



IOWA BICYCLE AND PEDESTRIAN LONG RANGE PLAN



July 2018

 **IOWA DOT**



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A note about placeholders

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1. INTRODUCTION AND CONTEXT



Introduction

Walking and bicycling are proven ways to improve the quality of life for Iowa's citizens, providing an essential option for people to get to work, school, and other destinations. Many Iowans have embraced bicycling and walking for transportation purposes, and with the extremely popular RAGBRAI event and the state's extensive trail system, Iowa is also a great place for recreational riding and walking. Moving forward, Iowa DOT has made a commitment—through the development of this Bicycle and Pedestrian Long-Range Plan—to expand opportunities and further improve conditions for bicycling and walking across the state.

This plan builds upon the State Transportation Plan, *Iowa in Motion 2045*, which identifies comprehensive transportation objectives as well as specific needs and recommendations for non-motorized transportation.

Purpose of the plan

The Bicycle and Pedestrian Long-Range Plan has three key objectives:

1. Improve the policies and practices for the ongoing development of the Iowa bicycle and pedestrian system and program. This is especially important in light of the current national transportation bill (Fixing America's Surface Transportation, or FAST Act) and evolving national design guidelines. Central to this objective is the development and adoption of a Complete Streets policy.
2. Expand the intercity and through-city bicycle network by providing guidance for the completion of national trail segments (including the Mississippi River Trail, American Discovery Trail, and Lewis and Clark Trail) and establishing additional US Bicycle Routes (national bikeways for cyclo-tourism and transportation).
3. Facilitate implementation of the plan by including a funding toolbox, enhancing design guidelines used by Iowa DOT and local agencies, and making recommendations for program priorities.

This plan serves as the primary guide for Iowa DOT decision-making regarding bicycle and pedestrian programs and facilities (sidewalks, trails, bike lanes, paved shoulders, etc.). It also has applicability for regional, county, and city plans and programs, helping to achieve a better level of statewide coordination and continuity for all levels of bicycle and pedestrian mobility.

The role of context

A thorough review of the contextual elements that shape the current state of walking and biking in Iowa serves as the basis of this Plan and a foundation for the analysis and recommendations contained within. These elements include identifying the agencies involved in planning, designing, and maintaining infrastructure; events and innovative practices occurring within Iowa; demographic characteristics; estimated number of people walking and bicycling; and the numerous plans and policies that shape how infrastructure is planned, funded, and designed.

1.1 Infrastructure jurisdiction and planning responsibility

Iowa's transportation system is composed of multiple interconnected networks that each has a primary purpose but often serves secondary purposes as well. The primary purpose of US and State Highways, for example, is to facilitate the movement of goods and people between cities. However, these highways often take on the additional roles of facilitating mobility and access within the cities that they pass through. Case in point, many of Iowa's small-town Main Streets are in fact US or State Highways, yet they have lower speed limits, on-street parking, and other features that make them also function as local streets. In many cases, most of the traffic on these roadways originates from within the community.

From a bicycle and pedestrian perspective, US and State Highways can pose challenges (as well as opportunities) for local jurisdictions that wish to develop effective citywide bicycle and pedestrian systems. Municipalities, MPOs, and RPAs have the responsibility to plan bicycle and pedestrian systems within their jurisdictions. Almost

invariably, the plans require infrastructure changes on roadways under Iowa DOT jurisdiction. This necessitates increased coordination and compromising between the parties and their goals.

The jurisdiction over multi-use trails (MUTs), in contrast, is typically tied to location. MUTs in and around cities are typically the responsibility of municipalities and MUTs in rural areas are typically the responsibility of counties. In addition, other organizations—such as the Department of Natural Resources and the Iowa Natural Heritage Foundation—help develop MUTs and the National Park Service often provides assistance for the planning of MUTs. MPOs and RPAs often take the lead in planning multi-city trail systems. Iowa DOT's role in the planning and development of MUTs is generally limited to high-level planning efforts (such as this Plan) and providing funding for construction.

See the discussion on MPO and RPA planning activities in [\[Chapter/Appendix Number\]](#) of the [\[Technical Guide \(working title\)\]](#) for more information about the role of local and regional agencies in planning and developing bicycle and pedestrian systems.





Innovative practices in Iowa

The level of accommodation of bicyclists and pedestrians varies across the state. While some communities have made very few accommodations, several regions and cities are doing innovative things in terms of walking and bicycling infrastructure and programs. Many cities across Iowa have adopted bicycle, pedestrian, and/or trail plans in the past few years; communities have been establishing Complete Streets policies; and many cities and counties alike have been constructing multi-use trails, bike lanes, sidewalks, and paved shoulders. The following includes a few examples of the efforts being made across Iowa.

- **Central Iowa Trail Network** – This 676-mile system of multi-use trails links 11 counties in central Iowa, connecting many communities to each other, the coast-to-coast American Discovery Trail, and to central Des Moines. This network also includes the famous High Trestle Trail bridge, which crosses the Des Moines River. This bridge has drawn national attention due to its significant length and innovative, artistic design.
- **Trout Run Trail** – This 11-mile multi-use trail loop in Decorah encircles much of the city while paralleling the Upper Iowa River and providing access to the Decorah Trout Hatchery. The trail includes several public art installations and an architecturally-unique bridge (complete with color-changing LED lighting) over Iowa 9.
- **Bob Kerrey Pedestrian Bridge** – Another unique architectural bridge, this structure spans the Missouri River between Council Bluffs and downtown Omaha, providing an interstate bicycle and pedestrian connection and one of the most spectacular bridges of its kind.
- **Downtown Des Moines** – Many improvements have occurred over the last few years, including the launch of the B-cycle bikeshare system; the construction of bike lanes, contraflow bike lanes, and a separated bike lane; and the installation of bicycle-specific traffic signals. Des Moines has also installed reverse angle on-street parking, which requires cars to back into spaces and pull forward to leave. Compared to traditional angle parking, reverse angle parking improves drivers' visibility when pulling out of a parking space—a valuable benefit when bike lanes are present.
- **Johnson County Bicycle Commuter Guide** – The MPO of Johnson County publishes this guide, which contains safety tips and a map of commuter showers, bike racks (covered and uncovered), and bike lockers.
- **Online Interactive User Maps** – Several groups, including Iowa DOT, Linn County, Waterloo, and the Iowa Natural Heritage Foundation have developed online user maps that display multi-use trails and/or on-road bikeways. Many of these maps also provide information about various trails, such as trailhead locations, visitor amenities, etc.
- **Cedar Valley Trails Network** – The Cedar Valley Trails in the Waterloo/Cedar Falls metropolitan area was the first comprehensive network of trails developed in Iowa. With over 110 miles of connected multi-use trails, the Cedar Valley Trails system connects local, county, and state parks; downtowns; and a multitude of other attractions in the metropolitan area, while also offering trail users numerous loops ranging from 2.5 miles to nearly 20 miles in length. Some of the trail amenities include Prairie Pathways, which provides historical context of the Cedar Valley through a system of interpretive panels and kiosks, and the first trail emergency response system developed in the state.

1.2 Organizations and events

The efforts of the Iowa DOT, MPOs, RPAs, counties, and municipalities to improve conditions for walking and bicycling are greatly strengthened by dedicated non-governmental organizations that seek the same goals. In many ways, becoming a more walkable and bicycle-friendly state is not possible without the ongoing commitment of organized advocates.

Such organizations are also responsible for hosting numerous events, such as Iowa's famous RAGBRAI—the Register's Annual Great Bicycle Ride Across Iowa. These events attract thousands of participants from around the world and provide opportunities for people of all abilities and levels of fitness to participate.

Below is a list describing some of the organizations and events that contribute to the popularity of bicycling and walking in Iowa today.

Iowa Natural Heritage Foundation

The Iowa Natural Heritage Foundation (INHF) is a private, nonprofit conservation organization that plays a significant role in funding and developing recreational trails across Iowa. Since its inception in 1980, the INHF has played a role in the development of nearly 600 miles of trails. The organization provides various levels of support, from minor technical assistance to land acquisition and fundraising. Since trails in Iowa are not managed by a statewide agency, the INHF also provides resources and coordination for local jurisdictions that are responsible for operating and maintaining the trails.

Iowa Bicycle Coalition

The Iowa Bicycle Coalition (IBC) is the state's primary advocacy organization for bicyclists. The IBC focuses on both recreational and transportation bicycling, provides education to users, is involved with Safe Routes to School efforts, holds an annual education conference (the Iowa Bike Summit), and is a major partner for RAGBRAI. The group works with local organizations, the Iowa DOT, municipalities, MPOs, and other entities to improve conditions for bicycling. Also an active lobbying group, the IBC has had a significant impact on changing legislation to the benefit of vulnerable road users.

RAGBRAI

The Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI) is Iowa's largest and oldest organized bike ride. First held in 1973, RAGBRAI is a multi-day ride that starts on one side of the state and ends on the other. The ride is planned, coordinated and sponsored by the Des Moines Register newspaper and is supported by the Iowa Bicycle Coalition. The route changes each year and the annual Route Announcement Party has become a major event in its own right. The event is limited to 8,500 riders each year due to logistic constraints, but since its inception, over 275,000 riders have participated. The route passes through numerous small towns (at least 780 since its inception) and as a result has a significant positive economic impact for a number of communities. RAGBRAI has inspired numerous similar events across the country, but it remains the original and most notable ride of its type in the United States.



Bike to Work Week

The Iowa DOT, Iowa Bicycle Coalition, and numerous local bike clubs, advocacy organizations, MPOs, and municipalities partner to organize activities during national Bike to Work Week (part of National Bike Month) and encourage people to commute on two wheels during the week. Events typically include media campaigns, commuter stations with free breakfast and bike tune-ups, prizes and giveaways, and pub crawls. These events all seek to encourage more people to make bicycling an every-day part of their lives.

Other events

Organized bike rides occur nearly every weekend throughout the year and on many weekdays as well. These include benefit rides or rallies, simple open club/training rides, or theme rides. Examples include the annual Bike Ride to Rippey (also known as the “Brr Ride,” which has occurred every February for 37 years), the annual Baccoon Ride (a bacon-themed ride along the Raccoon River Valley Trail), and the weekly Thursday Taco Ride from Council Bluffs to Mineola. These events are all important opportunities for recreational bicyclists to connect and explore Iowa’s roads and trails.



Held since 1973, RAGRBAI is Iowa’s largest—and most famous—organized bike ride.

1.3 Iowa's population

Understanding the demographic characteristics of Iowa's population will help inform the assessment of bicycling and walking conditions in the state. In this section, population is analyzed in terms of total population, rural and urban shares of population, and population by age. This context is especially relevant to the Crash Analysis performed as part of the assessment of existing conditions (Chapter 2).

Iowa's total population in 2010 was 3,046,355¹ and in 2016, the Census Bureau estimated the total population to be 3,134,693. Considering the geographic size of the state relative to the population size, Iowa has a relatively low population density compared to other states (it is the 36th densest state). It is also part of America's agricultural heartland, which is evidenced by the state's moderately low population density. However, when taking a closer look, Iowa's population is clustered in urban areas, at least in terms of population distribution, with 64 percent of the population living in a city (see Figure 1).

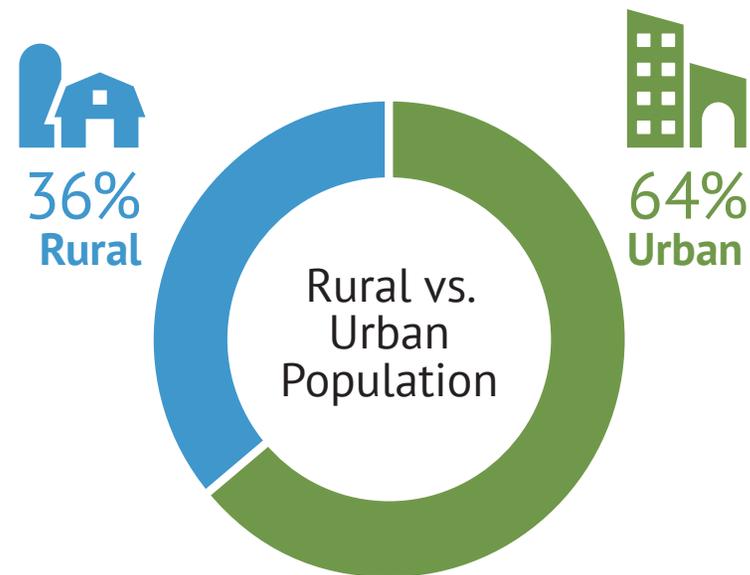
Approximately 31 percent of the state's population lives in a city with a population of 50,000 or more, of which Iowa has eleven. Figure 2 illustrates the populations of Iowa's eleven largest cities for the 2010 Census and the 2016 American Community Survey estimate. Three cities—Cedar Rapids, Davenport, and Des Moines—exceed a population of 100,000. Davenport broke the 100,000 threshold between 2010 and 2012.

Population distribution is relevant for several reasons. First, it means that the context in which most Iowans bike and walk is within cities, rather than rural areas. Only a small proportion of state highways are within cities and suburbs, but these roads often pose major barriers to bicycling and walking. From a transportation standpoint, this means that improving conditions for bicycling and walking will rely heavily on the Iowa DOT's partnerships with municipalities and Metropolitan Planning Organizations (MPOs). Second, the majority of

bicyclists riding on rural roads live within cities and suburbs. Access to rural roads is entirely dependent on the quality, safety, and comfort of "transitional" roads that connect city street grids through suburban areas to low-traffic rural roads.

Population by age is a useful statistic to consider when analyzing bicycling and walking trips and computing rates. For example, knowing the population distribution by age for the state (Figure 3) is helpful in analyzing bicyclist and pedestrian crashes (Chapter 4: Infrastructure Analysis and Recommendations). Understanding the share of the population held by each age range allows the analysis to identify which age ranges experience a disproportionate share of crashes.

Figure 1.1: Rural vs. Urban Population



The US Census Bureau considers any area with a population of 2,500 or greater to be "urban."

¹ Source: U.S. Census Bureau, 2010 Census.



Figure 1.2: Total Population for Iowa's Largest Cities (50,000 or more)^{2 3}

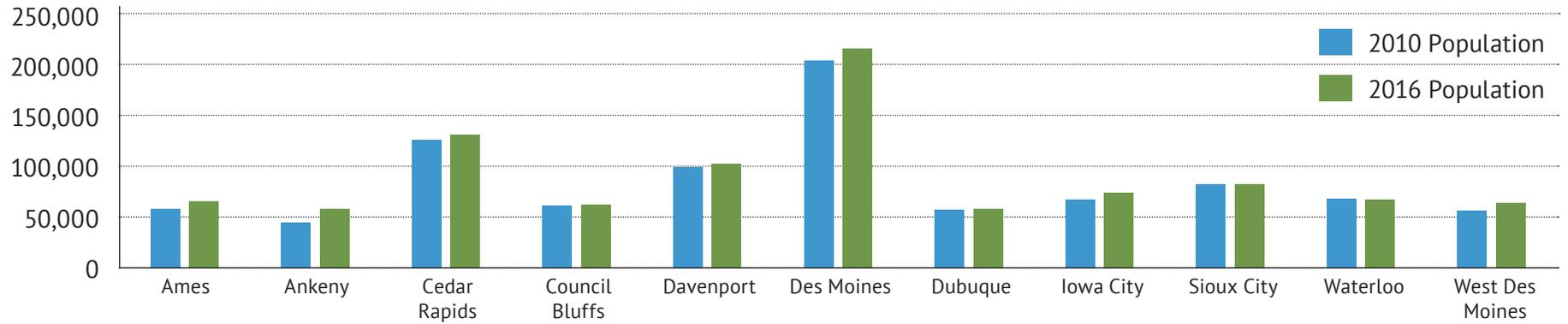
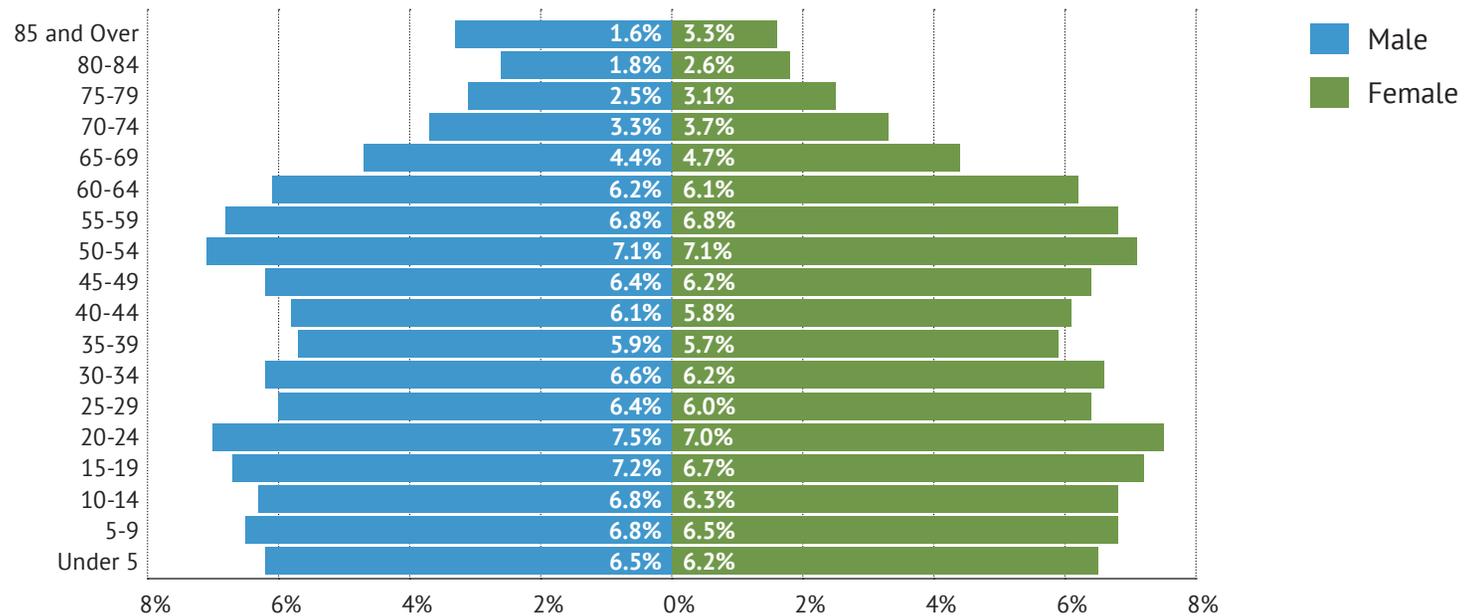


Figure 1.3: Population by Sex and Age⁴



2 Source: U.S. Census Bureau, 2000 Census.

3 Source: U.S. Census Bureau, 2010 Census.

4 Source: U.S. Census Bureau, 2010-2012 American Community Survey.

1.4 Biking and walking today

Estimating the number of bicycle and pedestrian trips taken per year is an important but challenging task. This is largely because consistent and comprehensive bicycle and pedestrian data collection is limited in most states, including Iowa. There are two primary sources for this analysis—the Census Bureau’s American Community Survey (ACS) and the National Household Travel Survey (NHTS), which is conducted as a joint effort by FHWA and other federal agencies. Each of these sources has limitations, however—the ACS only accounts for journey to work trips and the NHTS includes all trips, but is conducted on an irregular basis once every five to ten years.

It is important to consider that the ACS focuses on transportation trips and likely underrepresents recreational trips to a significant degree.

American Community Survey

The ACS is performed every year for each state and every one, three, or five years for counties and cities (depending on population size). This tool collects journey to work data by asking “How did this person usually get to work last week?” Respondents are allowed to select multiple options. Limitations of this methodology include:

1. It asks people about their journey to work for only one week out of the year. If it happened to be a week with poor weather, normal bicycle and pedestrian commuters might have chosen to drive or take transit.
2. The question asks what mode people *usually* used. Taken literally, if someone walks or bikes to work one day per week, they would likely not say that they usually use that mode of transportation.
3. This survey only collects transportation to work data. Many people walk and bike for recreational purposes or for transportation purposes other than commuting to work.

According to the ACS, there are 1.55 million workers over 16 in Iowa. Of this total, 0.5 percent reported bicycling to work and 3.5 percent walking to work; this translates to approximately 7,730 individual bicycle commuters (not trips) and 54,100 pedestrian commuters. The percentage of bicycle commuters has remained steady, while the percentage of walkers has declined slightly. Ames, Iowa City, and Dubuque all have above average levels of walking and/or bicycling, according to the ACS data for 2011 through 2015. Ames and Iowa City both have major universities, which is likely the primary contributor to their higher-than-average mode shares for bicycling and walking.⁵ Seven universities, colleges, and seminaries are located in Dubuque, which likely contributes to its higher-than-average mode share for walking. However, it has a lower mode share for bicycling, which may be attributed, in part, to the area’s steep hills.

⁵ Students are not counted in the data unless they are in the workforce. Therefore, a student that walks or bikes to a part-time job on campus would be counted. In addition, faculty, staff, and other university employees would be counted in the data.

2009 NHTS Mode Share (All Trips)



2011-2015 ACS Mode Share (Journey to Work)



2017 NHTS Mode Share (All Trips)





National Household Travel Survey

The National Household Travel Survey (NHTS) is performed irregularly (once every 5 to 10 years) but—unlike the ACS—accounts for all types of trips, not just journey to work trips. The last NHTS was performed in 2017 and was funded by FHWA, the Federal Transit Administration, the American Automobile Association (AAA), and the American Association of Retired Persons (AARP) and some state DOTs. The previous NHTS was performed in 2009. In order to increase the sample size (and statistical validity) in the 2009 NHTS, the Iowa DOT elected to pay for 2,000 additional travel diaries and the Linn County Regional Planning Commission paid for 1,200 additional surveys.

The results of the 2017 NHTS show greater mode shares for bicycling and walking in Iowa than was recorded by the ACS—1.0 percent of all trips were bicycling trips and 8.6 percent were walking trips. For a direct comparison, the NHTS estimates journey to work trips at 0.6 percent for bicycling (compared to the ACS estimate of 0.5 percent) and 5.3 percent for walking (compared to the ACS estimate of 3.8 percent). The mode share for bicycling dropped significantly since 2009, while the mode share for walking increased.

Table 1.1: Comparison of 2017 and 2009 National Household Travel Survey Mode Share

	2017 NHTS	2009 NHTS
Bike Mode Share (all trips)	1.0%	1.6%
Walk Mode Share (all trips)	8.6%	6.8%
Bike Mode Share (journey to work)	0.6%	1.5%
Walk Mode Share (journey to work)	5.3%	4.8%

In terms of the total number of annual bicycling and walking trips, the NHTS estimates 3.6 billion and 38.9 billion, respectively. When considering journey to work trips, the NHTS estimates 418 million trips by bicycle (11.6 percent of all bicycling trips) and 2.9 billion walking trips (7.4 percent of all walking trips).

In comparing Iowa to the nation as a whole, the mode share for bicycling is equal to the national mode share (although it was significantly higher in 2009 at 1.6 versus 1.0 percent) while the mode share for walking is lower (6.8 versus 10.5 percent).

While the NHTS and ACS record different information at different times, it is clear that the mode shares and number of bicycling and walking trips in Iowa far exceed what can be estimated based on the ACS journey to work mode share data.

Other sources

Another indication of the levels of bicycling and walking in Iowa are the trail use counts performed by Iowa DOT between 2008 and 2010. Over the course of these three years, counters were placed at 29 locations across the state between Memorial Day and Labor Day (counters were placed along different trails each of the three years). On average, these counters recorded 2,883 bicycles at each location during this period. This was a worthwhile effort that should be repeated every few years as a benchmarking exercise. In developing *The Economic and Health Benefits of Bicycling in Iowa*, researchers from the University of Northern Iowa extrapolated this data across the 52 trails more than 5 miles long that existed in Iowa at that time. Currently there are 60 trails more than 5 miles long in Iowa. As a result, they estimate that approximately 149,916 bicycle trips are taken along Iowa's trails each year between Memorial Day and Labor Day. However, this result seems to be only a good indication of bicycling on trails, considering it is several orders of magnitude less than the estimated number of trips as calculated by the NHTS (62 million trips in 2009).

1.5 Summary of plans, policies and standards

Many ongoing planning efforts, current policies, and standing practices at the national, state, and regional level affect bicycling and walking in Iowa. Because the majority of transportation funding originates with federal programs, there is a high degree of interplay between the various levels of government.

A detailed review of relevant plans, policies, and standards is provided in [Chapter/Appendix Number] of the [Technical Guide (working title)].

Federal

Federal policy has far-reaching implications for state, regional, and local transportation policies, programs, and projects. While state departments of transportation have a considerable amount of leeway and flexibility in how each plans, programs, designs, and conducts its general business, federal policy ensures that certain minimum standards, provisions, and methods are consistent across the country. In terms of bicycle and pedestrian transportation, the Federal Highway Administration (FHWA) has produced **Accommodating Bicycle and Pedestrian Travel: A Recommended Approach** (commonly referred to as the “mainstreaming policy”) to provide guidance on federally-funded transportation projects. This policy was most recently updated in 2017. Most importantly, the document sets forth an official policy that bicycling and walking facilities shall be incorporated into all transportation projects utilizing federal aid unless exceptional circumstances exist.

This guidance has been reinforced by the **Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations** published in 2010 by the US Department of Transportation (USDOT). The document stipulates that walking and bicycling should be treated as equals with other transportation modes. It also recommends policy adjustments and strategies for state departments of transportation

and metropolitan planning organizations to better address the needs of bicyclists and pedestrians.

Other federal activity has been important in this arena as well. **The Americans with Disabilities Act (ADA)** ensures a minimum level of accommodation for all users of the public right of way, even those of limited ability. To address this issue, the US Department of Justice (USDOT) and USDOT undertook a joint effort to publish guidelines ensuring compliance with the requirements of the ADA as it relates to transportation projects, released as *USDOT/USDOT Joint Technical Assistance on the Title II of the ADA Requirements to Provide Curb Ramps when Streets, Roads, or Highways are Altered through Resurfacing* (2013).

The Federal Transportation bill signed into law in December, 2015, known as the **FAST Act** replaced the former transportation act known as Moving Ahead for People in the 21st Century (MAP-21). The primary federal transportation funding program for bicycling projects, known as the Transportation Alternatives Program (TAP) under the previous transportation act, MAP-21, was replaced with a set-aside of Surface Transportation Block Grant Program funding for transportation alternatives (STBG-TA). These set-aside funds include all projects and activities that were previously eligible under TAP, encompassing a variety of smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, and safe routes to school projects. For most projects under the STBG-TA Program, the Federal share is generally 80 percent and 20 percent State or local match, with some exceptions, predominantly safety improvements or projects on tribal or national park lands where 100 percent federal funding can be available.

Other programs under the new FAST Act have remained largely unchanged, although names of programs have seen some changes. The long-standing Surface Transportation Program (STP) has been converted into the Surface Transportation Block Grant Program (STBG). This name change recognizes that this program has the most flexible eligibilities among all Federal-aid highway programs and aligns the program’s name with how the FHWA has historically



administered it. The STBG is intended to be flexible—including to fund bicycle and pedestrian accommodations—to best address State and local transportation needs. The STBG-TA program replaces the **Transportation Alternatives Program (TAP)**, which itself combined the **Transportation Enhancements (TE)**, **Safe Routes to School (SRTS)**, and **Recreational Trails Program (RTP)**. Projects that were previously eligible under any of these programs, and carried forward as TAP, are now eligible under STBG-TA. However, STBG-TA is more competitive than the programs it replaces, because it combines multiple funding categories that were previously separate and has a smaller overall funding allocation. Furthermore, up to half of the funding can be diverted to projects outside of this program

From Washington, D.C., to Iowa, Federal policy shapes the planning and design of pedestrian and bicycle facilities.



State

The State of Iowa has produced a number of plans related to bicycle and pedestrian travel. **Iowa in Motion 2045**, published in 2017, is the state's long-range transportation plan, the chief guide to Iowa's transportation policy. The document lists "increasing demand for well-connected bicycle and pedestrian facilities" as one of 10 key state transportation issues. In this regard, the plan identifies funding as one of the key obstacles, particularly as it relates to the expansion of the state's network of trails. Section 4.2 of the plan describes in detail how bicycling and walking are important to the state's economy. The plan states that "The importance of bicycling and walking to Iowa's economy is significant, as both provide many benefits in the areas of health and fitness, tourism, and the environment."

The state's vision for its trail network is the result of multiple plans over the past two decades, but is most comprehensively described in the **Iowa Trails 2000** plan. This plan defined a statewide network of trails and described design guidelines for trails and rural on-road bike facilities. More recently, the Iowa Department of Natural Resources echoes the call for expansion of the state's trail system in its 2013 to 2018, 5 Year **Outdoor Recreation in Iowa** plan.

In recognition of the increasing profile of bicycling in the public consciousness, the University of Northern Iowa and the Iowa Bicycle Coalition produced **Economic and Health Benefits of Bicycling in Iowa** in 2012, a study that quantifies the economic impact of bicycling on the state's economy. The researchers found nearly a half-billion dollars in economic activity and over \$80 million in savings on health care costs statewide annually. The health benefits of walking and bicycling also feature in the Governor's Healthiest State Initiative, a program to encourage health and well-being throughout the state.

A significant effort related to pedestrian mobility is the Iowa DOT's program to improve the accessibility of trails and sidewalks along the state highway system. Last updated in 2017, the Iowa DOT maintains an **ADA Transition Plan** that identifies priorities for curb ramp replacement, sidewalk repair, and other accessibility improvements.

The Iowa DOT is currently inventorying and evaluating trails that are within Iowa DOT right of way for ADA compliance. In addition to upgrading curb ramps, crosswalks, and sidewalks as part of reconstruction and repaving projects (as required by federal law), the Iowa DOT implements the ADA Transition Plan in part through a program that makes investments in sidewalk and curb ramp improvements in communities with populations less than 5,000.

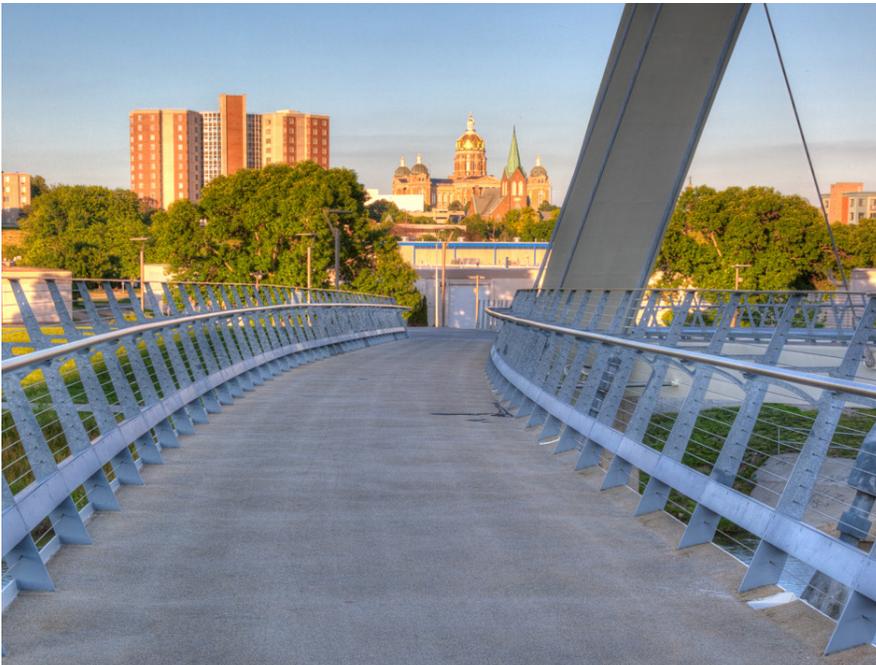
The design of streets and roads in Iowa adhere to three sets of standards: the **Design Manual, Bridge Design Manual, and Statewide Urban Design and Specifications (SUDAS)**. The first two manuals are maintained and used by the Iowa DOT while SUDAS is used by counties and municipalities. In addition to roadway facilities designed for motorists, these manuals set the standards and criteria for bicycle and pedestrian accommodations such as sidewalks, paths, bike lanes, and paved shoulders. These documents—the content of which are closely aligned—have been in use for nearly two decades and are each

updated every few years. A more in-depth discussion of the guidelines, as well as suggested enhancements, can be found in [Chapter/Appendix Number] of the [Technical Guide (working title)].

Regional

Iowa is unique in that the entire state is covered by some form of a regional body that engages in transportation planning. Federally-mandated **Metropolitan Planning Organizations (MPO)** are the local transportation authorities through which federal transportation funding is funneled. These agencies, however, are only present in more populous regions. **Regional Planning Affiliations (RPA)** serve as the regional agency for planning in all non-metropolitan areas of the state. In some cases an MPO and a surrounding RPA may share the same staff and resources, although they will have different boundaries, member governments, boards, and bylaws.

Although regional planning is ubiquitous in Iowa, the level at which each agency considers bicycle and pedestrian issues varies significantly. The level of funding allocated to bicycle and pedestrian infrastructure ultimately depends on the priorities of the member government representatives. It is entirely possible that an RPA could allocate a greater percentage of its overall transportation budget to bicycle and pedestrian projects than an MPO might allocate, due to differing member government priorities. Regardless, each MPO and RPA in Iowa has an important role in improving conditions for walking and bicycling.



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2. VISION AND GOALS



Choosing our path

Bicycling and walking are important elements of Iowa's transportation system and are also recreational activities enjoyed by millions each year. They are healthy activities that require relatively low levels of investment per mile of accommodation, yet are major contributors to economic development and tourism across the state.

This chapter describes the vision for the future of walking and bicycling in Iowa, outlines seven goals designed to help achieve this vision, and summarizes the stakeholder input that shaped the development of this plan.

2.1 Vision for the future

Where we are today

In many ways, Iowa excels as a state for walking and bicycling. Its scenic landscapes, vibrant communities, and engaged citizens support opportunities for expanding mobility for non-motorized users. However, most bicyclists and pedestrians regularly experience inadequate accommodations, lack of bikeway or trail connectivity, and are stressed when using many of Iowa's streets and roads.

Where we want to be

The vision for this plan is that the state as a whole, including all citizens and all governmental agencies, will adopt walking and bicycling as valid forms of transportation—a position that is supported by current state code¹ and federal policy². This requires changing the mindset that bicycling and walking are only recreational activities and encouraging more people (all genders, ages, cultures, and abilities) to engage in these activities.

Iowa's streets and roads must be made safer, less stressful, and more civil in order to encourage more people to walk and bicycle. This includes educating bicyclists on how to safely share the road and increasing motorists' awareness of the rights of bicyclists to use most roads in Iowa. It also means ensuring streets and roads effectively serve all transportation users, including motorists, freight, transit, bicyclists, and pedestrians. The end goal is to make more of the great state of Iowa accessible by bicycle and by foot while eliminating bicycle and pedestrian-related injuries and fatalities, in keeping with the Iowa DOT's zero-fatality goal.

How we can get there

Historically, the provision of accommodations for bicycling and walking has not been mainstreamed into the planning and design processes of the Iowa DOT and most MPOs, RPAs, counties, and municipalities. Accommodations were only provided if specifically requested and, in most cases, funded by a local jurisdiction or if space for bicycling was provided by default (e.g., an unused parking lane or a paved shoulder wide enough to accommodate bicycling). When such requests were made, there was a great

1 Iowa Code § 321.234 states "A person, including a peace officer, riding a bicycle on the highway is subject to the provisions of this chapter and has all the rights and duties under this chapter applicable to the driver of a vehicle..."

2 FHWA's Accommodating Bicycle and Pedestrian Travel: A Recommended Approach policy (also known as the "mainstreaming policy") and the USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations.

level of uncertainty regarding whether accommodations were warranted or compatible and, if so, how they should be designed. The results were inconsistency in planning and designing accommodations from one part of the state to another and a common perception that accommodating bicycling and walking was not central to the Iowa DOT's mission.

Achieving the vision for this Plan is dependent on the Iowa DOT, county engineering departments, MPOs and RPAs, and cities making the provision of safe and comfortable accommodations for walking and biking a regular part of roadway design—a concept also known as **mainstreaming**. Improved coordination and shared procedures between these agencies is crucial, as is reframing the approach to funding infrastructure projects. Furthermore, new funding sources and approaches—such as funding bikeways and sidewalks as small yet meaningful parts of larger projects—will be used in order to bridge the gap between current infrastructure and future needs. Changes to Iowa DOT's project development process are outlined in Chapter 3: Program Review and Recommendations and a funding strategy is described in Chapter 7: Funding Strategy.

Finally, bicycle and pedestrian accommodations need to be provided and designed in a context-sensitive manner relative to site-specific factors. In other words, with few exceptions (such as interstate highways and highly-constrained environments) all streets and roads in Iowa will accommodate all expected users. The manner in which the accommodation is provided (paved shoulders, shared roadways, bike lanes, sidepaths, sidewalks, etc.) will depend on traffic volume, motor vehicle speed, pavement width, and other relative factors. Guidance for appropriate accommodations is provided in Chapter 4: Infrastructure Analysis and Recommendations.

Taking action

With this Plan and the accompanying Complete Streets Policy, Iowa DOT is adopting a new perspective on walking and bicycling as essential modes of transportation, receiving due consideration

of needs. This means embracing a Complete Streets approach to considering bicycling and walking needs as part of every road or street project in which Iowa DOT is involved (and encouraging counties and cities to do the same) while providing appropriate, context-sensitive accommodations where needed. This approach is supported by the Federal Highway Administration (FHWA), which—through multiple iterative policy statements—in fact mandates that bicycle and pedestrian mobility needs to be considered and included in every project, with few exceptions.

Mainstreaming bicycling and walking requires several shifts in the practices and approaches of all agencies engaging in street and road projects in Iowa, including:

- Measuring current conditions and identifying the factors that determine ease of use for bicyclists and pedestrians (see Chapter 4);
- Establishing a toolbox of facility types, including guidance as to which is appropriate for various situations pedestrians (see Chapter 4);
- Adopting policies and practices that codify and explain the mainstreaming of bicycling and walking (see Chapters 3, 6, and 7);
- Rewriting manuals to incorporate current best practices and educating planners and engineers accordingly;
- Reconsidering funding streams to fund accommodations from the same source as the larger roadway project (see Chapter 7); and
- Increasing coordination between Iowa DOT's Central Office and District Offices, as well as between Iowa DOT and MPOs, RPAs, counties, and municipalities (see Chapter 3).

Mainstreaming bicycling and walking infrastructure development will not only increase mobility for these modes, but is the most economical way to provide accommodations.



2.2 Goals

A small set of clear, easy-to-remember goals were developed based on input from a Policy Advisory Committee and a Technical Advisory Committee (described later in this chapter) to simplify the vision and the steps needed to achieve it. These goals shaped the development of the Plan and should continue to influence programs, investments, and other actions related to bicycling and walking into the future.

1. **Valid** – Ensure that policy makers, roadway designers and planners, law enforcement officials, motorists, bicyclists and pedestrians recognize that bicycling and walking are valid modes of transportation.
2. **Safe** – Improve the safety and friendliness of Iowa’s roads and trails to accommodate on-road bikeways and sidewalks, reduce crashes, and eliminate fatalities.
3. **Coordinated** – Improve coordination between the Iowa DOT Central Office, each Iowa DOT District, regional agencies, and local partners to streamline maintenance and the implementation of programs, policies, and infrastructure projects, and to increase consistency.
4. **Connected** – Enact policies and develop infrastructure to create an interconnected network of on-road bikeways, sidewalks, multi-use trails, and end-of-trip facilities that uses the appropriate facility type to connect people to their destinations.
5. **Funded** – Increase the overall level of funding for bicycle and pedestrian infrastructure and programs, explore the flexibility of funding sources, and maximize the efficiency of funding to bridge the gap between what is needed and what is available.
6. **Well-Designed** – Establish guidelines for the design of on-road bikeways, sidewalks, and multi-use trails to ensure they are comfortable, sustainable, convenient, and consistent.
7. **Healthy** – Promote opportunities for active and sustainable lifestyles that include walking and bicycling on a daily basis.



2.3 Plan development

The major elements of the Bicycle and Pedestrian Long Range Plan development process included:

1. Assessing existing conditions, including bicycle compatibility for rural roads and analyzing crash data;
2. Analyzing current policies and practices, including project scoping and funding;
3. Recommending new policies and modifications to existing policies;
4. Recommending processes and guidelines for planning and designing infrastructure;
5. Establishing a new planning framework for the Statewide Trails Vision;
6. Assessing a path for the establishment or completion of national trails (American Discovery Trail, Mississippi River Trail, and Lewis and Clark Trail) and US Bicycle Routes that pass through Iowa;
7. Recommending an implementation and funding approach; and
8. Developing performance measures.





2.4 Stakeholder involvement

The development of this plan was directly guided by the involvement of various stakeholders, both internal and external to Iowa DOT. The most significant period of stakeholder involvement occurred early in the project, during which fifteen meetings were held to gather input. The outreach was organized such that meetings were held in each of the six Iowa DOT Districts and were coordinated through their District Planners. There were generally three types of meetings held in each District: District Staff meetings, Metropolitan Planning Organization (MPO) and Regional Planning Affiliation (RPA) staff meetings, and public input meetings. In a few cases, the District and MPO/RPA meetings were combined to accommodate travel and schedule conflicts. Over the course of the development of this plan, more than 40 stakeholder meetings were held.

Advisory Committees

Two advisory committees were active throughout the development of this plan and helped determine and shape the plan's goals and policy direction. Each committee met eight times over the course of the development of this plan in order to review analysis findings, policy recommendations, and priorities. The committees were composed as such:

Policy Advisory Committee (PAC)

- American Public Works Association, Iowa Chapter
- City engineer/disabled community representative
- County engineer representative
- Iowa Bicycle Coalition
- Iowa Department of Natural Resources
- Iowa Department of Public Health
- Iowa Natural Heritage Foundation
- Metropolitan Planning Organization representative
- Regional Planning Affiliation representative

Technical Advisory Committee (TAC)

- Iowa DOT Office of Bridges & Structures
- Iowa DOT Office of Design
- Iowa DOT Office of Location & Environment
- Iowa DOT Office of Systems Planning
- Iowa DOT Office of Traffic & Safety
- Planners and Engineers from Iowa DOT Districts

District outreach

In addition to involving representatives from District Offices on the TAC, meetings were held with each of the six District Offices early in the project. At about half of these meetings, the majority of the District Office attended and provided input; for the other meetings, a smaller group consisting of the District Engineer, District Planner, and two or three other staff members provided input. Receiving input from District Office staff was critically important toward the development of the Long-Range Plan because of the critical role they play in project development, design, and planning. Each District Office provides guidance for project development to municipalities, counties, MPOs, and RPAs. They also often oversee the funding requirements of local projects utilizing Federal Aid.

At these meetings, staff were asked a number of questions, such as “What type of guidance would be most helpful regarding bicycle and pedestrian accommodations” and “What is the process for and challenges associated with securing project funding?” The input from each District was slightly unique, but several themes were universal.

District Office staff identified the need for Policy considerations related to:

- The need for better local planning efforts and the communication and timing of requests for accommodations from Local Public Agencies;
- When to accommodate and how accommodations are funded;
- The responsibility and level of required maintenance; and
- The need for a more substantial funding mechanism for construction and maintenance.

District Office staff identified the need for Guidance considerations related to:

- The selection of accommodation type; and
- The design of facility elements (e.g., width, signage, markings, etc.)





Metropolitan Planning Organization (MPO) and Regional Planning Affiliation (RPA) Staff

MPOs and RPAs are multi-jurisdictional organizations tasked with regional transportation planning, including transportation for bicyclists and pedestrians. They are involved with—or are at least knowledgeable of—most transportation projects that occur within their region. They also play a role in allocating federal funds and applying for state grant funds for bicycle and pedestrian projects, most notably funds from the Surface Transportation Block Grant-Transportation Alternatives Program (STBG-TA). The STBG-TA program replaces the Transportation Alternatives Program (TAP), which itself combined the Transportation Enhancements (TE), Safe Routes to School (SRTS), and Recreational Trails Program (RTP). The questions asked at these meetings were similar to those asked at District Office meetings.

