

**Town of Avon  
Recreational Trails Master Plan  
February 2009**



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## PLAN OVERVIEW

### Introduction

In 1983, construction began in Avon’s Wildridge Subdivision. Since that time, a growing population of outdoor-oriented residents and visitors has increased recreational use of the open space located north of Interstate 70 (I-70) near Exit 167. The subject planning area is shown in Figure 1. Popularity of the local trail system over the past years has resulted in changes to user patterns of trails. Increased use has resulted in trail-related challenges including access and parking, environmental impact, and user codes of conduct. These and other concerns triggered discussion at a regional, municipal, and community level on how to most effectively manage these lands and the varied recreational trail uses taking place.

**Figure 1 – Planning Area**



The area’s trails network consists of a mix of informal social trails, purpose-built or dedicated trails and relic access roads. The network has developed over the past couple of decades with little formal planning with respect to ecological sensitivity, neighborhood interface, local and regional connectivity or recreational uses. Historically, trail construction and maintenance has been conducted primarily by local residents, independent volunteers, and the U.S. Forest Service, with increasing inputs by the Town of Avon and surrounding communities in recent years. The result has been an informal network of trails that provides niche user experience necessitating local knowledge for navigation.

## Vision Statement

The vision guiding the Town of Avon’s Recreational Trails Master Plan was developed from input provided through public consultations held in August 2006 and August 2008. At a general level, the vision expresses what people agree needs to be protected or retained and what may be accomplished. The vision for the Town of Avon is fundamentally one of sustainability – of respecting natural systems and managing uses of the trails in ways that enhance the resident and guest experiences and protect the ability of future generations to enjoy this wonderful endowment.

By adopting an approach that protects the local ecology while providing recreational, social and health benefits, the local trail system can become a model of sustainable recreational trails management. At the heart of achieving this vision is a commitment to balancing environmental protection with recreational uses and activity. This commitment will be shared by all who are responsible for this asset – individuals using the area, partnering government agencies, surrounding private land owners, and other stakeholders. Common, sustainable strategies should emphasize awareness, education, safety and stewardship. Management approaches will be shaped by a desire to minimize negative impacts on the environment and local residents, while maximizing opportunities for positive outcomes such as community partnerships, education, habitat protection, or other opportunities.

The Town has a collaborative and systematic vision for implementing this new Recreational Trails Program. An Avon Recreational Trails Advisory Group should be formed to direct trail planning, design, construction, and maintenance. This Group should consist of five members, with at least one full-time resident from Wildridge and one from Mountain Star participating. Participants who are not on Town staff should be nominated or self-volunteered and be confirmed by the Planning and Zoning Commission or the Town Council. The Trails Advisory Group will have the key responsibility to develop and manage a volunteer program for trail construction and maintenance. The Trails Advisory Group will also be responsible for updating this Recreational Trails Master Plan periodically (e.g. every 2-3 years) and presenting the update to Town leadership for formal adoption. Town staff will lead project implementation activities (including development of mapping and design details, review of deliverables from consultants, annual budget planning, bidding and assignment of trail construction contracts), public relations, and communications with outside stakeholders (e.g. USDA Forest Service, Singletree HOA, Eagle County).

## Statement of Principles

The principles listed below were developed in conjunction with the vision statement, with input provided from Town of Avon staff and through the public consultation process. The principles express the range of basic concepts which are crucial to the development of a successful recreational trails management program and the realization of the vision.

### *1. Sustainable Planning Framework*

The mountain environment is important asset requiring careful management to preserve and sustain it for future generations. This requires a framework that supports a harmonious balance between long-term social, economic, and environmental values. Balancing the biophysical and physical capacity of the area to accommodate recreational use is a key consideration.

### *2. Public Health, Safety and Risk Management*

To enhance the healthy outdoor lifestyles found on the western slope, users require a challenging, yet safe and maintained outdoor mountain recreational trail system within a risk management framework that includes standards and regulations for trail use. Risks of use should be clearly communicated to trail

users through appropriate trail signage and educational information. Implementation of an effective trail maintenance program also promotes good risk management.

### ***3. Accessibility and Recreation***

The surrounding mountain areas are spaces to be enjoyed by local residents and visitors, and accessibility to meet recreational needs must be achieved while maintaining the ecological integrity of natural areas through the creation of appropriate supporting amenities like trailheads/access points and regulations regarding use. This includes providing infrastructure to support legitimate access and to balance neighborhood livability with recreational uses.

### ***4. Stewardship and Responsibility***

Responsibility, accountability and stewardship must be fostered at all levels including individual users, community groups, resource managers and other partner agencies. This shared responsibility begins with public and multi-agency involvement in the development of this plan, including development of policies and standards for managing the social, environmental and economic aspects of trail use in the area. Policies should include opportunities for stewardship and ongoing involvement by local volunteers in monitoring and implementation of the recreational trails program.

### ***5. Leadership, Partnerships and Innovation***

The challenges arising from growing recreational use present an opportunity for the Town to become a leader in effective, sustainable management of the area. Avon's value as a destination must be matched by leadership through innovation, co-operation, and partnerships promoted by a comprehensive plan for long term management and sustainability of the natural environment. Avon's recreational trail system is not only a local asset, but a regional resource. While this plan focuses on trail access and use related specifically to the planning area, the Town alone cannot effectively manage this vast area. Hence, the importance of existing partnership with surrounding land owners and managers like the US Forest Service and adjacent municipalities and homeowner's associations.

### ***6. Awareness, Public Education and Advocacy***

Awareness, education and advocacy are integral to fostering respect for the natural environment and an appreciation for the health and safety of the public recreating within it. Building respect and awareness of these issues through public education and advocacy is crucial. This can be accomplished through creating an organized volunteer program, performing public outreach and education by providing printed and electronic information, and partnering with organizations like Gore Range Natural Science School who promote environmental education and awareness.

### ***7. Environment Preservation, Opportunities and Enhancement***

A proactive approach is required to ensure that biodiversity and critical habitats and ecosystems are preserved while managing recreational use in the area. Deliberate strategies and actions will recognize and respect the importance of protecting sensitive areas like winter range habitat for deer and elk, and will develop initiatives to enhance the ecological values of the system. To stay relevant it will also encourage ongoing research and learning, and apply environmental technologies and practices.

### ***8. Adaptive Management***

Recognizing the magnitude of the challenge in managing the mountain area in the face of growing and changing trends in recreational activities, it is important to adopt an approach that is innovative, adaptable and responsive to evolving social and environmental expectations. An adaptive management approach must include a monitoring function to evaluate the effectiveness of initiatives, modify actions as required, and incorporate new approaches and decision-making processes if necessary. To remain proactive and

adaptive as the plan evolves and is implemented, it will be important to continue to anticipate future recreational trends through ongoing communication with recreation professionals, recreationalists, residents, and other partners.

### ***9. Tourism and Economic Considerations***

Opportunities for marketing the availability of recreational trails should be considered. Trails that are easy to find and use, offer unique experiences, and have quantifiable distances and elevation gain will be more marketable.

### ***10. Financial Development***

This plan recognizes that limited budgets exist for all the Town's planned capital projects. A variety of initiatives can be explored to further develop and implement this plan. The long term success of the plan depends on reliable and sustainable funding strategies within the context of innovative partnerships, priority setting and cost/benefit considerations.

## **PURPOSE**

The Recreational Trails Master Plan is intended to provide guidance to Avon for the initial development of its recreational trails program so it can effectively manage and maintain a formalized system of sustainable trails that will serve the year-round leisure needs of area residents and visitors. The plan offers information herein for fostering development of a formalized recreational trails program through sustainable principles and best management practices for trail design, construction, and maintenance. It offers recommendations on developing a routine and remedial maintenance program that emphasizes visitor safety, sustainability, and documented safety inspections. The plan puts forward the results of a sustainability assessment of existing trails and provides recommendations based on the findings. It also identifies new trail opportunities within the project planning area and presents cost estimates for these capital improvement projects.

This plan is intended as a "living" document to be periodically reviewed and updated as necessary (minimum of every three years) to meet changing development conditions, community needs, and on-going trails program evolution.

### **Benefits of Trails**

Trails provide opportunities for people to participate in outdoor recreation and outdoor adventure pursuits. Trails welcome all people regardless of age, income, ethnic background, or beliefs and provide benefits to a dramatically wider population than golf courses, soccer fields, tennis courts, and similar public facilities. Trails provide key access by allowing users to immerse themselves in the natural flora and fauna of the area and experience the splendor of nature and beauty of the Rocky Mountains. Without trails, users may not fully experience the natural resources of the area, and often end up creating more impact by trampling vegetation off the trail.

Trails allow access to natural areas that provide many unique opportunities for environmental education. Schools often use trails as dynamic living laboratories. By allowing children to have fun learning about their environment, they may genuinely begin to understand its ecological systems and develop life-long stewardship to minimize their impact upon it. Trails can also be very cost effective in comparison to other recreational facilities. They occupy minimal land and may be located in floodplains, utility corridors, irrigation canals, along roads, and in areas that cannot be developed. The simplistic nature of trails typically lends themselves to less maintenance, less vandalism, and less potential for lawsuits than other recreational amenities.

## Trail Resources

The following resources provide additional professional trail-related information:

- America Bikes - [www.americabikes.com](http://www.americabikes.com)
- American Trails - [www.americantrails.org](http://www.americantrails.org)
- Anasazi Trails, Inc. - [www.anasazitrailsinc.com](http://www.anasazitrailsinc.com)
- Bicycle Colorado - [www.BicycleColo.org](http://www.BicycleColo.org)
- Bikes Belong - [www.bikesbelong.org](http://www.bikesbelong.org)
- Bureau of Land Management (BLM) - [www.blm.gov](http://www.blm.gov)
- Equestrian Land Conservation Resource - [www.elcr.org](http://www.elcr.org)
- International Mountain Bicycling Association (IMBA) - [www.IMBA.com](http://www.IMBA.com)
- Leave No Trace - [www.lnt.org](http://www.lnt.org)
- National Public Lands Days - [www.npld.com](http://www.npld.com)
- Rivers, Trails and Conservation Assistance Program - [www.nps.gov/rtca](http://www.nps.gov/rtca)
- The National Trails Training Partnership - [www.NTTP.net](http://www.NTTP.net)
- The Trust for Public Lands - [www.tpl.org](http://www.tpl.org)
- US Forest Service - [www.fs.fed.us](http://www.fs.fed.us)
- US Forest Service Partnership Resource Center - [www.partnershipresourcescenter.org](http://www.partnershipresourcescenter.org)

## Existing and Potential Future Cooperative Trail Partners

- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| US Forest Service                     | Colorado Division of Wildlife     |
| Colorado Department of Transportation | Colorado State Patrol             |
| Eagle County Sheriff's Department     | Eagle County – ECO Trails Program |
| Eagle Valley Land Trust               | Berry Creek Metro District        |
| Mountain Star Subdivision             | Singletree Subdivision            |
| Holy Cross Electric                   | Avon's Residents and Businesses   |

## TRAIL DEFINITIONS

### Types of Trails

#### *Designated Trails*

“Designated trails” are trails that have been built for a purpose, accepted, mapped, managed, and improved to agency standards as a main route with a definable use or uses. Designated trails have trailhead signs, maps, and improved corridors and surfaces unlike non-designated social trails. Asphalt, concrete, crusher fines, and natural surface trails of various widths can be considered designated. These trails serve a purpose and are considered permanent improvements to the property. Designated trails help promote sustainability and resource protection and provide for specific recreational opportunities such as hiking, wildlife viewing, and mountain bike and horseback riding.

#### *Social Trails*

“Social trails” are non-designated trails created by users for specific recreational uses of the property. The tread surface of a social trail is typically very narrow and not well defined. Braided social trails are not uncommon in certain areas. The most predominant types of social trails have been created by hiker access and tend to follow the fall line and can create erosion problems. Social trails show a need for a path to a desired recreational point of interest or access point. Some social trails may be recommended for improvement based on the need for access to these areas. Social trails that are redundant or cause erosion

by following bad alignments should be considered for closure and rehabilitation and will develop again if not closed and properly reclaimed.

