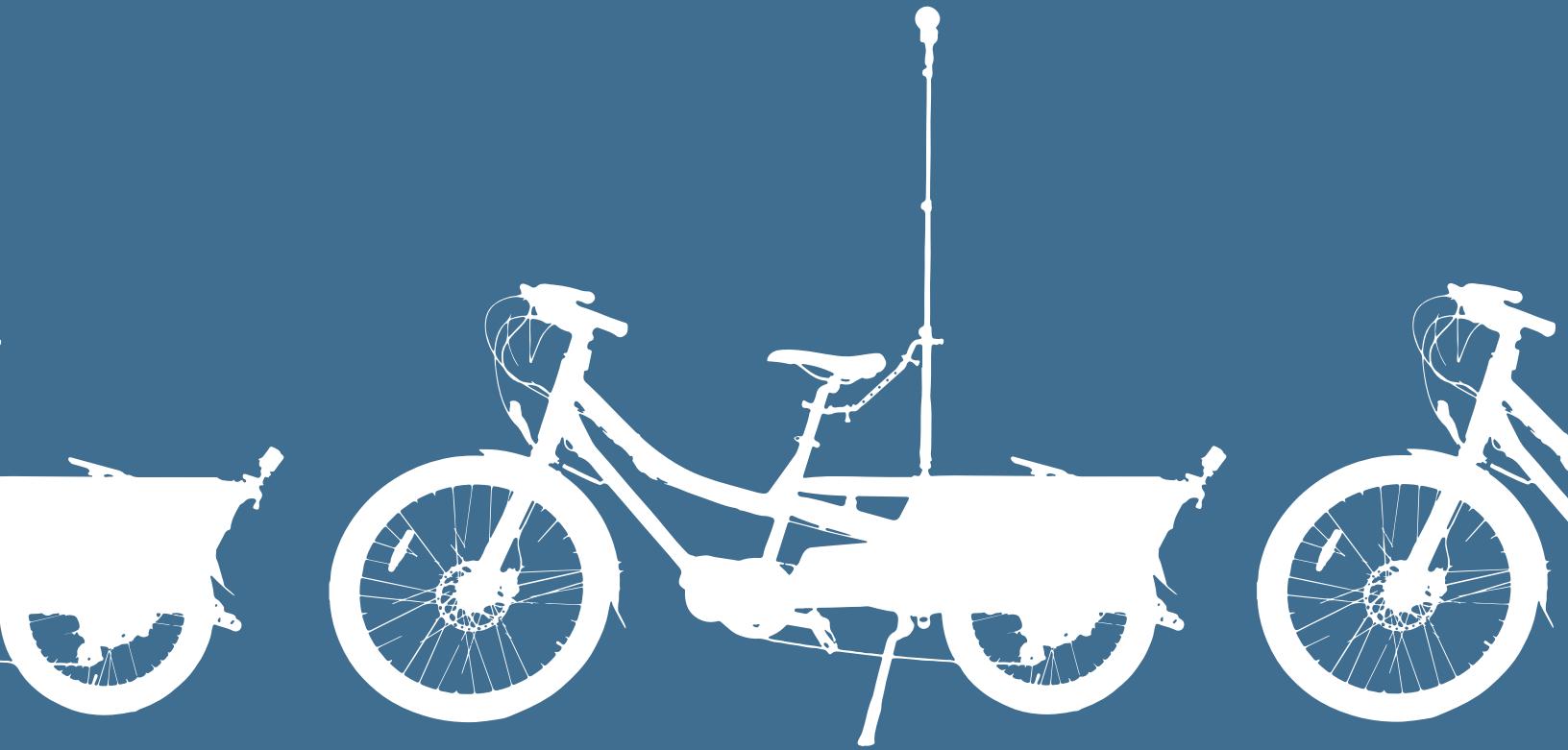


# CENTRAL IOWA TRAIL CONDITION

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## 2019 REPORT



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## Introduction

Central Iowa is home to more than 600 miles of shared use trails connecting urban centers with natural rural landscapes that showcase the beauty of the heart of Iowa. Trails in Central Iowa continue to be an important quality of life aspect for thousands of residents and visitors every year by providing recreational opportunities accessible to all ages. More recently, the trails have been leveraged as a tool to generate additional tourism through events like the BaCoon Ride along the Raccoon River Valley Trail.

This extensive trail system continues to grow and evolve as missing links in the trail system are constructed by local communities, county conservation boards, or collaborations between local partners. Each year the Des Moines Area Metropolitan Planning Organization (MPO) allocates funding through state and federal programs to fill gaps within the trail system. As more Iowans embrace bicycling for both recreation and daily transportation, the trail system will continue to see use throughout the year.

While the network of trails expands, the existing trail network is starting to mature and soon spending priorities will require a greater focus on the maintenance of existing trails. Currently, when trail maintenance is required, local governments utilize field investigations to determine the condition of trail

segments they plan to maintain. The field investigation process can be time-consuming and sometimes difficult as not all trail segments are readily accessible by road. Communities need a systematic approach of tracking the pavement condition of their trails so they can plan and program funds for future maintenance accordingly.

### Connection to *Mobilizing Tomorrow*

The Des Moines Area MPO's long range transportation plan for the Greater Des Moines, called *Mobilizing Tomorrow*, provides the goals for the transportation network to the year 2050. Goal 1 of *Mobilizing Tomorrow*, which was updated in 2019, is to "manage and optimize the transportation infrastructure and services" within the region. As the region's infrastructure continues to age, priority has shifted toward monitoring and managing the existing before investment in new trails.

Currently, the Des Moines Area MPO utilizes pavement condition data collected for the entire street network to provide a regional review of the investment necessary to maintain the current condition of the roadway network. However, no such comprehensive database existed for the extensive trail network within the region.



With the development of the Data Bike Trail Condition Report in 2017, the Des Moines Area MPO similarly sought to support long-range planning of trail maintenance by providing data to make performance-based decisions on prioritizing trail maintenance.

The Central Iowa Trail Condition project aims to fill and regularly update this information gap within the Central Iowa trail system by:

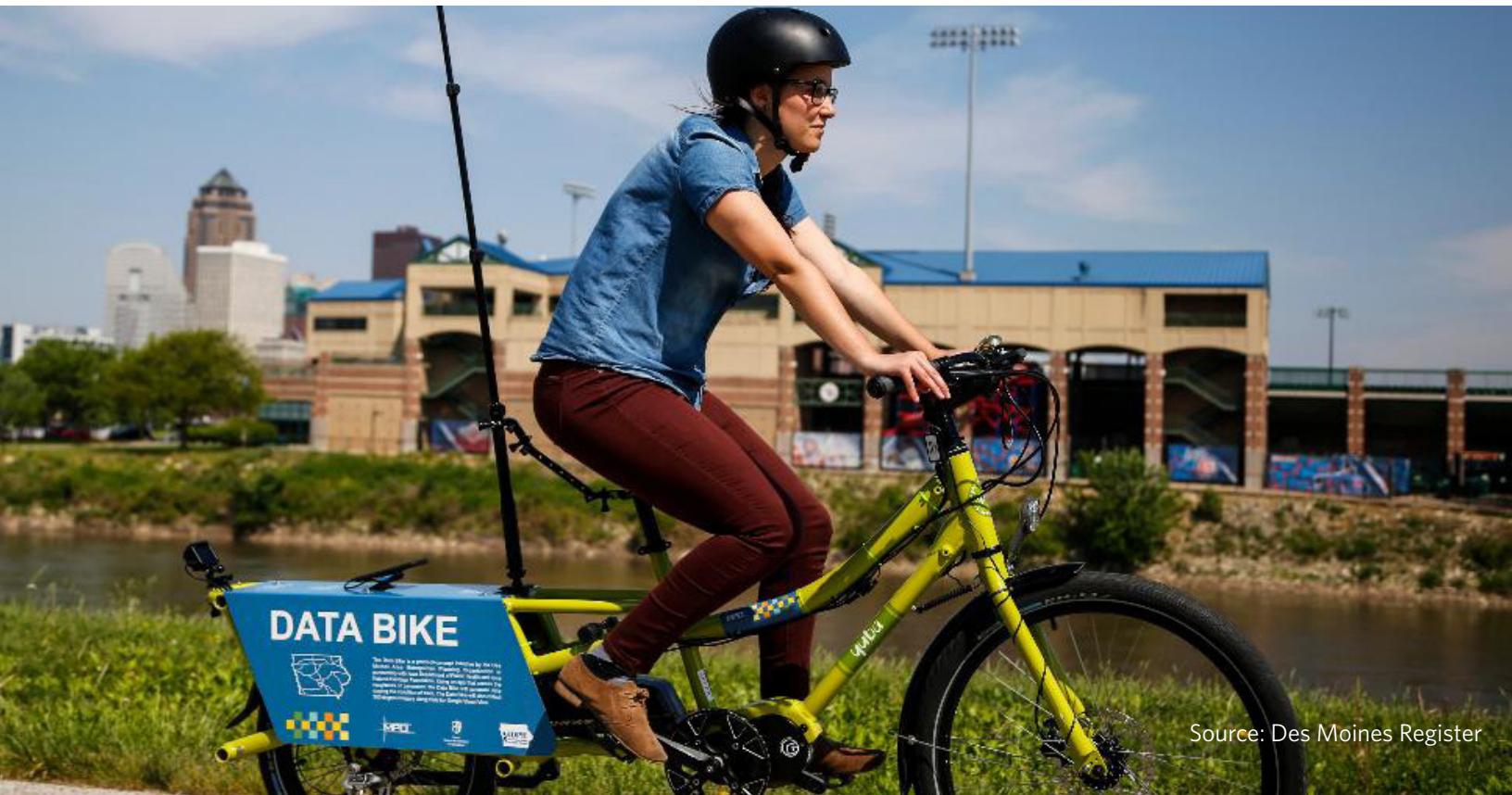
- Using a bike-based data collection vehicle to improve the efficiency of collecting data on the extensive trail network.
- Regularly updating the inventory of condition data for all paved trails within Central Iowa, with a focus on trail roughness and geo-located photos of trail surfaces.
- Continuing to provide data to local agencies, consultants, and the public to inform a long-term maintenance strategy for the Central Iowa trail network.
- Making the project replicable and promoting the project to expand knowledge regarding approaches to collect trail condition data.
- Making high quality imagery available to trail users and tourists.