The discussions largely revolved around funding strategies, which vary greatly between the MPOs and RPAs. With flexibility inherent in the current federal transportation legislation (FAST Act), each MPO and RPA has been able to evaluate needs in the manner they choose and direct funding where deemed appropriate. In some regions, under the previous transportation act (MAP-21), the flexible Transportation Alternatives Program (TAP) money was used as originally intended for funding bicycle and pedestrian facilities. In other regions, TAP funds have been “flexed,” or added, to Surface Transportation Program³ (STP) funds for roadway and bridge improvements. Yet in other areas, STP funds have been used in conjunction with TAP money to make significant bicycle and pedestrian facility development possible. In this way, it seems that giving the MPOs and RPAs authority over where funds are directed is valued by those organizations toward meeting their most critical needs.

However, concern was expressed by some RPA representatives, mostly in very rural areas, that the funding they receive is not sufficient for the completion of even very minor projects. Some of these RPAs are trying to overcome this challenge by accumulating money over multiple years, yet this situation remains discouraging for these jurisdictions. This practice also limits buying power due to continued inflation in construction costs.

Just as funding strategies vary, so does the level of planning from region to region. In speaking with MPOs/RPAs, it was determined that in some cases local public agencies have no bicycle and pedestrian facility plans. In others, the plans that are available may be decades old or contain only very vague priorities. While yet other areas have current plans that are updated on a regular basis and prove to be valuable as roadway improvements are implemented. The inconsistency of local (and regional in some cases) planning for bicycling and walking necessitates increased coordination and support between the Iowa DOT, MPOs/RPAs, counties, and municipalities.

3 STP was the MAP-21 predecessor of the FAST Act’s Surface Transportation Block Grant (STBG) program. See Chapter 1: Introduction and Context and Chapter 7: Funding Strategy.

2.5 Public input

Six public meetings—one in each Iowa DOT District—were held and were very well attended by bicycling advocates, trail supporters, elected and appointed officials from local communities, and interested citizens. Since these meetings occurred early in the planning process, only a brief presentation explaining the timeline and goals of the project was given. The true focus of the meeting was to learn from the public what they think is being done well, what they think can be done better, and how the plans goals should be achieved.

In order to gain this type of input, topical exhibits focusing on education, encouragement, enforcement, and engineering were displayed and participants were asked to write comments on one half of each exhibit to indicate what is done well in Iowa and on the other half write ideas as to what could be done better. Another set of exhibits presented the draft goals of the Long-Range Plan and participants were invited to write ideas as to how to achieve each goal. Table 2.1 and Table 2.2 provide a summary of the input received.

Public input meeting locations and attendance figures

- District 1 – Des Moines - 61
- District 2 – Mason City - 45
- District 3 – Sioux City - 22
- District 4 – Atlantic - 41
- District 5 – Fairfield - 10
- District 6 – Cedar Rapids - 48

787 total comments were received.

The “5 Es” of bicycle and pedestrian transportation

The “5 Es” are commonly referred to as a comprehensive way to consider the various factors that impact walking and biking.

Education efforts typically focus on teaching all transportation users (drivers, bicyclists, and pedestrians) how to safely interact and follow the rules of the road.

Encouragement activities focus on increasing biking and walking through fun and interesting activities. Encouragement efforts seek to demonstrate that biking and walking are valid modes of transportation.

Enforcement activities focus on enforcing the rules of the road for all users (motorists, bicyclists and pedestrians). Enforcement also prioritizes having links between the law enforcement community and the biking community.

Engineering refers to the planning, design, and prioritization of physical infrastructure, such as multi-use trails, paved shoulders, and pedestrian safety improvements.

Evaluation and planning efforts seek to quantify the impact of the other “Es.” This category was not used for the open house exercise, because it was assumed that the majority of participants would lack adequate information to comment on the evaluation and planning activities occurring in Iowa.



Table 2.1: Summarized public input meeting comments – Four of the “5 Es”

	What is done well in Iowa?	What could be done better?
 Education	<ul style="list-style-type: none"> • RIDE RIGHT education materials (Des Moines Register) • Walking school bus program • Bike rodeos • Bike map • This meeting 	<ul style="list-style-type: none"> • Better driver education – bike passing • Youth education – school programs • Share the road • Engineer training • Public service announcements • Education of legislators
 Encouragement	<ul style="list-style-type: none"> • Bike map • Organized rides • Iowa Bicycle Coalition efforts • Increase in accommodation (trails and bike lanes) 	<ul style="list-style-type: none"> • Need a “World Capital of Trails” annual event • Promote strategies to businesses to encourage bicycling by employees • Transportation centers with lockers, showers, and vending (tubes) • Promote safe bicycling loops • Tax credits for bicycling to work • Bike share programs in more cities
 Enforcement	<ul style="list-style-type: none"> • Passing rule • Law enforcement support during RAGBRAI • Cops on bikes 	<ul style="list-style-type: none"> • Tough enforcement/fines for motorists that hit bikers/walkers • Enforced stops • Adopting Utah/Idaho stops (bicyclists treat red lights as stop signs and stop signs as yield signs) • Cyclists obeying traffic laws • Headlights and taillights required
 Engineering	<ul style="list-style-type: none"> • Specific trail projects and networks • New bike lanes • Road diets • City implemented bike plans 	<ul style="list-style-type: none"> • More communication on upcoming projects so accommodations can be proposed • Consider accommodations as integral parts of projects • Connect towns – more connectivity • Design for people, not only for cars • Many specific improvements/connections noted • Many specific design standards recommended

Table 2.2: Summarized public input meeting comments – Plan goals

Draft Goals	Comments
<p>Valid</p> <p>Ensure that policy makers, roadway designers and planners, law enforcement officials, motorists, bicyclists and pedestrians recognize that bicycling and walking are valid modes of transportation.</p>	<ul style="list-style-type: none"> • Study the economic impact of trails • Add bicycling to driver's education • Allow use of eminent domain to complete routes • Add trails to the DOT 5-year plan • Study the health benefit of increased bicycle and pedestrian accommodation • Get policy makers on bikes • Adopt complete streets policies statewide
<p>Safe</p> <p>Improve the safety and friendliness of Iowa's roads and trails to accommodate on-road bikeways and sidewalks, reduce crashes, and eliminate fatalities.</p>	<ul style="list-style-type: none"> • Wider paved shoulders on rural roads • Increased signage toward shared use or full lane use • Adjust rumble strips to have gaps and provide buffer between bicyclists and vehicles • Add driver's test questions about interactions with bicycles and pedestrians • Revise the hierarchy from fastest to smallest - pedestrians and bicyclists first • Higher maintenance for bike facilities, lighting
<p>Coordinated</p> <p>Improve coordination between Iowa DOT Central Office, each DOT District, regional agencies and local partners to streamline maintenance and the implementation of programs, policies and infrastructure projects and increase consistency.</p>	<ul style="list-style-type: none"> • Consistent design standards • Cooperation between DOT, Conservation Boards, and trail groups • DOT take a larger role in coordinating town to town connections • Improvement in regional trail plans • State Bicycle Advisory Commission • Include non-cyclists on committees • Web page / map to show connection status



Draft Goals	Comments
<p>Connected</p> <p>Enact policies and develop infrastructure to create an interconnected network of on-road bikeways, sidewalks, multi-use trails and end-of-trip facilities that uses the appropriate facility type (bike lane, shared road, paved shoulder, etc.) to connect people to where they want to go.</p>	<ul style="list-style-type: none"> • Numerous specific improvements • More grade separations for bicycles/pedestrians • Connect discontinuous sidewalks • Continuous bike lanes • DOT should help coordinate where trails go between communities • Connect cities as a priority • Connect employment to retail
<p>Funded</p> <p>Increase the overall level of funding for bicycle and pedestrian infrastructure and programs, explore the flexibility of funding sources and maximize the efficiency of funding to bridge the gap between what is needed and what is available.</p>	<ul style="list-style-type: none"> • Funding for maintenance • Mandate 3% of all state and federal transportation funding for bicycles/pedestrians • Bike registration • Take the Transportation Alternatives Program (TAP) back to the State level • State needs to fund priority trails • Establish Iowa's Water & Land Legacy funding • Include trails in Iowa DOT 5-yr plan • Increase gas tax with % to bicycles/pedestrians
<p>Well-Designed</p> <p>Establish guidelines for the design of on-road bikeways, sidewalks and multi-use trails to ensure they are comfortable, sustainable, convenient and consistent.</p>	<ul style="list-style-type: none"> • Add connections to existing trails for better mobility • Sharrows are not enough • Larger buffers between bikes and vehicles at higher speeds • Wider paved shoulders for 3-wheeled and trailers • Appropriate railings on bridges • Consider capacity in trail design, and amount of pedestrian traffic
<p>Healthy</p> <p>Promote opportunities for active and sustainable lifestyles that include walking and bicycling on a daily basis.</p>	<ul style="list-style-type: none"> • Encourage businesses to promote wellness programs, with incentives for bicycling to work • Tax breaks for bike commuting • Combine with Healthiest State Initiative • More trails and bike lanes to promote healthy lifestyle



3. PROGRAM REVIEW AND RECOMMENDATIONS



Many moving parts

Serving bicycle and pedestrian transportation involves many complementary actions and initiatives that include planning the system; funding, designing, constructing, and maintaining infrastructure; educating all users on traffic safety; encouraging people to bike and walk; enforcing traffic law; and evaluating the success of these efforts.

There are numerous activities that occur as part of Iowa's bicycle and pedestrian program, many of which involve multiple DOT Offices and outside organizations. An example is Iowa's State Recreational Trails Program—the Office of Systems Planning manages the grant program, the Office of Local Systems is often involved in reviewing contracts, local jurisdictions apply for grants and implement projects, and the Office of Traffic and Safety often assists with implementing the projects. In practice, therefore, many organizations in addition to Iowa DOT are involved in and responsible for the various efforts that comprise Iowa's bicycle and pedestrian program.

This chapter is organized into three parts:

1. Agency and organization roles
2. Program assessment
3. Program recommendations

3.1 Agency and organization roles

Although it was developed by the Iowa DOT, this is a bicycle and pedestrian plan for the whole of Iowa. Cities, counties, MPOs, RPAs, the Iowa DOT, and the US Department of Transportation all have roles in planning, designing, constructing, and maintaining elements of the transportation system. Each also has a role in ensuring adequate bicycle and pedestrian accommodations are provided to improve access and connectivity.

This Plan is meant to guide the Iowa DOT's decision making, inform and influence local and regional agencies, and inspire the actions of advocates and non-profits. As such, the successful and effective implementation of this plan depends on the support and actions of a variety of agencies and organizations.

US Department of Transportation

The US Department of Transportation (USDOT) supports bicycling and walking as integral parts of transportation systems. Many of its policies, guidances, and plans for bicycle and pedestrian transportation originate from its Federal Highway Administration (FHWA) arm. Several of the federal policies pertaining to bicycling and walking were discussed in Chapter 1. This includes FHWA's "mainstreaming policy," which requires the consideration of bicycling and walking to be integral to transportation planning and engineering processes. This position was further reinforced in 2010, when the USDOT stated that walking and bicycling should be considered as equals with other transportation modes and that adequate accommodations should be provided for people of all ages and abilities, especially children. The primary responsibilities of the USDOT and FHWA in the implementation of this plan include:

- Implementing its policies pertaining to walking and bicycling (including the "mainstreaming policy") requiring that all projects in which federal funding is utilized (including local projects) consider accommodations for bicycling and walking based on the surrounding context.
- Leveraging FHWA Division Offices to ensure that USDOT and FHWA policies pertaining to mainstreaming bicycle and pedestrian transportation are being followed at the state level.

USDOT launched the “Safer People, Safer Streets Initiative” in early 2015. Over the course of a year and a half, the USDOT increased its work to address non-motorized safety issues and help communities create safer, better connected bicycling and walking networks. The Department rolled out a variety of new resources, issued new research, and highlighted existing tools for a range of transportation professionals. They engaged safety experts, existing and new stakeholders, local officials, and the public on a range of targeted strategies to help get these materials into use and encourage safety in and around streets, including bus stops, transit stations, and other multi-modal connections.

As part of the “Safer People, Safer Streets Initiative” the USDOT field offices convened transportation agencies to conduct road safety assessments in every state. They also launched a Mayors’ Challenge for Safer People and Safer Streets, and worked with stakeholders to identify and remove barriers to improving non-motorized safety.

The Initiative focused on four areas:

1. Bicycle and Pedestrian Trends
2. Walking and Biking Support National Goals
3. USDOT Responsibility
4. Responsibility of States and Local Transportation and Enforcement Agencies

More information can be found by viewing the “Safer People, Safer Streets Initiative” site at: <https://www.transportation.gov/safer-people-safer-streets>

Iowa DOT

The Iowa DOT has the leading role in implementing this plan on a statewide level, and has direct responsibility for including bicycle and pedestrian facilities on state highways and providing technical and

planning assistance to city, county, and regional units of government. Not only must it modify its practices and policies to mainstream biking and walking into the state highway transportation system, the Iowa DOT must also support and encourage cities, counties, and regional agencies to enhance bicycling and walking conditions on the local and regional levels. The primary responsibilities of the Iowa DOT regarding bicycle and pedestrian transportation include:

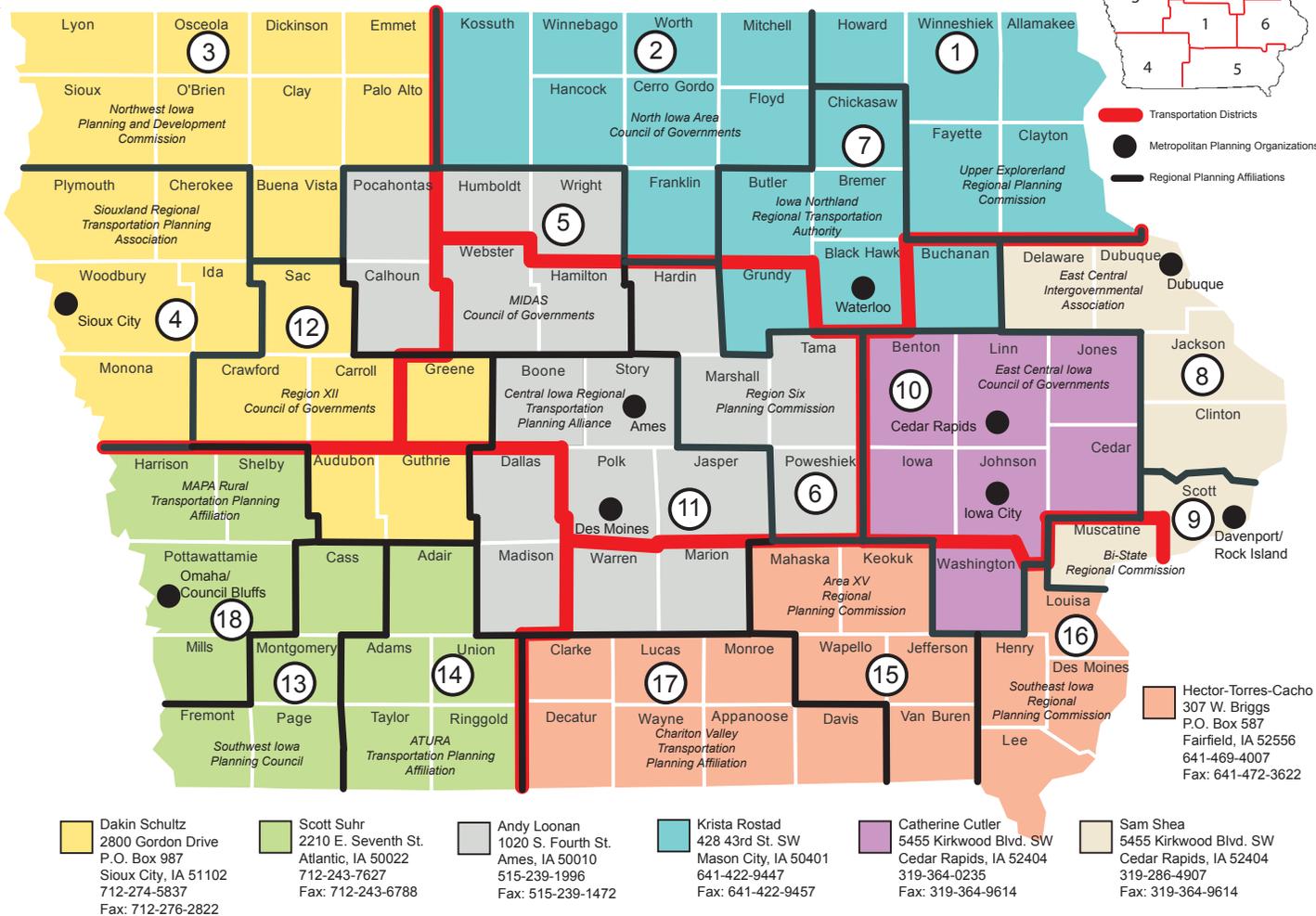
- Federal policies – Adopt and incorporate FHWA’s “mainstreaming policy” and other federal policies pertaining to bicycle and pedestrian transportation into the Department’s planning, funding, and design policies and practices.
- State highways – Enhance the state highway system to accommodate bicycling and walking in rural areas and within cities and metro areas by improving and increasing crossings and facilitating linear access. The Complete Streets Policy (see Chapter 6) reinforces this role and calls for the planning and design of bicycle and pedestrian accommodations on urban and suburban segments of state highways unless there are circumstances that make their inclusion unreasonable.
- Local/regional support and assistance – Encourage and support implementation by other units of government by providing technical assistance and training for the planning, design, construction, and maintenance of safe and comfortable bicycle and pedestrian infrastructure and encouraging cities, counties, and regional agencies to adopt Complete Streets policies.
- Funding – Ensure that state and federal funding is being effectively used to improve walking and biking in Iowa by coordinating and supporting the inclusion of bicycle and pedestrian accommodations on local projects when state and/or federal funds are used, adopting project selection criteria to identify the most beneficial projects, and assisting regional agencies in creative solutions for utilizing Surface Transportation Block Grant-TA funding for its intended purposes.



Figure 3.1: Iowa DOT Districts and locations of MPOs and RPAs

District Transportation Planners' Areas of Responsibility

Metropolitan Planning Organizations and Regional Planning Affiliations



Regional Planning Affiliations (RPAs)

1. Upper Explorerland Regional Planning Commission
2. North Iowa Area Council of Governments
3. Northwest Iowa Planning & Development Commission
4. Siouxland Regional Transportation Planning Association
5. MIDAS Council of Governments
6. Region Six Planning Commission
7. Iowa Northland Regional Transportation Authority
8. East Central Intergovernmental Association
9. Bi-State Regional Commission
10. East Central Iowa Council of Governments
11. Central Iowa Regional Transportation Planning Alliance
12. Region XII Council of Governments
13. Southwest Iowa Planning Council
14. ATURA Transportation Planning Affiliation
15. Area 15 Regional Planning Commission
16. Southeast Iowa Regional Planning Commission
17. Chariton Valley Planning & Development
18. MAPA Rural Transportation Planning Affiliation

- Education and safety – Partner with the Governor’s Traffic Safety Bureau (GTSB) to provide education for all users on traffic laws and the rights of bicyclists and pedestrians through drivers’ education curriculum, public relations campaigns, and other avenues.
- Statewide networks – Develop and enhance coordination between the many agencies involved with developing a statewide network of trails and on-road bikeways.
- Implementation performance – Continually monitor implementation (via performance and input measures) to gauge the effectiveness of actions, including expanding programs to count or estimate bicycle and pedestrian use.

In practice, Iowa DOT’s bicycle and pedestrian program is loosely organized across various offices and locations. Staff members that are part of the program can be divided into two categories:

1. Staff whose primary responsibilities include bicycle and pedestrian issues. These staff members are located within the Office of Systems Planning (Bicycle and Pedestrian Coordinator, Planning Team Leader, Grant Programs Team Leader, and Transportation Enhancement/Alternatives Program Manager) and the Offices of Design and Local Systems (multiple staff who focus on ADA issues).
2. Staff members in the Office of Design, Office of Bridges and Structures, and District Offices who set standards and design streets and roads that contain bicycle and pedestrian accommodations, as well as multi-use trail projects. Although staff members are spread amongst multiple offices, project stakeholders consider Iowa to have a coherent bicycle and pedestrian program.

MPOs and RPAs

Metropolitan Planning Organizations (MPOs) and Regional Planning Affiliations (RPAs) are responsible for planning regional mobility improvements. This includes identifying priority transportation projects to be included in each agency’s four-year Transportation Improvement Program (TIP) and allocating Surface Transportation Block Grant (STBG) funding for projects. These agencies are also responsible for distributing STBG Transportation Alternatives Set-Aside (STBG-TA) funding within their regions. MPOs and RPAs have four primary responsibilities related to bicycle and pedestrian mobility:

- Regional network plans – Develop and regularly update regional bicycle and pedestrian plans that identify key needs and facilitate coordination between jurisdictions.
- Regional priorities – Prioritize funding to maximize benefits to all modes, including using prioritization methods for distributing TAP funds based on the ability of projects to improve bicycle and pedestrian access and safety.
- Agency coordination – Serve as a technical resource to communities and liaison to the Iowa DOT to ensure that the planning and design of bicycle and pedestrian infrastructure is coordinated and consistent across the state.
- Creative funding solutions – Optimize the amount of funding allocated to bicycle and pedestrian projects, including the STBG program and the STBG-TA set-aside. Small agencies especially should be open to creative ways to bank TA Flex funds or otherwise make use of TA Flex funding for its intended purpose.

MPOs and RPAs will play a vital role during the ongoing implementation of this plan. Going forward, these organizations are encouraged to adopt regional Complete Streets policies that serve to prioritize transportation funding to projects that enhance mobility for all modes, not just motor vehicles.



List of MPOs

1. Ames Area MPO
2. Bi-State Regional Commission (Davenport/Quad Cities)
3. Black Hawk County MPO (Waterloo area)
4. Corridor MPO (Cedar Rapids area)
5. Des Moines Area MPO
6. Dubuque Metropolitan Area Transportation Study
7. Metropolitan Area Planning Agency (Council Bluffs/Omaha area)
8. Metropolitan Planning Organization of Johnson County (Iowa City area)
9. Sioux City Metropolitan Planning Council



Counties

Counties are the primary agencies responsible for ensuring that Iowa's transportation system provides local access in rural areas. They are responsible for planning, designing, constructing, and maintaining thousands of miles of paved and unpaved rural roads that are not part of the state highway system. Therefore, these units of government are also responsible for providing and maintaining adequate bicycle and pedestrian accommodations along roads, especially in areas surrounding but outside of incorporated cities. All counties in Iowa receive funding from the state for transportation projects, but also use revenue generated primarily by property taxes. Therefore, the Iowa DOT and the state as a whole has an interest in seeing state and federal funding being used to provide bicycle and pedestrian infrastructure in compliance with state and federal policy.

Counties will play an important part in implementing this plan, although the level of investment required of counties will likely be less than for other units of government. Namely, their implementation roles include:

- Provide accommodations – Ensure that county road projects consider accommodations for bicyclists and pedestrians. Most county roads in Iowa have such low traffic that only wayfinding signs may be necessary.
- Paved shoulders on high-traffic roads – Identify the need for paved shoulders along county roads with high levels of actual or potential bicycle use and coordinate with regional agencies and nearby cities to develop funding strategies.
- Maintenance – Maintain roadway surfaces and strive to prioritize maintenance on roads that have high levels of actual or potential bicycle use (as identified by local or regional bicycle network plans).

Moving forward, counties are encouraged to adopt Complete Streets policies or follow the Complete Streets approach. Regardless of

funding sources for projects, counties should plan and design roadway projects with the clear assumption that bicyclists (and often pedestrians) will be using them. Context is important and needs to be considered; for example, county roads outside of urban areas will rarely need sidewalks while roads/streets passing through unincorporated but developed areas may warrant sidewalks. The use of state and/or federal funds on a county project increases the importance that bicycle and pedestrian facilities are included in the project.

Cities

By length, city streets comprise approximately one-third of Iowa's paved streets and roads. Although municipalities receive some state aid for local street projects, locally-generated revenue (e.g., property taxes) fund a considerable portion of city street projects. Furthermore, the majority of biking and walking trips originate or occur within cities and the vast majority of crashes involving bicyclists and pedestrians occur within cities and metro areas. Municipalities therefore play a major role in making Iowa better for bicycling and walking. Here are a few of the responsibilities of municipalities in implementing this plan:

- Local network plans – Plan citywide bicycle and pedestrian networks to identify key cross-town routes, routes that connect to neighboring cities and/or regional bicycle and pedestrian networks, and infrastructure needs along arterial and collector streets as well as high-activity areas, such as downtowns.
- Parking – Provide or facilitate the provision of adequate bicycle parking (in terms of quantity and design) to accommodate and encourage bicycle use.
- Encouragement and education – Partner with advocates and community groups to sponsor bike to work and walk to work days; bike rallies, *ciclovías*, and other special events; and education opportunities.
- Legislation – Adopt local ordinances that protect vulnerable road users, by requiring motor vehicles to provide adequate clearance

when passing a bicyclist, pedestrian, construction worker, public safety officer, agricultural vehicle, etc.

Cities should use a two-pronged approach to bicycle and pedestrian planning:

1. Community-wide planning – The development of a comprehensive bicycle and pedestrian plan can lead to a number of implementation strategies with short, moderate, and long-term staging of key projects. These plans almost always include recommended bicycle and pedestrian networks and identify key gaps that need to be closed. They also often include a series of non-facility related recommendations (e.g., policies, education programs, bike route maps, enforcement strategies, etc.).
2. Adopt a Complete Streets policy or follow the Complete Streets approach – Regardless of funding sources for projects, cities should plan and design street projects with the clear assumption that bicyclists and pedestrians will be using them. The use of state and/or federal funds on a city or county project increases the importance that bicycle and pedestrian facilities are included in the project.



Ciclovías

Ciclovías are a temporary closing of a street to automobile traffic to allow people to walk and bike freely. These events often take on the quality of a community celebration and can be organized as stand-alone events, or as part of existing events or festivals. *Ciclovías* can provide a great opportunity for people to get out and discover what it is like to bike and walk in their community. Most importantly, they demonstrate to participants the possibilities associated with walking and biking and hopefully entice people to continue biking and walking after these special events.



Advocacy organizations

Advocacy groups represent the people walking and bicycling on Iowa's transportation system. As is common across the country, Iowa's advocacy groups primarily focus on bicycling while pedestrian advocates are uncommon. However, an emerging trend is for bicycling groups to join with pedestrian advocates to promote Complete Streets and the needs of all transportation users. The roles for advocates in implementing this plan are:

- Encouragement – Support and encourage people to walk and bike for transportation and recreation purposes, participating in bike to work and walk to work events, holding bike rallies and other events, and providing education opportunities for the community.
- Political involvement – Communicate to local, state, and national elected officials the importance of laws that protect vulnerable road users and funding for improving infrastructure for bicycling and walking. Encouraging legislation and support elected officials that promote biking and walking.
- Partnerships – Support the efforts of cities, counties, and regional agencies by attending public meetings, providing insight into infrastructure needs, and speaking on behalf of bicyclists and pedestrians.
- Recognition – Encourage and assist communities and businesses in making improvements for bicyclists and pedestrians and applying to receive recognition by the Bicycle Friendly Community, Walk Friendly Community, and Bike Friendly Business programs.

Program assessment

Iowa's bicycle and pedestrian program was assessed by analyzing feedback from outside observers (the Bicycle Friendly State program), processing input from internal and external stakeholders, and a thorough review of Iowa DOT's project development process and design practices.

3.2 Bicycle Friendly State program

The League of American Bicyclists (LAB)—the nation's oldest bicycle advocacy organization, founded in 1880—has programs that recognize bicycle-friendly communities, businesses, universities, and states. The Bicycle Friendly State (BFS) program is unique in that it ranks all 50 states (whereas the programs for communities, businesses, and universities only rate those that make the effort to apply). The BFS program provides good insight into the strengths and areas for improvement in Iowa's bicycle and pedestrian program compared to programs in other states.

Ratings for the BFS program are based on the survey responses from state bicycle and pedestrian coordinators. The survey asks a number of varied questions, such as:

- Has your state DOT recommended protected or separated bike lanes during the planning and design phase of a roadway project?
- Does your state DOT have a design manual, or has your state adopted or endorsed a design manual, that includes guidance for protected and/or separated bike lanes?
- What is the amount of state funding (i.e. derived from state revenue sources) allocated to bicycling and walking projects and programs?
- How many LANE MILES of planned bicycle facilities does your state expect to have installed on or adjacent to state owned or controlled roads within the next 2 years?
- Is there an active statewide bicycle or pedestrian advocacy group?
- Does your state DOT maintain a webpage or website that directs bicyclists to relevant state traffic laws, planning documents, and/or other state programs that affect bicycling in your state?
- Does your state specify a safe passing distance for motorists overtaking bicyclists as a distance sufficient to avoid contact with a bicyclist if the bicyclist were to fall over?
- How has your state DOT worked to incorporate health into transportation decision-making?
- Does the state have a statewide bike plan and/or a combined bike and pedestrian plan that was adopted within 10 years?



Based on survey responses, scores are applied to each state based on five categories: legislation and enforcement, policies and programs, infrastructure and funding, education and encouragement, and evaluation and planning. These scores reflect what was done the previous year (that is, the 2017 score is based on the survey responses from 2016). The program provides a national ranking for each state based on its scores and a separate ranking based on its standing within its region.

Iowa's ranking

For 2017, Iowa was ranked #30 in the country and #6 in the Midwest (Minnesota, Michigan, Illinois, Ohio, and Wisconsin—in that order—outranked Iowa in the Midwest region). Historic rankings are shown in Table 3.1. The drop in ranking from 2011 onward is largely due to advances made in other states.

Table 3.1: Bicycle Friendly States historic rankings for Iowa

Year	Rank
2010	7 th
2011	6 th
2012	16 th
2013	21 st
2014	25 th
2015	28 th
2017	30 th

Report card

In addition to the rankings, the LAB produces “report cards” for each state. The report cards include the state’s category scores and feedback for how to improve the state’s bicycle-friendliness. See Table 3.2.

The report card also contains a written description of Iowa’s status. The report states that “Iowa is middle of the pack in every category. Like many states, there are many places with room for improvement. The best place(s) to start would be our Bicycle Friendly Actions – Iowa is one of only 3 states has not taken a single one of our Bicycle Friendly Actions. While progress on any of our Bicycle Friendly Actions would be positive, the adoption of a complete streets law or statewide policy, and/or the adoption of a statewide bicycle plan would be our choice of priorities. Either would be a strong step towards providing the long-term guidance and resources necessary to improve in each category.”

The LAB defines Bicycle Friendly actions as “a Complete Streets policy, a safe passing law, a statewide bike plan, spending 2 percent or more of federal transportation money on biking and walking, and a bicycle safety emphasis area.” These five Bicycle Friendly Actions are further described in the Feedback portion of the report card.

Table 3.2: Report card scores and rankings (2017)

Category	Score (out of 100)	Rank (out of 50 states)
Infrastructure & Funding	54	26 th
Education & Encouragement	61	19 th
Legislation & Enforcement	59	34 th
Policies & Programs	58	22 nd
Evaluation & Planning	56	31 st

Specific feedback

LAB feedback specific to Iowa includes the following recommendations, many of which are wholly or partially addressed by the adoption of this plan:

“Adopt a statewide Complete Streets law. The National Complete Streets Coalition has model state policy language and a variety of other resources to ensure adoption and implementation.”

This plan includes Iowa DOT’s first Complete Streets policy.

“Adopt a state bicycle master plan. Your state bike plan should provide a 10-year basis for comprehensive planning for bicycle facilities on state roadways and the development of bicycle facilities at the local level.”

This plan serves as Iowa DOT’s first statewide bicycle plan.

“Adopt a safe passing law with a minimum distance of 3 feet to address bicyclist safety.”

Iowa has a law (IAC 321.281) that prohibits motorists from steering “unreasonably close to or toward a person riding a bicycle.” While it does pertain, this law is not specific to passing.



It is supplemented by another law (IAC 321.299), which requires passing at a “safe” (yet undefined) distance when one vehicle overtakes another vehicle. A 2012 opinion from the Iowa Attorney General’s office states that this law applies to overtaking a bicyclist (this is supported by IAC 321.234, which states that bicycles have the same rights and responsibilities as motorists in Iowa). There have been a number of Senate and Assembly bills in the last few years that have attempted to pass a defined-distance safe passing law.

“Iowa should spend more federal funding on bicyclists and pedestrians. Current federal spending on biking and walking projects is lower than the 2 percent set-aside provided in federal law. Adopt project prioritization criteria for federal funds that incentivize bicycle projects and accommodations.”

Iowa is not spending a significant amount of federal funds on stand-alone bicycle and pedestrian projects. This is partially due to TAP Flex funding being transferred to STP funds by RPAs. More significantly, the state is not spending any significant amount on accommodations provided as parts of larger projects—therefore, HSIP, CMAQ, NHPP, and STP funds are not often utilized for accommodations.

“Adopt a law prohibiting a motorist from opening an automobile’s door unless the motorist is able to do so safely. Iowa is one of only 9 states to not provide legal protection to bicyclist injured by “dooring”

Iowa does not have any such law, but the Drivers Manual does encourage motorists to exercise caution when opening their door.

Additional information regarding the LAB ranking of the State of Iowa can be found at the LAB web site at <https://www.bikeleague.org>



3.3 Interviews with internal and external stakeholders

In order to gain a broad perspective of Iowa DOT's Bicycle and Pedestrian Program, 12 interviews were held with numerous DOT staff (seven of the interviews) and individuals outside of the DOT (five interviews including MPO staff, a county engineer, the Governors Traffic Safety Bureau of the Department of Public Safety, and the Iowa Bicycle Coalition). Each interview took 30 to 60 minutes to conduct, depending on the length of each interviewee's responses. The same questions were asked during each interview (see Figure 3.2) but in many cases additional discussion occurred outside of the scripted interview questions. The additional discussion was unique to the interviewee based on the nature of their relationship with the DOT.

Overall, two major themes stand out from the interviews:

1. Most of the interviewees agree that the lack of funding or lack of flexibility in funding is the primary challenge for improving bicycling and walking conditions in Iowa. The lack of funding is also an indication of a reactive approach to bicycle and pedestrian accommodation.
2. Interviewees are generally positive about the bicycle and pedestrian program, citing the Iowa DOT's efforts to improve guidance, strive for multi-modalism, and partner with other organizations as positive steps.

Taken together, these two themes suggest that the Iowa DOT is successful in its existing programs that serve bicyclists and pedestrians. However, there are several sub-themes that support the finding that the DOT is not currently doing all that is needed (providing adequate staff resources for technical assistance for bicycle and pedestrian projects, adopting effective policies for the provision and design of accommodations, ensuring consistency between District Offices and between state, regional, and local efforts, etc.).

Figure 3.2: Interview questionnaire

Defining the Relationship

1. Briefly describe your job or position emphasizing those parts which have brought you in contact with the Iowa bicycle and pedestrian program?
2. We would like to know more about your relationship with the DOT. With what function of the DOT are you most in contact?
3. Do you work with or are you associated with another group or state agency providing a bicycle and pedestrian service? Please tell us which ones.
4. Do you have a daily, weekly, or monthly contact with the DOT with respect to bike and pedestrian services?

Evaluating the Relationship

5. Do you consider the DOT bicycle and pedestrian program to be in a reactive or proactive mode?
6. Please indicate your level of satisfaction with DOT's handling of bicycle and pedestrian program using a 1 to 10 scale with 10 being best. If associated with more than one aspect of the program, please feel free to provide individual scores.
7. What should DOT's top program priority be?

Discussion of Potential Changes

8. What are the greatest challenges and opportunities for improving bicycle and pedestrian accommodation in Iowa?
9. Do you think bicycling and walking should be accommodated in all practical situations or should there be some qualifier/threshold?
10. Can the planning and design of bicycle and pedestrian accommodations be improved with respect to central office and district office coordination? Is there an increased role for the central office? District office? Fine as is?
11. Which practices/policies should be modified to facilitate accommodation? How should they be changed?
12. Explain how project scoping and design is affected by bicycle and pedestrian issues. What about ADA?
13. What enforcement, education, evaluation, or encouragement efforts should occur in Iowa and who should take the lead?
14. What do you think is the best untapped source of funding for bicycle and pedestrian projects?
15. What are the top two or three things this plan should accomplish in order to be successful in your mind?

3.4 Project development process review

Successful implementation of bicycle and pedestrian accommodations into the transportation system is dependent on the process by which accommodations are selected, designed, and constructed. Far too often, bicycle and pedestrian accommodations are not included in street and road projects or are added as an afterthought. This often results in inadequate accommodations for the context, or a lack of accommodations altogether. The project scoping process is the critical stage in the development of transportation infrastructure and is when it is determined whether and how bicycle and pedestrian accommodations are included.

Process overview

The Iowa DOT project development process is based on a scripted list of events, leading to the eventual bid letting and construction of the project. While the DOT does not have a unified, stand-alone procedural manual or document to guide the scoping process for projects, there are several sections in the Office of Road Design's Design Manual that provide guidance for the scoping of road design projects. The scoping process typically takes two to six months and occurs two to 10 years before ribbon-cutting, depending on the complexity, funding availability, and scale of the project. Scoping for projects generally follows this process:

Draft Project Concept Statement

The process starts with the initial development of the Project Concept Statement, which can be led by several groups, including District Staff or staff from the Offices of Design or Bridges and Structures. The Iowa DOT uses a "shell" document that provides the basis for the concept statement letter. The shell includes guidance paragraphs and lists typical topics that need to be addressed. Consultants also assist with the concept development phase of projects.

Project needs are identified from many sources, and are often planned and programmed with very basic, heuristic cost data. Today, most projects are envisioned by District Staff, since they have the most knowledge of the transportation and improvement needs of their respective Districts. The concept development process takes a contemplated project, defines the issues to be solved by the project (sometimes identifying outstanding bicycle and pedestrian needs), establishes the criteria that will be used to design the project, and sets the overall direction.

Design Criteria Worksheets

An important tool used early in the process is the Design Criteria Worksheet (Design Manual Chapter 1 Section 1C-1). A unique worksheet exists for each type of project (rural two-lane highway, urban multi-lane roadway, rural expressway, etc.). The worksheets assist the designer in choosing lane widths, design speed, maximum grade, etc. These worksheets present the first opportunity where bicycle and pedestrian accommodations could be added to a project. Currently, the worksheets only include preferred and acceptable paved shoulder widths for roads where bicyclists are to be accommodated. Sidewalks or sidepaths within the typical cross section are not mentioned. They do not provide any guidance as to whether or not accommodations should be included, nor is there any requirement to justify the omission of accommodations.

Project Management Team and jurisdictional coordination

After the development of the Design Criteria Worksheet, there is typically a significant amount of thought and work put toward refining the project concept. This effort often involves an assigned Project Management Team (PMT), which is assembled to include personnel with either the appropriate technical expertise or authority to set the direction of the project.

The PMT considers the project improvement needs and goals, the criteria suggested by the worksheets, and the context of the project environs. Local jurisdictions and other affected stakeholders are



consulted at this point in the concept development. Currently, this is the only opportunity for a local entity to identify a desire to include a bike or pedestrian improvement during the concept process.

Typical Roadway Sections

Typical Roadway Sections (Design Manual Chapter 3 Section 3A-1) are available for each type of project. After completing the Design Criteria Worksheet and the PMT refines the project concept, the designer develops a “project typical section” that coordinates with the selections in the Design Criteria Worksheet. The project typical section is the basis for the ultimate design of the project. It should include any accommodations for bicycles and/or pedestrians that are to exist within the right-of-way.

Final Project Concept Statement

The work of the PMT and project designer culminates in a variety of developed data that could include study reports; map exhibits; plan and profile sheets; bridge type, size and location (TSL) drawings; and design correspondence. This data is summarized in the revised Project Concept Statement. At this point, the project designer and Office Director or Assistant District Engineer must document any variances from the DOT’s guidelines. Relevant guidelines are listed in the Design Manual Chapter 1 Section 1C-8. The documentation must identify the design exception, provide supporting information for the exception, identify mitigating measures, and justify the need for the exception. No accommodation or complete streets policies or guidance are listed in this Design Manual section, meaning that justification or explanation for not accommodating bicycling/walking on a project is not required.

Once finalized, the Project Concept Statement is circulated to an established list of personnel for review and comment. This represents the last opportunity for the inclusion of pedestrian and bicycle accommodations within the concept phase. Once comments are addressed and the Project Concept Statement is finalized, the project may move forward to the preliminary design process.

Process analysis

The current scoping process falls short in that it does not include any requirements to consider (and include or rule out) bicycle and pedestrian accommodations or complete streets approaches during the scoping process. Namely, it does not reference the need to consult Iowa DOT’s 1999 Bicycle and Pedestrian Accommodation policy. This guidance is also not usually electively consulted, since it does not have the necessary degree of clarity and specificity for designers to make rational decisions.

Instead, the way in which accommodations or complete streets elements become incorporated into projects is that someone taking part in the scoping process identifies the need. This need typically must be consistent with an existing plan, or otherwise be justified with evidence of the need for accommodation. In most situations, it



Public and Stakeholder Involvement

Public and stakeholder involvement is an important part of the project development process, although past public engagement efforts (such as a recently completed Planning and Environmental Linkages (PEL) study or Environmental Impact Statement (EIS) for the corridor) may reduce the level of engagement necessary.

The typical public engagement approach is to provide early information about the project on Iowa DOT's website, hold one or more public meetings during the scoping and conceptual design phase, and present the proposed scope of the project at a later public meeting or online.

is someone from a local partner agency that identifies these needs, since bicycle and pedestrian accommodations (other than federally-mandated ADA compliancy activities) are not at the forefront of the minds of most District Office staff. The implication is that the local partner agency is then expected to fund the accommodation, since it is often someone from said agency who identified the need.

This presents a strong opportunity for a policy change to make a substantial difference on the inclusion of bicycle and pedestrian accommodations on Iowa DOT projects. The local cost share requirement often eliminates accommodations from projects, since the local funding requested may not be available within the time parameters of the project, or even affordable by the local government. Local entities are often unprepared to commit, or are not in touch with their local constituency that may desire the accommodation.

As a result, project development continues without the inclusion of accommodations, essentially precluding bicyclists and pedestrians from using the roadway once the project is completed.

Process recommendations

In order to adequately implement the Complete Streets policy, the Iowa DOT's project scoping process must be modified to mainstream bicycle and pedestrian accommodations. The following recommendations were developed to modify the Iowa DOT's project development process to ensure effective implementation of the Complete Streets Policy. However, cities and counties can benefit as well by incorporating elements of these recommendations into their project development processes.

Draft Project Concept Statement

The shell letters should be modified to require the designer to specifically state expectations for accommodating bicyclists and pedestrians through the project, including whether local or regional plans call for any specific accommodations along or across the project. During this phase of the process, the designer should also note and record the On-Road Bicycle Compatibility Rating for each segment of the project. If the rating is "poor" or "moderate," efforts should be made to improve conditions.



Design Criteria Worksheets

Modify the Design Criteria Worksheets (Design Manual Chapter 1 Section 1C-1) so that they default to including accommodations (sidewalks and bike lanes in urban areas and paved shoulders in rural areas). This may involve adding a line item with preferred and acceptable values for sidewalk width, modifying the acceptable paved shoulder width (specific widths are discussed in further detail later in this chapter), and adding provisions for bike lanes to the urban worksheets.

Project Management Team and jurisdictional coordination

When assembling the scoping team, appoint one person who will represent bicycle and pedestrian interests and ensure accommodations are adequately considered. This could be the District Planner, another staff member from the District, or someone from Central Office.

Typical Roadway Sections

Modify the Typical Roadway Sections (Design Manual Chapter 3 Section 3A-1) so that they default to including accommodations based on context. The changes should be studied further, but will generally include:

- Adding 5-foot wide sidewalks to each urban typical section;
- Adding 5-foot wide bike lanes to each 2-lane urban typical section and both 4-lane undivided urban typical sections; and
- Ensuring each variation of the 2-lane rural typical section (such as 2-lane highway with a right turn lane) includes 4-foot wide paved shoulders.

Final Project Concept Statement

Modify the design decision documentation requirements of this section (Design Manual Chapter 1 Section 1C-8) to include the Bicycle and Pedestrian Facility Selection Guide (see Chapter 5) and the Complete Streets Policy (specifically Section 2: Exemptions) to the list of guidelines requiring justification and documentation of variances.

