

CHAPTER 2. BICYCLE AND PEDESTRIAN SYSTEM

2.1 EXISTING CONDITIONS

For many residents and visitors, non-motorized access to the many varied recreational and scenic opportunities is a key element in the Avon experience. Non-motorized facilities include identified bike routes along the roadway system, separate bicycle/pedestrian trails, and attached or detached sidewalks. Uses may include commuting, local trip making, recreational and fitness purposes, or intermodal transfer to transit or parking; such trips may be regional or local in nature.

2.1.1 Regional Trails System

A regional trails system within Eagle County provides for bicycle and pedestrian movements along the I-70/Eagle River corridor. Current facilities and planned future trail connections are documented in EAGLE VALLEY REGIONAL TRAILS PLAN, ECO Trails, December 2001. A continuous system of paved trails linking the communities along the Eagle River from Dotsero to Minturn, with connection east to Vail, is currently being developed. Existing and planned spur trails will connect to recreational areas, open space, backcountry (unsurfaced trails), and other multi-modal facilities. The regional trails system serves non-motorized users, including bicyclists, pedestrians, joggers, inline skaters, and equestrians.

Figure 2.1 shows the existing regional trails system in Avon, along with planned links. The regional system includes a core trail paralleling US 6 and the Eagle River. There are missing trail segments between West Beaver Creek Boulevard and Lake Street, and east of Stonebridge Drive. On the north side of I-70, a paved core trail extends along Nottingham Road from Metcalf Road to Avon Road. This trail then resumes along Swift Gulch Road, extending east to Post Boulevard. In addition to constructing the missing segments, other enhancements are planned as funding becomes available.

2.1.2 Recreational Trails

In addition to the regional trails identified above, the Town of Avon has several existing unsurfaced trail systems which serve primarily recreational and social purposes. These trail systems are described as follows:

- **Avon/Singletree East-West Connector Trail.** This trail provides pedestrian connection from June Creek Road in the Singletree subdivision (located just west of Avon along the north side of I-70) to the western terminus of Nottingham Road.
- **Saddle Ridge Trail.** This trail connects the Wildridge neighborhood to the Avon/Singletree East-West Connector Trail. Local access occurs on Saddle Ridge Loop at Long Spur, both Wildridge local roads.
- **Beaver Creek Lookout Trail.** This existing trail extends south from Beaver Creek Point (a Wildridge local road) along the ridge above Metcalf Road, overlooking the Town of Avon.