### ***Mountain Bike Trails***

Mountain bike specific trails have changed the design of sustainable trail systems. A mountain bike trail typically has a rolling and curving flow. Mountain bikers prefer trails with low to moderate grades typically less than 10 percent slope for ascending and higher grades of 15 to 25 percent slope for more challenging descents over stable rock. Trail widths vary 18 to 24 inches for singletrack trails up to 48 inches for wider trails to facilitate emergency rescue. Rolling grade dips and contouring curves promote water drainage, tend to curb the higher speeds associated with descents, and provide an enjoyable ride to the mountain biker.

### ***Equestrian Trails***

Equestrian trails should be designed with wider corridors of 9 to 14 feet, gradual curves radius of 6 to 10 feet, and a more direct alignment. Minimum clearance for overhanging vegetation is 10 feet. Equestrian trails are designed for the enjoyment of the rider and the horse. An equestrian rider likes rides to scenic vistas, various loop and destination opportunities, and access to a water source. Low grades less than 10% and stable soils are desired for the most sustainable trail tread surface.

### ***Hard Surface Trails***

Hard surface trails can provide regional connectivity and provide opportunities for mobility-impaired users. They can be constructed of asphalt or concrete. The design should also incorporate a rolling design and crown to shed water and provide aesthetics. These trails provide a corridor for pedestrian transportation through sensitive riparian zones or the infrastructure for non-motorized travel along a transportation corridor.

### ***Accessible Trails***

Many parks and open space areas are constructing accessible trails that comply with American with Disabilities Act (ADA) guidelines as part of their trail systems. ADA accessible trails are stable surface trails that meet the certain guidelines. Accessible trails should allow relatively easy access for wheelchairs, strollers, and visually- and mobility-impaired users. Accessible trails can be constructed from concrete, asphalt or crusher fines to provide all-weather routes for all visitors. For the planning area, crusher fines will be most practical. Accessible trails should be designed and constructed at less than an 8 percent grade to promote accessible use. The trail tread should be free of obstacles, excessive outslopes, and cracks and gaps in the trail surfacing.

Currently no official standards exist for creating accessible trails. However, guidelines from the American with Disabilities Act Accessibility Guidelines (ADAAG), the Uniform Federal Accessibility Standards (UFAS), and the American National Standard Institutes (ANSI) provide good starting points. Also, the Forest Service has released the new *Accessibility Guidebook on Outdoor Recreation and Trails*. The Guidebook is a user-friendly guide to integrating accessibility in the outdoor recreation environment while maintaining the natural settings. Critical trail access features include grade, cross slope, width, surface, and vertical clearance.

Grades – The maximum grade for an accessible trail should be less than 8 percent for any distance. Grades can be greater than 8 percent, but rest areas should be placed at 50 feet maximum intervals above these higher grade sections. The average maximum grade shall be

permitted to be 8 percent where it is not feasible to comply. Where maximum grades exceed this recommendation, shorter sections with higher maximum grades are acceptable if rest areas are placed closer together and cross-slopes are less than 5 percent maximum.

Cross Slopes – Maximum cross slopes should not exceed 3 to 5 percent for any distance. Rolling dips and grade dips should be gradual. Rapidly changing grades or dips can flip chairs backwards. Cross slopes can exceed 5 percent for very short distances, but only if the running grades are kept to less than 5 percent and rest areas are provided.

Width – The minimum tread width for an accessible trail is 36 inches, but passing space should be provided at a width of 5 feet at least every 300 to 1,000 feet. The clearing width shall be permitted to be reduced to 32 inches where it is not feasible. Guidelines call for passing spaces to be a minimum of 60 inches wide by 60 inches high.

Surfaces – Surface material on an accessible trail must be firm enough to resist deformation by the indentation and rotation of wheels. Protruding obstacles should not exceed 1 inch and gap openings (cracks, etc.) should be less than 0.75 inches if oriented perpendicular to travel or less than 0.50 inches if parallel to the direction of travel. Openings in trail surfaces shall be of a size that does not permit passage of a 0.75 inch diameter sphere, except where it is not feasible. Tread obstacles shall be permitted to be 2 to 3 inches maximum where running grades and cross slopes are 5 percent or less or where it is not feasible. Edge protection along areas with any significant drop-off should be a minimum height of 4 inches and areas with greater drop-offs should have railings.

Vertical Clearance – A vertical clearance of 80 inches (doorway height) should be maintained for the entire trail tread. All protruding objects up to this height and below 27 inches should be kept clear. Low visibility and blocked lines of sights are considered to be hazardous.

### ***Sustainable Trails***

With respect to all types of recreational trails, “sustainability” can be defined as follows:

“Sustainability on natural surface trail corridors is defined as the characteristic of a travel surface to support currently planned and future uses with minimal impact to the natural systems of the area. Sustainable trails have negligible soil loss or movement while allowing the naturally occurring plant systems to inhabit the area, recognizing required pruning and eventual removal of certain plants over time. Sustainable trails will not adversely affect the naturally occurring fauna. Sustainable trail design will accommodate existing and future uses while only allowing appropriate uses. The sustainable trail will require little rerouting and minimal maintenance over extended periods of time.”

[January 1991, National Park Service; Rocky Mountain Region]

## ***TRAIL DESIGN***

### ***Clinometer Use***

Trails should be designed using a hand-held clinometer that can be purchased at any mapping or survey store. The instrument measures grades when flagging a potential trail route or reroute. Degrees and percent grade are measured inside the instrument. Trails are designed using percent grade. A

trail's grade is calculated by dividing total elevation change by the length of the trail, multiplied by 100. The overall trail grade for a sustainable trail should range between 8 to 10 percent. It is difficult to determine grade without using a clinometer. A trail designer uses a clinometer with a partner by determining their eye height in reference to their partner. When on a slope, position the zero level of your eye height on your partner and read the corresponding grade. If alone, tie flagging at your eye height and look back towards the flagging to determine the grade. Working with a partner is recommended.

### ***Grade Reversals***

Grade reversals are essential to trail sustainability. Grade reversals can be in the form of grade dips, water bars, steps, and knicks. A grade reversal collects a flow of water and diverts it off of the trail tread. If trails are constructed without grade reversals, water travels down the trail tread creating erosion channels and destroying long sections of the trail tread. Grade reversals give the trail a rolling effect that is enjoyable to the user.

### ***The Half Rule***

The Half Rule is a good design practice. Trails grades should never exceed half of the measured side-slope grade. If this occurs, water traveling down the hillside from above will intercept the trail and travel down the trail tread instead of sheeting over the critical edge of the trail. For example, if the side slope of a hillside measures 20 percent, do not design the trail with a maximum trail grade exceeding 10 percent. A poorly constructed trail tread grade of 15 percent will become the path for water, a trail grade of 8 percent will be sustainable and water will sheet over and down away from the trail tread. The half rule is especially useful on gentle slopes of less than 10 percent, where trail grades must be less than 5% to adhere to this rule.

### ***Trail Grades***

The recommended practice for constructing sustainable trails is to design the trail with an overall grade of 8 percent. Trail grades can exceed 8 percent when entering and exiting grade reversals, but overall should not exceed 8 percent. This is a general rule and trail tread conditions can vary, changing the maximum grade for sustainability. Highly erosive soils will decrease the maximum sustainable trail grade and solid rock will increase the maximum sustainable trail grade. On an 8 percent grade, a grade reversal or dip can usually have short pitches on the ramps that may exceed 15 percent. As long as these features are less than 50 feet in length, excessive grades will not cause any significant problems.

### ***Critical Points***

Critical points are located in two areas of a typical trail cross section. The top of the backslope where it blends into the natural topography above the trail tread, and the outer edge of the trail below the trail tread. These critical points are often overlooked when constructing a trail. Water flows down the fall line of a hillside and obstructions at critical points will divert water onto the trail or keep it from exiting the trail. Rounding the critical points above and below the trail will aid the shedding of water from the trail tread. The enhanced slope of the lower critical point will minimize the formation of an outer berm over the time the trail tread is compacting.

### ***General Design Guidelines of Sustainable Trails***

- ✓ Align trails using the natural topography of the land with a rolling contoured design.
- ✓ Align trails to ensure that water exits the trail tread often and in sheet flow pattern.
- ✓ Rolling grade dips should be the standard water drainage feature.
- ✓ Shared-use trails should be constructed with a 4 to 6 foot wide trail tread.

- ✓ Singletrack trails should be constructed with an 18 to 24 inch wide trail tread.
- ✓ The average maximum grade of the trail tread should not exceed 8 percent.
- ✓ The maximum grade of the trail tread should not exceed 12 percent.
- ✓ Trail grades should be checked with a clinometer during design and construction.
- ✓ Back slopes should be constructed between a 1:1 and 2:1 ratio.
- ✓ Trail tread outslopes should be 3 to 6 percent.
- ✓ Trail tread outslopes should be checked with a digital level.
- ✓ Adequate directional signage should be provided.
- ✓ Provide sufficient trail map information so that a user with average ability can find the trail head and have a reasonably good idea of where the trail leads.
- ✓ The trail system is signed well enough that an average user can follow the trail in all kinds of weather during its normal season of use.
- ✓ The trail stem has no unmarked unreasonable safety hazards that would not be expected by the average user of that type of trail during its normal season of use.
- ✓ Trail alignments are located in an area that minimizes its impact to native flora and fauna.
- ✓ Trail alignments do not unreasonably infringe upon the privacy of adjacent landowners.
- ✓ The trail system is reasonably free of logs, brush, rocks, man-made hazards, and other obstructions that would prevent or deter use by users unless specifically designed for as a particular use like a freestyle bicycle riding feature.
- ✓ Construction of bridges, ramps, retaining walls, steps and should be well designed, stable, and properly constructed to assume no additional risk to the user.

### ***Trail Signage***

Develop an effective trail signage system. The way a trail system is signed significantly affects the users. Signs help manage your trail system and minimizing liability by providing general information, regulations, warnings and interpretive information. Signage should be consistent with the information style already in use by the Town of Avon when appropriate. Appropriate signs should be located at trailheads, trail junctions, destinations, convergence points with roads and trails, and desired interpretive locations as necessary. Signs play a vital role in managing risk. Consider using warning signs to mark unexpected hazards. Signs can also be used to indicate trail difficulty, remind visitors of trail rules, encourage responsible use, and many other things.

#### Directional Signs

- ✓ Signs indicating route name, direction, mileage of trail, mileage to junctions, and elevation gain in section
- ✓ Signs indicating routes back to the trailhead and facilities

#### Regulatory Signs

- ✓ Accessible trails should be signed with appropriate symbols and warnings for both the trail users and motorist where the trail crosses or shares the road
- ✓ Stop signs should be placed at all road crossings for both trail and road users
- ✓ Cross walks should be well delineated on road surface
- ✓ Slow signs should be installed where trails approach hazards

### Interpretive Signs

- ✓ Signs should be spaced to keep information and visitor use dispersed
- ✓ Signs should be numeric to coincide with printed brochures, or
- ✓ Informative signs shall be placed along trail

### International Mountain Bicycling Association Rules of the Trail Signs

- ✓ Ride on open trails only
- ✓ Leave no trace
- ✓ Control your bicycle
- ✓ Always yield trail
- ✓ Never spook animals
- ✓ Plan ahead
- ✓ Respect other users
- ✓ Expect other users

### Suggested Rules of the Trail Signs

- ✓ Use at your own risk
- ✓ Be Courteous to other users
- ✓ Be Predictable
- ✓ Do not block the trail
- ✓ Keep right, except when passing
- ✓ Pass on the left
- ✓ Alert others when you are about to pass
- ✓ Slower traffic has the right of way
- ✓ Do not skid on the trails
- ✓ Bikes yield to all users
- ✓ Hikers yield to horses
- ✓ Bicyclists dismount in yielding to horses
- ✓ Respect trail closures
- ✓ Use a helmet and gloves when riding bicycles
- ✓ Respect private property

### ***Switchback Turn***

A switchback turn provides a level turning platform when reversing direction along a steep ascent or descent. The radius of the switchback turn is tight. They are difficult to construct, but are a necessary trail feature when trying to keep grades low on side slopes greater than 15 to 20 percent. The lower leg of a switchback turn is built up with rock and soils created while cutting in the trail tread, sometimes requiring a retaining wall. The upper leg is sloped inward and the lower leg is sloped outward. Grade reversals are constructed into and out of a switchback turn and water is diverted off the edge of the turning platform. Switchbacks that are constructed properly create a sustainable turning platform and stabilize the trail tread when elevation needs to be gained or lost. This type of turn concentrates water on the uphill edge to be drained off the end of the turn. Care should be used if these volumes of water are significant or have high velocity flow. Armoring may be needed to minimize any erosion associated with this water.