Potential Challenges Posed by Functionally Obsolete Bridges

Including bicycle accommodations on a more regular basis means that more reconstruction and repaving projects will include the addition of bike lanes or paved shoulders wide enough for bicycle use. These projects do not always include new bridges, however, and it is therefore highly likely that there will be inconsistent shoulder widths between existing bridges and new road sections. This will result in bicyclists leaving the shoulder and entering the travel lane in order to cross substandard bridges (warning signs are recommended in these instances). From a safety perspective, it is undesirable for a bicycle facility to be discontinuous in this manner. However, compared to other types of bicyclists, those that ride longer distances in rural areas are typically better prepared to mix with motor vehicle traffic and ride within the travel lane, especially across short bridges on lower-volume roads. This is a distinctly different situation than a trail or shared use path approaching a bridge without dedicated accommodations, in which case bridge modifications or a separate bicycle/pedestrian bridge would be required.

Resurfacing, Restoration, or Rehabilitation (3R) projects

3R activities are valuable ways to extend the life of rural and urban roadways in a cost-effective manner. They consist of three types of projects:

- Resurfacing – Adding additional pavement or overlays that result in less than a 4” increase to the pavement thickness. These projects may include small areas of reconstruction, but generally do not require additional right-of-way.
- Restoration – Adding additional pavement that results in more than a 4” increase to the pavement thickness. These projects may include small areas of reconstruction as well as pavement widening and sometimes require additional right-of-way.
- Rehabilitation – Reconstructing intersections, widening or replacing pavement, adding shoulders, and improving drainage in order to improve traffic flow and safety. These projects sometimes require additional right-of-way.

Federal-aid 3R projects require consideration of safety improvements. This includes reviewing culverts, bridges, and other objects within clear zones; providing traffic control devices in accordance with the MUTCD; and analyzing recent crash data. For all federal-aid 3R projects, the addition of shoulders is required, but there is not a requirement for any portion of the shoulders to be paved.

3R projects typically require pavement markings to be reapplied. This represents an opportunity to provide bike lanes or other on-road bicycle facilities where adequate pavement width exists or is added.

The 3R program functions differently from the standard scoping process for new/reconstruction projects. Specifically, it is a much faster process and typically revolves around a one-year plan and budget. Each Iowa DOT

District develops and designs its own 3R projects each year. A project concept statement is developed for each and Local Partner Agencies (LPAs) are often involved.

Many LPAs initiate 3R projects. In these cases, the scoping, design, and programming processes are managed by the Iowa DOT Office of Local Systems and are outlined in Instructional Memorandums to Local Public Agencies and the Federal-Aid Project Development Guide. Instructional Memorandum No. 3.214 outlines 3R project requirements.

3R projects are opportunities for including on-road bicycle accommodations. Since they typically involve the reapplication of pavement markings or shoulder widening, it is important that 3R projects include accommodations for bicyclists and pedestrians, when possible. This may include striping bike lanes or paved shoulders where excess pavement is available, providing additional pavement width when a road is being widened, or marking high-visibility crosswalks. Due to the sheer volume of 3R projects each year, the fact that each Iowa DOT District develops and designs its own 3R projects, and the lesser degree of Local Partner Agency and public involvement, ensuring compliancy will be more challenging. However, some Districts are already in the practice of adding 4-foot wide paved shoulders as part of 3R projects.



3.5 Summary of program opportunities and challenges

Overall, the analysis finds that many of Iowa DOT's existing official programs (grant programs, coordination with MPOs/RPAs, etc.) are functioning well and that those individuals whose primary job responsibilities include bicycle and pedestrian issues (the Bicycle and Pedestrian Coordinator, Planning Team Leader, Grant Programs Team Leader, Transportation Enhancement/Alternatives Program Manager, State and Federal Recreational Trails Program Manager, and ADA staff in the Office of Local Systems) are performing their jobs effectively.

However, the Iowa DOT has three primary challenges regarding its approach to bicycle and pedestrian accommodation:

1. Project scoping – ensuring that bicycle and pedestrian accommodations are considered during the scoping process;
2. Project design – ensuring the design of accommodations is adequate and consistent across the state; and
3. Project funding – ensuring adequate funding is available and that accommodations for bicyclists and pedestrians are funded as promptly and fully as are facilities for other transportation modes.

These challenges are interrelated and pertain to issues of coordination between Central Office and District Offices, lack of clear policy and guidance, and lack of motivation to adequately fund bicycle and pedestrian accommodations.

3.6 Program recommendations

Making Iowa a better place for walking and bicycling (thereby achieving the vision and goals of this plan set forth in Chapter 3) requires changes to the programs, practices, and policies of the Iowa DOT as well as each regional, county, and municipal agency, all of which are involved in planning, designing, building, and maintaining Iowa's transportation system. Policies, adopted and enacted by the Iowa DOT and other agencies, serve as the foundation of such a change. This chapter outlines a comprehensive set of policy recommendations intended to guide decision-making, enhance design and planning practices, and facilitate the expansion of intercity and through-city bicycle and pedestrian networks.

The following policy recommendations are intended to be comprehensive to address identified challenges and issues uncovered during the development of this plan based on stakeholder input, staff experience, and an analysis of practices and policies in Iowa. Many of these policies will fall under the purview of the Iowa DOT, but some do not. These policies are intended to be comprehensive and far-reaching, even if they go beyond the Iowa DOT's purview—for some of the following policies, municipalities, counties, or Metropolitan Planning Organizations (MPOs) and Regional Planning Affiliations (RPAs) will be the primary responsible parties.

Policies and practices

1.1 Adopt and implement the Complete Streets Policy that applies to all Iowa DOT projects.

The term “Complete Streets” refers to the practice of considering the needs of and accommodating all modes of transportation (including bicycling and walking) on every road and street. Complete Streets is a process, not a specific outcome, and is therefore sensitive to the context in which the project occurs. For example, a low to moderate traffic rural road might not need sidewalks and bike lanes, but adding paved shoulders to accommodate bicyclists may be warranted. The Complete Streets Policy is presented and explained in Chapter 6. This policy applies only to projects on Iowa DOT roadways (including projects initiated by MPOs/RPAs); however, Metropolitan Planning Organizations (MPOs), Regional Planning Affiliations (RPAs), counties, and municipalities are encouraged to adopt Complete Streets policies, perhaps using the Iowa DOT policy as a basis.

1.2 Continue to ensure compliance with Title II of the Americans with Disabilities Act on all transportation projects.

The Iowa DOT and regional, county, and municipal agencies in Iowa actively ensure that transportation projects reduce barriers for persons with disabilities by complying with Title II of the Americans with Disabilities Act. The Iowa DOT and other agencies in the state should continue utilizing the Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) when designing a project. In addition to ensuring compliance when constructing, reconstructing, resurfacing, and rehabilitating roadways, the Iowa DOT and regional, county, and local partners should identify segments of urban primary and secondary roads that are not ADA-compliant and prioritize the reconstruction of those sidewalks and curb ramps.

1.3 Update the Design Manual and Bridge Design Manual to increase the quality and consistency of accommodations design across the state.

The Iowa DOT should increase the quality and consistency of accommodations design on state highways from one District to the next by providing updated and expanded guidance. To do so, the Office of Road



Design and Office of Bridges and Structures should modify the Design Manual and Bridge Design Manual to reflect national best practices regarding the design of bicycle and pedestrian accommodations in order to provide clear and thorough standards and guidance for Districts to use when designing projects. Specific recommendations include:

- a) Develop an on-road bikeways section for the Design Manual based on the AASHTO Guide for the Development of Bicycle Facilities. Coordinate this section with the on-road bikeways section from the SUDAS manual.
- b) Modify and add clarity to standard road plan files, especially noting that the minimum effective paved shoulder width for bicyclists is 4 feet from edge of pavement to the rumble strip.
- c) Reference the Facility Selection Matrix for accommodation types and treatments (see Chapter 4) to help designers deal with unique situations, such as bike lanes in the presence of on-street parking, climbing lanes, contra-flow lanes, paved shoulders at rural intersections, bridges, etc.

The Statewide Urban Design and Specifications (SUDAS) manual—the local equivalent of the Iowa DOT Design Manual—should also be updated based on national best practices and to coordinate with the Iowa DOT’s Design Manual.

1.4 Provide technical expertise in the Central Office

District Office designers may not have the time or familiarity to design accommodations, so Central Office could provide an increased level of technical support. This could include providing technical assistance on typical design elements (such as signals, crosswalks, bike lane markings at intersections, bikeway design in general, etc.) or becoming involved in problem solving on specific projects. Such a role will necessitate having engineers with expertise in bicycle and pedestrian infrastructure within Central Office (either in the Office of Systems Planning or the

Office of Road Design), which can be achieved by hiring new staff or assigning existing staff. These engineers may also provide a significant amount of oversight (including reviewing plans for individual projects) for the first few years after these policies are implemented to ensure a thorough understanding by project designers.

1.5 Develop and implement maintenance guidelines to address bicyclist and pedestrian needs.

Bicyclists rely on clean and smooth surfacing to balance and to negotiate turns and stops. Tire scraps, litter, broken glass, vegetation, and pavement damage all pose significant hazards for bicyclists, who are much more affected by these issues than are motorists. Similarly, sidewalks and paths must be clear of debris and tripping hazards for pedestrians, not only to enhance the operation of the pedestrian network but also to maintain ADA compliance.

The Iowa DOT should develop and implement maintenance guidelines to ensure that bicycle and pedestrian accommodations are properly maintained on a regular basis. In developing the guidelines, the Iowa DOT should decide what level of maintenance is adequate, identify who is responsible for which element (the Iowa DOT Districts Offices, counties, municipalities, etc.), and determine how maintenance will be funded. The resulting guidelines should be made available for use by counties and municipalities. In general, paved shoulders and on-street bikeways should be swept at least twice per year (once after most snow has disappeared and once during the autumn leaf fall) and inspected annually for pavement and pavement marking damage. The Iowa DOT District Offices should continue to respond to public requests for maintenance of its roads if hazards are reported.

Interagency coordination

2.1 Provide training for planners and engineers on how to effectively plan, select, and design appropriate and accessible accommodations.

Once the Complete Streets Policy has been adopted and the Design Manual and Bridge Design Manual have been revised (policy recommendations 1.1 and 1.6), the Iowa DOT should provide training to planners and engineers. This training should be provided to the Iowa DOT, MPO, RPA, county, and municipal staff and should include an overview of new practices, guidance on how to select appropriate accommodations (based on the selection matrix, see policy recommendation 1.3), and examples of common design challenges and solutions. Training sessions should be provided up front in each District and then annually at the Iowa DOT's Central Office.

2.2 Continue to develop and enhance coordination between the many agencies involved with developing a statewide network of trails.

The statewide trail network as it stands today is a result of the efforts of many municipal, county, and regional governments as well as the Iowa Department of Natural Resources, the Iowa Natural Heritage Foundation, and the National Parks Service. Each of these agencies has a role in funding, planning, developing, and managing these trails. These agencies should strengthen coordination in conjunction with the Iowa DOT to continue developing a network of statewide trails. It is especially important for these agencies to identify opportunities to eliminate gaps in the system and preserve corridors for future trail use.

2.3 Support the efforts of local and regional jurisdictions by sharing knowledge and providing guidance.

Numerous organizations are responsible for making Iowa a better place to walk and bike, including the Iowa DOT; other state agencies; regional, county, and local governments; and non-profit

groups. The Iowa DOT should continue to develop and support such relationships by:

- a) Assisting in revising SUDAS to reflect national best practices, as recommended in recommendation 1.3;
- b) Providing training to regional, county, and local planners and engineers, as outlined in recommendation 2.1;
- c) Providing technical assistance to regional, county, and local planners and engineers, as outlined in recommendations 1.4 and 2.4; and
- d) Encouraging the prioritization of worthy projects by setting forth clear prioritization criteria, as outlined in the funding strategy described in Chapter 7.

2.4 Encourage and support local and regional bicycle and pedestrian planning.

Many of the regional agencies and municipalities in Iowa have bicycle and pedestrian plans that were created to expand the non-motorized network in a coordinated and logical manner. The Iowa DOT encourages each MPO and RPA, as well as cities and counties (especially those with populations exceeding 10,000), to develop or revise bicycle and pedestrian plans that coordinate with this statewide Bicycle and Pedestrian Long-Range Plan. In order to do so, the Iowa DOT should support the development of regional and local plans by developing planning guidelines that outline the suggested content, approach, and methods for bicycle and pedestrian planning. In addition, the Iowa DOT should provide limited technical assistance as staff availability allows, which will also help the Iowa DOT be aware of community plans (both adopted and conceptual) for bicycling and walking.

Safe Routes to School (SRTS) plans are also important efforts that each school district in Iowa should develop. Dedicated funding for SRTS plans and programs has recently been eliminated, but it



is still important to fund these efforts. A SRTS plan can often be efficiently developed as part of a community-wide bicycle and pedestrian plan.

2.5 Encourage communities to apply for bicycle friendly and walk friendly community status.

The League of American Bicyclists ranks applicant communities on their level of “bicycle friendliness” on a scale from “Honorable Mention” through “Platinum.” The Bicycle Friendly Community program provides a roadmap to enhance conditions for bicycling. The application process will help communities recognize their strengths and weaknesses regarding bicycling, and the response from the League of American Bicyclists will help guide each community in improving bicycling.

The Pedestrian and Bicycle Information Center (PBIC) awards communities that improve and prioritize pedestrian safety,

access, mobility and comfort with either a bronze, silver or gold designation. PBIC, which is a partnership between the Federal Highway Administration and the University of North Carolina, provides a community assessment tool to evaluate existing pedestrian conditions and programs largely based on “4 E’s”—education, encouragement, engineering, and enforcement. This walk audit can also be used in planning for future improvements and filling in the gaps in the other E’s.

The Iowa DOT, MPOs, and RPAs should encourage Iowa communities to work toward and apply for both awards. These agencies should also provide support for communities that wish to apply, such as by reviewing applications and providing suggestions for minor improvements.

Network planning

3.1 Reduce barriers created by major highways and other transportation facilities in cities and metro areas.

Many Interstate, US, and state highways pass through cities and can pose significant barriers to bicyclists and pedestrians. Limited-access roads (most Interstate highways and some US highways) offer very few street crossings, typically every one-half to three miles where an arterial or major collector street crosses. While these distances are negotiable for motorists, they are very limiting for non-motorized users. It is important to provide crossings for bicyclists and pedestrians (either as part of a street crossing or as a standalone overpass/underpass) where needed to improve connectivity and increase access for these users. Whenever a limited-access road is being constructed or reconstructed, the Iowa DOT should assess cross-access needs and build overpasses and underpasses accordingly. In general, a crossing of some sort should be provided at least every one-half mile in cities and metro areas.



There are also many at-grade US and state highways that pass through cities and create barriers. These highways often double as arterial streets and convey large volumes of traffic. The Iowa DOT and its regional and local partners should work to make these streets (especially US and state highways that serve as main streets in small communities) better for bicycling and walking. It is also important to make crossing these streets easier, such as by narrowing intersections where possible, shortening signal phases to reduce bicyclist and pedestrian wait times¹, providing longer crossing times, limiting right turns on red, upgrading pedestrian accommodations (enhanced crosswalks, median islands, pedestrian countdown signals, and curb ramps), lowering design speeds, etc. The Complete Streets policy will help accomplish this task for streets that are part of the state highway system, but it is important for cities and MPOs to take the lead in improving major city streets not on the state highway system.

3.2 Expand connected bicycle and pedestrian networks in cities and metro areas to increase access and improve safety.

The bicycle and pedestrian networks need to be expanded by increasing the number of miles of accommodations provided. The sidewalk, multi-use trail, and on-street bikeway (bike lanes, shared lanes, cycle tracks, etc.) networks should be expanded—with a focus on reducing gaps in the system—to provide adequate connectivity for bicycle and pedestrian needs. The provision of on-street bikeways and the selection of accommodation type should be based on traffic volumes and speeds to reduce stress levels for bicyclists. Included in Chapter 4 is a Bicycle and Pedestrian Facility Selection Guide that includes a toolbox and selection matrix that provide guidance on facility type based on various context parameters. It is especially important near schools to provide bicycle and pedestrian accommodations that are appropriate for youth. These efforts will mostly fall under the purview of local and

regional governments and should be supported by the Iowa DOT through technical and planning assistance.

3.3 Expand connected bicycle and pedestrian networks in rural areas to increase access and improve safety.

In rural areas and within the metro area periphery (areas of transition between cities and the surrounding countryside), US, State, and county highways should be improved for bicycling in a context-sensitive manner by providing accommodations based on each roadway's On-Road Bicycle Compatibility Rating (see Chapter 4) with the goal of ensuring all non-Interstate rural roads have a rating of "good" or "moderate" for bicycling based on this methodology. In addition, MPOs, RPAs, the Iowa Natural Heritage Foundation, the Iowa Department of Natural Resources, counties, and other agencies should continue expanding multi-use trail systems into the metro area periphery to improve access to low-traffic rural roads. They should also continue to provide intercity trail connections where such connections are logical. Using abandoned railroads for rail-to-trail conversions is a great way to connect cities for transportation purposes, provide recreational opportunities, and encourage tourism and economic development.

3.4 Encourage transit integration with bicycle and pedestrian networks.

Connected bicycle and pedestrian networks increase the reach of transit systems by expanding the number of destinations that can be accessed. Every transit agency in Iowa should work toward providing bike racks on compatible transit vehicles in the near future. This is a relatively inexpensive action that can provide significant benefit to persons without motor vehicles. In addition, all transportation agencies in Iowa should use proximity to transit centers and bus stops as criteria when prioritizing the provision of accommodations for bicycling and walking.

1 This will also increase bicyclist and pedestrian compliance with traffic/pedestrian signals.



3.5 Regularly assess bicycle and pedestrian network needs, identify gaps, and target improvements.

The current bicycle and pedestrian network (comprised of multi-use trails and on-road bikeways) has numerous gaps, whether they be physically disconnected pieces of infrastructure or roads with poor compatibility with on-road bicycling. While the Complete Streets policy (recommendation 1.1) will significantly close gaps in the on-road bikeway system in the long term, it is important in the short term to identify key gaps and prioritize these locations for improvement in order to accelerate the improvement of a connected network for biking and walking. The following recommendations are made in order to identify needs:

- a) The Iowa DOT should annually or biennially recalculate the On-Road Bicycle Compatibility Rating for all rural and metro area periphery paved roads in order to identify the segments with the worst conditions for bicycling based on traffic volume, traffic speed, and pavement width. Roads in the metro area periphery should be targeted for improvement since they will generally be roads with greater existing and latent demand for bicycling, compared to roads in more rural areas;
- b) MPOs and RPAs should annually review their multi-use trail network and identify gaps in the networks. Shorter gaps should be prioritized for improvement;
- c) Determine a method to assess the demand for bicycle and pedestrian accommodations in order to further justify the expense of providing accommodations. Several methods exist (e.g., the Latent Demand Score model²) but are mostly comparative (rating one segment versus another segment) and do not estimate the actual number of users. A simpler method is to estimate the total travel demand and multiply by Iowa's

² Landis, B. and Toole, J. Using the Latent Demand Score Model to Estimate Use. In Pro Bike/Pro Walk 96 Resource Book. Presented at the Ninth International Conference on Bicycle and Pedestrian Programs, Portland, Maine, September 1996, pp. 320-325

bicycle mode share (1.0 percent of all trips according to the 2017 National Household Travel Survey) and pedestrian mode share (8.6 percent of all trips); and

- d) Hold annual or semi-annual public meetings to gain feedback on proposed projects and receive ideas for specific network improvements. One opportunity is to hold a widely-publicized open house concurrent with the annual Iowa Bike and Trails Summits (the open house should be open to those not attending the Summits). Another option is to hold a public meeting in each District once or twice per year.

Safety and law enforcement

4.1 Identify key bicycle- and pedestrian-related enforcement issues based on crash data and other evidence.

There are numerous traffic violations and behaviors regularly committed by bicyclists, pedestrians, and motorists. However, some violations are more likely to result in injuries and fatalities than others. For example, a bicycle equipped with a siren or whistle (prohibited by IAC 321.434) does not likely result in as many crashes as a bicyclist (or motorist) running a stop sign or red light, riding the wrong way on a one-way street, or failing to yield right-of-way. The Iowa DOT and the GTSB should collectively review crash data with law enforcement officers on a regular basis to identify the behaviors that most often result in crashes and develop enforcement tactics accordingly.

4.2 Incorporate bicycle safety-related education into training for new and experienced law enforcement officers.

Bicycle-related training for law enforcement officers often includes training that equips officers with the skills and knowledge to enforce the law on bikes. However, this training does not include any content regarding traffic interactions between motorists, bicyclists, and pedestrians. Law enforcement officers are not always aware of the types of traffic violations that are

most likely to result in crashes between bicyclists and motorists. Brief education courses for law enforcement officials can provide information about these topics and potentially count toward continuing education requirements that many officers are required to pursue. In addition, annual reviews of bicycle and pedestrian crash statistics and reports will provide law enforcement agencies with knowledge of the specific behavioral issues and high-risk crash locations within Iowa. Furthermore, law enforcement officers should consider seeking League Cycling Instructor certification, which will allow them to effectively teach bicycle safety and skills courses to other officers and the general public.

4.3 Enact legislation designed to protect vulnerable road users.

Iowa's existing legislation related to vulnerable road users prohibits motorists from steering "unreasonably close to or toward a person riding a bicycle" (IAC 321.281) and requires overtaking vehicles to pass at a "safe" (yet undefined) distance (IAC 321.299).



However, there are additional protections that could be enacted, as outlined below. Each of these recommendations has been adopted in multiple other states.

- a) Modify IAC 321.299 to require motorists to change lanes when passing another vehicle (including cars, bicycles, agricultural equipment, construction equipment, etc.);
- b) Adopt a vulnerable road user law that increases penalties beyond the current penalties outlined in IAC 321.482A for a motorist that injures or kills a bicyclist, pedestrian, construction worker, law enforcement officer, or any other vulnerable roadway user; and
- c) Adopt a statewide, all-ages cell phone ban to combat distracted driving and increase safety for everyone on the road.

4.4 Evaluate key safety challenges pertaining to walking and bicycling and develop crash reduction strategies.

The development and implementation of Iowa's Strategic Highway Safety Plan (SHSP) is the state's primary way to identify, quantify, and develop countermeasures for safety problems on Iowa's roads. It also shapes how Highway Safety Improvement Program funds are used. However, in the past this document has not considered bicycle and pedestrian safety. Each time the SHSP is updated, it should include an analysis of crashes involving bicyclists and pedestrians as well as strategies for reducing and ultimately eliminating these crashes. In support of the SHSP and as general practice, it is important that planners and engineers conduct safety audits of intersections and corridors that have a high number of bicycle and/or pedestrian crashes. The Iowa DOT should develop a process and program for conducting these audits and work the MPOs, RPAs, counties, and municipalities to complete the audits.



Education and encouragement

5.1 Provide education for all users on traffic laws and the rights of bicyclists and pedestrians.

Many people have a negative perception of bicyclists—that they ignore traffic laws or impede the flow of traffic. This perception is often tied to beliefs that bicycles do not belong on roadways or that they should be licensed and taxed. It is of critical importance that the general public understand traffic laws as they relate to bicycling and walking. Most notable is that the law gives bicyclists the right to use any roadway unless bicycling is specifically restricted (typically Interstate highways). It is also important that all users—bicyclists, pedestrians, and motorists alike—understand how to safely interact with each other on Iowa’s roads and streets. The Iowa DOT and its partners should inventory current and past education efforts across the state. Then, building upon the successful programs, a comprehensive statewide education program should be developed and implemented in partnership between the Iowa DOT, the Iowa Bicycle Coalition, the Iowa Department of Public Safety, the Governor’s Traffic Safety Bureau (GTSB), and other as appropriate. This program should include:

- a) A “Bicycle Awareness and Traffic Safety” public relations campaign distributed via the internet, billboards, the Iowa DOT’s dynamic message signs, bus advertisements, and other media;
- b) Revisions to the drivers’ education curriculum (including training for commercial drivers) including the rights of bicyclists and pedestrians and current and future vulnerable road user laws;
- c) Build upon the Iowa Bicycle Coalition’s education program to provide safety and skills training courses annually for adults and youth. These courses should include practical (on-the-bike) training as well as classroom lessons to teach participants how to safely use the transportation system and obey the rules

of the road. Curriculum for school-aged children should also include pedestrian safety. The League of American Bicyclists has recently released a new Smart Cycling Quick Guide, which can be used to reach a broader audience than those willing to participate in more intensive bicyclist training programs.; and

- d) Investigate offering a bicycle and pedestrian education course as an alternative for bicyclists, pedestrians, and motorists who are first-time minor offenders of bicycle and pedestrian-related rules of the road. Consider requiring such a course in addition to regular fines and penalties for habitual offenders.

The education program should reach all road users in Iowa, but targeted efforts should be made to reach younger drivers.

5.2 Encourage more people to walk and bicycle in conjunction with education efforts.

The adage of “knowledge is power” is true for bicycling and walking. When people receive training on how to safely bicycle and walk while interacting with traffic, they become empowered and encouraged to utilize active transportation regularly. The design of on-line and print safety and how-to materials, training courses, maps, and other education efforts should consider the need for encouragement and espouse the health, safety, environmental, and economic benefits of bicycling and walking. This is true for adult bicyclists and pedestrians as well as children and their parents.

5.3 Coordinate education and encouragement efforts with partners and events to reach broader audiences.

There are many organizations and groups other than the Iowa DOT that come into contact with bicyclists and other road users. Leveraging the contacts made by these groups is a good opportunity to further spread the education and encouragement message. The Register’s Annual Great Bicycle Ride Across Iowa (RAGBRAI), which draws thousands of participants each year,

is an example of such an opportunity. Bicycling and walking advocates should continue to use RAGBRAI, the Iowa Bicycle Summit, and other events to encourage bicycling by introducing people to bicycling in Iowa, encourage daily active transportation, and convey key education messages and materials. In addition, The Register provides educational materials on the RAGBRAI website, which should be coordinated with a statewide education campaign. In terms of public agencies, the partnership with the Governor's Traffic Safety Bureau (GTSB) of the Department of Public Safety can be broadened and strengthened as a way to coordinate with law enforcement agencies across Iowa to provide more face-to-face education in communities.

5.4 Encourage the provision of incentives for people who choose to walk and bicycle to work.

Walking and bicycling to work has many benefits. For the individual, it saves money, improves health, and is enjoyable. In addition, the more people who walk and bicycle instead of drive, the less traffic congestion and air pollution there will be. The private sector can encourage more walking and bicycling by providing employees with incentives. Employers will find that more walking and bicycling leads to healthier employees, which leads to lower health insurance premiums and higher productivity. In addition, as part of the Bicycle Commuter Benefit—a qualified transportation fringe benefit (26 U.S.C. sec. 132(f))—employers may provide up to \$20 per month of reimbursement for employees who bike to work.



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4. INFRASTRUCTURE ANALYSIS AND RECOMMENDATIONS



Tools for improvement

The planning and design of bicycle and pedestrian accommodations is an exercise in incorporating these modes into a transportation system that has—for the last 100 years—been built almost exclusively for automobiles. In the past five to ten years, significant advancements have been made in the United States in terms of the design of innovative accommodations and better understanding the nature of and opportunity for increased bicycle and pedestrian travel.

This chapter includes an analysis of existing conditions and recommendations intended to facilitate the development of consistent and interconnected bicycle and pedestrian networks through standardized design and comprehensive system planning. Also included are tools to aid in the selection of appropriate accommodation types for any given context and basic methodologies for effectively planning networks to increase access for non-motorized road users in a safe and equitable way. The recommendations are applicable on the local, regional, and state levels and identify the roles of various agencies.

This chapter is organized into four parts:

1. **Assessing the System** – an analysis of the existing roadway and multi-use trail network.
2. **Pedestrian Planning and Design** – planning and design considerations and guidance for accommodating pedestrians.
3. **Bicycle Planning and Design** – planning and design considerations and guidance for accommodating bicyclists.
4. **Facility Selection** – guidance on the selection of an appropriate bicycle or pedestrian facility based on traffic volumes and speeds.

4.1 Assessing the system

Infrastructure for bicycling and walking has two basic forms—Iowa's road network and multi-use trails (MUTs). Rural roads and city streets form a widespread and interconnected network in Iowa, providing access to every city and practically every destination in the state. For this reason, accommodating bicyclists and pedestrians on roads and streets is of utmost importance. MUTs can provide direct connections, a higher level of comfort for users compared to on-road bikeways, and outstanding recreational opportunities. However, while many people prefer MUTs, by their very nature they cannot connect the majority of destinations.

According to the 2017 *Iowa in Motion* (Iowa's long-range State Transportation Plan), there are currently more than [3,000] miles of bicycle and pedestrian facilities, excluding standard sidewalks. The majority of these miles of infrastructure [(1,866 miles or more than 62 percent)] are in the form of multi-use trails while the remainder is in some form of on-road bikeway (bike lanes, paved shoulders, wide sidewalks, etc.). However, it is important to recognize that while only [870] miles of on-road bikeways have been identified, there are more than one hundred thousand miles of roads in Iowa on which bicycling is permitted.

Placeholders: mileage of roadway

The following section contains numerous references to roadway mileage with certain characteristics. Many of these figures are based on 2015 data and will be updated with 2018 data as the plan is finalized.

Roadway system overview

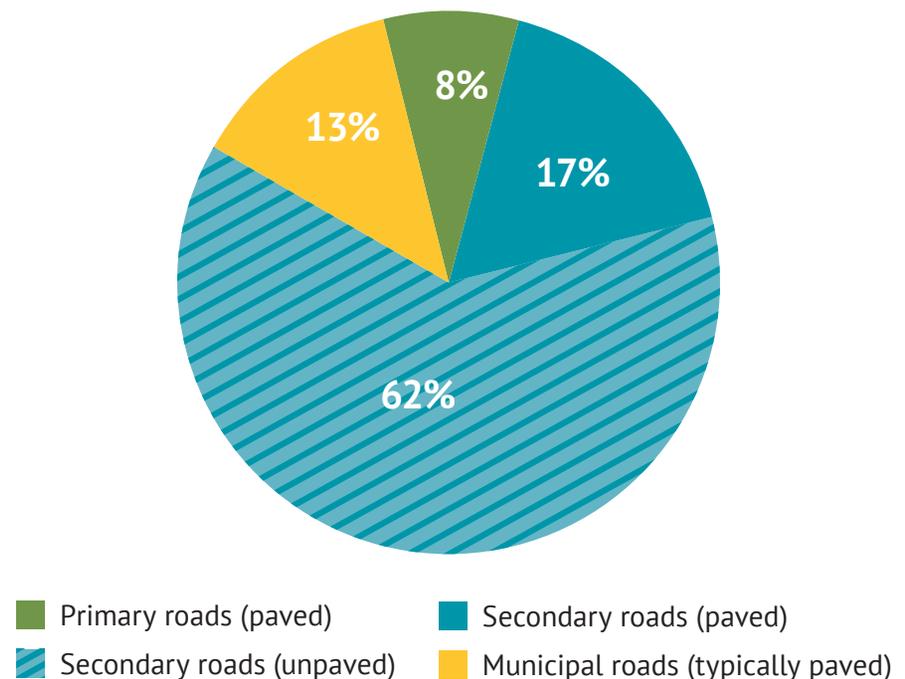
[Iowa contains 115,135 total centerline miles of roadway (43,042 miles are paved). This figure includes 626 miles of state park and institutional roads.] The state’s roadway system is classified according to three main categories—primary roads, secondary roads, and municipal roads.

Primary roads include Interstate, US, and State Highways, totals [9,574] miles. In general, the traffic volumes of these roadways make them poorly suited, or at least challenging, for bicycling. However, infrastructure improvements—such as wide paved shoulders—can accommodate bicyclists that choose to use these roads. While it is unlikely that primary roads will become major routes for bicyclists, short segments of US and State Highways can be used to close gaps between bikeways along lower-volume roads where alternatives do not exist. Examples include “Main Street” segments in small municipalities or a two-mile segment of primary road to connect bikeways on two low-traffic secondary roads. From a pedestrian perspective, sidewalks along primary roads are very important, especially if these roads provide direct access to businesses and other destinations. It is important to note that Iowa does not allow bicyclists or pedestrians to use the Interstate Highway system or four-lane divided roadways with posted minimum speed limits¹.

Secondary roads include County Trunk and Farm-to-Market Roads, totals [90,355] miles. Iowa’s secondary roads system provides great opportunities for bicycling and walking. This system, which includes [19,120] centerline miles of paved roads, forms a grid across the state, connecting cities large and small. These roads typically have lower volumes of traffic and are therefore well-suited for many bicyclists, even when paved shoulders are not present (see the On-Road Bicycle Compatibility Rating section later in this chapter).

Municipal roads include local city streets and rural roads, totaling [15,102] miles. These roads are locally-controlled and maintained, either by cities or counties. Streets within cities are typically paved and provide good opportunities for on-road bicycling (especially where they serve as alternative routes to higher-volume primary and secondary roads).

Figure 4.1: Miles of roadway by type

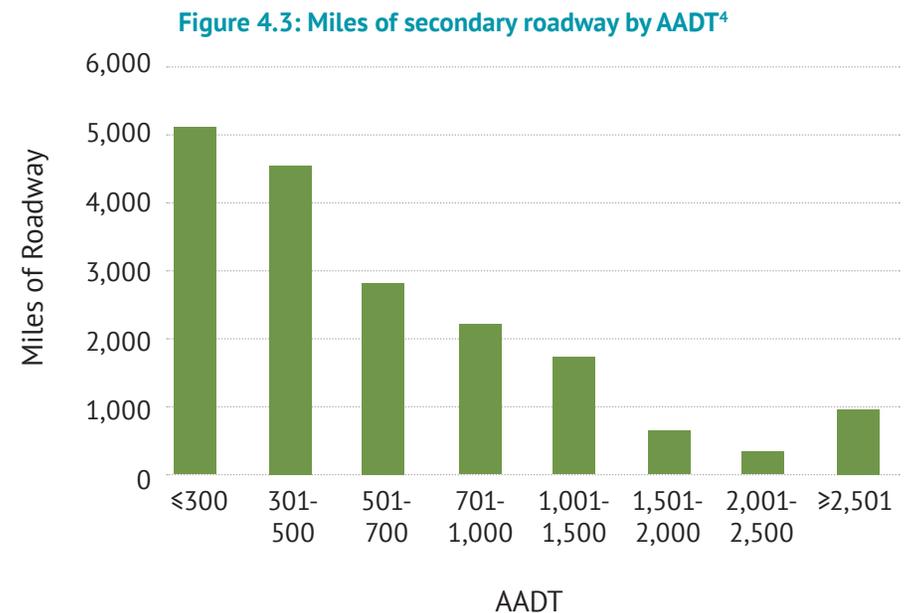
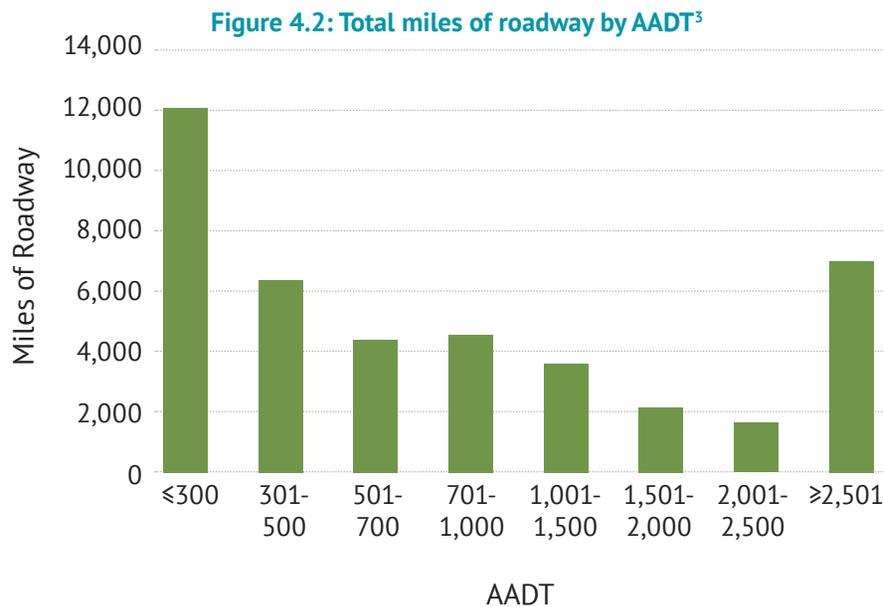


¹ Iowa Code § 321.285.



Traffic volume

Traffic volume contributes to the overall level of stress of a roadway for all modes of transportation. It is also a major factor in determining the suitability of a roadway for on-road bicycling. Considering the [43,042] miles of paved roads in Iowa, the majority of Iowa’s roads have low to low-moderate volumes of daily traffic—[83 percent (35,562 miles) have fewer than 2,500 AADT². Of the 18,438 miles of paved secondary roads, 17,475 miles or 94.8 percent have fewer than 2,500 AADT. Just over 65 percent of all roads have less than 1,000 AADT (see Figure 4.2: Total miles of roadway by AADT² and Figure 4.3).]



2 Annual Average Daily Traffic – the total volume of traffic on a roadway per year, divided by 365.

3 Data source: Iowa DOT’s GIMS database (2012 historical data).

4 Data source: Iowa DOT’s GIMS database (2012 historical data).

Multi-use trail system overview

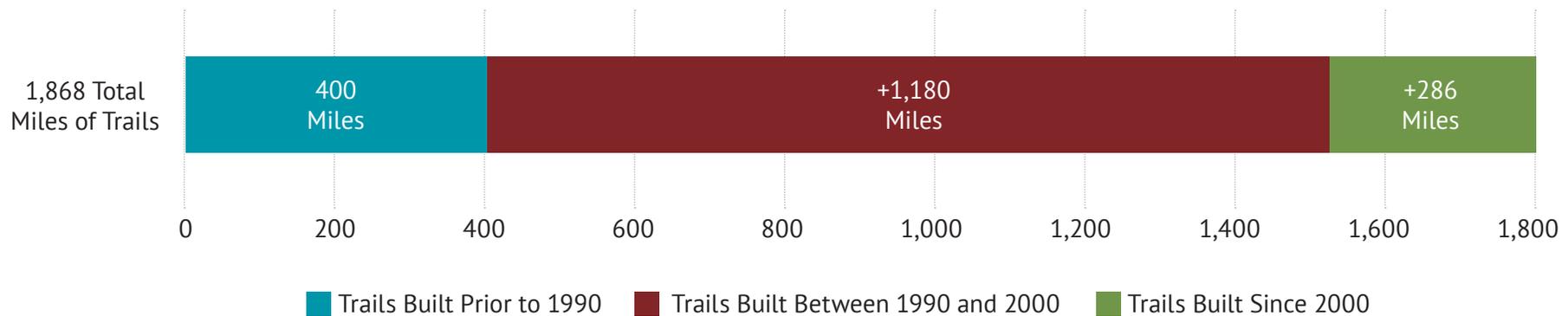
According to the 2017 *Iowa in Motion*, there are currently approximately 1,866 miles of multi-use trails (MUT) across the state. The majority of miles of trail were constructed in the period between 1990 and 2000, which roughly coincides with the period between the State’s two major trail plans.

MUTs built since 2012 utilizing any form of state or federal funding have been built in accordance with American Association of State Highway and Transportation Officials (AASHTO) standards updated in 2012⁸. Namely, MUTs are 10 feet wide and be designed for use by bicyclists and pedestrians. Future MUTs utilizing state or federal funding will also be built to these standards. However, lower standards were in place prior to 2012 and the minimum width required for state and federal funding eligibility was 8 feet (although 10 feet was often recommended and constructed). MUTs that are only 8 feet wide are more challenging for bicyclists and pedestrians to share.

National trails

There are three national trails that cross Iowa—the coast-to-coast American Discovery Trail goes east to west from Davenport to Council Bluffs, the Mississippi River Trail parallels the eastern border of the state, and the Lewis and Clark trail follows the Missouri River from Sioux City south to the Missouri Border. The word “trail” in this case is a route designation; each of these corridors were developed using a combination of multi-use trails and on-road bikeways. The American Discovery Trail is generally considered complete whereas the other two are in varying stages of completeness.

Figure 4.8: Miles of trail built over time⁸



⁸ Guide for the Development of Bicycle Facilities, 4th Edition. https://bookstore.transportation.org/collection_detail.aspx?ID=116

⁹ Guide for the Development of Bicycle Facilities, 4th Edition. https://bookstore.transportation.org/collection_detail.aspx?ID=116



Trails: facility type versus route designation

In Iowa, the word “trail” is used to refer to several distinct concepts:

1. A multi-use trail – a paved path that is separated from the roadway and intended for use by bicyclists and pedestrians. These may be within the right-of-way of a roadway or may be unrelated to any roadway, such as a path along a creek or river. These can be used for transportation and recreation.
2. An unpaved trail – nature trails, mountain bike trails, and other unpaved paths that are primarily used for recreation.
3. A route designation – terminology used to identify a bicycle and pedestrian corridor that may include multi-use trails, sidewalks, and on-road bikeways. An example of this usage is the term “Mississippi River Trail.”

It is important to recognize the distinction between the various meanings of this term. In order to differentiate, the use of the word “trail” on its own is avoided in this document.

4.2 On-road bicycle compatibility rating

During the past 20 years a significant amount of research has been conducted on what bicyclists consider to be important for their level of comfort on roadways. This is often referred to as “bicycle level of service” (BLOS). Bicyclists uniformly indicate that level of service for them is dictated by variables affecting their safety (including speed, separation from motor vehicle traffic, and volume and size of passing vehicles). A model used by the Wisconsin Department of Transportation (WisDOT), and now several other states, was developed with rural roadways in mind.

Background

WisDOT has been using this bicycle level of service model since 1982. The model was designed to be sensitive to the conditions of low and moderate volume rural roadways, much like Iowa’s secondary road system. The model was based on the probability of a conflict between bicyclists and passing vehicles, based on research performed as part of a National Cooperative Highway Research Program (NCHRP) study.⁵ Very few rural roads with low volumes of traffic have enough width to allow three vehicles (two passing motorists and a bicyclist) to comfortably share the same linear space. The statistical probability of motor vehicle/bicycle conflict has a major impact on the suitability of a roadway for shared use and overall safety. The model was made sensitive to volumes based on earlier research conducted for warranting passing lanes on highways. Using and modifying that formula, a bicyclist can expect to encounter nine times as many conflicts on a road with 1,500 vehicles per day as compared with a road that has 500 vehicles. On a road with 5,000 vehicles, the conflicts would be one hundred times as great as on a road with 500 vehicles per day.

Methodology

This bicycle compatibility rating assessment was performed for all paved rural Primary and Secondary roadways as part of the existing conditions assessment. The assessment does not include roads and streets in cities and metro areas because the model was not designed to account for the numerous impacting factors present in these environments, such as multiple lanes and number of driveway crossings. The model uses factors including average daily traffic volume, roadway width, percent yellow center line, and percent truck traffic. Based on a combination of these factors, roadway segments are rated “good,” “moderate,” or “poor.” A generalized explanation of the methodology is displayed in Table 4.1. A detailed methodology and analysis is provided in [Chapter/Appendix Number] of the [Technical Guide (working title)].

