Rapid City Area
Bicycle and Pedestrian Master Plan

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July 2011

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Acknowledgments

The City of Rapid City appreciates the efforts of the residents who participated in the development of this Plan. Their creativity, energy, and commitment to the future of the Rapid City area were the driving force behind this planning effort.

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"The preparation of this report has been financed in part through grant[s] from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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Chapter 1. Introduction

The Rapid City Bicycle and Pedestrian Master Plan ("Bicycle and Pedestrian Master Plan") builds on past and on-going efforts by the Rapid City Area Metropolitan Planning Organization (MPO) and the City of Rapid City to enhance transportation options and improve the quality of life in the Rapid City area. The Bicycle and Pedestrian Master Plan, which will be adopted as part of the *Rapid City Comprehensive Plan*, will guide the development of a network of bicycle and pedestrian routes that link activity centers within the city and provide opportunities for connections to surrounding areas. This network will not only make bicycling and walking a more viable mode of transportation, but it will contribute to an enhanced quality of life in the community and provide economic development opportunities.

Throughout this plan, the term "pedestrian" refers to a person moving from place to place, either on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe the movement of a pedestrian.

Similarly, the term "bicyclist" refers to a person moving from place to place using a bicycle or similar human-powered vehicle like a tandem bicycle, tricycle, recumbent bicycle, etc. "Bicycling" and "to bicycle/to bike" are terms used to describe the movement of a person operating a bicycle.

Vision, Goals, and Objectives

Vision

Rapid City will enhance transportation choices by developing a network of on-street and off-street bicycle and pedestrian facilities that provide connections to destinations throughout the city.

Figure 1. The Leonard "Swanny" Swanson Memorial Pathway provides a continuous facility that acts as a spine for the bicycle and pedestrian networks.

Goals & Objectives

Goal 1. Support bicycling and walking as viable transportation modes in Rapid City.

Objective 1.1. Implement the Rapid City Area Bicycle and Pedestrian Master Plan facility recommendations to provide bicycling and walking routes to key destinations.

- Action 1. Complete the high-priority bikeway network and sidewalk gap projects in the next five years (2011 – 2015).

Benchmark: Miles of new bikeways and sidewalks completed; percentage of high-priority projects identified in the Bicycle and Pedestrian Master Plan completed.

- Action 2. Complete the medium-priority projects within the next 20 years (2011 – 2030).

  Benchmark: Miles of new bikeways and sidewalks completed; percentage of medium-priority projects identified in the Bicycle and Pedestrian Master Plan completed.

Figure 2. While Rapid City has an extensive off-street bikeway network, the City does not currently designate any on-street bikeways.

Objective 1.2. Seek new funding sources and strategies to reduce the financial impact on the City.

- Action 1. In the case where grant requirements or construction as part of another project make construction of a lower priority project possible or required by law, pursue funding for that project regardless of priority.

  Benchmark: Proportion of roadway restriping, reconstruction, and construction projects that include bicycle and/or pedestrian improvements.

- Action 2. Seek funding for bicycle and pedestrian transportation projects through grant opportunities.

  Benchmarks: Number of grants applied for; amount of grant funding acquired.

Objective 1.3. Improve bicyclists' and pedestrians' safety and comfort by accommodating these modes during construction or facility repair activities.

- Action 1. Minimize disruption to bicycle and pedestrian travel by providing alternate routes during construction or repair activities.

  Benchmark: Development of guidelines/policies for providing bicycle and pedestrian access through or around construction zones.

Goal 2. Promote bicycling and walking in the Rapid City area by improving awareness of bicycle and pedestrian facilities and opportunities.

Objective 2.1. Improve public awareness of the on-street bicycle network and presence of bicyclists.

- Action 1. Install signs along all local and regional bikeways to assist with wayfinding and to increase awareness of bicyclists by motorists.

  Benchmark: Development of a wayfinding signage plan; number of signs installed.

- Action 2. Make bicycling and walking resources available through the City of Rapid City website.

  Benchmark: Development of web content on the City of Rapid City's website providing information about walking and bicycling; frequency of page views.

- Action 3. Increase action by law enforcement officers in regards to bicycle- and pedestrian- related violations by motorists, bicyclists, and pedestrians.

  Benchmark: Number of informational warnings and citations issued related to bicyclists or pedestrians; number of crashes involving bicyclists or pedestrians.

- Action 4. Promote the availability of bicycle racks on RapidRide buses.

- Benchmark: Development of web content on the RapidRide website providing information on how to use bike racks on the buses.

Objective 2.2. Support education and encouragement efforts in the region.

- Action 1. Apply to become a Bicycle Friendly Community (BFC) through the League of American Bicyclists' award program.

  Benchmark: Completed BFC application; goal of initial recognition at the bronze level with a target of obtaining gold level recognition.

- Action 2. Convene a standing Bicycle Advisory Committee (BAC) to focus on Plan implementation and obtaining funding for bicycle and pedestrian projects and programs.

  Benchmark: Appointment of a BAC; at least four meetings each year.

Goal 3. Integrate bicycle and pedestrian planning into Rapid City's Planning Processes.

Objective 3.1. Institutionalize bicycle and pedestrian planning into Rapid City Growth Management's work plan and Engineering department plans.

- Action 1. Review and update the Bicycle and Pedestrian Master Plan project and program priorities every five years.

  Benchmark: Revised project priorities list every five years.

- Action 2. Revise the street criteria manual to include consideration of bicycles based on road classification.

- Benchmark: Updated street design criteria manual; appropriate bicycle and pedestrian access provided in new developments as specified in this plan.

Objective 3.2. Require inclusion of bicyclists and pedestrians in citywide planning efforts.

- Action 1. Adopt a Complete Streets policy to consider the needs of pedestrians and bicyclists in new development and roadway reconstruction.

  Benchmark: Adopted Complete Streets Policy.

Chapter 2. Existing Conditions

This chapter provides both an overview and a more detailed inventory of existing pedestrian and bicycle facilities in the Rapid City area, including sidewalks, intersection improvements, shared-use paths, on-street bicycle facilities, and bicycle parking. The second section of this chapter identifies important destinations for bicyclists and pedestrians, especially connections to transit and schools. An analysis of system strengths and weaknesses follows, which highlights key areas where improvements may be needed.

Figure 3. Downtown Rapid City has wide sidewalks with planters and pedestrian-scale lighting in the buffer zone.

Figure 4. Many outlying streets accommodate pedestrian travel along wide shoulders.

Overview of Bicycle and Pedestrian Facilities

Pedestrian Facilities

Pedestrian travel is typically accommodated by sidewalks, shared-use paths, and road shoulders. Pedestrian facilities recognized by the American Association of State Highway and Transportation Officials (AASHTO) are:

- Sidewalks are walkways along roadways that are separated from the roadway with a curb and/or planting strip and have a hard, smooth surface (usually concrete). The travel way for pedestrians should be clear of utility poles, sign posts, fire hydrants, and other furnishings (Figure 3).
- Shared-use paths are facilities that are typically separated from the roadway right-of-way, often located on former rail corridors, or along waterways or utility corridors, or passing through parks and open spaces. Shared use paths are used by multiple user types including pedestrians, bicyclists, skaters, and/or runners. Shared use paths may be paved or unpaved.
- Roadway shoulders often serve as pedestrian routes in rural areas. Rural roads should usually have shoulders wide enough so that both pedestrians and bicyclists can use them (Figure 4).

These three types of facilities comprise the majority of Rapid City's pedestrian facilities network.

Note: Guidelines and minimum standards for pedestrian facilities are provided in the *Americans with Disabilities Act* guidelines, primarily in the draft *Public Rights-of-Way Accessibility Guidelines* (PROWAG).

Sidewalks

A fairly complete sidewalk system (with sidewalks on both sides of streets) can be found in downtown Rapid City and nearby older residential neighborhoods. Downtown Rapid City's sidewalk environment includes a variety of complementary pedestrian facilities such as curb ramps, pedestrian-scale lighting, curb extensions and amenities like benches, trash receptacles, and public art. Outside of downtown Rapid City, newer developments have sidewalks, but in many other locations, demand trails indicate the need for additional sidewalks.

Figure 5. Curb-tight sidewalks on arterials can be an uncomfortable walking environment.

Curbside sidewalks can be uncomfortable for pedestrians, particularly along arterial streets or major collectors without on-street parking to act as a buffer (Figure 5). Providing a planting strip or buffer between the street and the roadway improves the pedestrian environment and planting strips can be used to store snow in the winter, keeping the sidewalk clear (Figure 6).

Figure 6. Buffers or planting strips provide space for utilities, bus stops, and snow storage.

ADA-Compliance at Intersections

Curb ramps are fundamental to an accessible pedestrian network – a sidewalk without a curb ramp is useless to a person who utilizes a wheelchair or similar assistive device as it forces them to travel in the street and/or to use driveways to make crossings. Likewise, curb ramps that are too steep, lack a level landing area or have a lip between the street and end of the ramp greater than 1" high also pose access problems.

Current design standards for curb ramps now require tactile domes be installed at the ends of every ramp to indicate there is a street or large driveway crossing (Figure 7). The domes are large enough to be felt underfoot or with long canes used

Figure 7. ADA-compliant curb ramp with tactile domes.

by visually impaired pedestrians. Tactile domes also should be a contrasting color to the sidewalk pavement as some people with visual impairments can discern surface color changes.

Push-buttons to trigger pedestrian walk signals should also accommodate all users. Accessible push buttons are large and can be pushed using a fist, elbow, arm, etc. instead of the smaller buttons on older versions that must be pushed by a finger.

Figure 8. Frequent pedestrian use along Deadwood Avenue is evident by the worn "demand trail", indicating a good location for a pedestrian facility investment.

Demand Paths

In some parts of Rapid City there are worn paths along roadways without pedestrian facilities where people are obviously walking despite the lack of a sidewalk (Figure 8). These trodden paths are often referred to as "goat paths", "desire lines" or "demand trails". Self-worn paths are not appropriate formal pedestrian accommodations, but they do provide a clear indication where people are already walking and the investment in a sidewalk or paved path would be beneficial.

Multi-User Facilities

Shared-Use Paths

Shared-use paths (also referred to as "trails" and "multi-use paths") are often viewed as recreational facilities, but they are also important corridors for utilitarian (work, shopping, or other functional) trips. Shared-use paths can provide a desirable facility particularly for pedestrians and bicyclists of all skill levels because they are separated from traffic. They are important assets for a community by encouraging healthy and active lifestyles, promoting nonmotorized transportation over longer distances, and making the area more attractive to visitors.

One type of shared-use path that has specific design considerations is a side path, or a two-way trail on one side of the road, located within the road right-of-way. Side paths can be differentiated from shared-use paths that have an exclusive right-of-way, such as paths in a greenway, park, or trails adjacent to a railroad or utility corridor. Local shared-use paths with exclusive right-of way are listed in Table 1; Map 1 shows their locations.

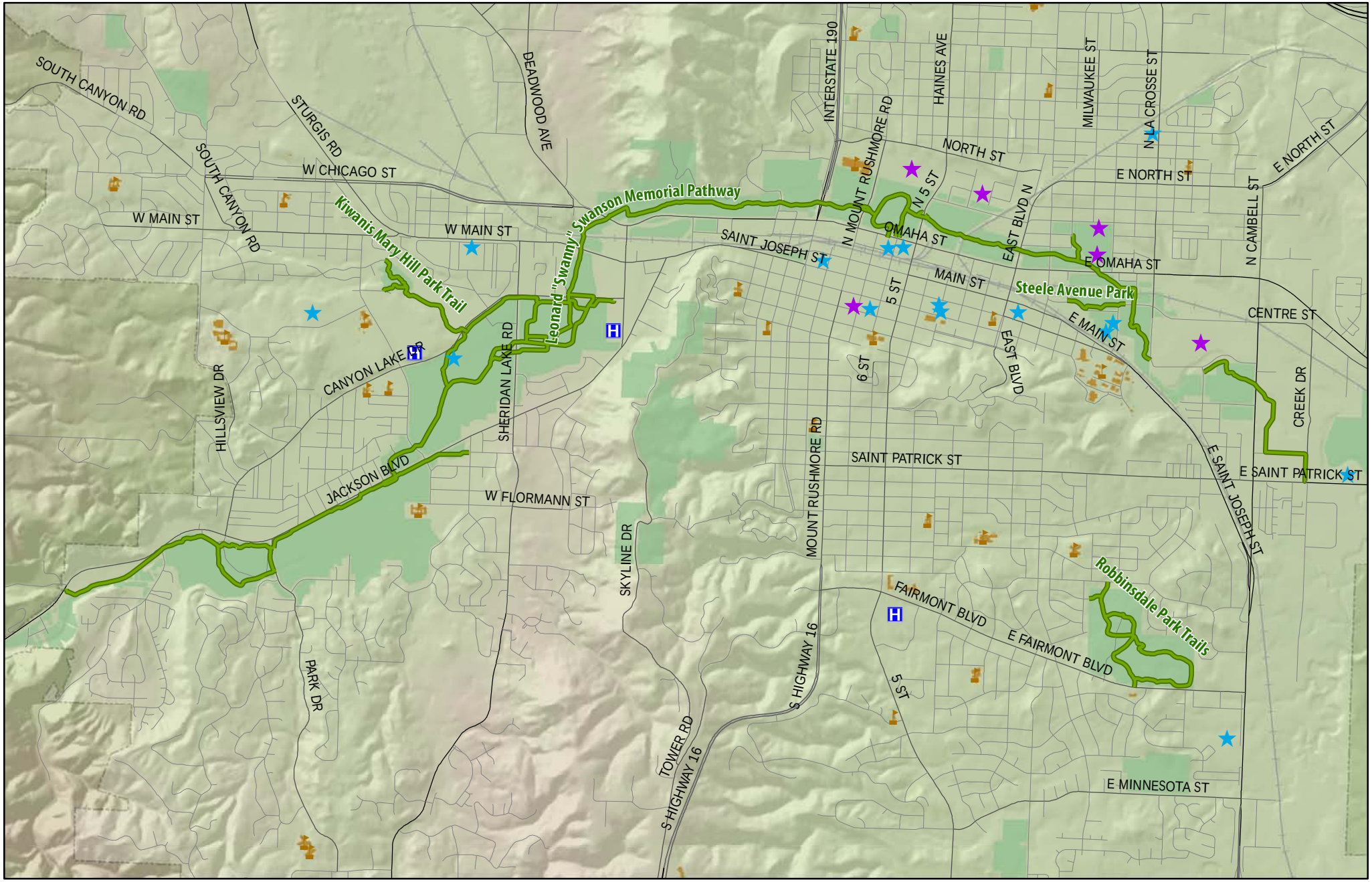
Figure 9. The Leonard "Swanny" Swanson Memorial Pathway is a popular walking and bicycling facility.