## Central Iowa Trails

The beginning of the Central Iowa trails network started with the Bill Riley Trail, now known as the Neal Smith Trail. Since the late 1970s, local community leaders and organizations have pushed for trails within and connecting their communities. This leadership is still seen today as a majority of trails are managed by local agencies rather than state agencies.

In 2004, the Central Iowa Bicycle-Pedestrian Roundtable was formed to further develop bicycle and pedestrian facilities in Central Iowa. The Roundtable encompasses the planning areas of the Des Moines Area MPO, the Ames Area MPO, and the Central Iowa Regional Transportation Planning Alliance (CIRTPA). The mission of the Roundtable is “to facilitate the development, maintenance, and promotion of a world-class commuter and recreational trail system in Central Iowa.”

The Roundtable assisted Des Moines Area MPO staff in creating, *CONNECT: Central Iowa Bicycle and Pedestrian Transportation Action Plan 2020*. This plan includes projects, programs, and policies on bicycle and pedestrian transportation in upcoming years. Additionally, it includes the breakdown of four Trail Level of Significance Classifications.





In 2019, only Level 1 & 2 trail data was collected, in addition to a few Downtown Des Moines on-street facilities. With the upcoming update of the CONNECT Plan, future Data Bike reports should become consistent with the new State classification system. The four Trail Level of Significance classifications used for this report are as follows:

### ***Level 1: State Significance***

- Must first meet all of the criteria described in Level 2.
- Must span two or more counties and be recognized by the State of Iowa/Iowa Department of Transportation as a Level 1 Trail.
- A decisive knowledge of the trail boundaries must exist.
- Alternatively, must receive approval by the Central Iowa Bicycle-Pedestrian Roundtable.

### ***Level 2: Regional Significance***

- Must first meet all of the criteria described in Level 3.
- Must exist in two or more city or county jurisdictions.
- Must connect places, streets or trails of significance to the Central Iowa region

- Alternatively, must receive approval by the Central Iowa Bicycle-Pedestrian Roundtable.

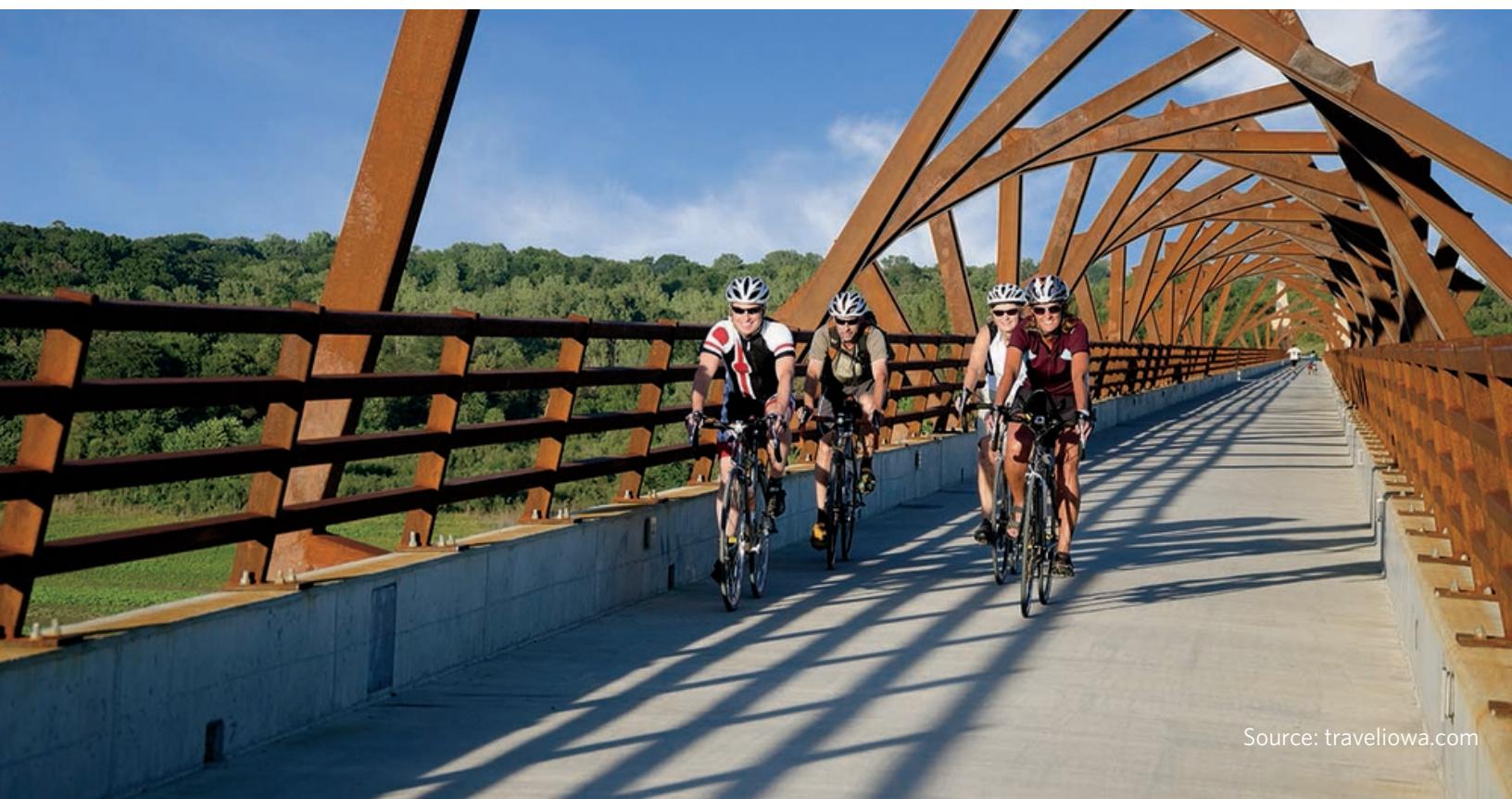
### ***Level 3: Jurisdiction Significance***

- Must first meet all of the criteria described in Level 4.
- Must be a minimum of 8 feet in width.
- Must connect places, streets, or trails of jurisdictional significance.
- Alternatively, must receive approval by the Central Iowa Bicycle-Pedestrian Roundtable.

### ***Level 4: Local/Neighborhood Significance***

- Must meet the minimum criteria to be designated as a Shared-Use Path, Bicycle Lane, or Bicycle Route, as specified in the Manual on Unified Traffic Control Devices.

