges, their use will result in pedestrian facilities that benefit all people.

The Municipal Code, which includes the zoning ordinance, the traffic code, and the public improvements code, contains language regulating some elements. State laws and rules regulate others. Standard Construction Details, issued by the Town of Mammoth Lakes Standard Plans for Public Works, apply to the pedestrian realm. There are also numerous guidelines issued by various national organizations that constitute the canon of standard engineering practice. These include the Manual on Uniform Traffic Control Devices (MUTCD) and the Americans with Disabilities Act Access Board (ADAAG) Guidelines.

It should be noted that the operative plan for pedestrian facilities will be the anticipated Mobility Plan. The discussion of pedestrian facilities is included to inform the development of the Mobility Plan and to illustrate the overlap between mobility and recreational trails planning in Mammoth Lakes.

6.5.1. Promenades

Promenades are wide pedestrian walkways along major streets. Currently promenades are used along Main Street as a combination sidewalk and multi-use path extension. This configuration can work as long as pedestrian volumes and bicyclist speeds are relatively low, but numerous at-grade crossings of intersecting streets and driveways can present a problem as motorists may not anticipate fast moving bicyclists. Crossings can be of particular concern where motorists turning right onto Main Street cross and block the promenade as a fast moving bicyclist comes downhill in the opposite direction of traffic. As pedestrian and bicyclist volumes increase, TOML should consider measures to slow cyclists to speeds more compatible with pedestrian activity and encourage faster cyclists to use adjacent streets by providing bike lanes.

Existing Design	**Figure 6-29. Pedestrian Promenade Design**
	**Existing Guidance:** Town of Mammoth Lakes Design Guidelines **Local Issues:** Existing Main Street promenades provide ample space and an attractive walking environment for pedestrians and low volume bicycle traffic. Increased bicycle and pedestrian activity may lead to future conflicts especially in areas where they are directly connected to multi-use paths. In anticipation of increased bicycle and pedestrian activity, the Town should begin to provide attractive alternatives for bicyclists such as bike lanes and a median bike path along Main Street.

Design Guidance:

- Pedestrian promenades should be designed to reinforce their function as high use pedestrian areas. Promenades should continue to be designed with sidewalk coloring or special paving and should not maintain the appearance or function of a multi-use path.
- Where users transition from a multi-use path to a promenade, signage should change accordingly (i.e. from :"Main Path" to "Main Street Promenade").
- Wherever possible, bike lanes should be provided on adjacent streets to encourage faster bicyclists to use the street rather than the promenade.

Applicable Locations: Main Street and major pedestrian thoroughfares

6.5.2. Curb Extensions

Curb extensions (sometimes called curb bulbs or bulb-outs) have many benefits for pedestrians. They shorten the crossing distance, provide additional space at the corner (simplifying the placement of elements like curb ramps), and allow pedestrians to see and be seen before entering the crosswalk. Curb extensions can also provide an area for accessible transit stops and other pedestrian amenities and street furnishings. Curb extensions are not currently included in the Town of Mammoth Lakes Public Works Standards.

<table>
<tr><td>Existing Design</td><td>Figure 6-30. Curb Extension Design</td></tr>
<tr><td colspan="2">Existing Guidance:
AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities

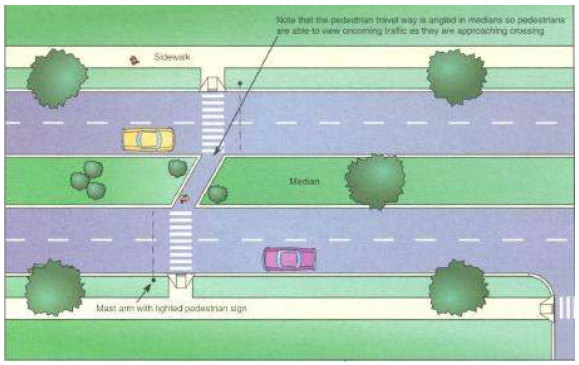
Local Issues:
In areas with on-street parking and mid-block pedestrian crossings, curb extensions can be used to shorten the crossing distance for pedestrians and make pedestrians waiting to cross more visible to motorists.</td></tr>
<tr><td>Recommended Design</td><td></td></tr>
<tr><td></td><td>Design Guidance:
Curb extensions may be used at any corner location, or at any mid-block location where there is a marked crosswalk, provided there is a parking lane into which the curb may be extended. Curb extensions are not generally used where there is no parking lane because of the potential hazard to bicycle travel.

In high pedestrian use areas, curb extensions are a preferred element for corner reconstruction except where there are extenuating design considerations such as the turning radius of the design vehicle, or transit and on-street parking factors.

Curb extensions can be compatible in areas with heavy snowfall provided that they are visibly marked for snow removal crews. The photograph left shows curb extensions with reflective snow posts to ensure that motorists are aware of the curb extensions at night and to indicate the location of the curb for snow removal crews. Curb extensions in Mammoth should be accompanied by reflective posts suitable for local snow depths and careful design for drainage.</td></tr>
<tr><td colspan="2">Applicable Locations: Pedestrian crossings (especially mid-block) on roads with on-street parking.</td></tr>
</table>

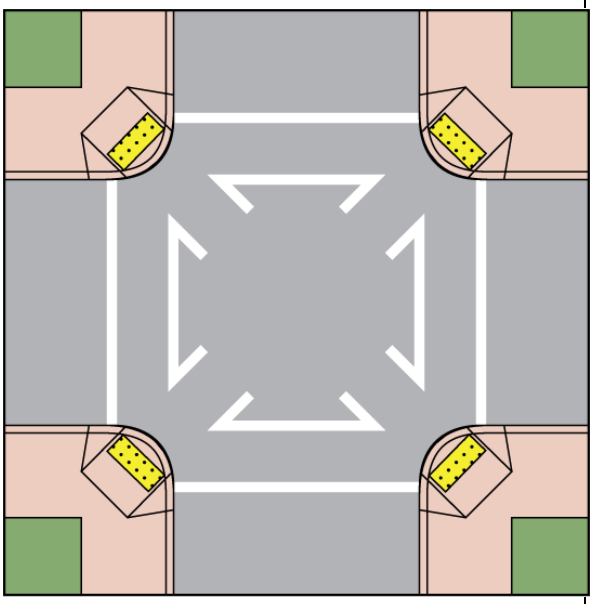
6.5.3. Refuge Islands

Refuge islands allow pedestrians to cross one segment of the street to a relatively safe location out of the travel lanes, and then continue across during the next gap in traffic. At unsignalized crosswalks on a two-way street, a median refuge island allows the crossing pedestrian to navigate each direction of traffic separately. This can significantly reduce the time a pedestrian must wait for an adequate gap in the traffic stream. Like curb extensions, refuge islands should be marked for snow removal crews.

Existing Design	**Figure 6-31. Refuge Island Design**
Existing Guidance: MUTCD, AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities **Local Issues:** Wide roadways can be intimidating and difficult to cross. The provision of refuge islands can increase the comfort and safety of pedestrians (and bicyclists).	
Recommended Design	
  Source: AASHTO (above) 	**Design Guidance:** - Accompanying crosswalks should have higher visibility markings such as Piano Key, Ladder, or some variation of colored or textured paving. - Refuge Islands work well in mid-block situations but can also occur at intersections as a part of the median. - Continuous medians can provide multiple opportunities for refuge islands and can also reduce the surface area of roadways that have to be cleared of snow. - Continuous Medians can also be used as bike paths (see 5.1.2 Median Bike Paths) - Medians and refuge islands may be used for snow storage as long as snow banks are not allowed to reach heights that impair pedestrian visibility at crossings. - Medians in Mammoth should be accompanied by reflective posts suitable for local snow depths.
Applicable Locations: Main Street, Meridian Boulevard	

6.5.4. Pedestrian 'Scramble' Crossing

A pedestrian scramble is an exclusive phase of signal operations at a signalized intersection. This phase permits crossings for pedestrians in any direction including diagonal crossings. This phase must be paired with a prohibition of right turn on red for vehicles and typically involves unique pavement markings such as those shown below.

Recommended Design	**Figure 6-32. Pedestrian 'Scramble' Crossing**
	**Existing Guidance:** MUTCD 3B-17 AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities **Local Issues:** As development increases and becomes more pedestrian-oriented, the need for high-volume pedestrian crossings may be necessary. Providing a unique signal phase for pedestrians that allows crossing in all directions, including diagonal crossing. The intersection of Minaret Road and Main Street will likely see pedestrian activity increase significantly as the Mammoth Crossing, Mammoth Hillside, Holiday Haus, and Sierra Star developments are completed. The installation of a pedestrian scramble in these locations has potential to significantly improve access between the Lake Mary Path and the North Village recreation portal. The intersection of Old Mammoth Road and Meridian Blvd may also see significant increases in pedestrian activity with new development in that area.
Recommended Design	
	**Design Guidance:** This type of treatment should be considered at intersections with high levels of pedestrian activity, especially at locations with commercial activity or other common pedestrian destinations at all four corners.
Applicable Locations: Four way intersections with high levels of pedestrian activity.	

6.6. Soft-Surface Trail Design Guidelines

The Town of Mammoth Lakes does not currently design, construct, or maintain soft-surface trails. These guidelines for soft-surface trails have been included for informational purposes and would only be used if the Town were to begin developing and maintaining soft-surface trails. 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.

6.6.1. Soft Surface Summer Trails

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
- Insloped 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 6-2. 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

* Grades may exceed recommendation over rock surfaces.

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.

Range of Difficulty Specifications by User

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

Table 6-3. Trail Type Specifications - Bicyclist

Skill Level	Tread Width	Trail Corridor	Average Grade – Soil*	Max Grade – Soil*	Outslope (Soil)	Turn Radius*	Skill Level
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 6-4. Trail Type Specifications - Equestrian

Skill Level	Tread Width	Trail Corridor	Average Grade – Soil*	Max Grade - Soil	Outslope (Soil)	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 6-5. 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.

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 the proposed Trail Management Objective (TMO).

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 TMO's 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.

Soils and Erosion Control

Evaluation of soils types, topography and drainage patterns should be used to inform trail routing and design to minimize erosion and potential runoff impacts to stormwater systems and adjacent water bodies. Best Management Practices for erosion control, both during construction and operation of the trails should be implemented to minimize potential impacts.

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 6-1. Mammoth Lakes Regional Soils

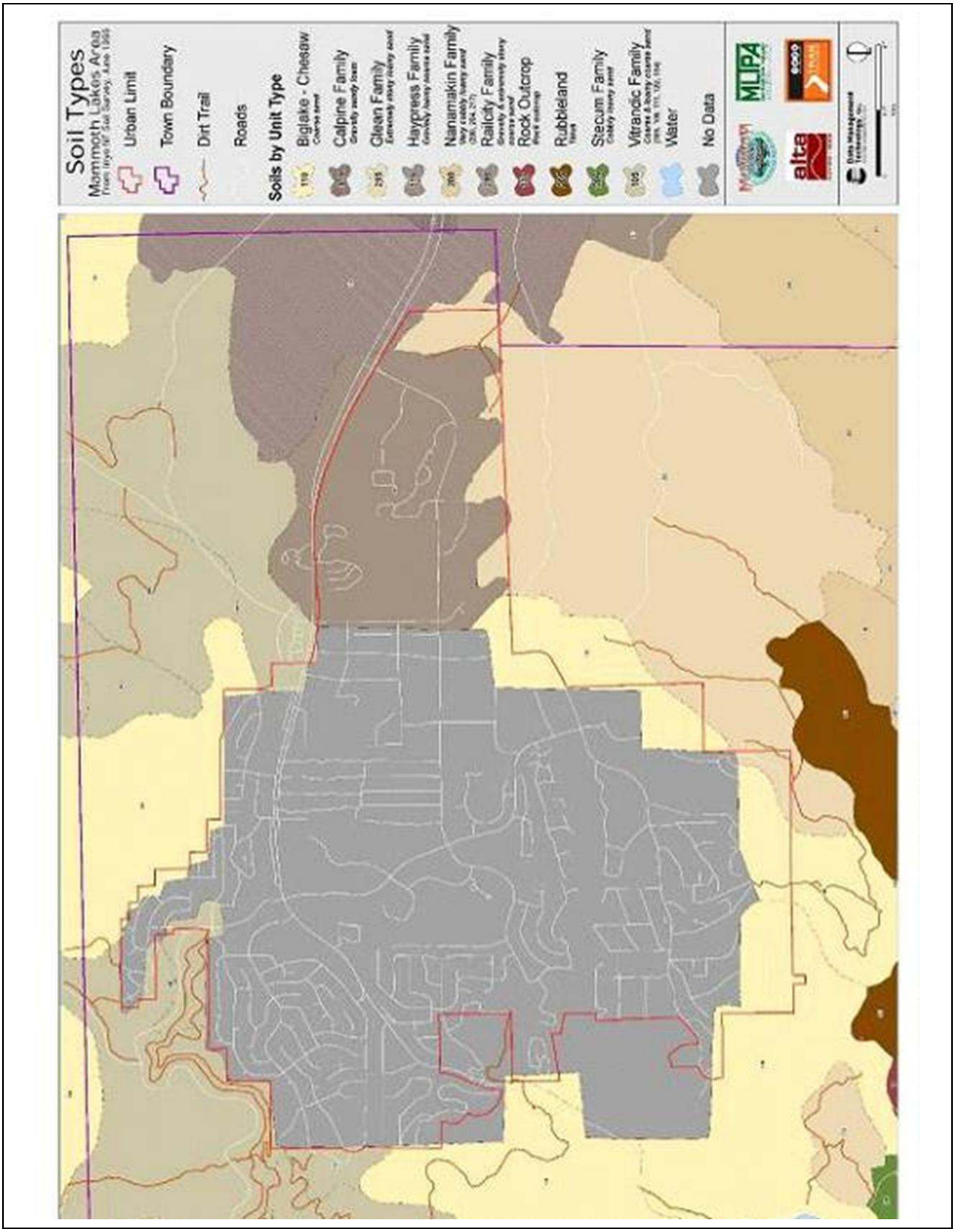


Table 6-6. Trail Specifications by Soil Type

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%

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

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 (BRL) Principals

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

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.