Table 1. Existing Shared-Use Paths with Exclusive Right-of-Way

Pathway Name	Pathway Limits	Length (mi)
Leonard "Swanny" Swanson Memorial Pathway	Jackson Boulevard - E St Patrick Street	11.8
Kiwanis Mary Hall Park Trail	Brookside Drive - Canyon Lake Drive	0.8
Robbinsdale Park Trails	Internal trail	1.8
Steele Avenue Park	Elm Avenue - Steele Avenue	0.3
Total shared-use paths with exclusive right-of-way:		14.6

Side Paths

Several shared-use paths in the Rapid City area are directly adjacent to roadways and within the street right-of-way (Figure 10). These 'side paths' serve both bicyclists and pedestrians and are wider than a standard sidewalk. Side paths provide routes between residential areas and employment centers as well as to retail areas.



Map 1. Existing Shared-Use Paths

Rapid City Area
Bicycle and Pedestrian Master Plan

Source: Data obtained from Rapid City MPO
Author: HWK
Date: August 2010

0 0.4 0.8 Miles

Shared-Use Path
Hospital
Civic Destination
Recreational/Tourist Destination
School
Parks
Railroads
City of Rapid City

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Most side paths in Rapid City have a buffer from the roadway, while at intersections the side path turns toward the street so bicyclists cross at intersections. However, drivers at intersections or entering and exiting driveways may not be expecting faster moving bicyclists traveling adjacent to the roadway and sometimes against the flow of traffic. Because bicyclists are expected to stop at every intersection on a side path even along a main street that has right-of-way, riding on a side path is slower than on-street riding and many commuter or long-distance riders prefer riding on street.

Table 2 lists the side paths currently existing in Rapid City.

Figure 10. Less-confident bicyclists can use side paths adjacent to roads to avoid mixing with vehicle traffic in Rapid City.

Table 2. Existing Side Paths

Street Name	Side Path Extent	Length (mi)
5th Street	Texas Street - E Minnesota Street	0.51
5th Street	Columbus Street - Cleveland Street	1.04
Anamosa Street	Milwaukee Street – Racine Street	0.23
Cambell Street	Rocker Drive - E Saint James Street	0.18
Elm Avenue	E Talent Street – E Oakland Street	0.2
E Fairlane Drive	Fairmont Boulevard - Maple Avenue	0.06
E Minnesota Street	Odde Drive - Minnesota Street Park	0.32
E Minnesota Street	5th Street - West of Parkview Drive	0.36
E Saint Patrick Street	Creek Drive - Star of the West Sports Complex	0.42
Haines Avenue/N 5th Street	North of Cobalt Drive - Omaha Street	4.11
Hillsview Drive	Raider Road - W Saint Patrick Street	0.29
Lemmon Avenue/N 1st Street/Memorial Park East	College Avenue - Memorial Park East Trail	0.98
Omaha Street	Mount Rushmore Road - 5th Street	0.29
Park Drive	Canyon Lake Park to Corral Drive	1.66
Parkview Drive	E Minnesota Street - Parkview Park	0.22
Range Road	Raider Road - Soo San Drive	0.60
Sheridan Lake Road	Corral Drive to Wildwood Drive	0.96
Sheridan Lake Road/ Corral Drive	Sioux Park Trail to Park Drive	2.91
Twilight Drive	Shadow Drive - Reservoir Road	1.47
Total side paths:		**16.81**

Figure 11. Shoulder bikeways are delineated with a fog line, and can use pavement stencils and signs.

Figure 12. Designated bike lanes are designated with pavement markings and signs, and parking is prohibited.

Figure 13. Shared lane marking treatments improve visibility of bicyclists on streets where bicyclists and automobiles share a travel lane.

Bicycle Facilities

In addition to shared use paths and side paths discussed above, bicycling is often accommodated using on-street bicycle facilities and improvements.

On-street bikeways can take several forms, depending on the speed and volume of traffic on the roadway, space available to accommodate bicyclists, and type of user expected on the facility. Formal on-street bikeways facility types include:

- Shoulder bikeways – paved roadways with striped shoulders wide enough for bicycle travel, may include signs. (Figure 11)
- Bike lanes – separate roadway space for bicycles accompanied by pavement stencils and signage. (Figure 12)
- Shared lanes – roads where bicyclists and automobiles share a travel lane. Two types of shared lanes include:
    - Shared lane markings can be used on shared streets with higher vehicular speeds and volumes, to improve visibility of bicyclists (Figure 13).
    - Signed shared roadways are low traffic speed and volume streets, where greater separation is not necessary to accommodate bicyclists of all abilities.

Currently Rapid City has only a few formalized on-street bikeways. An un-signed wide shoulder on Mountain View Road is designated for bicycle travel. Sixth Street from Omaha Street to Kansas City Street is under development as a shared lane.

Bicycles are not prohibited on any roads in Rapid City, including I-90 and I-190. As such, the city's entire street network is effectively the bicycle network, regardless of whether or not a bikeway stripe, stencil, or sign is present on a given street. Bicyclists share the road with cars on streets with lower traffic speeds and volumes, or on roadways with a wide shoulder where a bicyclist can avoid riding in traffic.

In addition to these on-street bicycle facilities, cycle tracks and mountain bicycling areas accommodate off-street bicycle travel, described below.

Cycle Tracks

A cycle track is a hybrid facility combining the experience of a side path with the on-street infrastructure of a conventional bike lane (Figure 14). Cycle tracks provide exclusive space for bicyclists that is physically separated from pedestrians and motor vehicle drivers. Cycle tracks are appropriate on streets with high traffic volumes where greater separation is needed, and where cross-traffic is limited. Cycle tracks require special attention at intersections. Likewise, maintenance needs to be a factor when considering the use of cycle tracks.

Figure 14. Cycle track on Kansas City Street.

Rapid City has a cycle track on Kansas City Street in downtown. However, the street usually has low automobile traffic speeds and volumes, and many bicyclists tend to ride in the street rather than on the cycle track.

Mountain Bicycling Trails

In addition to the transportation and recreation routes listed above, the Rapid City area is home to high-quality mountain bicycle opportunities and hiking trails. The "M Hill" area north of Omaha Street and west of I-190 has several mountain bicycling trails of varying difficulty. These trails provide recreational opportunities to Rapid City residents as well as visitors to the area. High-quality bicycle and pedestrian routes should be provided to encourage riders or hikers to access the system via nonmotorized means.

Related Facilities/Services

Bike Parking

Bike parking is a critical component of a community's bikeway network and can strongly influence one's decision whether to complete a trip via bicycle. Some bike racks are provided in downtown Rapid City near the library (see Figure 15), in a few other sidewalk locations, and at local schools.

Figure 15. Bicycle parking at the library.

The quality of existing bike parking facilities varies by location, particularly due to the style of rack chosen and/or placement of the rack. For example, some existing racks near schools are considered substandard

Figure 16. Bike racks provided at several schools do not support bicycles when they are locked.

because they do not provide sufficient points of contact to support a bicycle at two points (Figure 16). In other words, they do not allow a bicycle frame and at least one wheel to be locked to the rack without the use of a long bicycle cable or mounting the bicycle over the rack.

Informal bike parking includes bicycles locked to hand rails, street signs, light poles and other objects and indicates a demand for additional bike parking supply. Some bikes were observed informally parked in downtown Rapid City, suggesting that insufficient formal bike parking is being provided and/or that it is not conveniently located in close proximity to a storefront or building entrance.

Figure 17. RapidRide bus stop with a bench but no concrete waiting pad between the street and sidewalk.

Transit Connections

The Rapid Transit System (RTS) serves the metropolitan area and carries more than 215,000 annual passenger trips.[1] RapidRide is the fixed-route transit service for the Rapid City area and consists of five routes with 30-minute headways serving the north, south and west areas of the region.

Providing a strong pedestrian and bicycle link to transit is an important part of making non-motorized transportation a part of daily life in the Rapid City area. There are several main components of bicycle and pedestrian transit integration:

- Allowing bicycles on transit, either by providing bicycle racks on the front of buses and/or allowing bicycles to be brought on the buses;
- Providing benches, shelters, posted schedules, bicycle parking and other features at transit stops; and
- Improving connections between walkways, bikeways and transit

[1] Rapid City 2009-2013 Transit Development Plan (2009)

RapidRide buses are already equipped with front-mounted bicycle racks that hold two bicycles. However, RapidRide's website or the individual route schedules do not provide any information about riding the bus with a bicycle. Adding information about the availability of the bicycle racks on the buses and how to use them onto RapidRide's website and/or schedules would be an easy and low-cost improvement the City could quickly implement.

While the RapidRide transit system provides transportation options in the Rapid City area, the service is limited by the service hours of 7 am to 6 pm, which requires passengers to be at the station by 5:30 at the latest. In addition, the routes are limited in extent and several populated areas are not served by transit. The availability of the bicycle racks on the buses can help extend the system's coverage area if passengers combine bus and bicycle trips.

Some bus stops do not provide shelter, which can be a deterrent for potential riders during snow in the winter, heat in the summer, and thunderstorms year-round. Several do not include a concrete pad or curb ramp, which provide an accessible route to the stop.

The RTS also operates the City View Trolley and the Dial-a-Ride paratransit service. Operating from Memorial Day weekend through mid-October, the trolley provides a narrated tour of Rapid City and is mostly geared to visitors. The Dial-a-Ride paratransit service serves persons with disabilities and seniors who cannot use the RapidRide fixed route transit service. Neither of these services provides bicycle accommodation, which could encourage bicycle tourism and assist bicycling to transit.

Table 3 shows ridership numbers for 2009 and 2010.

Table 3. Rapid Transit System Ridership, 2009-2010

Year	RapidRide	Dial-A-Ride	City View Trolley
2009	218,476	71,775	124 (Daily Average)
2010	250,286	75,324	146 (Daily Average)

Pedestrian and Bicyclist Destinations

It is particularly important for the bicycle and pedestrian networks to provide access to popular destinations in the community. Within Rapid City area, popular destinations include:

- Educational Facilities: the South Dakota School of Mines and Technology, the National American University, Western Dakota Technical Institute, the University of South Dakota's School of

Nursing, Black Hills State University (four locations), elementary schools, junior high schools, and high schools.

- Employment Centers: Rapid City Regional Hospital, Wal-Mart/Sam'sClub, Green Tree, NEW Finance Corporation, and others.
- Commercial Areas: the Rushmore Mall, the East Family Thrift Center, the Midland Shopping Center, Baken Park, the City of Rapid City's central business district, and neighborhood commercial areas.
- Hospitals and Health Centers: Rapid City Regional Hospital, Rapid City Regional West – Center for Behavioral Health, Sioux San Indian Hospital, Rapid City Community Health Center, Black Hills Rehabilitation Center.
- Downtown Rapid City: Rapid City Public Library, the Rushmore Plaza Civic Center and the Journey Museum.
- Regional parks: Badlands National Park, Wind Cave National Park, Devil's Tower National Parks, and the Black Hills trails.
- Regional national areas: Mount Rushmore National Memorial and the Jewel Cave National Monument.

System Opportunities and Constraints

This section provides an overview of the positive characteristics that currently support walking and bicycling, and it identifies potential barriers to accommodating and encouraging bicycle and pedestrian trips, which this plan seeks to address. Appendix C provides additional discussion of these opportunities and constraints, as well as a review of existing conditions by area.

Opportunities

Positive characteristics that currently support bicycling and walking in Rapid City include:

Figure 18. Pedestrians walk in the median along West Boulevard.

- Topography in the downtown area
- Downtown land use characteristics
- Presence of existing walk- and bike-friendly streets
- Existing spine trail
- Presence of grade-separated shared-use path crossings of streets
- Available space to implement low-cost improvements

Constraints

However, people walking and bicycling in and around the Rapid City area face a variety of challenges, including:

- Challenges crossing some major streets,
- Roadway connectivity barriers formed by interchanges, Rapid Creek, and railroads
- Limited street system connectivity
- Lack of wayfinding tools such as signs guiding bicyclists to key destinations
- User conflicts on trails
- Maintenance issues
- Uncomfortable travel environments along high-volume roadways
- Fragmented sidewalk network in some areas
- Sidewalk obstructions and access, including utility poles, snow storage, and ADA-accessibility
- Lack of on-street bikeways

Figure 19. The 'Gap' (West Main Street between Jackson Boulevard and 12th Street) presents significant difficulties for bicycle access.

Chapter 3. User Needs Assessment

This chapter presents an overview of the needs of existing and potential pedestrians and bicyclists in the Rapid City area. Adequate identification of user needs enables planners and policy-makers to develop sound solutions for improving the community's bicycle and pedestrian networks.

The second part of this chapter summarizes estimates of existing and future system demand. The text presents a model that predicts the number of bicycle and pedestrian trips currently occurring and that may occur in the future in the Rapid City area. The travel demand model also estimates the resulting air quality benefits as well as difficult-to-quantify benefits of improved walking and bicycling networks in Rapid City such as livability, safety, public health, and other benefits.

Needs and Types of Bicyclists

The needs and preferences of bicyclists vary depending on a bicyclist's skill level and the type of trip a rider wishes to take. This plan aims to provide more comfortable and direct bicycling routes for existing cyclists and to encourage other residents and visitors to begin riding for transportation and/or recreation.

Needs of Casual and Experienced Riders

Casual bicyclists typically include youth, adults and seniors who ride a few times per month or less. Child bicyclists, seniors and adults new to bicycling may prefer shared use paths, while bicyclists with more experience may prefer on-street facilities like bike lanes. Bicyclists who ride for recreational purposes may prefer scenic, winding, shared use paths whereas bicyclists who ride to work or for errands may prefer more direct on-street bicycle facilities. Table 4 summarizes the needs of casual and experienced bicyclists.