Today, Iowans and visitors continue to enjoy trails and what they provide for communities. The demand for trails and better connectivity between individual trails persists. As the Central Iowa trail system continues to grow, it will become increasingly important to create a reliable procedure to conduct condition assessments in order to maintain a high quality network and locate gaps in the network.



## Iowa Data Bike

A primary objective of this project has been to develop a bike-based data collection vehicle to improve the efficiency of collecting data on the extensive trail network. The data collected with the Data Bike is intended to compliment the field inspections performed by local government staff and not meant as a replacement for thorough physical inspections. While the primary metric reported is trail roughness, this measure alone is only a component among other factors used in a holistic assessment of trail condition.

Using an electric-assist bicycle, an iPhone, an app designed to detect pavement roughness, and a pair of cameras, the Des Moines Area MPO created a tool to efficiently collect data to evaluate trail condition.

### The Data Bike uses three main components to collect data:

1. The rRuf app on the iPhone collected accelerometer data to measure the roughness of trail pavement.
2. A GoPro camera mounted on the rear of the bike provided geo-located photos of the trails.
3. A Samsung Gear 360 mounted above the rider's head provided imagery used for Google Street View.



Source: Des Moines Area MPO



## Data Collection Process

The Data Bike is ridden on Des Moines Area trails to collect roughness and pavement data. In the past, Des Moines Area MPO personnel has been responsible for collection and processing of all data.

The Des Moines Area MPO incorporated a public engagement component into the data collection process in 2019. The intent was twofold; to educate and engage the public in this important project and to understand how to improve the process and methodology in the future. In order to solicit a group of volunteers, the Des Moines Area MPO utilized the Street Collective's volunteer network. Des Moines Area MPO staff worked closely with the selected volunteers according to their skill levels to help them understand the Data Bike components as well as the data collection process.

## State of the Trails

During the summer and fall of 2019, the Data Bike collected approximately 112 miles of roughness data on Level 1 and 2 trails, including Downtown Des Moines on-street bike facilities. Additionally, more than 25,600 photos of the trail surface and more than 1,200 photos for Google Street View were collected.

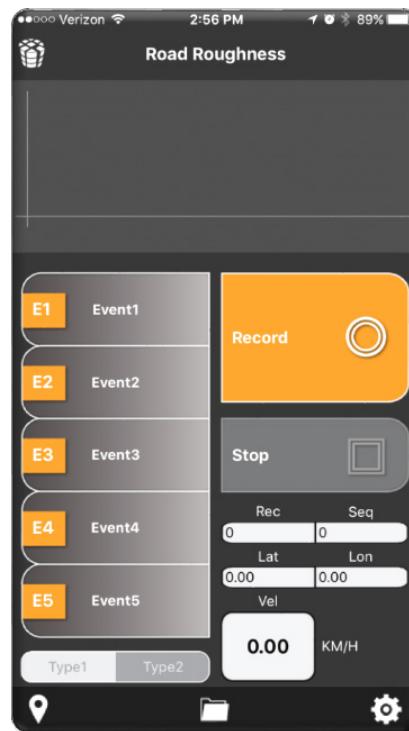
The data collected to date provides evidence that the regional trail network in Central Iowa is in good condition with 96 percent of trail miles in smooth or very smooth condition. While these trails may have intermittent cracking, maintenance has been completed to keep trail users on a smooth surface.

It should be noted that trail segments traverse through multiple jurisdictions and the responsibility of maintenance may lie with a separate entity.

The photos collected on the trails provide a snapshot of the experience available to users. As previously stated, the trails provide a link between the urban cityscapes and the rolling rural landscapes. Trailheads in towns throughout the region highlight the investment in amenities that make Central Iowa a trail destination.

## Trail Roughness

The accelerometer data collected by the Data Bike indicated significant changes in the smoothness of the trail segments. Using the accelerometer data, the trails can be categorized into five roughness categories. The photos on the following page illustrate roughness conditions for each of the five levels.



Source: Des Moines Area MPO

The rRuf app scores the condition of trails by using the iPhone's accelerometers and gyros to produce a segmented Class 3 response based roughness condition rating. It includes an automated intelligent map matching algorithm that connects collected data to the appropriate trail segment. Through the RUBIX dashboard, the trail network can be monitored to ensure coverage and filling of gaps as needed. This specialized app is also able to produce averages and other statistics if data on sections of trails are collected multiple times.

There may be minor inconsistencies in the roughness data. For example, wooden trail bridges, gravel trail heads and brick surfaces may be indicated as a "rough or very rough surface." These differences account for only 0.71 miles, of which 0.31 miles are classified as Fair, 0.28 miles as Rough, and 0.12 miles as Very Rough.



### ■ Very Smooth

Very Smooth trails have nearly no cracking or vegetation growing on the trail. Variations in smoothness can be caused at seams between concrete or other material spread across trail.



### ■ Smooth

Smooth trails are typically in good condition, but are beginning to show signs of cracking. Cracking on smooth trails generally does not create discomfort for the rider.



### ■ Fair

Fair trails are beginning to show increased wear and typically have more cracking. Cracking on trails in fair condition can cause minor discomfort for riders.



### ■ Rough

Trails in Rough condition are showing advanced cracking with vegetation growing through the surface. These cracks are typically wider and deeper than cracks along Fair conditioned trails and can cause discomfort for riders.

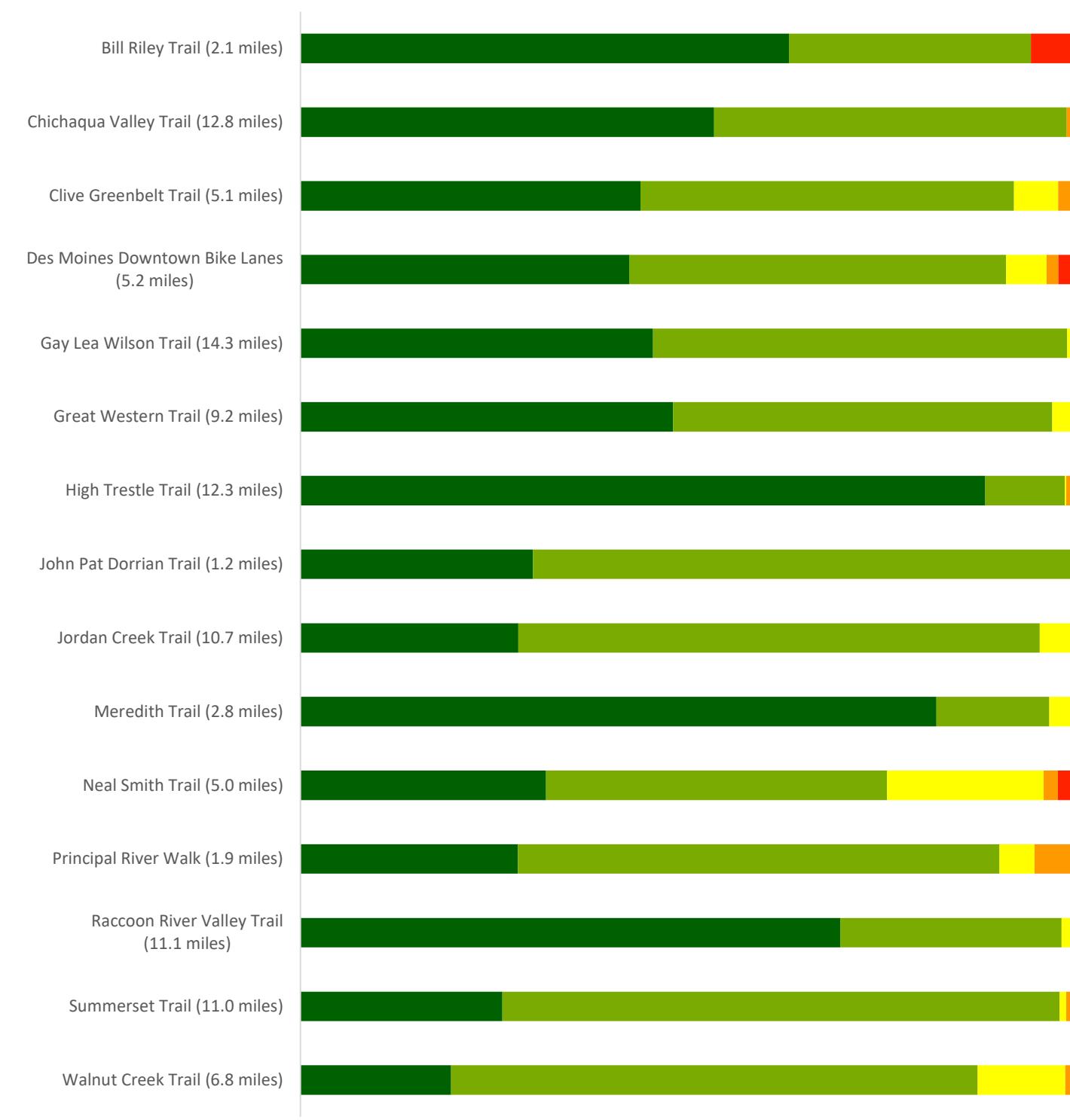


### ■ Very Rough

Very Rough condition trails have cracking similar to trails in Rough condition, but also have vertical displacement of the trail surface. Very Rough conditions on trails may be avoided by riders, but if traversed can cause discomfort.