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.

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.

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.

Trail System Configurations

Out-and Back Trails

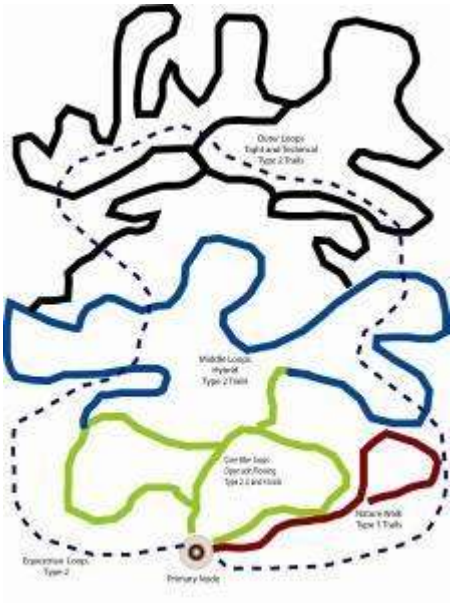
Wherever possible, trails should be designed as loops, or connect with other segments to provide a looping experience. Out-and-back trails are appropriate to sensitive interpretive sites or short distances to other key destinations. Hikers, more than other groups, enjoy out and back trails. These trails 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

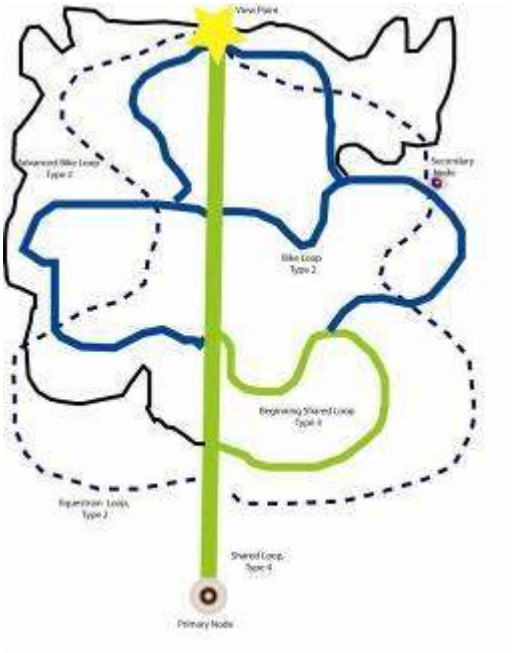
A closed system is one that utilizes one primary node, usually a major trailhead or portal to access a system of trails that all loop back to that primary node. This system usually has topographic, land ownership, or jurisdictional constraints that confine it one specific region. To maximize a trail 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.



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.

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.

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.

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.





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.

6.6.2. 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

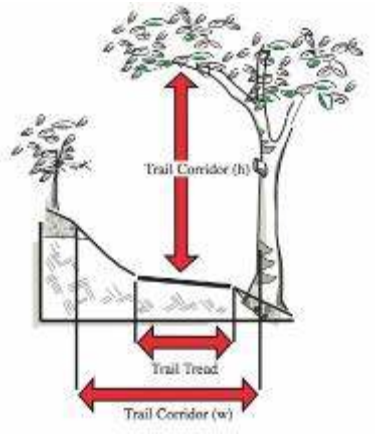
Any trail where the grade of the trail exceeds half the grade of the sideslope of the surrounding terrain (for example, a 25% trail grade on a 30% sideslope). On a fall-line trail water travels the length of the trail instead of sheeting across the tread, accelerating erosion.

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 side slopes. 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.

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.

6.6.3. Winter Trails

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

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

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 6-7. 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

6.7. Easements

Where required for public access or trail/pathway development, the minimum easement width shall be 20 feet when feasible. Such width will be minimally sufficient for access/egress, pathway surfacing, variation in pathway alignment, amenities, and/or landscaping.

Design Guidelines References:

Alternative Treatments for At-Grade Pedestrian Crossings, ITE
California Manual on Uniform Traffic Control Devices (CA-MUTCD), Caltrans
Guide for the Development of Bicycle Facilities, 3rd Edition, AASHTO
Guide for the Planning, Design and Operation of Pedestrian Facilities, AASHTO
Manual on Uniform Traffic Control Devices (MUTCD), FHWA
Highway Design Manual (HDM), Caltrans
Public Works Standards, TOML
Trail Solutions, IMBA

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CHAPTER 7. OPERATIONS AND MAINTENANCE

The creation of an effective operations and maintenance plan that promotes responsible use of the trail system throughout all four seasons is one of the key objectives of this Trails Master Plan. The following chapter explains the recommended maintenance and management program along with estimated costs.

Note: The guidance provided in this chapter will be incorporated into the Mammoth Lakes Trail System Operations and Maintenance Manual, which will be a living document, intended to provide uniform guidance for the ongoing management of the Mammoth Lakes Trail System.

7.1. Maintenance Roles and Responsibilities

7.1.1. Town of Mammoth Lakes

The Town of Mammoth Lakes (TOML) is currently responsible for maintaining all Town owned roads, multi-use paths, sidewalks, and bikeways. Maintenance operations are performed by the Public Works and Parks and Recreation departments, with Public Works maintaining streets. The Parks and Recreation Department maintains identified sidewalk segments as well as maintaining parks and multi-use paths both in Town and on Forest Service land. TOML maintenance and operation of facilities on USFS land are done under agreements known as "Special Use Permits". These negotiated and binding agreements between TOML and USFS offer significant opportunities for trail facilities in Mammoth Lakes. TOML currently holds a Special Use Permit from the Forest Service to maintain 9.5 miles of "12 foot wide public bike trail" on USFS property including segments of the Main Path, the Welcome Center and Shady Rest Path, the Meridian Path and the future Lake Mary Bike Path. This Special Use Permit expires in 2036. Maintenance is currently paid for through the Town's General Fund and through Mello-Roos District funding and Assessment Districts. Funding can be used to provide maintenance from both private contractors and/or Town staff. TOML also has an agreement with the Water District to borrow (when feasible) their equipment to pre-groom the eastern segments of the Main Path so that it may be used for cross-country skiing in the winter.

7.1.2. California Department of Transportation (Caltrans)

Caltrans is responsible for the maintenance of Highway 203 which includes Main Street and the section of Minaret Road north of Main Street and adjacent to the North Village. Caltrans does not clear sidewalks or bus stop areas along 203.

7.1.3. United States Forest Service (USFS)

The Forest Service is responsible for the maintenance of all roads and trails within the Inyo National Forest. Key facilities relevant to this plan are the trails and roadways in the Lakes

Basin and Shady Rest area. These facilities are operated and maintained under the Special Use permit identified in 7.1.1 (above). In the winter, the Forest Service grooms the snow on top of Sawmill Cutoff road, and all other snowmachine/multi-use (orange diamond) trails. The Forest Service also pre-grooms the cross-country skiing (blue diamond) trails in the Shady Rest area. Classic cross-country and skate ski tracks are then laid by Mammoth Nordic and available for free use by the general public. In the Lakes Basin, Lake Mary Road is groomed for general winter use. In the Lakes Basin, Mammoth Mountain Ski Area, the operator of the Tamarack Cross-Country ski center, grooms all trails within their fee area for classic cross-country and skate skiing. The project team also noticed corduroy-type grooming extending outward from the road closure at Mill City in February 2008. Key sources of funding for winter trail grooming include the state gas tax and funding acquired through OHV "green sticker" registration fees administered by the California Department of Motor Vehicles. These state funding sources are intended for maintenance of motorized trails. However, a small portion of this funding is used for winter grooming of non-motorized trails that lie within close proximity to the OSV trail system. This non-motorized trail grooming takes place at Shady Rest and Inyo Craters.

7.1.4. Mammoth Community Water District (MCWD)

The Mammoth Community Water District is responsible for maintaining all rights-of-way under its ownership. In addition, MCWD currently loans grooming equipment to TOML in order to pre-groom the Main Path between the Main Street tunnel and Mammoth Creek Park for cross-country skiing in the winter. Mammoth Nordic then lays classic cross-country ski tracks using its own equipment.

7.1.5. Volunteer Maintenance Efforts

Numerous organizations have expressed and/or participated in volunteer summer or winter trail maintenance efforts. Mammoth Nordic currently grooms cross-country ski trails (blue diamonds) in the Shady Rest area. Mammoth Nordic also has a contract with TOML to groom the section of Main Path between the Main Street tunnel and Mammoth Creek Park. The Mammoth Snowmobile Association have also expressed interest and/or actively participated in trail maintenance efforts. Other less documented volunteer maintenance efforts may also be taking place in the area. Local hiking, equestrian, mountain biking, road cycling and numerous other activity groups comprise a large pool of potential volunteer labor.

Figure 7-1. Winter Maintenance Responsibilities and Equipment

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7.2. Maintenance Guidelines

A high level of trail maintenance is critical to the overall success and safety of the trail system. Maintenance includes such activities as pavement stabilization, landscape maintenance, facility upkeep, sign replacement, fencing, mowing, snow removal, snow grooming, litter removal, painting, and pest control. However, the effects of a good maintenance program are not limited to the physical and biological features of the trails:

- A high standard of maintenance is an effective way of helping advertise and promote trails as a regional and state recreational resource;
- The psychological effects of good maintenance can be an effective deterrent to vandalism, litter, and encroachments;
- Good maintenance is necessary to preserve positive public relations between adjacent land owners and government;
- Good maintenance can help make enforcement of regulations on the trails more efficient. MLTPA, Mammoth Snowmobile Association, Mammoth Nordic, and others local organizations and service groups will take pride in "their" trail and will be more apt to assist in protection of the trail system.
- A proactive maintenance policy will help improve safety along the trails.

A successful maintenance program requires continuity and a high level of citizen involvement. Regular, routine maintenance on a year-round basis will not only improve trail safety, but will also prolong the life of the trails. Maintenance activities required for safe trail operations should always receive top priority.

7.2.1. Paved Multi-Use Path Maintenance

The maintenance of paved paths is similar in some ways to the maintenance of on-street bicycle facilities.

Summer / Fall Maintenance

Cracks, ruts and water damage will have to be repaired periodically. In addition, vegetation control will be necessary on a regular basis.

Where drainage problems exist along the trails, ditches and drainage structures will need to be kept clear of debris to prevent wash outs. Checks for erosion along the trails should be immediately after any storm that brings flooding to the local area.

The trail surface should be kept free of debris, especially broken glass and other sharp objects, loose gravel, leaves and stray branches. Trail surfaces should be swept periodically to keep them clear of debris. Sweeping should be scheduled based on need. For example, path segments in forested areas such as Shady Rest will tend to accumulate surface debris such as leaves and pine needles at a faster rate than other path segments. These areas should be swept more frequently in order to maintain safe surface conditions on paved MUPs.

Winter (Snow) Maintenance

This activity takes place after snowstorms and periodically between storms to condition the snow surface for a variety of winter activities. Snow clearing or grooming machine operators, who are most familiar with the segments in their care, should identify and report any additional maintenance needs while they are in the field.

Paved multi-use pathways require significant public investment and should be used to their fullest potential year-round. Determining the highest and best winter use for the Town's paved multi-use pathways is a subjective decision that can change over time. Fortunately, the fleeting nature of snow allows for significant flexibility and creativity in dealing with it from storm to storm and season to season. The decision to clear, groom, or leave a paved MUP unmaintained should be the result of a public decision making process involving the Town of Mammoth Lakes officials, residents, and stakeholders. The decision will necessarily be based on the demand for different activities on each segment and the physical and budgetary constraints associated with winter pathway maintenance. Any changes to winter maintenance operations along paved paths should be made by early spring so that the appropriate changes can be made to maps and signage in time for the upcoming winter season. The following paragraphs describe the different levels of winter maintenance on the Town's paved multi-use pathways.