Due to the existing shared use path, Rapid City offers many opportunities for casual bicyclists. In several locations, the existing shared use paths are accessible from residential neighborhoods. Many experienced bicyclists also use the trail system. This combination of fast-moving bicyclists on training rides with slower-moving bicyclists and pedestrians may result in user conflicts.

Table 4. Characteristics of Casual and Experienced Bicyclists

Casual Riders	Experienced Riders
Prefer off-street shared use paths or bike lanes along low-volume, low-speed streets	Prefer on-street or bicycle-only facilities as opposed to shared use paths
May have difficulty gauging traffic and may be unfamiliar with the rules of the road. May walk bicycle across intersections	Comfortable riding with vehicles on streets. Negotiate streets like a motor vehicle, including "taking the lane" and using left-turn pockets
May use a less direct route to avoid Arterials with heavy traffic volumes	May prefer a more direct route
May ride on sidewalks and ride the wrong way on streets to avoid a difficult crossing or to access a destination on a particular side of the street.	Avoid riding on sidewalks or on shared use paths. Rides with the flow of traffic on streets
May ride at speeds slightly faster than walking	Ride at speeds up to 20 MPH on flat ground, up to 40 mph on steep descents
Bicycle for shorter distances: up to 2 miles	May cycle longer distances, sometimes more than 100 miles

Characteristics of Recreational and Utilitarian Trips

Bicycle trip purposes can be separated into recreational and utilitarian trips. Recreational trips can range from a short family outing to a local park to a long distance group ride or something in between. Many utilitarian trips are made by commuter bicyclists going to and from work or school, as well as people who use bicycles to go shopping or run other errands. Utilitarian bicyclists include those who choose to use a bicycle as a means of transportation as well as those who have no other alternative transportation due to economic, medical or licensing reasons. Table 5 summarizes general characteristics of recreational and utilitarian bicycle trips.

The Rapid City area's shared-use path system provides excellent access to several parks, recreation areas and downtown. However, not all neighborhoods have easy bicycle access to employment centers, schools and shopping. For casual recreational riders, this may not be a serious deterrent, since they may be willing and able to drive with their bicycle to a shared-use path access point. However, this may not be desirable for more experienced recreational riders or commuters as they typically like to use their bicycles for the whole trip. Bicycle-friendly on-street connections between residential areas and the trails and between residential areas and shopping and commute destinations would likely increase the prevalence of bicycle commuting and may also increase recreational riding.

Table 5. Characteristics of Recreational and Utilitarian Bicycle Trips

Recreational Trips	Utilitarian Trips
Directness of route not as important as visual interest, shade, protection from wind	Directness of route and connected, continuous facilities more important than visual interest, etc.
Loop trips may be preferred to backtracking	Trips generally travel from residential to shopping or work areas and back
Trips may range from under a mile to over 50 miles	Trips generally are 1-5 miles in length
Short-term bicycle parking should be provided at recreational sites, parks, trailheads and other activity centers	Short-term and long-term bicycle parking should be provided at stores, transit stations, schools, workplaces
Varied topography may be desired, depending on the skill level of the cyclist	Flat topography is desired
Cyclists may be riding in a group	Bicyclists often ride alone
Cyclists may drive with their bicycles to the starting point of a ride	Bicyclists ride a bicycle as the primary transportation mode for the trip; may transfer to public transportation; may or may not have access to a car for the trip
Trips typically occur on the weekend or on weekdays before morning commute hours or after evening commute hours	Trips typically occur during morning and evening commute hours (commute to school and work); shopping trips also occur on weekends
Cyclists' preferred type of facility varies, depending on the skill level of the cyclist	Generally use on-street facilities, may use trails if they provide easier access to destinations than on-street facilities

Bicycle and Pedestrian Safety

Safety concerns are another reason to improve bicycling conditions in Rapid City. Although the incidence of collisions involving bicycles may be low, concerns about safety have historically been the single greatest reason people do not commute by bicycle, as captured in polls as early as 1991.[2] A national Safe Routes to School survey in 2004 similarly found that 30 percent of parents consider traffic-related danger to be a barrier to allowing their children to walk or bike to school.[3] Addressing those concerns for bicyclists through physical and program improvements is another major objective of this plan. Improving safety for bicyclists can also be accomplished by increasing the number of people who walk and bike; as

[2] Lou Harris Poll (2001)

[3] U.S. Centers for Disease Control and Prevention. *Barriers to Children Walking to or from School United States 2004, Morbidity and Mortality Weekly Report* September 30, 2005. Available:www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm.

more people walk, a pedestrian's risk of being injured by a motorist is reduced.[4]

Safety Needs Analysis

Local crash data is a valuable source of information for identifying difficult areas of the community for bicyclists and pedestrians to traverse. It can also highlight specific interactions between bicyclists and motorists and pedestrians and motorists that require increased awareness or engineering.

Appendix E provides an overview of bicycle crash typologies and common unsafe bicyclist behaviors, which can be addressed through engineering and education or awareness programs. The appendix also presents a summary of crash data involving bicycles and pedestrians provided by the City for the Rapid City Pedestrian/Bicycle Crash Report (2002-2008) as well as state records from 2004-2008. The 2002-2008 Pedestrian and Bicycle Crash Report identifies trends and specific locations to target improvements.

Key findings from this safety analysis include:

- Between 2002 and 2008, 121 crashes involving bicyclists and 136 crashes involving pedestrians were reported in the City of Rapid City.
- A high incidence of crashes occurred in the month of October between the hours of 12:00 pm and 7:00 pm.
- Over half of bicyclists and the majority of pedestrians involved in crashes were under 20 years of age.

While the majority of crashes involving bicyclists were due to ride-out crashes, crash location indicates locations where expectations of bicyclists and motorists may not be clear or where other improvements might benefit bicyclists.

Crash Location

The majority of crashes involving pedestrians occurred within Rapid City's downtown and along major corridors including Mt. Rushmore Road, 5th Street/Haines Avenue, and East Boulevard/E North Street. Crashes involving bicyclists occurred more commonly along Van Buren Street, St. Patrick Street, W. Main Street, and Jackson Boulevard. Most of these streets are busy with more than two lanes of traffic. In several locations, bicyclists have few alternate routes and because they need to access nearby destinations.

[4] Jacobsen, P.L. (2003). *Safety in numbers: more walkers and bicyclists, safer walking and bicycling.* Injury Prevention 9:205-209.

The majority of the crashes involving bicycles and pedestrians took place at an intersection (Figure 20). Measures to increase visibility of bicycles and pedestrians at all crossing locations would increase safety for bicyclists and pedestrians. Complicated intersections should be simplified where possible.

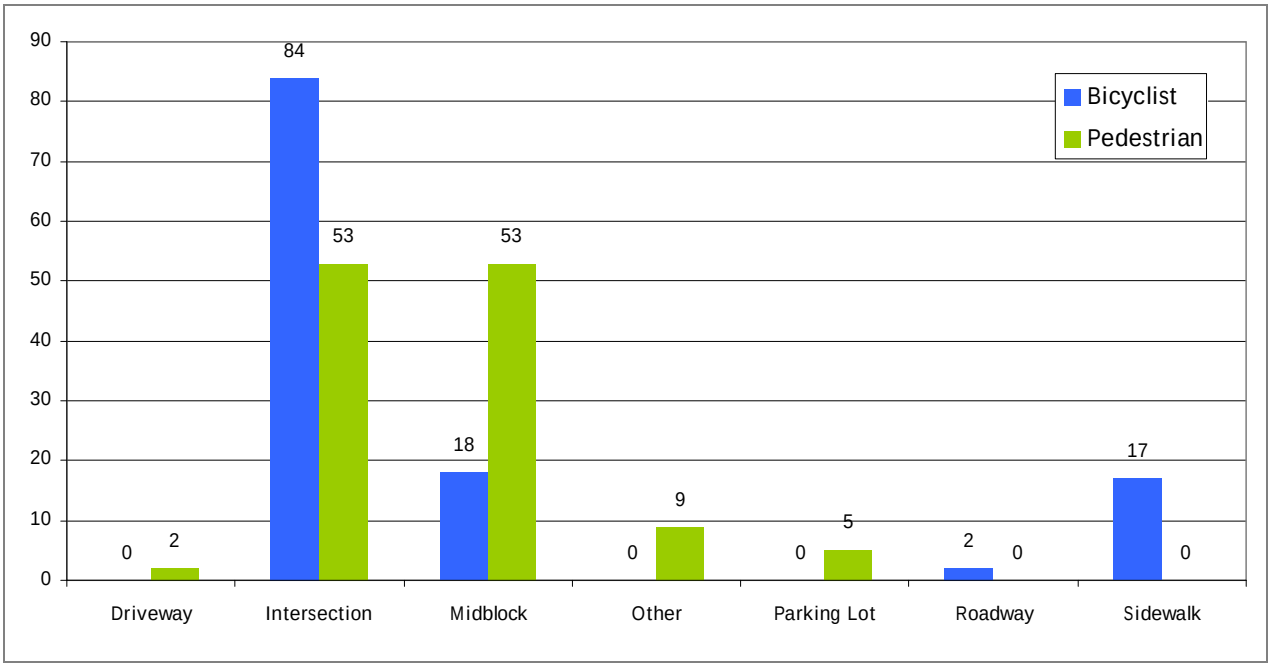

Figure 20. Location of Crashes Involving Bicyclists and Pedestrians, 2002-2008

Analysis

Locations that have experienced crashes are prioritized in the Bicycle and Pedestrian Master Plan recommendations. In addition, the types of crashes bicyclists tend to be involved in indicates lack of awareness and a need for improved facilities that offer clear guidance to drivers and bicyclists about which mode is expected to yield in different situations.

Appendix E provides additional analysis of the crash data in Rapid City.

Predicting Walking and Bicycling Demand

Demand models estimate usage of existing pedestrian and bicycle facilities and anticipate the potential usage of new facilities. The model used in this plan is based on data from the U.S. Census American Community Survey (ACS) 2006-2008 and other planning documents from the City of Rapid City and the MPO. This model assumes that, in addition to people who reported they commute exclusively by bicycle or walking that:

- A proportion of people that commute via transit access it on foot or by bicycle,
- A number of people who work from home take trips during the day, and
- Groups not captured by traditional commute trips tend to have a higher nonmotorized mode split, particularly students.

Full model assumptions and methodology can be found in Appendix D.

Table 6 and Table 7 show the models predicting the number of daily pedestrian and bicycle trips in the Rapid City area. (Note: trips are defined in the Census as primary mode; this analysis separated partial trips that are taken by walking or bicycling, including access to transit.)

Table 6 . Existing Pedestrian Demand Model Results

Variable	Value	Source
Study area population	120,858	ACS 2006-2008 estimate for the Rapid City Metropolitan Area
Employed population	61,757	ACS Population of workers over 16
Walk-to-work mode share	2.0%	ACS Means of transportation to work for workers over 16
Number of walk-to-work commuters	1,239	(employed persons) * (walking mode share)
Work-at-home mode share	4.8%	ACS Means of transportation to work for workers over 16
Number of work-at-home walk commuters	739	Assumes 25% of population working at home makes at least one daily walking trip
Transit-to-work mode share	0.7%	ACS Means of transportation to work for workers over 16
Transit pedestrian commuters	392	Assumes 85% of transit riders access transit by foot
School children, ages 6-14	19,726	ACS 2006-2008 School enrollment by level of school
School children walking mode share	11.0%	National Safe Routes to School surveys, 2003
School children walk commuters	2,170	(school children pop.) * (walking mode share)
Number of college students	7,161	ACS 2007 School enrollment by level of school
Estimated college walking mode share	60.0%	*National Bicycling & Walking Study*, FHWA, Case Study 1, 1995
College walking commuters	4,297	(college student pop.) * (walking mode share)
Total number of walk commuters	8,837	(bike-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
School and commute walking trips subtotal	17,673	Total walk commuters x 2 (for round trips)
Other utilitarian and discretionary trips:		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	48,248	
Current Estimated Daily Pedestrian Trips:	**65,921**	

Table 7. Existing Bicycle Demand Model Results

Variable	Value	Source
Study area population	120,858	ACS 2006-2008 estimate for the Rapid City Metropolitan Area
Employed population	61,757	ACS Population of workers over 16
Bike-to-work mode share	0.1%	ACS Means of transportation to work for workers over 16
Number of bike-to-work commuters	62	(employed persons) * (bicycling mode share)
Work-at-home mode share	4.8%	ACS Means of transportation to work for workers over 16
Number of work-at-home bike commuters	296	Assumes 10% of population working at home makes at least one daily bicycle trip
Transit-to-work mode share	0.7%	ACS Means of transportation to work for workers over 16
Transit bicycle commuters	115	Assumes 25% of transit riders access transit by bicycle
School children, ages 6-14	19,726	ACS 2007 School enrollment by level of school
School children bicycling mode share	2.0%	*National Safe Routes to School* surveys, 2003
School children bike commuters	395	(school children pop.) * (bicycling mode share)
Number of college students	7,161	ACS 2007 School enrollment by level of school
Estimated college bicycling mode share	5.0%	National Bicycling & Walking Study, FHWA, 1995
College bicycling commuters	358	(college student pop.) * (bicycling mode share)
Total number of bike commuters	1,110	(bike-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
School and commute bicycling trips subtotal	2,221	Total bicycle commuters x 2 (for round trips)
Other utilitarian and discretionary trips:		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	6,062	
Current Estimated Bicycle Trips:	**6,062**	

The bicycle and pedestrian demand model for the Rapid City area indicates that approximately 65,600 walking trips and more than 6,000 bicycle trips are taken each day. The model also indicates the largest group of pedestrians is school students (around 2,000) and the largest trip purpose is for non-work-related commute trips (approximately 48,000). Likewise, most bicycle commuting trips in Rapid City are made by school students (almost 400). The model also shows that non-commuting trips comprise the vast majority of existing bicycle demand. Note: These numbers are applicable to weekdays only and are averaged over the course of the year.

Current Air Quality Benefits

The expected number of walking and bicycling trips in the Rapid City can be directly translated into reduced motor vehicle trips. This number can be used to determine approximate reduction in motor vehicle miles traveled (VMT), which has a direct effect of reducing vehicular emissions and improving air quality.