### ***Climbing Turns***

Climbing turns are constructed on gentler side slopes that do not exceed 15 to 20 percent. The radius of the climbing turn is wide and may be 20 feet or more. A short portion of the climbing turn travels up the fall line for a short distance. Grade reversals are constructed before and after the turn, and both legs of the trail are down sloped. This type of turn keeps most of the water in sheet flow, however a rut may form running down the apex of the turn.

### ***Insloped Turn***

Insloped turns are constructed around corners that displace the user to the edge of the trail. Mountain bikers like to negotiate turns around a banked corner. This is a unique feature designed along mountain bike trails. The construction of a berm keeps the user on the tread surface and keeps them from displacing soil to the outside edge of the trail.

### ***Rock Steps***

Rock steps are used to ascend and descend portions of trail with grades too steep for a natural trail tread surface. Rock is a natural building material that is resistant to erosion and excessive weathering. Rock structures generally require less maintenance than similar structures constructed from wood. Rock steps can also be used to provide the user with a stable platform to step when ascending or descending decomposed granite trail surfaces. Use large rocks embedded into the soil or interlock smaller rocks together to provide a solid step. Set them in a manner so that they do not move when used. Interlocking sequential steps provide a solid trail tread in steep areas with loose soils. Always crib your walls from the backside, and use the basket of fruit principle of filling the voids with successively smaller rocks from the bottom to top, filling small crevices with gravel or soil.

### ***Water Crossings***

There are numerous ways to align a trail over a drainage crossing. A natural swale crossing descends into and ascends out of the drainage below the contour. This will keep water from flowing along the trail tread when passing over it and prevent the drainage from running down the trail. Water should not flow up the trail tread; it will continue to travel downhill past the trail alignment. A natural swale crossing can be armored to reduce the amount of erosion and regrading required after major storm events. Armor the trail tread by placing rock to grade within the trail tread where the main drainage channel crosses over the trail. Culverts can be used for water crossings with larger flows or continued flow. Culverts come in a variety of sizes and materials. Install the culvert under the trail tread and armor the inlet and outlet with natural rock. Fill the trail tread up to grade with an appropriate material, wet the material, and compact. This allows water to flow under the trail instead of over the trail. Culverts are drier than natural swales and cost less than bridges.

### ***Simple Bridges, Boardwalks, Raised Treads, and Tread Armor***

Simple bridges can be constructed from natural materials. Rocks make excellent abutments. Peeled logs work well for the stringers provided they are not allowed to come into contact with the ground. Place two to three logs across the water crossing, use logs heavy enough to stay in place. Adze (shape) the tops of the logs flat to provide a level walking or riding surface or attach a decking of dimensional lumber or small diameter natural peeled logs.

Boardwalks are used to travel over wetlands. There are several designs for boardwalks and all of them tend to be costly. A natural material boardwalk can be constructed using rocks as abutments and natural

peeled logs for the stringers and decking. Turnpikes are constructed over seasonable wet terrain and boggy areas. A turnpike is constructed by raising the trail tread with natural materials between two peeled logs. Seasonably wet and boggy trail treads can also be armored with natural rock. Placement of a landscape fabric to prevent material co-mingling may be required. Place rocks close together to form a hardened trail pavement across the wet trail alignment.

## **TRAIL CONSTRUCTION**

### **Corridor Clearing**

Clearing the corridor is the first step to proper trail construction. Clearing vegetation from the trail corridor makes construction easier by exposing the terrain. The process consists of removing trees and trimming with chainsaws, hand saws, or pole trimmers. Only remove trees that are absolutely necessary. A good trail designer will not design a trail that requires the removal of large trees. Trails should be designed to avoid large trees and minimize environmental impacts.

Loppers and hand pruners work well to trim back brush and small vegetation within the corridor. Gas powered trimmers are effective along corridors with tall grasses. Distribute the slash at least 10-feet away from the trail corridor. Place the ends of cut limbs away from the trail and place debris no higher than 10-inches off of the original ground surface. Use debris from a newly cut trail corridor to cover old sections of trails that have been rerouted.

### **Trail Tread Excavation**

Trail alignments can be marked down the centerline or the downhill edge of the trail tread. The latter is the preferred method. The trail tread can be cut by hand with a Pulaski or cut with a machine designed to cut trail tread, the SWECO 480 trail dozer.

The excavation of the bench may prove to be the most important part of the construction process. Excavate the trail tread to the proper width and approximate outslope designed. Utilize the natural topography and build in grade reversals when cutting the trail tread.

Distribution of the soil and woody materials excavated from the trail tread is the labor intensive part of the trail construction process. Machine-cut trail treads form a large berm of debris that must be removed from the outer edge of the trail tread. Spoils can be disposed of in several ways. Vegetation below the trail tread should be raked free of loose soils to prevent it from drying and creating a trail alignment that reclaims quickly and is more aesthetic to the user. Spoils removal can be distributed by tossing material downhill in a fanning motion. Keep soils the recommended 10 feet away from the trail. Do not allow debris to catch on limbs of trees. This will not allow the debris to blend into the natural setting. Rake down the debris to create the important critical point below the trail. Excessive amounts of spoils can be removed with machinery like a mini-excavator or a trailer pulled behind an all-terrain vehicle (ATV). Spoils can also be transported to a rerouted alignment that requires reclamation.

### **Cutting the Backslope**

The backslope of a trail is often an overlooked component of trail construction. The backslope should be cut with a McLeod or a Pulaski to a 1: 1 ratio and blended into the natural topography above the trail. Cut the backslope to a stable angle depending on soil type and compact with the end of the McLeod. Deposit all spoils in the same manner as for the excavation process.

### **Shaping the Backslope**

The outslope of the trail tread can be shaped more precisely by small cuts with the McLeod. Gently form the outslope to a 3 to 5 percent grade. Grade dips and knicks can also be cut into the trail grade in this manner. Water entering onto the trail tread travels across the trail tread and exits over the critical point of the trail tread.

### **Compaction**

Compaction of the trail tread, backslope, outslope, and grade reversals can be accomplished by using the end of the McLeod. The use of a machine, like the SWECO 480, will compact the trail tread surface considerably during construction because of its excessive weight. A properly constructed trail tread exposes virgin soil that has good compaction capabilities. Avoid adding loose soil to the trail tread and attempting to compact it. Shaping virgin soil to the shape desired will form a stronger surface. Compaction of crusher fines trail is required during the construction process. Crusher fines that are wetted to near saturation and compacted provide a more sustainable trail tread. Use a vibratory compactor to compact crusher fines trails.

### **Grubbing**

During the final stages of trail construction, small roots can be cut out of the trail tread using axes and pruners. Gently remove roots and any woody materials within the trail tread surface. Distribute the spoils during the final raking process.

### **Finish Work**

Rake small debris from the trail tread and distribute in the same manner as described for the excavation of the tread and backslope. A tine harrow can be used on 48 inch wide trails to groom and rake the small debris from the trail surface. Reclaim the edges of the trail corridor. Place natural materials like pine duff and cut vegetation along exposed slopes. Place large rocks and stumps away from the trail tread, but in a manner to naturalize the area. The goal is to make trail users believe that the trail has been there for a long time and not newly constructed.

Abandoned portions of trail can be reclaimed using spoils, rocks, and logs derived from the construction of the reroute. Scarify the soil along the section of trail to be reclaimed by loosening it with the McLeod and Pulaski. This will make it easy for vegetation to regenerate along the tread. Make the old section of trail unappealing by making it difficult to negotiate. Reseed in areas that are difficult to reclaim. Most often, natural plants will often reclaim along the edge of the new trail eliminating the need to reseed the area.

## **TRAIL MAINTENANCE PROGRAM**

Avon does not currently have a formal trail maintenance program in place but should consider implementing one as part of developing their formalized trail program. Trails are a considerable investment, should be aggressively maintained and receive the highest priority, adequate support and a visual top down commitment by every level of management. A routine trail maintenance program will not only assist in protecting this investment, but also keep users safe from unreasonable hazards and risks. The paramount goal of trail maintenance is to provide a reasonably safe trail system that remains available to public use long after it is constructed. Public funds devoted to the safety of existing or proposed trails are a cost-effective investment because they can decrease the liability exposure of public

agencies. There are two terms commonly used to describe the level of safety or liability: hazard and risk. A hazard is a condition that creates a degree of risk. Risk is the probability of an injury or damage occurring from a specific hazard. A systematic risk management approach incorporating safety into the trail experience can be accomplished through routine and remedial inspection and maintenance to address safety concerns and trail hazards.

User safety is critical to trail design, operations and management. The Town should consider implementing a trail safety program that includes risk management assessments, inter-agency design reviews for all proposed trail improvements, and accident and crime reporting protocols. Town of Avon department managers, planners, designers and engineers, law enforcement, fire/rescue and field maintenance personnel should be consulted during the trail design and safety review process.

### **Trail Inspections**

An effective trail maintenance program begins with a means of locating and identifying problems. Trail inspections are integral to all trail maintenance operations. Periodic inspections and a routine maintenance schedule should be developed, implemented, and documented. Well-organized records, in particular a written safety inspection and maintenance log, may act to deter user allegations and lawsuits regarding negligence. Inspections should occur on a regularly scheduled basis, the frequency of which will depend on the amount of trail use, location, age, and the type of construction. For trails with moderate use, inspections should be performed monthly during the primary use months. For trails with low use bi-annual inspections beginning in the spring may be sufficient.

### **Volunteer Trail Inspector Program**

As expressed during community meetings and based on the willingness of local residents to provide trail support, Avon should consider implementing a Volunteer Trail Inspector Program. In the spring of each year, new volunteers can be recruited and given a four to six hour classroom introduction and training session. After the classroom training an equivalent length of time should be spent on training the volunteers about what a trail “should” look like through a field training session. Each volunteer should be asked to dedicate approximately four hours a month, and assign each a specific trail, or section of trail, to inspect on a monthly basis. These routine trail inspection assignments can be changed each month or as necessary. The Town can rely on the volunteer inspectors to patrol each and every mile of the trails system at least once a month during peak periods of use. Volunteers should be responsible for finding and reporting major new problems (a washout for instance), immediate safety concerns, missing signage, or vandalism. Situations which might compromise the safety of trail users can be dealt with the next working day to eliminate the concern. More detailed or remedial inspections can be left for Town of Avon staff to complete.

### **Staff Inspections**

Avon currently does not have a permanent Trails Specialists on staff. In this case, a dedicated staff person should be identified and properly trained as the Town’s year-round Trails Specialist and patrol the entire system at least three times a year, identifying the more technical needs of the system like possible reroutes. Routine and remedial maintenance projects can be noted by volunteers and staff on a Trail Maintenance and Safety Inspection form which asks for pertinent information. An example form is included in Table 1 on the next page. Maintaining a logbook and/or electronic database with completed



forms is a valuable and recommended management tool. Forms completed by volunteers and staff will serve as a documented record of trail maintenance work and safety inspections performed for risk management purposes. The example form provided can be revised and reproduced according to Avon's trail system configuration and management needs.

**Table 1 – Trail Maintenance and Safety Inspection Form**

<b>Trail Maintenance and Safety Inspection Form</b> This Trail Maintenance and Safety Inspection Form must be completed on each trail at specified frequencies set by the trail's assigned maintenance level.  Level 1 - Highest level of maintenance (bi-monthly) Level 2 - Moderate level of maintenance (monthly) Level 3 - Low level of maintenance (bi-annually) Level 4 - Minimal level of maintenance (annually)					
TRAIL NAME	INSPECTOR				DATE FORM COMPLETED
TRAIL MAINTENANCE LEVEL	TRAIL FEATURE STATUS	GOOD	FAIR	POOR	Notes/Drawings
Trailhead Structure					
Trailhead Signs					
Trailhead Maps					
Tread Problems, Ruts, Trenches, Outslope					
Erosion Problems, Gullying					
Slides and Sloughs					
Loose Soil in Trail Tread					
West Soil in Trail Tread					
Geotextile Showing					
Backslope					
Outslope					
Switchbacks					
Grade Dips					
Ditches					
Steps - Rock or Timber					
Retaining Walls					
Swales - Natural or Armored					
Culverts and Drains					
Corridor Cleaning - Trees, Limbs, Weeds, Rocks					
Obstacles					
Social Trails					
Reclaimed Trails					
Signage Repairs					
Fences/Railings Repairs					
Bridges					
Benches, Tables, Grills					
Other:					

## **Maintenance Activities**

Trail maintenance is integral to an agency's trail management responsibilities and should be performed on a continuous, scheduled basis. Various housekeeping or maintenance tasks include corridor cleaning, deberming, reshaping and addressing drainage problems that may arise.