Snow Removal or Clearing

After snowfalls, town pathways may be cleared of all snow accumulation, providing a clear paved surface for ideal use by foot traffic. Cleared pathways may also be used for winter bicycle use. Snow removal is best for path segments that provide connections to key pedestrian destinations. The Needs Analysis chapter of this report brought to light a widespread concern for winter pedestrian safety. It also showed that pedestrian/motor vehicle collisions are most likely to occur during winter months. If clearing a segment of paved path will help to improve winter pedestrian safety, the Town should seriously consider clearing that segment, unless it would significantly disrupt the continuity of a groomed path or place and undue burden on Town resources. Currently the Town clears segments of the Main Path and the Meridian Path to provide access to the Welcome Center and schools. If it is decided that a segment of paved path is to be cleared in the winter, every effort should be made to ensure that the segment remains free of ice to prevent slipping injuries. This will likely require ongoing inspection between snow events to ensure that ice buildup and drifting snow is removed promptly. Salt, sand, or de-icing solution should only be used if special circumstances warrant; such as severe ice buildup or freeze thaw cycles on the trail surface. Snow stakes should be used along all paths intended for clearing in order to ensure that only the paved surface is cleared (see **Figure 7-2**).

Grooming

Winter trail 'grooming' involves compacting the snow surface so that it can be more easily used for typical winter activities. Winter trail grooming typically varies based on the intended use of the trail. Winter trails intended for both motorized and non-motorized use generally have a wider groomed area and typically follow an existing roadway (i.e. Sawmill Cut-off road in the Shady Rest area). Non-motorized trails may also have a very wide groomed area if expected levels of use are high (i.e. Lake Mary Road south of the winter closure.) Groomed winter trails can be used for a wide variety of winter recreation activities, including winter walking, snowshoeing, dog-sledding and as connection facilities to winter vistas,

snowplay areas, and backcountry activities. Trails groomed specifically for cross-country skiing typically have two elements, a wide compacted surface with a corrugated surface typically six to twelve feet wide for 'skate skiers', and a narrow pressed set of tracks for 'classic' or 'traditional' cross-country skiing. Typically, grooming equipment is towed behind a wide variety of vehicles from snow mobiles to full sized tracked vehicles. The public-cross country ski trail in the Shady Rest area are groomed by a local non-profit group—Mammoth Nordic—using a grooming attachment that is towed behind a low-emissions snowmobile. Grooming frequency is determined by use and snowfall events. Grooming is typically carried out after at least four inches of new snowfall. Winter grooming of paved path facilities to accommodate the full complement of winter activities may present some limitations in terms of the width of the "groomable" area. Addressing at-grade road and driveway crossings represent challenges to be anticipated and effectively engaged.

No Snow Maintenance

The decision to provide no snow maintenance may be necessary in some cases. Because the Town's population increases significantly during winter, the need for safe pedestrian passage and recreational facilities in or near Town also increases during winter months. Therefore, the decision not to clear or groom paved pathways will tend to be more budgetary than utilitarian. Snow removal and grooming are a significant expense. In addition, snow can act as an insulating layer and help prevent heaving or other damage. Snow removal on some trails in winter can accelerate the need for major trail maintenance or reconstruction during summer months. In order to ensure that the Town is making the best use of all its resources (infrastructure and capital), the decision not to maintain a segment of paved path during the winter should be made as part of an open public process that clearly presents the mobility, recreational, and budgetary impacts of that decision.

Figure 7-2. Winter Maintenance Issues



Clear MUP – Main Path at Sawmill Cutoff



Winter Trail with Wide Groomed Area - Lake Mary Road

Spring Maintenance

As the snow melts in the spring, paved paths can emerge from winter operations covered in dirt and debris. Signage along paved paths generally sustains significant damage from snow maintenance operations and from the effect of natural snow movement. Because residents

and visitor will begin using these facilities as soon as they are exposed, every effort should be made to sweep and clear these facilities as early as practical. Lingering patches of snow should be cleared to provide a safe smooth surface for bicyclists and pedestrians. Any signage that is missing should be replaced and any striping or stenciling that has become well worn should be repainted. This is also an opportunity to remove any irrelevant or misleading signage and add any additional signage that may be relevant to upcoming summer and winter trail activities. For example, if a segment signed for cross-country skiing will not be groomed the following season, the cross-country skiing signs should be removed as part of spring maintenance. These activities should be undertaken as early as possible and constitute the majority of paved multi-use path maintenance.

Figure 7-3. Spring Maintenance Issues



Damaged Signage



Lingering Snow



Cross Country (XC) Ski Sign



XC Ski Sign along Meridian (This segment is actually cleared—not groomed—in winter.)

7.2.2. On-Street Bikeway Maintenance

While implementing bikeway facilities is important, keeping them in good condition is equally important. When a bicycle lane becomes filled with debris, for example, cyclists are forced into the motor vehicle lane. Poor bikeway maintenance can contribute to accidents and deter potential cyclists unwilling to risk flat tires and skidding on city streets. Typical seasonal maintenance activities are described below. It should be noted that the "winter (snow)" maintenance season in Mammoth Lakes may extend from late October to early May, making the "spring" and "summer/fall" maintenance periods significantly shorter than the seasons themselves.

Summer/Fall Maintenance

Periodic checks should be made of the on-street bikeway network with work being confined to spot fixes and damage response. Activities during these seasons could be driven by maintenance requests from the public.

Winter (Snow) Maintenance

Like motorists, bicycle commuters require consistent access to roadway facilities year-round. The use of bike lanes and the outside lanes or shoulders of bike routes as winter snow storage should be avoided, because this effectively narrows the roadway width and forces any cyclists using the roadway closer to traffic under conditions which have already been complicated by snow and debris. However, if absolutely necessary bikeways should act only as temporary snow storage areas during plowing operations under winter storm conditions. After storm events, TOML and Caltrans snow removal crews should use blower machinery to remove snow stored on bikeway facilities, both to open these facilities to bicycle use and to clear room for temporary snow storage from subsequent storms.

Spring Maintenance

As temperatures warm in the spring, on-street bikeways emerge from winter operations covered in debris and in some cases bike lane striping and stencils are worn or erased from studded snow tires and plow blades. Every effort should be made to sweep and clear these facilities as early as practical. Any signage that is missing should be replaced and any striping or stenciling that has become well worn should be refreshed. These activities should be undertaken as early as possible and constitute the majority of on-street bikeway maintenance.

7.2.3. Sidewalk Maintenance

The lack of available sidewalks during both summer and winter was a common concern expressed during the summer and winter CAMP sessions. During summer the issue was primarily a lack of infrastructure, with Main Street being the area of greatest concern. In winter, however, the discussion focused heavily on maintenance and the ability to walk in Town.

Aside from being essential to summer and winter "feet first" mobility, the Town's sidewalks and promenades are key to providing safe and convenient access to the various summer and winter recreational opportunities in and around town. In winter, when the Town's population is the highest and safety conditions are most precarious, it is essential to provide accessible sidewalks throughout town. It may be necessary to initiate a prioritization process

in order to decide which sidewalks receive (and don't receive) winter maintenance in the short term. However, it should be the ultimate goal of the Town to clear all sidewalks in winter and summer to enhance mobility, access to recreational opportunities, and public safety. Sidewalk maintenance is the responsibility of the Public Works Department and should be achieved either through ordinance or the creation of new assessment districts. Recreational trails funding should not be used for sidewalk maintenance purposes.

Town of Mammoth Lakes Municipal Code is not clear about responsibility for snow removal on sidewalks other than those located within assessment districts. **Figure 7-4** provides sample municipal code language from Fort Collins, Colorado.

Figure 7-4. City of Fort Collins Municipal Code

Sec. 24-21. Removal of snow and ice required; lien.

(a) The owners or occupants of property abutting upon or adjacent to sidewalks within the City shall at all times keep the sidewalks abutting upon or adjacent to the lot or lots owned or occupied by them free and clear of snow and ice. If any such owners or occupants shall fail to remove the snow and ice from the sidewalks abutting upon or adjacent to their property within twenty-four (24) hours after the accumulation of snow and ice, then the City Manager may at once have the hazard corrected by removal of snow and ice from the sidewalk or by the application of abrasive material; and the cost, including inspection and other incidental costs in connection therewith, including the costs for carrying charges and costs of administration, shall be assessed against the property abutting upon or adjacent to the snow obstruction and the owner thereof.

(b) If the property owner contest the declaration of nuisance and/or the assessment of costs, he or she shall file a written request with the Director of Neighborhood and Building Services, within ten (10) days from the service of a notice of assessment, a written request for a hearing before the Referee.

(c) Such assessment shall constitute an automatic, perpetual lien in the several amounts assessed against each property from the date the assessment became due until paid. Such liens shall have priority over all other liens except general taxes and prior special assessments. In case any such assessment that has not been set for hearing pursuant to Subsection (b) is not paid within thirty (30) days after it has been certified by the Director of Neighborhood and Building Services and billed by the Financial Officer or his or her designee to the owner by deposit in the United States mail, addressed to the owner of record at the address as shown on the tax rolls of the County Assessor, or such other, more recent address as may be available to the City, and any agents, representatives or occupants as may be known, the Financial Officer or his or her designee shall be authorized to certify to the County Treasurer the list of delinquent assessments, giving the name of the owner of record, the number of the lot and block and the amount of assessment plus a ten-percent penalty. The certification shall be the same in substance and in the same form as required for the certification of taxes. The County Treasurer, upon the receipt of such certified list, is hereby authorized to place the same upon the delinquent tax list for the current year and to collect the assessment in the same manner as taxes are collected with such charges as may by law be made by the Treasurer, and all the laws of the State for the assessment and collection of the general taxes, including the laws for the sale of property for unpaid taxes, shall apply to and have full force and effect for the collection of all such assessments. Notwithstanding the foregoing, if the offending property is not subject to taxation, the City may elect alternative means to collect the amounts due pursuant to this Article, including the commencement of an action at law or in equity and, after judgment, pursue such remedies as are provided by law.

7.2.4. Summer Grooming

Trailheads, ski lift loading areas, the bottoms of ski swaths near wetlands or trails, and extreme mountain biking trails should be inspected in summer to note if drainage improvements or mulching are needed to keep dust down or limit erosion during worst-case summer convective thundershowers.

7.2.5. Vegetation and Pest Management

In general, visibility between plantings at trailside should be maintained so as to avoid creating the feeling of an enclosed space. This will also give trail users good, clear views of their surroundings, which enhances the aesthetic experience of the trail. Under story vegetation along trail corridors should not be allowed to grow higher than 36 inches. Tree species selection and placement should be made that minimizes vegetative litter on the trail and root uplifting of pavement. Vertical clearance along the trail should be periodically checked and any overhanging branches over the trail should be pruned to a minimum vertical clearance of 10 feet.

The trail system moves through a variety of landscape settings. Some basic measures should be taken to best protect the trail investment. This includes brush removal 2' on each side of the regional and most community trails to prevent invasion of plants into the pavement area.

7.3. Existing Town of Mammoth Lakes Maintenance Policies

The responsibility of maintaining the Town's trail and other infrastructure is shared between the Department of Tourism and Recreation and the Department of Public Works.

7.3.1. Tourism and Recreation

The Tourism and Recreation Department is responsible for maintaining all parks and recreational trails under the jurisdiction of the Town of Mammoth Lakes.

Figure 7-5. TOML Tourism and Recreation Trail Maintenance Policy

The following trail maintenance schedule adopted by the Parks and Recreation Commission (12/2006):

WEEKLY – Summer

1. Sweep entire paved path if necessary
2. Pick up liter, debris, fallen limbs, etc.
3. Check all safety items - repair as needed all safety markers, lights, and reflectors.
4. Check all signing - repair or replace as needed
5. Check all bridges and under crossings - remove any graffiti, check drainage structures, guardrails, reflectors, and lights.
6. Check Culverts - remove clogged debris.

WEEKLY – Winter Use Areas where applicable

1. Check entire winter path for hazards, usability (Use snowmobile or cross-country skis for transport).
2. Pickup liter, debris, fallen limbs, etc.
3. Check all safety items - repair as needed all safety markers, lights, reflectors, if not under snow.
4. Check all exposed signage - repair or replace as needed.
5. Check all bridges and under crossings - remove any graffiti, check drainage structures/, guardrails, reflectors, lights.
6. Check usability of under crossings used for X-country skiing - clear as needed.
7. Check culverts - remove clogs/debris/ice dams if possible.

MONTHLY - Summer

1. Check and repair all drainage structures, diversion weirs, ditches, erosion control devices; clear rocks and debris; remove / modify potential drainage problems.
2. On paved paths, check pavement for hazards, boles, cracks and repair as needed; make even with pavement - eliminate any drop offs,
3. Clear shoulders of unwanted vegetation encroachment; remove overhead limbs and branches in travel way.
4. Check bridges for loose deck members and rails; check support structural members, repair as needed.

MONTHLY - Winter Use Areas where applicable

1. Check and repair all drainage structures; clear ice dams if possible.
2. Check cross-country path for hazards, holes, depressions, rough sections, etc. - repair as needed f cover with snow.
3. Remove overhead limbs and branches in travel way.
4. Check bridges for damaged rails; check support structural members if possible - repair as needed.