Table 8. Vehicle Trips/VMT Reduction for Current Bicycle and Pedestrian Trips

Variable	Pedestrian Trips	Bicycle Trips
Reduced Vehicle Trips per Weekday*	6,017	816
Reduced Vehicle Trips per Year	1,570,363	212,904
Reduced Vehicle Miles per Weekday†	6,415	5,062
Reduced Vehicle Miles per Year	1,674,326	1,321,217

* Assumes 73% of walking/bicycling trips replace vehicle trips for adults/college students and 53% for school students.
† Assumes average walking round trip travel length of 1.2 miles for adults/college students and 0.5 mile for school children and bicycling trip length of 8 miles for adults/college students and 1 mile for school children.

From the model's estimate of the current levels of bicycling and walking in the Rapid City area, it is possible to calculate that bicycling and walking currently replace approximately 6,000 motor vehicle trips every weekday (trips that otherwise would be made via automobile). The reduction of 6,000 motor vehicle trips daily equates to an annual reduction of more than 1,600,000 vehicle miles. Table 8 illustrates the results of the vehicle trips and vehicle mileage reduction from existing pedestrian and bicycle trips, respectively. Notably, the replacement of 6,000 motor vehicle trips each weekday results in 11,000 pounds less carbon dioxide emitted in Rapid City daily, which totals over 1.77 million pounds less carbon dioxide emitted annually.

Additional air quality benefits from the existing bicycle and walking trips taken in Rapid City are enumerated in Appendix D.

Estimating Future Walking and Bicycling Trips

Estimating future benefits requires additional assumptions regarding Rapid City's future population and commuting patterns in the year 2035. Future population predictions determined by the Rapid City MPO were used in this model. The mode split variables used as model inputs represent a realistic, achievable goal of what the daily number of pedestrian and bicycle trips could be with a more complete pedestrian and bikeway system.

The future analyses assume a more complete pedestrian and bicycle transportation network and concurrent program development to encourage use. Walking and bicycling commute mode share was increased to address the higher use potentially generated by the addition of new facilities and enhancements to the existing system. Based on this analysis, it is anticipated that daily pedestrian trips will increase to 109,000 and bicycle trips will increase to almost 29,500 trips by 2035. While this is a substantial increase over existing numbers of trips, each additional person walking or bicycling is expected to take several trips, and people who may not have walked or bicycled at all previously may begin walking or bicycling.

Based on projected population growth and the expected increase in walking and bicycling, developing the Rapid City bicycle and pedestrian network will replace about 12,000 weekday motor vehicle trips, which would eliminate more than 8,000,000 motor vehicle miles traveled per year and result in a substantial decrease in vehicle emissions (see Table 9).

Table 9. Vehicle Trips/VMT Reduction for (2035) Future Pedestrian and Bicycle Trips

Variable	Pedestrian Trips	Bicycle Trips
Reduced Vehicle Trips per Weekday*	9,888	2,777
Reduced Vehicle Trips per Year	2,580,885	724,843
Reduced Vehicle Miles per Weekday†	11,796	20,018
Reduced Vehicle Miles per Year	3,078,741	5,224,805

* Assumes 73% of bicycle trips replace vehicle trips for adults/college students and 53% for school children.
† Assumes average walking round trip travel length of 1.2 miles for adults/college students and 0.5 mile for school children, and average bicycle round trip \ length of 8 miles for adults/college students and 1 mile for school children.

Difficult-to-Quantify Benefits of Bicycling

Although bicycling is known for its environmental and health benefits, it also has tangible economic benefits. The League of American Bicyclists reported that bicycling makes up $133 billion of the US economy, funding 1.1 million jobs.[5] The League also estimates bicycle-related trips generate another $47 billion in tourism activity. Many communities have enjoyed a high return on their investment in bicycling. For example, the Outer Banks of North Carolina spent $6.7 million to improve local bicycle facilities, and reaped the benefit of $60 million of annual economic activity associated with bicycling.[6]

Figure 21. Walking and bicycling are safe, healthy, and fun activities that contribute to quality of life.

Multiple studies have also shown that walkable, bikeable neighborhoods are more livable and attractive, increasing home values, [7] and resulting in increased wealth for individuals and additional property tax revenue. Similarly, bike lanes can improve retail business directly by drawing customers and indirectly by supporting the regional economy. Patrons who walk and bike to local stores have been found to spend more money to visit local businesses than patrons who drive.[8]

By replacing short car trips, bicycling and walking can help families defray rising transportation costs. Families that can replace some of their driving trips with walking or bicycling trips send a lower proportion of their income on transportation, compared to households that rely on cars[9] freeing additional income for local goods and services.

Bicycling can also improve quality of life. Since bicycling is among the most popular forms of recreational activity in the U.S.,[10] when bicycling is available as a daily mode of transportation, substantial health benefits result. The health benefit of bicycling for exercise can reduce the cost of

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[5] Flusche, Darren for the League of American Bicyclists. (2009). *The Economic Benefits of Bicycle Infrastructure Investments.*

[6] N.C. Department of Transportation, Division of Bicycle and Pedestrian Transportation. (). *The Economic Impact of Investments in Bicycle Facilities.* atfiles.org/files/pdf/NCbikeinvest.pdf

[7] Cortright, Joe for CEOs for Cities. (2009). *Walking the Walk: How Walkability Raises Home Values in U.S. Cities.*

[8] The Clean Air Partnership. (2009). *Bike Lanes, On-Street Parking and Business: A Study of Bloor Street in Toronto's Annex Neighborhood.*

[9] Center for Neighborhood Technology. (2005). *Driven to Spend: Pumping Dollars out of Our Households and Communities.*

[10] Almost 80 million people walking and 36 million people bicycling for recreation or exercise nationally, and 27.3 percent of the population over 16 bicycling at least once over the summer. (National Sporting Goods Association survey, 2003)

employer spending on health care by as much as $500 a year (by decreased sick leave and compensation), which provides a financial incentive to businesses that provide health coverage to their employees.[11]

[11] Feifei, W., McDonald, T., Champagne, L.J., and Edington, D.W. (2004). *Relationship of Body Mass Index and Physical Activity to Health Care Costs Among Employees.* Journal of Occupational and Environmental Medicine. 46(5):428-436

Chapter 4. Recommendations

This chapter lays out a 20-year plan for completing the system of walkways, bikeways, and shared-use paths. The recommended network builds upon previous and on-going local and regional planning efforts and reflects the extensive input offered by city staff, the project Steering Committee, bicycle and pedestrian stakeholder groups, and Rapid City residents.

The recommended bicycle and trail network includes a comprehensive and diverse set of bicycle and trail facilities connecting key destinations in and around Rapid City. System improvements include establishing a formalized on-street bikeway system, completing gaps in the existing sidewalk system, upgrading intersections for safer trail crossings, and projects to enhance safety and encourage bicycling and walking. Suggested improvements include low-cost measures yielding immediate results, such as re-striping of streets to accommodate bike lanes. Other improvements, such as expanding the local trail system, represent longer-term strategies for transforming Rapid City into a truly bicycle- and pedestrian-friendly community.

The Bicycle and Pedestrian Master Plan allows the City of Rapid City to focus and prioritize implementation efforts where they will provide the greatest community benefit.

Recommended Walkway Improvements

The recommended pedestrian network builds upon Rapid City's existing system of sidewalks and shared-use paths. The City completed an inventory of sidewalks on arterial and collector roadways, which was used to identify major roads without sidewalks on either side of the road. While sidewalks on both sides of a street are preferred, they are particularly necessary near pedestrian attractors, such as schools and community centers and in the downtown area. In addition, along major roads where crossings are further than an eighth of a mile apart, sidewalks should be provided on both sides to accommodate pedestrians walking to a crossing.

Sidewalk Project Selection

A sidewalk inventory developed by Rapid City staff was used to locate gaps in the sidewalk network on arterial and collector streets. The Bicycle and Pedestrian Master Plan sidewalk project list includes identified sidewalk gaps on either side of the street. Criteria used to identify the priority project list prioritized demand paths, which indicate where people walk despite the lack of sidewalk. Sidewalks adjacent to pedestrian trip attractors are also prioritized, as pedestrian activity is expected to be high close to these uses. Criteria used to prioritize sidewalks are shown in Table 10.

Table 10. Sidewalk Prioritization Criteria Selection

Criteria	Score	Measurement
Land Uses	12	Within 1/8 mile of a school, park, or destination (includes work release sites, hospitals, fire department stations, civic uses, the Rapid City Public Library, and others)
	8	Project within ¼ mile of school, park, or destination
	4	Project within ½ mile of school, park, or destination
	0	Project further than ½ mile to a school, park, or destination
Roadway Classification	15	Principal arterial
	10	Minor arterial
	5	Collector
Demand	20	Existing demand path
	0	No existing demand path
Transit	8	Within 1/8 mile of a bus route
	4	Project within ¼ mile of a bus route
	2	Project within ½ mile of a bus route
	0	Project further than ½ mile of a bus route

Sidewalk Recommendations

Table 11 and Table 12 show the high-priority sidewalk projects in the city and the three-mile planning area, respectively. All recommended sidewalk improvements are shown in Map 2.

Table 11. Top City Sidewalk Projects

Name	Extent	Length (miles)	Land Uses	Classification	Demand	Transit	Total Points	Side
5th Street	South Street - Clark Street	0.05	12	15	20	8	55	West
Cambell Street	Centre Street - Rocker Drive	0.23	12	15	20	8	55	Both
Cambell Street	Rocker Drive - 560' S of Saint James Street	0.26	12	15	20	8	55	East
Cambell Street	280' N E St. Charles Street - E St. Patrick Street	0.18	12	15	20	8	55	East
E Omaha Street/E Highway 44	La Crosse Street - S Valley Drive	1.74	12	15	20	8	55	Both
Omaha Street	West Boulevard - Mount Rushmore Road	0.20	12	15	20	8	55	North
S 5th Street	57' S 3rd Street - 95' N Elk Street	0.15	12	15	20	8	55	West
W Omaha Street	Mountain View Road - Oshkosh Street	0.51	12	15	20	8	55	Both
W Omaha Street	Oshkosh Street - Founders Park Drive	0.21	12	15	20	8	55	North
Deadwood Avenue	N Plaza Drive - W Chicago Street	1.72	12	15	20	4	51	Both
Total City Sidewalk Recommendations		**5.25**						

Table 12. Top Sidewalk Projects in the Three-Mile Planning Area

Name	Extent	Length (miles)	Land Uses	Classification	Demand	Transit	Total Points	Side
E Highway 44	City Limits - Jolly Lane	0.52	4	15	20	0	39	Both
Haines Avenue	City Limits - Mall Drive	1.33	8	15	0	8	31	East
Country Road	City Limits - 3 Mile Limits	3.34	12	15	0	0	27	Both
Highway 16	City Limits - 3 Mile Limit	4.91	12	15	0	0	27	Both
Highway 44	Jolly Lane - 3 Mile Limit	7.45	12	15	0	0	27	Both
Jackson Boulevard	Dark Canyon Place - City Limits	1.53	12	15	0	2	29	Both
N La Crosse Street	Seger Drive - E Mall Drive	0.19	4	15	0	8	27	Both
Nemo Road	3 Mile Limit - City Limits	5.78	12	15	0	0	27	Both
Reservoir Road	Avenue A - Lamb Road	4.30	12	15	0	0	27	Both
S HIghway 79	City Limits - 3 Mile Limits	4.72	12	15	0	0	27	Both
Sheridan Lake Road	3 Mile Limit - City Limits	5.76	12	15	0	0	27	Both
W Highway 44	3 Mile Limit - City Limits	3.67	12	15	0	0	27	Both
Total Three-Mile Planning Area Sidewalk Recommendations		**43.5**						

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Prioritized Sidewalk Projects

Within City Limits

- High Priority
- Medium Priority
- Low Priority

Three-Mile Planning Area

- High Priority
- Medium Priority
- Low Priority

- Shared-Use Path
- Sidewalks Both Sides
- Sidewalk One Side
- Desire Paths
- Railroads

- Special Generators
- City of Rapid City
- Box Elder
- Three-Mile Planning Area

Note: The sidewalk inventory evaluated sidewalks on collector and arterial roadways only. Sidewalks should be provided on both sides of local streets when development or street construction occurs.