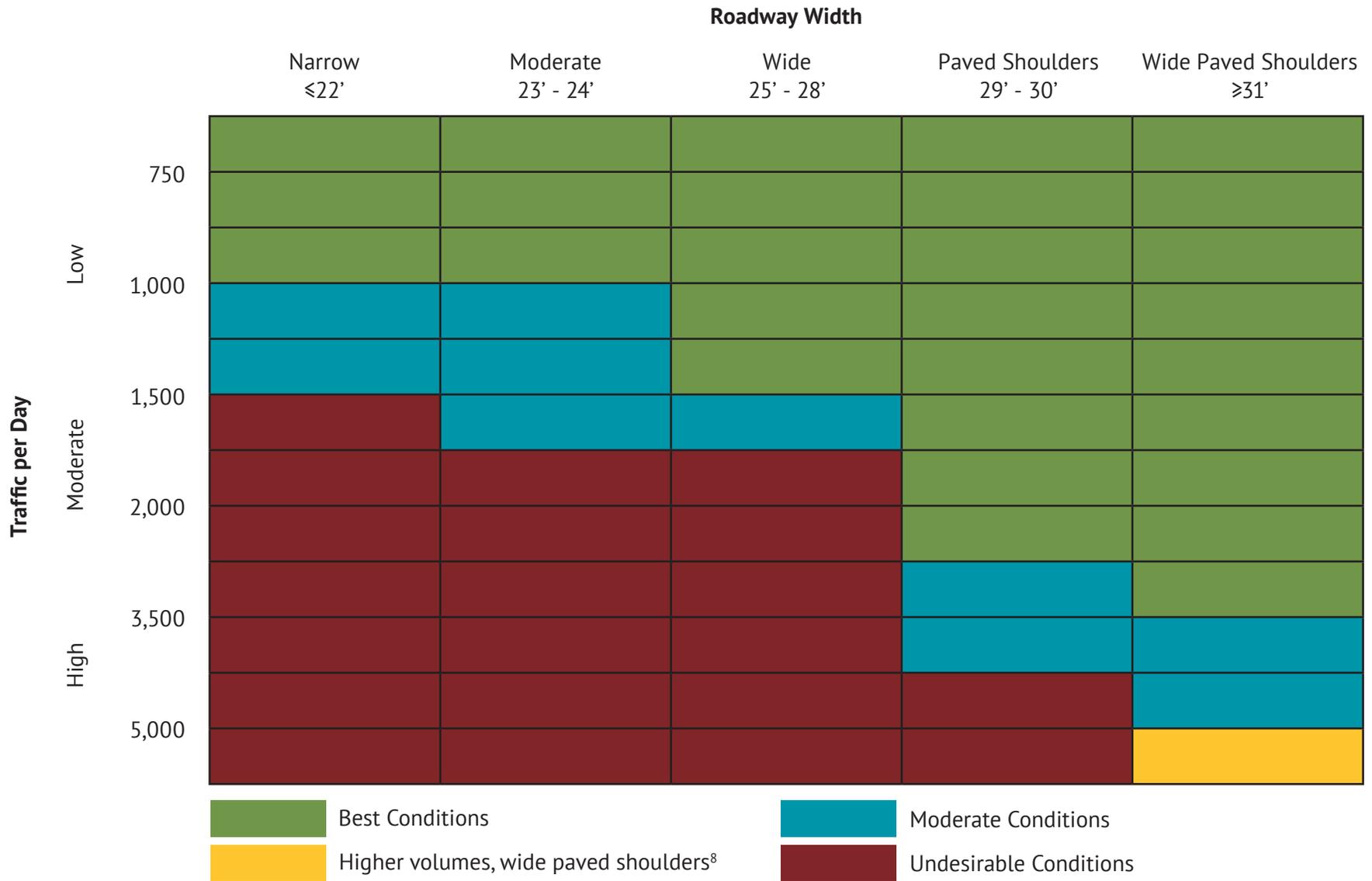
Placeholders: figures 4.4, 4.5, and 4.6

Each of these figures references 2015 data. These figures will be updated with 2018 data as the plan is finalized.

5 Glennon, John C. Design and traffic control guidelines for low-volume rural roads. Washington, D.C.: Transportation Research Board, National Research Council, 1979. Print.



Table 4.1: Generalized bicycling conditions for rural roadways⁷



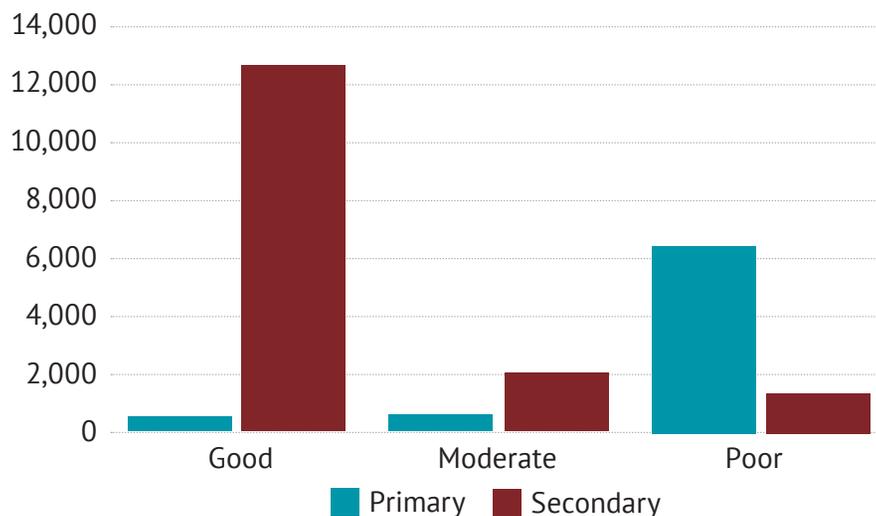
6 *Wisconsin Rural Bicycle Planning Guide*. Wisconsin Department of Transportation. April 2006. 15.

7 Not used for this analysis.

Analysis

When applied to Iowa’s primary and secondary road systems, the results are generally positive. [More than 13,500 miles of roadway (nearly 57 percent of Iowa’s 23,700 miles of paved primary and secondary rural roads, excluding urban roadways, municipal roadways, and Interstate highways) were rated as “good” (see Figure 4.4) by On-Road Bicycle Compatibility Rating). The majority of rural roads receiving a “good” rating are part of the secondary road system (roughly 13,000 out of 13,500 lane miles). Very few secondary roads receive a “poor” rating.] The major contributing factor for the good ratings these roads receive is the very low volumes of traffic (AADT) present.

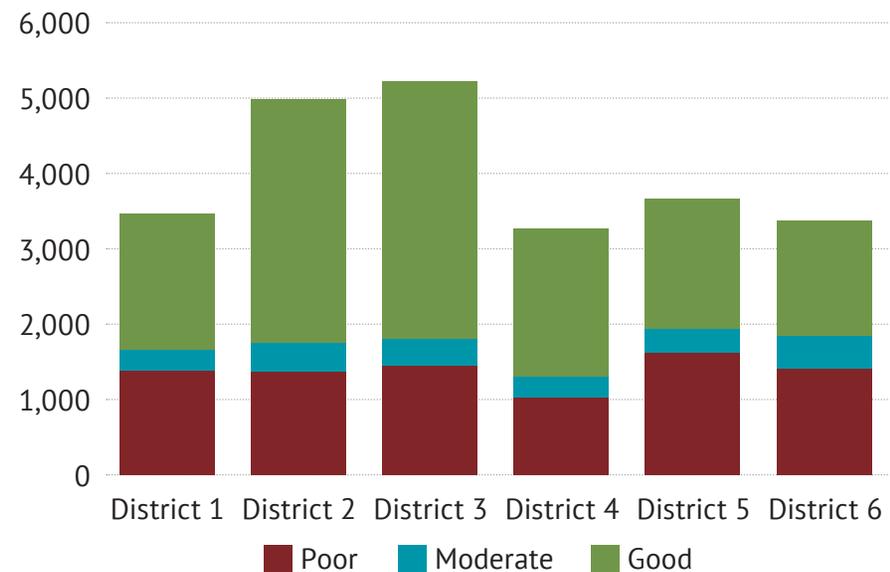
Figure 4.4: Miles of primary and secondary rural roadway (excluding interstate highways) by on-road bicycle compatibility rating



By Iowa DOT District

The distribution of ratings by district is shown in Figure 4.5: Miles of roadway by on-road bicycle compatibility rating by district. All districts are relatively consistent in terms of the number of lane miles of “poor” rated roads. This generally mirrors the number of lane miles of primary roadways (excluding Interstate highways) in each district. Primary roads are generally not very compatible with on-road bicycling due to their high traffic volumes. In contrast, the numbers of lane miles of “good” rated roads varies significantly across districts, and roughly parallel the presence of paved secondary roads. Districts 2 and 3, which cover the northern portion of the state and contain greater shares of paved secondary roads than other districts, have larger numbers of “good” rated lane miles. District 5, on the other hand, has the lowest proportion of “good” rated roads as well as the lowest proportion of paved roads.

Figure 4.5: Miles of roadway by on-road bicycle compatibility rating by district



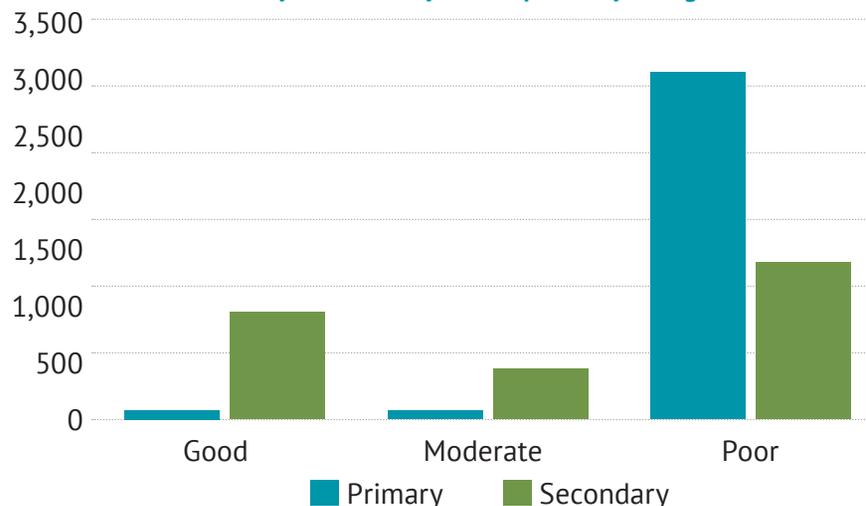


Surrounding metro areas

One of the most important issues highlighted by this analysis is the fact that roadways surrounding metro areas are not very compatible for on-road bicycling due to the high volumes of traffic they carry. Figure 4.6: Miles of primary and secondary rural roadway within two miles of MPOs by on-road bicycle compatibility rating⁶ illustrates the ratings of rural roads inside of and within two miles of Metropolitan Planning Organization (MPO) boundaries but outside of incorporated city limits. Compared to Figure 4.4, the majority of secondary roads and nearly all primary roads receive “poor” ratings. This means that access to “good” rated roads from major population centers is very limited.

It is logical—yet a challenge nonetheless—that roads surrounding population centers have the highest levels of traffic (a major contributing factor for the compatibility rating) and are in proximity to the highest concentrations of current and would-be bicyclists. While [26 percent] of the roads in the metro area peripheries are rated “good” or “moderate,” these roads do not tend to provide continuous connections in and out of most cities. Rather, they are discontinuous

Figure 4.6: Miles of primary and secondary rural roadway within two miles of MPOs by on-road bicycle compatibility rating



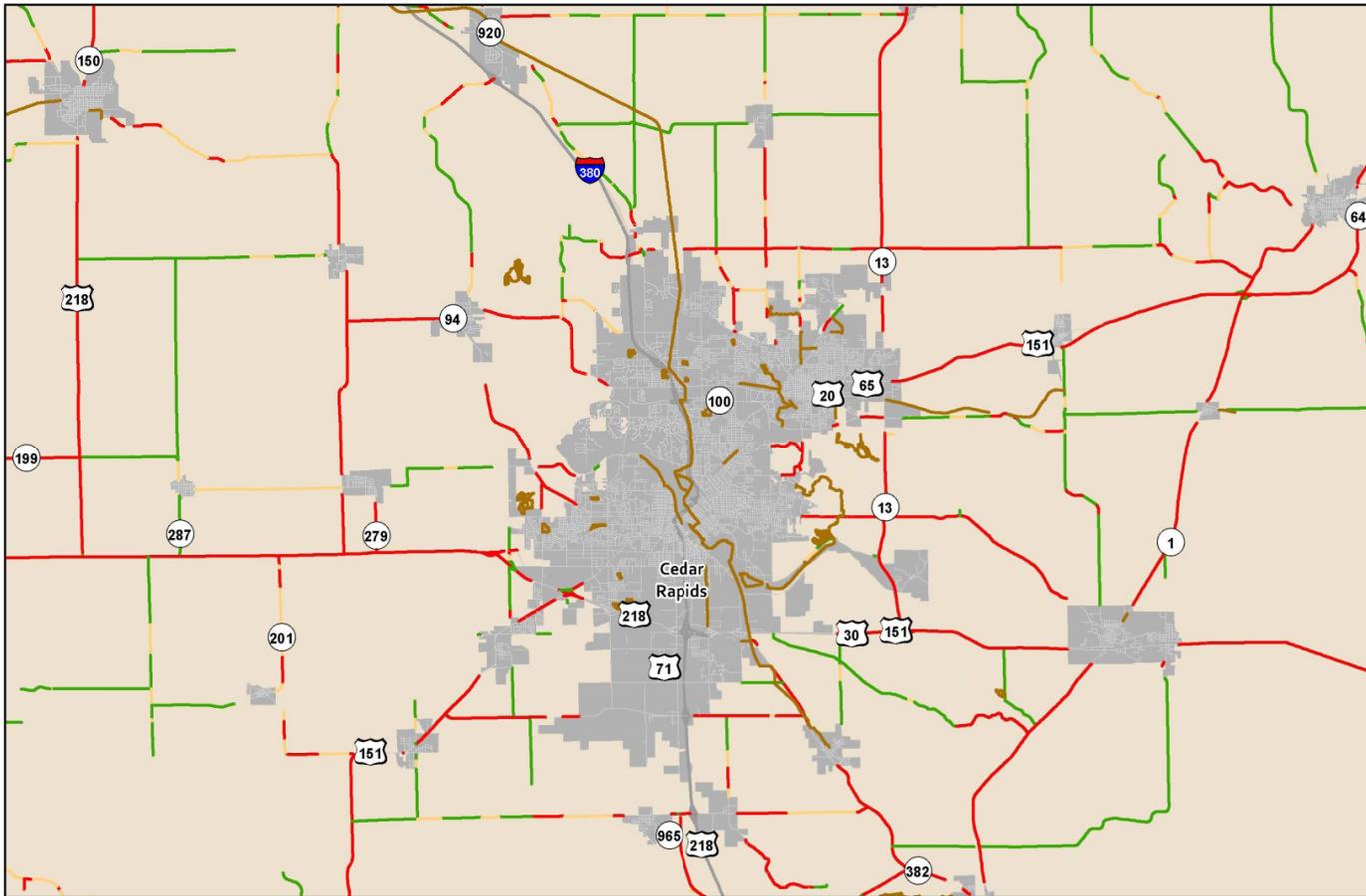
and interrupted by segments of “poor” rated roads. There are a number of implications, including the fact that access to “good” rated rural roads is greatly limited for city-dwellers and intercity connectivity is likewise inadequate. Figure 4.7: On-road bicycle compatibility for the Cedar Rapids metro area.⁷ reinforces this point by illustrating the area accessible by bike from Cedar Rapids if “poor” rated roads are avoided. It is apparent that without the Cedar Valley Nature Trail (running north to Waterloo) and the Grant Wood Trail (running east, south of and roughly parallel to US-151), access outside of the metro area would be highly challenging. In addition to Cedar Rapids, MUTs help several other metro areas—including Council Bluffs, Des Moines, Dubuque, and Waterloo—partially overcome this challenge by providing a low-stress way for bicyclists to reach the “good” rated rural roads.

Perhaps a greater problem is that transportation options are limited for people living in the periphery of metro areas. This is especially challenging for people accessing the random residences and businesses built along primary and secondary roads and to new neighborhoods built with multiple access points. Without suitable accommodations (such as wide paved shoulders), these roads will likely never be considered “bike friendly.”

It should not be assumed that these issues are unique to the Cedar Rapids area. Rather, each of the large metro areas in Iowa faces the same challenge. Indeed, some have even poorer conditions for bicycling along metro area periphery roads and do not have the benefit of a separated path leading to low-traffic rural roads.

Furthermore, the problem of poor access to suitable roads for bicycling is not limited to roads within the metro area peripheries. Conditions along the majority of metro area arterial streets in Iowa are poor for bicycling due to high volumes of traffic, traffic speeds, and lack of adequate space for bicyclists (by way of bike lanes, wide outside lanes, sidepaths, etc.). However, within cities there are typically low-traffic parallel streets that can be used by bicyclists, so access to destinations is not eliminated but may be limited. In addition, many cities are retrofitting accommodations into their primary streets to improve mobility (see Chapter 1).

Figure 4.7: On-road bicycle compatibility for the Cedar Rapids metro area.



**Bicycle & Pedestrian
Long-Range Plan**
On-Road Bicycle
Compatibility
0 0.5 1 2 3
Miles

January 2, 2014

On-Road Bicycle Compatibility Rating
 Good
 Moderate
 Poor
 Bicycles Prohibited
 Other Roads
 Multi-Use Trail

All Data Provided by Iowa DOT Unless Noted.

On-Road Bicycle Compatibility ratings were determined based on Iowa DOT's 2012 GIMS data using the Wisconsin Department of Transportation's Rural Bicycle Planning Guide methodology.

**Placeholders:
figure 4.7**

This map was created using 2015 data. It will be updated with 2018 data as the plan is finalized.



4.3 Crash analysis

Crashes are an unfortunate reality for all modes of travel, including bicycling and walking. While the total number of crashes occurring in Iowa continues to decline, thousands of crashes and hundreds of fatalities occur each year as a result of collisions involving motorists. Bicyclist fatalities account for 1.3 percent of all fatalities (53 out of more than 4,000 total fatalities recorded over a ten-year period¹⁰). Considering the 0.5 percent mode share for bicycling (according to the American Community Survey Journey to Work data; see Chapter 1), this is significant. Pedestrian crashes involving motorists resulted in an average of nearly 500 per year with 22 fatalities on average every year.

For this analysis, crashes were analyzed based on the *Safety, Analysis, Visualization and Exploration Resource* (SAVER) dataset for a five-year period from 2008 to 2012. There are at least three limitations to this analysis:

- This dataset only includes reported crashes. Many minor crashes (those that do not result in a major injury, fatality, or property damage exceeding \$1,000) are not reported.
- This dataset only includes crashes involving a motor vehicle. Bicyclist loss of control, collisions with debris, crashes between multiple bicyclists, and crashes between bicyclists and pedestrians—no matter how severe—are not included in this data.
- Without an accurate and up-to-date estimate of pedestrian and bicycle miles traveled or trips taken data, it is impossible to determine accurate crash rates.

The following summarizes the analysis of crashes occurring during a five-year period from 2008 to 2012 involving motorists and bicyclists (2,085 crashes) and motorists and pedestrians (2,333).

Placeholders: crash data

The crash analysis was created using 2008 to 2012 data. It will be updated with 2012 to 2017 data as the plan is finalized.

¹⁰ Iowa Strategic Highway Safety Plan. Ten-year period between 2002 and 2011

Bicycle crash analysis

Over the five-year period (2008 to 2012), a total of 2,085 crashes involving bicyclists and motorists occurred. The number of crashes varied somewhat over this period and averaged 417 per year. Of these, 23 resulted in fatalities (1.1 percent of all crashes) and 211 resulted in major injuries¹¹ (10.0 percent of all crashes) occurred. The majority of crashes resulted in minor or possible injuries, with very few resulting in no injuries.

The following statistics provide additional insight into bicycle-related crashes. A more detailed analysis with additional charts and graphs is provided in [Chapter/Appendix Number] of the [Technical Guide (working title)].

Age

- People ages 5 through 24 represent 27.3 percent of the population yet are involved in 55.2 percent of all bicycle crashes.
- People ages 50 through 59 represent 14.0 percent of the population yet are involved in 43.5 percent of all bicycle fatalities.
- 838 bicycle crashes over the five-year period involved children (infants to age 17). This equates to 40.2 percent of all crashes. However, only three fatalities occurred—less than half of one percent of child bicycle crashes (and approximately 13 percent of all bicycle fatalities).

Figure 4.9 illustrates bicyclist crashes and fatalities by age

¹¹ “Major injury” is defined as any injury other than a fatal injury which prevents the injured person from walking, driving, or from performing other activities which he/she performed before the accident.

Location

- The vast majority of bicycle-related crashes occur in urban areas (93.3 percent). This is likely due to the increased number of bicyclists in these areas as well as the increased number of conflict points present in cities.
- The majority of bicycle crashes resulting in fatalities occur in rural areas (60.8 percent). This is also typical, in part due to the higher speeds at which vehicles travel in rural areas.
- More than 66 percent of all crashes occurred at intersections and driveways, as did more than 57 percent of fatalities and major injuries.

Figure 4.10: Rural versus urban bicycle crashes¹⁰ illustrates rural versus urban bicycle crashes by severity.

Road type

- A total of 73 percent of all crashes occur along municipal streets and roads. Just fewer than 60 percent of fatalities and major injuries occur on these roads.
- Secondary roads see only 4.1 percent of all crashes but are the location of 15 percent of all major injuries and fatalities. Crashes on rural roads are very unlikely, but when they do occur, they are 4.5 times more likely to result in a major injury or even a fatality.

Seasonality

Most bicycle crashes occur during the summer and early fall months of June and September. This is typical across the country and is assumed to be a result of fewer people riding during the cold winter months.



Figure 4.9: Bicycle crashes by age

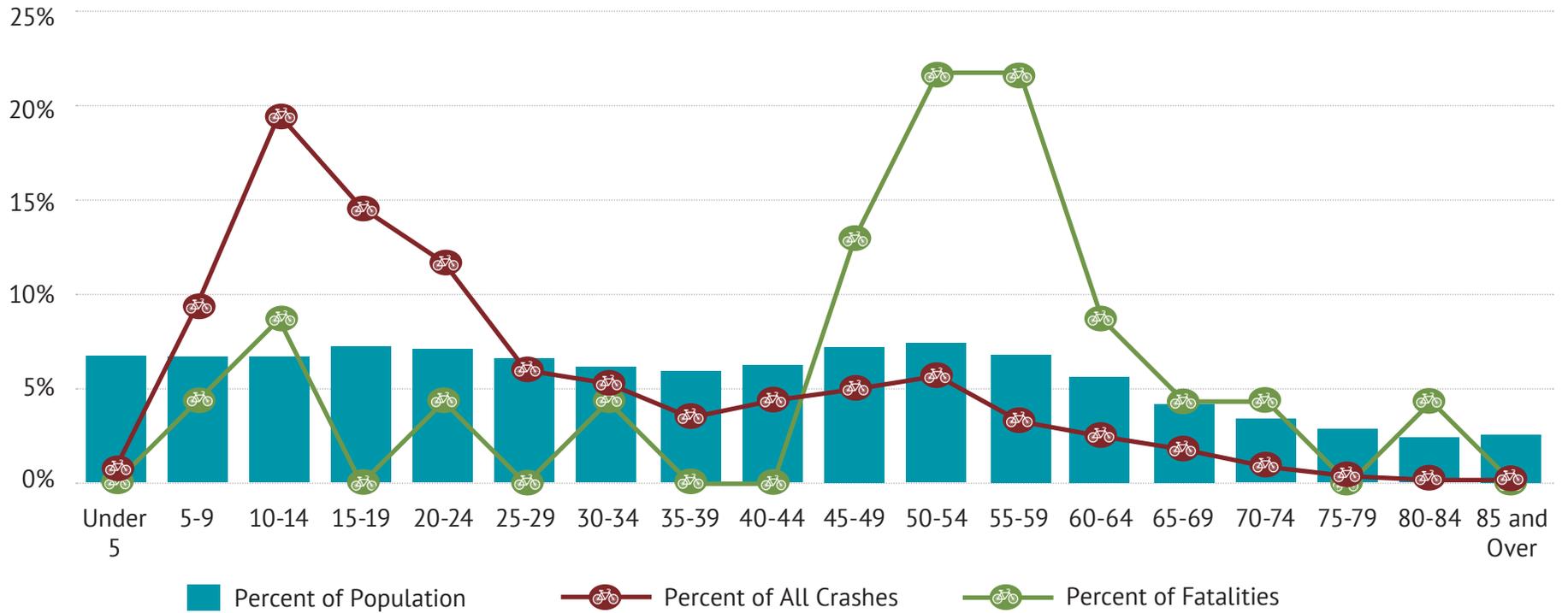
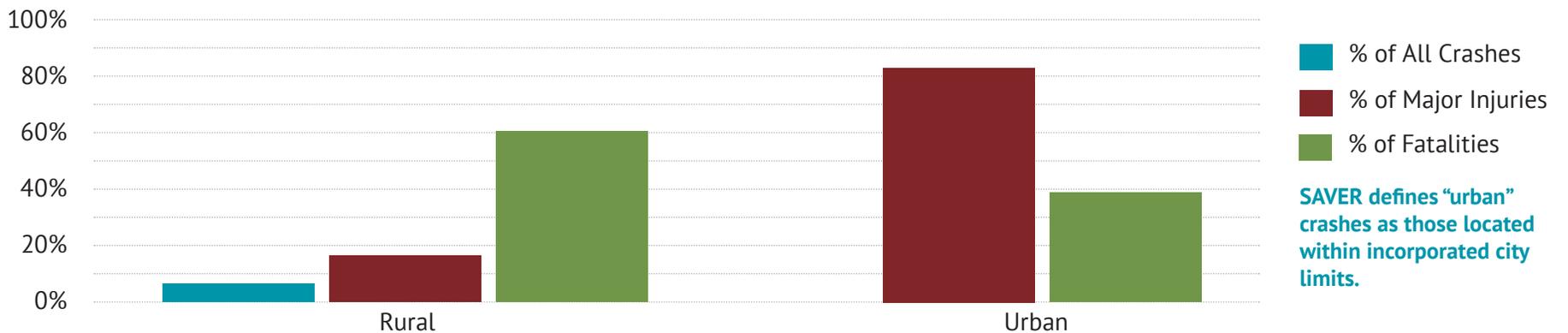


Figure 4.10: Rural versus urban bicycle crashes



Pedestrian crash analysis

Over the five-year period from 2008 to 2012, a total of 2,333 crashes involving pedestrians occurred. The number of crashes varied somewhat over this period and averaged 467 per year. Of the 2,333 total crashes involving pedestrians, 108 fatalities (4.5 percent of all crashes) and 409 major injuries (16.6 percent of all crashes) occurred. The majority of crashes resulted in minor or possible injuries, with very few resulting in no injuries. Compared to bicycle injury severity, pedestrian crashes tend to result in a higher rate of major injuries and fatalities.

Age

- People ages 5 through 24 represent 27.3 percent of the population yet are involved in 41.7 percent of pedestrian crashes.
- People ages 70 through 84 represent 8.3 percent of the population yet are involved in 18.9 percent of all pedestrian fatalities.
- 732 pedestrian crashes over the five-year period involved children (ages 0 to 17). This equates to 31.4 percent of all crashes. Fatalities accounted for 1.8 percent of all child pedestrian crashes.

Figure 4.11: Pedestrian crashes by age¹ illustrates pedestrian crashes and fatalities by age.

Location

- The vast majority of pedestrian-related crashes occur in urban areas (91.9 percent). Higher levels of pedestrian activity and higher levels of motor vehicle traffic are likely the major contributing factors.
- A disproportionate amount of pedestrian crashes in rural areas (39.6 percent) result in fatalities.

Figure 4.12: Rural vs urban pedestrian crashes² illustrates rural versus urban pedestrian crashes by severity.

Road type

- A total of 72 percent of all pedestrian crashes occur along municipal streets and roads. Just fewer than 57 percent of fatalities occur on these streets and roads.
- Interstate Highways are the site of 2.8 percent of all pedestrian crashes but 7.4 percent of the fatalities. Tow truck operators, construction workers, stranded motorists, and law enforcement officers outside of vehicles are typically coded as pedestrians in crashes.
- Secondary roads are the site of 4.3 percent of all pedestrian crashes and 8.1 percent of fatalities.

Time of day

Time of day plays a major role both in terms of total number of crashes and in terms of the severity of crashes. The greatest numbers of crashes occur in the four-hour period between 2:00 and 5:59pm (33 percent of all crashes). However, this period only accounts for 24.2 percent of fatalities.



Figure 4.11: Pedestrian crashes by age

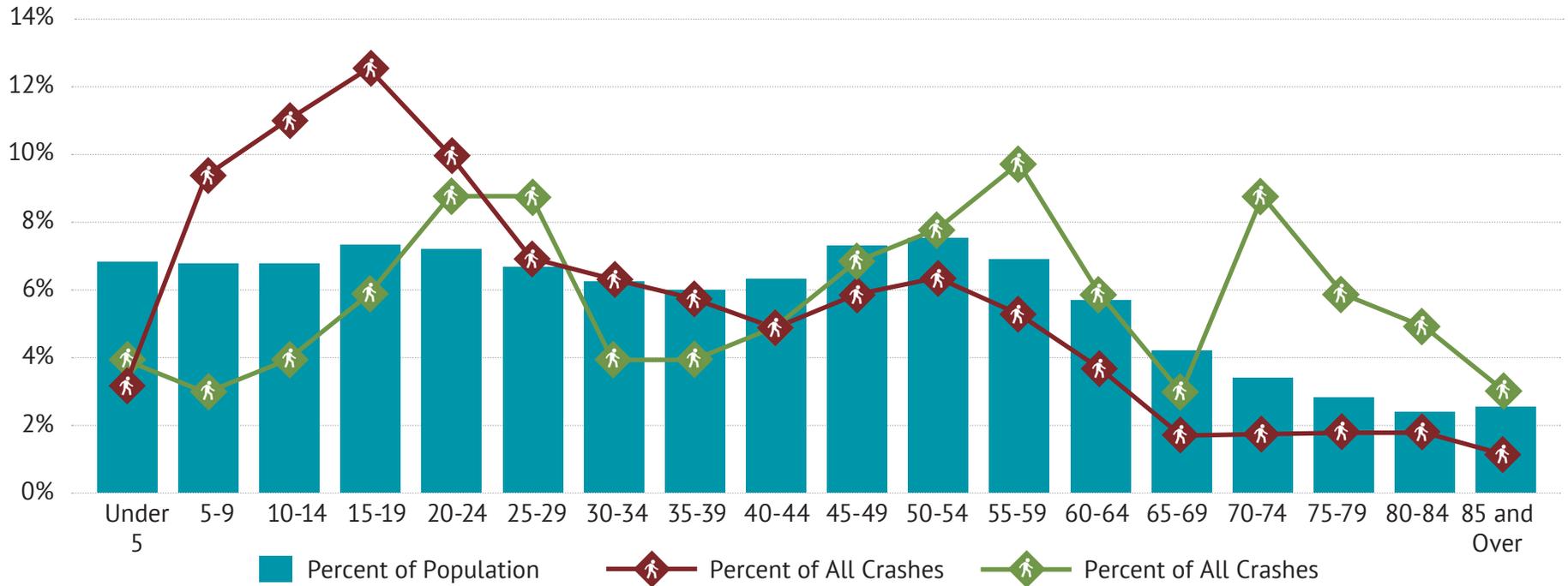
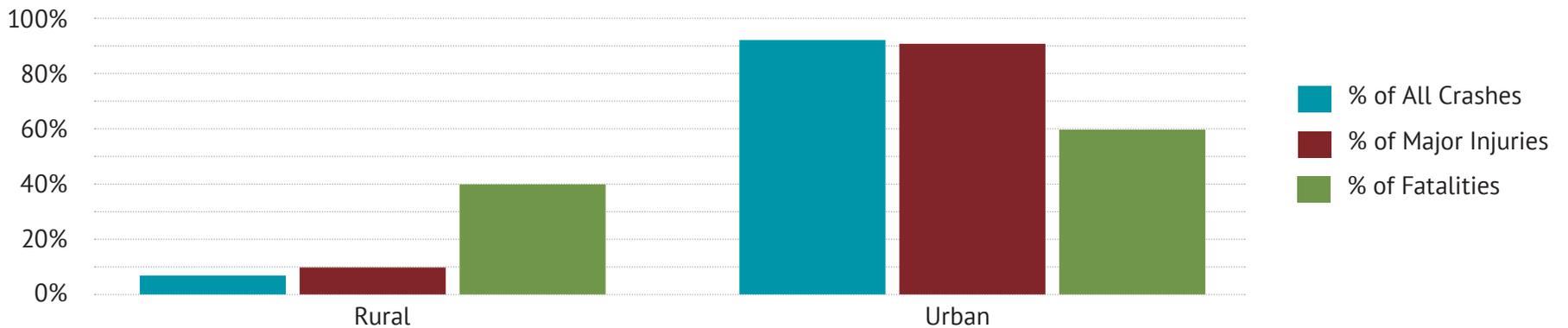


Figure 4.12: Rural vs urban pedestrian crashes



Note: The percentages of All Crashes do not total 100 percent because 35 crashes (1.5 percent of the total) were not classified as rural or urban in the SAVER database.

4.4 Summary of infrastructure opportunities and challenges

There are numerous opportunities and challenges that impact the ability for bicyclists and pedestrians to travel safely and comfortably within the state. Since many of the challenges are also opportunities—and since many of these issues affect bicyclists and pedestrians alike—they are not categorized in this analysis. The most significant of these issues are discussed below.

Grid of secondary roads – Iowa has an extensive secondary road system (county roads and farm-to-market roads). As previously discussed, the roads within this system tend to have low volumes of traffic. They also form a grid, which provides access to almost every corner of the state (see Figure 4.13). However, a significant portion of the secondary road system is unpaved, which tends to coincide with topography (see Figure 4.14: Roads with Grades 1 percent or Greater⁴). Areas with rolling hills tend to be less agriculturally-productive, which means less tax revenue is generated and less money is available to pave county roads. Regardless, Iowa’s secondary road system is one of the most significant opportunities in the state for bicyclists.

Traffic volume – The majority of Iowa’s rural roads (83 percent of all non-interstate paved rural roads and 95 percent of paved secondary roads)—are considered to have low to moderately-low volumes of traffic (below 2,500 AADT). Traffic volume is a significant contributing factor in determining whether a road is suitable for bicyclists (in addition to other factors; see the On-Road Bicycle Compatibility Rating section later in this document). The low-traffic-volume nature of many roads in the state is a significant opportunity for bicyclists. Conversely, the high traffic volume of some roads, especially those in metro areas, results in high levels of stress for bicyclists and can create major barriers for bicycle connectivity. In addition, high-volume roads are often uncomfortable for pedestrians, even if they are well-protected from the nearby traffic.

Pavement width and lack of paved shoulders – Whether or not a road of any given traffic volume is suitable for bicyclists is a factor of that road’s total pavement width (including paved shoulders, if present). Many of Iowa’s roads are generally narrow—more than 71 percent

of the secondary road system is 22 feet wide or less. The majority of Iowa’s paved roads (primary and secondary) lack paved shoulders, which have many benefits including reducing single vehicle run-off-road crashes (SVROR) and providing a place for bicyclists. The lack of paved shoulders also affects pedestrians, who may otherwise use paved shoulders in rural areas where sidewalks do not exist.

Rumble strips – The placement of rumble strips within paved shoulders minimizes the usefulness of said shoulders for bicyclists. Moving to a practice of constructing “rumble stripes” (milled rumble strips with the lane edge line placed over them) would still provide a countermeasure for run-off-the-road crashes while increasing the usefulness of the shoulder for bicyclists.

Rural intersection design – As previously mentioned, rural intersections are quite challenging for pedestrians due to their lack of crosswalks, curb ramps, or pedestrian signals. The geometric design of many rural intersections also makes crossings exceedingly long for pedestrians and often allow motor vehicle drivers to turn at higher speeds, which impacts the safety of bicyclists.

Wide, high-traffic roads in cities – Many US and State Highways that pass through cities take on additional roles, including service as primary thoroughfares. Quite often, these roads end up with many thousands—or even tens of thousands—of motor vehicles. Consequently, they often are designed as four- or even six-lane roads. These end up posing major barriers for pedestrians and bicyclists needing to cross the road, due to long crossing distances, lack of median refuges, and the stresses of high traffic volumes without adequate gaps in traffic. Accommodating bicyclists along these roads is also difficult since bike lanes or separated multi-use trails



(sidepaths) are often warranted, yet right-of-way is typically very limited and often the corridor itself is constrained by adjacent land uses.

Level of multi-use trail development – Over the past two decades, Iowa has developed an extensive multi-use trail system. These trails provide many opportunities for transportation and recreational biking and walking. However, due to the expense of MUT construction and difficulty in acquiring right-of-way for new trails, the system has many gaps that decrease its connectivity. In addition, the expense of MUT maintenance and limited funding sources may discourage communities from constructing trails on their own or in partnership with DOT. According to the Rails-to-Trails Conservancy, maintenance costs average more than \$2,000 per mile per year. Local communities are typically responsible for maintaining MUTs, even when they are constructed within DOT right-of-way.

While MUT trail development will and should continue in the future, it is unlikely that MUTs alone will be able to provide a statewide system for bicyclists and pedestrians.

Unpaved road network– Iowa has an extensive network of unpaved roads—gravel or earthen—totaling approximately 73,000 miles across the state. Many of these roads are classified as “Level B” roads by the counties, which mean they receive a very low level of maintenance and are used on an “at your own risk” basis. Iowa’s unpaved road network provides an opportunity for gravel road bicycling, a small yet growing form of bicycle riding and racing. This sport could encourage and support tourism and related economic development opportunities. A number of gravel road races and rides have occurred over the last few years and many have originated in Grinnell, which has become the de facto center of gravel road bicycling in Iowa.

Figure 4.13: Paved Secondary Roads

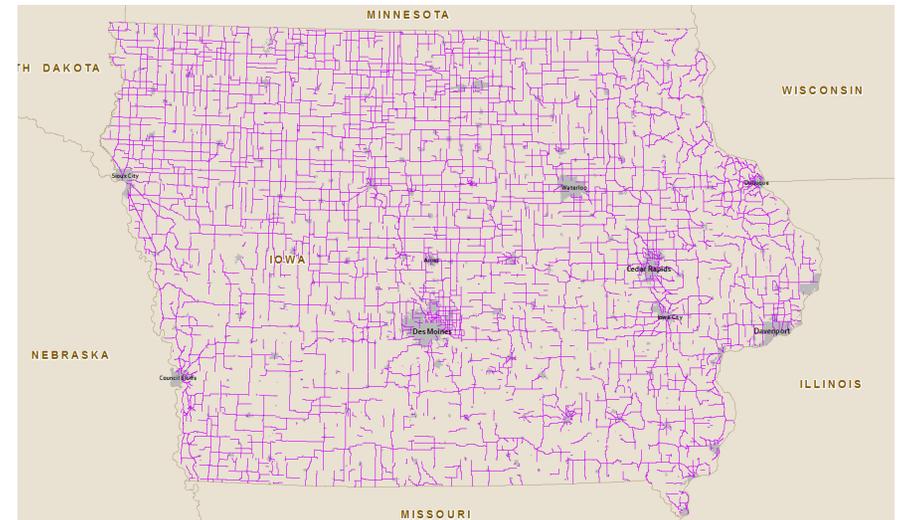
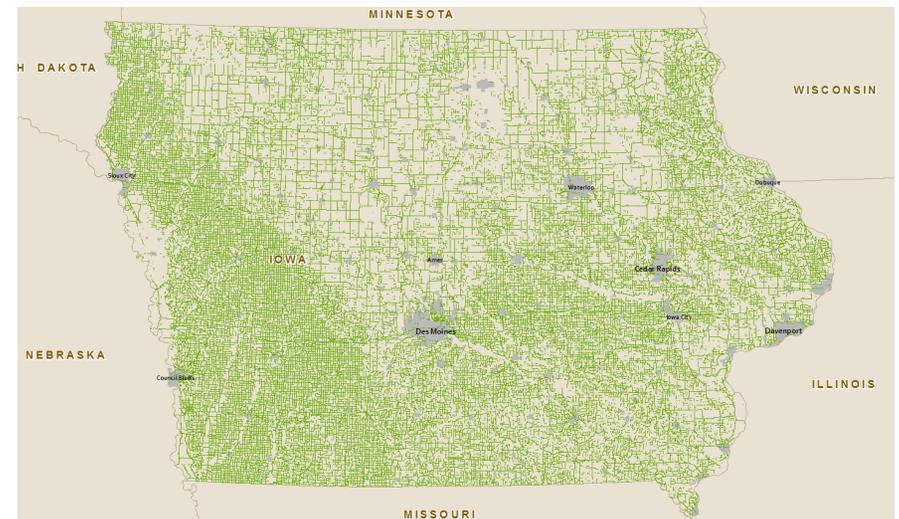


Figure 4.14: Roads with Grades 1 percent or Greater



Pedestrian planning and design

The vast majority of pedestrian travel occurs within urban areas, especially where comfortable and accessible infrastructure is present and when development patterns are dense and diverse (such as small town main streets, big city downtowns, walkable “town center” developments, etc.). While some people make commuting trips by foot, more often people walk for utilitarian and leisure trips—going shopping or out to eat, heading to the park or school, visiting a neighbor, or simply for exercise and recreation. In reality, walking trips often occur between driving and bicycling trips (e.g., people biking or driving to a shopping area and walking from store to store). In addition, walking is a primary mode of transportation for many people in Iowa out of necessity because they do not always have access to a motor vehicle (17 percent of households have only one motor vehicle and 2.6 percent do not have any).

4.5 Walking in rural contexts

While the focus of pedestrian transportation planning is decidedly urban, it is important to consider pedestrian mobility in rural areas, especially in the urban/suburban periphery. While rural pedestrian travel constitutes a fraction of total pedestrian trips, it still occurs in several ways:

- Walking for exercise – Rural roads are often the only place for rural residents to walk or jog.
- Short to moderate walks at the edge of communities – It is not uncommon for people to walk from just outside an urban area into a city. So-called “cow paths” are often seen as evidence of pedestrian use and demand.
- Walking to rural destinations – Nearby gas stations, neighbors’ homes, places of employment, and rural schools are all destinations to which rural residents might walk rather than drive.

Current conditions

Dedicated pedestrian infrastructure in rural areas is practically non-existent and it is estimated that very few pedestrians venture along roads well outside of cities. However, it is somewhat common for pedestrians to walk along semi-rural roads on the outskirts of cities and suburbs to get between their homes and retail establishments or to visit neighbors. People will often walk in rural areas for exercise and recreation as well.

Although not ideal facilities, paved and granular shoulders may be used by pedestrians and can provide improved margins of safety for occasional use. However, pedestrians using shoulders may encounter several challenges, including rough surfaces, debris, and barriers such as narrow bridges. They must also walk facing traffic, which on occasion (largely depending on pedestrian’s route) might be



impractical. It can be safely assumed that roadway shoulders do not meet accessibility requirements for pedestrians with disabilities.

In addition, intersections along rural roads can be quite challenging, even though most intersections typically have low traffic volumes. Firstly, they do not include crosswalks, curb ramps, or pedestrian signals. Secondly, the geometric design of many rural intersections makes crossings exceedingly long.

Accommodations approach

The Complete Streets Policy will necessitate considering the need for pedestrian accommodations in rural areas. In most cases, no formal accommodation will be warranted due to the lack of nearby

commercial and residential development. In these cases, paved shoulders—although not designed as pedestrian facilities—can benefit rural pedestrians. It is unlikely that paved shoulders can satisfy federal accessibility requirements (the Americans with Disabilities Act) and without crosswalks and pedestrian signals, they do little to improve intersection safety for pedestrians. However, if the context or usage demand does not warrant a sidewalk or multi-use trail, yet there is evidence of some pedestrian use and the choice is between paved shoulders or nothing at all, paved shoulders are preferable. This is not to say that the rural context will never warrant true pedestrian accommodations; in fact, it is probable that unique factors will dictate that formal accommodations (sidewalks, multi-use trails, intersection improvements, etc.) are necessary on occasion.



4.6 Walking in urban and suburban contexts

In order to achieve this plan’s goal for increased pedestrian travel, attention must be primarily focused on urban and suburban pedestrian accommodations. This entails accommodating linear movement along streets and other corridors (via sidewalks and multi-use trails) as well as providing safe and comfortable opportunities to cross major streets. Each organization responsible for planning or designing transportation infrastructure should carefully consider the nature and purpose of pedestrian trips and improve access accordingly.

Current conditions

Transportation infrastructure—especially Interstate Highways, expressways, and railroads—can pose major barriers for pedestrian mobility in cities and suburbs. Iowa DOT has built a number of bicycle and pedestrian overpasses and other crossings to help minimize these barriers. The inclusion of overpasses varies across the state, but is generally considered a primary part of major expressway projects in the more populated regions, such as the Des Moines area. Speeds are lower in cities making streets more suitable for walking along and across. The increased presence of sidewalks also improves pedestrian comfort and safety.

In general, sidewalks are present along primary and secondary roads within cities. In many of Iowa’s cities, a US or State Highway serves as the primary thoroughfare, and often is designated as “Main Street” by the local municipality. In these situations, wide sidewalks are typically provided in the downtown commercial area and standard sidewalks are provided along other primary and secondary roads.

The presence of sidewalks along the frontage roads of Interstate Highways in cities and metro areas varies depending on several factors. If an Interstate Highway generally follows the grid of local streets, such as is the case with I-380 in Cedar Rapids, sidewalks are usually present along frontage roads. In instances where the Interstate Highway cuts across the grid—such as I-235 through downtown Des Moines—sidewalks are only present in certain locations where development fronts the frontage road. Many Interstate Highways run along the suburban, car-dominated periphery of metro areas and lack sidewalks (I-80 in Davenport is an example).