SEASONAL MAINTENANCE

Fall

1. Check all cross-country ski trail signage - repair and replace as needed.
2. Check all drainage structures carefully before they are covered with snow.

Spring

1. Perform bridge maintenance; replace worn or defective parts; apply wood preservative/stain; paint/rust-stop all metal parts; replace/repair metal supports as needed.
2. Apply any paint used for striping of pathway; re-stripe pathway where needed.

LONG TERM MAINTENANCE

1. At least every 5 years or as required, repair all cracks, holes, edges, depressions in paved path and apply seal coat - establish rotational program.
2. Reconstruct any section of pathway that may be hazardous, severely eroded.
3. Check structural integrity of all bridges and under crossings.

The Town of Mammoth Lakes General Fund ('08 – '09 budget) allocates monies for the operation and maintenance of Parks, Recreation & Trails ($1,294,230). The trail system maintenance portion ($51,001) of the allocated monies is currently only 4% of the total parks, recreation & trails maintenance and operations budget. In addition to the maintenance of the Town's trails and parks, Tourism and Recreation Department staff provides winter snow removal and summer sweeping of sidewalks at the locations described in **Table 7-1**.

Table 7-1. Tourism and Recreation Department Sidewalk Maintenance Efforts

Location	Funding Source
Old Mammoth Road (both sides)	Assessment district
East side of Sierra Park Road from Meridian to the Hospital (general fund)	General Fund
North Village	Assessment District
Canyon Blvd	Assessment District
Welcome Center from the parking lot to the T&R office (cleared) and from T&R office to Sawmill Cutoff Road (groomed)	General Fund
At Aspen Village to access bus stop	General Fund
Main Path segment from Chateau to Library	Safe Routes to School

7.3.2. Public Works

The Public Works Department is responsible for maintaining the Town's streets and sidewalks. Public Works also maintains certain sections of paved multi-use paths such as the Meridian Path which is cleared in order to provide a safe route to local schools.

Figure 7-6. TOML Public Works Department Snow Management Policy (Summary)

The Town of Mammoth Lakes has an extensive snow removal policy covering roadways, sidewalks and pathways. Excerpts from this policy are as follows:

Sidewalks shall be blown once per day or when the snow accumulates in excess of 6 inches or more either at the conclusion of or during a storm event. Sidewalk ice conditions shall either be removed by chipping or by other means appropriate to the Division Maintenance Manager, including ice melt and/or cinders. This includes Town sidewalks and trails that are currently being cleared and those sidewalks to be cleared in the future.

The priority order of snow removal is:

1. Support for emergency agency responses.
2. Main arterials and bus routes.
3. Secondary residential streets.
4. Cul-de-sacs.
5. Scenic loop.
6. Park and ride lot.
7. Sidewalks and trails.
8. Bus shelters.
9. Traffic signals and pedestrian beacons.

7.4. Maintenance Budget and Costs

The responsibility of maintaining the Town's trails, bikeways, and sidewalks fall under the purview of two departments—Public Works and Tourism and Recreation. The following pages discuss the costs of this maintenance.

7.4.1. Tourism and Recreation

The cost of maintaining the Town's existing parks and trail system (including sections of Main Path on land administered by the USFS) fall under the purview of the Tourism and Recreation Department. The trails maintenance budget has increased over the last three years, but on average remains at just under five percent of the overall Tourism and Recreation maintenance budget. The most recent (FY 2007/2008) trail maintenance budget was $35,000. As a point of comparison, the cost for maintaining the Whitmore Park and Pool was $227,676. **Table 7-2** shows the maintenance budget for trails and parks over the three most recent fiscal years. Maintenance costs include labor, supplies and contractual services. All trail-related equipment and snow removal costs are covered under the Public Works budget.

Table 7-2. Tourism & Recreation Budget

Tourism and Recreation Expenditures	Fiscal Year 2005-2006 Final Budget	Fiscal Year 2006-2007 Final Budget	Fiscal Year 2007-2008 Final Budget
Main Street Landscaping Maintenance	59,962	80,027	102,358
Parks Maintenance	365,643	440,561	489,702
Tourism Loan to Fractional District for Parks Maintenance		111,689	109,138
Trail System Maintenance	25,000	30,000	35,000
Total Maintenance Expenditures	450,605	662,277	736,198
Total Departmental Expenditures	$ 3,555,169	$ 3,642,646	$ 3,931,358

While the cost of maintaining the trail system has been relatively low in the past, it will need to increase as the trail system expands and levels of service are improved. Both the Department of Public Works and the Tourism and Recreation Department need to identify funding sources and allocate sufficient funding to maintain the facilities under their purviews. The trails network, the sidewalk network and recreation nodes require the highest achievable levels of maintenance to ensure that residents and visitors have safe and convenient access to recreational opportunities.

Table 7-3. Operations and Maintenance Costs by Facility Type and Frequency*

Facility Type	Season	Frequency	Annual Cost
Paved Multi-Use Paths and Bikeways			
Multi-Use Path	Annual	Annual – Includes sweeping, trimming, vegetation, patching pavement, and sign replacement	$10,500 per mile
Bike Lanes	Annual	Based on Five Year Maintenance Cycle including restriping restenciling and replacing signage.	$3,400 per mile per year
Bike Routes	Annual	Replacing signage when needed	$350 per mile
Sidewalks			
Old Mammoth Road Sidewalks	Winter & Summer	Snow removal following each snow event (including trucking the snow off) also includes summer maintenance including landscape maintenance	$71,000 - $142,000 per mile of sidewalk

*These are average planning-level costs for the State of California. Costs will vary based on desired summer and winter maintenance levels. Maintenance costs for Multi-use paths will vary significantly depending on the selected level of winter maintenance. Economies of scale can potentially lead to lower per unit costs.

7.4.2. Public Works

The Public Works Department budget covers the majority of the Town's maintenance costs including street and sidewalk maintenance, snow removal, and the operation and upkeep of all maintenance facilities and equipment. Activities directly related to this plan include snow removal on paved trails, on-street bikeways and bikeway signage. **Table 7-1** shows the total Public Works budget over the past three years and a breakdown of the maintenance-related elements. Summer maintenance and snow removal expenditures will increase significantly as new sidewalks are built and cleared, but these costs can be offset by additional assessment districts and/or by assigning responsibility for sidewalk snow removal to adjacent property owners.

Table 7-4. Public Works Budget

Public Works Expenditures	Fiscal Year 2005-2006 Final Budget	Fiscal Year 2006-2007 Final Budget	Fiscal Year 2007-2008 Final Budget
Facility Maintenance	41,327	48,750	53,897
Street Maintenance (Gas Tax Fund)	479,595	509,421	598,308
Street Sign Replacement	5,000	5,000	5,000
General Road Rehabilitation, Curbs & Gutters	523,491	627,211	752,211
Snow Removal (Gas Tax Fund)	839,711	992,800	1,045,387
Summer Equipment Storage (Gas Tax Fund)	325,609	293,995	342,132
Winter Equipment Garage (Gas Tax Fund)	854,730	867,186	1,023,932
Corporate Yard Maintenance (Gas Tax Fund)	120,332	116,613	125,416
Old Mammoth Road Assessment Levy	8,837	8,837	8,837
Transfer for Assessment District-Public Benefit	46,050	98,214	41,400
Total Maintenance Expenditures	$ 3,198,632	$ 3,469,813	$ 3,955,120
Total Departmental Expenditures	$ 4,026,737	$ 4,337,619	$ 4,796,479

7.5. Recommended Maintenance Policies

Currently, much of the Town's bicycle, pedestrian, and trail infrastructure is inaccessible during winter months. The following maintenance policy recommendations will allow Mammoth residents to receive the highest level of year-round recreation and mobility benefits from their investments in bicycle pedestrian, and trail infrastructure. The following recommendations are derived from a comprehensive analysis of existing conditions, future needs and public input. Recommendations M2 through M5 relate specifically to sidewalk maintenance which—while significantly impacting recreational trail access—will be more comprehensively addressed through non-recreational planning/policy efforts and non-recreational funding sources. The sidewalk-related recommendations in this plan should be strongly considered in future policy/planning efforts such as Sidewalk Master Plan updates, Mobility Plan, and snow management policies. However, the sidewalk-related maintenance recommendations from those planning and policy documents will ultimately supercede recommendations M2 through M5.

Recommendation M1: Development of Coordinated Year-Round Maintenance Plan

The Department of Tourism and Recreation and the Department of Public Works should work together to develop a year-round maintenance plan. This plan should include a clear division of responsibilities between departments. The plan should also clearly identify funding sources for the maintenance of different facilities. Maintenance efforts can be carried out both by TOML maintenance personnel, and as stewardship opportunities with volunteer organizations.

Recommendation M2: Snow Removal and Grooming on Paved Paths (MUPs) and Sidewalks

All segments of paved pathway within the Town of Mammoth Lakes—or under its control through the Special Use Permit with the Forest Service—should be open and accessible for year-round use. This should be achieved through winter maintenance including clearing some sections of path and grooming others. Funding should be provided through the Tourism and Recreation Department's trail maintenance budget. Snow removal on mid block trail connectors should be funded through Mello-Roos funding or through an ordinance similar to the example provided in **Figure 7-4**. Determining which segments to clear or groom should be accomplished though a public process that may need to be repeated as new MUP and sidewalk segments are constructed and travel patterns change. In preparation for this process, snow stakes should be installed along the Town's multi-use paths to facilitate winter snow removal and grooming.

Recommendation M3: Prioritization of Snow Removal along Individual Paved Path (MUP) Segments

As the paved path system is developed, identify which segments have the greatest transportation value (i.e. those that are school walking routes), and prioritize snow removal on these segments immediately after a snowfall with the goal of having all winter-maintained paved trails cleared within 48 hours from the end of snowfall. **Table 7-5** describes the MUP segments where snow removal is the preferred winter condition.

Table 7-5. MUP Segments Preferred for Snow Removal

Path Name	From	To	Notes
College Connector	Sierra Park Road	College Dorms	School route.
Lake Mary Path	Davison Road	Minaret Road	Only option for pedestrians along a major road (no sidewalks).
Main Path	Old Mammoth Road	Welcome Center	Connects Welcome Center to Main Street Promenade.
Main Path (Meridian Boulevard)	Sierra Park Road	Main Path / Industrial Park	Only option for pedestrians along a major road (no sidewalks).
Main Path (Old Mammoth Road)	Waterford Avenue	Mammoth Creek Park West	Only option for pedestrians along a major road (no sidewalks).
Main Path (S side of 203)	Sierra Park Road	Tunnel Under 203	Only option for pedestrians along a major road (no sidewalks).
Manzanita Connector	Manzanita Road	Tavern Road	Potential to form important pedestrian connection to schools.
Meridian Path	Lodestar Path	Joaquin Road	Only option for pedestrians along a major road (no sidewalks). School route.
School Connector	Meridian Boulevard	Main Path	School route.
Tallus Path	Main Street	Meridian Boulevard	Connects residential and commercial area.

Recommendation M4: Prioritization of Winter Grooming along Individual Paved Path (MUP) Segments

As the paved path system is developed, identify the segments of path that have the greatest recreational value, and prioritize winter grooming on these paths—where feasible—within 72 hours from the end of snowfall. The following table describes the MUP segments where a groomed surface is the preferred winter condition. TOML prefers that winter grooming activities be carried out by local organizations. **Table 7-6** describes the MUP segments where a groomed surface is the preferred winter condition.

Table 7-6. MUP Segments Preferred for Winter Grooming

Path Name	From	To	Notes
College Connector	College Dorms	Main Path	Provides over-snow access between college dorms and groomed sections of Main Path.
Forest Trail to Shady Rest Connector	Forest Trail	Sawmill Cutoff Road	Provides over-snow connection between Shady Rest and residences to the west.
Knolls Path (south route)	Community Center	Shady Rest	Provides over-snow access between Knolls/North Village and Shady Rest.
Lake Mary Path	Twin Lakes Parking Area	Davison Road	Provides over-snow access between Lakes Basin and residences to the north and east.
Lodestar Path	Northern Terminus	Meridian Boulevard	Provides over-snow access between Eagle Lodge and residences to the north and east.
Main Path	Lodestar Path	Waterford Avenue	Provides over-snow access between Eagle Lodge and residences to the south and east.
Main Path	Welcome Center	Mammoth Creek Park	Provides non-motorized winter recreational opportunity. Currently identified as preferred for grooming.
Mammoth Creek Park Connector	Meadow Lane	Main Path (Mammoth Creek Park West)	Provides over-snow access between residences and groomed sections of Main Path.
Shady Rest Path	Main Path (N side of 203)	Welcome Center	Potential non-motorized loop once extension to Welcome Center is complete.

Recommendation M5: Preservation of Pavement Markings

It is important that pavement markings on roadways at crosswalks and path crossings be visible and durable. Recessed thermoplastic is recommended to be used as paint gets worn quickly and can fade or disappear in a matter of 1-3 years.