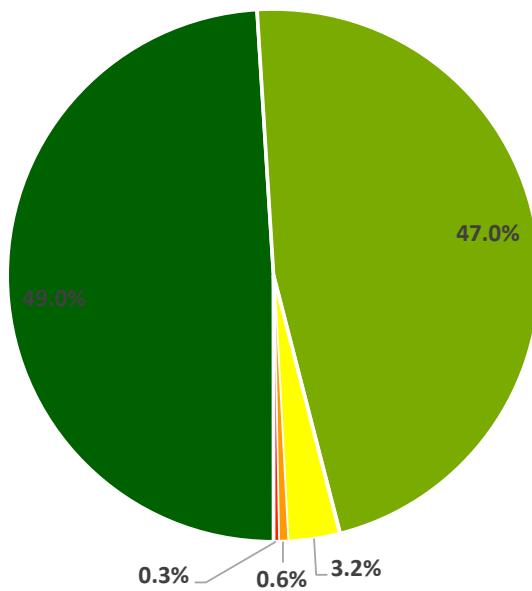
## 2019 Trail Condition



■ Very Smooth ■ Smooth ■ Fair ■ Rough ■ Very Rough

Note: Based on percent of mileage collected in 2019

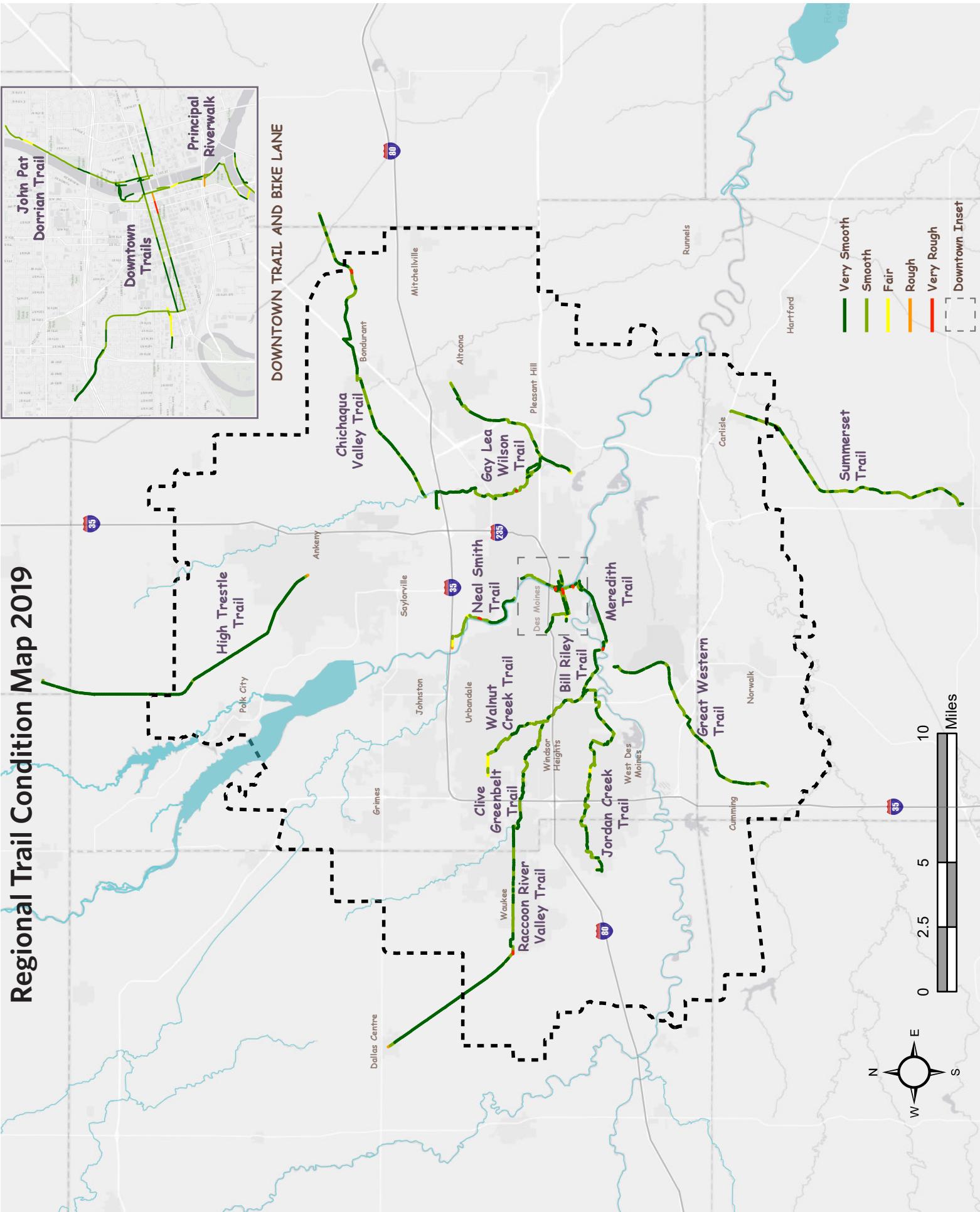
## Trail Mileage by Condition



■ 49.0% (54.7 miles) Very Smooth ■ 47.0% (52.4 miles) Smooth ■ 3.2% (3.5 miles) Fair ■ 0.6% (0.6 miles) Rough ■ 0.3% (0.3 miles) Very Rough

## Key Findings

- Of the Level 1 and 2 trail segments collected in 2019, **96%** (about 107 miles) are in good condition with Smooth or Very Smooth surface conditions.
- Of the trail segments collected in 2019, only **1%** (about 1 mile) are in Rough or Very Rough conditions.
- Of the Des Moines Downtown trails and bike lanes, only **3%** (about 0.2 miles) are in Rough condition or Very Rough conditions.

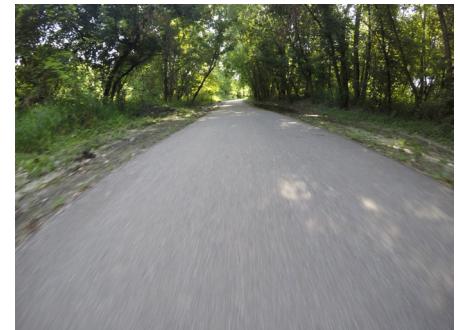


# BILL RILEY TRAIL

- 64% (1.4 miles) Very Smooth
- 0% (0.0 miles) Fair
- 5% (0.1 miles) Very Rough

- 31% (0.7 miles) Smooth
- 0% (0.0 miles) Rough

Miles: 2.1  
Location: Des Moines  
Primary Surface Type: Asphalt



1.  Smooth

2.  Very Smooth

3.  Very Smooth



4.  Very Rough



5.  Smooth



6.  Smooth

Note: Due to rounding, mileages may not be exact.



# CHICHAQUA VALLEY TRAIL



■ 53% (6.8 miles) Very Smooth  
■ 0% (0.0 miles) Fair  
■ 0% (0.0 miles) Very Rough

■ 46% (5.8 miles) Smooth  
■ 1% (0.1 miles) Rough

Miles: 12.8

Location: Bondurant, Polk County and Jasper County

Primary Surface Type: Asphalt and Concrete



1. ■ Very Smooth



2. ■ Very Smooth



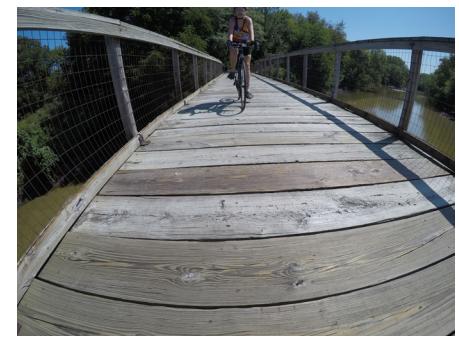
3. ■ Smooth



4. ■ Very Smooth



5. ■ Smooth



6. ■ Rough

Note: Due to rounding, mileages may not be exact.