0 1 2 Miles

N

Map 2. Prioritized Sidewalk Projects

Rapid City Area
Bicycle and Pedestrian Master Plan

Source: Data obtained from Rapid City MPO
Author: HWK
Date: February 2011

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Recommended Bikeway Improvements

Although Rapid City currently lacks a comprehensive on-street bikeway network, the City could formalize a network with signs and pavement markings, as well as longer-term improvements. The following recommendations also recognize that costs and difficulty of implementation vary widely. The phasing plan divides projects into three classifications, based on ease of implementation:

- Classification I: Signed shared roadways and bike lane restriping
- Classification II: Bike lane
- Classification III: Shared-use paths and bicycle facilities on undeveloped streets

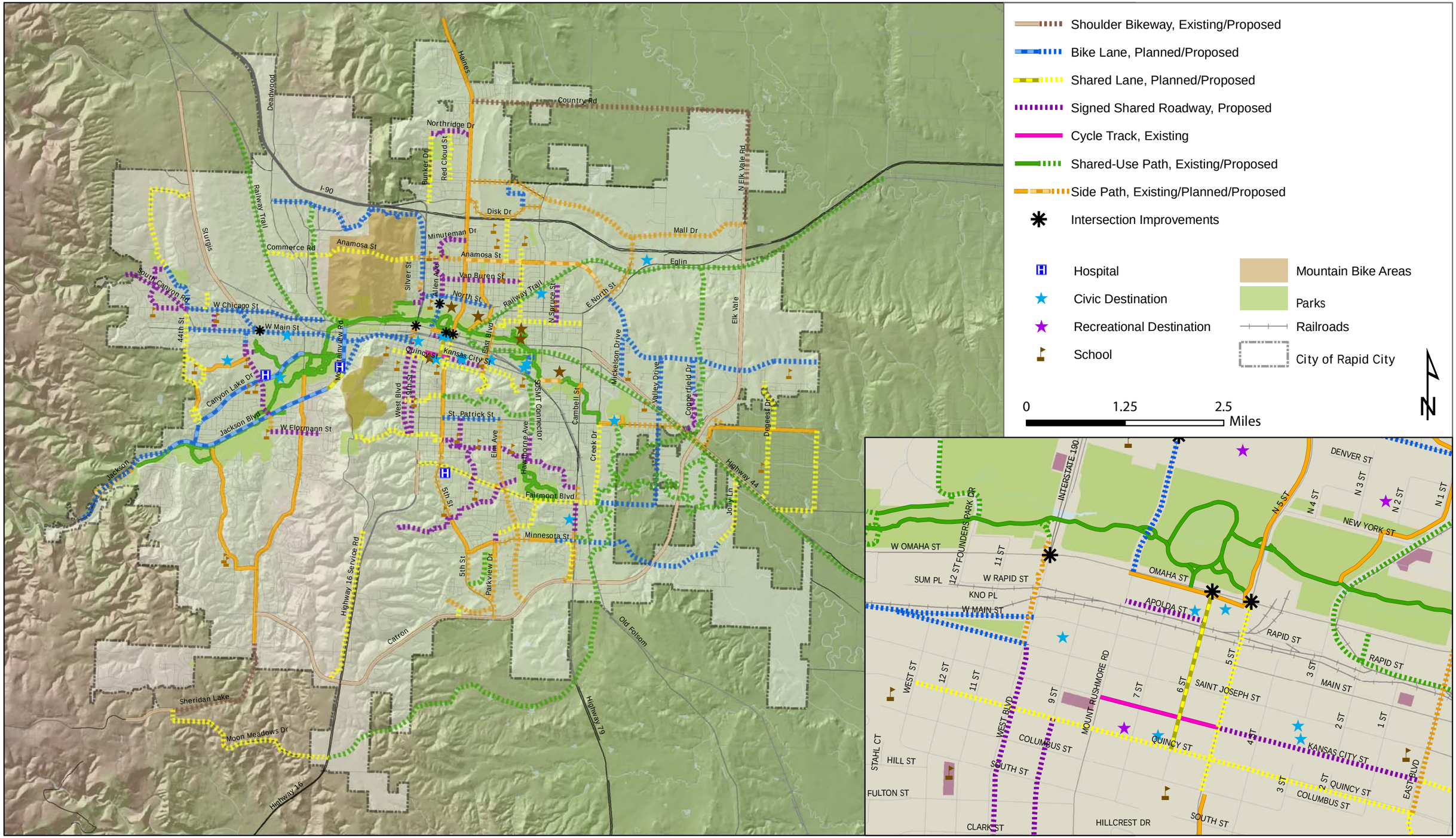
Bicycle Project Selection

The recommended bicycle network builds upon the previously proposed bikeways and connects to existing bikeways. The recommended network fills system gaps, continues expansion of the regional shared-use path network, formalizes existing routes used by bicyclists, and improves access between residential, employment, civic, and commercial destinations. Table 13 summarizes the criteria and methodology used to attribute points to each potential bikeway project. Points were assigned out of a total of 76 points. Within each of the classification groups, projects were divided into short-, medium-, and long-term in approximate thirds.

The project priorities may change according to available funds, new roadway projects, new development and redevelopment opportunities, or other factors. Medium- and long-term projects are also important and may be implemented at any point in time as part of a development or public works project. In general, as new public works projects are contemplated, bicycle accommodations should always be included regardless of priority.

Table 13. GIS-Based Bicycle Project Criteria

Criteria	Score	Measurement	Technical Notes
System Connectivity	20	Project within an 1/8 mile of existing bicycle/shared use facilities	Used 'as the crow flies' distance and considered existing bike lanes, side paths, shared-use paths, and cycle tracks.
	15	Project within a 1/4 mile of existing bicycle/shared-use facilities	
	10	Project within a 1/2 mile of existing bicycle/shared use facilities	
	5	Project provides partial connection where no other facilities exist	Visual analysis of locations where street connectivity is poor to determine critical regional links.
	0	Project further than a ½ mile of existing facilities or does not connect to the existing system	
Land Uses	12	Within 1/8 of a school, park, or destination (includes work release sites, hospitals, volunteer fire department stations, civic uses, the Rapid City Public Library, and others)	Used 'public buildings' shapefile as well as additional locations provided by the City.
	8	Project within ¼ mile of school, park, or destination	
	4	Project within ½ mile of school, park, or destination	
	0	Project further than ½ mile from a school, park, or destination	
Dedicated Facility	15	Off-street facilities and bike lanes	Based on recommended facility type.
	8	On-street bikeway along a collector road/road with posted speeds of 30 mph or less	30 mph or less
	4	On-street bikeway along a minor arterial/road with posted speed of 35-45 mph	35-45 mph
	0	On-street bikeway along a primary road/road with posted speeds of 50 mph or more	50 mph or more
Regional Benefit	15	Connects to neighboring community	Based on review of the map.
	8	Connects to outlying area in the Rapid City Area	
	0	Does not provide regional benefits	
Cost Effectiveness	14	Project team has identified sufficient space for a bike route	Based on proposed project type.
	8	Other on-street facility (additional review required)	
	6	Off-street facility	



Map 3. Recommended Bikeways

Rapid City Area
Bicycle and Pedestrian Master Plan

Source: Data obtained from Rapid City MPO
Author: HWK
Date: May 2011

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Recommendations for Shared Roadways and Bike Lane Restriping Projects

Many on-street bicycle facilities can be developed inexpensively with paint and signs. These facilities include shoulder bikeways, bike lane restriping, shared lane markings, and signed shared roadways.

Shoulder Bikeways

Rapid City has several streets with existing paved shoulders wide enough to accommodate bicyclists (four feet minimum continuously). To identify these as bicycle routes, the City should install "Bike Route" signs and repaint edge lines as needed. Accommodation for bicyclists on these streets should be preserved when they are reconstructed, or when intersections or turning lanes are developed. If any of these streets is built to an urban cross-section with curb and gutter, the road should include bike lanes.

Table 14. Shoulder Bikeway Projects

Route	Extent	Length (miles)	Tier
Country Road	Haines Avenue - N Elk Vale Road	3.50	High
Airport Road	Airport - E Highway 44	1.29	Low
N Elk Vale Road	Country Road - E Mall Drive	1.43	Low
Total Shoulder Bikeway Recommendations		**6.22**	

Bike Lane Restriping

Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and are denoted by pavement stencils and signs. On streets in Rapid City that have high vehicle speeds, dedicated bike lanes are appropriate to separate bicyclists from motor vehicle travel and turn lanes. On many of these roads, physical constraints limit street retrofit measures, and bike lanes must be retrofitted to the existing curb-to-curb widths. The least expensive and intrusive method is to narrow vehicular travel lanes and re-stripe the street with bike lanes. Table 15 lists the bike lane projects that could be implemented through restriping roadways.

Table 15. Bike Lane Restriping Projects

Route	Extent	Length (miles)	Tier
Jackson Boulevard	W Main Street - Mountain View Road	0.48	High
Mountain View Road	W Omaha Street - Jackson Boulevard	0.58	High
North Street	West Boulevard N - Allen Avenue	0.91	High
Soo San Road	W Main Street - Brookside Road	0.16	High
W Chicago Street	N 44th Street - Deadwood Avenue	1.76	High
West Boulevard N	Anamosa Street - Silver Street	0.26	High
Mt. Rushmore Road	North Street - Omaha Street	0.45	Medium
Steele Avenue	Brennan Avenue - Railroad	0.28	Medium
Jackson Boulevard	W Highway 44 - Chapel Lane	1.53	Low
W Main Street	44th Street - Soo San Drive	0.76	Low
Total Bike Lane Restriping Recommendations		**7.17**	

Shared Lane Markings

Shared lane markings are often used on streets where bike lanes are desirable but are not possible due to width constraints, and where motor vehicle speeds are moderate (less than 35 mph). High visibility pavement markings (MUTCD Section 9C.07) are placed in the travel lane to alert motorists of bicycle traffic, while also encouraging cyclists to ride at an appropriate distance from the "door zone" of adjacent parked cars. Placed in a linear pattern along a corridor, shared lane markings also encourage cyclists to ride in a straight line so their movements are predictable to motorists. These pavement markings have been successfully used in many small and large communities throughout the U.S.

Table 16. Shared Lane Marking Projects

Route	Extent	Length (miles)	Tier
44th Street	W Chicago Street - Raider Road	1.06	High
5th Street	Omaha St - Columbus St	0.46	High
Covington Street	Twilight Drive - E Highway 44	0.89	High
E Centennial Street/Locust Street	Parkview Drive - E Fairmont Boulevard	0.82	High
E New York St/N Maple Ave/E Philadelphia Street	East Boulevard - Cambell Street	1.00	High
Flormann Street/Meade Street	West Boulevard - 5th Street	1.27	High
Jackson Boulevard	Mountain View Road - Mountain View Road	0.28	High

Route	Extent	Length (miles)	Tier
Jolly Lane	E Highway 14 - Daly Circuit	0.90	High
Milwaukee Street	Crestwood Drive - E New York Street	1.00	High
Cathedral Drive/Fairmont Boulevard	Mount Rushmore Road - Creek Drive	2.35	Medium
City Springs Road Extension	Sturgis Road - Galena Drive	1.57	Medium
Creek Drive	E Saint Patrick Street - Fairmont Boulevard	1.01	Medium
Franklin Avenue/Belleview Drive/E St Andrew St	West Boulevard - 5th Street	0.55	Medium
N 40th Street	Fish and Game Site - W Chicago St	0.25	Medium
N Maple Avenue	Disk Drive - Anamosa Street	0.57	Medium
Quincy Street	West Street - East Boulevard	1.20	Medium
Raider Road	44th Street - Hillsview Drive	0.55	Medium
Triple Crown Drive	E Minnesota Street - E Catron Boulevard	0.53	Medium
Anamosa Street	Commerce Road - Silver Street	1.14	Low
Bunker Drive	Sagewood Street - Disk Drive/I-90	0.86	Low
Black Hills Boulevard	E Stumer Road - E Catron Boulevard	0.13	Low
Commerce Road/Lien Street	Railroad - Rand Road	0.81	Low
Degeest Drive	Homestead Street - Twilight Drive	0.65	Low
Dunsmore Road	Sheridan Lake Road - Moon Meadows Drive	0.14	Low
E Kansas City Street	East Boulevard - SD School of Mines & Technology	0.60	Low
East Boulevard	E Quincy Street - Signal Drive	0.45	Low
Hillsview Drive	Canyon Lake Road loop	0.46	Low
Moon Meadows Drive	Dunsmore Road - Highway 16	2.27	Low
Red Cloud Street	Northridge Drive - Mall Drive	0.63	Low
Reservoir Road/Longview Road	Twilight Drive - E Highway 44	1.48	Low
Total Shared Lane Marking Recommendations		**25.88**	

Signed Shared Roadways

Signed shared roadways are streets where motorists and bicyclists share the same space. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist unless a wide outside lane is provided. The most suitable roadways for shared bicycle use are those with low speeds (25 mph or less) or low traffic volumes (3,000 vehicles per day or fewer). The route should be signed with standard Manual on Uniform Traffic Control Devices (MUTCD) green bicycle route signs with directional arrows.

Rapid City has a relatively well-connected system of lower-volume streets with posted speed limits of 25 mph. With the addition of relatively small-scale treatments, many streets in the area could become good bikeways for riders of all ages and skills.

Table 17. Signed Shared Roadway Projects

Route	Extent	Length (miles)	Tier
Alta Vista Drive/Anaconda Road	East of City View Drive - E Fairmont Boulevard	1.65	High
E Fairlane Drive	Elm Avenue - Robbinsdale Park	0.25	High
E Oakland Street	Hawthorne Avenue - Cambell Street	0.87	High
Kansas City Street	5th Street - East Boulevard	0.48	High
Meade Street/E Indiana Street	5th St - Hawthorne Avenue	1.21	High
Minuteman Drive	Lindbergh Avenue - Anamosa Street	0.60	High
Parkview Drive	E Liberty Street - E Minnesota Street	0.14	High
Sagewood Street/Northridge Drive	Bunker Drive - Haines Ave	0.56	High
Soo San Road	Brookside Drive - Range Road	1.00	High
Van Buren Street	Allen Avenue - Milwaukee Street	0.99	High
W South Street	Soo San Road – Mary Hill Park	0.11	High
9th Street	Quincy Street - Flormann Street	0.99	Medium
Cambell Street Service Road	Fairmont Boulevard - Richland Drive	0.37	Medium
Hawthorne Avenue	E Main Street - E Oakland Street	0.34	Medium
N Spruce Street	Meadowlark Road - E Philadelphia Street	0.50	Medium
Nordby Lane	W Saint Louis Street - W Main Street	0.19	Medium
Oak Avenue	E Indiana Street - Colorado Street	0.62	Medium
Silver Street/Philadelphia Street	N 11th Street - Boegel Street	0.61	Medium
West Boulevard	Leonard "Swanny" Swanson - Flormann Street	1.18	Medium
Allen Avenue	Anamosa Street - North Street	0.51	Low
Apolda Street	N Mount Rushmore Road - 6th Street	0.19	Low
Copperfield Drive	End of Existing Street - Highway 44	0.61	Low
Prairie Avenue	Saint Patrick Street - E Indiana Street	0.35	Low
San Marco Boulevard	City Springs Road - South Canyon Road	0.36	Low
San Marco Boulevard	South Canyon Road- W Chicago Street	0.31	Low
South Canyon Road	Berry Boulevard - N 44th Street	2.04	Low
W Chicago Street	San Marco Boulevard - N 44th Street	0.35	Low
W Flormann Street	Argyle Street - Mountain View Road	0.63	Low
Total Signed Shared Roadway Recommendations		**18.01**	

Recommendations for Bike Lanes Requiring Construction

While several of the bike lane projects can be accomplished simply by restriping a roadway, other projects would require additional construction and engineering effort. These projects may be able to reallocate existing street width through road diets or parking reduction to accommodate bike lanes, while some projects may require road widening.