Recommendation M6: Use of Salt, Sand or De-Icing Solution

Sand or de-icing solution should only be used if special circumstances warrant, such as severe ice buildup or freeze thaw cycles on the path surface. Salt should not be used as a de-icing agent.

Recommendation M7: Clearing of Sidewalks for Winter Use

All existing and future sidewalks (including mid-block connectors) should be cleared within a maximum of 24 hours from end of snowfall. This should be achieved through the use of assessment districts and/or the assignment of responsibility for sidewalk snow removal to adjacent property owners through the adoption of an ordinance similar to the example provided in **Figure 7-4**. This recommendation will be studied by the Mobility Commission through the Mobility Plan process before implementation.

Recommendation M8: Prioritization of Sidewalk versus Roadway Snow Removal

Sidewalk clearing operations should be increased in priority from 7th to 3rd on the Town of Mammoth Lakes' snow removal priority list.

Recommendation M9: Prioritization of Snow Removal along Individual Sidewalk Segments

Priority for sidewalk and pathway snow removal should be determined to make best use of TOML resources. It is suggested that the following be considered:

- First priority: School walking paths, heavily used wheelchair accessible areas and high use commercial areas adjacent to main roads. To be cleared during (if necessary) and completely within 12 hours of end of snowfall.
- Second priority: Walks expanding out from the school and along major roads. To be cleared within 18 hours from end of snowfall.
- Third priority: Residential and industrial areas. To be cleared within 24 hours from end of snowfall.

Recommendation M10: Coordination between Roadway and Sidewalk Snow Removal

During heavy snowstorms multiple clearings will be necessary to keep critical pedestrian connections passable. Snowplows unavoidably deposit large amounts snow directly onto the sidewalk. During plowing operations, a sidewalk snow removal crew should follow roadway plowing to remove snow from designated walkways, using tractor and snow blowers. Coordination between roadway and walkway snow removal vehicles is necessary to keep both facilities clear. If snow falls over a long time period, TOML should repeatedly return to priority one areas before clearing lesser-used areas.

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CHAPTER 8. IMPLEMENTATION STRATEGY – COSTS & FUNDING

The total cost of the construction of the proposed trail system will require exploring the possibility of pooling grant funds from different sources. This chapter provides planning-level cost estimates and a menu of potential funding sources.

8.1. Phasing

The projects identified in the plan as "Near-Term" will be implemented first. Other recommended projects will be implemented as opportunities arise and funding becomes available. The Town of Mammoth Lakes should continue to work with local stakeholders, non-profit organizations and agency partners to identify priority projects.

The Town should develop a process for prioritizing recommended projects based on public input, funding availability, and the ability of the project to add immediate value to the existing trail system. Projects that complete the Main Path "Loop" should receive high priority. Projects that will provide clear and immediate benefits for public safety should also be prioritized. There should be flexibility built into the prioritization process in order to enable the Town of Mammoth Lakes to respond effectively and efficiently to changing needs.

Project prioritization and phasing will ultimately be determined through the Master Facility Plan (MFP) process. The MFP establishes capital projects that the Town desires to implement in the future. The MFP contains a schedule of Project Cost Estimates that cover a five year projection of financing and a needs list that allocates what funding comes from Developer Impact Fees (new development) as well as what is needed from other sources (existing development). The Capital Improvement Projects list is informed by the MFP.

8.2. Cost Estimates

The cost estimates in this section are still in draft form and have not yet been adjusted to reflect actual local costs. These costs will be refined further during the public review process. The following planning level cost estimates can be used for the purposes of programming for the Town's Master Facilities Plan and Capital Improvement Program (CIP). These cost estimates are intended for planning purposes only and actual construction costs can be determined after each project has undergone more detailed feasibility and engineering design work. The following tables provide planning level estimates for the costs of the following capital projects in this plan: new signage and amenities at recreation nodes, paved multi-use paths, bike lanes, bike routes, and key crossing improvements. Estimates for additional maintenance costs associated with these new facilities have also been provided. All near-term projects have been allocated funding and are not included. Costs for 'future vision' projects and sidewalks are not included.

Table 8-1 provides the unit cost assumptions used to develop the cost estimates. **Tables 8-2** through **8-4** provide cost estimates for recreation node improvements, paved multi-use paths, crossing improvements, and on-street bikeways.

Table 8-1: Unit Cost Estimates*

Type	Unit	Cost
Recreation Node Amenities		
Asphalt Parking Area (includes accessways, excludes land cost)	Space	$10,000
Asphalt Parking Area (half motorized, longer spaces to accommodate trailers)	Space	$13,500
Asphalt Parking Area (full motorized, all spaces accommodate trailers)	Space	$4,896
Signage (Portals, Parks and Trailheads)	Node	$8,750
Signage (Access/Egress Points)	Node	$2,750
Restroom (with running water, optional lighting)	EA	$200,000
Bike racks	EA	$1,000
Drinking Fountain	EA	$2,800 - 5,000
Furnishings (benches)	EA	$1,000
Trail Lighting (Decorative)	EA	$1,500 - 3,500
Gateway or Entry Monument	EA	$2,000 - 8,000
Paved Multi-Use Paths		
Paved Multi-Use Path (General)	LF	$230
Grade-Separated Crossings (Tunnels)	EA	$500,000
Paved Multi-Use Path (Difficult Terrain)	LF	$465
At-Grade Crossing Enhancements (centerline striping and warning signage)	EA	$5,000
On-Street Bikeway Facilities		
Bike Lanes (striping and signage only)	LF	$10
Bike Lanes (striping, signage, road widening with shoulder)	LF	$57
Bike Lanes (striping, signage, road widening with curb and gutter)	LF	$95
Bike Lanes (uphill direction only, widening on one side)	LF	$50
Bike Route (signage only)	LF	$4
Bike Route (signage and shoulder widening)	LF	$55
Soft-Surface and Other Trail Facilities		
Easy Terrain	LF	$3
Moderate Terrain	LF	$5
Difficult Terrain	LF	$6
Extreme Terrain	LF	$20
Boardwalk (non-motorized, no maintenance vehicle access)	SF	$80
Boardwalk (maintenance vehicle access)	SF	$140
Crossings		
HAWK Crossing	EA	$50,000
Toucan Crossings	EA	$85,000
ADA Ramp	EA	$2,500
Curb Extension	LF	$50
Annual Maintenance		
Portal/Park/Trailhead (signage only)	EA	$500
Year-Round Trailhead (signage + parking + restroom)	EA	$102,000
Summer Trailhead (signage + parking + restroom)	EA	$58,000
Winter Trailhead (signage + parking + restroom)	EA	$44,000
Access/Egress Point (signage only)	EA	$250
Paved Multi-Use Path	MI	$10,000
Bike Lanes	MI	$3,400
Bike Routes	MI	$500
HAWK Crossing	EA	$2,000
Toucan Crossing	EA	$4,000

* Planning-level cost estimates only. Unit costs should be replaced with recent local cost estimates as they become available.

Items with green background were used in cost calculations. Items with white background are for detail design and informational purposes.

Table 8-2: Recreation Node Cost Estimates

						Parking			
GIC	Name/Description	Node Type	Season	Signage	Restroom	# Spaces	Cost	Capital Cost	Maintenance Cost*
13	Canyon Lodge (MMSA)	Portal	Winter	$8,750	$0	0		$8,750	$500
46	Main Lodge (MMSA)	Portal	Year-Round	$8,750	$0	0		$8,750	$500
191	North Village (MMSA)	Portal	Year-Round	$8,750	$0	0		$8,750	$500
36	Tamarack Lodge (MMSA)	Portal	Year-Round	$8,750	$0	0		$8,750	$500
195	Community Center	Park	Year-Round	$8,750	$200,000	0		$208,750	$102,000
134	Mammoth Creek Park, East	Park	Year-Round	$8,750	$200,000	15	$150,000	$358,750	$102,000
152	Mammoth Creek Park, West	Park	Year-Round	$8,750	$0	0		$8,750	$50,000
97	Shady Rest Park	Park	Summer	$8,750	$0	0		$8,750	$5,000
193	Trails End Park	Park	Year-Round	$8,750	$0	0		$8,750	$5,000
88-90	Coldwater Campground	Trailhead	Summer	$8,750	$0	0		$8,750	$500
42	Earthquake Fault	Trailhead	Year-Round	$8,750	$0	0		$8,750	$500
80	Horseshoe Lake	Trailhead	Summer	$8,750	$0	0		$8,750	$500
67	Hwy 203 Motorized Access	Trailhead	Year-Round	$8,750	$200,000	15	$73,440	$282,190	$102,000
86-87	Lake George	Trailhead	Summer	$8,750	$0	0		$8,750	$500
44	Power Plant	Trailhead	Winter	$8,750	$200,000	15	$202,500	$411,250	$75,000
186	Shady Rest / Saw Mill Cutoff Road	Trailhead	Winter	$8,750	$0	0		$8,750	$500
163	Sherwin Creek Rd, USFS gravel borrow pit	Trailhead	Year-Round	$8,750	$200,000	15	$202,500	$411,250	$102,000
64	Sierra Blvd at Forest Trail	Trailhead	Year-Round	$8,750	$200,000	15	$202,500	$411,250	$102,000
14	Eagle Lodge - temp (MMSA)	Access/Egress	Year-Round	$2,750	$0	0		$2,750	$250
41	Lake Mary Bike Path NE Terminus	Access/Egress	Summer	$2,750	$0	0		$2,750	$250
35	Lake Mary Rd winter terminus	Access/Egress	Winter	$2,750	$0	0		$2,750	$250
28	Mill City	Access/Egress	Winter	$2,750	$0	0		$2,750	$250
27	Tamarack Street	Access/Egress	Year-Round	$2,750	$0	0		$2,750	$5,000
34	Twin Lakes Parking	Access/Egress	Summer	$2,750	$0	0		$2,750	$250
							TOTAL COST	$2,204,940	$655,750

* Maintenance cost estimates represent the additional annual cost resulting from the implementation of recommended improvements.

Table 8-3: Multi-Use Path Cost Estimates

Project No.[1]	Street	From	To	Quantity	Unit	Improvement Type	Unit Cost	Capital Cost	Maintenance Cost[2]
MUP 2-1	Main Path (4a)	Mammoth Creek Park	Minaret Road	921	LF	MUP	$230.00	$211,830	$1,744.32
						Tunnel	$500,000	$500,000	
MUP 2-2	Lodestar Connector	Majestic Pines Drive	Hidden Valley Road	441	LF	MUP	$230.00	$101,430	$835.23
MUP 3-1	College Connector	Sierra Park Road	Main Path	3769	LF	MUP	$230.00	$866,870	$7,138.26
MUP 3-2	Elementary School Connector	Meridian Boulevard	Main Path	426	LF	MUP	$230.00	$97,980	$806.82
MUP 3-3	Industrial Park Connector	Elementary School Connector	Commerce Circle	2275	LF	MUP	$230.00	$523,250	$4,308.71
MUP 3-4	Mammoth Creek Park Connector	Meadow Lane	Main Path	602	LF	MUP	$230.00	$138,460	$1,140.15
MUP 3-5	Manzanita Connector	Manzanita Road	Hidden Creek Development	480	LF	MUP	$230.00	$110,400	$909.09
MUP 3-6	MCWD Access	Main Path	MCWD Facility	677	LF	MUP	$230.00	$155,710	$1,282.20
MUP 4-1	Shady Rest Park Path Extension	N Terminus of Shady Rest Path	Main Path at Hwy 203 / Meridian Blvd	6,769	LF	MUP	$230.00	$1,556,870	$12,820.08
MUP 4-2	Forest Trail to Shady Rest Connector	Forest Trail	Shady Rest Park Path	2,792	LF	MUP	$230.00	$642,160	$5,287.88
MUP 4-3	Knolls Path (south route)	Community Center Park	Shady Rest Path at Sawmill Cutoff Road	14,098	LF	MUP	$230.00	$3,242,540	$26,700.76
MUP 4-4	Mammoth Creek Path	Main Path	MCWD Facility	5,596	LF	MUP	$230.00	$1,287,080	$10,598.48
			TOTAL LENGTH	**38,846**	**LF**	**TOTAL COSTS**		**$9,434,580**	**$73,572**
				7.4	**MI**				

1. Project numbers are based on the recommendation number and the order in which each project is listed. For example, the first project listed under recommendation MUP 1 will receive the number MUP 1-1, the
2. Maintenance cost estimates represent the additional typical annual cost of maintaining MUPs based on an average of projects statewide. While Mammoth will experience higher winter maintenance costs due to

Table 8-4: Crossing Improvements Cost Estimates

Project No.[1]	Street	Location	Improvement Type	Capital Cost	Maintenance Cost[2]
X 2-1	Minaret Road	Forest Trail	At-Grade Crossing	$50,000.00	$2,000.00
X 2-2	Minaret Road	North Village (Mid Block)	At-Grade Crossing	$10,000.00	
X 2-3	Lake Mary Road	Davison Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-4	Lake Mary Road	Lakeview Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-5	Lake Mary Road	Canyon Boulevard	At-Grade Crossing	$50,000.00	$2,000.00
X 2-6	Lake Mary Road	Bridges Lane	At-Grade Crossing	$50,000.00	$2,000.00
X 2-7	Lake Mary Road	Lee Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-8	Main Street	Minaret Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-9	Main Street	Mountain Boulevard / Callahan Way	At-Grade Crossing	$50,000.00	$2,000.00
X 2-10	Main Street	Sierra Boulevard / Mono Street	At-Grade Crossing	$50,000.00	$2,000.00
X 2-11	Main Street	Forest Trail	At-Grade Crossing	$50,000.00	$2,000.00
X 2-12	Main Street (Hwy 203)	Sierra Park Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-13	Meridian Boulevard	Minaret Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-14	Meridian Boulevard	Sierra Park Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-15	Meridian Boulevard	College Parkway	At-Grade Crossing	$50,000.00	$2,000.00
X 2-16	Meridian Boulevard	Wagon Wheel Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-17	Old Mammoth Road	Chateau Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-18	Old Mammoth Road	Minaret Road	At-Grade Crossing	$50,000.00	$2,000.00
X 2-19	Old Mammoth Road	Ski Trail	At-Grade Crossing	$50,000.00	$2,000.00
X 2-20	Old Mammoth Road	Waterford Ave	At-Grade Crossing	$50,000.00	$2,000.00
			TOTAL	**$960,000.00**	**$38,000.00**

1. Project numbers are based on the recommendation number and the order in which each project is listed. For example, the first project listed under recommendation X2 will
2. Maintenance cost estimates represent the additional typical annual cost of maintenance resulting from project implementation.