Routine maintenance refers to the habitual routine of litter and trash removal, noxious weed control, sign replacement, or other regularly scheduled activities. Routine maintenance also includes minor repairs and replacements such as fixing potholes or replacing handrails.

Remedial maintenance refers to correcting problems as well as repairing, replacing, or restoring major trail components that have been damaged, destroyed, or have significantly deteriorated over time. Minor repairs such as repainting, deberming, or replacing signs may occur on a 5 to 10 year cycle. Major reconstruction items might occur over a longer period. Other examples of remedial maintenance include stabilization of an eroded sideslope, repaving a trail surface, or replacing a foot bridge and should be a consideration in formulating a long-term capital improvement plan.

### ***Corridor Cleaning***

Periodic tree trimming, pruning, and vegetation removal within the trail tread is required along most trail alignments. Keeping the trail corridor up to standards by clearing the trail corridor is important along multiple use trail systems. Trail corridor clearing prevents user conflicts and opens up the line of sight around corners for the trail user.

Many trails through grassy fields and sage brush flats tend to grow over with vegetation. The trail tread can become overgrown. Trimming, mowing, or cutting in a new trail tread may be needed to delineate the trail tread if left unattended. The trail alignment should be visible to the trail user. Tall grasses within the trail tread make the alignment difficult to negotiate and follow for many types of users. Some agencies have resorted to spraying herbicides on overgrown trails as a last resort. This is not recommended and can be avoided with regular trail inspections and routine maintenance.

### ***Drainage Solutions***

Trails that have been previously constructed eventually show signs of erosion and trail tread degradation from rainfall events and use. Several features can be implemented during trail construction to facilitate drainage and minimize future trail degradation and include rolling grade dips and knicks. Rock water bars and steps can also be constructed to divert water from the trail and stabilize the tread for the users but are only recommended in very limited situation where drainage was not properly address during initial trail construction.

### ***Deberming***

Even a well-designed bench cut trail becomes cupped along the centerline, especially on trails with equestrian use. Trail users compact a path down the center of the trail tread creating a berm to the outside. Water collects in the trail and travels down the trail tread creating an erosion problem. Trails in this condition need to be debermed and the downhill critical point needs to be reestablished. Cut down the berm with an appropriate tool and distribute the spoils down and away from the trail. Re-establish outslope of the compacted tread.

### ***Crowning a Flat Trail***

Flat trails become compacted with use and begin to collect water. A flat trail with this problem can be fixed by adding material and crowning the trail tread. Materials to crown the trail can be derived by constructing a ditch along one or both sides and then using this material to raise the tread. Appropriate crusher fines material may also be brought into the site and adequately wetted and compacted with equipment.

### ***Rerouting***

Trail segments that are constructed at poor grades, across certain areas of poor soils, or experience severe erosion should be considered for rerouting. Many times the construction of a well-designed reroute is less costly than continued maintenance down the existing poorly designed trail alignment. Rerouting trails is a common practice on existing alignments that are not sustainable but should be undertaken only by an experienced trailbuilder.

### ***Trail Construction and Maintenance Tools***

Certain tools are required to perform trail construction and routine and remedial trail maintenance tasks such as corridor cleaning or de berming. Table 2 on the following page presents a list of hand, power, and mechanized tools specifically used for building and maintaining trails. It also includes status of the Town's trail tool inventory. The type and amount of tools needed for on-going trail maintenance depends on the type and condition of trails within the system, operating budget limitations, and how much new trail construction and maintenance will be performed in-house.

**Table 2 – List of Trail Tools**

<b>List of Trail Tools</b>	<b>Status</b>	
	<b>Have</b>	<b>Need</b>
<b>Specially Designed Tools</b>		
Rolotape Measuring Wheel – Measures distances along a proposed or existing trail.	X	
Clinometer – Measures grades and side slopes of trail treads.		X
Global Positioning System (GPS) Unit – Plots waypoints and tracks along existing or proposed trails.	X	
Flagging Tap and Pin Flags – Used to mark the trail alignments during field layout.	X	
<b>Hand Tools</b>		
Pulaski – The preferred tool for cutting woody vegetation out of the trail tread. The head has a grub hoe on one side and an axe on the other.		X
McLeod – This is probably the most versatile trail tool and is used for cutting backslopes, shaping the trail, and compacting soil.		X
Pick Mattock – Used for digging out larger rocks and roots and for cutting the trail tread.	X	
Rock Bar – Pries heavy boulders and logs from the ground. Used as levers, two make moving large rocks easier.	X	
Garden Rake/Landscape Rake – Used to move spoils, small rocks, and debris.	X	
Hand Pruner/Lopper/Axe – These tools are used to trim small branches and roots.	X	
Hand Saw – Trims branches from the trail corridor.		
Wheel Barrow – Used to move large quantities of spoils, rock, or debris.	X	
Shovel – Loosens/moves small amounts of dirt, digs ditches, and cleans grade dips.	X	
Drawknife – Peels bark from a log which increases the life of the log.	X	
<b>Power Tools</b>		
Chainsaw – Typically the first tool used to begin trail corridor clearing.		X
Power Weed Cutter/Mower – Cuts grasses and weedy vegetation in the corridor.		X
<b>Mechanized Tools</b>		
SWECO 480 Trail Dozer – Specialized 48-inch wide trail building bull dozer with hydraulic 6-way tilt blade, rippers, and a hydraulic tool attachment.		X
Mini Excavator with Thumb – Cuts backslopes, moves large rocks, and distributes spoils.	X	
Front End Loader – Places crusher fines on surfaced trails and moves large quantities of rock and materials.	X	
Motorized Carriers and Power Wheelbarrows – Places crusher fines on surfaced trails and moves large quantities of rock and materials.	X	

## AVON'S RECREATIONAL TRAILS

Currently, Avon's recreational trails are primarily "social trails". They are an informal system of natural surface trails as shown on maps 1 and 2, Appendix A. There are two existing trailheads in the Wildridge Subdivision that provide access to trails on the west side of the system. One is located off June Creek Spur and the other is located off Old Trail Road in the Wildridge Pocket Park. Access points are also located off Beaver Creek Point, Saddle Ridge Loop, Nottingham Road and off June Creek Road in the Singletree Subdivision. The Buck Creek and Buffalo Ridge trailheads provide access to trails on the east side of the planning area.

Most trails within the planning area have a southern aspect providing spectacular vistas of the Eagle River Valley, the Sawatch Mountain Range of the Holy Cross Wilderness Area, and Beaver Creek Ski Resort to name a few. The project area is within the Colorado Division of Wildlife Management Area 541 (Deer and Elk Winter Range) where the emphasis for management is to provide adequate amounts of quality forage, cover and solitude for deer, elk, and other species while on winter range.

### Background

On August 8, 2006, the Town of Avon initiated the public involvement process to gather information on Avon's recreational trails by hosting a community Open House. The goal was to review existing trails and collect data to better understand trail use. Based on the input received from property owners and trail users collected through voting exercises and questionnaires, there is convincing evidence that the public would like to see creation, maintenance and monitoring of a formalized trail system. Trail use information collected also indicates that residents use trails primarily for hiking/snowshoeing, pet walking, and mountain biking. There is also a clear demand for mixed-use trails including motorized use.

The Holy Cross Ranger District of the White River National Forest is working in cooperation with the Town of Avon, Berry Creek Metro District, and the Singletree Property Owners Association to improve non-motorized recreation opportunities north of I-70 and west of Metcalf Road in West Avon (April 2007 US Forest Service Decision Memo). The area currently has a network of old roads and trails that are not part of the US Forest Service transportation system. All parties recognize that it is mutually beneficial to work in partnership to maintain quality trail recreation experiences, protect wildlife habitat, preserve open space, provide volunteer stewardship opportunities, and build grass-root constituencies to care for National Forest Service Lands. To this end, a Challenge Cost Share Agreement and accompanying Annual Operating Plan was entered into by these parties on July 7, 2007. The agreement articulates the working arrangement between all parties for planning, developing, and maintaining a recreational trail system on Forest Service lands between the Singletree Subdivision and the Town of Avon. This working arrangement includes specific aspects of trail management including signing, development of sustainable trails, trail maintenance, stabilization and revegetation of degraded areas, and education and law enforcement. Avon's future trail projects have been prioritized in part based on the terms of the 2007 Forest Service Decision Memo and Annual Operating Plan.

On August 14, 2008, a follow-up public meeting with residents of the Wildridge community was held to inform them of progress with respect to formalizing the trail system and prioritizing the various trail and trailhead projects. Maps showing the current trail system and proposed future trails were presented to the attendees. Priorities and plans for trail improvements and construction were discussed with the group.

On August 22, 2008, the Eagle County Board of County Commissioners put forth a new release to unveil a major land protection initiative for more than 2,100 acres of land in the greater mid-valley area that

would permanently protect it for public benefit through a creative, multi-party land exchange involving five partners – Eagle County, the Town of Avon, the State Land Board, the US Forest Service and the Eagle Valley Land Trust. Of this acreage, two properties now owned by the US Forest Service would be conveyed to the town of Avon as part of its open space program. One property is the 470-acre West Avon parcel between the Wildridge and Singletree subdivisions which has been a target for development for many years. Conservation easements held by the Eagle Valley Land Trust would be placed on these lands to assure this acreage continues to be permanently protected, publicly-accessible open space and provide significant wildlife habitat and eliminate the threat of land fragmentation.

## **Location and Resources of the Project Area**

The Town of Avon is located approximately 130 miles west of Denver, Colorado along Interstate 70 and the Eagle River on the western slope of the Rocky Mountain continental divide. The project planning area is shown in Figure 1 (see page 1).

### ***Topography***

The sedimentary layers surrounding the Eagle River Valley have been eroded to form a dendritic finger-like drainage pattern. Soft shale layers create rolling landforms while the more resistant limestone and sandstone form sharp ridges and steep bluffs high above the river valley. When moving up in elevation, the topography yields a mountain environment and characterizes the general topography in the area.

### ***Soils***

Soils in the area vary and range from coarse (sand/gravel) to fine-textured (clay/silts). Mountain and foothill regions are typically well-drained and coarse-textured to rocky and/or sandy. Shrub land regions are typified by deep, fine-grained clayey and silty soils.

### ***Vegetation***

Elevation largely determines what type of biotic communities one may find in a given location, as temperatures generally decrease and precipitation increases as one moves upward. The biotic communities prevalent from 7,500 feet to 9,500 feet elevation in the project area are a mixed-conifer Montane forest dominated by Douglas-fir, interspersed with stands of Aspen on north and west facing slopes and a mixture of shrub lands and pinion-juniper woodlands on south and east facing aspects and at the lower elevations. Riparian/wetland ecosystems are found along the Buck Creek and Metcalf Creek drainages.

### ***Climate***

On average, the Eagle County seat (Eagle) receives 11 inches of rainfall and 54 inches of snowfall annually. Humidity is low. Average temperatures range from 73 degrees Fahrenheit in summer to 34 degrees Fahrenheit in the winter.

## **Sustainability Assessment**

A sustainability assessment of Avon's recreational trails was conducted in August 2008. The outcome revealed that large portions of the Avon/Singletree Trail and the Saddle Ridge Trail are primarily situated on steep and erosive fall line ridges. As seen in photographs on pages 23 through 28 and 41 through 45,

these trails are badly degraded, have poor overall sustainability, as they violate the half rule and maximum sustainable grade principles of trail construction, and are prone to continued moderate erosion exacerbated by users. Under fall line conditions, surface water runoff flows down the trail versus sheet flowing across it. As the grade steepens, gravitational force accelerates runoff water. Acceleration increases water velocity which strips away valuable top soil and the trail's tread during each precipitation event. This results in more and more rocks being exposed to the surface. Due to the unsustainable configuration, the situation worsens over time and the trail becomes more eroded and rocky and more technically challenging for most pedestrian and bicycle users to navigate. Installing drainage features like water bars or cutting knicks or adding rolling grade dips to mitigate these conditions is time consuming and ill-advised as it does nothing more than provide a short term band-aid remedy to the situation. Rerouting the trail, or sections of the trail, is typically a more viable long-term management strategy and cost savings measure over time.