Table 18. Bike Lanes Requiring Construction

Route	Extent	Length (miles)	Tier
St. Joseph Street	W Main Street - West Boulevard	0.32	High
W Main Street	Soo San Road - West Boulevard	2.14	High
E Minnesota Street	Minnesota Street Park - Cambell Street	0.25	Medium
Harmony Heights Lane	Plaza Boulevard - Anamosa Street	2.79	Low
N Maple Avenue	Mall Drive - Disk Drive	0.47	Low
N Plaza Drive/Plaza Boulevard	Deadwood Avenue - Harmony Heights Lane	1.08	Low
St. Patrick Street	5th Street - Elm Avenue	0.73	Low
Total Bike Lane Construction Recommendations		**7.78**	

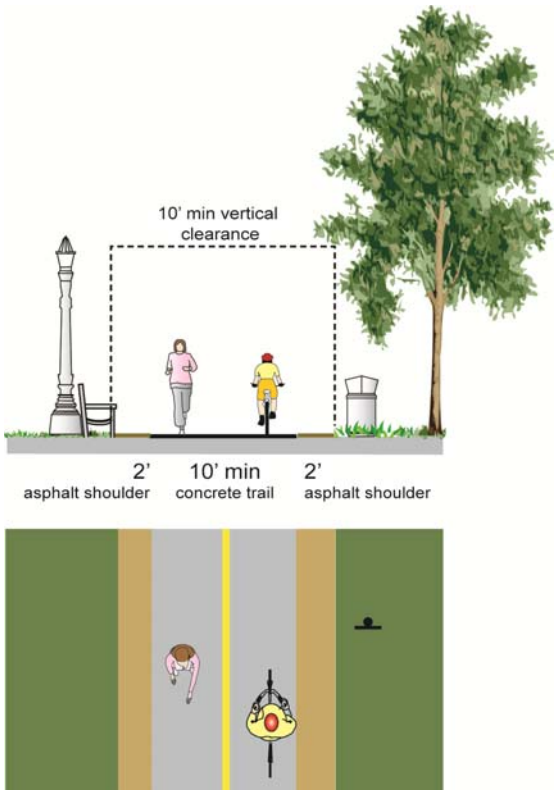

Figure 22. Recommended width for Leonard "Swanny" Swanson Memorial Pathway.

Recommendations for Shared-Use Paths, Side Paths, and Bikeways on Undeveloped Streets

The final category of bikeways is facilities that require additional financial outlay or that should occur in conjunction with a roadway construction or reconstruction project. These include bike lanes recommended on streets that have not been constructed, side paths, and shared-use paths.

Shared-Use Paths

In addition to the following specific project recommendations, it is recommended that the existing Leonard "Swanny" Swanson Memorial Pathway be widened to a 10-foot minimum standard with two-foot shoulders along its entire length (Figure 22). In addition, lighting along the trail would enhance safety for users and facilitate use of the trail for winter commuting. Development of trail projects requires significant coordination and is usually

facilitated by grant funding. This plan therefore does not prioritize all recommended shared-use paths; rather, shared-use paths should be planned and constructed as opportunities arise. In particular, the City should pursue opportunities to connect to and expand the existing Leonard "Swanny" Swanson Memorial Pathway. Table 19 shows the prioritization for these segments.

In addition to these shared-use paths and others shown in the recommended bikeways maps, the City should pursue opportunities to connect neighborhoods via drainage ways and shared used paths throughout the city.

Table 19. Prioritized Leonard "Swanny" Swanson Memorial Pathway Extensions

Extent	Length	Tier
Fairmont Boulevard – Cambell Street	0.81	Low
E St. Patrick Street – Fairmont Boulevard	1.38	Medium
Minnesota Street – S Highway 16	5.61	Low
S of Fairmont Boulevard – Minnesota Street	0.57	Low

Bike Lanes on Future Roadways

Future roads should be constructed with sufficient right-of-way to accommodate bicyclists via bike lanes. Table 20 lists planned future roads which would build out the bicycle network.

Table 20. Bike Lanes on Future Roadways

Route	Extent	Length	Tier
Anamosa Street	Valley Drive - Elk Vale Road	1.01	Low
Copperfield Drive	E Anamosa Street - Existing Street	0.42	Low
E Anamosa Street	E North Street - Mickelson Drive	0.60	Low
E Anamosa Street	Mickelson Drive - Valley Drive	0.58	Low
E Anamosa Street	Elk Vale Road - N Reservoir Road	1.03	Low
Fairmont Boulevard	Creek Drive - S Valley Drive	0.75	Low
Highway 16 Service Road	Skyline Drive/Tower Road - Catron Boulevard	1.98	Low
Mickelson Drive	E Anamosa Street - E HIghway 44	0.51	Low
E Minnesota Street	Cambell Street - Jolly Lane	2.10	Low
St. Martins Drive/N 44th Street	Sturgis Road - W Chicago Street	0.67	Low
Valley Drive	Anamosa Street - Fairmont Street	1.87	Low
Total Bike Lane on Future Roadway Recommendations		**11.52**	

Side Paths

While this plan focuses on the development of an on-street bikeway network to complement and connect to existing off-road facilities, in some locations vehicular speeds are too high to accommodate bicyclists on the roadway. In other locations, side paths provide a connection between other facilities on one side of the roadway. Table 21 shows the proposed side path project list.

Table 21. Side Paths

Route	Extent	Length	Tier
5th Street	Cleveland Street - Texas Street	0.87	High
Anamosa Street	Silver Street - Haines Avenue	0.66	High
Anamosa Street	Haines Ave - Milwaukee Street	0.70	High
E Anamosa Street	Racine Street - Century Road	0.77	High
Anamosa Street	Century Road - E North Street	0.27	High
E St. Patrick Street/Highway 44	Existing Side Path - Twilight Drive	1.14	High
East Boulevard	E Quincy Street - E New York Street	0.61	High
Jackson Boulevard	Cliffside Park - Existing Trail	0.75	High
Jackson Boulevard	Cleghorn Canyon Road - Cliffside Park	0.75	High
Parkview Drive	Parkview Park - 5th Street	0.53	High
5th Street	E Minnesota Street - E Catron Boulevard	0.99	Medium
Argyle Street	Jackson Boulevard - W Flormann Street	0.20	Medium
Cambell Street	E Oakland Street - Fairmont Boulevard	0.19	Medium
Cambell Street	Richland Drive – Elk Vale Drive	0.67	Medium
Disk Drive	Haines Avenue - N La Crosse Street	1.13	Medium
E Minnesota Drive	Parkview Drive- Odde Drive	0.46	Medium
Elm Avenue	E Saint Patrick Street – E Talent Street	0.31	Medium
Elm Avenue	E Oakland Street – Field View Drive	1.33	Medium
Elm Avenue	Field View Drive - E Catron Boulevard	0.56	Medium
I-190/Drainageway	West Boulevard N - Silver Street	0.13	Medium
San Francisco Street	La Crosse Street - Cherry Avenue	0.29	Medium
Stumer Road	Enchantment Road - 5th Street	0.63	Medium
West Boulevard	W Omaha Street - Saint Joseph Street	0.26	Medium
Concourse Drive	Elk Vale Road - Twilight Drive	0.20	Low
E North Street	Mall Drive - Anamosa Street	0.71	Low
Mall Drive	Haines Avenue - N Elk Vale Road	3.72	Low
Twilight Drive	E Highway 44 - Shadow Drive	0.18	Low
Total Side Path Recommendations		**19.01**	

Education and Encouragement Strategies

Improvements to bicycle and pedestrian infrastructure should be complemented by programs and activities designed to promote bicycling and walking. There are a number of existing efforts to encourage bicycling and walking in Rapid City, including efforts by local agencies and active community groups, shown in Table 22.

Table 22. Existing Education and Encouragement Programs in Rapid City

Resource or Event	Available
Rapid City Parks and Recreation Facilities Map	www.rcgov.org/pdfs/Parks-and-Recreation/bike_path_map.pdf
George S. Mickelson Trail Guide	www.sdgfp.info/parks/regions/northernhills/mickelsontrail/GSMTrailGuide.pdf
Bike Walk Run Committee	On hiatus
Black Hills Mountain Bike Association (BHMBA)	http://bhmba.org/
Black Hills Reconditioned Bikes for Kids	http://www.rapidnet.com/~bikerbfk/
Black Hills Volkssport Association	http://www.ava.org/clubs/bhva/
South Dakota Bicycle Coalition (SDBC)	http://www.sdbicyclecoalition.org/
Black Hills Fat Tire Festival	http://www.bhfattirefestival.com/
Black Hills Journey	Not available
League of American Bicyclists (national organization)	http://www.bikeleague.org/
Mickelson Trail Trek	http://gfp.sd.gov/state-parks/directory/mickelson-trail/trail-trek.aspx
Police Department Pedestrian Safety Campaign, "Pedestrian Safety, It's a Two-Way Street"	http://temp.rcgov.org/police/
Yellow Bike-a-Thon	http://www.rapidnet.com/~bikerbfk/

Program Recommendations

The City can encourage bicycling and walking in the region through select programs and by supporting local advocates' efforts. Key strategies include applying to become acknowledged as a Bicycle Friendly Community by the League of American Bicyclists. This program would require only staff time for the application. Another program the MPO might take a leading role in is to convene a Bicycle and Pedestrian Advisory Committee, with a work plan developed through the development of this Bicycle and Pedestrian Master Plan.

The MPO can also support advocates' efforts by providing in-kind support, meeting space, tables, publicity, and printing for groups holding an event.

The MPO can support the school district in their desire to implement a Safe Routes to School program by providing grant writing and technical expertise. Table 23 summarizes these key programs. Additional information is available in Appendix H.

Table 23. Program Recommendations

Resource or Event	Description	Potential Partners	Purpose	Timeframe
Become a Bicycle Friendly Community	Focus improvements on the League of American Bicyclists' award program and apply for recognition	South Dakota Bicycle Coalition	Receive recognition; build community support	One-time, with regular updates
Convene a Bicycle Advisory Committee (BAC)	Appoint citizen volunteers and key staff to advise the City on pedestrian and bicycling issues and assist with grant applications, plan review, etc.	South Dakota Bicycle Coalition	Advise City on bicycle and pedestrian issues	Ongoing
Develop and Launch a Bicycle/ Pedestrian Safety Awareness Media Campaign	Develop a marketing campaign highlighting bicyclist and pedestrian safety	Local bicycling and walking groups	Create awareness of bicycling and walking; promote safety	Late spring/ early summer, or in con-junction with back to school
Host National Bike Month Activities	Host group rides and events, offering incentives and rewards	South Dakota Bicycle Coalition, local groups and shops, large employers	Encourage bicycling and build a cycling community	Annually in May
Establish a "Create a Commuter" Program	Provides basic bicycle safety education and fully-outfitted commuter bicycles to low-income adults striving to connect to work, workforce development, or other daily needs by bicycle	Local bicycling groups and shops, such as Black Hills Reconditioned Bikes for Kids	Empower low-income residents to bicycle for transportation	Ongoing
Safe Routes to School Program – Phase 1	Educate students and their parents about walking and biking to school	Rapid City /Meade School Districts, parent groups, school neighbors	Improve safety with facilities/programs, encourage more bicycling and walking to and from school	School year

Community-Wide Improvements

Supporting facilities encourage bicycle trips and improve comfort and usability of the physical network.

Bicycle Wayfinding Signing Plan

Landmarks, natural features, civic destinations, neighborhood business districts and other visual cues help residents and visitors navigate through Rapid City. Placing signs throughout the city indicating to bicyclists their direction of travel, location of destinations, and the distance to those destinations will increase users' comfort and convenience of the bicycle system. Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should expect bicycle traffic.

Rapid City should adopt an on-street wayfinding signage similar to the MUTCD-approved sign shown in Figure 23 for use along bicycle facilities.

Signage can serve both wayfinding and safety purposes including:

- Familiarizing users with the bikeway system
- Helping users identify the best routes to destinations
- Addressing misperceptions about travel time and distance
- Helping overcome a "barrier to entry" for people who do not bicycle often and who fear becoming lost

Wayfinding signs are a relatively cost-effective means for improving the walking and bicycling environment. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Guidance for sign placement and height can be found in Appendix F.

Rapid City should create a community-wide Bicycle Wayfinding Signage Plan that identifies:

- Sign locations along existing and planned bicycle routes
- Sign type – what information should be included and what is the sign design
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and riding time to each destination

Figure 23. Model MUTCD-approved wayfinding signage.

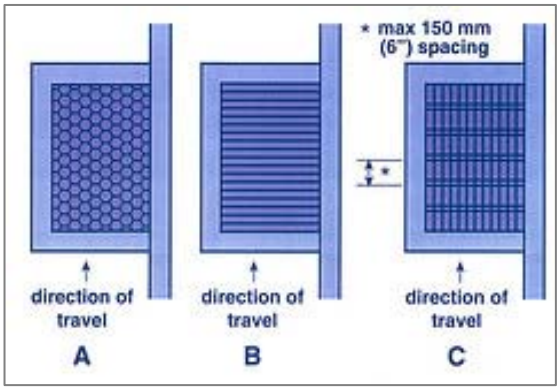

Figure 24. Examples of bicycle-safe drainage grates.

Drainage Grate Retrofits

The City should continue its efforts to retrofit existing drainage grates as roads are being resurfaced. Some older drainage grates can create slippery conditions for bicyclists and/or catch a bike wheel if they have metal grates that are parallel to the direction of travel. Newer grate styles have grates that are perpendicular to the travel lane or in a grid or mesh pattern. These newer grate types are much safer for bicyclists. Figure 24 demonstrates examples of bicycle-safe drainage grate coverings.

Rapid City should establish a goal for the number of drainage grates to retrofit each year. Retrofitting and replacing existing drainage grates will facilitate safe bicycle crossing movements and can reduce the City's liability exposure.

Bicycle Parking

Bicycle parking is an essential element of the bikeway network; without an adequate place to park, people may decide not to take a trip via bicycle. Improperly locked bicycles can crowd the sidewalk and restrict pedestrian movement.

Rapid City should consider linking bicycle parking requirements to land uses. Sample bicycle parking requirements recommended by the Association of Pedestrian and Bicycle Professionals (APBP) in the 2010 *Bicycle Parking Guidelines* are provided in Appendix G.