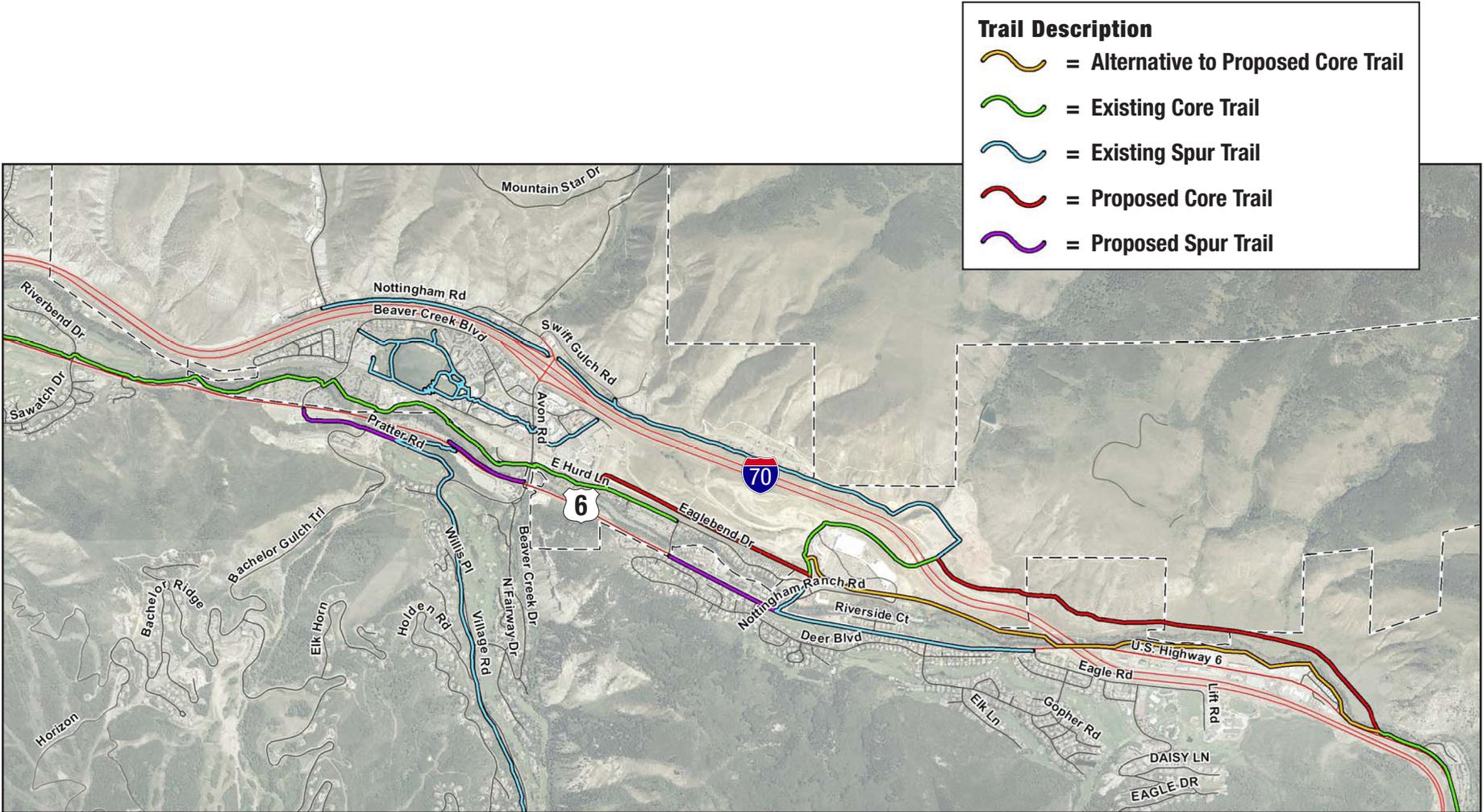


Figure 2.1
Existing Trail System

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- **Buck Creek Trail.** This recreational trail extends north along Buck Creek into Forest Service lands and a historical site north of Avon. An existing trailhead and small parking area provides access off Buck Creek Road, north of I-70.
- **Buffalo Ridge Trail.** This trail is accessed from an existing trailhead and parking area on Swift Gulch Road just west of the Buffalo Ridge condominium development. The trail extends east and north into Forest Service lands. A designated pedestrian crosswalk on Swift Gulch Road provides connection to the nearby regional core trail along Swift Gulch Road.

2.1.3 Local Bicycle/Pedestrian Connection

Within Avon, local pedestrian connections are constrained. As identified in the roadway inventory, existing sidewalks within the Town Centers have limited continuity. **Figure 2.2** provides examples of missing sidewalk sections along East Beaver Creek Boulevard within Avon. The East Beaver Creek Boulevard Streetscape Improvement Project is a designed but currently unfunded project that would enhance pedestrian connections and provide streetscape amenities along this roadway. West Benchmark Road streetscape improvements would add more pedestrian connectivity between Riverfront, the Transit Center, and Nottingham Park.

Because the Eagle River is a barrier for residents living along the north side of US 6, a sidewalk is needed between Post Boulevard and West Beaver Creek Boulevard to provide pedestrian connection to the existing river crossings and regional transit stops. Approximately 2 miles of sidewalk are needed along the north side of US 6.

There is also a sidewalk disconnect at the existing at-grade railroad crossing on West Beaver Creek Boulevard just south of the Avon Elementary School. Although designated bike lanes are present within the paved way, there is currently no provision for pedestrians across the tracks; sidewalk is needed along both sides of West Beaver Creek Boulevard in this area.

Based on an inventory of existing conditions within the core area, there is approximately 660 lineal feet of missing sidewalk along East Beaver Creek Boulevard and approximately 1,340 lineal feet along West Beaver Creek Boulevard (for a total of 2,000 lineal feet) that should be provided to help ensure pedestrian connectivity. **Figure 2.3** illustrates the locations of the existing sidewalk deficiencies.