Table 8-5: On-Street Bikeway Cost Estimates

Project No.[1]	Street	From	To	Quantity	Unit	Improvement Type	Unit Cost	Capital Cost	Maintenance Cost[2]
B 2-1	Minaret Road	Mammoth Scenic Loop	Mammoth Knolls Dr	3,096	LF	Bike Lanes	$57.00	$176,472	$1,994
B 2-2	Minaret Road	Mammoth Knolls Dr	Main St	2,058	LF	Bike Lanes	$95.00	$195,510	$1,325
B 2-3	Lake Mary Road	Davison Rd	Minaret Rd	2,713	LF	Bike Lanes	$9.50	$25,774	$1,747
B 2-4	Meridian Blvd.	S Majestic Pines Drive	N Majestic Pines Drive	649	LF	Bike Lanes	$9.50	$6,166	$418
B 2-5	Meridian Blvd.	Sierra Park Rd	Highway 203	6,936	LF	Bike Lanes	$9.50	$65,892	$4,466
B 2-6	Old Mammoth Road	Red Fir Road	Minaret Road	7,419	LF	Bike Lanes	$9.50	$70,481	$4,777
B 2-7	Old Mammoth Road	Main Street	Mammoth Creek Park	4,396	LF	Bike Lanes	$95.00	$417,620	$2,831
B 3-1	Forest Trail	Minaret Road	Canyon Blvd	5,599	LF	Bike Lanes	$57.00	$319,143	$3,605
B 3-2	Canyon Blvd.	Lake Mary Road	Hillside Drive	5,624	LF	Bike Lanes	$50.00	$281,200	$3,622
B 3-3	Lakeview Blvd.	Rainbow Lane	Canyon Blvd	2,635	LF	Bike Lanes	$57.00	$150,195	$1,697
B 3-4	Majestic Pines Drive	Silver Tip Lane	Lodestar Drive	1,903	LF	Bike Lanes	$57.00	$108,471	$1,225
B 3-5	Chateau Road	Minaret Road	End	2,991	LF	Bike Lanes	$57.00	$170,487	$1,926
B 3-6	Sierra Nevada Road	Azimuth Drive	Sierra Park Road	764	LF	Bike Lanes	$57.00	$43,548	$492
B 3-7	Laurel Mountain Road	Main Street	Sierra Nevada Road	1,826	LF	Bike Lanes	$57.00	$104,082	$1,176
B 3-8	Tavern Road	Laurel Mountain Road	Sierra Park Road	1,183	LF	Bike Lanes	$57.00	$67,431	$762
B 3-9	Sierra Manor Road	Tavern Road	Meridian Blvd	1,716	LF	Bike Lanes	$57.00	$97,812	$1,105
B 3-10	Sierra Park Road	Main Street	End	3,190	LF	Bike Lanes	$57.00	$181,830	$2,054
B 4-1	Forest Trail	Canyon Blvd	Lakeview Blvd	3,115	LF	Bike Route	$4.00	$12,460	$295
B 4-2	Majestic Pines Drive	Silver Tip Lane	Lodestar Drive	1,903	LF	Bike Route	$4.00	$7,612	$180
B 4-3	North Waterford Ave.	Majestic Pines Drive	Old Mammoth Road	1,268	LF	Bike Route	$4.00	$5,072	$120
			TOTAL LENGTH	**74,439.00**	**LF**	**TOTAL COST**		**$2,507,257**	**$47,934**
				14.10	**MI**				

1. Project numbers are based on the recommendation number and the order in which each project is listed. For example, the first project listed under recommendation B1 will receive the number B 1-1, the second will
2. Maintenance cost estimates represent the additional typical annual cost of maintenance resulting from project implementation.

Map 8-1. Project Number Map

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8.3. Funding

Funding that can be used for bicycle, pedestrian and recreational trail projects, programs and planning comes from all levels of government. This section covers federal, state, regional and local sources of bicycle and pedestrian funding, as well as some non-traditional funding sources that may be used for bicycle and pedestrian projects.

8.3.1. Local Funding Sources

Tax Measure R

Measure R is a half-cent sales tax initiative to raise and secure a stable funding source for local parks, recreation and trails, in The Town of Mammoth Lakes. Measure R funds can be used "…only for the planning, construction, operation, programming and administration of all trails, parks and recreation facilities managed by the Town of Mammoth Lakes without supplanting existing parks and recreation facility maintenance funds." Measure R passed with 72 % of the vote on June 3, 2008. Collection of funds started on October 1, 2008 by the State Board of Equalization. The Town Tourism & Recreation Commission will administer the process by which projects will be considered, reviewed, and funded with Measure R monies.

APPLICATION DEADLINE	N/A – TOML Allocates Funding
TYPE OF PROJECTS FUNDED	– Planning – Construction – Maintenance – Safety and Education
TYPE OF TRAILS ELIGIBLE	Recreational Trails, Pathways and Support Facilities

Tax Measure U

Measure U extended the Utility Users Tax (UUT) and redirected UUT funds to pay for mobility, recreation, and arts and culture projects throughout the Town of Mammoth Lakes. As of September 2011, a process was underway to determine the application process, project types that may be funded, and trail types potentially eligible for Measure U funding.

APPLICATION DEADLINE	TBD
TYPE OF PROJECTS FUNDED	TBD
TYPE OF TRAILS ELIGIBLE	TBD

Transportation Development Act

Transportation Development Act Article 3 funds are state block grants awarded monthly to local jurisdictions for transit, bicycle and pedestrian projects in California. Funds for pedestrian projects originate from the Local Transportation Fund, which is derived from a ¼ cent of the general state sales tax. Local Transportation Funds are returned to each county based on sales tax revenues. Article 3 of the Transportation Development Act sets aside 2% of the Local Transportation Funds for bicycle and pedestrian projects. Eligible pedestrian and bicycle projects include: construction and engineering for capital projects; maintenance of bikeways; bicycle safety education programs (up to 5% of funds); and development of comprehensive bicycle or pedestrian facilities plans. A city or county may use these funds to update their bicycle and pedestrian plan not more than once every five years. These funds may be used to meet local match requirements for federal funding sources.

APPLICATION DEADLINE	Determined by County and City Transportation Agencies
TYPE OF PROJECTS FUNDED	– Planning – Construction – Maintenance – Safety and Education
TYPE OF TRAILS ELIGIBLE	Paved

Developer Impact Fees

Fees placed on new development can be used as local matching funds to attract funding from other grant sources.

APPLICATION DEADLINE	County and City
TYPE OF PROJECTS FUNDED	– Planning – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved

8.3.2. Statewide Funding Sources

The State of California uses both federal sources and its own budget to fund the following bicycle and pedestrian projects and programs.

Sierra Nevada Conservancy: Proposition 8 Proposition 84

In November 2006, voters approved Proposition 84 Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. Mono County and the City of Mammoth Lakes will be eligible to apply for funds under programs being

developed by the State. It is anticipated that the California Department of Parks and Recreation will have programs to disburse grant funds.

APPLICATION DEADLINE	To be determined
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved – Conservation & Restoration projects – Trail of Statewide significance (California Coastal Trail)
LINK TO PROGRAM	California State Parks Local Assistance Program Bill Meyer for Mono County (916) 651-1406 bmeyer@parks.ca.gov

California River Parkways Program

The California River Parkways Program is a state program that provides competitive grants to projects that provide public access to rivers or streams or are a component of a larger parkway plan that provides public access to rivers or streams. The program focuses on non-motorized access. The program was established in 2002 when California voters passed The Proposition 50, the Water Security, Clean Drinking Water and Beach Protection Act of 2002. Funds can be used to develop walking, bicycling trails, provide amenities, property acquisition, construction of interpretive signage and overlooks, boardwalk construction, informational displays, interpretive kiosks, signage. The program is administered by the California Resources Agency. The program, may be receiving additional funds from Proposition 84.

In addition to providing public access to rivers or streams, eligible projects must meet two of the following five requirements:

- Recreation - Provide compatible recreational opportunities, including trails for strolling, hiking, bicycling and equestrian uses along rivers and streams.
- Habitat - Protect, improve, or restore riverine or riparian habitat, including benefits to wildlife habitat and water quality.
- Flood Management - Maintain or restore the open-space character of lands along rivers and streams so that they are compatible with periodic flooding as part of a flood management plan or project.
- Conversion to River Parkways - Convert existing developed riverfront land into uses consistent with River Parkways.
- Conservation and Interpretive Enhancement - Provide facilities to support or interpret river or stream Restoration or other conservation activities.

Public agencies and nonprofit organizations are eligible for funding. Projects must comply with CEQA, real property must be acquired from a willing seller priority is given to projects

that are included in an approved watershed plan and include watershed protection measures. This funding could be used for projects paralleling Mammoth Creek.

APPLICATION DEADLINE	October
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved
LINK TO PROGRAM	http://www.resources.ca.gov/bonds_prop50riverparkway.html

Bicycle Transportation Account

The Bicycle Transportation Account provides state funding for local projects that improve the safety and convenience of bicycling for transportation. Because of its focus on transportation, Bicycle Transportation Account projects must provide a demonstrable level of utility for transportation purposes. For example, all in-town on-street and paved bikeways would be good candidates for funding. The extension of the Shady Rest Park Path would be less competitive. Funds are available for both planning and construction. Bicycle Transportation Account funding is administered by Caltrans and cities and counties must have an adopted Bicycle Transportation Plan in order to be eligible. The maximum amount available through the Bicycle Transportation Account is $1.2 million dollars, cities and counties are eligible to apply. The Town of Mammoth Lakes will have eligibility for this funding though the latest re-adoption of the General Bikeways Plan. Eligible projects include all on-street bikeway and paved multi-use path projects. All project must be designed to the standards outlined in Chapter 1000 of the Highway Design Manual.

APPLICATION DEADLINE	December
TYPE OF PROJECTS FUNDED	– Planning and Design – Construction – Major repair and maintenance
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved
LINK TO PROGRAM	http://www.dot.ca.gov/hq/LocalPrograms/bta/btaweb%20page.htm

Habitat Conservation Funds

This is a relatively small program approved by voters as part of Proposition 70, the Mountain Lion initiative. The program has approximately $2 million per year to fund habitat restoration and trails. There are six programs, but only four programs are funded on an annual rotating basis. Grants are small, usually less than $100,000.

APPLICATION DEADLINE	October
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved – Habitat restoration near trails or part of trail project.
LINK TO PROGRAM	California State Parks Local Assistance Program. Sandy Berry (916) 651-7741 sberr@parks.ca.gov

Environmental Enhancement Mitigation Program

The EEMP program has not always received regular appropriations by the Legislature. Grants are usually less than $200,000. The principal requirement is to link the project with a local state transportation project. It needs support from the local Caltrans District.

APPLICATION DEADLINE	November
TYPE OF PROJECTS FUNDED	– Land acquisition – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved

Wildlife Conservation Board Public Access Program

Funding for the acquisition of lands or improvements that preserve wildlife habitat or provide recreational access for hunting, fishing or other wildlife-oriented activities. There is up to $250,000 dollars available per project with applications accepted quarterly. Projects eligible for funding include interpretive trails, river access, and trailhead parking areas. The State of California must have a proprietary interest in the project. Local agencies are generally responsible for the planning and engineering phases of each project. This funding source can be used for improvements to Recreation Nodes and projects that improve access to fishing, bird watching, and other activities along Mammoth Creek and in the Lakes Basin.