# CLIVE GREENBELT TRAIL



■ 44% (2.3 miles) Very Smooth  
■ 6% (0.3 miles) Fair  
■ 0% (0.0 miles) Very Rough

■ 48% (2.5 miles) Smooth  
■ 2% (0.1 miles) Rough

Miles: 5.1  
Location: Clive  
Primary Surface Type: Asphalt and Concrete



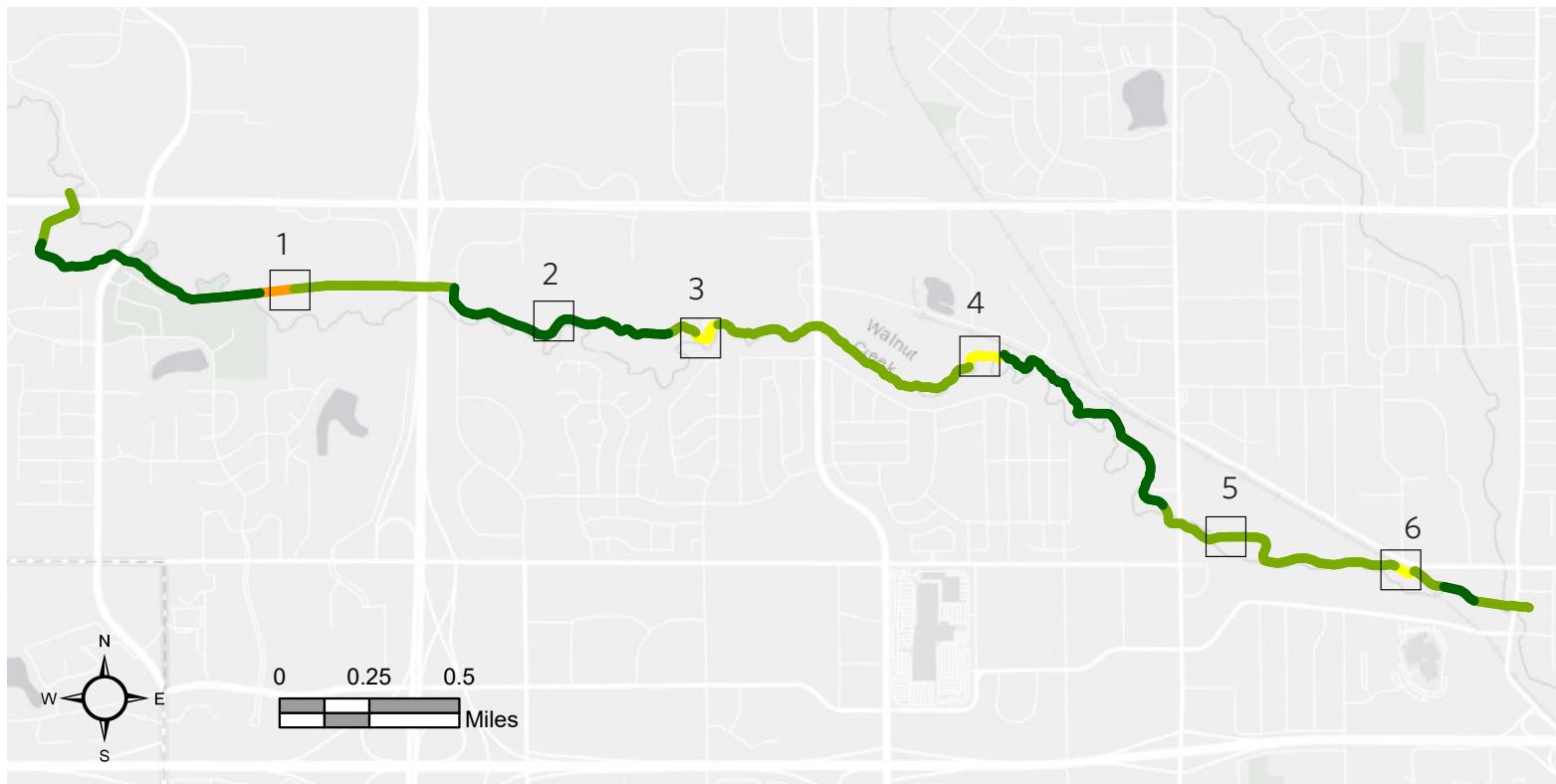
1. ■ Rough



2. ■ Very smooth



3. ■ Fair



4. ■ Fair



5. ■ Smooth



6. ■ Fair

Note: Due to rounding, mileages may not be exact.



# DES MOINES DOWNTOWN BIKE LANES



■ 43% (2.2 miles) Very Smooth  
■ 5% (0.3 miles) Fair  
■ 2% (0.1 miles) Very Rough