In addition, I-70, Avon Road, the Eagle River, and the Union Pacific Rail Road all create barriers to bicycle and pedestrian movements. Future bicycle/pedestrian enhancements currently under consideration or identified in previous transportation planning efforts include the following potential connections:

- Grade separated solutions for pedestrian/bicycle crossing of I-70 between Metcalf Road and West Beaver Creek Road.
- Pedestrian solution for crossing of Avon Road within the Town core area.
- Grade separated solution for crossing the UPRR from Eagle Bend Drive near Stonebridge Drive providing connection to the Village at Avon.

An evaluation of these potential pedestrian connections is included in the following section.



Figure 2.2
Sidewalk Discontinuity
East Beaver Creek Boulevard

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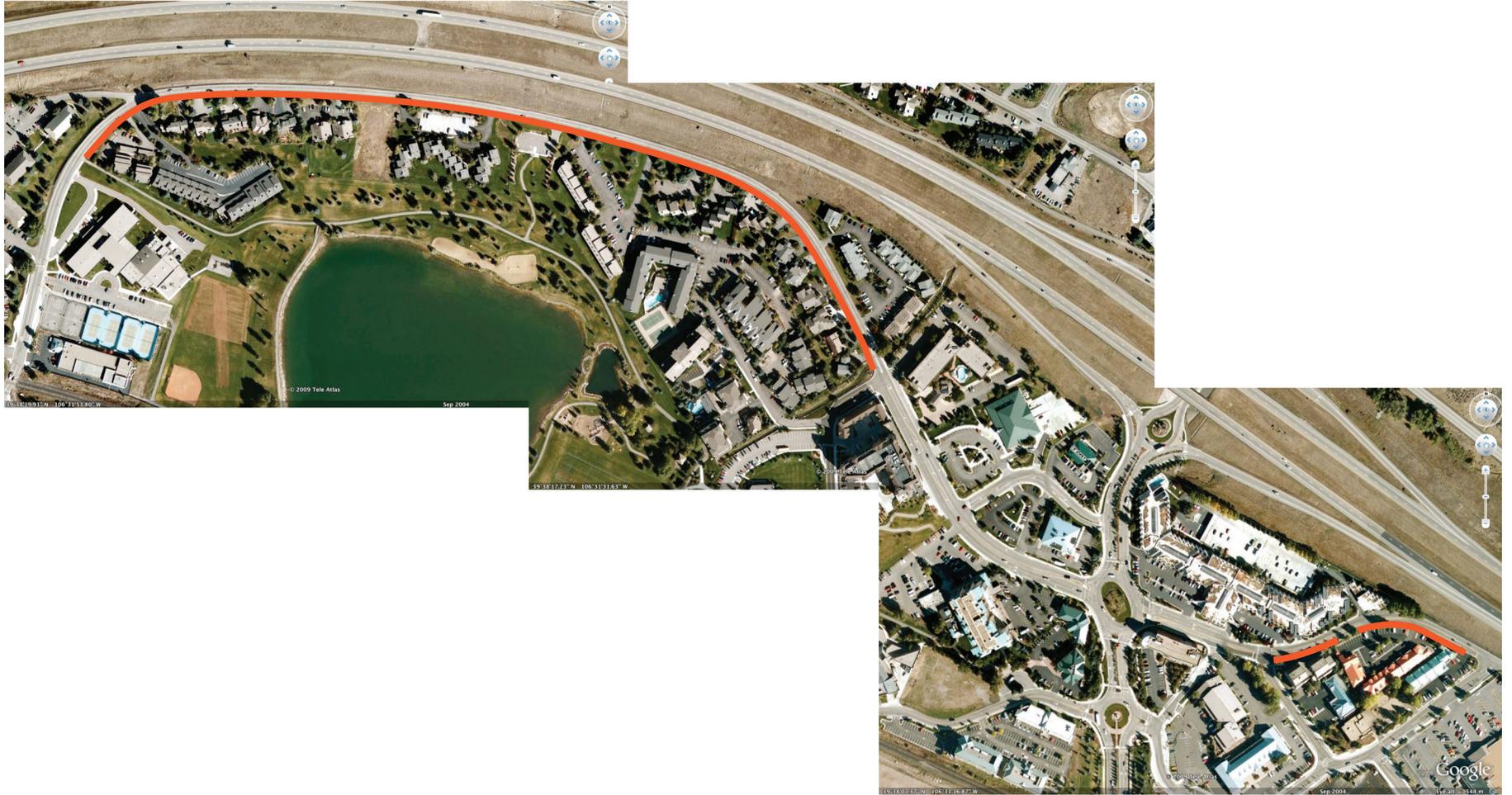