APPLICATION DEADLINE	Quarterly
TYPE OF PROJECTS FUNDED	– Construction
TYPE OF TRAILS ELIGIBLE	– Paved – River Access and Trailheads – Unpaved
LINK TO PROGRAM	http://www.wcb.ca.gov/Pages/public_access_program.htm

Community Based Transportation Planning Demonstration Grant Program

This fund, administered by Caltrans, provides funding for projects that exemplify livable community concepts including bicycle and pedestrian improvement projects. Eligible applicants include local governments, metropolitan planning organizations and regional transportation planning agencies. A 20% local match is required and projects must demonstrate a transportation component or objective. There is $3 million available annually statewide.

APPLICATION DEADLINE	October
TYPE OF PROJECTS FUNDED	Planning
TYPE OF TRAILS ELIGIBLE	Not Applicable
LINK TO PROGRAM	http://www.dot.ca.gov/hq/tpp/offices/ocp/cbtpg.htm

8.3.3. Federal Funding Sources

The primary federal source of surface transportation funding—including bicycle and pedestrian facilities—is the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users. This Federal bill is the third iteration of the transportation vision established by Congress in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) and renewed in 1998 and extended in 2003 through the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFE-TEA). Also known as the Federal Transportation Bill, the $286.5 billion bill was passed in 2005 and authorizes federal surface transportation programs for the five-year period between 2005 and 2009.

Federal funding is administered through the state (Caltrans and the State Resources Agency) and regional planning agencies. Most, but not all, of these funding programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Many Federal programs require a local match of between 10-20%. Federal funding is intended for capital improvements and safety and education programs and projects must relate to the surface transportation system.

Specific funding programs under the federal transportation bill for bicycle and pedestrian facilities that might be potential funding sources for the Mammoth Lakes Trails Master Plan include:

- Federal Lands Highway Funds—Approximately $1 billion dollars are available nationally through 2009 for planning and construction of bicycle and pedestrian projects built in conjunction with roadways.
- Transportation, Community and System Preservation Program—$270 million nationally through 2009 for projects that improve the efficiency of the transportation system, reduce the impact on the environment, and provide efficient access to jobs, services and trade centers.

- Recreational Trails Program—$370 million nationally through 2009 for non-motorized trail projects. (See below).

APPLICATION DEADLINE	Varies
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction – Safety and Education Programs
TYPE OF TRAILS ELIGIBLE	Paved Unpaved
LINK TO PROGRAM	http://www.fhwa.dot.gov/safetealu/index.htm

Federal Lands Highway Funds

Federal Lands Highway Funds may be used to build bicycle and pedestrian facilities in conjunction with roads and parkways at the discretion of the department charged with administration of the funds. The projects must be transportation-related and tied to a plan adopted by the State and Metropolitan Planning Organization. Federal Lands Highway Funds may be used for planning and construction.

APPLICATION DEADLINE	Varies
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	Paved
LINK TO PROGRAM	http://www.fhwa.dot.gov/flh/flhfs051028.htm

Transportation, Community and System Preservation Program

The Transportation, Community and System Preservation Program provides federal funding for transit oriented development, traffic calming and other projects that improve the efficiency of the transportation system, reduce the impact on the environment, and provide efficient access to jobs, services and trade centers. The program is intended to provide communities with the resources to explore the integration of their transportation system with community preservation and environmental activities. The Program funds require a 20% match.

APPLICATION DEADLINE	Varies
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	– Paved
LINK TO PROGRAM	http://www.fhwa.dot.gov/tcsp/pi_tcsp.htm

Recreational Trails Program

The Recreational Trails Program (RTP) provides funds annually for recreational trails and trails-related projects. The RTP is administered at the federal level by the Federal Highway Administration (FHWA). It is administered at the state level by the California Department of Parks and Recreation. The maximum amount of RTP funds allowed for each project is 88% of the total project cost. The applicant is responsible for obtaining a match amount that is at least 12% of the total project cost. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized as well as motorized uses. Funds may be used for:

- Maintenance and restoration of existing trails;
- Purchase and lease of trail construction and maintenance equipment;
- Construction of new trails; including unpaved trails.
- Acquisition of easements or property for trails.
- State administrative costs related to this program (limited to seven percent of a State's funds).
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

APPLICATION DEADLINE	October
TYPE OF PROJECTS FUNDED	– Planning & Design – Property Acquisition – Construction – Safety and Educational Programs – Maintenance and Restoration of Existing Trails
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved
LINK TO PROGRAM	http://www.fhwa.dot.gov/environment/rectrails/index.htm http://www.parks.ca.gov/?page_id=21362 California State Parks Local Assistance Program Bill Meyer for Mono County (916) 651-1406 bmeyer@parks.ca.gov

Land and Water Conservation Fund

The Land and Water Conservation Fund is a federally-funded program that provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. The Fund is administered by the National Parks Service and the California Department of Parks and Recreation and has been reauthorized until 2015.

Cities, counties and districts authorized to acquire, develop, operate and maintain park and recreation facilities are eligible to apply. Applicants must fund the entire project, and will be reimbursed for 50% of costs. Property acquired or developed under the program must be retained in perpetuity for public recreational use. The grant process for local agencies is competitive, and 40% of grants are reserved for Northern California.

In 2006, approximately $480,000 was available for projects in Northern California.

APPLICATION DEADLINE	May
TYPE OF PROJECTS FUNDED	– Planning & Design – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved
LINK TO PROGRAM	http://www.parks.ca.gov/?page_id=21360

8.3.4. Non-Traditional Sources

Community Development Block Grants

The Community Development Block Grant program provides money for streetscape revitalization, which may be largely comprised of pedestrian improvements. Federal Community Development Block Grant grantees may "use [these] funds for activities that include (but are not limited to): acquiring real property; reconstructing or rehabilitating housing and other property; building public facilities and improvements, such as streets, sidewalks, community and senior citizen centers and recreational facilities, paying for planning and administrative expenses, such as costs related to developing a consolidated plan and managing Community Development Block Grant funds; provide public services for youths, seniors, or the disabled; and initiatives such as neighborhood watch programs."

APPLICATION DEADLINE	N/A
TYPE OF PROJECTS FUNDED	– Planning – Construction – Property Acquisition – Safety and Education
TYPE OF TRAILS ELIGIBLE	Not Applicable
LINK TO PROGRAM	http://www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm

American Greenways Program

Administered by The Conservation Fund, the American Greenways Program provides funding for the planning and design of greenways. Applications for funds can be made by local regional or statewide non-profit organizations and public agencies. The maximum award is $2,500, but most range from $500 to $1,500. American Greenways Program monies may be used to fund unpaved trail development.

APPLICATION DEADLINE	June 1
TYPE OF PROJECTS FUNDED	– Planning – Construction
TYPE OF TRAILS ELIGIBLE	– Paved – Unpaved
LINK TO PROGRAM	http://www.conservationfund.org/?article=2471

CHAPTER 9. BENCHMARKING AND EVALUATION

Measurable benchmarks will help the implementation process for the trail system. Physical implementation, user safety, and quality of service benchmarks can become part of the infrastructure management systems utilized by the Town and its partners. These benchmarks are based on the proposed projects presented in the plan, and include the following performance measures. The existing conditions (miles of multi-use paths, bikeways, trails, etc.) reported in this plan should be used as a baseline measure for the ongoing implementation of this plan. Progress should be compared against existing conditions and compared against the progress of previous years as implementation continues. For areas where no data currently exists, data collection should occur as soon as possible to be used as baseline data upon which future data will be compared.

9.1. Benefits of Trail System

9.1.1. Economic Benefits

In order to quantify the economic benefits of the trail system, it will be necessary to find ways to estimate annual revenue generated from trail-related equipment sales, rentals and repairs, along with lodging, retail, and related business activity.

- Number of unique hotel visits per year or season (compared to previous years or seasons).
- Number of hotel nights stayed per year or season (compared to previous years or seasons).
- Sales tax revenue from retail sales related to trail equipment.
- Revenue or number of lift tickets sold by MMSA (summer and winter).

9.1.2. Environmental Benefits

Calculate the reductions in and greenhouse gases and other vehicle-related emissions based on the number of vehicle trips shifted to bicycling, walking and transit.

9.1.3. Health Benefits

Calculate the number of calories burned through trail use by linking user counts to average trip lengths and average calories burned per mile. Work with health professionals to calculate the associated heath cost savings of a healthy community.

9.2. Recreational Trails Environment

The following benchmarks can be used to provide an ongoing evaluation of the recreational trails environment. Many of the indicators used to measure recreational activity are also proxies for economic activity generated through improvements to the recreational trails environment.

9.2.1. Implementation

All of the following infrastructure benchmarks should be reported annually and compared to existing (current) conditions and the progress achieved during the previous year.

- Number of recreation nodes that have been upgraded to provide the amenities recommended in this plan.
- Miles of new soft-surface trails and multi-use path programmed into the Capital Improvements Program.
- Miles of new soft-surface trails and multi-use path programmed for implementation by the USFS.
- Miles of new soft-surface trails and multi-use path constructed through the CIP and new development.
- Miles soft-surface trail and multi-use path available (cleared or groomed) for winter use each year.
- Number of volunteer hours dedicated to trail maintenance, educational programs and other stewardship efforts, as reported by local organizations .

9.2.2. Trail User Needs and Safety Assessment

TOML should secure funding and begin a community-based process to identify user needs and safety concerns along the Town's system of paved paths as the network expands. The assessment should address user conflict, the effectiveness of signage, maintenance, and other safety issues. The process should also seek to identify the most appropriate winter use for each paved path segment under the operation and maintenance of the Town of Mammoth Lakes (i.e. groomed for cross-country, cleared for walking & bicycling, etc). This project should take place after all (or most) of the paved path segments as "near-term" projects have been built. A potential funding source is the Caltrans Community-Based Transportation Planning Grant Program, described in Chapter 8.

9.2.3. Recreational Activity

- User counts at strategic locations (recreation nodes)
- Surveys of schoolchildren about their recreational behaviors

9.2.4. Trail Safety

- Comparison of trail-related injuries and fatalities based on local hospital data
- Periodic survey of community perceptions on bicycle/pedestrian access and safety
- Develop a system for reporting trail-related hazards and user conflicts and track how many hazards have been reported and subsequently mitigated each year

9.2.5. Trail User Experience

- Periodic surveys on trail-user satisfaction compared to previous surveys by TOML and USFS

9.2.6. Accessibility

- Present results of accessibility assessments for multi-use paths, trails and pedestrian facilities to the public once completed
- Provide updated accessibility information for recreation nodes, MUPs and trails on trail maps and other information sources, such as the Internet

9.3. Bicycling Environment

The following benchmarks can be used to provide an ongoing evaluation of the bicycling environment.

9.3.1. Implementation

All of the following infrastructure benchmarks should be reported annually and compared to existing (current) conditions and the progress achieved during the previous year.

- Number of miles of new bike lanes and multi-use path programmed into the Capital Improvements Program
- Number of miles of new bike lanes and multi-use path constructed through the CIP and new development
- Number of miles bike lanes and multi-use path available (cleared) for winter use each year

9.3.2. Bicycling Activity

- Annual bicycle counts at strategic locations
- Periodic counts of bicycle parked in bicycle racks around town
- Comparison 2000, 2010 and 2020 Census Journey to Work Data to track the number of people bicycling to work
- Conduct personal travel surveys similar to the National Household Transportation Survey (NHTS) in order to track bicycle use for all trips (not just the journey to work)
- School-based counts and surveys of bicycling activity
- Participate in the League of American Bicyclists Bicycle Friendly Cities Program with a goal of achieving the Gold or Platinum rating.

9.3.3. Bicycling Safety

- Comparison of annual bicycling injuries and fatalities based on California Highway Patrol (SWITRS) data
- Comparison of annual bicycling injuries and fatalities based on local hospital data
- Periodic survey of community perceptions on bicycle/pedestrian access and safety

- Develop a system for reporting bicycling hazards and track how many hazards have been reported and subsequently mitigated each year.

9.4. Pedestrian Environment

The following benchmarks can be used to provide an ongoing evaluation of the pedestrian environment.

9.4.1. Implementation

- Number of miles of new multi-use path programmed into the Capital Improvements Program
- Number of miles of new multi-use path constructed through the CIP and new development

9.4.2. Pedestrian Activity

- Annual pedestrian counts at strategic locations
- Comparison 2000, 2010 and 2020 Census Journey to Work Data to track the number of people walking to work
- School-based counts and surveys of pedestrian activity
- Conduct personal travel surveys similar to the National Household Transportation Survey (NHTS) in order to track pedestrian activity for all trips (not just the journey to work)[10]

9.4.3. Pedestrian Safety

- Comparison of annual pedestrian injuries and fatalities based on California Highway Patrol (SWITRS) data
- Comparison of annual pedestrian injuries and fatalities based on local hospital data
- Periodic survey of community perceptions on pedestrian access and safety
- Develop a system for reporting pedestrian hazards and track how many hazards have been reported and subsequently mitigated each year.