■ 49% (2.5 miles) Smooth  
■ 1% (0.1 miles) Rough

Miles: 5.2

Location: Des Moines

Primary Surface Type: Asphalt and Concrete



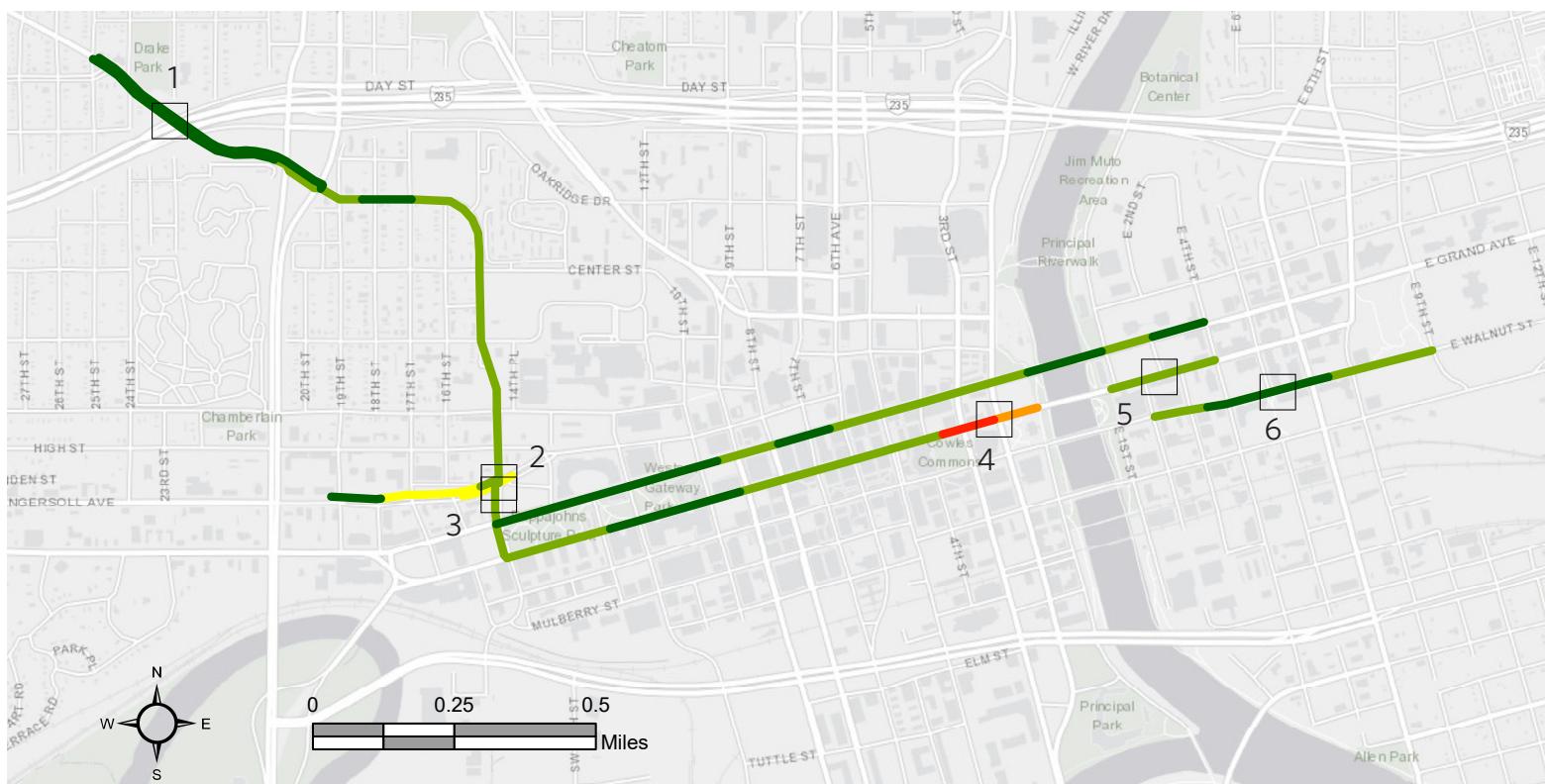
1. ■ Very Smooth



2. ■ Fair



3. ■ Fair



4. ■ Rough



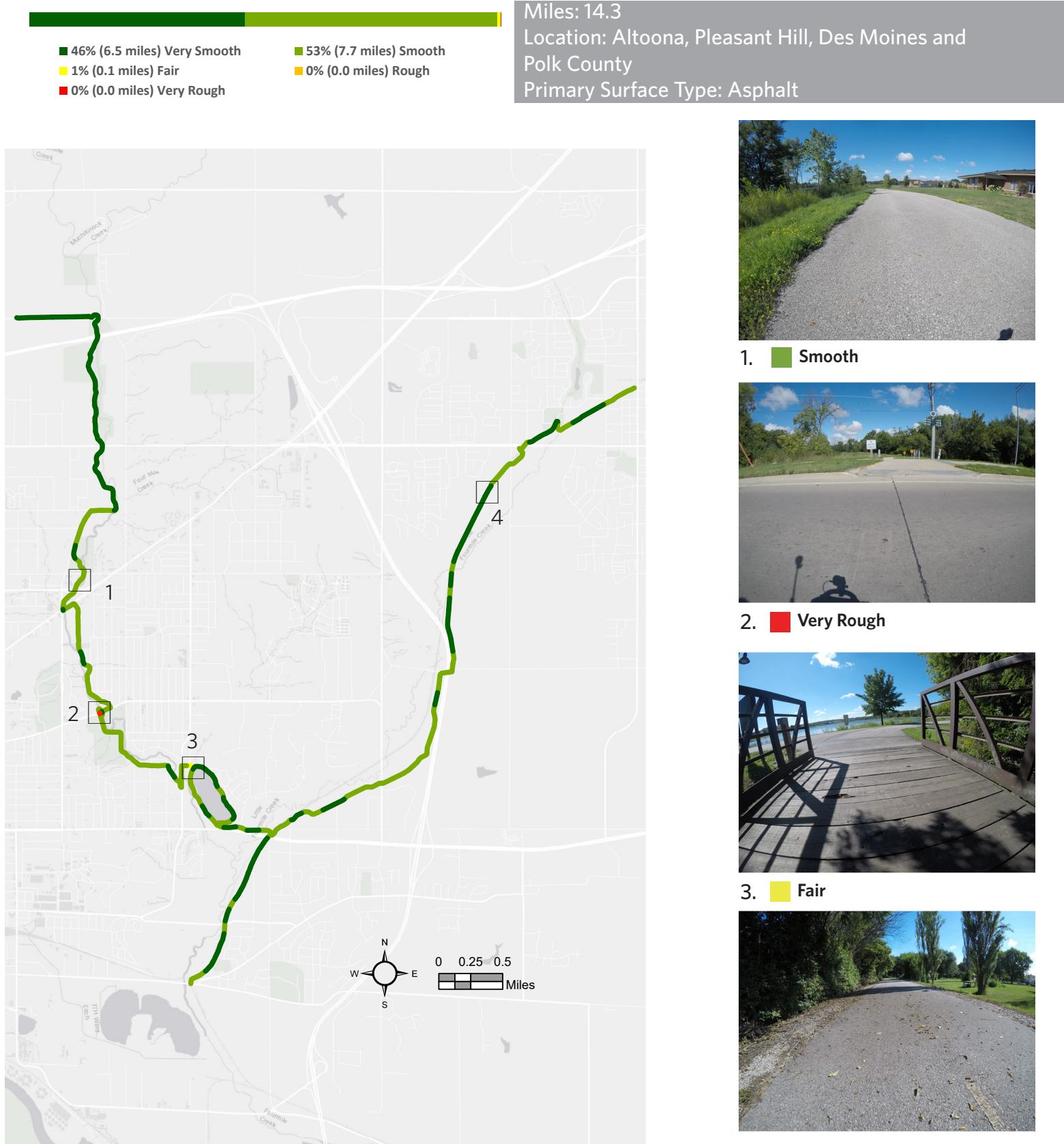
5. ■ Smooth



6. ■ Very Smooth

Note: Due to rounding, mileages may not be exact.

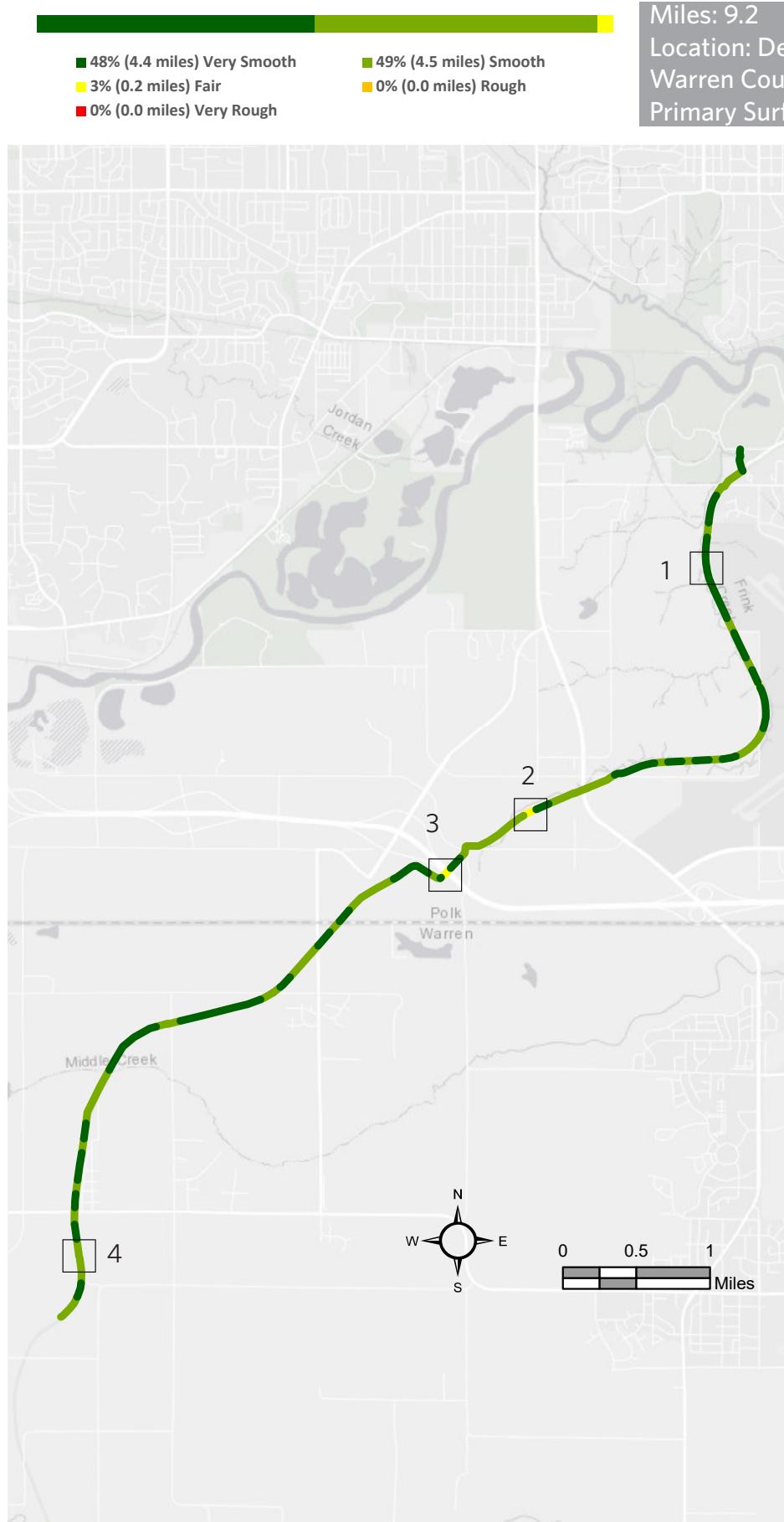
# GAY LEA WILSON TRAIL



Note: Due to rounding, mileages may not be exact.