Figure 2.3
Areas of Sidewalk Deficiency

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2.2 FUTURE CONDITIONS

2.2.1 Regional and Recreational Trails Planning

Ongoing development of the regional paved trail system through Avon follows the Eagle Valley Regional Trails Plan, administered by the ECO Trails Program. As new links are added, connectivity for non-motorized users is enhanced along the Eagle River corridor. The Town of Avon has partnered with ECO on both trails and transit elements, and is the key participant in driving the final trail connection between Avon and Eagle Vail. This Comprehensive Transportation Plan also helps support the goals of the Regional Trails Plan, as follows:

- The proposed Town Standards for roadway cross sections identify requirements for sidewalks and bicycle/pedestrian lanes to improve both safety and connectivity for non-motorized users.
- The proposed Traffic Impact Study Guidelines will require new development to quantify travel modes, specify pedestrian improvement plans, and demonstrate connectivity to the adjacent non-motorized system and regional trails facilities.

The recently adopted TOWN OF AVON RECREATIONAL TRAILS MASTER PLAN, Anasazi Trails, Inc., February 2009 provides a formal basis for developing a local system of sustainable, unpaved recreational trails from the mix of informal social trails, purpose-built trails, and abandoned access roads. The Trails Plan considers access issues, parking, neighborhood interface, and environmental impacts. Standards for design, construction, and ongoing maintenance of different types of trails are established. The report identifies six recreational trail projects and provides preliminary opinions of probable cost, as summarized in **Table 2.1**

Table 2.1 Recreational Trails Capital Improvement Projects

Trails Project	Description	Cost Opinion
Avon/Singletree Trail	New trailhead at Nottingham Road. Trail reconstruction and reclamation activity.	\$148,500
Beaver Creek Lookout Trail	New trailhead and overlook. Trail reconstruction and reclamation activity.	\$250,300
Metcalf Creek Trail	New trail construction. New trailhead, parking area, and toilet facilities.	\$243,300
Saddle Ridge Trail	Trail construction/reconstruction and reclamation activity. New access point.	\$37,200
Buck Creek Trail	Bridge construction and trail reconstruction.	\$54,700
Interior Connecting Trails	Trail reclamation activity. New trail and access point construction.	\$32,600
Total		\$766,600

Source: Town of Avon Recreational Trails Master Plan, Anasazi Trails, Inc., February 2009.

As indicated, the recreational trails projects are anticipated to cost approximately \$766,600.00.

2.2.2 Local Bicycle/Pedestrian Connections

The sidewalk deficiencies previously identified on **Figure 2.3** total approximately 2,000 lineal feet. Based on current cost data for concrete sidewalks in Avon, a total cost of \$180,000 is anticipated to construction of the missing sidewalk sections.

Other non-motorized improvements that should be incorporated include:

- A trail connection at the southwest corner of Nottingham Park to West Beaver Creek Boulevard. Currently, unauthorized pedestrian access is through a damaged section of fence. There is a narrow sidewalk along the tennis courts that is also used.
- Connectivity improvements to the existing trail along Nottingham Road for area residents. Enhancements should include sidewalks, crosswalks, streetscape and lighting improvements, and transit stops. Approximately 2,000 lineal feet of guardrail along the south side of Nottingham Road creates a barrier for residents trying to access the trail. Only one opening is currently provided, with a paved connection from Nottingham Road to the trail. At least two more such openings should be provided for better trail access.
- Bike lanes on Metcalf Road. Metcalf Road is becoming increasingly popular as a bike route for residents of Wildridge and Wildwood. Currently, bike riders must use the travel lanes, and safety concerns have been expressed. Bike lanes should be provided along both sides of Metcalf Road from the intersection at Nottingham Road, continuing along Wildridge Road to the intersection at Old Trail Road in the Wildridge neighborhood.
- Pedestrian improvements on West Beaver Creek Boulevard at Sun Road and pedestrian connection from Sun Road to Mainstreet. These enhancements are envisioned in the Avon West Town Center District Investment Plan.
- Pedestrian bridge over I-70 from the Buffalo Ridge apartments to the Village at Avon. This improvement is shown in the Village at Avon PUD.
- Trail connection from Nottingham Road bike path to the Buck Creek Trailhead.
- Pedestrian underpass of US 6 at Beaver Creek and pedestrian bridge over the Eagle River at the Kayak Park. This connection will provide grade-separated pedestrian access from the south side of US 6 to the regional trail system and the Town core area.
- Sidewalk along the north side of Chapel Place at the east side of Chapel Square.
- Grade separated crossing under US 6 on the east side of the Avon Road roundabout.
- Sidewalks or separate paved trails along US 6.