[10] The U.S Census only tracks the commute (or journey to work). NHTS and other journal-based personal travel surveys track all trips by mode of travel and thus provide a clearer picture of transportation mode choice. Sample surveys can be obtained by the Federal Highway Administration (FHWA) or regional planning agencies such as the Southern California Association of Governments (SCAG).

Glossary of Terms

The definitions in this section are intended to define terms as they are used in this Trail System Master Plan. Many of the terms defined here have different or broader meanings when used in other contexts.

Access/Egress Point – The most basic type of recreation node. An access/egress point has the same characteristics as a GIC point, but has been formalized so that access there is legal and/or regularly maintained by a public or private entity. The basic elements of an access/egress point should include signage and a clear passageway sufficient to accommodate the intended users. These locations may or may not include low-impact amenities such as a source of drinking water or limited parking.

Activity Centers – specific locations or discrete areas that attract significant levels of human activity or trips (civic buildings, schools, shopping centers, areas of high employment, etc).

At-Grade Crossing – a junction where trail or sidewalk users cross a roadway over the same surface as motor vehicle traffic, as opposed to a grade-separated crossing where users cross over or under the roadway using a bridge or tunnel.

Bicycle Boulevard - Streets designed to limit or prohibit motor vehicle traffic, using barriers or other design elements, in order to enhance bicycle safety and enjoyment.

Bicycle Facilities - A general term used to describe all types of bicycle-related infrastructure including linear bikeways and other provisions to accommodate or encourage bicycling, including bike racks, lockers, and showers at employment destinations.

Bike Lane - A striped lane for one-way bike travel on a street or highway.

Bike Path – See "Multi-Use Path"

Bike Route - A shared roadway specifically identified for use by bicyclists, providing a route based on traffic volumes and speeds, street width, directness, and/or cross-street priority, denoted by signs only.

Bikeway – A generic term for any road, street, path or way that in some manner is specifically designed for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Bollard – Post used to restrict motor vehicle entry onto trails

Bus - Refers to a public transportation vehicle operating on a Town of Mammoth Lakes summer or winter transit route.

Class I Bikeway - See "Bike Path" and "Multi-Use Path"

Class II Bikeway - See "Bike Lane"

Class III Bikeway - See "Bike Route"

Clearance, Lateral – Width required for safe passage of soft-surface trail or paved pathway users as measured on a horizontal plane.

Clearance, Vertical – Height required for safe passage of soft-surface trail or paved pathway users as measured on a vertical plane.

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.

Concept and Master Planning (CAMP) - An effort led by the non-profit Mammoth Lakes Trails and Public Access (MLTPA) to encourage public participation in the development of the Trail System Master Plan update. MLTPA hosted two major events as part of this effort: "CAMP: Summer" and "CAMP: Winter".

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).

Curb Extension – Extension of the curb and sidewalk area that narrows the crossing distance for pedestrians and provides standing space for pedestrians waiting to cross the street. Also referred to as a "bulb out".

Directional Signs – These are typically placed at road and trail junctions (decision points) to guide trail users toward a destination or experience.

Easement - the privilege of using something that is not your own (as using another's land as a right-of-way to your own land)

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.

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.

Forest Trail - A trail wholly or partly within or adjacent to and serving the National Forest System that the U.S. Forest Service deems necessary for protection, administration, and use for the National Forest System and the use and development of its resources. (USFS definition)

Full Bench Cut - Refers to excavating a very steep cross slope. (Never toss excess material down slope. Haul out or disperse on the tread.)

Geographic Information Systems (GIS) - Computerized system of hardware and software used for electronic storage, retrieval, mapping, and analysis of geographic data.

Geometry - The vertical and horizontal characteristics of a transportation facility, typically defined in terms of gradient, degrees, super elevation, and travel speed.

GIC Point –GIS Inventory Contract (contracted by TOML with MLTPA) points provide the basis for selecting recreation nodes and may include any official or unofficial locations where a recreational transition or activities occurs. This transition can include parking a car or disembarking from another mode of transportation in order to engage a recreational activity. The transition may also be between jurisdictional boundaries or between types of experiences (i.e. urban and rural, paved to unpaved). All recreation nodes have at least one associated GIC point, but not all GIC points are recreation nodes.

Global Positioning System (GPS) - A system which enables a mobile receiver to determine its precise geographic location via satellite telemetry.

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

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:

Grade Separation - Vertical isolation of travelways through use of a bridge or tunnel so that traffic conflicts are minimized.

Grade-Separated Crossing – a bridge or tunnel allowing trail users to cross over or under a major roadway.

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, known as a knick.

Level of Service (LOS) - Term for the measurement of how well traffic "flows" on a roadway system or segment, "multi-modal LOS" contains measures for many modes including bicycles, pedestrians, transit, and motor vehicles

Lift - Refers to chair lifts and gondolas associated with the Mammoth Mountain Ski Area.

Loop Detector - A device placed under the pavement at intersections which can detect a vehicle or bicycle and trigger an actuated or semi-actuated signal to turn green.

Medians – Area in the center of the roadway that separates directional traffic, and provides a crossing halfway point for pedestrians (also can be effective traffic calming design). Medians may be level with the surrounding roadway or "raised" using curb and gutter. Medians may include landscaping, concrete, paint/striping or any combination thereof.

Mode Split - Percentage of trips that use a specific form of transportation. A one percent bicycle mode split indicates that one percent of trips are made by bicycle. Also referred to as mode share.

Multi-Use Path – a paved pathway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Multi-use paths may be used by pedestrians, bicyclists, skaters, wheelchair users, joggers, and other non-motorized users.

National Forest System Trail - A forest trail other than a trail that has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority. (USFS definition)

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

Near-Term – Refers to projects that are funded, designed and/or under construction.

Off-Highway Vehicle (OHV) - Any motorized vehicle designed for or capable of cross-county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

Off-Road Trail – A trail primarily by mountain bikers, hikers and equestrians that is off of the road and is a non-paved surface.

Outslope – Refers to the down slope part of the tread that helps to shed water from the trail.

Over-Snow Vehicle (OSV) - A motor vehicle designed for use over snow that runs on a track or tracks and/or a ski or skis while in use over snow.

Park - A self-contained recreation facility that generally include the same amenities (parking, restrooms, trash/recycling) as a trailhead. Since all parks operated by the Town of Mammoth Lakes—except Whitmore Park—currently provide access to existing trails, parks essentially serve as trailheads with the additional amenities unique to each individual park.

Partial Bench Cut - Refers to an excavated cross slope. Used on hill sides with a gradual cross slope to help.

Pathway, Paved – A paved pathway is a linear trail facility used primarily for non-motorized transportation or recreation and constructed with a surface comprised of asphalt and/or concrete. Alternative surface materials such as decomposed granite or soil binders may be considered as an alternative to asphalt or concrete pavement.

Paved Shoulder – the outer edge of the roadway beyond the outer stripe edge that provides a good place for cyclists when it is wide enough (4-5 feet), free of debris, and does not contain rumble strips or other obstructions.

Pavement Marking – An assortment of markings on the surface of the pavement that give directions to motorists and other road users in the proper use of the road. (the "Manual on Uniform Traffic Control Devices" determines these standard markings).

Pedestrian Facilities – General term used to describe infrastructure improvement for pedestrians, including—but not limited to—sidewalks, crosswalks, and promenades.

Portal - The most developed form of recreation node. A portal includes all the amenities of a trailhead plus lodging and restaurants.

Promenade – A wide sidewalk facility (min 10 ft) installed in areas of high pedestrian activity. Promenades are designed primarily for pedestrian use, but may be linked to multi-use paths and used by slow moving bicyclists and other trail users.

Quality of Life – "Quality of life" generally refers to the level of overall personal satisfaction (or dissatisfaction) with the physical, cultural or intellectual conditions under which one lives; and the ability to comfortably pursue enjoyable daily activities. The Needs Analysis chapter describes the recreational activities commonly pursued by Mammoth residents and visitors and discusses how their enjoyment of those activities can be enhanced.

Recreationist – a person who seeks recreation especially in the outdoors.

Recreation Node - a general term to describe a geographic location of existing or potential significance for outdoor recreation.

Refuge Islands – corner raised triangles or medians, used by pedestrians at intersections or mid-block for assistance with crossing wide streets, especially with motor vehicle right turn lanes.

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.

Right-of-Way - A privilege or right to cross over or use the land of another party for egress and ingress such as roads, pipelines, irrigation canals, or ditches. The right-of-way may be conveyed by an easement, permit, license, or other instrument. Also, the right of one vehicle, bicycle, or pedestrian to proceed in a lawful manner in preference to another vehicle, bicycle, or pedestrian.

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.

Secondary Trail Identification Markers - These are placed at regular intervals along the trails to assure users that they are on the correct trail. International activity symbols would be posted here together with trail access information.

Shared Roadway - A roadway where bicyclists and motor vehicles share the same space with no striped bike lane. Any roadway where bicycles are not prohibited by law (i.e. interstate highways or freeways) is a shared roadway. A bike route (Class III) is a shared roadway which has been identified as favorable to use by bicyclists.

Side Slope Gradient - Cross slope.

Sight Distance - The distance a person can see along an unobstructed line of sight.

Soft-Surface Trails – Trails developed using surface materials that do not include concrete or asphalt pavement. A typical soft-surface trail consists primarily of native soils. However, in some cases, wooden structures, decomposed granite, rock armoring, soil binders and other trail building techniques may be implemented as needed to address issues specific to any given trail or trail segment.

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

Stairs - Built of rock or wood, stairs 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.

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.

Surfacing - 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.

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.

Switchbacks - Used for steep grade changes only when terrain or land boundaries dictate. Preferred for hikers. (Never stack switchbacks one on top of the other.)

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."

Traffic Calming - Changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and/or cut-through volumes in the interest of street safety, livability, and other public purposes.

Traffic Control Devices - Signs, signals, or other fixtures, whether permanent or temporary, placed on or adjacent to a travelway by authority of a public body having jurisdiction to regulate, warn, or guide traffic.

Traffic Volume - The number of vehicles that pass a specific point for a specific amount of time (hour, day, year).

Trail - A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail. (USFS definition)

Trail Braiding – An advanced stage of trail degradation typically occurring along unsustainable trail alignments where rutting or pooling of water is caused by erosion or the compaction of wet soils. To avoid the degraded segment, trail users take a route around the degraded trail segment. Soon the alternative route becomes worn and the exposed soil eventually succumbs to the same rutting or pooling of water, inducing users to take a third route and so on.

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.

Trail Identification Marker - These signs identify the trail. They should be large enough to be visible and readable for drivers, with appropriately sized typography. Information to be displayed could include the name of the portal, a jurisdictional branding element, parking information and whether the trail is accessible for motorized and/or non-motorized users.

Trail Information Kiosks - These provide the universe of information including a trail map, distances to destinations, trail conditions, trail experiences, connection with area amenities, and regulatory and safety information (hours of operation, rules, etc.). The size of these directories (small or large) will depend on the type and popularity of the particular trail.

Trail Management Objectives (TMOs) – Trail Management Objectives (TMOs) are fundamental building blocks for trail management. TMOs tier from and reflect forest plan, travel management and/or trail-specific management direction. TMOs synthesize and document, in one convenient place, the management intention for the trail, and provide basic reference information for subsequent trail planning, management, condition surveys, and reporting.

Trail Vehicle - A vehicle designed for trail use, such as bicycles, snowmobiles, trail bikes, trail scooters, and all-terrain vehicles. (USFS definition)

Trailhead – A developed recreation node which provides—at a minimum—automobile and/or bicycle parking facilities, trash/recycling, restrooms and signage.

Trail-Oriented Development (TrOD) – Development designed to make trails more useful by linking them with jobs and other economic activities. Real estate development and other physical infrastructure oriented toward adjacent trail, providing entrances facing the trail and directional signage leading to trail facilities.

Transportation Demand Management (TDM) - Generally refers to policies, programs, and actions that are directed towards increasing the use of high occupancy vehicles (transit, carpooling, and vanpooling) and the use of bicycling and walking with the express purpose of reducing or limiting vehicle cold starts and miles traveled for congestion and air quality purposes.

Tread - The actual portion of a trail upon which users travel, or the typical width of the dirt footprint.

Utilitarian Trips – Trips that are not for work or recreational purposes, such as running errands.

Water Bars – Technique used to correct erosion problems on a trail that is traveling the fall line. This technique involves labor-intensive installation and maintenance and has the potential to create trail hazards for all users. With proper trail design and the use of grade reversals, this technique should rarely be needed in the Mammoth region.

Waterbar – Technique to prevent erosion in construction of off road trails.

Wide Curb Lane – A 14 foot (or greater) wide outside lane adjacent to the curb of a roadway, that provides space for cyclists to ride next to (to the right of) motor vehicles. Also referred to as a "wide outside lane".

Thank You

The Town of Mammoth Lakes, USFS, Mammoth Mountain Ski Area, & MLTPA would like to thank you for your interest and participation in the Town of Mammoth Lakes Trail System Master Plan process.