# GREAT WESTERN TRAIL



1. ■ Very Smooth



2. ■ Fair



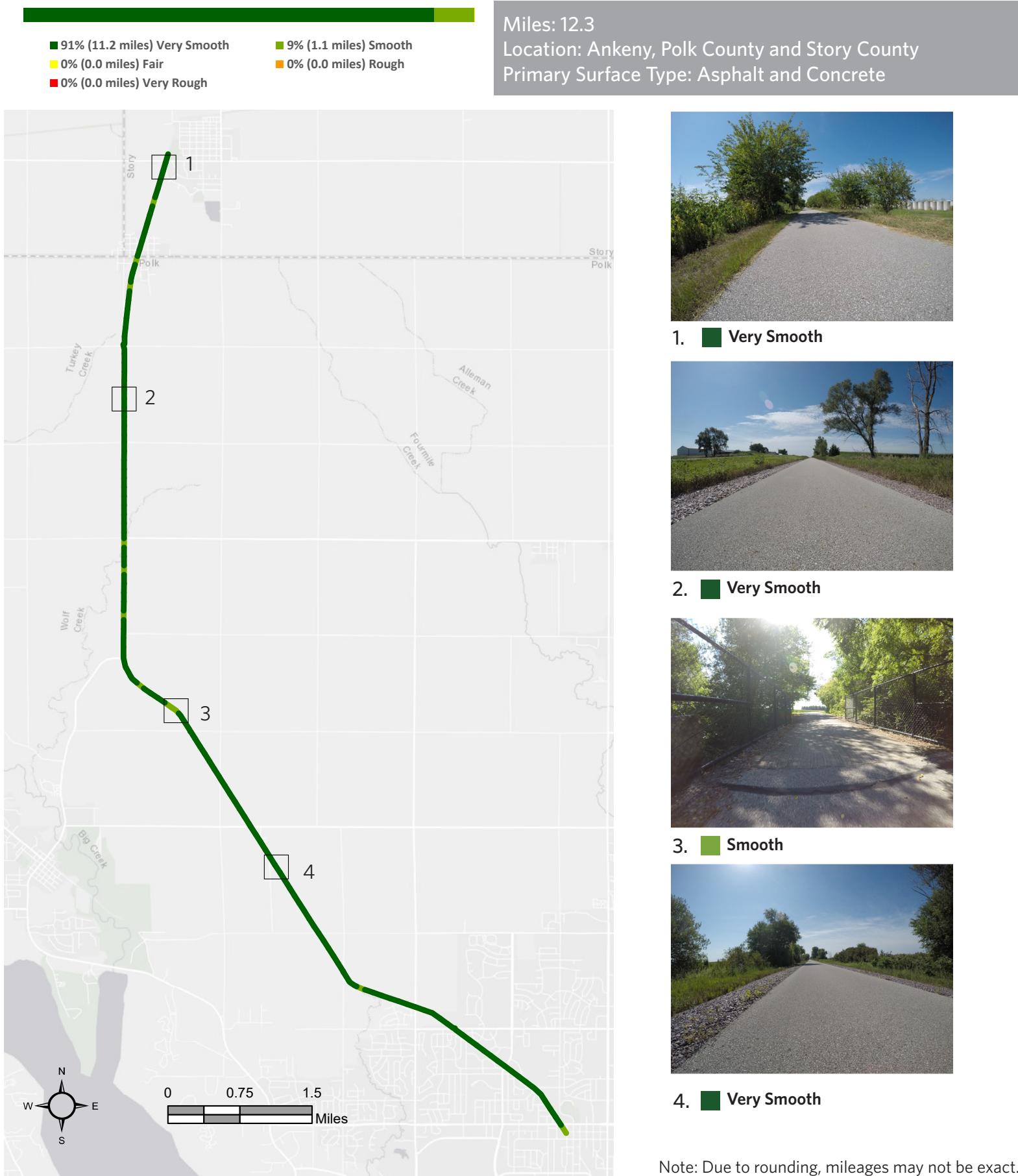
3. ■ Fair



4. ■ Smooth

Note: Due to rounding, mileages may not be exact.

# HIGH TRESTLE TRAIL





# JOHN PAT DORRIAN TRAIL



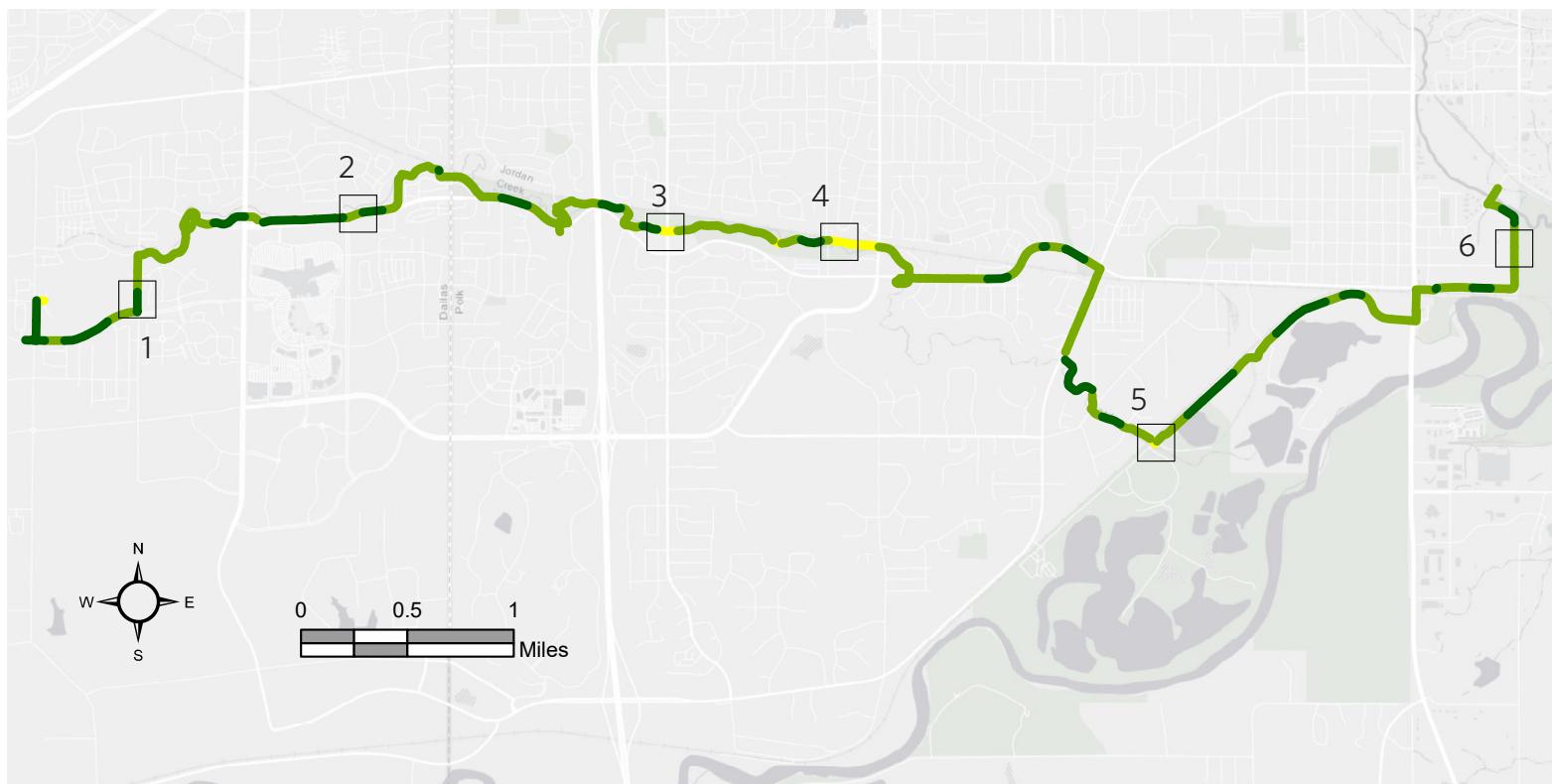
# JORDAN CREEK TRAIL



Miles: 10.7

Location: Des Moines and West Des Moines

Primary Surface Type: Asphalt and Concrete

1. █ Very Smooth2. █ Smooth3. █ Fair4. █ Fair5. █ Fair6. █ Smooth

Note: Due to rounding, mileages may not be exact.