Because of the number of barriers (I-70, Avon Road, the Eagle River, and the UPRR), and due to the unconventional street layout that has evolved in Avon, visitors, particularly pedestrians, can have difficulty finding their way about town. Although the Town currently has visitor maps and other way-finding resources on-line, additional measures that would help visitors as they navigate through Avon include roadway directional signing and informational displays at major transit stops and activity centers. With the redevelopment of the East and West Town Centers, and development within the Village at Avon, there will be opportunities to simplify the street network and provide logical pedestrian connections to further enhance way-finding.

2.2.3 Potential Grade Separated Pedestrian Solutions

An evaluation was conducted for potential grade separated pedestrian crossings at selected locations within Avon. The evaluations were based on design criteria published by the American Association of State Highway and Transportation Officials (AASHTO). Alternative crossings for I-70, Avon Road, and the Union Pacific Rail Road (UPRR) were considered.

2.2.3.1 I-70 Pedestrian Crossing between Metcalf Road and West Beaver Creek Road

A pedestrian crossing of I-70 in the vicinity of Metcalf Road has been proposed to provide a more convenient connection from residential and commercial land uses north of I-70 to the Town core area. Currently, the closest pedestrian connection occurs at Avon Road. A new crossing could shorten pedestrian trips by as much as a mile (per one-way trip). Because of the grades along I-70 in this area, an underpass is considered to be more feasible than a bridge over the highway. **Figure 2.4** illustrates this potential concept.

Pedestrian Crossings Design Criteria

- Per AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004, Section 3.5.3 – Overpasses vs. Underpasses, the vertical clearance for long distance underpasses should be a minimum of 10 feet. Minimum trail width for underpasses with a length over 60 feet should be wider than 16 feet.
- I-70 width from outside edge of pavement to outside edge of pavement equals 170 feet (as measured in ACAD from aerial mapping).
- The elevation difference between the low point on the north side of I-70 and the surface of I-70 is 7468.0 feet minus 7450.0 feet, or 18 feet.
- Assuming the trail starts at the low point, the total height needed is 10 feet (vertical clearance) plus 1 foot of structure depth plus 2 feet of sub-base plus 1.5 feet of pavement equals 14.5 feet. Because this is less than the available 18 feet, we believe the tunnel will fit.
- The AASHTO Roadside Design Guide (2006), Table 3.1, provides clear-zone requirements in feet from edge of through traveled way. The minimum clearance, with a 1:4 foreslope, 65 to 70 mph design speed, and design ADT over 6000, is 46 ft (from edge of traveled way to box culvert headwall).
- The resultant minimum pedestrian underpass length is 262 feet (170 plus 46 plus 46 equals 262 feet).



Figure 2.4
I-70 Crossing Near Metcalf Road

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Cost Analysis - Pedestrian Crossing of I-70

- The recently completed pedestrian underpass at the 144th Avenue/I-25 Interchange is a pre-cast box culvert with many aesthetic architectural features. The total cost, without retaining walls, was \$996,503. At a length of 176', the cost per linear foot is \$5,662. If this system were used for the Avon pedestrian underpass of I-70, the box culvert alone would cost approximately \$1,483,000.
- The pedestrian underpass for the 136th Avenue/I-25 Interchange project was a simple cast-in-place box culvert with basic architectural features. The total cost was \$217,088. At a length of 240', the cost per linear foot was \$905. If this system were used for the Avon pedestrian underpass of I-70, the box culvert alone would cost approximately \$237,000.
- A shoe-fly detour on I-70 to phase the construction of the box culvert would cost \$750,000, based upon a similar detour cost analysis prepared for the Preble Creek Drainage project at I-25/SH 7.
- Based on the above, the total cost of the I-70 pedestrian underpass would range between approximately \$987,000 and \$2,233,000, depending on the level of aesthetic treatment.