The presence of sidewalks along primary and secondary roads tends to mirror the presence of sidewalks along city streets.

Over the past few years, Iowa DOT has been making a concerted effort to meet accessibility compliance requirements as mandated by FHWA. As a result, new or replaced curb ramps, and sidewalks have been installed along a number of primary and secondary roads across the state.





Accommodations approach

The approach to increasing pedestrian accommodations has several components and is opportunity-driven; that is, the vast majority of accommodations should be provided as part of larger street and highway projects. The approach includes five components:

1. The Complete Streets Policy calls for the inclusion of pedestrian facilities when urban and suburban streets that are on the state highway system are reconstructed or newly constructed. In addition, cities, counties, and regional agencies are strongly encouraged to adopt and implement similar Complete Streets policies.
2. When streets are resurfaced, existing sidewalks, crossings, and curb ramps must be made compliant with federal accessibility standards in most cases. Replacing entire lengths of sidewalks may not be required, depending on the project.
3. For streets that have high levels of pedestrian demand or disproportionate levels of pedestrian crashes, yet are not going to be reconstructed or subject to 3R activities for a significant period of time, communities are encouraged to provide short-term solutions, such as adding sidewalks or improving intersections as stand-alone projects.
4. Opportunities to develop standalone pedestrian connections (such as multi-use trails that serve transportation purposes or sidewalks that connect cul-de-sacs to nearby thoroughfares) should be sought. Projects that help improve pedestrian access and connectivity should be prioritized for funding.
5. When areas within cities are newly developed or redeveloped, municipal codes should require sidewalks to be provided along public rights-of-way.

However, pedestrian planning should not always be project-driven; rather it should occur in an ongoing manner on a community-wide basis (see “Planning the Network” later in this section).

4.7 Planning pedestrian networks

The inclusion of pedestrian accommodations in larger street and road projects is important, but planning for pedestrian access and connectivity on a broader scale is essential in establishing a highly-functional walking environment. This is especially true in urban and suburban areas, where pedestrian trips are far more frequent. Urban/suburban pedestrian plans should typically be oriented around areas of high activity, because people are far more likely to walk in areas where there are many destinations. The Iowa DOT recommends that cities, counties, and regional agencies work cooperatively to plan local and regional pedestrian networks based on the following guidelines:

- The foundation of a pedestrian network is areas of high activity (e.g., main streets, commercial corridors, downtowns, high-density residential areas, mixed-use zones, etc.) as well as any residential or commercial development within the surrounding 1/4 to 1/2 mile (the typical distance people are willing to walk). Such areas will likely quickly spring to mind for planners familiar with their jurisdictions; however, high activity areas can be quantitatively identified based on population density, density and diversity of destinations, and density of intersections (a measure of street network connectivity). Each local network plan should include continuous sidewalks along both sides of every street in high activity areas.
- Longer-distance connections are also important, especially for people without cars. Network plans should connect high-activity areas to each other and to neighborhoods via multi-use trails and sidewalks along streets. Areas closer to each other are more likely to generate pedestrian trips.
- In lower-demand areas, especially where high-activity areas are few or less apparent, sidewalks should be prioritized on collector and arterial streets.

- Once the network is established, the plan should identify gaps in the sidewalk network, sidewalks that are not compliant with federal accessibility guidelines, and streets/intersections with high instances of pedestrian crashes and/or high traffic volumes.
- Finally, solutions for improving network safety, accessibility, and connectivity should be developed and prioritized.

Rural pedestrian network planning is also valid, especially in the form of regional and intercity multi-use trail plans or in areas where longer-distance walking might be more likely (such as city-to-city walking trips along the Missouri or Mississippi Rivers). In these cases, network planning will take a “point-to-point” approach by identifying opportunities to connect distinct destinations or parallel a natural feature or transportation corridor. Chapter 5: Statewide Network Recommendations outlines the vision for a statewide multi-use trail system, upon which counties, regional agencies, and multi-jurisdictional partnerships can build.

4.8 Pedestrian facilities

Pedestrian infrastructure is primarily provided in the form of sidewalks or multi-use trails. However, there are many unique treatments that can be implemented to improve the pedestrian experience, encourage more walking, and decrease the number of crashes that occur. The following summarizes the most common facilities and treatments and provides key design guidance. However, designers should consult the latest version of the Iowa DOT Design Manual or the Iowa Statewide Urban Design and Specifications (SUDAS), as well as national standards and guidelines, which are listed at the end of this section.

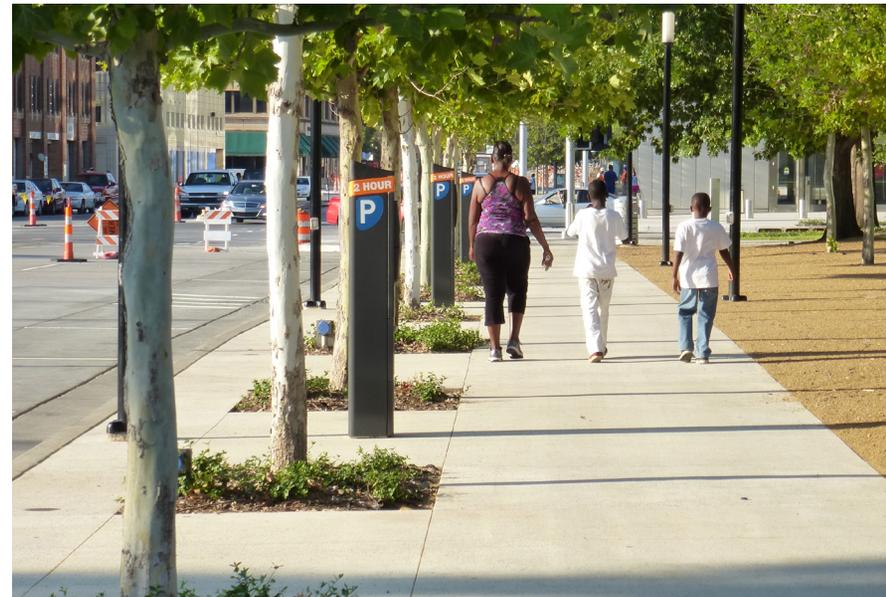
Sidewalks

Sidewalks are the most common pedestrian facilities and are typically located within public right-of-way, adjacent to property lines. Sidewalks provide dedicated space for pedestrians with vertical and/or horizontal separation between motor vehicles and pedestrians.

The presence of sidewalks on both sides of the street corresponds to approximately an 88 percent reduction in “walking along road” pedestrian crashes.

Basic design parameters

The standard width for a sidewalk is 5 feet with 4 feet permitted to avoid obstructions (or the current standard as specified in the Iowa DOT Design Manual or SUDAS). Sidewalks should be wider at schools, transit stops, downtowns, main streets, and anywhere else higher volumes of foot traffic occurs.





Multi-Use trails and sidepaths

A multi-use trail (MUT) is a two-way facility physically separated from motor vehicle traffic and used by pedestrians, bicyclists, and other non-motorized users. The cost of MUTs typically greatly exceeds the cost of sidewalks and on-road bikeways since they often require right-of-way acquisition and drainage changes.

Basic design parameters

The minimum width for a MUT is 10 feet and 8 feet is acceptable for short distances under physical constraint (or the current standard as specified in the Iowa DOT Design Manual or SUDAS). Additional width can be provided to accommodate high volumes and separated parallel paths can be provided to reduce conflicts between bicyclists and pedestrians. MUTs must be designed with bicyclists in mind (e.g., designing curves based on an 18 mile per hour design speed).



Curb ramps

Curb ramps provide transition between sidewalks and crosswalks and must be installed at all intersection and midblock pedestrian crossings, as mandated by federal legislation (1973 Rehabilitation Act and ADA 1990). All newly constructed and altered roadway projects must include curb ramps. Agencies with more than 50 employees are required to have a transition plan in place to address the staging of the curb ramp upgrades.

Basic design parameters

The design parameters of individual curb ramps are relatively complex and are explicitly stated in the Iowa DOT Design Manual. Separate curb ramps should be provided for each crosswalk at an intersection rather than a single ramp at a corner for both crosswalks. The separate curb ramps improve orientation for visually impaired pedestrians by directing them toward the correct crosswalk.



Marked crosswalks

Marked crosswalks include a variety of facility types intended to increase the safety of pedestrians crossing streets and roads. In addition to pavement markings, crosswalks may include signals/beacons, warning signs, in-street signage, and raised platforms. Marked crosswalks are most important on multi-lane streets, areas of high pedestrian traffic (downtowns, universities, etc.), and midblock crossings.

Basic design parameters

Some crosswalk striping patterns are more effective than others. Ladder, zebra, and continental striping patterns are understood to be the most visible to drivers. FHWA provides extensive guidance on when to provide marked crosswalks (see *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines*, 2005).



Pedestrian refuge islands

Raised islands located along the centerline of a street or road, as roundabout splitter islands, or as “pork chop” islands where right-turn slip lanes are present provide refuge for pedestrians and allow multi-stage crossings of wide streets. They can be provided at intersections or at midblock crossings. At unsignalized intersections and midblock crossings, refuge islands allow pedestrians to negotiate one direction of traffic at a time. They also permit multi-stage crossings at intersections with signals, which can allow shorter signal phases but may encourage noncompliance with pedestrian signals.

Basic design parameters

The minimum width is 6 feet (or the current standard as specified in the Iowa DOT Design Manual or SUDAS), but 8 feet is recommended to accommodate higher pedestrian volumes, bicyclists, and wheelchair users. Curb ramps with detectable warnings are required, as are five foot by five foot landing areas if a grade change occurs.





Pedestrian signals

Pedestrian signals control the flow of foot traffic through intersections and across roads. They include traditional walk/don't walk signals, rapid-flash beacons, hybrid or HAWK signals, and other illuminated traffic control devices. Pedestrian signals reduce pedestrian crashes, especially when leading pedestrian intervals and/or countdown signals (shown in the image) are incorporated.

Basic design parameters

The absolute minimum walk time (illuminated walking figure or "WALK" text) is 7 seconds, but in most cases should be longer. Signal timing should allow pedestrians to cross the entire street in one cycle. Two-stage crossings may be implemented in situations where non-compliance would otherwise result (such as crossing wide, multi-lane roads). The use of continually-flashing beacons should be avoided; rapid-flash beacons, traditional traffic signals, or HAWK signals are preferred.



HAWK signal (left) and a pedestrian countdown signal (right).

Pedestrian facility design guidelines and resources

The following manuals and guidelines should be referenced when designing pedestrian facilities and treatments:

1. The Iowa Department of Transportation Design Manual;
2. The Iowa Department of Transportation Bridge Design Manual;
3. Iowa Statewide Urban Design and Specifications (SUDAS);
4. Manual on Uniform Traffic Control Devices (Federal Highway Administration);
5. Guide for the Planning, Design, and Operation of Pedestrian Facilities (American Association of State Highway and Transportation Officials);
6. Public Rights-of-Way Accessibility Guidelines (United States Access Board);
7. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach: An ITE Recommended Practice (Institute of Transportation Engineers); and
8. Urban Street Design Guide (National Association of City Transportation Officials).
9. FHWA Pedestrian Safety Guide and Countermeasure Selection System (PedSafe)
10. FHWA Bicycle and Pedestrian Information Center

Bicycle planning and design

Bicycling is a varied activity that serves many purposes. Traditionally, bicycle trips have been categorized as either recreation or transportation, but this greatly oversimplifies things. People ride bicycles to make short trips to stores, school, and a variety of other destinations. They commute to work by bicycle. They go on recreational rides on rural roads or local multi-use trails. Some people make long multi-day trips to another city or state or ride hundreds of miles in a single day for recreational purposes. Some ride alone while others carry children or even a week's worth of groceries in trailers or on cargo bicycles. Quite often, trips serve both recreation and transportation purposes.

There is also a wide range in the types of people who bicycle. There is no minimum or maximum age for riding a bicycle and people of all abilities ride for leisure and mobility (often on tricycles, which are significantly wider than the standard bicycle). There is also variability in how comfortable people are mixing with motor vehicle traffic, with some only willing to bicycle on multi-use trails while others are comfortable on high-traffic urban arterial streets. Bicycling is truly one of the most varied modes of transportation and adequately accommodating it requires identifying solutions that benefit the majority of current and potential bicyclists and the different types of trips they make.

4.9 Bicycling in rural contexts

People who bicycle in rural areas are generally experienced interacting with motor vehicle traffic. They also tend to ride longer distances and are better equipped—literally and figuratively—for the rigor of riding in less-populated areas with higher-speed traffic. There are some exceptions to this, however, so it cannot be assumed that all rural bicyclists are comfortable mixing with anything more than minimal traffic.

Current conditions

Conditions for bicyclists on paved rural roads vary depending on traffic volumes and the presence and design of paved shoulders. While motor vehicle speeds, road geometry, and truck traffic also factor in, a rule of thumb is that most experienced adult bicyclists are comfortable using paved roads without paved shoulders (i.e., mixing with motor vehicle traffic) if traffic volumes are below 1,000 to 1,500 AADT. Above this AADT threshold, paved shoulders are increasingly important. American Association of State Highway and Transportation Officials (AASHTO) 2012 standards dictate a minimum effective paved shoulder width (clear pavement between the rumble strip and edge of pavement) of 4 feet (5 feet if adjacent to a curb, barrier, or railing) for use by bicyclists.

Most of Iowa's paved roads—including roads with traffic volumes exceeding 1,500 AADT—do not have paved shoulders. Lower volume roads and higher volume roads that were constructed prior to current standards typically have earthen or granular shoulders. Some of these roads do have paved shoulders, but they are typically between 2 and 4 feet in width and usually have a 12 to 16-inch milled rumble strip placed 6 to 12 inches from the lane edge line. As a result, few existing paved shoulders provide the 2012 AASHTO minimum usable (or effective) width of 4 feet.



Current standards include installing milled rumble strips within new and retrofitted paved shoulders. The current standard design dictates a 12-inch wide rumble strip placed 6 inches from the lane edge line for all roads other than Interstate highways. Many of the paved shoulders recently built along Iowa roads are the default width of 4 feet or narrower, in some cases. The placement of rumble strips on 4-foot shoulders reduces the usable or effective shoulder width to 2 feet 6 inches or less, which is less than the 2012 AASHTO minimum effective width of 4 feet. In other words, many of the new paved shoulders in Iowa are inadequate for bicyclists according to 2012 AASHTO standards. However, when Iowa DOT installs 6-foot wide shoulders with rumble strips (required for roads with traffic volumes exceeding 5,000 AADT), the effective width for bicyclists is an adequate 4 feet 6 inches.

In summary, bicyclists need 4 feet of usable or effective paved shoulder width (not including rumble strips) when traffic volumes exceed 1,000 to 1,500 AADT, but Iowa DOT's current standards only provide 4 feet of effective paved shoulder width on roads with traffic volumes between 3,000 and 5,000 AADT and 2 feet for roads with volumes less than 3,000 AADT.

It bears mentioning that most of the Iowa DOT District offices do not regularly sweep, blow, or otherwise clean paved shoulders of rocks, glass, tire shreds, or small debris. However, if a District office receives a complaint, they typically send a sweeper or blower out to clean up the shoulder. Based on comments received from District staff and other stakeholders, it seems that cyclists rarely file official complaints or requests for maintenance.

Accommodations approach

The Complete Streets Policy will necessitate considering the need for bicycle accommodations in rural areas. However, context is important. On very low-traffic rural roads, very little accommodation is needed other than perhaps wayfinding and regulatory signage (e.g., "Bikes May Use Full Lane"), which is relatively inexpensive. On higher-traffic roads, paved shoulders will be required. Along with adopting the Complete Streets Policy, the Iowa DOT will need to revise its Design Manual to better accommodate bicyclists using paved shoulders. Selecting the appropriate bicycle accommodation type should be based on context (traffic volume, speed, etc.). The facility selection matrices provided later in this chapter provide guidance in this process.



4.10 Bicycling in urban and suburban contexts

Many people think of urban bicycle trips as primarily “commuting” trips (bicycling to and from work). However, as reported by the 2009 National Household Travel Survey (NHTS) for Iowa, nearly twice as many bicycling trips are made for utilitarian purposes (shopping, visiting friends, social events, etc.) than for getting to work. These utilitarian trips are often multi-destination and frequently involve children. This relates to motor vehicle trips, of which the NHTS reports approximately 80 percent are for utilitarian (non-work-related) purposes. Bicycling for utilitarian purposes also has the greatest room for growth. Furthermore, enabling more people to make non-journey-to-work trips by bicycle instead of by car has the ability to significantly reduce motor vehicle traffic congestion and emissions (according to the NHTS, 42 percent of car trips in Iowa are 2 miles or less—this distance is easily covered by bicycle).



Current conditions

Transportation infrastructure—especially expressways and railroads—can pose major barriers for bicycle mobility in cities and suburbs. Iowa DOT has built a number of bicycle and pedestrian overpasses and other crossings to help minimize these barriers. The inclusion of overpasses varies across the state, but is generally considered a primary part of major expressway projects in the more populated regions, such as the Des Moines area. Speeds are lower in cities making streets more suitable for biking along and across.

Urban bicycle infrastructure varies from community to community. In general, urban sections of primary, secondary, and municipal roads do not have shoulders—rather, travel or parking lanes are adjacent to the curb and gutter, sometimes with minimal offsets. In some cities—specifically those that have made concerted efforts to improve conditions for bicycling—dedicated bike lanes and other types of facilities are present. However, a lack of bike lanes does not necessarily indicate poor conditions for bicycling. Low-volume streets, such as those commonly found in cities with gridded street networks, are often ideal for bicycling. Some low volume streets are ideal for bicycle travel and are candidates for designation as “bicycle boulevards.” A bicycle boulevard is a low stress street, typically with traffic calming elements such as traffic circles, speed humps, curb extensions, and chicanes, where bicyclists are drawn away from the high-volume streets.

Bicycle accommodations in the form of bike lanes can be found on primary and secondary roads in some cities, typically where the local municipality has requested accommodation in accordance with its own bike plan.



Accommodations approach

Thinking of urban bicycling in terms of utilitarian trips indicates the need to reconsider the approach to providing accommodations and planning bicycling networks. With a focus on commuting bicycle trips and recreational riding, the traditional approach to bicycle accommodation in urban areas has been to guide bicyclists to low-traffic streets and multi-use trails. However, when considering the utilitarian purpose of bicycling, it is important to also provide adequate accommodations along streets on which destinations are located, even on streets with higher traffic volumes. Context-sensitive bicycle accommodations (such as buffered bike lanes) will need to be provided to ensure a low- to moderate-stress bicycling experience along higher-traffic streets.

The approach to increasing bicycle accommodations in urban and suburban contexts has several components and is opportunity-driven; that is, the vast majority of accommodations should be provided as part of larger street and highway projects. The approach includes four components:

1. The Complete Streets Policy calls for the inclusion of context-sensitive bicycle facilities when urban and suburban streets that are on the state highway system are reconstructed or newly constructed, unless extenuating circumstances make doing so unfeasible. In addition, cities, counties, and regional agencies are strongly encouraged to adopt and implement similar Complete Streets policies.
2. Selecting the appropriate bicycle accommodation type should be based on context (traffic volume, speed, etc.). The facility selection matrices provided later in this chapter provide guidance in this process.
3. For streets that have high levels of bicyclist demand or disproportionate levels of bicyclist crashes, yet are not going to be reconstructed or subject to 3R activities for a significant period of time, communities are encouraged to provide short-term solutions

as stand-alone projects, such as retrofitting bike lanes, adding shared lane markings and measures to reduce motor vehicle speeds, or designating low-traffic parallel streets as bike routes.

4. Opportunities to develop standalone bicycle connections (such as multi-use trails that serve transportation purposes or connect cul-de-sacs to nearby thoroughfares) should be sought. Projects that help improve bicycle access and connectivity should be prioritized for funding.

However, bicycle planning should not always be project-driven; rather it should occur on a community-wide basis (see “Planning the Network” later in this section).

Equity

It is important to consider equity in the transportation system. Planning and building bicycle infrastructure often results in some neighborhoods being underserved compared to others. Many lower-income people bicycle (or walk) out of necessity, whether because they lack access to a motor vehicle or are poorly served by transit. However, lower-income neighborhoods are often underserved in many ways, including bicycle infrastructure. Furthermore, post-war neighborhoods, which tend to have very car-dependent development patterns, are also often underserved by bicycle networks. Providing adequate bicycle accommodations in underserved areas not only increases equity, it also can help encourage people to drive less and bicycle more.

4.11 Planning bicycle networks

Bicycle networks should be continuous, connect seamlessly across jurisdictional boundaries, and provide access to destinations. Destinations for utilitarian trips are constant, irrespective of trip mode (especially in urban areas). In other words, anywhere a person would want to drive for utilitarian purposes is a potential destination for bicycling. This is especially true in urban areas. As such, planning connected low-stress bicycle networks is not achieved by simply avoiding motor vehicle traffic. Rather, planners should identify solutions for lowering stress along higher-traffic corridors so that bicycling can be a viable transportation choice for the majority of the population.

The Iowa DOT recommends that cities, counties, and regional agencies work cooperatively to plan local and regional bicycle networks based on the following guidelines:

- First and foremost, it is strongly recommended that each jurisdiction adopts a Complete Streets policy similar to the Iowa DOT's Complete Streets policy outlined in Chapter 6. This will ensure that all streets include adequate, context-sensitive bicycle accommodations.
- The core of a local or regional bicycle network is typically a system of long distance/regional routes along low-stress bikeways. Interconnected multi-use trails often serve as the foundation for this system, but it is also necessary to identify potential connections along streets. Each city should strive to develop a grid of bikeways and each MPO/RPA should develop a spoke-and-hub network of regional routes that connect surrounding cities.
- Bicycle transportation is dependent on access to local destinations, many of which are located along higher-traffic arterial streets. Adequate, context-sensitive accommodations should therefore be provided along these streets. If continuous accommodations are not feasible, accommodations should be

provided to the extent possible and be connected with routes along parallel lower-traffic streets.

- For longer trips or for bicyclists that do not need to access as many destinations, alternative parallel routes along low-traffic streets should be provided. These can be in the form of bicycle boulevards/neighborhood greenways, which prioritize bicycle travel and often include traffic calming, or simply as signed routes.
- Bicycle network plans should strive to make every street bicycle friendly in high-activity areas, such as downtowns, university campuses, etc.
- Each network plan should identify necessary accommodation types (bike lanes, sidepaths, cycle tracks, etc.) for each collector and arterial street based on traffic volumes, speeds, and other factors using the Facility Selection Matrix provided at the end of this chapter. Plans should also consider how accommodations can be implemented (such as through removing unnecessary travel or parking lanes, narrowing lanes, or simply adding pavement markings).





While the Complete Streets Policy will ensure that the inclusion of bicycle accommodations is considered for all rural state highways, there is still much value in rural bicycle network planning on the local and regional levels. As described earlier in this Chapter, rural roads in the urban periphery are the most stressful for bicyclists. Local, countywide, and regional bicycle plans can improve access from cities to low-traffic rural roads by identifying key connecting roads that need accommodations.

For state highways not slated for reconstruction or 3R activities in the near future, network plans can identify where short-term retrofits are needed and warranted. For county roads, which are not subject to the Proposed Complete Streets Policy, a rural network plan can identify those roads that need accommodation (whether longer-term as part of reconstruction or short-term as retrofits) and can identify potential funding strategies.

Chapter 5: Statewide Network Recommendations outlines the vision for a statewide multi-use trail system as well as a system of interstate bikeways (US Bicycle Routes, the Mississippi River Trail, and the Lewis and Clark Trail), upon which counties, regional agencies, and multi-jurisdictional partnerships can build.

4.12 Bicycle facilities

There is a wide variety of bicycle facilities available, including several types of on-road bikeways and separated multi-use trails. There are also spot treatments and intersection improvements that can be implemented to improve the experience for people bicycling, encourage more walking, and decrease the number of crashes that occur. The following summarizes the most common facilities and treatments and provides key design guidance. However, designers should consult the latest version of the Iowa DOT Design Manual or the Iowa Statewide Urban Design and Specifications (SUDAS), as well as national standards and guidelines, which are listed at the end of this section.

Multi-use trails and sidepaths

A multi-use trail (MUT) is a two-way facility physically separated from motor vehicle traffic and used by pedestrians, bicyclists, and other non-motorized users. This type of facility provides recreational opportunities in addition to transportation. The cost of MUTs typically greatly exceeds the cost of sidewalks and on-road bikeways since they often require right-of-way acquisition and drainage changes. While mostly separated from motor vehicle traffic, MUTs that run parallel to streets and roads (referred to as “sidepaths”) can be high-stress accommodations for bicyclists depending on the design of driveway and street crossings and number of crossings per mile.

Basic design parameters

The minimum width for a MUT is 10 feet and 8 feet is acceptable for short distances under physical constraint (or the current standard as specified in the Iowa DOT Design Manual or SUDAS). Additional width can be provided to accommodate high volumes and separated parallel paths can be provided to reduce conflicts between bicyclists and pedestrians. The geometric design of MUTs must be based on a typical design speed for bicyclists (typically 18 miles per hour). Sidepaths may not be appropriate where there are many commercial driveway crossings and/or intersections per mile.



Paved shoulders

Paved shoulders benefit all road users. The additional pavement width outside of the travel lanes reduces run-off-road crashes, aids maintenance, and provides space for bicyclists. Pedestrians often use paved shoulders, although they are not designed as pedestrian facilities and typically do not meet accessibility requirements. Additional benefits include reducing pavement edge deterioration, accommodating oversize and maintenance vehicles, and providing emergency refuge for public safety vehicles and disabled vehicles.

Basic design parameters

The minimum functional width for a paved shoulder used by bicyclists is 4 feet (especially if placed between rumble strips and the edge of pavement). On lower-traffic roads, a narrower 3-foot wide shoulder can be provided immediately adjacent to the travel lane if rumble strips are omitted or placed at the outside edge of the shoulder. The width of a paved shoulder is dependent on traffic volumes and speeds.



Bike lanes

Bike lanes are on-road bikeways designated for exclusive use by bicyclists through pavement markings and signs (optional). They are typically applied to arterial and collector streets with moderate traffic volumes and/ or speeds. Bike lanes are usually applied on both sides of a street, but can be applied individually as contra-flow lanes on one-way streets or climbing lanes on streets with limited pavement width. Buffers (as shown in the below right image) can be placed between the bike lane and travel lane and/or parking lane to provide additional separation. When placing next to on-street parking, the potential risk of “dooring” exists and should be mitigated by striping wider lanes, door zone pavement markings, or buffers.

Basic design parameters

Bike lanes are typically 5 feet wide and have a minimum width of 4 feet not including the gutter (or the current standard as specified in the Iowa DOT Design Manual or SUDAS).





Separated bike lanes

Separated bike lanes, also called cycle tracks or protected bike lanes, are exclusive bicycle facilities separated from motor vehicle traffic and pedestrians by way of physical barriers (curbs, parked cars, medians, etc.). They can be raised or built at road grade and may be two-way, especially on one-way streets (far left image). They are primarily applied to streets with high motor vehicle traffic volumes/speeds but may also be applied to streets with moderate motor vehicle traffic but high bicycle traffic.

Basic design parameters

The design of separated bike lanes is very complicated, especially at intersections and their approaches. A one-way separated bike lane must be at least 5 feet wide and 7 feet wide to allow passing. A two-way separated bike lane must be at least 8 feet wide but preferably 10 or 12 feet wide.



Bicycle boulevards

Bicycle boulevards follow lower volume, lower speed streets designed to prioritize bicycle through travel and calm motor vehicle traffic. They are generally suited for people of all ages and abilities and are relatively easy and cost-effective to implement. Bicycle boulevards may simply include shared lane markings and “bikes may use full lane” signage or can include traffic calming measures such as street trees, traffic circles, chicanes, and speed humps. Intersections should prioritize bicycle movement and minimize stops, where possible.

Basic design parameters

Target speeds are typically around 20 miles per hour; there should be a maximum 15 mile per hour speed differential between bicyclists and vehicles. The preferred motor vehicle traffic volume is up to 1,500 cars per day and the recommended maximum is 3,000 cars per day.



Shared roads and shared lanes

Where traffic volumes and speeds are low, many bicyclists can comfortably share lanes with motor vehicles. In rural areas, no treatments are usually needed, although wayfinding signage is beneficial. On urban streets with moderate traffic volumes, shared lanes usually include shared lane markings (or “sharrows”) to indicate preferred bicyclist lane positioning, act as wayfinding aids, and alert drivers to a greater expected presence of bicyclists.

Basic design parameters

In rural areas, shared roads should have traffic volumes below 1,500 ADT. In urban areas, shared lanes should be provided on streets with posted speed limits of 35 miles per hour or less and ADT less than 3,000. Higher speeds and traffic volumes may discourage bicyclists.



Bike routing and wayfinding

Wayfinding is a system of signs and pavement markings that guide bicyclists along preferred routes (which may or may not be numbered) to destinations across cities, regions, and states. Signs may state distance to destinations or include route numbers. Wayfinding generally improves the usefulness of bicycle networks, especially when routes are diverted away from well-known streets.

Basic design parameters

First and foremost, sign design and placement must be according to the Manual on Uniform Traffic Control Devices (MUTCD). Signs should state the direction and distance to important destinations. Distance can be provided in miles or minutes of riding (the latter is recommended only in urban areas). In addition, wayfinding can take the form of route signs, directing bicyclists at each turn. Such wayfinding can enhance the usability of long-distance routes, such as the Mississippi River Trail or planned US Bicycle Routes.





Bikeway intersection pavement markings and signal design

Intersections should be optimized to accommodate bicyclists by enhancing pavement markings and ensuring signals serve the needs of bicyclists. Enhanced pavement markings warn users of potential conflict locations, help define expected behaviors, and encourage turning motorists to yield to bicyclists. Improved signal designs provide adequate time for bicyclists to clear signalized intersections, minimize bicyclist delay, and increase the likelihood that bicyclists will comply with the signal.

Basic design parameters

The selection of specific treatments varies based on factors such as motor vehicle traffic volume, bicycle traffic volume, and intersection geometry. Bicycle-specific signals (far left image) may be used and have received interim approval from FHWA.



Bicycle facility design guidelines and resources

The following manuals and guidelines should be referenced when designing bicycle facilities and treatments:

1. The Iowa Department of Transportation Design Manual;
2. The Iowa Department of Transportation Bridge Design Manual;
3. Iowa Statewide Urban Design and Specifications (SUDAS);
4. Manual on Uniform Traffic Control Devices (Federal Highway Administration);
5. A Policy on Geometric Design of Highways and Streets (American Association of State Highway and Transportation Officials);
6. Guide for the Development of Bicycle Facilities (American Association of State Highway and Transportation Officials); and
7. Urban Street Design Guide (National Association of City Transportation Officials).

4.13 Facility selection

Motor vehicle traffic volume and speed are critical contextual considerations for bicyclist and pedestrian safety and comfort. Proximity to motor vehicle traffic is a significant source of stress, safety risks, and discomfort for bicyclists, and corresponds with sharp rises in crash severity and fatality risks for vulnerable users when motor vehicle speeds exceed 25 miles per hour. Furthermore, as motorized traffic volumes increase, it becomes increasingly difficult for motorists and bicyclists to share roadway space.

Two tools are provided to help planners and engineers determine appropriate types of bicycle and pedestrian accommodations for any given context.

The first tool is a pair of bicycle facility selection matrices that provide guidance on selecting an appropriate facility type based on posted speed limit, traffic volume, and context.

The second tool is a context characteristics of common facility types table (Table 4.2), which summarizes various attributes of the primary bicycle and pedestrian facility types used in Iowa and provides additional guidance on facility selection.

Bicycle facility selection matrices

Numerous types and widths of bicycle facilities are available and some are more appropriate than others for any given context. To select an appropriate facility based on traffic volume and speed, Figure 4.15 and Figure 4.16 should be consulted. These matrices include preferred and acceptable values for each facility type. Designers should utilize forecast traffic volumes if available. Additionally, designers should default to selecting the preferred facility when possible.

Context characteristics of common facility types table

Table 4.2 provides several pieces of critical information that provide guidance for the selection of appropriate bicycle and pedestrian facility types:

Description – What the facility type is and how it should be applied.

Intended Users – Whether the facility type accommodates bicyclists, pedestrians, or both.

Context – Whether the facility type is appropriate in urban settings, rural areas, or both. Specific mention is made if the facility is appropriate in the urban periphery but not in true urban areas.

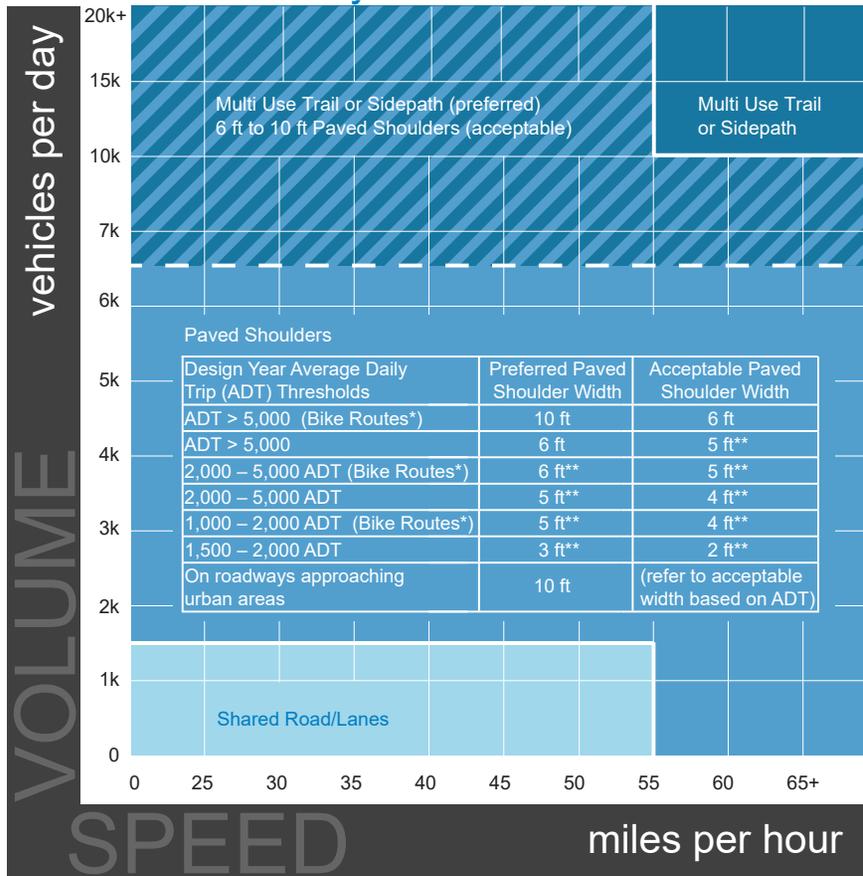
Posted Speed Limit – The maximum speed limit with which the facility type is compatible.

Motor Vehicle Traffic Volume – The maximum traffic volume (in average Annual Daily Trips or ADT) with which the facility type is compatible. These thresholds are generalized. Especially in urban areas, factors such as outside lane width, percent of heavy truck traffic, speed limit, and presence of on-street parking can have significant effects on the appropriateness of a facility. For urban areas, the designer should calculate the Bicycle Level of Traffic Stress (LTS) score to determine whether the facility is appropriate (i.e., receiving a score of LTS 1 or LTS 2).

Other Considerations – Further information regarding the appropriateness of each facility type.

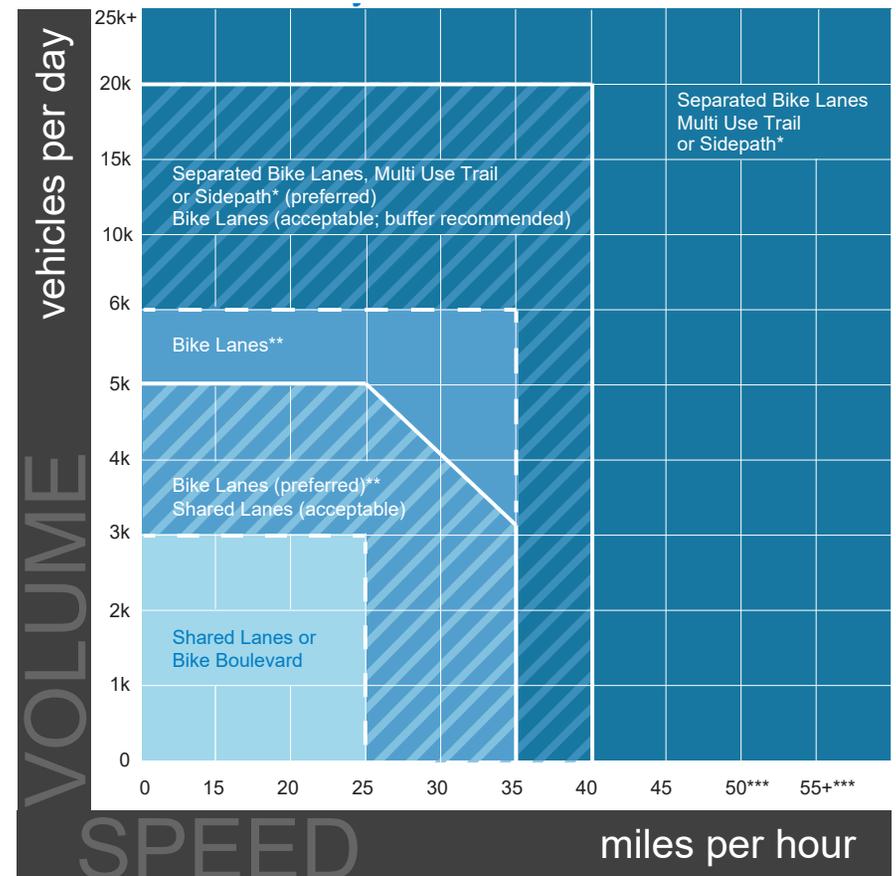


Figure 4.15: Rural facility selection matrix



*On roadways where a higher level of bicycle traffic is expected (e.g., bike routes identified by cities, counties, RPAs, and MPOs, as well as official US Bicycle Routes and national trails).
 **Paved width exclusive of rumble strips.

Figure 4.16: Urban and suburban facility selection matrix



*To determine whether to provide a multi use trail/sidepath or separated bike lane, consider pedestrian and bicycle volumes or, in the absence of volume, consider land use.
 **Advisory bike lanes may be an option where traffic volume < 4,000 ADT
 ***Speeds 50 mph or greater in urban areas are typically found in urban/rural transition areas.

Table 4.2: Context characteristics for common facility types

	Multi-Use Trails and Sidepaths	Paved Shoulders	Shared Roads/Lanes
Description	Multi-use trails and sidepaths are typically designed as two-way facilities physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. The term “sidepath” refers to a multi-use trail along a roadway.	Additional pavement width outside of the travel lanes that reduce crashes, aid maintenance, and provide space for bicyclists and pedestrians (although paved shoulders typically do not meet accessibility requirements for pedestrians).	Shared roads or shared lanes are standard travel lanes shared by bicyclists and motor vehicles. Signage and shared lane markings (also known as “sharrows”) should be used on higher-traffic shared roads.
Intended Users	Bicyclists and Pedestrians	Bicyclists	Bicyclists
Context	Urban and Rural	Rural and Urban Periphery	Urban and Rural
Posted Speed Limit*	Urban: Any speed (typically 30 mph or higher) Rural: Any speed (typically 55 mph or higher)	Any speed (typically 45 mph or higher)	Urban: 25 mph or lower (preferred); 35 mph or lower (acceptable) Rural: 55 mph or lower
Motor Vehicle Traffic Volume*	Urban: Any volume (typically 15,000 ADT or greater) Rural: Any volume (typically 6,500 ADT or greater).	6,500 ADT or lower (preferred) Any volume (acceptable) Shoulder width to accommodate bicyclists depends on traffic volume. See Figure 1 for guidance on selecting appropriate width.	Urban: 3,000 ADT or lower (preferred) 5,000 ADT or lower (acceptable) Rural: 1,500 ADT or lower
Other Considerations	Sidepaths should be at least 10 feet wide (wider where higher bicycle and pedestrian traffic is expected, e.g., urban areas). Special consideration must be given to the design of roadway crossings to increase visibility, clearly indicate right-of-way, and reduce crashes. Alternative accommodations should be sought when there are many intersections and commercial driveway crossings per mile.	Provides more shoulder width for roadway stability. Shoulder width should be dependent on characteristics of the adjacent motor vehicle traffic. Placement of the rumble strip is critical to providing usable space for bicyclists and pedestrians.	May be used in conjunction with wide outside lanes. Explore opportunities to provide parallel facilities for less confident bicyclists. Where motor vehicles allowed to park along shared lanes, place markings to reduce potential conflicts with opening car doors. On low speed (<=25 mph) low traffic (<=3,000 ADT) streets, traffic calming and diversion can be used to slow traffic or create a “bicycle boulevard.”

* Speed and traffic volume are interrelated and must be considered together when selecting an appropriate facility for bicyclists. Typically, as speeds increase, the traffic volume threshold for providing separation (e.g., via a multi-use trail or separated bike lanes) decreases. Refer to Figures 4.15 and 4.16 for guidance in considering both variables.



Separated Bike Lanes	Bike Lanes & Buffered Bike Lanes	Sidewalks	
<p>Separated bike lanes, also known as cycle tracks, are physically separated by a vertical element from the adjacent motor vehicle lanes. Buffered bike lanes that do not include a vertical element are not considered separated bike lanes.</p>	<p>4- to 6-foot wide lanes designated for exclusive use by bicyclists. Typically applied to arterial and collector streets where volumes and/or speeds would otherwise discourage bicycling. May include striped buffers (typically 18 inches to 3 feet in width) for further separation.</p>	<p>A pedestrian walkway located within public right-of-way, typically adjacent to property lines. Sidewalks provide vertical and/or horizontal separation between vehicles and pedestrians and are the most common pedestrian facility type.</p>	<p>Description</p>
<p>Bicyclists</p>	<p>Bicyclists</p>	<p>Pedestrians</p>	<p>Intended Users</p>
<p>Urban</p>	<p>Urban</p>	<p>Urban and Urban Periphery</p>	<p>Context</p>
<p>Any speed, typically 30 mph or higher</p>	<p>35 mph or lower (preferred) 40 mph or lower (acceptable; buffer preferred above 35 mph)</p>	<p>Any speed</p>	<p>Posted Speed Limit*</p>
<p>Any volume (typically 6,000 ADT or greater)</p>	<p>6,000 ADT or lower (preferred) 20,000 ADT or lower (acceptable; buffer preferred above 10,000 ADT)</p>	<p>Any volume</p>	<p>Motor Vehicle Traffic Volume*</p>
<p>Separation can be achieved through a vertical curb, a parking lane, flexposts, plantings, removable curbs, or other measures.</p> <p>Special attention should be paid to intersection treatments. “Protected intersection” design should be incorporated to the extent possible.</p>	<p>Painted buffers are encouraged when roadway width allows, regardless of traffic speeds and volumes. Where on-street parking is adjacent to a bike lane, provide a bike lane of sufficient width to reduce probability of conflicts due to opening vehicle doors and objects in the road. In locations with high on-street parking turnover, consider placing buffers between the parking lane and bike lane. Analyze intersections to reduce bicyclist/motor vehicle conflicts.</p>	<p>Sidewalks should be provided as the default pedestrian accommodation within communities. When retrofitting sidewalks in a community, it is best to first concentrate on busier streets and around places where walking is more common: schools, transit stops, commercial areas, etc.</p> <p>Sidewalks should be a minimum of 4 feet wide in residential areas and 5 feet wide along arterial and collector streets.</p>	<p>Other Considerations</p>



5. STATEWIDE NETWORK RECOMMENDATIONS



The role of statewide networks

The Complete Streets Policy, discussed in Chapter 6, will have a major impact on improving Iowa's state highways for bicycling and walking. Eventually, the incremental improvements made by following the Complete Streets Policy will mean that Iowa's network for bicycling and walking will provide a higher level of mobility. However, there is still a significant need to plan specific bicycle and pedestrian networks for a variety of reasons, such as to account for situations not covered by the Complete Streets Policy (e.g., county roads), plan a statewide network of multi-use trails, and facilitate the implementation of Iowa's portion of multiple national trails and US Bicycle Routes.