A network of social trails was observed in the Forest Service land immediately south of the Wildridge Subdivision between the Saddle Ridge Trail and the Beaver Creek Lookout Trail. Most of these trails are not sustainable and have impacted the natural resources and are confusing to novice and visiting trail users. A map of this area showing those social trails recommended for closure is provided in map 3, Appendix A. There are also some social trails in the Pocket Park Loop area that are not sustainable and recommended for closure. In addition to closing these trails, they should be reclaimed which entails breaking up compacted soil manually or mechanically to improve soil porosity followed by revegetation of the area with native grasses and shrubs.

The Beaver Creek Lookout Trail and Buck Creek Trail require corridor cleaning and limited reconstruction to reshape the backslope and de berm and reestablish the tread's outslope to facilitate drainage and resurrect sustainable conditions.

### **Recommended Capital Improvement Program**

Table 3 presents a summary of Avon's recreational trails capital improvement projects, page number location of each project, work element, description of work, and estimated costs. A discussion of the capital improvement trail projects with individual cost estimates presented in Tables 4 through 9 follows.

**Table 3 – Recreational Trails Capital Improvement Projects Summary\***

<b>Page Number</b>	<b>Work Element</b>	<b>Description of Work</b>	<b>Estimated Costs</b>
p. 23	Avon/Singletree Trail/Nottingham Road Trailhead	Design and construct new Nottingham Road Trailhead. Reconstruct ¼ mile of trail and permanently close and reclaim ¾ mile of trail. Construct new trailhead off Nottingham Road.	\$148,500
p. 30	Beaver Creek Lookout Trail	Construct new trailhead and terminus overlook, close and reclaim ¼ mile of social trail, and limited reconstruction of existing trail.	\$250, 328
p. 37	Metcalf Creek Trail	Design and construct approximately 3 ½ miles of new singletrack trail and a new trailhead with parking and toilets.	\$243,278
p. 41	Saddle Ridge Trail	Closure and reclamation of ¼ mile of social trails, reconstruct ¼ mile of existing trail, and construct ½ mile of new spur trail to Beaver Creek Lookout trail and construct new access point.	\$37,221
p. 47	Buck Creek Trail	Reconstruct ¼ mile of trail and design and install new footbridge.	\$54,649
p. 49	Interior Connecting Trails	Closure and reclamation of ¼ mile of existing social trails and construction of ½ mile of new singletrack trail, access point and amenities.	\$32,551

**Total = \$766,527**

*\* The projects listed above are not prioritized into a particular order. Project scheduling will be done based on input from stakeholders and available funding.*

***Avon/Singletree Trail/Nottingham Road Trailhead Project***

Current Status:	Existing Trail; Proposed New Trailhead
Trailhead/Access Point:	The June Creek access point located off June Creek Road in Singletree and the proposed Nottingham Road trailhead
Trail Surface:	Natural
Tread Width:	Varies from singletrack to doubletrack (18 to 56 inches)
Length:	1.4 miles

This existing trail primarily runs east to west and connects Avon to the Singletree Subdivision. As seen in the accompanying photographs, a significant portion of the trail is aligned along what appears to be an old utility service road. The trail is open to pedestrian, equestrian, and mountain bicycle users between April 16<sup>th</sup> and December 14<sup>th</sup> and closed to all uses during the winter from December 15<sup>th</sup> to April 15<sup>th</sup>. An area adjacent to the trail is referred to as “Motorcycle Flats” and is located south and west of the trail’s junction with the Saddle Ridge Trail. Motorized use is prohibited at anytime in this area or on the trail. Approximately one-quarter mile section of the west end of the trail is within the Singletree Subdivision boundary. Overall, the trail is in fair to poor condition and lacks adequate signage. A single trailhead sign was observed at the June Creek access point in the Singletree Subdivision. An assessment of the trail revealed the majority of it is not in sustainable condition. The following photographs reveal many sections that are badly eroded, most of which fall along the utility service road. The trail is difficult to navigate on foot or by mountain bicycle as it is steep, rocky and rutted out in places. Several sections have washed out areas within the length of the trail’s tread. When attempting to access this trail from Nottingham Road, it is not obvious as trail signage is absent.

**Avon/Singletree Trail Photos**



Looking east from Singletree Subdivision at the Avon/Singletree Trail and June Creek Trail access point



Looking west at Motorcycle Flats below the Avon/Singletree Trail seen in upper right corner



Looking west at Avon/Singletree Trail from the Nottingham Road access point



Looking east towards the Nottingham Road access point



Looking east at an eroded and washed out section of the Avon/Singletree Trail



Looking east at one of the more sustainable sections of the trail



Looking south at a badly eroded and washed out section of the trail



Looking west at Singletree Subdivision in background from Avon's western property boundary



Looking northwest at one of the most eroded sections of the trail



Looking southeast down the adjoining section of eroded trail as seen in the previous photo

New construction of the Nottingham trailhead and one-quarter mile reconstruction of sections of the existing trail are identified for 2009. In addition, approximately three-quarters of a mile of trail are recommended for permanent closure and reclamation. The project's construction cost estimate is presented in Table 4. The US Forest Service recommends reconstructing portions of the trail to stabilize the route (US Forest Service Decision Memo, April 2007). In agreement with this recommendation, approximately one-half mile of trail should be reconstructed to begin the process of trail stabilization. At minimum, when reconstructing the trail, specifications and principles for sustainable shared-use trail construction and maintenance and the minimum criteria for designated trails should be implemented. Reconstruction efforts should begin from Nottingham Road and continue west as funding permits. By reconstructing the initial eastern portion of trail first, it will provide users with a close-in sustainable trail experience. The trail system should be signed well enough so that an average user can follow the trail during its normal season of use. Depending on annual priorities and availability of trail funding, the process of trail assessment, reconstruction, and closure/reclamation should occur on a biennially cycle. Repeating this process over the next four to six years will restore much of this trail to a more sustainable and user-friendly condition. For all trails in the system, a periodic maintenance and safety inspection program should be set up to evaluate and correct trail deficiencies at specified intervals. Typically, inspections occur on mountain trails at least monthly from May through September and some times more frequently depending on level of use and availability of funding and staff.

**Table 4 – Avon/Singletree Trail/Nottingham Road Trailhead Capital Improvement Project Cost Estimate**

<b>Trail Name:</b>	<b>Avon/Singletree Trail</b>
<b>Project Type:</b>	Trail Reconstruction/Reclamation/New Trailhead
<b>Project Description:</b>	Reconstruct approximately 0.5 miles of trail necessary to stabilize the route for multi-use. Also includes closure and reclamation of 0.75 miles
<b>Approximate Length:</b>	1.4 miles
<b>Trailheads/Access Points:</b>	Construct new trailhead off Nottingham Road

<b>Trail Reconstruction/Reclamation</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Reconstruction (by hand)	\$12,540.00	2,640	\$4.75	Linear Foot
Closure and Reclamation (by hand)	\$17,028.00	3,960	\$4.30	Linear Foot
Revegetation	\$8,500.00	1	\$8,500.00	Lump Sum
<b>Subtotal</b>	<b><u>\$29,568.00</u></b>			
Mobilization (12%)	\$3,548.16			
Administration (3%)	\$887.04			
<b>Estimated Total</b>	<b><u>\$34,003.20</u></b>			

<b>New Trailhead Construction - Nottingham Road Trailhead</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Plans/Permits	\$3,500.00	1	\$2,500.00	Lump Sum
Base/Subgrade Preparation	\$10,500.00	1	\$10,500.00	Lump Sum
Curb and Gutter	\$13,000.00	200	\$65.00	Linear Foot
Asphalt Paving	\$220.00	1	\$220.00	Ton
Drainage Construction	\$12,500.00	1	\$12,500.00	Lump Sum
New Trailhead Amenities (signs, benches, curb stops, etc.)	\$9,500.00	1	\$9,500.00	Lump Sum
Toilets	<u>\$24,500.00</u>	1	\$24,500.00	Lump Sum
<b>Subtotal</b>	<b><u>\$73,720.00</u></b>			
Mobilization (12%)	\$8,846.40			
Architecture and Engineering (15%)	\$11,058.00			
Project Management (10%)	<u>\$7,372.00</u>			
<b>Estimated Total</b>	<b><u>\$100,996.40</u></b>			

<b>PROJECT ESTIMATE SUBTOTAL</b>	<b><u>\$134,999.60</u></b>
<b>CONTINGENCY (10%)</b>	<b><u>\$13,499.96</u></b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b><u>\$148,499.56</u></b>

<b>Assumptions</b>
Construct one (1) 50' x 100' asphalt trailhead/parking area (3-5 car)
Storm Water Pollution Prevention Plan preparation
Base/subgrade preparation includes clearing and grubbing
Construct one (1) two-hole concrete vaulted toilet (no water)
Does not include any utility relocations

***Beaver Creek Lookout Trail Project***

Current Status: Existing Trail; Proposed New Trailhead  
 Trailhead/Access Point: There are three access points for this existing trail located in Wildridge Subdivision off Beaver Creek Point. The Saddle Ridge access point also provides indirect entry to the trail.  
 Trail Surface: Natural  
 Tread Width: Varies from singletrack to double track (18 to 56 inches)  
 Length: 0.5 miles

The Beaver Creek Lookout Trail primarily runs north and south and has an undefined connecting trail to the Saddle Ridge Trail. Much of the trail appears to be aligned on an old service road. Several social trails connect this trail and to surrounding points of interest and other trails in the area. Although each trail access point has a no parking sign and a Pet Pick-up station, the trail currently has three informal access points off Beaver Creek Point. The trail is also accessible from the Saddle Ridge Trail access point off Saddle Ridge Loop in the Wildridge Subdivision. The Beaver Creek Overlook Trail is open to pedestrian, equestrian, and mountain bicycle users year around. Dogs must be on a leash between December 15 and April 14 to protect deer and elk from harassment while on their winter range. Overall the trail is in good to fair condition with a couple of small sections of marginally sustainable trail.

**Beaver Creek Lookout Trail Photos**



Looking south at northern Beaver Creek Lookout Trail access point and proposed new trailhead location



Looking southwest at middle Beaver Creek Lookout Trail access point and trail in the background



Looking southwest at southern Beaver Creek Lookout Trail access point off Beaver Creek Point



Looking south along the Beaver Creek Lookout Trail from northern access point - middle access point seen adjacent to the road



Looking north along the Beaver Creek Lookout Trail and at access points off Beaver Creek Point



Looking southwest along the Beaver Creek Lookout Trail from the middle access point area



Looking south along the Beaver Creek Lookout Trail at its terminus on the point in the middle of the photograph



Looking southeast from the Saddle Ridge Trail highpoint at Beaver Creek Lookout Trail on the ridge line

Limited reconstruction to define the terminus and connector to the Saddle Ridge Trail is recommended by the US Forest Service. Future plans call for construction of a new trailhead on Forest Service lands at the midway point of Beaver Creek Point on the west side of the road. The trailhead is to be constructed for three to five cars, surfaced, and signed for no overnight parking (US Forest Service Decision Memo, April 2007). Construction of an overlook shelter should be considered for the trail’s terminus and can provide a location for educational and interpretive opportunities. In addition to limited trail reconstruction and construction of the new trailhead and overlook terminus, approximately one-quarter mile of adjacent social trails are recommended for closure and revegetation and are presented on map #3 in Appendix A. At minimum, when reconstructing the trail and its terminus and connector to the Saddle Ridge Trail, specifications and principles for sustainable shared-use trail construction and maintenance and the minimum criteria for designated trails should be implemented. A future consideration for this trail would be to reconstruct it for accessible use by mobility-impaired users according to the American Disabilities Act Accessibility Guidelines. Typically, this involves surfacing the trail with crusher fines, asphalt or concrete and ensuring the trailhead meets ADA guidelines.