2.2.3.2 Pedestrian Solution for Avon Road

Avon Road presents a both a physical and psychological barrier to pedestrians and bicyclists attempting to cross the road. To help ensure a cohesive feel between the East and West Town Centers, it is important to mitigate this barrier. To address this issue, enhanced pedestrian and bicycle crossings shall be evaluated as a part of new development and improvements along Avon Road. Enhancements may include either at-grade or grade-separated solutions.

Avon Road Pedestrian Crossing Cost Analysis

Alternative pedestrian solutions for Avon Road were evaluated based on topographical constraints and typical mountain area construction cost. The resultant preliminary cost opinions range between approximately \$500,000 and \$1.0 million.

2.2.3.3 Stonebridge Pedestrian Crossing at UPRR

A pedestrian crossing of the UPRR near Stonebridge Drive has been considered to provide access from residential uses and transit stops south of the tracks to existing and planned commercial uses in the Village at Avon. The potential for the rail line to become active would drive the need for this improvement. While the rail line remains inactive, an at-grade pedestrian crossing is preferred by the Town. For this exercise, three grade-separated alternatives have been evaluated: an overpass with ramps, an overpass with elevators, and an underpass. **Figure 2.5** illustrates the potential overpass location. The underpass would likely be located farther west near an existing culvert along Hurd Lane.



Figure 2.5
Railroad Pedestrian Crossing at Stonebridge Drive

Pedestrian Crossing Design Criteria

- Per CDOT Design Guide 2005, Table 3-3, the minimum vertical clearance for pedestrian overpasses over railroad tracks is 17.5 feet.
- Per AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, Sec. 3.2.7, the maximum grade allowed is 5 percent.
- The UPRR right-of-way width from fence line to fence line is 100 feet (as measured using aerial mapping).
- Assuming the pedestrian bridge over the railroad has a structure depth of 6 feet and a vertical clearance of 17.5 feet over the railroad tracks, the total height from existing ground to the top of bridge would be 23.5 feet. The total length of ramp necessary to access the bridge on either side of the railroad tracks would then be 940 feet ($23.5 \text{ feet}/0.05 = 470 \text{ feet} \times 2 \text{ sides} = 940 \text{ feet total}$).
- The minimum pedestrian overpass length would be approximately 100 feet plus an additional 15 feet either side of the UPRR right-of-way for a total of 130 feet.
- The total length of structure (assuming the ramps would be switchback style structures) would, therefore, be 1,070 feet (130 feet + 940 feet).

Pedestrian Bridge Crossing the UPRR Cost Analysis

- A pedestrian bridge across the UPRR, plus ramp structures on either side would be approximately \$2.25 million (1,070 feet x 14 feet x \$150 per square foot).
- A pedestrian bridge with elevators on each side and simple aesthetic features would cost between \$1.4 million and \$1.8 million, based on costs from recent similar projects.

Pedestrian Underpass Crossing the UPRR Cost Analysis

- A pedestrian box culvert underpass would require a RR shoofly detour in order to construct the underpass in two phases. A recent, similar double track shoofly for BNSF cost over \$1.5 million to construct.
- Based on costs previously identified, a simple box culvert underpass at this location would cost approximately \$120,000 (\$905 per lineal foot x 130 feet).
- A more complex underpass with enhanced aesthetics would cost approximately \$736,000 (\$5,662 per lineal foot x 130 lineal feet).
- Therefore, the total cost for the pedestrian underpass alternative would range from \$1.62 million to \$2.236 million, including the RR shoofly.