5.1 A new approach to statewide network planning

All types of bikeways and trails (state, regional, and local) are important for the mobility of bicyclists and pedestrians in Iowa. Just as Interstate highways and city streets serve different purposes yet are equally important, so are the various types of bikeway and trail networks. In the past, the trails in Iowa were designated as:

Level 1: Trails of Statewide Significance;

Level 2: Trails of Regional Significance; and

Level 3: Trails of Local Significance.

However, this implied a prioritization of statewide trails over regional and local trails. Beginning with this plan, the Iowa DOT is discontinuing the numbered classification system and simply referring to trails as either part of the statewide trail network (which includes regional trails) or local trails that are part of a local trail network.

“Trail” versus “route”

The term “trail” is often used to denote several different things, such as a nature trail a paved pathway, or an interstate on-road bike route. In this plan, the phrase “**multi-use trail**” refers to a paved or smooth gravel pathway for walking and bicycling that is separated from motor vehicle traffic yet still functions as a transportation facility.

The phrases “**national trail**” and “**route**” are used to denote interstate bicycle and pedestrian routes that are often referred to as “trails,” such as the Mississippi River Trail, which predominately utilizes paved shoulders or shared roadways.

There is, of course, some overlap. The American Discovery Trail *route* follows many miles of paved separated *multi-use trails* (as well as on-road bikeways).

This Plan identifies two types of statewide networks for bicycle and pedestrian mobility:

1. A statewide network of multi-use trails

The Statewide Trails Vision largely mirrors past statewide trails network vision plans and returns to a pure multi-use trail focus. For the purposes of allocating state and federal funding, the Iowa DOT will prioritize trails that make significant contributions to improving state and regional connectivity, but local trails may still be eligible under new prioritization criteria. There are similarities to the state's roadway network, in which the Iowa DOT plans, designs, and funds state highways. Counties do the same for Farm-to-Market roads and municipalities are responsible for local streets. However, for multi-use trails, the Iowa DOT has a modest coordination role, but at the same time a much smaller role with regard to designing and maintaining multi-use trails. It will continue to be the responsibility of cities, counties, volunteer groups, the Department of Natural Resources, and other partners to maintain multi-use trails.

The statewide trails vision network, discussed on the following pages, has been planned based on historical corridors (such as railroad alignments) and decades of planning and development. However, refinements and even larger modifications can be made and proposed by MPOs and RPAs so long as connectivity is not greatly altered. This new approach to statewide trail planning indicates regional and statewide priority for multi-use trails to guide local, regional, and statewide investment, encourage linkages, preserve corridors, and indicate needs related to road projects (e.g., including provisions for future trail crossings when reconstructing a road).

2. A statewide network of national trails and US Bicycle Routes.

This network is composed of three former Level 1 trails (the American Discovery Trail, the Mississippi River Trail, and the Lewis and Clark Trail) as well as several US Bicycle Routes. While portions of this network will be in the form of multi-use trails (at least 75 percent of the American Discovery Trail will be multi-use trail, much of which will overlap the statewide multi-use trail network), it will largely be composed of on-road bikeway facilities (mostly low-traffic rural roads).

The purpose of this network element is to coordinate with national plans for interstate routes, encourage bicycle tourism, and improve intercity connectivity. This plan will help to identify road segments on which accommodations are needed, such as wider paved shoulders or multi-use trails, and segments that are not part of the state highway system (such as county roads) and are therefore not affected in the same way as state highways by the Proposed Complete Streets Policy.



Other network considerations

Whether for recreation or transportation purposes, most bicycle and pedestrian trips cover short distances. Avid bicyclists will often ride 100 or more miles in one trip, but for the majority of the bicycling and walking population, trips are often a few miles or less. This is especially true for utilitarian walking and bicycling trips, which represent the majority of transportation-related non-motorized trips. Therefore, the continued development and improvement of local and metro area bicycle and pedestrian networks is very important in terms of providing transportation choices and shifting trips from motor vehicles to walking and bicycling.

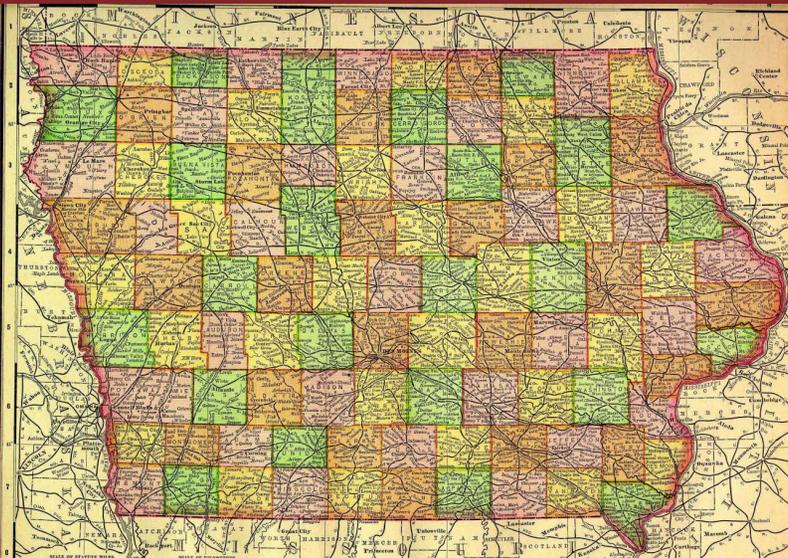
Local and metro area bicycle and pedestrian networks primarily exist within cities and metro areas. The strategies for developing these networks therefore differ from those used in the development of rural networks. For example, while it is preferable to avoid high-traffic rural roads, it is important to provide bicycle and pedestrian accommodations along high-traffic city streets (which are often state highways) because these are the streets along which the majority of destinations are located. In other words, if local bicycle networks primarily follow low-traffic side streets, access to destinations will be severely limited. The types of accommodations and treatments provided are also more numerous and context-sensitive—traditional bicycle lanes, bicycle lanes with physical separation from motor vehicles, cycle tracks, shared lanes, multi-use paths, bicycle boulevards, unique pavement markings, specialized traffic signals, etc.

The implementation of effective local and metro area networks is therefore arguably more challenging than for rural networks. There are many more agencies and stakeholders involved—including the Iowa DOT—so partnerships between organizations and knowledge-sharing is crucial. As such, the Iowa DOT will strive to foster such partnerships, encourage municipal and regional Complete Streets policies, provide technical assistance through design guidelines, and promote the development and implementation of comprehensive bicycle and pedestrian transportation plans.

5.2 Statewide Trails Vision

The State of Iowa has envisioned a statewide multi-use trail network for more than 40 years, dating back to the bicycling renaissance of the 1970's and the start of such traditions as RAGBRAI. Most of the first long-route independent trails were constructed in the early 1980's on former railroad rights-of-way, which crisscross Iowa and at one point connected practically every city in the state to a national freight and passenger transportation network (Figure 5.1).

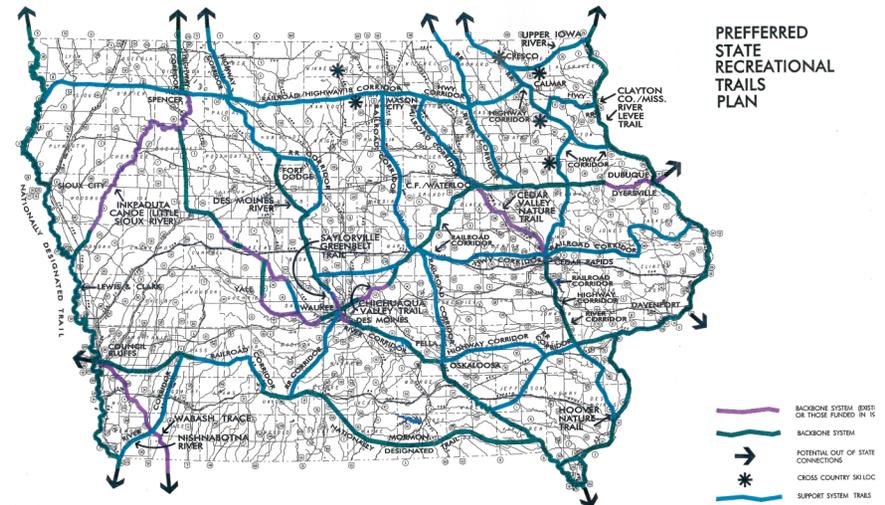
Figure 5.1: Iowa Railroad Map (1895)



The initial plan for a formal statewide trail network started in 1973 with a focus on recreation, rather than transportation. The Iowa State Conservation Commission (now the Iowa Department of Natural Resources) set forth to find natural, cultural, and historic treasures in Iowa that would help provide the groundwork for potential trail routes. The plan suggested that the assembled corridor system be used to serve as a guide in planning a statewide trail network but it did not address how to implement, manage, or fund the system.

In 1987, public demand for quality outdoor recreational facilities prompted the Iowa Legislature to take action. Lawmakers asked the Iowa DOT to develop a more detailed statewide trail plan. After conducting extensive research and collecting an inventory of data, the *Iowa Statewide Recreational Trails Plan* was published in 1990 (Figure 5.2). At this point, approximately 400 miles of the statewide system were in place. This plan included approximately 2,928 corridor

Figure 5.2: Iowa Statewide Recreational Trails Plan (1990)





miles, slightly more than half of which was considered the “backbone” system (longer corridors that run parallel to Iowa’s most significant natural resources, span state boundaries, or provide connections to major cities). This plan introduced the concept of classifying trails based on national, statewide, regional, or multicounty significance.

In 2000, the Iowa DOT published *Iowa Trails 2000* (Figure 5.3), which reported that approximately 1,180 miles of trails, many of which have less-expensive granular surfacing rather than asphalt or concrete, had been built as part of the system (a construction rate of approximately 78 miles of trails per year between 1990 and 2000). *Iowa Trails 2000* proposed an expanded statewide vision to include 4,391 miles of trails. All trails in the state, whether built by state agencies, cities, local groups, or county conservation boards, were considered part of the statewide trails vision. While the plan identified general corridors and trail location criteria, specific alignments, trail use, trail surface,

and other detailed design issues were to be determined by the agency or group that implemented the trail, and by subsequent planning efforts. Based on the 1990-2000 rate of trail construction, the statewide trails vision would be complete in approximately 56 years.

During the 2000s, the Iowa DOT determined that in order for the DOT to most effectively invest its limited resources in a multi-use trail system, a smaller, more focused network needed to be established. Between the adoption of the Iowa Trails 2000 plan and the Iowa in Motion 2040 plan (discussed on the following page) the Iowa DOT identified five trails of statewide significance from the statewide trails vision map. These trails provide high-level connectivity with other major trails in Iowa and, in some cases, trails in other states. Development of some of these trail corridors was envisioned to involve improving primary highways and county roads with paved shoulders, constructing multi-use trails, and in some cases,

Figure 5.3: Iowa Trails 2000 Statewide Trail Vision

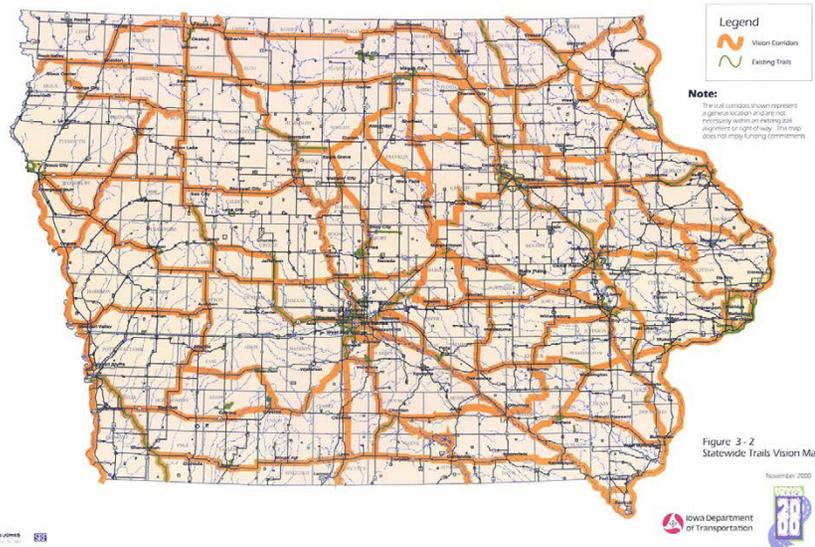
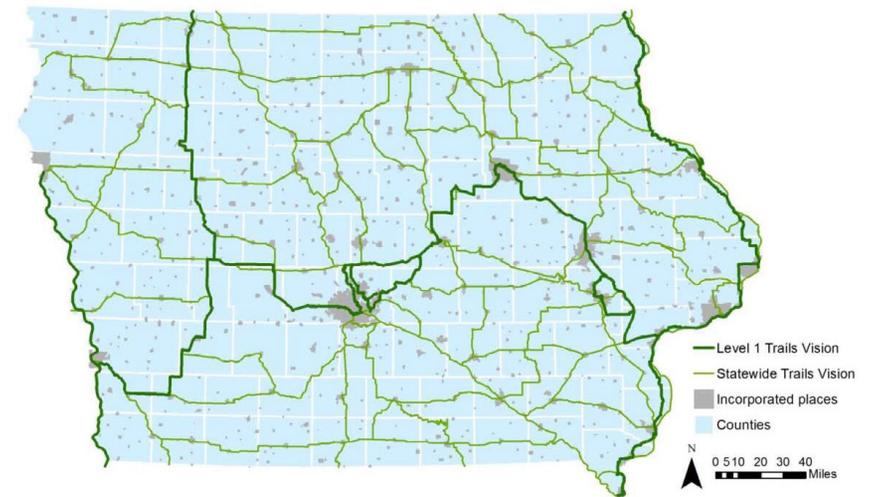


Figure 5.4: Iowa in Motion 2040 Trails Vision Map

This map identifies the five Level 1 Trail corridors, and also illustrates the Statewide Trails Vision from prior planning documents. It is assumed that the trails on the Statewide Trails Vision would be considered Level 2, or regional trails.



merely signing bike routes along low-traffic primary highways and county roads without making infrastructure improvements. This determination signified a shift away from a focus on a statewide network of multi-use trails to a network of mixed-facility “trail” routes. The five trails of statewide significance included:

- American Discovery Trail – envisioned as a continuous multi-use trail but currently predominately utilizes on-road routes
- Mississippi River Trail – envisioned as a mixed facility route, mostly on paved shoulders
- Lewis and Clark Trail – envisioned as a mixed facility route, mostly on shared roadways
- Iowa Great Lakes Connection – envisioned as a multi-use trail, with potential for interim use of shared roadways and paved shoulders
- Central Iowa Trail Loop – envisioned as a multi-use trail

Adopted in 2012, Iowa’s previous long-range transportation plan (*Iowa in Motion – Planning Ahead*) projected the demand for transportation services out to 2040. Building on the prior work of *Iowa Trails 2000*, *Iowa in Motion* separated multi-use trails into three functional classifications:

- Level 1 – Trails of statewide significance
- Level 2 – Trails of regional significance
- Level 3 – Trails of local significance

Each of the five Level 1 trail corridors (see Figure 5.4) was evaluated to determine whether the “trail” route would likely be an on-road route along a primary highway or county road, or be constructed as a separated multi-use trail. The specific alignment, type of improvement, and responsible jurisdiction would be determined at the time of project development. The adoption of this plan further shifted the

focus from an exclusively multi-use trail network toward mixed-facility routes for the Level 1 system.

5.3 Updated Statewide Trails Vision

The emphasis on the five Level 1 Trails introduced over the last decade was intended to focus the Iowa DOT’s resources and funding mechanisms to create a backbone system for the statewide trail network. However, this focus has arguably set priority on trail corridors that are not yet in demand by Iowans. Trails in Iowa are typically built by expanding existing networks and seizing opportunities as they arise. In most cases, the successful development of a trail requires the organized determination and commitment of local and regional governments, interest groups, and individual citizens to create the momentum needed. While this sometimes includes segments of Level 1 Trails, more often than not, the trails that are prioritized by communities, MPOs, RPAs, and the public are not part of one of these five corridors. Furthermore, there is an expectation that a “trail” is a paved bicycle and pedestrian path separated from motor vehicle traffic. While the continued development of national “trail” routes (such as the Mississippi River Trail, which is primarily composed of on-road routes) remains important, the consensus amongst local and regional governments, interest groups, and citizen stakeholders is to primarily use “trail” funding to develop true multi-purpose trails, and only occasionally to fund on-road bicycle accommodations when significant opportunities arise.

Therefore, as identified in Iowa’s current long-range transportation plan, *Iowa in Motion 2045*, the vision for Iowa’s statewide trail system is returning to its original conception—a statewide network of separated multi-use trails that connects rural communities, metropolitan areas, state and county parks, and natural amenities. The prioritization of projects will be based on the trail’s ability to improve access and connectivity rather than on its functional classification. The Level 1/Level 2/Level 3 classification scheme will no longer be used. Rather, trails in Iowa will be classified as part of the Statewide Trails Vision or as a secondary connecting trail of local importance. This new



classification will have an effect on prioritization for funding, but will not be an overriding determinant.

Current status

The Statewide Trails Vision map (Figure 5.5) is a compilation of the trail planning efforts completed over the last few decades. The network of completed trails has been updated to accurately depict the routes that have been constructed to-date. The vision map is not intended to depict a full build-out of all trail segments across the State of Iowa. Rather, it should be utilized as a planning tool so that development opportunities can be pursued as they arise. As local public agencies and planning organizations continue their trail planning efforts, the vision map will continue to evolve. The goal of the statewide map is to encourage consistent and continuous planning across jurisdictional and planning boundaries.

Included on the map is a depiction of the level of completeness of the system. This was determined based upon past studies; known construction completion; a comparative analysis with trail planning efforts; and interviews with communities, planning organizations, and the INHF. Various planning organizations and local governments have ongoing trail planning efforts that could alter the network as proposed. At this point, the envisioned system is approximately 40 percent complete. The [2,314] existing miles of multi-use trails include mostly asphalt, concrete, and crushed stone surfaces. In some cases, the trails are simply graded earth. At the time of writing, [29] miles of trails are programmed, meaning they are funded and/or under design. The majority of the envisioned network is currently planned or proposed.

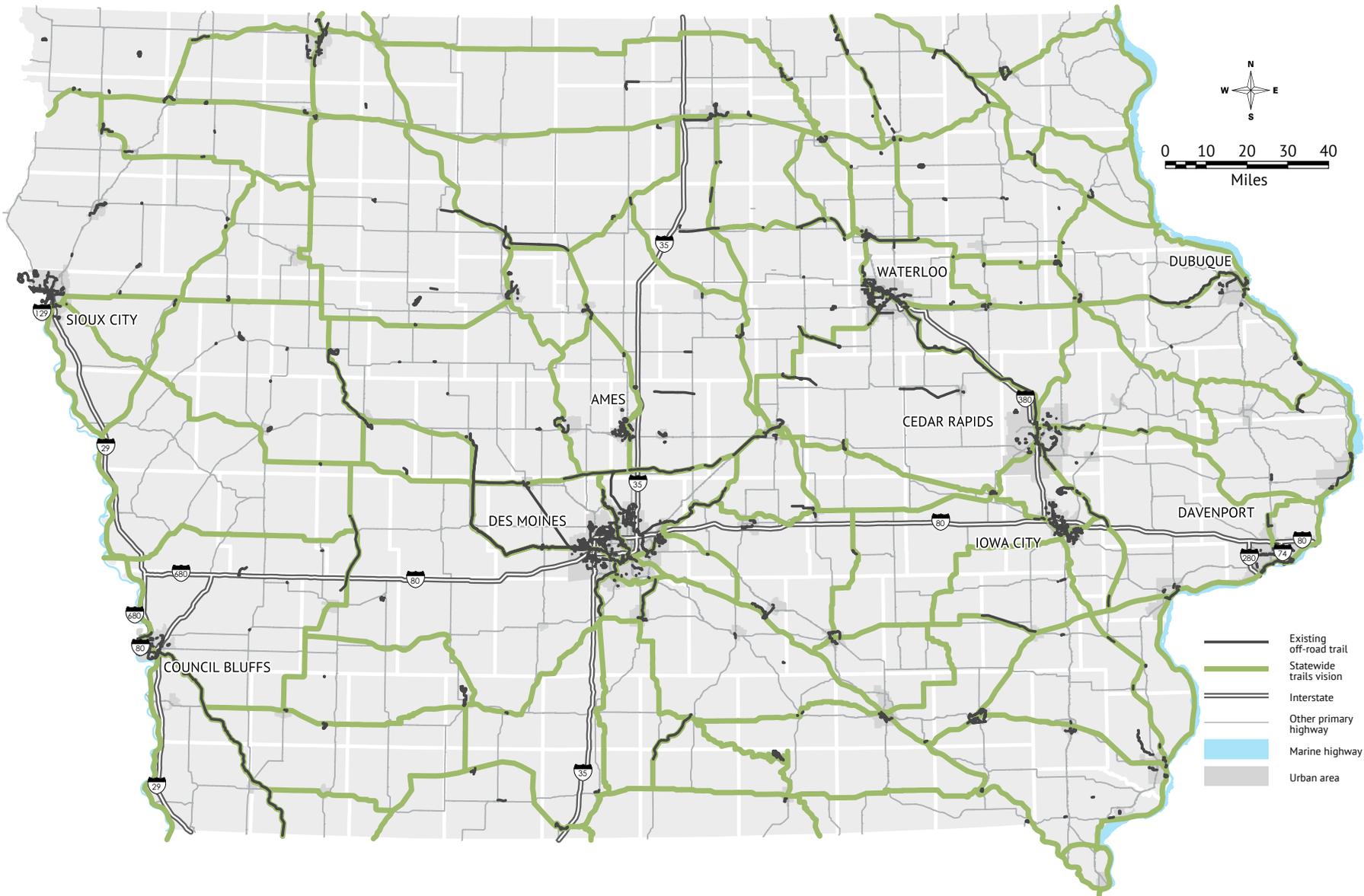
Table 5.1: Statewide Trails Vision – Current status

Trail Status	Mileage	% of Statewide Network
Existing	2,314 miles	40%
Programmed	29 miles	0.5%
Planned (part of an adopted local or regional trail plan)	90 miles	1.5%
Proposed (by this Long-Range Plan)	3,294 miles	58%

Placeholders: mileage of trails

The table to the left is based on 2015 data and will be updated with 2018 data as the plan is finalized.

Figure 5.5: Statewide Trails Vision for multi-use trails





Cost estimates

While every trail is unique, it is possible to estimate an approximate cost per mile based on historical project data. In recent years, hundreds of miles of trail have been constructed in Iowa. An analysis of the construction costs shows that trails built on abandoned railroad grades are less expensive per mile than trails built on virgin land, while trails in cities or those requiring significant grading are among the most expensive.

Per mile costs for varying types of accommodations, based on recent historical construction costs, are presented in the following table. The modification factors are multipliers used to adjust the base cost per mile depending on varying conditions. For example, the typical cost per mile for a multi-use trail on former railroad grade is \$200,000 (0.5 modification factor times the \$400,000 base cost) and the typical cost per mile for a new sidepath along a rural roadway is \$480,000 (1.6 times \$300,000).

Table 5.2: Typical per mile cost estimates for multi-use trails based on historic costs in Iowa

Facility Type	Typical Cost per Mile	Modification Factors	
New paved multi-use trail on independent alignment, 10' wide	\$400,000	Former RR grade	0.5
		Flat terrain	0.6
		Rolling terrain	1.0
		Hilly terrain	1.2
		Along stream bank	1.2
		Densely developed area	2.0
New paved sidepath, 10' wide	\$300,000	Along urban roadway	1.0
		Along rural roadway	1.6
		Densely developed area	1.4
Unpaved multi-use trail	\$200,000	Former RR grade	0.6
		Flat terrain	1.0
		Rolling terrain	1.2
		Hilly terrain	1.4

5.4 Trail system funding, management, and maintenance

Funding sources and levels

Iowa has a number of available funding streams that can be used for the development of the Statewide Trail Network. Those that are administered by the Iowa DOT include Federal Recreational Trails, the State Recreational Trails Program, and the Surface Transportation Block Grant-Transportation Alternatives Program (part of the Federal funding the state receives under the current FAST Act transportation funding bill). Each of these is a dedicated funding source, meaning that all of these funds are predominately allocated to bicycle and pedestrian projects. There are also several funding programs that are not administered by the Iowa DOT. The Iowa DNR's Resource and Environment Protection (REAP) program provides funding for state and local projects, including trail corridor preservation. Other programs and grants such as Vision Iowa, legacy funds, and corporate donations also contribute much needed funding for trail development.

The level of funding available for multi-use trails is inconsistent. For example, while Iowa's State Recreational Trails Program had \$6 million budgeted for FY2014, the amount of funding available through this program was half that in previous years. In 2016 the program was funded at \$2.5 million and in 2017 the program is funded at \$1 million. Furthermore, there is a significant level of uncertainty regarding the future of federal funding as the FAST Act (and therefore the Surface Transportation Block Grant-Transportation Alternatives Program).

The most effective way to validate trail development as a statewide goal is to increase the level of funding within any program devoted to bicycle and pedestrian accommodation improvements. The Statewide Trails Vision includes thousands of miles of trail that have been identified and could be developed in the state. Multi-use trail projects will continue to be primarily funded by these dedicated funding programs (such as STBG-TA, State RTP, Federal RTP, etc.), except for trails built along roadways as parts of roadway projects. While it is not

reasonable to assume that every mile will be funded during the life of this plan, it is important that overall funding levels be increased so that trail development can better meet demand. Furthermore, it is important to make funding for multi-use trails more dependable. One way in which to work toward this goal is for the Iowa General Assembly to increase the state's sales tax, thereby funding the Natural Resources and Outdoor Recreation Trust Fund (Iowa Land and Water Legacy), which will provide approximately \$15 million in funding for trails per year. It will be the responsibility of regional agencies, local governments, and partners such as the INHF to identify priority projects for the Iowa DOT and Iowa DNR to fund.

Management and maintenance

It is the role of partners such as the INHF, MPOs and RPAs, and local jurisdictions to plan, acquire right-of-way, design, build, and maintain multi-use trails in Iowa. The Iowa DOT's role in the development and management of multi-use trails has historically been to provide funding and assist with building projects by helping local agencies with design, letting, and construction processes. With the potential exception of providing technical support for the planning and design of multi-use trails, the Iowa DOT's role will generally not change. While several public funding streams are available for the planning, design, and construction of new trails, maintenance costs typically fall solely on the local jurisdictions. At a minimum, these costs must be understood and acknowledged by the participating governments, and a plan for the permanent maintenance of the facility should be prepared.

Table 5.3 lists typical maintenance items that should be included in local and regional trail management plans:

When trail systems become interconnected, it can be advantageous for multiple entities to share resources, potentially with the goal of creating a trails authority. The creation of a trails authority with the ability to generate revenue would require enabling legislation, but



could serve a critical role in trail maintenance and management since the Iowa DOT has not historically been involved in the matter after a trail is constructed.

Another opportunity to maintain multi-use trails in a cost-effective manner is the establishment of non-profit foundations and “friends” groups (e.g., “Friends of the ____ Trail”) that help to fund maintenance of trails as well as provide safety patrols and promote the use of a trail or trail system. Examples in Iowa include the Cedar Trails Partnership, which is a non-profit that coordinates with multiple jurisdictions and manages a grant program to support the development and maintenance of the 100-plus mile Cedar Valley Trails system. Another example is the Friends of the Red Oak Trails, which helps to plan, promote, and maintain a short loop trail in the City of Red Oak.

Table 5.3: Typical maintenance activities for multi-use trails

Maintenance Activity	Frequency	Responsible Party
Mowing	Weekly or bi-weekly	Local jurisdiction
Weed control	Spring, then as needed	Local jurisdiction
Tree/branch trimming	Spring, then as needed	Local jurisdiction
Sweeping	Bi-weekly or as needed	Volunteers / local jurisdiction
Snow removal	As needed	Local jurisdiction
Garbage clean-up	Bi-weekly or as needed	Volunteers / local jurisdiction
Storm clean-up	As needed	Local jurisdiction
Striping/pavement markings	As needed, ~ 1-2 years	Local jurisdiction
Signage replacement	As needed, ~ 5 years	Local jurisdiction
Graffiti removal	As needed	Local jurisdiction
Shoulder grading	As needed, ~ 1-2 years	Local jurisdiction
Crack sealing	As needed, ~3-5 years	Local jurisdiction
Pavement repair patching	As needed, ~ 5 years	Local jurisdiction
Pavement replacement	As needed, ~ 25-50 years	Local jurisdiction

Summary of trail funding, management, and maintenance recommendations

- Increase the level of funding within existing funding programs devoted to bicycle and pedestrian accommodation improvements.
- Approve sales tax increase to fund the Natural Resources and Outdoor Recreation Trust Fund (Iowa Land and Water Legacy).
- Encourage participating agencies and organizations to develop plans for the permanent maintenance of trail facilities.
- Consider creating one or more trails authorities with the ability to generate revenue in order to maintain and manage trails across the state.
- Explore the creation of additional local foundations and friends groups to help fund the maintenance and patrol of trails.

5.5 National trails and US Bicycle Routes

Cross-country routes for bicycling and walking have been envisioned over the past several decades in a variety of ways. One origin of the concept was Bikecentennial, a coast-to-coast bicycle ride that occurred in the summer of 1976. The tour route was eventually designated as US Bicycle Route 76 and became the inspiration for a national grid of on-road routes for long-distance bicycle touring—the United States Bicycle Route System (USBRS). Other long-distance routes not directly associated with the USBRS have also been planned and partially implemented across the country. Some are envisioned as completely separated trails for hiking, others are predominately for on-road bicycling, utilizing low-volume roads and paved shoulders, and some are planned to utilize a mix of multi-use trails and on-road accommodations.

The US Bicycle Route System planning effort (the National Corridor Plan, see Figure 6) is a partnership between the Adventure Cycling Association (ACA) and the American Association of State Highway Transportation Officials (AASHTO). The vision entails more than 50,000 miles of interstate routes passing through each of the lower 48 states as well as six short routes wholly within Alaska. To date, nearly 12,000 miles of US Bicycle Routes have been approved in 25 states. For proposed US Bicycle Routes, the National Corridor Plan identifies 50-mile wide corridors, which are flexible based on opportunities for implementation. The plan states that it relies on state DOTs to determine the best route along each corridor and that the plan is open to expanding the system via spur and loop routes as well as new corridors. There are currently five proposed routes in Iowa. Route 51 runs north-south through the center of the state, Route 40 and Route 36 run east-west across the center of the state, Route 45 follows the Mississippi River, and Route 55 follows the Missouri River. For Routes 45 and 55, the plan is not specific as to which side of the river (and therefore in which state) the route is to be located.

In addition to the proposed routes identified by the National Corridor Plan, there are hundreds of “Alternate Corridors” across the country, including six in Iowa. The Alternate Corridors are interstate or connecting routes identified during the National Corridor Plan effort that were not prioritized and assigned a route number. There may be value in the future development of one or more of these corridors in Iowa as regional or state on-road bicycle routes to supplement the USBRS and provide increased access and connectivity to destinations. If established, routes along the Alternative Corridors would help connect the USBRS with the regional bike route systems that are the responsibility of MPOs/RPAs, counties, and volunteer organizations to plan and develop.

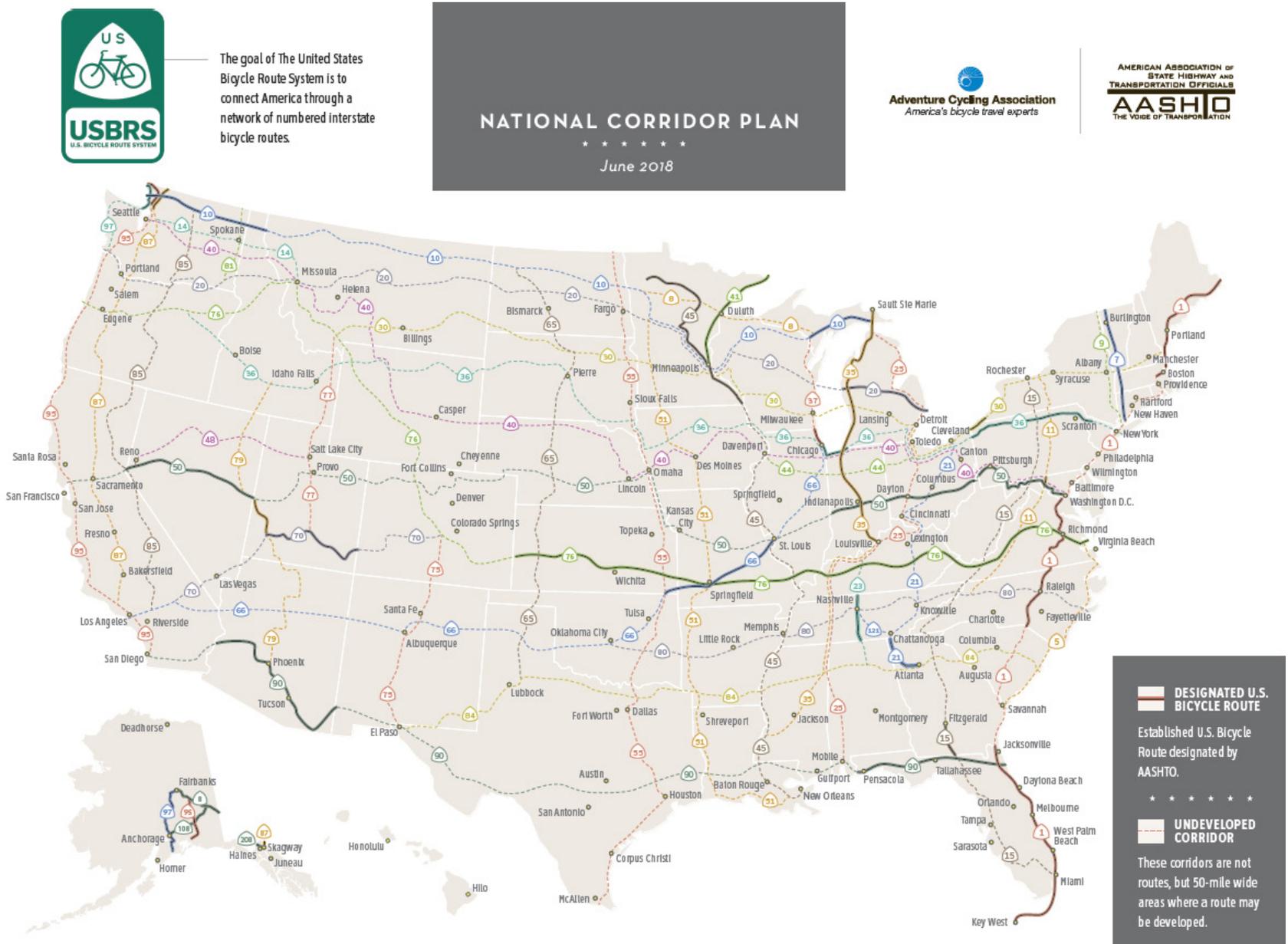
Three national trails pass through Iowa—the American Discovery Trail, the Mississippi River Trail, and the Lewis and Clark Trail. In the recent past, these were designated as three of five “Level 1” trail corridors, as discussed in the previous section.

While some of the multi-use trail segments (planned or existing) are considered by this plan to be part of the statewide trails vision network, the on-road portions are not. Still, further developing these corridors (as well as US Bicycle Route corridors) is important, primarily for expanding tourism and recreation opportunities, but also to a lesser degree for improving intercity transportation by bicycle. If the aforementioned US Bicycle Routes 45 and 55 are established in Iowa (rather than bordering states), they will follow the same alignments as the Mississippi River Trail and Lewis and Clark Trail, respectively.

The term “national trails” refers to a class of interstate non-motorized routes rather than a specific type of accommodation. National trails utilize separated multi-use trails, paved shoulders, and shared roadways.



Figure 5.6: The United States Bicycle Route System National Corridor Plan (June 2018)



The goal of The United States Bicycle Route System is to connect America through a network of numbered interstate bicycle routes.



DESIGNATED U.S. BICYCLE ROUTE

Established U.S. Bicycle Route designated by AASHTO.

UNDEVELOPED CORRIDOR

These corridors are not routes, but 50-mile wide areas where a route may be developed.

5.6 Planned combined system

There are many similarities between the US Bicycle Route system and the national trails that pass through Iowa. For example, both are interstate and both rely heavily on on-road bicycle accommodations.¹ Therefore, they can be considered as one system for the purposes of this plan. A statewide network of US Bicycle Routes and national trails is not more or less important than the previously-discussed statewide network of multi-use trails, rather it serves a different purpose. Establishing this predominately on-road system will open new possibilities for bicycle tourism and intercity travel by bicycle. It will also be faster to implement and significantly more economical to establish on a cost-per-mile basis since most of the alignments utilize low-traffic roads (so paved shoulders will not be required) and existing/programmed multi-use trails. Some roads will need accommodations, largely by way of paved shoulders. In general, the implementation of dedicated accommodations can be made concurrent with road reconstruction and 3R projects.

Table 5.4: National trail and USBR corridor status in Iowa

Corridor Name	Percent Complete
American Discovery Trail	70%
Mississippi River Trail (USBR 45)	35%
Lewis and Clark Trail (USBR 55)	0%
USBR 36	0%
USBR 40	0%
USBR 51	0%

The planned system, shown on the following map (Figure 5.7), combines the planned corridor alignments of the Mississippi River Trail/USBR 45, the Lewis and Clark Trail/USBR 55, and the American Discovery Trail, along with two alignment options each for USBR 40 and USBR 36. The planned routes for each of the three national trails (and therefore USBR 45 and 55) have been modified only as necessary to maintain continuity along the route if a constructed portion created a gap in a previously planned alignment. They have also been adjusted if the regional plan for a trail has been altered by the local public agency or planning organization.

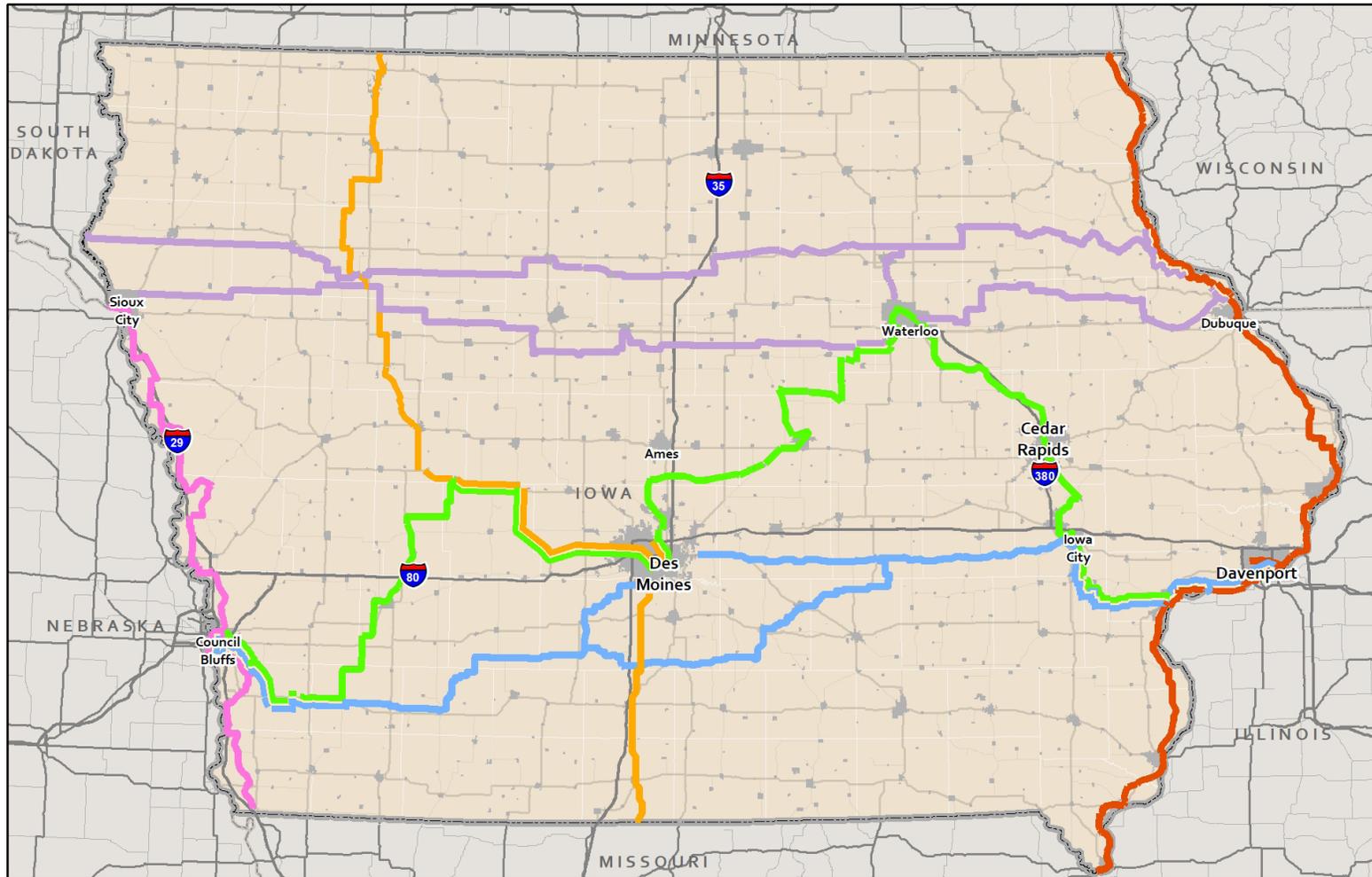
Figure 5.7 shows the proposed alignments of all USBRs and national trails in Iowa. The routes were determined to utilize existing, planned, and proposed trails, paved shoulders, and low-traffic rural roads. The alignments of the routes and national trails are not definitive. As continued planning and design occurs, these routes may shift to take advantage of opportunities or to avoid barriers.

Figure 5.8 shows the planned or proposed facility type (multi-use trail, paved shoulders, shared road, etc.). Where specified simply as “on-road” (as opposed to paved shoulder or shared road), this means that the route would be on-road, but a determination has not yet been made as to whether a dedicated facility (e.g., paved shoulders) is needed. In terms of status, planned facilities are those that are included in a preexisting regional or local bicycle and pedestrian plan, programmed facilities are those that are funded and/or designed, and proposed facilities are those that are being introduced by this plan.

¹ Approximately 34 percent of the American Discovery Trail is currently designated along rural roads (primarily shared roads, with some roads with paved shoulders) but the ultimate vision is for the ADT to exist as a coast-to-coast separated path.