**Table 5 – Beaver Creek Lookout Trail Capital Improvement Project Cost Estimate**

<b>Trail Name:</b>	<b>Beaver Creek Lookout Trail</b>			
<b>Project Type:</b>	Trail Closure/Reclamation & New Trailhead and Overlook Construction			
<b>Project Description:</b>	Construct new trailhead and terminus overlook/close and reclaim 0.25 miles of nonsustainable social trails/limited trail reconstruction			
<b>Approximate Length:</b>	0.50 miles			
<b>Trailheads/Access Points:</b>	Construct new trailhead off Beaver Creek Point			
<b>Trail Reconstruction/Reclamation</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Reconstruction (by hand)	\$2,850.00	600	\$4.75	Linear Foot
Closure and Reclamation (by hand)	\$5,676.00	1,320	\$4.30	Linear Foot
Revegetation	\$8,500.00	1	\$8,500.00	Lump Sum
<b>Subtotal</b>	<b>\$17,026.00</b>			
Mobilization (12%)	\$2,043.12			
Administration (3%)	\$510.78			
<b>Estimated Total</b>	<b>\$19,579.90</b>			
<b>New Overlook Construction</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Base/Subgrade Preparation	\$10,500.00	1	\$10,500.00	Lump Sum
Construct Concrete Pad	\$32,400.00	1,200	\$27.00	Square Foot
Construct Shade Shelter	\$36,000.00	1	\$36,000.00	Lump Sum
Interpretive Display	\$8,500.00	1	\$8,500.00	Lump Sum
Overlook Amenities (picnic table/signs, etc.)	\$4,500.00	1	\$4,500.00	Lump Sum
<b>Subtotal</b>	<b>\$91,900.00</b>			
Mobilization (12%)	\$11,028.00			
Architecture and Engineering (15%)	\$13,785.00			
Project Management (10%)	\$9,190.00			
<b>Estimated Total</b>	<b>\$112,118.00</b>			
<b>New Trailhead Construction - Beaver Creek Point</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Plans/Permits	\$3,500.00	1	\$3,500.00	Lump Sum
Erosion Control BMPs	\$4,500.00	1	\$4,500.00	Lump Sum
Base/Subgrade Preparation	\$10,000.00	1	\$10,000.00	Lump Sum
Curb and Gutter	\$13,000.00	200	\$65.00	Linear Foot
Asphalt Paving	\$420.00	2	\$210.00	Ton
Drainage Construction	\$12,000.00	1	\$12,000.00	Lump Sum
New Trailhead Amenities (signs, curb stops, etc.)	\$9,500.00	1	\$9,500.00	Lump Sum
Toilets	\$24,500.00	1	\$24,500.00	Lump Sum
<b>Subtotal</b>	<b>\$77,420.00</b>			
Mobilization (12%)	\$9,290.40			
Architecture and Engineering (15%)	\$11,613.00			
Project Management (10%)	\$7,742.00			
<b>Estimated Total</b>	<b>\$106,065.40</b>			

**Table 5 (continued) – Beaver Creek Lookout Trail Capital Improvement Project Cost Estimate**

<b>PROJECT ESTIMATE SUBTOTAL</b>	<b>\$237,763.30</b>
<b>CONTINGENCY (10%)</b>	<b>\$12,564.53</b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b>\$250,327.83</b>

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<b>Assumptions</b>
Construct one (1) 50' x 100' asphalt trailhead/parking area (3-5 car)
Storm Water Pollution Prevention Plan preparation
Base/Subgrade preparation includes clearing and grubbing
Construct one (1) two-hole concrete vaulted toilet (no water)
Does not include any utility relocations
Construct one (1) 40' x 30' interpretive overlook/shade structure (roof only)
No water or utilities anticipated

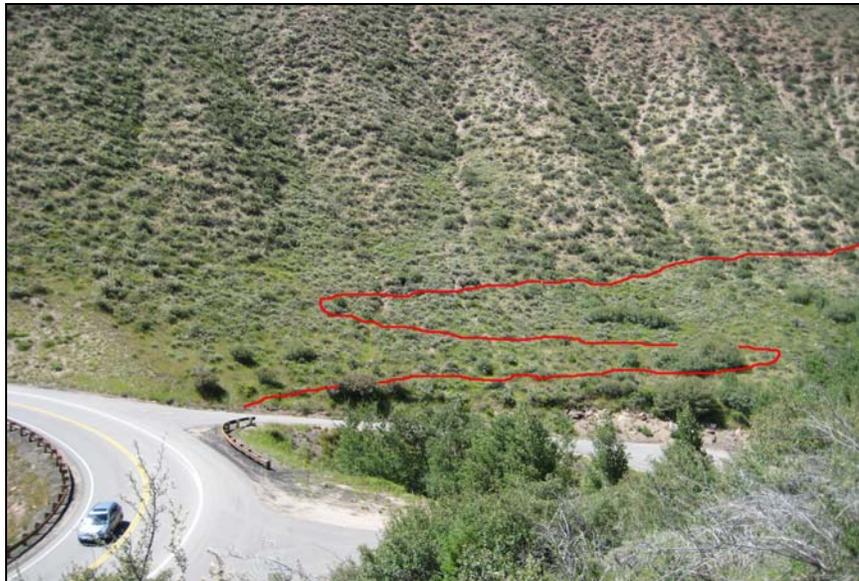
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### Metcalfe Creek Loop Trail Project

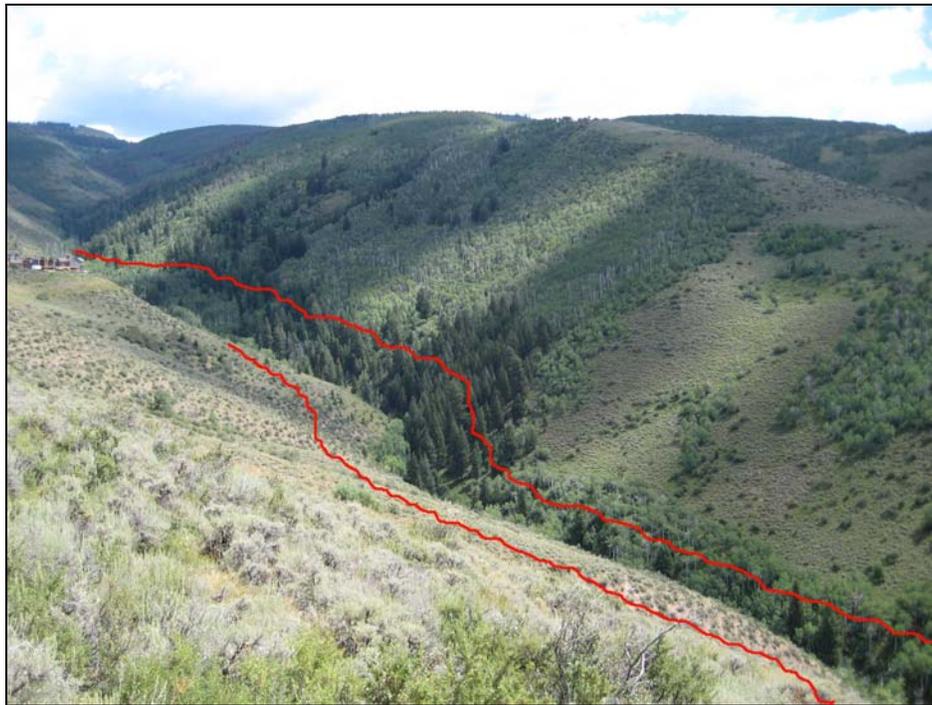
Current Status:	Proposed New Trail and Trailhead
Trailhead/Access Point:	The vehicle turnaround area at the Wildridge Road and Metcalfe Road intersection offers a good location for a trailhead.
Trail Surface:	Natural
Tread Width:	Singletrack (18 to 24 inches)
Length:	Estimated at 3.0 miles

Metcalfe Gulch holds the greatest potential for new trail construction within the Wildridge Subdivision. The conceptual trail route is shown on map #1 in Appendix A and in the following photographs. A new rolling contour, singletrack, loop trail constructed along the north and south facing slopes of the gulch is possible and offers the most sustainable alignment. The proposed trail will offer users approximately three miles of varied ecosystems through mixed stands of aspen and conifer forests on north facing slopes and sagebrush and mountain mahogany on the south facing aspects. The trail will also provide unique views of the creek and riparian ecosystem. A small foot bridge is needed to cross the head of Metcalfe Creek east of Coyote Ridge road. Eventually, this trail will connect with the proposed Coyote Loop Trail and form a looped system of trails enabling users to plan different routes and trail experiences. A new three to five car trailhead/parking area with concrete vault toilet is proposed at the vehicle turnaround area at the junction of Wildridge Road and Metcalfe Road. From the trailhead, users will have two different options for direction of travel depending on which aspect they choose. The warmer south facing section of trail should provide more snow-free user days. In the summer, users can choose to take the cooler north facing leg through the trees which will offer some shade and relief from the heat. Construction of the Metcalfe Creek Loop Trail and new trailhead should begin as soon as funding is available to initiate the planning phase and subsequent trail layout and design task. Planning and design for a new trailhead/parking area and associated amenities like toilets can take several months and should be completed before the start of the summer construction season.

#### Proposed Metcalfe Creek Loop Trail Photos



Looking north at the proposed Metcalfe Creek Loop Trail alignment from proposed trailhead



Looking east at the proposed Metcalf Creek Loop Trail alignment



Looking south at the proposed south side Metcalf Creek Loop Trail alignment originating from proposed trailhead



Looking northwest across Metcalf Gulch at proposed Metcalf Creek Loop Trail (bottom) and proposed Coyote Ridge Loop Trail (top)



Looking southwest down Metcalf Gulch at the proposed Metcalf Creek Loop Trail alignment and proposed Coyote Ridge Loop Trail (upper right)

**Table 6 – Metcalf Creek Trail Capital Improvement Project Cost Estimate**

<b>Trail Name:</b>	<b>Metcalf Creek Trail</b>
<b>Project Type:</b>	New Trail and trailhead construction
<b>Project Description:</b>	Construct new looped system of singletrack trails along gulch
<b>Approximate Length:</b>	3.5 miles
<b>Trailheads/Access Points:</b>	Construct new trailhead at Wildridge Road/Metcalf Road

<b>New Singletrack Trail Construction</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Trail Design and Layout	\$3,800.00	1	\$3,800.00	Lump Sum
Trail Construction	\$76,692.00	18,480	\$4.15	Linear Foot
Bridge Design and Construction	\$14,500.00	1	\$14,500.00	Lump Sum
Trail Amenities (signs, benches, etc.)	\$9,500.00	1	\$9,500.00	Lump Sum
<b>Subtotal</b>	<b>\$104,492.00</b>			
Mobilization (12%)	\$12,539.04			
Administration (3%)	\$3,134.76			
<b>Estimated Total</b>	<b>\$120,165.80</b>			

**Assumptions**  
 18" - 24" wide trail construction using hand tools. Includes corridor clearing and grubbing.  
 Construct one (1) 5' x 25' treated lumber foot bridge with railings to cross the creek at top of gulch.

<b>New Trailhead Construction - Metcalf Creek Trailhead</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Plans/Permits	\$3,500.00	1	\$2,500.00	Lump Sum
Base/Subgrade Preparation	\$10,500.00	1	\$10,500.00	Lump Sum
Curb and Gutter	\$13,000.00	200	\$65.00	Linear Foot
Asphalt Paving	\$220.00	1	\$220.00	Ton
Drainage Construction	\$12,500.00	1	\$12,500.00	Lump Sum
New Trailhead Amenities (signs, benches, curb stops, etc.)	\$9,500.00	1	\$9,500.00	Lump Sum
Toilets	\$24,500.00	1	\$24,500.00	Lump Sum
<b>Subtotal</b>	<b>\$73,720.00</b>			
Mobilization (12%)	\$8,846.40			
Architecture and Engineering (15%)	\$11,058.00			
Project Management (10%)	\$7,372.00			
<b>Estimated Total</b>	<b>\$100,996.40</b>			

<b>PROJECT ESTIMATE SUBTOTAL</b>	<b>\$221,162.20</b>
<b>CONTINGENCY (10%)</b>	<b>\$22,116.22</b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b>\$243,278.42</b>

**Assumptions**  
 Construct one (1) 50' x 100' asphalt trailhead/parking area (3-5 car)  
 Storm Water Pollution Prevention Plan preparation  
 Base/Subgrade preparation includes clearing and grubbing  
 Construct one (1) two-hole concrete vaulted toilet (no water)  
 Does not include any utility relocations

### Saddle Ridge Trail

Current Status:	Existing Trail; Proposed New Access Point
Trailhead/Access Point:	The only direct access point for this trail is located in Wildridge subdivision off Saddle Ridge Loop. The Beaver Creek Lookout Trail access points offer indirect access to the trail.
Trail Surface:	Natural
Tread Width:	Varies from singletrack to doubletrack (18 to 56 inches)
Length:	1.3 miles

This trail primarily runs north to south from the Saddle Ridge access point off Saddle Ridge Loop in the Wildridge subdivision and terminates at the junction of the Avon/Singletree Trail. The trail is open to pedestrian, equestrian, and mountain bicycle users year around. Dogs must be on a leash between December 15 and April 14 to protect deer and elk from harassment while on their winter range. With the exception of the first 700 linear feet beginning at the Saddle Ridge access point, the remainder of the trail is in poor condition and not sustainable due to its location along the ridge top and vertical alignment up and down the fall line. As seen in the following photographs, much of the lower sections of the trail are so severely eroded and rocky that pedestrian and mountain bicycle travel is technically difficult and very challenging for most users. Typically, what occurs to a trail in this condition is that users begin to travel off the existing trail surface resulting in the formation of parallel social trails which exacerbates erosion and rocky conditions. The trail tread also tends to widen or braid over time thereby causing further damage to the surrounding natural resources.