Street Design Criteria Manual Update

The City of Rapid City's Street Design Criteria Manual contains minimum street width standards by street classification but does not include bicycle accommodations as part of street design cross-sections. The City should revisit its Manual using the bicycle and pedestrian design guidelines provided in Appendix F to provide guidance for bicycle accommodation by level of street. The Manual should be modified to require bike lanes on all new arterial and collector streets, and revised cross-sections should be added to illustrate the new street designs. Figure 25 through Figure 27 show alternatives for how bicycles could be accommodated on arterial, collector, and local streets, respectively.

While shared lane markings are technically allowed on arterial roadways with posted speeds of 35 mph, this treatment is not comfortable for the majority of bicyclists and other treatments such as bike lanes and side paths are recommended. However, some bicyclists prefer riding on the street and

are comfortable sharing a lane with traffic, and those confident cyclists should be allowed to ride in the street.

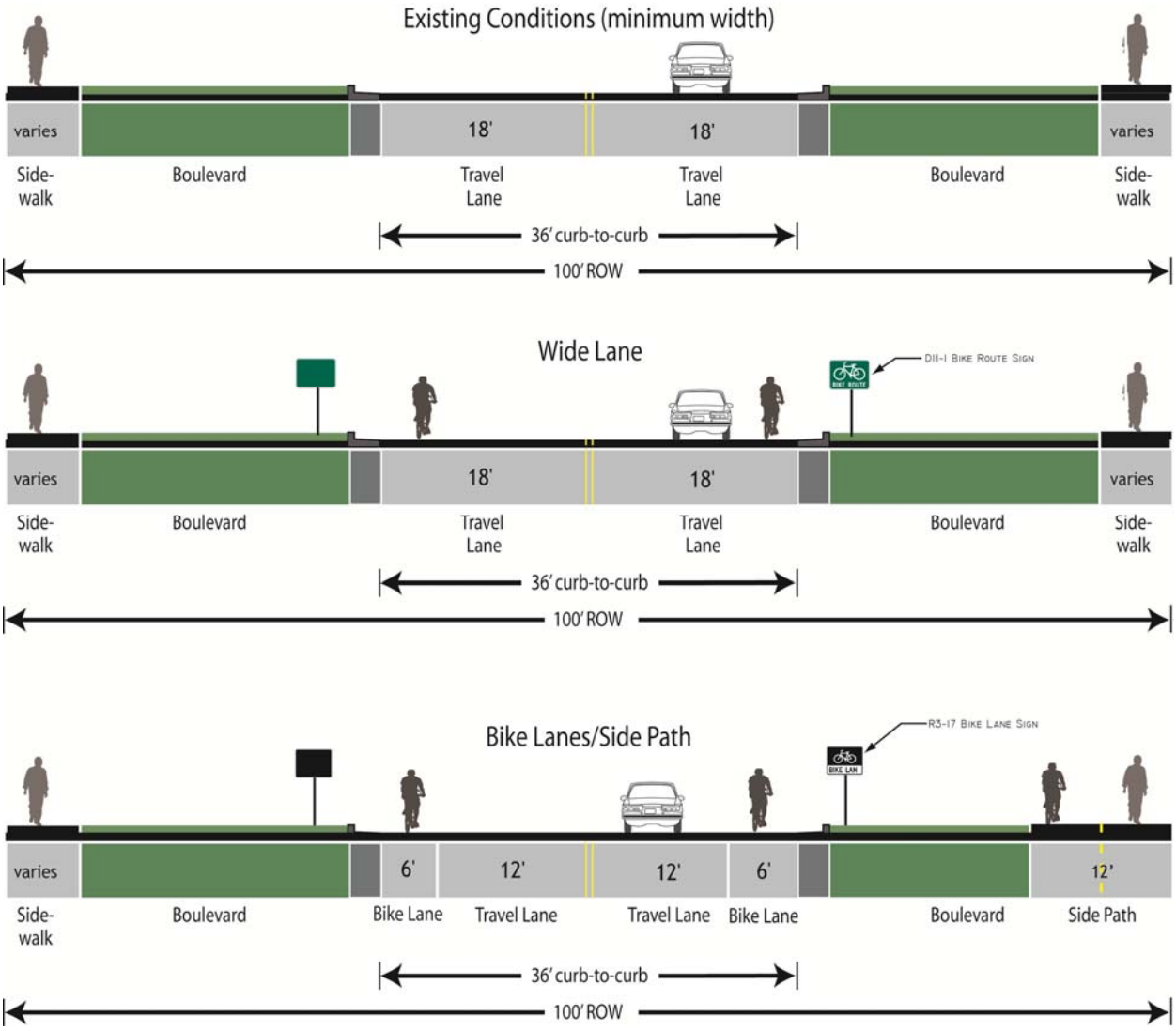

Figure 25. Alternatives for bicycle accomodation on arterial roadways.

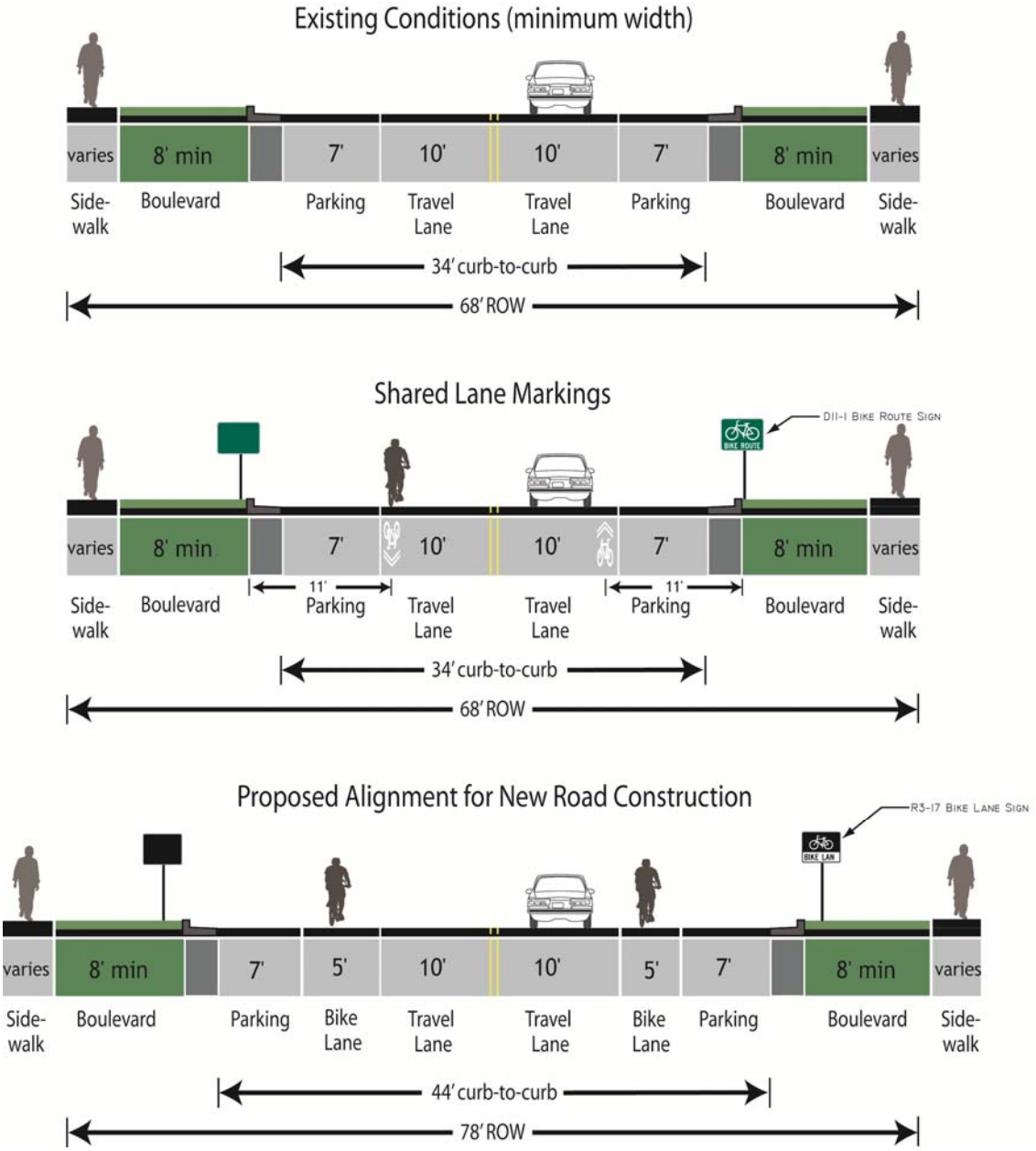

Figure 26. Alternatives for bicycle accomodation on collector roadways.

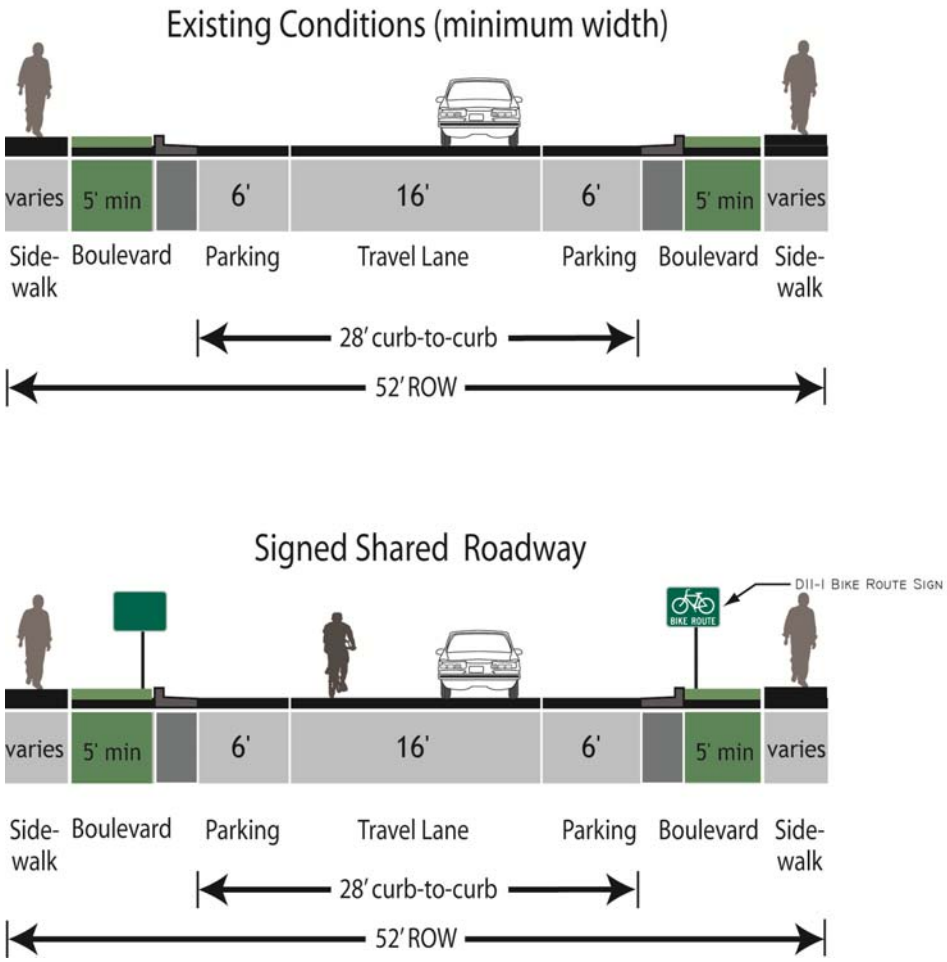

Figure 27. Alternatives for bicycle accomodation on local roadways.

Proposed Subdivision Requirements

Typical subdivision design in the U.S. promotes the almost exclusive use of the automobile. Residential subdivision streets are wide, non-linear, often lack connectivity and may or may not provide sidewalks. Most homeowners have ample room to park in their garages or in their driveways, however, little on-street parking is generally provided now. The use of cul-de-sacs and streets that limit circulation in and out of subdivisions can overload arterial streets that typically do not accommodate nonmotorized travel well. Retrofitting existing suburban neighborhoods to make them more bicycle and pedestrian friendly can often be more politically difficult than physically difficult. Design solutions include a number of options:

- Adding sidewalks, preferably on both sides of the street;
- Adding accessible curb ramps;
- Adding marked crosswalks;
- Creating bike lanes with striping and signage;

- Creating public access connectors between cul-de-sacs and adjacent streets to enhance circulation on foot or by bicycle; and
- Narrowing the streets (through a variety of techniques) to slow traffic and increase safety for nonmotorized users.

New subdivision design should include the following criteria at a minimum:

- Grid street pattern wherever possible with multiple intersections to provide ample opportunity for connectivity;
- Public right-of-way connections for bicyclists and pedestrians between cul-de-sacs and adjacent streets;
- Minimum of 5' wide sidewalks on both sides of the street;
- Shorter street blocks; and
- Proximity to neighborhood amenities such as parks, shops, schools, etc.

Multimodal Connections

Transit has an integral role in ensuring the success of an active transportation system. Quality integration among travel modes is mutually beneficial in extending the reach and catchment area of transit services, particularly in lower-density areas, as well as increasing the distance that can be comfortably traveled by a pedestrian or bicyclist.

Transit agencies have identified a number of reasons for providing active transportation connections to transit including:

- Increasing the number of multimodal trips;
- Removing motor vehicles from roads and parking lots to better utilize that space;
- Enhancing quality of life in the community by reducing emissions, noise, and traffic congestion and supporting active living, improved public health, equity and accessibility;
- Increasing the visibility of walking and bicycling as viable transportation options;
- Contributing to regional commuter assistance programs and extending low-cost transportation options; and
- Providing an alternative for pedestrians and bicyclists so that they can bypass areas that are barriers to bicycling, such as bridges, tunnels, steep hills, roads with traffic, and avoid riding at night or during adverse weather conditions. [12]

[12] Based on responses to a survey included in the TCRP *Bicycle and Transit Integration* study.