2.2.3.4 Future Grade Separated Solutions: US 6/Eagle River/UPRR

US 6, the Eagle River, and the Union Pacific Railroad create parallel barriers to north-south pedestrian movements within Avon. As development and redevelopment occurs along the south side of US 6, connection to the Town core will become increasingly important for all modes of transportation, and in particular, non-motorized travel. Future planning should include the potential for grade separated solutions to connect new development to the core area as depicted on **Figure 2.6**.

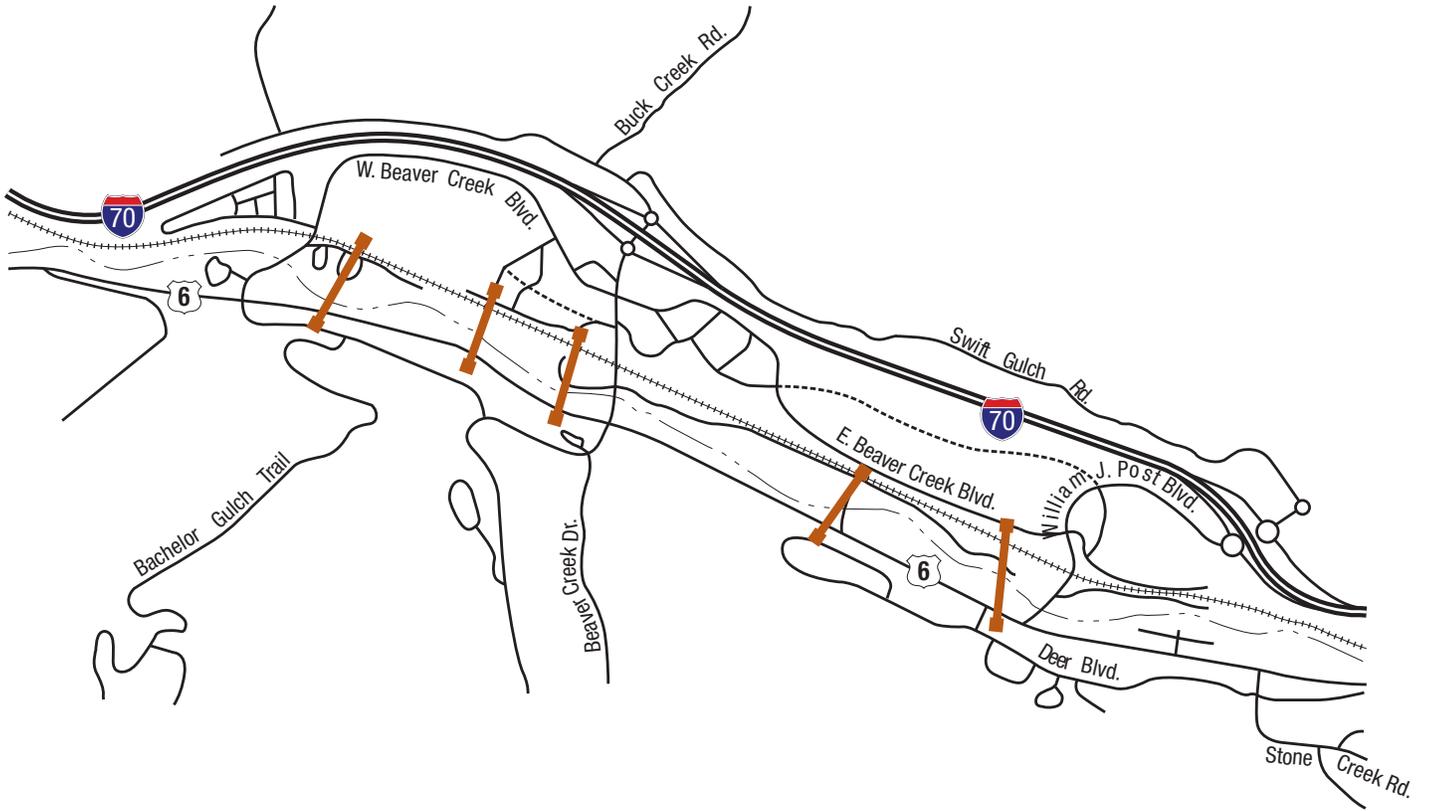


Figure 2.6
 Future Grade-Separated Solutions
 US 6 / Eagle River / UPRR