#### Saddle Ridge Trail Photos



Looking south at Saddle Ridge Trail access point from Saddle Ridge Loop



Looking northeast along the trail towards Saddle Ridge access point and Saddle Ridge Loop



Looking south at junction of Saddle Ridge Trail (right) and Beaver Creek Lookout Trail (left)



Looking southwest at the high point of Saddle Ridge Trail and junction of a social trail (left)



Looking north at an eroded section of the Saddle Ridge Trail just below its high point



Looking north at the high point of the Saddle Ridge Trail along an eroded section



Looking south down an eroded section of the trail which follows the ridge line



Looking north just below the furthest point of the ridge line as seen in the photo above

Reconstruction of the trail beginning at the Saddle Ridge access point and eventually terminating at the junction of the Avon/Singletree Trail is recommended. Additionally a connector trail needs to be defined that connects to the Beaver Creek Lookout Trail (US Forest Service Decision Memo, April 2007). Two possible connector trails currently exist. However, the most sustainable option is proposed and the other is recommended for closure as depicted on map #3 in Appendix A. Approximately one-quarter mile of the Saddle Ridge Trail and one-quarter mile of the connector trail to Beaver Creek Lookout Trail should be reconstructed to begin the process of trail stabilization. Reconstruction of this trail should be performed by an experienced professional trail builder to ensure a sustainable outcome as the topography presents significant challenges. At minimum, when reconstructing the trail, specifications and principles for sustainable shared-use trail construction and maintenance should be implemented. Also, some of the adjacent social trails should be closed and reclaimed as depicted on map #3 in Appendix A. Reclamation will entail breaking up compacted soil manually or mechanically to regain soil porosity followed by revegetation of the area with native grasses and shrubs. It is recommended that the trail be adequately signed. At minimum, depending on priorities and availability of funding, the process of trail reconstruction and closure and reclamation of social trails should occur biennially which should help resurrect the trail from poor condition over the next six to eight years. To help prioritize this cycle, work should begin from the Saddle Ridge access point and continue south as funding permits. Table 7 on the following page presents the capital improvement cost estimate for this project.

**Table 7 – Saddle Ridge Trail Capital Improvement Project Cost Estimate**

<b>Trail Name:</b>	<b>Saddle Ridge Trail</b>
<b>Project Type:</b>	Trail Reconstruction and new spur trail construction to Beaver Creek Lookout Trail
<b>Project Description:</b>	Reconstruct approximately 0.25 miles of new Saddle Ridge Trail and 0.25 miles of new spur trail. Also includes new trail access point construction
<b>Approximate Length:</b>	1.3 miles
<b>Trailheads/Access Points:</b>	Construct new access point off Saddle Ridge

<b>Trail Reconstruction and Access Point Construction</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Reconstruction (by hand)	\$6,270.00	1,320	\$4.75	Linear Foot
Closure and Reclamation (by hand)	\$5,676.00	1,320	\$4.30	Linear Foot
Trail Construction (by hand)	\$5,478.00	1,320	\$4.15	Linear Foot
Revegetation	\$8,500.00	1	\$8,500.00	Lump Sum
Construct Trail Access Point	\$3,500.00	1	\$3,500.00	Lump Sum
<b>Subtotal</b>	<b>\$29,424.00</b>			
Mobilization (12%)	\$3,530.88			
Administration (3%)	\$882.72			
<b>Estimated Total</b>	<b>\$33,837.60</b>			

<b>PROJECT ESTIMATE SUBTOTAL</b>	<b>\$33,837.60</b>
<b>CONTINGENCY (10%)</b>	<b>\$3,383.76</b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b>\$37,221.36</b>

<b>Assumptions</b>
Construct 18" - 24" wide trail using hand tools. Includes corridor clearing and grubbing.
Construction of trail access point includes installation of no parking signs, traffic bollards and steps.

## **Buck Creek Trail Project**

Current Status:	Existing
Trailhead/Access Point:	The only direct access point for this trail within Avon's jurisdiction is from the trailhead located off Buck Creek Road.
Trail Surface:	Natural
Tread Width:	Singletrack (18 to 24 inches)
Length:	0.5 miles on Avon property

The trail primarily runs north and south and connects the Buck Creek drainage to Forest Service property. It is a well defined singletrack trail that leads to the Red and White Road. The trail originates from an established trailhead off Buck Creek Road within Town of Avon property. The trail is for non-motorized use and includes hiking and biking activities.

The Buck Creek Trail has approximately ¼ mile of existing trail that has been identified for reconstruction (no photos available). The capital improvement cost estimate for this project is presented in Table 8 on the following page. At minimum, when reconstructing this short section of trail, specifications and principles for sustainable shared-use trail construction and maintenance and the minimum criteria for designated trails should be implemented.

**Table 8 – Buck Creek Trail Capital Improvement Project Cost Estimate**

<b>Trail Name:</b>	<b>Buck Creek Trail</b>
<b>Project Type:</b>	Trail Rehabilitation/Construct New Footbridge
<b>Project Description:</b>	Rehabilitate approximately 0.25 mile of existing to stabilize the route for multi-use. Also includes construction of new footbridge over creek
<b>Approximate Length:</b>	1.4 miles
<b>Trailheads/Access Points:</b>	Trailhead off Buck Creek Road

<b>Trail Reconstruction/Reclamation</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Rehabilitation (by hand)	\$6,270.00	1,320	\$4.75	Linear Foot
Revegetation	\$2,400.00	1	\$2,400.00	Lump Sum
<b>Subtotal</b>	<b><u>\$6,270.00</u></b>			
Mobilization (12%)	\$752.40			
Administration (3%)	<u>\$188.10</u>			
<b>Estimated Total</b>	<b><u>\$7,210.50</u></b>			

<b>New Footbridge Construction</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Plans/Permits	\$3,500.00	1	\$2,500.00	Lump Sum
Demolition, removal, and disposal of old bridge	\$5,500.00	1	\$5,500.00	Lump Sum
New footer preparation and construction	\$3,500.00	1	\$3,500.00	Lump Sum
Design and construct new 4' x 25' wooden footbridge with hand rails	\$18,500.00	1	\$18,500.00	Lump Sum
<b>Subtotal</b>	<b><u>\$31,000.00</u></b>			
Mobilization (12%)	\$3,720.00			
Architecture and Engineering (15%)	\$4,650.00			
Project Management (10%)	<u>\$3,100.00</u>			
<b>Estimated Total</b>	<b><u>\$42,470.00</u></b>			

<b>PROJECT ESTIMATE SUBTOTAL</b>	<b><u>\$49,680.50</u></b>
<b>CONTINGENCY (10%)</b>	<b><u>\$4,968.05</u></b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b><u>\$54,648.55</u></b>

<b>Assumptions</b>
Construct one (1) new 4' x 25' wooden footbridge with handrails across creek to replace old
Assumes reuse of existing abutments

## **Interior Connecting Trails**

Future opportunities exist for constructing new sustainable interior connecting trails within the Wildridge Subdivision and surrounding areas to enhance the developing trail system. Constructing additional interior trails are considered a lower priority in the overall process of Avon's short-term trail development and management planning efforts. As seen conceptually on the overview maps in Appendix A, some of the possibilities include the Coyote Ridge Loop Trail which will connect with the Metcalf Creek Loop Trail and offer more trail diversity in the area and access for visitors and residents living in that part of the community. The proposed Dry Creek Trail will also offer more connectivity and provide a designated trail which will minimize development and use of social trails within the system. Some of the existing social trails in the project area should be considered for closure and reclamation to minimize additional resource impacts. Table 9 on the following page presents the capital improvement cost estimate for this project.

**Table 9 – Capital Improvement Trail Project Cost Estimate**

<b>Trail Name:</b>	<b>Interior Trails - Wildridge Subdivision</b>
<b>Project Type:</b>	Trail Reclamation/New Trail Construction
<b>Project Description:</b>	Reclamation of approximately 0.25 miles of social trails and construct 0.5 miles of new singletrack trail.
<b>Approximate Length:</b>	Varies
<b>Trailheads/Access Points:</b>	Construct one new access point and use other existing access points (e.g. Pocket Park Trailhead)

<b>Trail Closure &amp; Reclamation/New Trail Construction</b>				
<b>Item</b>	<b>Total Cost</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Unit</b>
Closure and Reclamation (by hand)	\$5,676.00	1,320	\$4.30	Linear Foot
Revegetation	\$2,500.00	1	\$2,500.00	Lump Sum
New Trail Design and Layout	\$2,400.00	1	\$2,400.00	Lump Sum
New Trail Construction (by hand)	\$10,956.00	2,640	\$4.15	Linear Foot
Trail Amenities (signs, benches, etc.)	\$1,800.00	1	\$1,800.00	Lump Sum
Construct Trail Access Point	\$2,400.00	1	\$2,400.00	Lump Sum
<b>Subtotal</b>	<b>\$25,732.00</b>			
Mobilization (12%)	\$3,087.84			
Administration (3%)	\$771.96			
<b>Estimated Total</b>	<b>\$29,591.80</b>			