Transit Supportive Facilities

Facilities that improve the ability of people to walk or bicycle are critical in attracting and maintaining transit riders. Recommended provisions at transit stops, which will vary depending on the type and use of stops, include:

- Seating: either benches or seats adjacent to the transit stop post. Seating should be placed so that waiting passengers are visible to the bus driver.
- Shelter: provision of dedicated shelters at transit stops, especially higher volume stops, or use surrounding building elements such as awnings to provide protection from the elements.
- Trip Information: essential information that should be provided at every transit stop includes the route number and the stop number. It is also preferable to provide a route map and timetable.
- Bicycle Parking: In general, suburban and rural stops can make do with existing street furniture or simple bike racks. More guidance is provided in the design guidelines.
- Pedestrian-Scale Lighting: increase security and visibility for riders and transit operators by providing lighting; and
- Trash/Recycling Container.

Accessibility

Pedestrian Access to Transit Stops

Difficult and unsafe routes to transit stops can discourage or prevent pedestrians, including those that use wheelchairs, walkers and strollers from using the transit system.

Factors that influence pedestrian access to a transit stop include:

- Crossing location distance/quality
- Posted speeds
- Sightlines and distances
- Number of travel lanes
- Curb-to-curb width
- Traffic volume
- Pedestrian collisions
- Existence/ condition of sidewalks
- Slope

Sidewalks, ramps, and crossings are also essential parts of the pedestrian network and connect transit stops with adjacent and nearby land uses. Corridors that are served by a transit route are priority locations in the recommended pedestrian network. In addition, standards and guidelines for marked crossings and mid-block crosswalks are provided in the design guidelines.

Crossings are particularly important and where possible, these should be provided along the most direct path as pedestrians are typically unwilling to walk out-of-direction to access a crosswalk. This includes mid-block crossings, which should be treated appropriately depending on the crossing opportunities afforded by traffic and prevailing conditions of the roadway. Treatments to improve pedestrian crossings include:

- Clearing visual obstructions – street trees, telephone poles, limiting on-street parking, etc.
- Moving the stop to an existing marked or signalized crossing
- Adding curb extensions or median refuges to shorten the crossing distance
- Adding pedestrian signals

Bicycle Access to Transit Stops

The bicycle network should also connect to transit stops, especially since the RapidRide buses are equipped with bicycle racks to carry passengers' bikes. Key elements of bicycle access to bus stops include:

- Actuated traffic signals near the station that can be activated by bicycles; and
- Signed bikeway links should indicate streets leading to bus stops.

Bicycles on Transit

The local RapidRide buses are already equipped with front-loaded bicycle racks that carry up to two bicycles. These racks help extend the coverage area of the transit system as some passengers can use bicycles to connect to their origins and/or destinations that may not be served by the transit system.

Carrying bicycles onto transit also enables bicyclists to bypass potentially difficult situations like large hills, busy streets, long distances and inclement weather. It can also reduce the fear of being stranded in the case of equipment failure and may also prevent theft of bikes that would otherwise have to be locked up at a transit stop

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Chapter 5. Implementation Plan

As described in Chapter 4, Rapid City's recommended bicycle and pedestrian improvements consist of a comprehensive network of on-street bikeways and sidewalks of all types. This chapter begins with an implementation strategy, which presents a targeted approach for how Rapid City can institutionalize bicycle and pedestrian planning into its City processes. Possible federal, state and local funding sources are also identified.

Action Plan

The following actions are recommended as the first steps to implement the Rapid City Area Bicycle and Pedestrian Master Plan:

1. Adopt a Complete Streets policy to consider the needs of pedestrians and bicyclists in new development, redevelopment and roadway reconstruction and update the City's Infrastructure Design Criteria Manual to include consideration for bicycle and pedestrian travel based on road classification to begin policy implementation.
2. Dedicate Capital Improvement Plan (CIP) funds to bicycle and pedestrian projects. The City currently allocates $50,000/year for ADA (disability access) compliance projects. Providing a dedicated capital fund for bicycle improvement projects and sidewalk infill projects would allow the City to make progress on developing the bikeway network and completing the pedestrian network.
3. Implement several recommended bikeway projects annually, including those that are located on low-speed, low-volume streets where wayfinding signs would be sufficient to designate the bikeway.
4. Form a Bicycle/Pedestrian Advisory Committee to help guide the implementation of the Master Plan.
5. Complete five sidewalk infill projects - The highest priority locations were chosen where demand paths indicate existing walking activity and the travel speed and traffic volume of the adjacent streets are high.

Implementation Policies

The Rapid City Bicycle and Pedestrian Master Plan provides the long-term vision for the development of a community-wide bikeway network usable by all residents for all trip purposes. Implementation of the plan will take

place over many years. The following strategies and action items are provided to guide Rapid City toward the vision identified in the plan:

Strategy 1: Strategically Pursue Infrastructure Projects

City of Rapid City staff should utilize the City's existing capital improvement program (CIP) funding process to advance project recommendations in this Bicycle and Pedestrian Master Plan. Additionally, staff should incorporate bicycle and pedestrian improvements into other planned projects, pursue outside and grant funding and seek partnerships with other agencies and community partners

Policies:

Rapid City should seek to implement identified projects through current funding sources and track progress of plan implementation.

Policy 1.1 Pursue capital improvement funding or grant funding for pedestrian and bicycle improvements.

Policy 1.2 Install approved pedestrian and bicycle projects in conjunction with road improvement projects scheduled in the same area.

Policy 1.3 Publish a public report documenting the status of and on-going actions for all pedestrian and bicycle projects at the end of each fiscal year.

Strategy 2: Regularly Revisit Project Prioritization

Projects have been prioritized based on system connectivity, overcoming barriers, community support and other criteria described in Chapter 4. This list should be reviewed every fiscal year so new projects can be added, completed projects removed, and the priorities revised as conditions change. This strategy also supports collaborations with nearby jurisdictions on regionally-important walkways and bikeways.

Policies:

Complete an annual review and update of the bikeway and pedestrian improvements project lists by City staff with input from Pennington County, the Rapid City Parks Department, and other relevant agency staff. These updated lists should be made available to the public.

Policy 2.1 Annually review and update the Rapid City Area Bicycle and Pedestrian Master Plan project lists.

Policy 2.2 Share updated project lists with the public and other jurisdictions, including Pennington County and the Rapid City MPO.

Policy 2.3 Review and update the Bicycle and Pedestrian Master Plan as needed, but at least every five years.

Strategy 3: Integrate Bicycle Planning into Rapid City's Planning Processes

To ensure the Bicycle and Pedestrian Master Plan is implemented, the plan must be a living document that is incorporated into the day-to-day activities of transportation planning, design, funding, construction and maintenance in Rapid City. This plan recommends several ways for bicycle and pedestrian planning to be integrated into these processes.

Policies:

Policy 3.1 Implement a Complete Streets policy to ensure that bicycle and trail facilities are included in all major construction and reconstruction projects. Pedestrian, bicycle, and trail facilities should be addressed at the project scoping stage.

Policy 3.2 Revise the City's Infrastructure Design Criteria Manual to reflect the Bicycle and Pedestrian Design Guidelines in Appendix F and to ensure that appropriate pedestrian, bicycle, and trail facilities are built in new developments in accordance with this plan and other relevant plans.

Policy 3.3 Incorporate a pedestrian and bicycle facilities checklist into the plan review process.

Policy 3.4 Require sufficient right-of-way to be set aside for pedestrian, bicycle, and trail facilities as redevelopment projects occur.

Policy 3.5 Adopt a bicycle parking ordinance that establishes guidelines for bicycle parking linked to land uses.

Strategy 4: Encourage Private Donors to Support the Bicycle and Pedestrian System

The Friends of Rapid City Parks or other advocacy groups in the community could provide volunteer construction and maintenance services as well as possibly funding small projects like signage and wayfinding programs. Likewise, a formal "Adopt a Bikeway" program could be developed so corporations, institutions and individual private donors can support the existing and proposed bikeway and shared-use path system. This program can be leveraged to enhance maintenance through volunteer work and connect philanthropy with fundraising to help sustain the system.

Policies:

Policy 4.1 Encourage corporations, institutions and individual private donors to support the existing and proposed bikeway, shared-use path, and walkway systems.

Policy 4.2 Leverage this program to enhance maintenance through volunteer work and connect philanthropy with fundraising to help sustain the system.

Policy 4.3 Evaluate opportunities for establishing a philanthropic program that can be used to support the construction and maintenance of Rapid City's walkways, bikeways, and shared-use paths.

Strategy 5: Implement Education, Encouragement and Enforcement Activities

The City should augment the expanded bicycle network with education, encouragement and enforcement activities to support increased walking and bicycling by Rapid City residents. These support programs are critical to the success of the Master plan and have been prioritized based on cost and ease of implementation.

Policies:

Policy 5.1 Pursue grant and donor funding for recommended programs.

Policy 5.2 Form a Bicycle/Pedestrian Advisory Committee to help guide the implementation of the Master Plan.

Policy 5.3 Work with schools, youth groups, and other organizations to provide education and encouragement programs to Rapid City residents.

Policy 5.4 Work with the Police Department, media, advocacy and safety groups to create an educational program to educate pedestrians, bicyclists, and drivers on rights, responsibilities and safe practices to share the road safely and comfortably.

Cost Opinions

Unit prices were provided by Rapid City staff or taken from bicycle and pedestrian master plans and experience in nearby communities. Table 24 shows cost opinions (expressed in 2011 dollars) for elements of bicycle, pedestrian, and shared-use path improvement projects. Detailed inputs to

the cost estimates and planning-level cost opinions for the proposed bicycle and pedestrian improvements are provided in Appendix I.

*Table 24. Planning-Level Costs for Bicycle and Pedestrian Improvements**

Facility Type	Price*	Unit	Notes
Shoulder Bikeways	$1	LF	Signs every 600'.
Bike Lanes	$35	LF	Striping removal, re-striping (paint), pavement markings, and signs.
Shared Lane Markings	$7	LF	Pavement markings every 100' each direction, signs every 600'.
Signed Shared Roadway	$1	LF	Signs every 600'.
Side Path	$79	LF	Includes clearing and grubbing, grading, 12' wide asphalt surface
Sidewalk	$144	LF	6' width, includes concrete curb and gutter and drainage.
Amenity Costs			
Pedestrian Refuge Island	$12,000-$15,000	EA	
High-Visibility Crosswalks	$7,500	EA	Thermoplastic
ADA-Compliant Curb Ramps	$1,000	EA	
Curb Extensions	$12,500	EA	
Signs	$300	EA	Includes sign, pole and mounting hardware cost plus labor for installation
Bicycle Loop Detector	$2,500	EA	Imbedded pavement sensor so bicycles can trigger the traffic signal
Bicycle/Pedestrian Signal	$40,000	EA	
Drainage Grate	$1,500	EA	Bicycle-friendly

* 2011 estimated unit costs

* Costs include engineering (25%), contingency (15%), and design (20%) allowances.

Costs for including bicycle facilities on streets that are being constructed or re-constructed need to include right-of-way purchase costs in some cases.

Maintenance

On-street bikeways, sidewalks, and trails require regular maintenance and repair. On-street bikeways are typically maintained as part of standard roadway maintenance programs, and extra emphasis should be placed on keeping bike lanes and roadway shoulders clear of debris and keeping

vegetation overgrowth from blocking visibility or creeping into the roadway. Typical maintenance costs for on-street bikeway facilities are shown in Table 25.

Table 25. On-Street Bikeway Maintenance Frequency and Cost Opinions

Activity	Materials Type	Frequency	Cost Opinion*
Pavement resurfacing	Asphalt	Every 20 years	$50,000/mile
	Concrete	Every 20 years	$50,000/mile
	Aggregate	Every 3 years	$3,000/mile
Pavement sweeping	All	Weekly/monthly as needed	Part of regular street sweeping activities
Snow removal	All	Weekly/as needed	Depends on conditions, ~$150/mile
Tree/shrub trimming	All	5 months – 1 year	Part of regular street maintenance activities
Sign repair/ replacement	Worn	Every 10 years	$250/sign
	Stolen/damaged	As needed	$250/sign
Re-striping	Paint	Semi-annually	$2,600/mile
	Thermoplastic striping	Every 10-15 years	$10,600/mile

* 2011 estimated unit costs

Funding Sources

Acquiring funding for projects and programs is considerably more likely if it can be leveraged with a variety of local, federal and public and private sources (South Dakota does not have specific statewide funding for bicycle or pedestrian improvements). This section identifies potential matching and major funding sources available for bicycle and pedestrian projects and programs as well as their associated need and criteria.

Funding sources for bicycle and pedestrian facilities are listed below. Additional detail about these sources is provided in Appendix J.

Federal Funding Sources

Federal funding for bicycle and pedestrian facilities is primarily provided by the latest federal transportation act, the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU). SAFETEA-LU authorizes the Federal surface transportation programs for

highways, highway safety and transit for the five-year period 2005-2009. At this time, the authorization of a new federal transportation bill has not yet been completed; public agency staff should monitor the status of this legislation as federal funding programs currently available may be changed under new legislation. Existing federal programs under SAFETEA-LU that fund bicycle and pedestrian improvements include:

- Surface Transportation Program (STP)
- Highway Safety Improvement Program (HSIP)
- Transportation Enhancements (TE)
- Recreational Trails Program (RTP)
- State and Community Highway Safety Grant Program (Section 402)
- Safe Routes to School (SRTS)
- Community Development Block Grants (CDBG)
- Rivers, Trails and Conservation Assistance Program
- Land and Water Conservation Fund (LWCF)
- Transportation, Community and System Preservation Program (TCSP)
- National Scenic Byways Program

Metropolitan Planning Organization (MPO) Funding Sources

Metropolitan Planning Organizations (MPOs) are encouraged to use their federal planning funds to advance bicycle and pedestrian transportation improvements in their regions. Specifically, MPOs must incorporate nonmotorized transportation plans as integral parts of their regional Long Range Transportation Plans (LRTP).

Local Funding Sources

Communities throughout the country have looked to different local sources to find funding for bicycle, pedestrian and shared-use path projects. These sources vary from reallocation of an existing tax, to local bond measures. Existing local funding sources include:

- Road Use Tax (RUT) Funds
- Annual Capital Improvement Program (CIP) funding
- CDBG Entitlement Grant
- Tax Increment Financing/Urban Renewal Funds
- Rapid City's Vision 2012 Funding