Figure 5.7: National trail and USBR system alignments (including two alignment options each for USBR 36 and USBR 40)



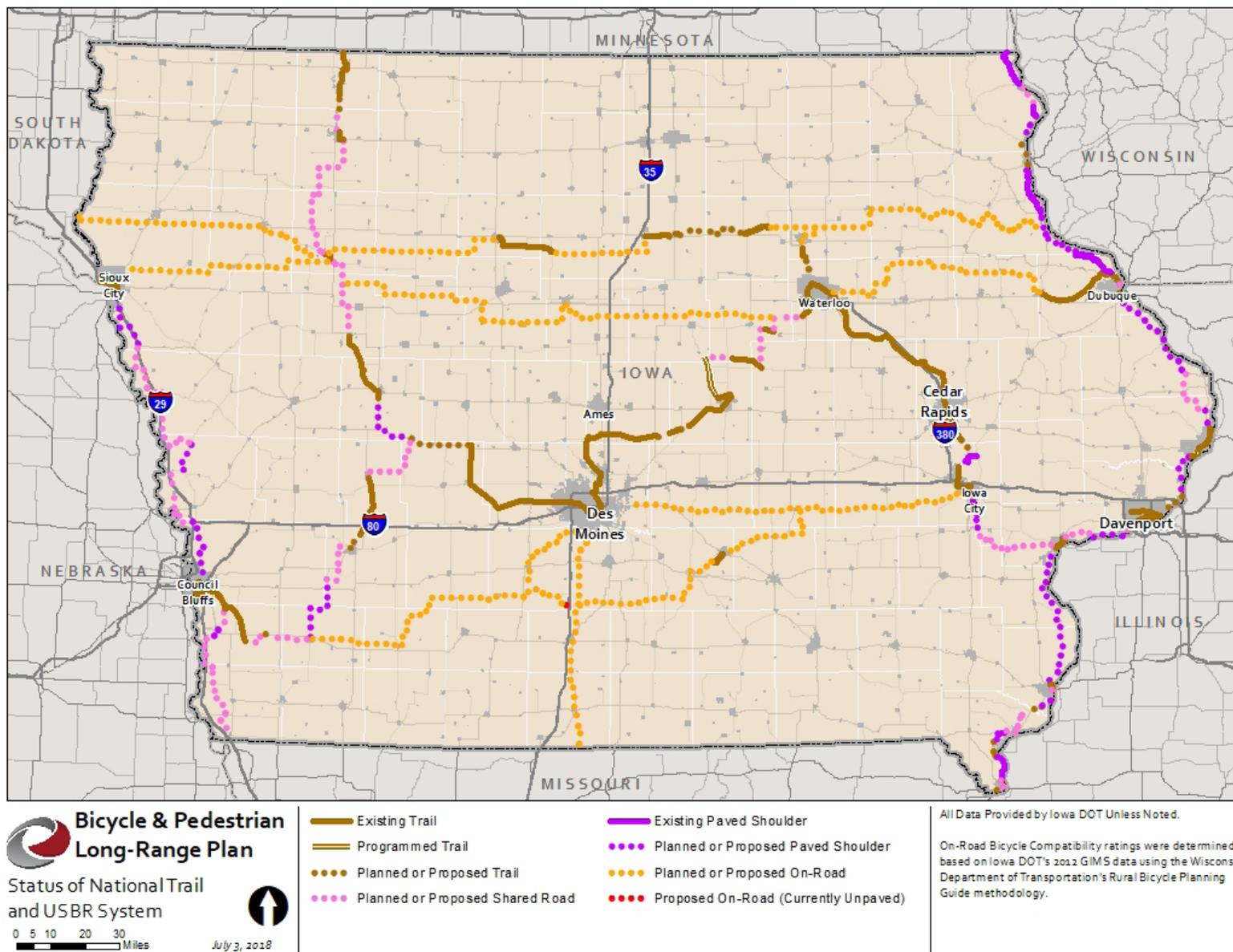
Bicycle & Pedestrian Long-Range Plan
 Status of National Trail and USBR System
 0 5 10 20 30 Miles
 July 3, 2018

- American Discovery Trail
- Mississippi River Trail (USBR 45)
- Lewis & Clark Trail (USBR 55)
- USBR 36
- USBR 40
- USBR 51

All Data Provided by Iowa DOT Unless Noted.

On-Road Bicycle Compatibility ratings were determined based on Iowa DOT's 2012 GIMS data using the Wisconsin Department of Transportation's Rural Bicycle Planning Guide methodology.

Figure 5.8: Status of national trails and USBR system corridors





5.7 Segment analysis and cost estimates

Each of the National Trail and USBRS corridors is discussed on the following pages. For each corridor, an overview of its history, assessment of current status, and implementation discussion is provided. Table 5.5 outlines the typical per-mile cost estimates used in determining the total cost for completing several of the corridors. Modification factors are provided as multipliers to adjust the base cost per mile depending on varying conditions. It is important to point out that the estimated paved shoulder costs are not entirely associated with each USBR since the probable course of implementation is to provide paved shoulders as part of future reconstruction work, during which paved shoulders would likely be provided anyway based on traffic volume.

Table 5.5: National Trail and USBRS per-mile cost estimates based on historic costs in Iowa

Facility Type	Typical Cost per Mile	Modification Factors	
New paved multi-use trail on independent alignment, 10' wide	\$400,000	Former RR grade	0.5
		Flat terrain	0.6
		Rolling terrain	1.0
		Hilly terrain	1.2
		Along stream bank	1.2
		Urban retrofit	2.0
New paved sidepath, 10' wide	\$300,000	Along urban roadway	1.0
		Along rural roadway	1.6
		Densely developed urban	1.4
New paved shoulders, 5' wide both sides	\$175,000*	Adequate shoulder width present	1.0
		Embankment widening required	2.0
		As a standalone project (not part of a larger 3R** project)	1.2
Shared Lane/Road	\$500	Rural route generally follows one road with few turns (wayfinding signage)	1.0
		Rural route includes many turns onto different roads (wayfinding signage)	2.0
		Urban route (wayfinding signage and shared lane markings)	10.0

* The probable course of implementation is to provide paved shoulders as part of future reconstruction work during which paved shoulders would likely be provided anyway based on traffic volume. Paved shoulders provide many benefits such as reduced maintenance costs, reduction in run-off-road crashes, etc., so these costs should not be seen as solely for the benefit of bicycling and walking.

** Resurfacing, restoration, or rehabilitation. These projects are less intensive than reconstruction projects and are typically budgeted and scheduled the same year that they are completed.

American Discovery Trail (ADT)

In 1989 the American Hiking Society envisioned a coast-to-coast multiuse trail that would link cities, towns, wilderness areas, forests, and deserts. The ADT website (<http://www.discoverytrail.org>) refers to the trail as “a new breed of national trail—part city, part small town, part forest, part mountains, part desert—all in one trail.” Passing through 15 states, the ADT is more than 6,800 miles long and stretches from Cape Henlopen State Park in Delaware to Pt. Reyes National Seashore in California. This “trail” is composed of traditional separated multi-use trails (paved and unpaved) as well as on-road segments.

Figure 5.9: American Discovery Trail national and state alignments²



Table 5.6: Estimated completion cost for the American Discovery Trail

Facility Type	Mileage	Total Cost Estimate (2014 Dollars)
Paved Multi-Use Trails	162 miles	\$33.5 million
Paved Shoulders	17 miles	\$4.7 million*
Shared Lanes/Road	139 miles	\$80,000
Total	318 miles	\$38.4 million

* Paved shoulder costs attributed to the ADT will likely be lower as the probable course of implementation is to provide paved shoulders as part of future reconstruction work during which paved shoulders would likely be provided anyway based on traffic volume.

2 Source: American Discovery Trail Society (discoverytrail.org)



Current Status

In Iowa, the trail route totals approximately 512 miles, much of it following existing multi-use paths, with undeveloped portions following assumed routes for future development or continued on-road accommodation. The ADT, which is approximately [70 percent] complete as of 2014, follows portions of a number of existing multi-use paths including:

- Wabash Trace Nature Trail
- Pioneer Trail
- T-Bone Trail
- Cedar Prairie Trail
- Raccoon River Valley Trail
- Cedar Valley Lakes Trail
- Clive Greenbelt Trail
- Cedar Valley Nature Trail
- John Pat Dorrian Trail
- Hoover Nature Trail
- Neal Smith Trail
- North Liberty Trail
- High Trestle Trail
- Clear Creek Trail
- Heart of Iowa Nature Trail
- Iowa River Corridor Trail
- Comet Trail
- Riverfront Trail

Approximately [73 percent] of the proposed rural on-road portions of the American Discovery Trail follow low-traffic roads that are considered “good” for bicycling based on the On-Road Bicycle Compatibility Rating analysis performed during this project.

Plan for Completion

Of the five routes discussed in this section (the three national trails and two US Bicycle Routes), the ADT is the most established at roughly [70 percent] complete. [Completing the ADT will entail constructing 162 miles of multi-use trail (13 miles of which are currently programmed) and designating 156 miles as on-road bikeways. The total cost for completing the American Discovery Trail in this form is estimated to be \$38.4 million (2014 dollars, not including right-of-way acquisition)], as shown on Table 5.6.

However, if Iowa’s segment of the ADT is to conform to the ultimate vision of a coast-to-coast separated trail, an additional [171] miles of multi-use trail will need to be constructed (in place of on-road bikeways), greatly increasing this cost.

Mississippi River Trail (MRT) / USBR 45

The MRT stretches from the river’s headwaters in Itasca, Minnesota south to the Gulf of Mexico. When finished, the MRT will link an approximately 3,000 mile route of trails and on-road bikeways through 10 states, including 335 miles in Iowa. Involving 10 states, the trail is planned and managed by an interstate organization known as Mississippi River Trail, Inc. The MRT is one of 16 National Millennium Trails, chosen in 2000 by the White House Millennium Council. The National Millennium Trails designation was given to interstate trails that reflect trails that “connect our nation’s landscape, heritage and culture and demonstrate our national commitment to improving the quality of life for all Americans” (Rodney Slater, US Secretary of Transportation, 1997-2001).

Figure 5.10: Mississippi River Trail National alignment

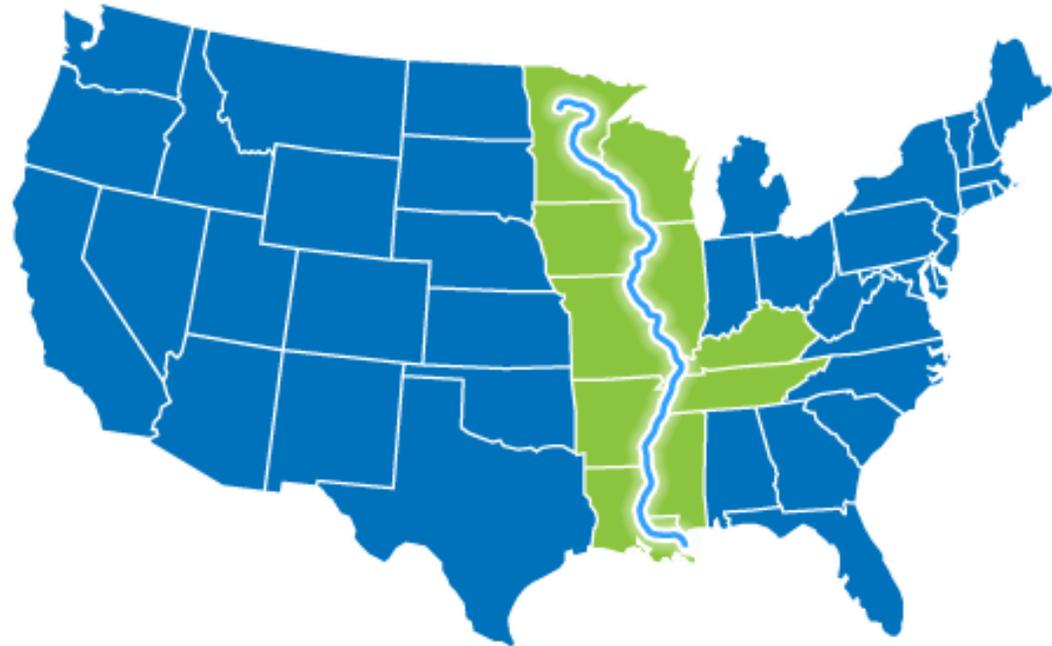


Table 5.7: Estimated completion cost for the Mississippi River Trail

Facility Type	Mileage	Total Cost Estimate (2014 Dollars)
Paved Multi-Use Trails	33 miles	\$12.2 million
Paved Shoulders	178 miles	\$47.8 million*
Shared Lanes/Road	30 miles	\$80,000
Total	241 miles	\$60.1 million

* Paved shoulder costs attributed to the MRT will likely be lower as the probable course of implementation is to provide paved shoulders as part of future reconstruction work during which paved shoulders would likely be provided anyway based on traffic volume.



Current Status

As of 2014, this trail is [35] percent complete in Iowa and much of it is still in the planning and development stages. Proposed segments that are not complete are generally still ride-able on existing county paved roads. The Iowa portion of the MRT was evaluated in 2003, *Iowa's Mississippi River Trail Plan*, to determine the best location for the route in Iowa. It was determined that in order to more quickly and economically begin implementing the route in Iowa, the majority of the trail would utilize the existing highway system, where feasible. [Of the 335 miles of MRT in Iowa, 75 miles are recommended along primary highways, 140 miles along county roads, and 80 miles within municipalities. In addition, 20 miles of shared-use paths will need to be constructed.] Some portions of the trail in Muscatine and Scott Counties will also serve as the American Discovery Trail. *Iowa's Mississippi River Trail Plan* calls for shoulders to be four to six feet wide (not including rumble strips) and paved with asphalt. In addition, about two miles of bridges may need to be re-decked in order to accommodate adequately-wide paved shoulders.

Plan for Completion

The 2003 *Iowa's Mississippi River Trail Plan* calls for a mix of multi-use trails and paved shoulders in rural areas. It does not recommend shared roads with wayfinding (which are much more economical than paved shoulders). Completing the MRT as planned will entail constructing [33 miles of multi-use trail (1.5 miles are currently programmed) and designating 208 miles as rural on-road bikeways (178 will require paved shoulders)]. The approach to implementing the MRT is incremental, taking advantage of reconstruction and 3R projects for the provision of paved shoulders. The total cost for completing the MRT will be [\$60.1 million (2014 dollars, not including right-of-way acquisition)], as shown on Table 5.7.

However, up to 48 miles of the route that is currently planned to include paved shoulders could instead be provided as shared lanes with wayfinding based on current and near-term traffic volumes and conditions. This would significantly reduce the cost of implementation.

Lewis and Clark Trail (LCT) / USBR 55

Lewis and Clark’s journey began in Washington D.C. and ended at the Pacific Ocean. The Lewis and Clark National Historic Trail, of which Iowa’s Lewis and Clark Trail is a part, begins at the Historic Camp Wood location on the Mississippi River near Saint Louis. The trail covers more than 3,700 miles and passes through 11 states. In Iowa, the Lewis and Clark Trail will extend from the South Dakota border at Sioux City to the Missouri border for a distance of approximately 150 miles along Iowa’s Missouri River Valley.

Figure 5.11: Lewis & Clark National Historic Trail alignment³

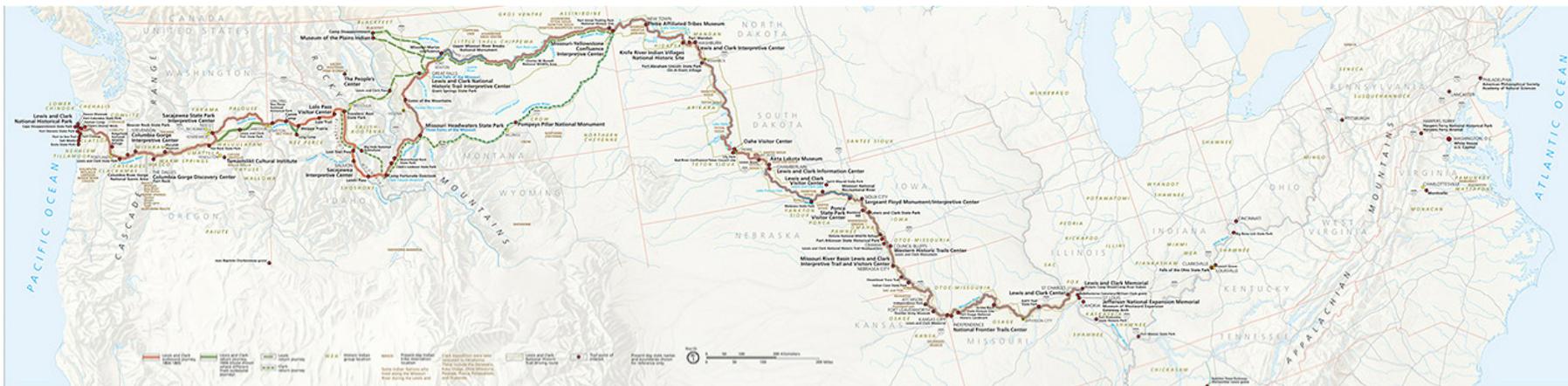


Table 5.8: Estimated completion cost for the Lewis and Clark Trail

Facility Type	Mileage	Total Cost Estimate (2014 Dollars)
Paved Multi-Use Trails	9 miles	\$1.8 million
Paved Shoulders	51 miles	\$13.7 million*
Shared Lanes/Road	135 miles	\$115,000
Total	224 miles	\$15.6 million

* Paved shoulder costs attributed to the Lewis and Clark Trail will likely be lower as the probable course of implementation is to provide paved shoulders as part of future reconstruction work during which paved shoulders would likely be provided anyway based on traffic volume.

3 Source: National Parks Service (<http://www.nps.gov/lecl>)



Current Status

The Iowa DOT has developed a master plan for a Lewis and Clark Multiuse Trail. The Iowa DOT and its partners would like to see a network that weaves together roads, trails, waterways, parks, and greenways for modern day explorers and also helps people discover the towns, businesses, museums, open spaces, and assets of western Iowa and surrounding areas. The study's overall goal is to make the landscapes and natural and human history of the Missouri River Valley and the Loess Hills more accessible to a wide variety of users for recreational, transportation, educational, and economic development purposes.

According to the study, the proposed route uses several different facility types. Because of the lack of abandoned rail corridors and the difficulty of acquiring right-of-way from private owners, the majority of the trail makes extensive use of existing public rights-of-way such as state and county roads and city streets.

To date, no portions of the LCT have been developed.

Plan for Completion

The *Lewis and Clark Multiuse Trail Study* includes numerous loops and bypass routes in addition to the primary north-south route. Completing the primary north-south route of the LCT will entail constructing 9 miles of multi-use trail and designating 186 miles as on-road bikeways (51 will require paved shoulders). The total cost for completing the initial primary north-south route of the LCT will be **[\$15.6 million (2014 dollars, not including right-of-way acquisition)]**, as shown on Table 5.8.

US Bicycle Route 36

Two portions of USBR 36—one through Pennsylvania and one through Indiana—are currently established. The remainder, however, is a prioritized corridor for future establishment. From east to west, it originates in New York City, passes through northern Pennsylvania and Ohio, turns north to Detroit, runs south of Lake Michigan through northern Indiana, passes through Chicago at which point it shifts north, and heads west, crosses the Mississippi River at Dubuque. It leaves Iowa near Hawarden, runs through South Dakota and northern Wyoming, goes through Yellowstone National Park, passes through Idaho Falls and Boise, and terminates at USBR 76 in eastern Oregon.

Current Status

The National Corridor Plan shows USBR 36 heading from Dubuque, across the northern portion of the state to Sioux Falls, where it will eventually link up with the Lewis and Clark Trail/USBR 55. The identified route for USBR 36 generally follows low-traffic roads while also utilizing existing and planned multi-use trails. The route will connect Dubuque, Waterloo, Storm Lake, Sioux City, and numerous small cities in between. It will pass through valleys, agricultural areas, and state parks.

Two potential alignments have been identified for USBR 36:

Northern Option – Approximately 75 percent of the proposed rural on-road portions of the northern USBR 36 alignment option follow low-traffic roads that are considered “good” for bicycling based on the On-Road Bicycle Compatibility Rating analysis performed during this project.

Southern Option – Approximately 90 percent of the proposed rural on-road portions of the southern USBR 36 alignment option follow low-traffic roads that are considered “good” for bicycling based on the On-Road Bicycle Compatibility Rating analysis performed during this project. This alignment has approximately 35 more miles of on-road portions than the northern alignment.

US Bicycle Route 40

USBR 40 is a currently-unestablished prioritized corridor that begins in New York City, heads west across New Jersey and Pennsylvania, moves west to Cleveland, passes through north-central Indiana and Illinois, and reaches the Mississippi River at Davenport. It leaves Iowa near Omaha, heads toward Lincoln, Nebraska, cuts northwest to run through Nebraska’s Sand Hills area, passes through Casper, Wyoming, heads north into Montana, passing through Missoula, and terminates in Seattle.

Current Status

The National Corridor Plan shows USBR 40 generally following the American Discover Trail alignment. However, there is an alternative southerly alignment for this USBR to follow a more southerly route across Iowa from Davenport to Council Bluffs, at which point it can cross the Missouri River into Omaha or follow the Lewis and Clark Trail north to Sioux City. This newly-proposed alignment will improve intercity connectivity between the Des Moines and Iowa City areas. This alternative southerly route splits near the Des Moines area to provide two options: to pass through the metro area or to bypass it.

Approximately 65 percent of the proposed rural on-road portions for the southerly alternative alignment for USBR 40 follow low-traffic roads that are considered “good” for bicycling based on the On-Road Bicycle Compatibility Rating analysis performed during this project.



US Bicycle Route 51

USBR 51 is an unestablished prioritized corridor recently added to the National Corridor Plan. This route begins in New Orleans, heads west toward Texas and runs north along the Texas/Louisiana and Oklahoma/Arkansas borders, it then passes through Springfield, Missouri, and heads north toward Des Moines. It then leaves Iowa near Spirit Lake and runs through western Minnesota until it merges with USBR 10 and USBR 20.

Current Status

The National Corridor Plan shows USBR 51 running due north to Des Moines, following a portion of the American Discovery Trail alignment toward Storm Lake, then north to Spirit Lake. As this is a newly-prioritized corridor, it has not been studied as much as USBR 36 or USBR 40.

Approximately 60 percent of the proposed rural on-road portions of USBR 51 follow low-traffic roads that are considered “good” for bicycling based on the On-Road Bicycle Compatibility Rating analysis performed during this project.

Great American Rail-Trail

The Great American Rail-Trail is a combination of completed trails, trails under construction, planned trails, and existing gaps, all primarily on former rail lines and canal towpaths spanning from Washington, D.C. to Washington state. With gentle gradients, it is usable by those with wide-ranging abilities. As a proposal recently introduced to the state of Iowa by the Rails-To-Trails Conservancy (RTC), the concept has not been studied as much as the other national trails and US Bike Routes discussed previously in this section.

Current Status

The proposed development plan shows the Great American Rail-Trail running east-west across central Iowa, primarily between Interstate 80 and US Highway 20, with portions of the possible routes generally following the American Discovery Trail alignment. As proposed, the Iowa DOT supports this alignment as it would link with the other two national trails that pass through Iowa, the MRT and LCT.



6. COMPLETE STREETS POLICY



The role of the Complete Streets Policy

The primary recommendation of this plan is for a statewide Complete Streets policy that applies to all Iowa DOT projects, including new construction, reconstruction, and 3R projects (resurfacing, restoration, or rehabilitation). From an infrastructure perspective, this is the most important recommendation of this plan. The Complete Streets Policy was developed based on the National Complete Streets Coalition's guidelines for state legislation. However, this policy is written as an Iowa DOT policy (rather than state legislation).

The policy is purposefully lacking in specifics (e.g., the criteria used to determine what *type* of accommodation must be provided) in order to maintain flexibility and avoid incompatibilities. Guidance for selecting appropriate facility types is provided in Chapter 5.

The specifics of Complete Streets design and policy implementation (which are recommended by this plan) should reside in modifications to the Iowa DOT's Design Manual and Bridge Design Manual. Periodic reports (see section 3.5 of the policy) should reflect whether the Iowa DOT and the state as a whole are adequately following this policy.

Although it is non-binding to other transportation agencies (MPOs, RPAs, counties, and municipalities), these agencies are encouraged to adopt similar policies, as some have already.

6.1 Complete Streets Policy language

Section 1 – Complete Streets

- 1.1 Motor vehicle, public transportation, bicycle, and pedestrian modes are each integral to the transportation system, and the Iowa Department of Transportation (DOT) shall view all transportation improvements as opportunities to improve safety, access, and mobility for all transportation users.
- 1.2 Accommodations for all users shall be considered in the planning, design, construction, and reconstruction of any primary highway, and should be considered for any secondary or local transportation project receiving federal or state funding. New accommodations shall be considered in Iowa DOT 3R projects (Resurfacing, Restoration, or Rehabilitation) whereby bicycling, pedestrian, and transit provisions can be added within the scope of the project. This shall include the reduction of barriers by including accommodations across, as well as along, transportation facilities. The Iowa DOT shall create a safe, comprehensive, integrated, and connected network to accommodate all users in a manner that is suitable and sensitive to the rural, suburban, or urban context.
- 1.3 The Iowa DOT shall (and any regional or local entity using state or federal funds to plan, design, or construct a transportation facility should) consult the latest versions of the following design guidelines and standards, which clarify and expand upon the Iowa DOT's design manuals and specifications:
 - a. *A Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials);
 - b. *Guide for the Development of Bicycle Facilities* (American Association of State Highway and Transportation Officials);
 - c. *Guide for the Planning, Design, and Operation of Pedestrian Facilities* (American Association of State Highway and Transportation Officials); and
 - d. *Public Rights-of-Way Accessibility Guidelines* (United States Access Board).

Finally, the Iowa DOT should utilize the latest version of the following guidelines, which apply to unique situations and where accommodation treatments are needed beyond typical applications:

- e. *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach: An ITE Recommended Practice* (Institute of Transportation Engineers); and
 - f. *Urban Bikeway Design Guide* (National Association of City Transportation Officials).
- 1.4 The Iowa DOT shall support the use of federal and state funds by Metropolitan Planning Organizations, Regional Planning Affiliations, counties, and cities for projects that follow a Complete Streets process by encouraging the examination of project prioritization and selection processes. The Iowa DOT should also examine applicable federal and state funding programs to ensure that projects that follow a Complete Streets process are fairly considered.
- 1.5 The Iowa DOT shall encourage regional and local entities to follow a Complete Streets policy for all transportation projects by encouraging possible modifications to SUDAS to reflect the Complete Streets process. The Iowa DOT may also provide assistance to and coordinate with regional and local entities in developing and implementing complementary Complete Streets policies. In the development of projects within city boundaries, the Iowa DOT shall offer assistance, as appropriate, in multimodal transportation planning and design.
- 1.6 The Iowa DOT shall modify its procedures, documents, training systems, and performance measures to ensure that the needs of all users of the primary highway system are included in all phases of all projects not excepted from the provisions of this policy by Section 2. The Iowa DOT shall create an implementation plan, including a schedule and stakeholder outreach plan, in consultation with interested stakeholders.
- 1.7 For bicycle and pedestrian accommodations within Primary Highway right-of-way, the Iowa DOT shall require the local sponsoring entity to complete form 632007, Application for Use of Highway Right of Way for Multipurpose Trail Operation. The permit

shall require the local entity to maintain the facility as appropriate for bicycle and pedestrian accommodations, including but not limited to maintenance and repair of the surface, maintenance of vertical and lateral clearances, snow removal, and debris removal. The permit shall require the local entity to be responsible for the facility meeting applicable municipal, county, state, and federal requirements, and addressing any necessary future modifications after initial construction. If applicable, the cost of constructing accommodations, when not an integral part of an Iowa DOT project or when found to be excessively disproportionate as determined by Sections 2.3 and 2.4, shall not be an Iowa DOT cost.





Section 2 – Exceptions

- 2.1 It is a goal of the Iowa DOT to improve bicycle and pedestrian safety, access, and mobility as part of all primary highway projects. However, there may be situations in which it is desirable to seek an exception in order to reduce the project cost impact of providing bicycle and pedestrian accommodations. Other than projects excepted from the provisions of this policy by Sections 2.2 and 2.3, all projects that are granted exceptions should still consider incremental bicycle and pedestrian improvement.
- 2.2 The provision of facilities pursuant to Section 1 shall not be required if:
- Bicycle or pedestrian use is prohibited on the transportation facility;
 - The transportation facility has a posted minimum speed limit;
 - The provision of the accommodations would be unsafe;
 - ROW acquisition would be necessary for the purpose of providing the accommodations;
 - The project scope is limited to maintenance activity; or
 - The provision of the accommodations is limited by the Code of Iowa or Iowa DOT Administrative Rules.
- 2.3 For roadway projects within incorporated areas, the provision of facilities pursuant to section 1 shall not be required if the Director of the Iowa Department of Transportation (or appointed designee) determines, with respect to a primary highway, that:
- The additional cost of new bicycle and pedestrian accommodations would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project. In cases where the additional cost is

considered excessively disproportionate, the project should still consider accommodations for bicycles and pedestrians, but the scope of accommodations may be reduced to the point that the additional cost does not exceed twenty percent of the total project budget; or

- There is a demonstrated absence of future need as determined by factors including current and future land use, current and projected user volumes, population density, and crash data. For design and construction, the time horizon considered for future need shall be defined as one-half of the operational lifespan of the transportation facility for pedestrian accommodations and the entire operational lifespan for bicycle accommodations. For example, if a road in the metro area periphery is being reconstructed with a 20-year lifespan, future development plans should be consulted and if the area will be developed within 10 years, pedestrian and bicycle accommodations should be provided. If it will be developed between 10 and 20 years, only bicycle accommodations should be provided. For planning and right-of-way acquisition, the time horizon considered for future need shall be defined as twice the operational lifespan of the transportation facility.

2.4 For rural projects, the provision of facilities pursuant to section 1 shall not be required if the Director of the Iowa Department of Transportation (or appointed designee) determines, with respect to a primary highway, that the additional cost of new bicycle and pedestrian accommodations would be excessively disproportionate to the need or probable use as determined by section (a) and (b) below.

- Excessively disproportionate is defined as exceeding a certain percentage of the cost of the larger transportation project. The cost exception threshold varies and is determined based on the current Bicycle Compatibility Rating (identified in the Bicycle and Pedestrian Long-Range Plan and maintained by the Office of Systems Planning) and the number of Need Tests that are

passed. The matrix below specifies the cost exception threshold to be used for rural projects.

		Need Tests Passed			
		3 or more	2 out of 5	1 out of 5	0 out of 5
Current Condition Bicycle Compatibility Rating	Poor	20%	15%	10%	0%
	Moderate	15%	10%	5%	0%
	Good	10%	5%	3%	0%

The following need tests may be electively performed in order to attempt to achieve a lower cost exception threshold for a project. If these tests are not performed, the cost exception threshold defaults to twenty percent.

1. A bikeway along the project is included in a bicycle or pedestrian plan.
2. The project creates a connection between two or more existing, programmed, or planned bikeways or trails.
3. The project is near a city (within 1 mile of corporate limits for cities less than 5,000 population, within 2 miles of corporate limits for cities with 5,000 to 15,000 population, and within 3 miles of corporate limits for cities over 15,000 population).
4. There are employment centers, parks, schools, residential areas, or other destinations within 0.5 miles of the project.
5. The project is part of an official or recognized bike route used regularly by a group of bicyclists, or there is probability that 25 or more bicyclists per day can be expected if adequate accommodations were provided (based on the American Community Survey statewide mode share for bicycling and the average daily traffic for the project).

- b. In cases where the additional cost is considered excessively disproportionate, the project should still consider accommodations for bicycles and pedestrians, but the scope of accommodations may be reduced to the point that the additional cost does not exceed the cost exception threshold. Reduced scope accommodations must still meet current standards unless a design exception is approved.

- 2.5 The Iowa DOT shall consult local and regional plans, local officials, and the general public, as appropriate, in both the provision of facilities and assessing exceptions.
- 2.6 Exceptions to this policy shall be documented in writing with supporting data that indicates the reason for the exception and shall be shared with the Advisory Committee as established in section 3.

Section 3 – Complete Streets Advisory Committee

- 3.1 There shall be established a Complete Streets Advisory Committee, staffed by the Iowa DOT, for the following purposes:
 - a. Providing education and advice to the Iowa DOT, local engineers and planners, consulting engineers, interest groups, and the general public;
 - b. Making recommendations to the Director of the Iowa DOT on policies and procedures, assisting in updating design guidance, providing educational opportunities to employees, and establishing new measures to track success in multimodal planning and design; and
 - c. Preparing periodic reports as outlined in section 3.5.



3.2 The Offices of Bridges and Structures, Design, Local Systems, Location and Environment, Systems Planning, Traffic and Safety, as well as Districts shall designate one or more staff members to serve on the Complete Streets Advisory Committee.

3.3 Non-Iowa DOT members of the Complete Streets Advisory Committee shall be appointed by the Director of the Iowa DOT (or appointed designee) and shall include members representing each of the following:

- a. The Iowa Department of Public Health;
- b. Practicing licensed engineers with expertise in multimodal transportation;
- c. Knowledgeable, experienced transportation planners with expertise in complete streets (Iowa chapter of the American Planning Association, Association of Pedestrian and Bicycle Professionals, etc.);
- d. The Iowa County Engineers Association;
- e. The American Public Works Association – Iowa Chapter;
- f. A Metropolitan Planning Organization (MPO);
- g. A Regional Planning Affiliation (RPA);
- h. American Association of Retired Persons;
- i. Organizations interested in the promotion of bicycling;
- j. Organizations interested in the promotion of walking;
- k. Organizations representing persons with disabilities;
- l. Automobile and/or trucking transport organizations; and
- m. Other interested parties as determined by the Iowa DOT.

3.4 *[Set terms for Advisory Board, such as term limits, a meeting schedule, and the appointment of the chairperson.]*

3.5 Periodic public reports may include the following information:

- a. A summary of specific actions taken by the Iowa DOT in the preceding year to improve the safety, access, and mobility of roadways for all users as defined in section 1.2;
- b. Any identified changes to the Complete Streets policy to facilitate implementation;
- c. Modifications made to or recommended for protocols, practices, guidance, standards, or other requirements to facilitate Complete Streets implementation;
- d. The status of the development of multimodal performance measures;
- e. Information collected from agencies on the percentage of trips made by foot, bicycle, and public transportation, together with the target level of the use of these modes;
- f. Crash statistics by mode, age, road type, location, and other relevant factors; and
- g. Other, related information as requested.

Section 4 – Effective date

4.1 This policy shall take effect on [date], provided that section 1 shall apply to any transportation project for which a final concept has been completed on or before [January 1 after a full calendar year].

4.2 The Iowa DOT shall review the fiscal impact of this policy upon the completion of one full programming and project letting cycle following the effective date identified in section 4.1, and biennially thereafter.

6.2 Additional guidance

Intent to improve conditions for biking

The intent of the Complete Streets Policy is to improve conditions for bicycling and walking in every project, even if the project has a lower cost exception threshold. On many projects this means improving the Bicycle Compatibility Rating from “poor” or “moderate” to “moderate” or “good.” On roads that already have a Bicycle Compatibility Rating of “good” prior to construction and with suitable pedestrian accommodations, the level of quality for bicycle and pedestrian accommodations should be maintained or improved.

For example, a two-lane roadway with 6-foot wide paved shoulders might be rated “good” for bicycling. But if the roadway is widened to four-lane and only 4-foot wide paved shoulders are provided due to right-of-way constraints, the rating may drop to “poor” or “moderate.” Such an outcome should be avoided if possible.

In other words, the intent is that post-construction conditions be at least as good as they were before the project began and that roadway projects do not result in a reduction of quality or comfort for bicyclists



or pedestrians. To achieve this objective, the selection of the bicycle facility type must be made in consideration of traffic volumes and speeds. See Chapter 4 for facility selection guidance.

Section 1.7 (maintenance agreements)

This section of the Complete Streets Policy requires that local entities to agree to maintain bicycle and pedestrian accommodations within Primary Highway right-of-way. This requirement is intended to apply to multi-use trails and sidewalks built alongside roadways. It is not intended to apply to bikeways constructed as part of the roadway, such as paved shoulder or bike lanes. On-road bikeways on Primary Highways should be designed, funded, constructed, and maintained as part of the roadway by Iowa DOT. Some exceptions to this practice may occur, however, if local entities desire a higher level of maintenance than can reasonably be provided by Iowa DOT. An example is the portion of Iowa 1 near Solon where local entities desired a very high level of shoulder sweeping and agreed to take on this maintenance activity.

Section 2.4 (rural project cost exception thresholds)

The policy’s matrix (recreated in Figure 6.1) provides a variable cost exception threshold based on existing conditions and the current and future need for accommodations. This matrix only applies to rural projects. By nature, projects within cities will usually be in areas with moderate to high levels of bicycle and pedestrian latent demand. Furthermore, since pedestrian activity in areas outside of cities is far less likely than is bicycle activity, this matrix focuses on conditions related to bicyclist demand.

For roadways with good or moderate current conditions for bicycling, it is important that conditions be maintained or improved when a project is designed and constructed, which is the reason why the matrix includes cost exception thresholds in the bottom row. Likewise, roadways on which there is a demonstrated absence of future need should not be required to allocate as much of the project



budget toward accommodations. However, it is important that some consideration be given on every project (even if all five absence of need tests are passed), such as providing regulatory, warning, or wayfinding signage.¹ Since wider pavement generally equates to better conditions for bicycling, it is also desirable to widen the pavement (total width of roadway and paved shoulders) as much as possible within the cost exception threshold, even if it is not possible to provide 4 to 6 feet of effective paved shoulder width.

Figure 6.1: Annotated Complete Streets Policy cost exception threshold matrix

		Need Tests Passed (see below)			
		3 or more	2 out of 5	1 out of 5	0 out of 5
Current Condition Bicycle Compatibility Rating	Poor	20%*	15%	10%	0%
	Moderate	15%	10%	5%	0%
	Good	10%	5%	3%	0%

* The percent of a project's budget may exceed 20% if high bicycle and/or pedestrian demand exists.

Minimum Target	Poor, but with some minimum improvement
Bicycle Compatibility Rating After Construction	Moderate
	Good

While it is ideal to improve conditions to a “good” Bicycle Compatibility Rating, a lower level of accommodation can be accepted if few of the absence of need tests are passed. For example, if a roadway is currently rated “poor” for bicycling and only one out of the five absence of need tests are passed, then only up to 10 percent of the project cost would need to be spent on accommodations to ideally improve the rating to “moderate” (although a rating of “good” would still be desired if achievable for 10 percent of the project budget).

Other than projects that are entirely exempt from the Complete Street Policy, the only situation in which no portion of the budget should be allocated to accommodations is if none of the need tests are passed

Need tests

Bicycle and pedestrian accommodations should be included in a project by default. In other words, providing accommodations should not require justification. Rather, in order to exclude accommodations in accordance with the exceptions clause of the Complete Streets Policy, the absence of future need should be demonstrated during the project scoping process.

The above matrix necessitates some quantifiable “tests” to determine whether the absence of need can be demonstrated. Conducting these tests is optional and should only be undertaken if the design engineer or Project Management Team believes a certain project will have an absence of need. These tests are stated in the above Complete Streets Policy (section 2.4). Guidance on the proper administration of these tests is provided in [\[Chapter/Appendix Number\] of the \[Technical Guide \(working title\)\]](#).

1 The Facility Selection Matrix and Bicycle Facilities and Treatments sections of Chapter 5 give guidance in this area; Design Manual section 12B-01 defines bicycle route, shared lane, and shared lane marking.

6.3 System-wide cost impact analysis

The purpose of the system-wide cost impact analysis is to approximate the fiscal impact of the Complete Streets Policy. As the policy only applies to Iowa DOT projects, this cost estimate only relates to the state highway system. The cost impact of the policy has been analyzed for two programs:

- Resurfacing, Restoration, or Rehabilitation (3R) Program
 - Considering rural accommodations in the form of paved shoulders
- 5-Year Highway Program (reconstruction/new construction of state highways)
 - Considering rural accommodations in the form of paved shoulders
 - Considering urban accommodations in the form of bike lanes, sidepaths, and sidewalks

3R Program cost impact analysis

Each year, the Iowa DOT allocates a portion of its budget toward 3R projects². In recent years, the statewide 3R budget has averaged approximately \$150 million for projects on approximately 325 miles of highway. The Complete Streets Policy requires that bicycle accommodations be considered and included as part of 3R projects if practical given the scope of each project. Pedestrian accommodations were not considered during this analysis because it is assumed that most 3R projects would be given exceptions from providing pedestrian accommodations due to low pedestrian demand and/or

² The 3R Program includes urban projects, as well as rural projects. Urban accommodations typically include bike lanes and sidewalks (rather than paved shoulders). However, data delineating the percentage of urban versus rural 3R projects was not available for this analysis. Since it is commonly understood that most 3R project miles are rural, it was assumed that all 3R project miles are rural for the purposes of this analysis. The cost of accommodating bicyclists and pedestrians will be greater for urban projects than for rural projects; considering the low cost per mile of 3R projects, many urban 3R projects will likely be excepted by the Complete Streets Policy.

the small size of the project budget. However, this omission does not remove the requirement in the Complete Streets Policy to provide pedestrian accommodations where warranted and when they can be provided for less than 20 percent of the project budget.

Need

Not all state highways require additional pavement to adequately accommodate bicyclists. The need for paved shoulders to accommodate bicyclists is dependent on the pavement width and traffic volume (ADT) of any given roadway.

- [7 percent] of Iowa's non-interstate state highway system is rated "good" for bicycle compatibility (see Chapter 2) and does not need additional paved shoulder width to effectively accommodate bicyclists.
- [8 percent] is rated "moderate" or "poor" but has traffic volumes of 5,000 ADT or greater and based on the Iowa DOT Design Manual standards should therefore have 6-foot wide paved shoulders added when roadwork is performed (providing basic accommodation for bicyclists).
- [68 percent] is rated "moderate" or "poor," has traffic volumes below 5,000 ADT, and could be improved by adding additional pavement width beyond the current Iowa DOT Design Manual preferred paved shoulder width values.
- [17 percent] is rated "poor" and has traffic volumes too high for paved shoulders to improve the rating for bicycle compatibility.

It can therefore be assumed that 68 percent of 3R project miles could fall under the purview of the Complete Streets Policy, by being required to consider additional paved shoulder width for bicycle accommodation. In most cases, the bicycle compatibility of a highway can be improved considerably by adding 1 to 2 additional feet of



paved shoulder beyond the Iowa DOT's standard paved shoulder widths.

Cost per mile

Based on cost data retrieved from projects completed during the past two to three years, it costs approximately \$25,000 per mile to add 1 additional foot of paved shoulder width as part of a 3R project. Historically, the majority of 3R projects in Iowa include shoulder work, which is understood as typically adding paved shoulders of widths commensurate with the traffic volume of the roadway.³ Therefore, the marginal cost for accommodating bicyclists on rural roads as part of 3R projects is typically \$50,000 per mile (the cost of 2 feet of HMA on each side of the road). This assumes adequate granular or earthen shoulder width exists or would otherwise be provided as part of each 3R project, which is largely in keeping with Iowa DOT practice.

Total cost impact

The total cost impact of the Complete Streets Policy was estimated by examining the FY2017

³ The Iowa DOT Design Manual states preferred paved shoulder widths. For rural two-lane highways, the preferred widths are generally 2 feet for roads with fewer than 3,000 ADT (unless part of the National Highway System, in which case the preferred width is 4 feet), 4 feet for roads with between 3,000 and 5,000 ADT, and 6 feet for roads with more than 5,000 ADT. Furthermore, the preferred paved shoulder width is 10 feet for roads that are approaching cities and metro areas and for portions of any road that have curves with superelevation rates of 7 percent or higher.

Broad benefits of paved shoulders

While this plan focuses on the need for paved shoulders as a way to provide accommodations for bicyclists (and occasionally pedestrians) in rural areas, it is important to recognize that paved shoulders provide a wide range of benefits for all road users. The original and primary purpose of paving shoulders is to improve roadway safety, namely by reducing motor vehicle crashes. According to the FHWA, shoulders have numerous benefits beyond improving bicycle accommodation, including:

- Providing space for emergency storage of disabled vehicles (to allow moving disabled vehicles from the travel lane);
- Significantly reducing costs for maintaining shoulders;
- Providing space for enforcement activities (such as issuing traffic citations);
- Providing space for maintenance activities (such as to allow maintenance work to occur without closing the travel lane and to provide space for snow storage in the winter);
- Providing an area for drivers to maneuver to avoid crashes (such as swerving to avoid rear-end crashes or debris in the travel lane); and
- Increasing safety by providing a stable, clear recovery area for drivers who have left the travel lane.

Furthermore, paved shoulders have been shown to reduce the need for repairs due to roadway pavement edge deterioration. The width of the paved shoulder also has a significant effect on crash reduction. An additional two feet of paved shoulder width (6 feet versus 4 feet) can reduce crashes by 26 percent (based on an 11-foot wide travel lane)*.

Therefore, the cost impact of providing slightly wider paved shoulders to accommodate bicyclists should be viewed with the understanding that investing in additional paved shoulder width to accommodate bicyclists is also an investment in providing quantifiable safety and maintenance benefits.

* FHWA. *Safety Evaluation of Lane and Shoulder Width Combinations on Rural, Two-Lane, Undivided Roads.*

3R projects for each Iowa DOT District office, identifying the need for bicycle accommodations, and estimating the additional cost required for said accommodations. Of the 56 projects in the combined FY2017 3R budget, 45 projects would have no additional cost for bicycle accommodations—either because the project already includes adequate paved shoulders or because the project would be considered exempt from the policy because it involved spot improvements, was a seal coat project (which are very low cost per mile and therefore not conducive to widening shoulders), or was on a roadway that prohibit bicycles (expressways with minimum speed limits).

Of the remaining eligible projects, eight projects passed two or fewer need tests, with one passing none of the tests. For these projects, the cost exception threshold was lowered to 15, 10, or 0 percent. Most of the projects required only 1.5 additional feet of paved shoulder width (per side) to provide an adequate accommodation. A few projects required an additional 2.5 to 3.5 feet per side. The estimated total cost of providing accommodations on the eligible projects totalled approximately 3 percent of the FY2017 3R budget of \$98.6 million.