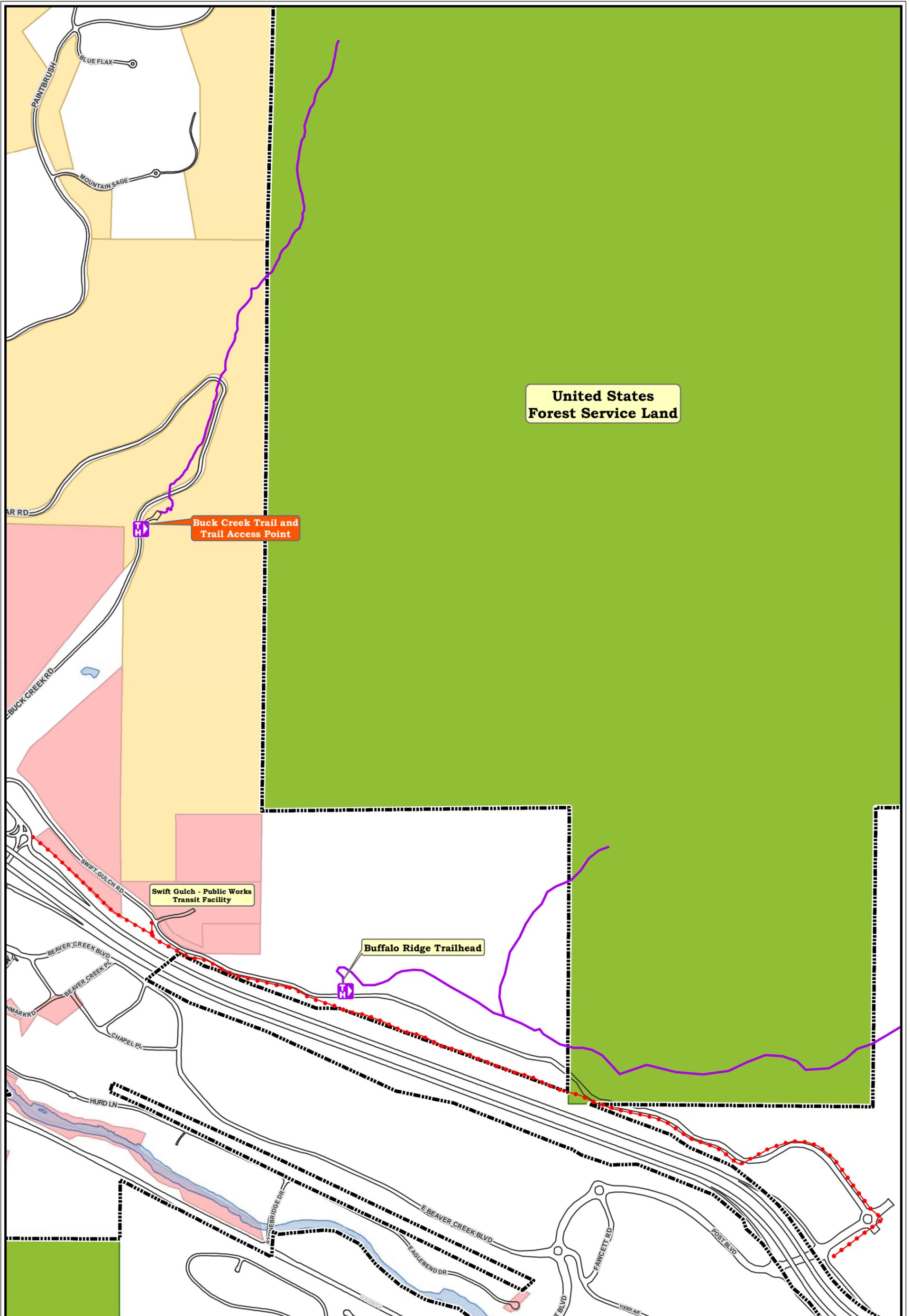
<b>PROJECT ESTIMATE SUBTOTAL</b>	<b>\$29,591.80</b>
<b>CONTINGENCY (10%)</b>	<b>\$2,959.18</b>
<b>TOTAL PROJECT COST ESTIMATE</b>	<b>\$32,550.98</b>

<b>Assumptions</b>
Construct 18" - 24" wide trail using hand tools. Includes corridor clearing and grubbing.
Construction of one trail access point - includes installation of no parking signs and traffic bollards.

## REFERENCES

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- Volunteers for Outdoor Colorado. July 1992. *Crew Leader Manual, Fourth Edition*, 93 pp. + appendix.
- 2001 Eagle Valley Regional Trails Plan
- Town of Avon Resolution No. 06-41, Series of 2006
- Town of Avon Comprehensive Plan, Goals and Policies, pages 61 & 62 only.
- October 5, 2006 Town of Avon Memo, August 8, 2006 Trails Open House Summary
- April 2007 USDA Forest Service Decision Memo, Singletree and West Avon Recreational Trails
- USDA Forest Service Agreement No. 07-CS-11021507-038, Cost Share Agreement and Exhibit A
- August 22, 2008 Eagle County Board of County Commissioners New Release titled: Major Land Initiative Unveiled
- Eagle County (ECO) Trails Program Website – <http://www.eaglecounty.us/ecoTrails/trailsPlan.cfm>

## **APPENDIX A**



**United States  
Forest Service Land**

**Buck Creek Trail and  
Trail Access Point**

**Swift Gulch - Public Works  
Transit Facility**

**Buffalo Ridge Trailhead**



**Avon Trails Master Plan  
Recommended Program - East**

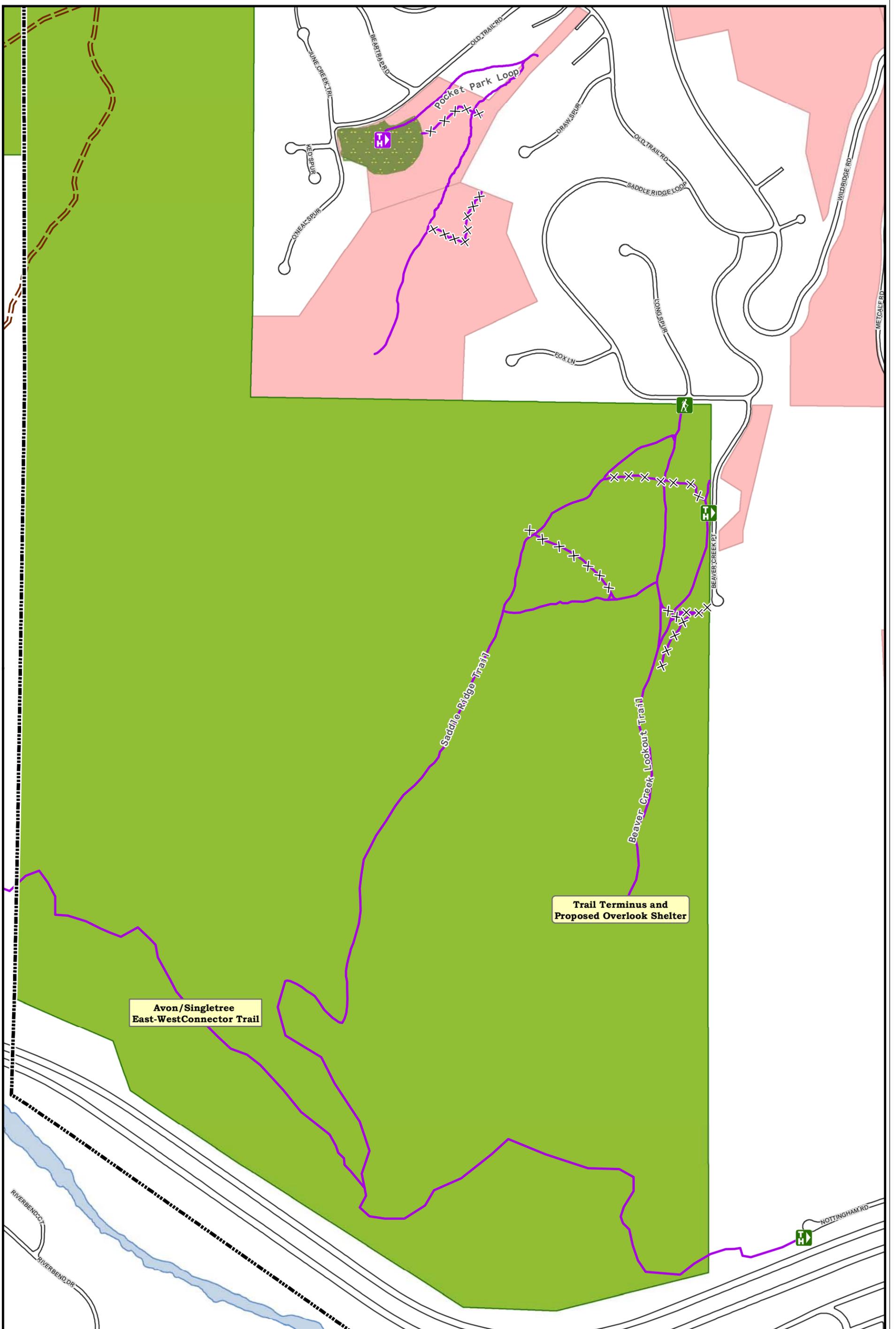
**MAP 2**

- |                    |                       |               |                   |
|--------------------|-----------------------|---------------|-------------------|
| Existing Trails    | Trailhead             | Town of Avon  | Lakes and Rivers  |
| ECO Trails - paved | Town of Avon Boundary | Mountain Star | Residential Roads |
|                    | USFS                  |               |                   |



Author: JTH, 03/02/09

*This map was produced by the Community Development Department.  
Use of this map should be for general purposes only.  
Town of Avon does not warrant the accuracy of the data contained herein.*



**Avon Trails Master Plan**  
Recommended Trail Closures

0 500 1,000 Feet

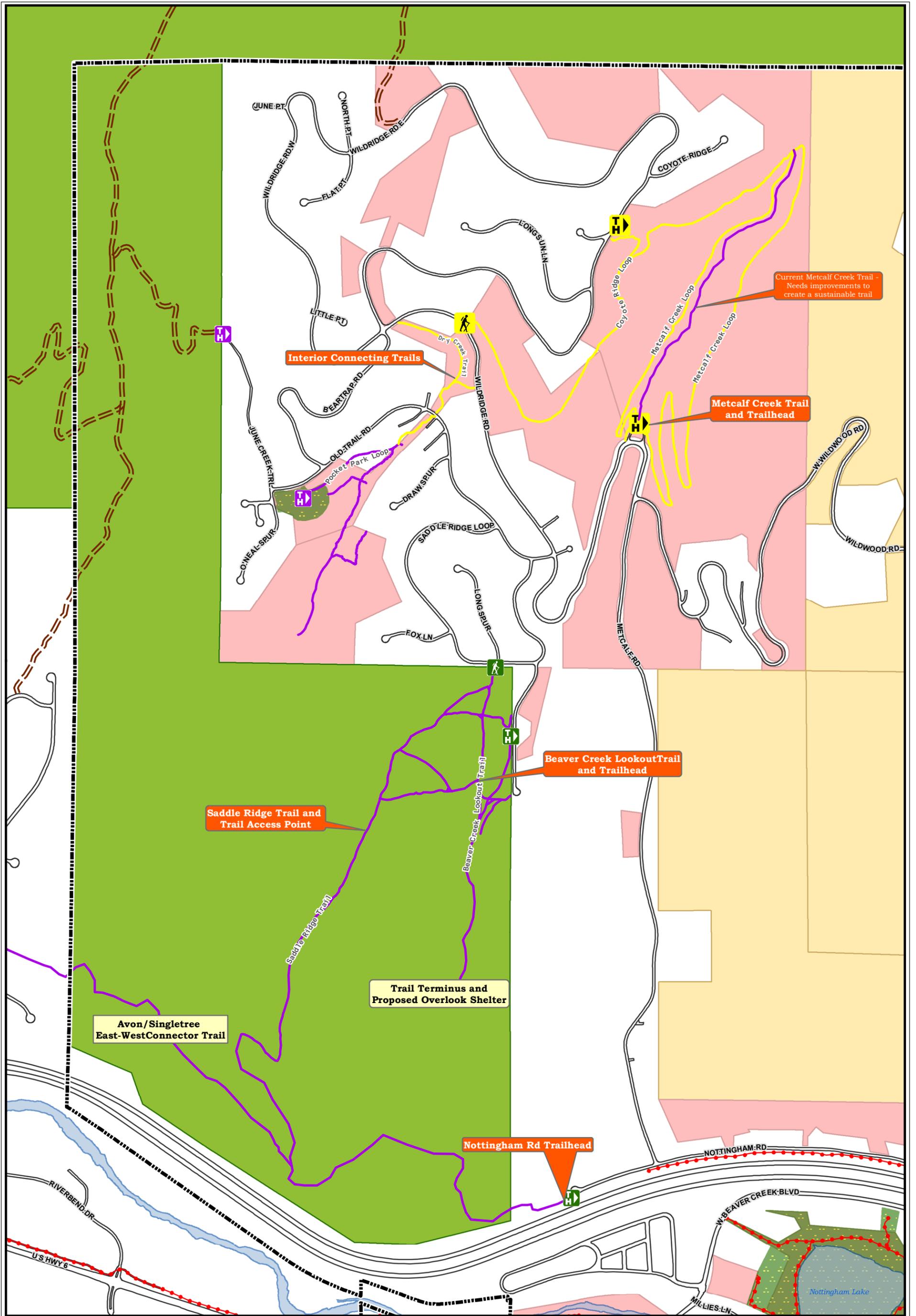
**MAP 3**

Existing Trails	Trailhead	Town of Avon	Public Land Roads
Town Parks	Future Trailhead	Mountain Star	Residential Roads
Proposed Trail Closures	Future Trail Access	USFS	Town of Avon Boundary



Author: JTH, 01/28/09

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**Avon Trails Master Plan**  
Recommended Program - West

0 800 1,600 Feet

**MAP 1**

Existing Trails	Trailhead	Proposed Trailhead	Open Space Ownership: Town of Avon	Public Land Roads
Proposed Trails	Future Trailhead	Proposed Trail Access	Mountain Star	ECO Trails
Town Parks	Future Trail Access		USFS	Residential Roads
				Town of Avon Boundary



Author: JTH, 03/02/09

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