5-year Highway Program cost impact analysis

The 2015-2019 Highway Program (and its November 2014 amendment) was reviewed to identify projects that would be affected by the Complete Streets Policy and determine the cost impact of providing bicycle and pedestrian accommodations. Overall, the Highway Program had budgeted over \$2.7 billion for projects between 2015 and 2019. Of this figure, approximately \$1.1 billion was for non-interstate pavement modernization and non-interstate capacity/system enhancement. It is primarily this portion of the Highway Program that would be affected by the Complete Streets Policy.

The analysis of the 5-Year Highway Program included the following components.

Project selection

Paving projects (often including grading), pavement rehabilitation projects that are not part of the 3R Program, pavement widening projects, reconstruction projects, and new construction projects were extracted into a table, along with costs, traffic volumes (ADT), and project length. Interchange projects, interstate highway projects, and projects that solely include activities like right-of-way acquisition and erosion control were not included. Bridge replacement projects were also not included because current standards ensure shoulder widths that are adequate for bicyclists. The result was a list of 33 projects.

Assumptions

For purposes of this analysis, it was assumed that none of the rural projects currently have paved shoulders and that any paved shoulder work that will be performed on rural projects will entail providing a paved shoulder of the Iowa DOT Design Manual's stated preferred width based on traffic volume. In addition, it was assumed that existing right-of-way and right-of-way to be acquired would be adequate for accommodations (that is, no right-of-way costs would be incurred by providing bicycle and pedestrian accommodations).

Project classification

Projects were classified as urban⁴ or rural based on location. A preferred bicycle treatment (shared road, relocate rumble strip, or widen shoulder by a certain number of feet) was identified for rural projects based on traffic volume. For urban projects, a review of aerial imagery and Google Street View imagery was performed to identify current conditions and constraints in a very cursory manner. A preferred bicycle and pedestrian treatment was identified for urban projects based on existing pavement width, traffic volume, and site constraints. For pedestrians, it is assumed that each project would

⁴ Urban projects include those within any incorporated city limit and typically are lower-speed roadways with curbs.



need a new 5-foot wide sidewalk on one side of the street for its entire length. While it is standard to provide sidewalks on both sides of a city street, the cost of providing a sidewalk on only one side was considered an average or typical situation since some projects already have sidewalks on both sides while others have stretches without any sidewalks.

Total cost impact

Costs for rural accommodations were estimated based on the unit cost determined during the 3R Program Cost Impact Analysis on the previous pages. Specifically, the cost of an additional 2 feet of HMA shoulder is \$50,000 per mile. Costs for urban accommodations vary based on existing pavement width and are based on national typical costs. For each project, the cost of context-sensitive accommodations as a percentage of the overall budgeted cost was calculated. This ranges from 0 percent to 125 percent (see next paragraph) with a median of 2 percent.

The sum of the cost of accommodations for each project equals 2.8 percent of the total budgets for these 33 projects.

Impact reduction effect of exceptions

Only two of the selected projects have accommodation costs that exceed the 20 percent maximum cost threshold allowed by the Complete Streets Policy (one minor pavement rehabilitation project at 125 percent and one pavement widening project at 100 percent)⁵. For these projects, a constrained bicycle and pedestrian treatment (such as shared lanes instead of bike lanes or shoulders) was sought; however, the budgets of these two projects are so small that no

⁵ Furthermore, 10 out of 33 projects exceed a 10 percent accommodation cost threshold and of these, three exceed a 15 percent threshold. Seven projects have no cost impact and 10 are between a 0.1 percent and 5 percent accommodation cost threshold.

accommodations can be provided at less than 20 percent of the budget. Therefore, the cost (and requirement) for accommodations was removed from the analysis. Removing these two projects lowered the cost of accommodations as a percentage of the combined project budgets from 2.8 percent to 2.2 percent.

System-wide cost estimate summary

The Complete Streets Policy allows for up to 20 percent of the project budget to be allocated toward bicycle and pedestrian accommodations. This may be incorrectly interpreted as meaning that 20 percent of the 3R Program and 5-Year Highway Program budgets are to be spent on bicycle and pedestrian accommodations. **However, this analysis demonstrates that the estimated cost impact of the Complete Streets Policy is much less than 20 percent—rather, it is 3.2 percent for the 3R Program and 2.2 percent for the Highway Program.**



7. FUNDING STRATEGY



Financing the vision

Funding is critical to the successful implementation of bicycle and pedestrian facilities along roadways as well as multi-use trails, including those that comprise the Statewide Trails Vision. Numerous funding sources are available, though the flexibility and availability of funds varies between programs. This chapter includes an overview of the funding programs available for bicycle and pedestrian accommodations, a brief review of the current funding practices in Iowa, a new strategy for funding, and recommendations to enact the new strategy.

7.1 Available funding programs

Federal programs

The Federal Transportation Bill signed into law in December 2015—known as Fixing America’s Surface Transportation (FAST) Act—retained many of the previous federal funding programs for which bicycle and pedestrian projects are eligible. The FAST Act contains five funding programs for which bicycle and pedestrian infrastructure projects are eligible:

- National Highway Performance Program (NHPP)
- Surface Transportation Block Grant Program (STBG)
- Highway Safety Improvement Program (HSIP)
- Congestion Mitigation and Air Quality (CMAQ)
- Surface Transportation Block Grant-Transportation Alternatives Set-Aside (STBG-TA),

Any of these five FAST Act program funds can be legitimately used for bicycle and pedestrian projects, even when such projects are constructed independently of roadway projects.

Surface Transportation Block Grant-Transportation Alternatives Set-Aside (STBG-TA)

The STBG-TA program replaces the Transportation Alternatives Program (TAP), which itself combined the Transportation Enhancements (TE), Safe Routes to School (SRTS), and Recreational Trails Program (RTP). Projects that were previously eligible under any of these programs, and carried forward as TAP, are now eligible under STBG-TA. However, STBG-TA is more competitive than the programs it replaces because it combines multiple funding categories that were previously separate and has a smaller overall funding allocation. Furthermore, up to half of STBG-TA funding can be diverted to projects outside of this program. Historically, three out of nine MPOs and 12 out of 18 RPAs transfer (or “flex”) some of their STBG-TA funds to their STBG fund for general street and road projects.

The most recent Federal Fiscal Year included \$8.8 million total for STBG-TA in Iowa. The Iowa DOT allocates the majority of these funds on a population basis to the MPOs and RPAs, but retains \$1 million to be allocated on a statewide basis (largely for programs rather than infrastructure). The distribution of funds to MPOs and RPAs for allocation is considered by many

to be preferable to a statewide competitive grant process because it guarantees each entity receives funding and allows flexibility in terms of how the funds are spent (including allowing STBG-TA Flex funds to be transferred to STBG pools). However, the available funding is spread so thinly that the available funds allocated to smaller RPAs require balances to be accumulated in order to fund worthwhile projects.

State programs

Iowa has a number of funding programs for which bicycle and pedestrian projects may be eligible. However, the guidelines for each funding program are not as detailed as those for the federal programs. For FY2018, Iowa's appropriated state funding totals approximately \$1.22 billion—more than three times the appropriated level of federal funding received by the state.

The single largest source of transportation funding in Iowa is the Road Use Tax Fund, which totals approximately \$1.5 billion¹. It is distributed by formula and either directly or indirectly contributes to practically every state-funded road project in Iowa. This fund is primarily fed by vehicle registration fees and fuel taxes. Other funding sources include the TIME-21 Fund (which is comprised of trailer, title, and registration fees and is appropriated by the General Assembly), the Rebuild Iowa's Infrastructure Fund (which is primarily comprised of wagering tax revenues), and the Statutory Allocations Fund (which is comprised of trailer, title, and driver license fees).

Approximately \$1.22 billion of these funds is allocated to the Iowa DOT's programs (see list below), while the remainder is divided between the Revitalize Iowa's Sound Economy (RISE) fund, the Transfer of Jurisdiction Fund, and Iowa's 99 counties. The funding is broken down as such:

- Iowa DOT Allocations (FY2018)
 - \$805.70 million – Highway Program
 - \$245.06 million – Highway Operations
 - \$103.61 million – General Services
 - \$41.01 million – Motor Vehicle License Plates and Operations
 - \$16.42 million – Transit Programs
 - \$4.88 million – Air Programs
 - \$1.00 million – State Recreational Trails Program
 - \$2.60 million – Railroad Programs
- Other Allocations (FY2018)
 - \$471.5 million – County Funds
 - \$295.8 million – City Funds
 - \$17.8 million – RISE Fund

Although other funding sources (such as the Highway Program) may be used to fund bicycle and pedestrian facilities as part of larger projects, the State Recreational Trails Program is the only currently active funding source in Iowa DOT's budget dedicated to bicycle and pedestrian infrastructure. The amount of funding available in this program varies from year to year, ranging from \$0 to \$6 million. This competitive program received 57 applications in 2014, 36 applications in 2016, and 31 applications in 2017. As with most competitive grant programs (in Iowa, as well as across the country), there is significantly more demand than available funding.

¹ Approximately half of the Road Use Tax Fund is distributed to counties and cities and half goes to Iowa DOT programs.



7.2 Funding strategy

Bicycle and pedestrian infrastructure is usually built and funded in one of two ways:

1. As stand-alone projects (most often multi-use trails), typically funded by dedicated funding programs such as the federal STBG-TA program, Federal Recreational Trails Program, or Iowa's State Recreational Trails Program.
2. As small parts of larger roadway projects (bicycle lanes, paved shoulders, sidewalks, and even sidepaths), funded by flexible sources such as the federal Surface Transportation Block Grant (STBG).

While the first approach might receive greater attention, the second is typically more efficient and has the potential to result in a far greater amount of infrastructure provided, due to economies of scale and the greater levels of funding available in flexible funding programs.

Current funding practices

In the past, Iowa DOT has not consistently constructed bicycle and pedestrian accommodations as part of roadway projects. There are two common exceptions where Iowa DOT has incorporated accommodations as part of larger projects—paved shoulders and ADA improvements. Paved shoulders are typically provided to increase motorist safety, yet are widely recognized as features that benefit bicyclists as well. The Iowa DOT has provided paved shoulders on many projects, either specifically to accommodate bicycling or (as is more often the case) primarily to improve motorist safety. However as previously mentioned, paved shoulders are often narrow and include rumble strips, which negate any benefit to bicyclists if their placement results in less than 4 feet of effective paved shoulder width (4 feet of clear width not including rumble strips, if present).

In accordance with U.S. Department of Justice (DOJ) and FHWA requirements to provide accessible accommodations for persons with disabilities, Iowa DOT includes costs for certain pedestrian infrastructure elements as part of roadway projects. Specifically, the reconstruction or resurfacing of a street or road triggers the FHWA requirement to provide accessible curb ramps where sidewalks are present. The cost for these accommodations is included in the overall project budget.

In summary, limited transportation funding is being utilized for bicycle and pedestrian infrastructure in Iowa, but changes—including the development of this plan—are occurring.

New strategy

Moving forward, new bikeways, multi-use trails, sidewalks, and other accommodations that expand the bicycle and pedestrian system in Iowa will be funded through a three-pronged strategy:

1. **Complete Streets** – Providing bicycle and pedestrian accommodations as small but important parts of larger street and road projects and funding these accommodations from the same source as the larger project is the most significant opportunity to improve Iowa’s bicycling and walking systems. Iowa DOT will follow this principle by implementing the Complete Streets policy (see Chapter 6) that applies to new construction, reconstruction, and 3R (resurfacing, restoration, or rehabilitation) projects on the state highway system. Cities, counties, and regional agencies are strongly encouraged to follow this principle by adopting similar Complete Streets policies. While it is anticipated that this approach will have a relatively minor impact on Iowa DOT’s total project costs, streets and highways will be made more accessible and safe for bicyclists and pedestrians, while also reducing crashes for motorists and decreasing maintenance costs.
2. **Rural Road Gap Elimination** – For crucial gaps in the state highway system that will not be eliminated as part of an upcoming reconstruction, 3R, or safety shoulder paving project, further implementation measures should occur. A strategy for their elimination is recommended through the development of a gap elimination analysis that prioritizes gaps based on traffic volume, pavement width, crash history, proximity to cities and metro areas, and other factors. The more effective efforts are to incorporate shoulder paving projects into reconstruction, 3R, and safety projects, the less reliant Iowa DOT will need to be in funding these gap closures independently. The use of Iowa Highway Program funds or consideration of Traffic Safety Improvement Program (TSIP) and Highway Safety Improvement Program (HSIP) funds are ways of closing these gaps through independent projects. Multiple gaps to be eliminated could be combined into single projects, where possible. Iowa DOT’s existing Under 5,000 Population ADA Compliance program can serve as a model for how a bicycle network gap elimination program could function.
3. **Standalone Projects** – These projects (such as multi-use trails not associated with roadways, retrofitting on-street bikeways separate from street reconstruction, etc.) shall continue to be funded as they are currently. This includes a variety of funding sources, such as city and county funds and private donations. State and federal funds for standalone projects will continue to primarily come from dedicated sources (e.g., STBG-TA, State Recreational Trails Program, etc.). To ensure that these funds generate acceptable returns on investment, steps will be taken to ensure that projects that do the most to improve access and connectivity for walking and biking are prioritized for funding. In addition, the amount of funding dedicated to walking and biking infrastructure projects will be increased over time.



7.3 Funding recommendations

Multiple actions are recommended to enact the new funding strategy and implement bicycle and pedestrian accommodations in a cost-effective, efficient manner. The recommendations are organized into three categories: Complete Streets (funding accommodations as part of larger roadway projects), project prioritization, and allocation of funding.

Complete Streets

Implement the Complete Streets Policy

It is of utmost importance that the Iowa DOT promptly proceed toward implementing the Complete Streets Policy and begin designing, funding, and constructing adequate and context-sensitive bicycle and pedestrian projects as small but important parts of larger street and road projects. Furthermore, the Iowa DOT strongly encourages each city, county, MPO, and RPA in Iowa to adopt similar Complete Streets policies. The Iowa DOT is available to provide guidance on the development, adoption, and implementation of such policies.

Use same-source funding to build accommodations as part of road projects

The Iowa DOT should begin funding all bicycle and pedestrian accommodations that are built as incidental parts of road projects from the same funding source as the rest of the road project. This should apply for all new projects and all projects entering the Concept Development phase at the time this plan is adopted. In addition, opportunities for bicycle and pedestrian improvements should be considered and (if accommodations are warranted and feasible) funded from the same source when the Iowa DOT grant program funds (including RISE, ICAAP, and TSIP) are used to construct or reconstruct streets and roads.

Leverage the Safety Shoulder Paving Program

The Strategic Highway Safety Plan includes a goal for paving a targeted amount of shoulders each year in Iowa as a measure to reduce run-off-road crashes. Funding for this safety improvement program comes from the state's Traffic Safety Improvement Program (TSIP) and Highway Safety Improvement Program (HSIP). Eliminating rural road gaps for bicyclists (defined as segments of road that receive a "poor" Bicycle Compatibility Rating) in conjunction with this safety program is a significant opportunity that can improve safety for bicyclists as well as motorists in a very cost-effective manner. This will typically entail an additional 1 to 2 feet of paved shoulder width, which will result in a minimal increase in project cost (if an adequate gravel base exists). Furthermore, rumble strip installation performed through this and other programs should allow at least 4 feet of effective clear paved width on shoulders used by bicyclists.



Project prioritization

Modify road project prioritization criteria to include level of improvement for bicycling and walking.

In Iowa, numerous projects are identified based on pavement condition, safety needs, traffic congestion, bridge condition, public requests, etc. The prioritization method often then involves the transportation agency attempting to fund as many of the most important projects from each category based on a constrained budget.

The Iowa DOT, MPOs, and RPAs should review their road project prioritization criteria to consider the project's potential benefits to bicycling and walking. This could include assigning higher priority to projects that provide a level of service increase for bicycling and/or walking, provide safety benefits, provide accommodations to improve connectivity between schools and neighborhoods, and eliminate gaps in the non-motorized transportation system. This is especially important on the regional level and should therefore be considered in the STBG prioritization method of each MPO and RPA. The prioritization of 3R projects should also be judged by whether they improve conditions for bicycling (using the On-Road Bicycle Compatibility Rating method for rural roads).

Develop clear and consistent criteria to prioritize funding for stand-alone bicycle and pedestrian projects.

For stand-alone projects (multi-use trails, sidewalks, and on-road bikeway retrofits not built as part of a larger roadway project), prioritization criteria should be developed and used in order to allocate funding to the most important projects. Prioritization criteria should include but not be limited to improving connectivity between schools and neighborhoods, eliminating gaps less than 1 mile in length, improving level of service for bicyclists, improving safety, being part of the statewide trails vision, and providing alternative parallel routes to high-traffic roads.

Once developed, these criteria can be used for statewide competitive grant programs (such as the State Recreational Trails Program). This method will apply to multi-use trail projects and any other stand-alone bicycle and pedestrian project (such as street retrofit projects solely for the purpose of accommodating bicyclists, end-of-trip facilities, bike share programs, education programs, Safe Routes to School plans and programs, etc.).



Allocation of funding

Increase the availability of funding for stand-alone bicycle and pedestrian projects.

In general, the overall level of funding for stand-alone projects should be increased to better meet the demand, which far exceeds the available funding from sources dedicated specifically for bicycle and pedestrian projects (such as STBG/TAP and SRTP). All federal funding programs (NHPP, STP, HSIP, CMAQ, and others) may be used for bicycle and pedestrian projects. The use of these flexible sources should be explored and they should be utilized where appropriate. In addition, the Iowa Clean Air Attainment Program (ICAAP), which includes federal Congestion Mitigation and Air Quality (CMAQ) funds, is available for bicycle and pedestrian projects (such as bike share stations and bike racks on busses).

Maintain or increase the funding level of the State Recreational Trails Program

The State Recreational Trails Program (SRTP) is the primary source used for stand-alone projects. This program in the past has provided \$3 million per year for recreational trails. For FY2014, this funding level was increased to \$6 million (however, \$1 million was allocated to the restoration of historic bridges). However, since MAP-21 eliminated dedicated Safe Routes to School funding, a decision that was carried into the FAST Act, these projects will now be funded by the SRTP. It is important that this funding program be maintained as it is currently the only dedicated funding program in Iowa whose funds may be used in any area of the state.

Natural Resources and Outdoor Recreation Trust Fund (unfunded program)

The Natural Resources and Outdoor Recreation Trust Fund was created when voters approved the Iowa's Water and Land Legacy amendment to the state constitution. The amendment included a provision for future sales tax revenue of three-eighths of a cent; this sales tax increase only takes effect once the General Assembly votes to increase the sales tax rate from its pre-2010 rate, which has not yet occurred. When funded, this trust fund will generate an estimated \$150 million per year for conservation efforts, 10% of which (approximately \$15 million per year) will be allocated to trail construction and maintenance.

This is a significant level of funding, especially when compared to the historic funding levels for bicycle and pedestrian dedicated funding sources in Iowa.

Increase funding allocated to bicycle and pedestrian programs

In addition to the functions of Iowa DOT's existing bicycle and pedestrian program (discussed in Chapter 3), there are a number of new programs (internal and external to Iowa DOT) and actions recommended by this plan. Each of the recommended programs or actions will need to be funded; therefore, the overall amount of program funding in Iowa will need to be increased.

Opportunities to increase current funding sources should be sought, but it is also important to explore new sources of funding, especially for programs external to Iowa DOT and those programs for which Iowa DOT is not the sole responsible organization. A funding roundtable—in which stakeholders from various state, regional, and local agencies; advocacy organizations; and non-profits meet to develop program funding strategies—is recommended for the purpose of exploring new funding sources.



8. IMPLEMENTATION



Achieving the vision

The ultimate goal of implementing the Bicycle and Pedestrian Long-Range Plan is to make walking and bicycling viable transportation options for all Iowans. Implementation of the plan will occur over many years and will require changes to funding practices and modifications to the planning and design processes of the Iowa DOT as well as city, county, and regional agencies. It also requires continued education for the general public and government agencies alike in order to recognize that biking and walking are valid modes of transportation and are central to daily life.

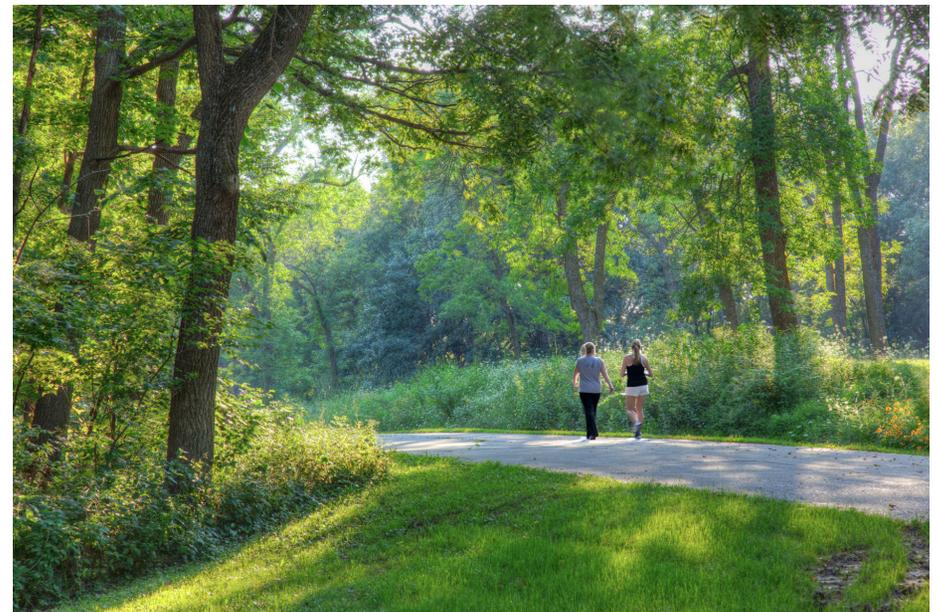
This chapter is structured into two sections:

- 1. Implementation actions** – this section sets forth a comprehensive implementation approach that includes engineering, education, enforcement, encouragement, and evaluation actions to be initiated and completed over several years.
- 2. Measuring the effectiveness of actions and investments** – this section includes a series of performance measures (used to track the outcomes of broad infrastructure and programmatic actions) and input measures (used to track the level of investment and input on the part of Iowa DOT and other implementing bodies).

8.1 Implementation actions

Implementation actions for the Bicycle and Pedestrian Long-Range Plan are divided into three time horizons and listed in the tables on the following pages.

- **Short-term actions** – The first steps to be taken toward implementing this Plan. These actions should be initiated as soon as possible, with the goal of having actions completed (or well-established in the case of on-going programs) within two to three years.
- **Mid-term actions** – These actions are intended to be initiated within the next one to three years and completed (or well-established in the case of on-going programs) within five to ten years.
- **Long-term actions** – Example long-term implementation actions to consider future needs during beyond the life of this Plan.



8.2 Short-term actions

The first steps to be taken toward implementing this plan are those that affect the greatest change or those that require minimal investment. As such, most of the short-term implementation actions are policy and program-oriented. These actions should be initiated as soon as possible, with the goal of having actions completed (or well-established in the case of on-going programs) within two to three years.

Table 8.1: Short-term implementation actions

Action	Responsible	Timeline	Steps	Other considerations	Associated recommendations ¹
Implement the Complete Streets Policy.	Iowa DOT	By Spring 2019	<ul style="list-style-type: none"> Complete policy Train staff Modify project development processes 	Requires modifying Iowa DOT's project scoping process as outlined in the Design Manual.	1.1, 1.3, 1.4 3.1 – 3.3 See Chapters 6 and 7
Modify Iowa DOT's project scoping process in accordance with the Proposed Complete Streets Policy.	Iowa DOT Highway Division	By Spring 2019	<ul style="list-style-type: none"> Develop a one-stop comprehensive project scoping process guide Distribute to staff 		1.1, 1.3, 1.4
Modify the Design Manual to uniformly comply with the latest version of national standards and best practices (AASHTO Guide for the Development of Bicycle Facilities, AASHTO Pedestrian Guide, and NACTO Urban Street Design Guide).	Iowa DOT Office of Design	By Spring 2019	<ul style="list-style-type: none"> Develop an on-road bikeways section Specify 4' minimum effective paved shoulder width for bicyclists Add 5' sidewalks and bike lanes to urban typical sections 		1.3, 1.4 2.1 3.1 – 3.3
Modify the Bridge Design Manual to uniformly comply with the latest version of national standards and best practices (AASHTO Guide for the Development of Bicycle Facilities and NACTO Urban Street Design Guide).	Iowa DOT Office of Bridges and Structures Iowa DOT Office of Design	By Summer 2019	<ul style="list-style-type: none"> Conform bridge designer and county engineer judgment statements with Proposed Complete Streets Policy Add requirement to consider bicycle accommodations when determining bridge width 		1.3, 1.4 2.1 3.1 – 3.3

¹ See Chapter 3.



Table 8.1: Short-term implementation actions (continued)

Action	Responsible	Timeline	Steps	Other considerations	Associated recommendations ²
Encourage modifications to SUDAS ² to uniformly comply with the latest version of national standards and best practices (AASHTO Guide for the Development of Bicycle Facilities, NACTO Urban Bikeway Design Guide, NACTO Urban Street Design Guide).	Iowa SUDAS Corporation with support from Iowa DOT and Iowa County Engineers Association	By Summer 2019	<ul style="list-style-type: none"> Copy revised sections from the Bridge Design Manual 		1.3, 1.4 2.3 3.1 – 3.3
Develop Complete Streets training for Iowa DOT staff as well as interested local and regional staff.	Iowa DOT Office of Systems Planning Iowa DOT Office of Design	Spring 2019	<ul style="list-style-type: none"> Develop training program Schedule workshops at each District office 		1.1, 1.3, 1.4 2.1, 2.3 3.1 – 3.3
Hold accessibility workshops designed to train local officials, agency staff, and professional engineers to effectively meet accessibility requirements on state, county, and local road projects.	Iowa DOT Central Office Iowa Bicycle Coalition	By Summer 2019	<ul style="list-style-type: none"> Identify case study examples of challenges in meeting accessibility requirements during the design process Work through potential solutions and strategies with participants 	This could be coordinated with the annual Bicycle Summit	1.2; 1.3, 1.4 2.1, 2.3 3.1 – 3.3
Designate one ³ licensed engineer in the Iowa DOT Central Office to be dedicated to providing technical assistance on bicycle and pedestrian facility design.	Iowa DOT Central Office	By Summer 2019	<ul style="list-style-type: none"> Determine responsibilities Determine appropriate division/office for employee 	This role could be addressed by modifying the responsibilities of one or more existing employees.	1.4 2.1, 2.3

² Statewide Urban Design and Specifications, the transportation infrastructure design manual used by municipalities and counties in Iowa.

³ One full-time equivalent (FTE).

Table 8.1: Short-term implementation actions (continued)

Action	Responsible	Timeline	Steps	Other considerations	Associated recommendations ⁴
Develop methodology for bicycle and pedestrian safety audits of high crash corridors and intersections to identify adequate countermeasures.	Iowa DOT FHWA Local jurisdictions	2019-2020	<ul style="list-style-type: none"> Identify high bicycle and pedestrian crash corridors and intersections Determine participants Conduct audits 	FHWA or Iowa DOT could lead, depending on format.	2.1 3.1 – 3.3 4.1, 4.4
Incorporate Bicycle and Pedestrian Safety into the Strategic Highway Safety Plan (SHSP) and consider the interrelated impacts of projects funded by the HSIP program.	Iowa DOT Office of Traffic & Safety	By end of 2018	<ul style="list-style-type: none"> Identify the most common crash types /contributing factors Include strategies for reducing and ultimately eliminating bicycle and pedestrian crashes 		3.1 4.1, 4.2, 4.4
Develop and distribute law enforcement curriculum for bicycle safety-related training.	Iowa DOT Iowa DPS Governor's Traffic Safety Bureau Iowa Bicycle Coalition	By end of 2019			4.2, 4.3 5.1 – 5.3
Develop and implement a Bicycle Awareness and Traffic Safety public relations campaign via web, billboards, dynamic message signs, bus advertisements, and other media.	Iowa DOT Office of Systems Planning Iowa DOT Office of Strategic Communications Iowa Bicycle Coalition	By Summer 2019	<ul style="list-style-type: none"> Identify primary messages Develop graphics and copy Procure billboard space, bus advertisement space, web hosting, etc. 	An example is the Iowa Bicycle Coalition's "Sharing the Road with Bicyclists" radio campaign. ⁴	4.3, 4.4 5.1 – 5.3
Provide safety and skills training courses annually for adults and youth in each Iowa DOT District.	Iowa Bicycle Coalition Iowa DOT	By Summer 2019	<ul style="list-style-type: none"> Develop/acquire curriculum Recruit and train instructors Identify local partners for hosting, advertising, etc. 	Instructors should be League Cycling Instructors (LCI), which costs \$300 for certification.	5.1 – 5.3

⁴ <http://traffic.iowabicyclecoalition.org/radio/>



Table 8.1: Short-term implementation actions (continued)

Action	Responsible	Timeline	Steps	Other considerations	Associated recommendations ¹
Identify the primary urban and rural crash types occurring in Iowa and develop strategies for reducing crashes.	Governor's Traffic Safety Bureau (DPS) Iowa DOT	By end of 2018	<ul style="list-style-type: none"> Review crash data for previous 5-10 years Review crash reports to identify crash types 	Coordinate with the development of the Strategic Highway Safety Plan and FHWA-led safety audits.	1.3, 1.4 3.1 – 3.3 4.1 – 4.4
Review road project prioritization criteria to consider the project's potential benefits to bicycling and walking.	Iowa DOT MPOs & RPAs	By end of 2019	<ul style="list-style-type: none"> Consider criteria that prioritizes projects that follow the Complete Streets process. 		1.3, 1.4 2.4 3.1 – 3.3 See Chapter 7
Develop clear and consistent criteria to prioritize funding for stand-alone bicycle and pedestrian projects, consistent with the Complete Streets Policy.	Iowa DOT	By end of 2019	<ul style="list-style-type: none"> Develop criteria that prioritize projects that have the greatest impact on improving access and connectivity. 	Create a consistent methodology to apply to State RTP, TAP, and other dedicated funding programs.	2.1, 2.2 3.1 – 3.3 See Chapter 7
Apply for US Bicycle Route Designation for USBR 36, 40, 44, 51, and 55 (applications submitted to AASHTO).	Iowa DOT Affected Jurisdictions Advocates	TBD	<ul style="list-style-type: none"> Review routes in detail with stakeholders. Develop or revise maps and turn-by-turn details. Coordinate with bordering states. Secure resolutions of support from cities, counties, and regional agencies. Prepare application. 	Concurrently, implementation plans should be developed or updated to deploy route signage and prioritize infrastructure improvements (e.g., paved shoulders) where necessitated by traffic volumes.	2.2 3.3

8.3 Mid-term actions

Implementation actions in the mid-term category are important, but are more challenging to initiate or are dependent on the groundwork laid by the short-term actions. These actions are intended to be initiated within the next one to three years and completed (or well-established in the case of on-going programs) within five to ten years.

Table 8.2: Mid-term implementation actions

Action	Responsible	Associated recommendations ⁵
Encourage and work with cities, counties, and MPOs/RPAs across the state to adopt Complete Streets policies using the Iowa DOT's Complete Streets Policy as a model.	Iowa DOT Cities Counties MPOs/RPAs Advocates	1.1 3.q1 – 3.3 See Chapter 6
Support MPOs and RPAs in the development and adoption of bicycle and pedestrian plans that are coordinated with the statewide Long-Range Plan.	Iowa DOT MPOs/RPAs Advocates	2.2 – 2.4 3.1 – 3.5
Identify barriers and gaps in the state highway system for bicycling and walking that will not be corrected by planned reconstruction/3R activities within the next five years and develop alternatives for providing adequate interim connections, especially in cities and metro areas.	Iowa DOT	1.2 3.1 – 3.5
Explore options for increasing the amount of dedicated funding allocated to bicycle and pedestrian projects and programs.	Iowa DOT Advocates	See Chapter 7
Develop and implement statewide maintenance and work zone guidelines to address bicyclist and pedestrian needs. These guidelines should be adaptable to city, county, and Iowa DOT maintenance and work zone responsibilities.	Iowa DOT Counties	1.5 2.2 – 2.4
Work with transit agencies across the state to provide bike racks on all compatible buses. This may include identifying a funding source for this relatively inexpensive action and/or developing product and operational guidelines to assist agencies with implementation.	Iowa DOT MPOs/RPAs	2.3 3.4

⁵ See Chapter 3.



Table 8.2: Mid-term implementation actions (continued)

Action	Responsible	Associated recommendations ⁵
Develop encouragement programs and events to get more people walking and bicycling. This includes designing safety and how-to materials, training courses, maps, and other education efforts that espouse the health, safety, environmental, and economic benefits of biking and walking.	Advocates Iowa DOT	5.1 – 5.4
Recommend a safe passing law that requires drivers to change lanes when passing another vehicle (including cars, bicycles, agricultural equipment, construction equipment, etc.).	Iowa DOT Iowa DPS Advocates	4.3
Recommend a vulnerable road user law that increases penalties beyond the current penalties for a motorist that injures or kills a bicyclist, pedestrian, construction worker, law enforcement officer, or any other vulnerable roadway user.	Iowa DOT Iowa DPS Advocates	4.3
Continually revisit drivers' education curriculum to include the rights of bicyclists and pedestrians, as well as current and future vulnerable road user laws (subsequent to adoption of new laws).	Iowa DOT Iowa Bicycle Coalition	5.1, 5.3 4.3
Annually recalculate the On-Road Bicycle Compatibility Rating for all rural and metro area periphery paved roads in order to identify segments with poor conditions for biking. Coordinate gap elimination efforts with opportunities in upcoming projects.	Iowa DOT	3.5
Update this Bicycle and Pedestrian Long-Range Plan in 5 to 10 years.	Iowa DOT	2.2 – 2.4 3.5 4.4

8.4 Long- term actions

Many of the direct and indirect recommendations of this plan can only be implemented by performing numerous implementation actions over the course of many years. Furthermore, some of the recommendations necessitate additional planning and analysis prior to implementation.

The following lists example long-term implementation actions and is not intended to be an exhaustive list of all future implementation needs. This plan will likely be updated before initiation begins for many of these actions, but it is important to consider future needs during current planning.

- Implement current plans for the US Bicycle Route and National Trails systems (which include the Mississippi River Trail, American Discovery Trail, and Lewis & Clark Trail). Revisit these plans every 5 to 10 years until each segment is completely implemented.
- Implement the Statewide Trails Vision plan discussed in Chapter 5 in an opportunity-based manner. This means constructing trails along the vision plan's alignment as right-of-way and funds become available. While the Iowa DOT has a role in providing funding for this purpose, implementation will primarily be the responsibility of cities, counties, MPOs/RPAs, the Department of Natural Resources, and nonprofit groups.

- Encourage every unit of government in Iowa that has jurisdiction of streets and roads to adopt a Complete Streets policy in order to accommodate bicyclists and pedestrians across the state.
- Continue to identify barriers and gaps in the state highway system for bicycling and walking that have not been corrected by reconstruction/3R activities and develop alternatives for providing adequate interim connections, especially in cities and metro areas.
- Continue to analyze crash data and develop strategies for increasing road safety for all users.
- Continue to expand education and encouragement programs to teach safe bicycling skills, educate road users on the rights of bicyclists and pedestrians, and encourage more people to ride and walk (since greater numbers of people biking has an inverse correlation with bicyclist crash rates).

Finally, it is important to update this Bicycle and Pedestrian Long-Range Plan at least every 10 years in order to account for infrastructure, legislative, and programmatic changes that affect bicycling and walking.

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Measuring the effectiveness of actions and investments

Using data-driven methods to measure the success of Iowa's efforts to improve conditions for walking and bicycling is the most accurate way to determine the effectiveness of the various actions (including programs and policies) and infrastructure investments resulting from the Long-Range Plan. Suitable methods will include those that use quantifiable data to measure improvements in the bicycle and pedestrian systems that primarily result from changes to the programs, policies, and investments of the various agencies and organizations involved in implementing this plan (the Iowa DOT, cities, counties, regional agencies, advocates, the public health community, etc.).

8.5 Methods of measuring

There are two primary methods of measuring the effectiveness of efforts made to improve conditions for walking and bicycling—performance measures and input measures.

Performance measures are used to track the outcomes of broad infrastructure and programmatic actions on the part of all stakeholders. They are the primary way to determine the effectiveness of actions and investments. There are three basic performance measures:

- Usage – how many trips are made by foot or by bicycle each year?
- Safety – how many bicycle- and pedestrian-related crashes occur each year?
- Accessibility – how useable is the infrastructure that is in place (compatibility of streets and roads for bicyclists)?

In addition, public health statistics (e.g., including obesity rates, percentage of seniors getting sufficient physical activity, etc.) can be considered performance measures. However, while bicycling and walking are healthy activities that can positively affect these statistics, they are not the only relevant factors. Diet, genetics, socioeconomic, and other factors also have significant impacts.

Input measures track the actions taken by various stakeholders. They are the primary way in which to track the progress of actions and investments. Input measures are believed to have a positive impact on performance outcomes, but there is no guarantee until the relationships are established. Input measure categories include:

- Funding
- Education
- Facilities
- Policy



8.6 Performance measures (outcomes)

Performance measures should use quantifiable data to measure outcomes or trends that can be attributed as results of the programs, policies, and investments made by the Iowa DOT and others. In other words, they do not measure the actions—or inputs—of the Iowa DOT, such as how much funding is allocated, but instead they measure the results of those actions, such as how many more people are walking or biking.

Baseline data must be established for each performance measure, which in some cases will require the Iowa DOT and its partners to engage in new data collection activities. Once the baseline is established, a quantifiable target is set for a specific point in the future for each performance measure. The Iowa DOT should consistently assess progress on each performance measure, preferably on an annual basis.

Pedestrian performance measures

The following performance measures will be used by the Iowa DOT to assess progress on improving conditions for walking in Iowa:

Usage – Pedestrian mode share		
Baseline 3.5% (2015 ACS)	Data and method American Community Survey journey to work data is the most consistently-available source of mode share information. However, it a) is an estimate and b) factors only trips to work, ignoring walking trips made for other transportation purposes as well as recreational trips.	Strategies <ul style="list-style-type: none"> Expand sidewalk and multi-use trail networks in order to provide adequate access and connectivity for pedestrian needs. Encourage more people to walk by providing safety materials, promote the health benefits of walking, increase the comfort and safety of infrastructure, and encouraging communities to become walk-friendly. Employers and communities can use incentives to promote walking.
Desired trend Increase	It can be assumed, however, that journey to work trips account for 6 to 7% of all walking trips (the 2009 National Household Travel Survey reported that 6.7% of walking trips in Iowa were journey to work trips).	
Safety – Pedestrian-related crashes per year		
Baseline 467 (2008-2012 average; includes all ages)	Data and method Pedestrian related crashes are recorded in the <i>Safety, Analysis, Visualization and Exploration Resource (SAVER)</i> dataset maintained by the Iowa DOT.	Strategies <ul style="list-style-type: none"> Incorporate pedestrian safety into the state's Strategic Highway Safety Plan. Recommend legislation designed to protect all road users. Conduct safety audits of intersections that have a high number of pedestrian crashes.
Desired trend Decrease		

Bicycle performance measures

The following performance measures will be used by the Iowa DOT to assess progress on improving conditions for bicycling in Iowa:

Usage – Bicycle mode share		
<p>Baseline 0.5% (2015 ACS)</p>	<p>Data and method American Community Survey journey to work data is the most consistently-available source of mode share information. However, it is an estimate and factors only trips to work, ignoring trips made for other transportation purposes as well as recreational trips.</p>	<p>Strategies</p> <ul style="list-style-type: none"> • Improve city streets and rural roads for bicycling by providing adequate accommodations based on traffic volumes, speeds, etc. • Encourage more people to bicycle by providing safety and how-to materials, on-the-bike training, continuing to popularize RAGBRAI, and encouraging communities and businesses to become bicycle-friendly.
<p>Desired trend Increase</p>	<p>It can be assumed, however, that journey to work trips account for 8 to 9% of all bicycling trips (the 2009 National Household Travel Survey reported that 8.1% of bicycling trips in Iowa were journey to work trips).</p>	
Safety – Bicycle-related crashes per year		
<p>Baseline 417 (2008-2012 average; includes all ages)</p>	<p>Data and method Bicycle related crashes are recorded in the <i>Safety, Analysis, Visualization and Exploration Resource (SAVER)</i> dataset maintained by the Iowa DOT.</p>	<p>Strategies</p> <ul style="list-style-type: none"> • Provide education for all road users on traffic law and bicyclists' rights. • Incorporate bike safety into the Strategic Highway Safety Plan. • Incorporate bicycle safety-related education into training for new and experienced law enforcement officials. • Recommend legislation designed to protect all road users.
<p>Desired trend Decrease</p>		
Accessibility – Percentage of the rural and urban transportation network suitable for bicycling		
<p>Baseline Rural: [X]% rated "good" Urban: [X]% rated BLOS B or greater</p>	<p>Data and method Bicycle compatibility ratings for rural roads have been calculated as part of this Plan. The ratings should be recalculated annually as new traffic volume data is available and as infrastructure changes are made.</p>	<p>Strategies</p> <ul style="list-style-type: none"> • Provide training for planners and engineers (DOT, county, city) on how to effectively plan and design suitable accommodations. • Incorporate a review of bicycle compatibility/level of service ratings as part of each project and ensure that an improvement in suitability results from the project. • Consider the need to improve bicycle suitability as a criterion in the prioritization of 3R projects.
<p>Desired trend Increase</p>	<p>New data collection efforts on the part of the Iowa DOT and county engineering departments will be needed to establish a baseline for urban bicycle level of service (BLOS) and compile data on an annual basis.</p>	



Child performance measures

The following performance measures will be used by the Iowa DOT to assess progress on improving conditions for children that bicycle and walk in Iowa:

Safety – Bicycle- and pedestrian-related crashes involving children per year		
<p>Baseline 314 (2008-2012 average)</p>	<p>Data and method Bicycle and pedestrian crashes are recorded in the <i>Safety, Analysis, Visualization and Exploration Resource (SAVER)</i> dataset maintained by Iowa DOT.</p>	<p>Strategies</p> <ul style="list-style-type: none"> • Encourage each school district or individual school to complete a Safe Routes to School plan. • Provide education for all road users on traffic law and bicyclists' rights. • Incorporate bicycle and pedestrian safety into the Strategic Highway Safety Plan. • Incorporate bicycle safety-related education into training for new and experienced law enforcement officials. • Recommend legislation designed to protect all road users. • Conduct safety audits of intersections that have a high number of bicycle and/or pedestrian crashes. • Provide traffic safety education for school-aged children. • Provide adequate bicycle and pedestrian accommodations near schools.
<p>Desired trend Decrease</p>		

8.7 Input measures (actions)

Input measures are used to track the progress of the Iowa DOT and the state as a whole in implementing the Long-Range Plan and its various recommendations. On their own, input measures cannot be used to determine if implementation actions result in improved conditions for walking and bicycling; rather they can only be used to determine whether implementation is occurring at an adequate pace.

Input measure	Baseline	Desired trend	Related goal	Who measures or implements
Number of MPOs/RPAs, counties, and cities that have adopted a Complete Streets policy.	To be determined.	Increase	Valid, Coordinated, Connected, Funded, Well-Designed	Iowa DOT compiles data from MPOs and RPAs.
Annual percent of non-Interstate highway project centerline miles excepted by the Complete Streets policy.	n/a	Decrease	Valid, Coordinated, Connected, Funded, Well-Designed	Iowa DOT
Number of miles of paved shoulder (4+ feet wide excluding rumble strips) added to the primary highway system.	0 miles	Increase	Connected	Iowa DOT
Number of miles of bike lanes added to the system. (Data annually collected by each MPO/RPA).	0 miles	Increase	Connected	Iowa DOT compiles data from MPOs and RPAs.
Number of miles of sidewalks and curb ramps added to the system. (Data annually collected by each MPO/RPA).	0 miles	Increase	Connected	Iowa DOT compiles data from MPOs and RPAs.
Number of miles of multi-use trails added to the system. (Data annually collected by each MPO/RPA).	0 miles	Increase	Connected	Iowa DOT compiles data from MPOs and RPAs.
Percent of Iowa's Transportation Alternatives Program (TAP) funds (and any future similar federal funding programs) used for bicycle and pedestrian purposes/projects.	To be determined.	Increase.	Funded	Iowa DOT compiles data from MPOs and RPAs.

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