# MEREDITH TRAIL

- 82% (2.3 miles) Very Smooth
- 3% (0.1 miles) Fair
- 0% (0.0 miles) Very Rough

- 15% (0.4 miles) Smooth
- 0% (0.0 miles) Rough

Miles: 2.8  
Location: Des Moines  
Primary Surface Type: Asphalt



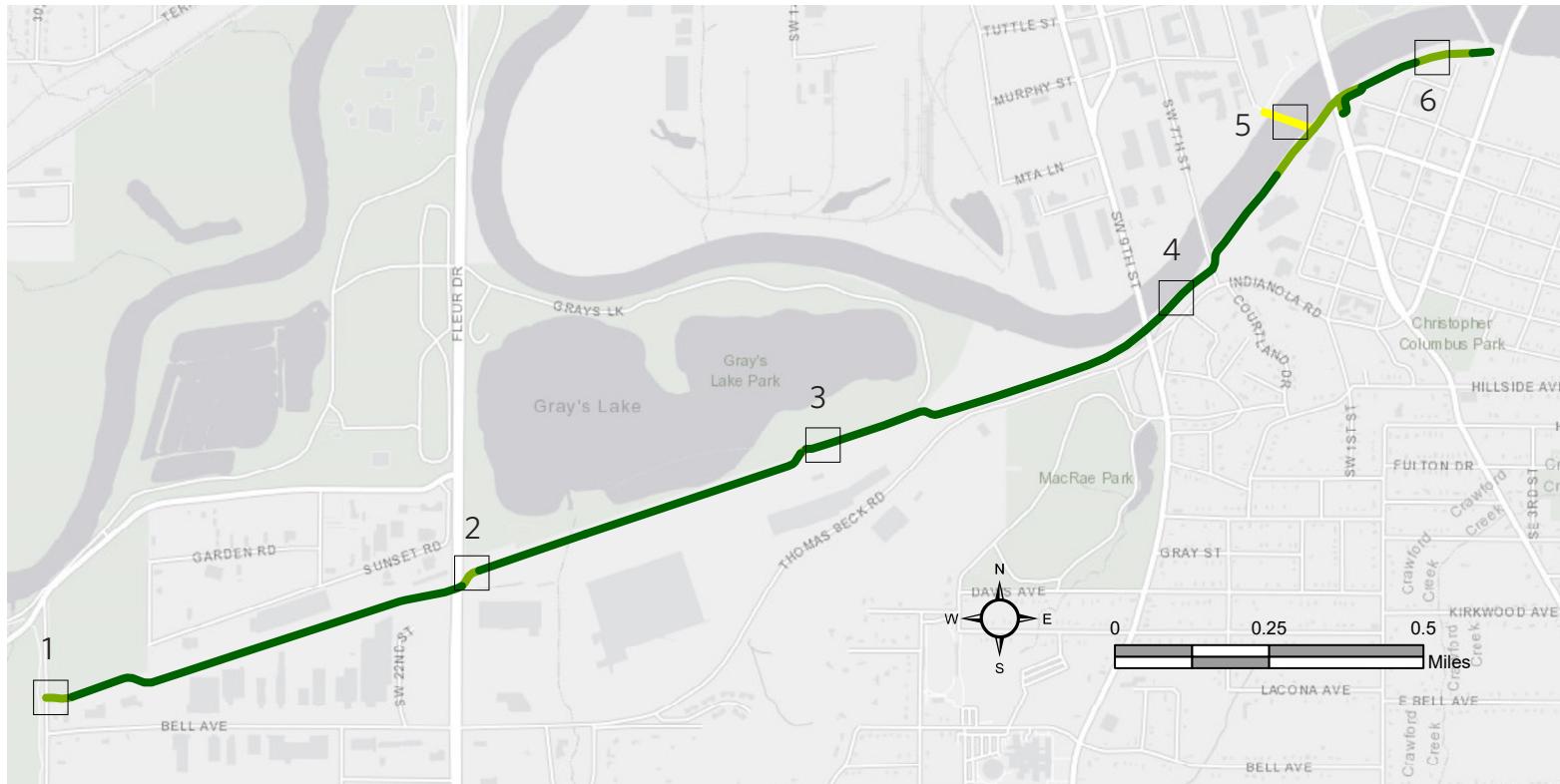
1.  Smooth



2.  Smooth



3.  Very Smooth



4.  Very Smooth



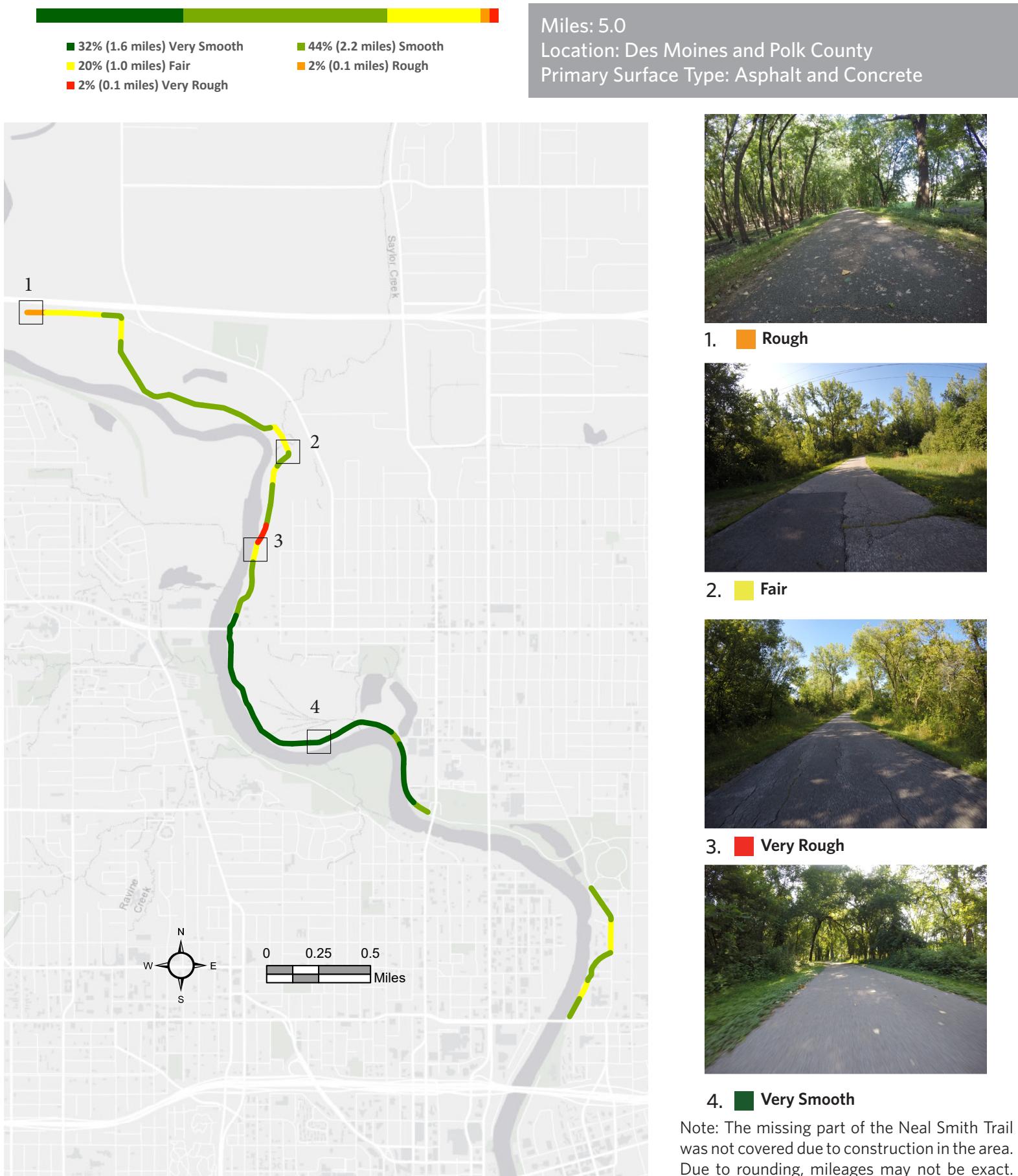
5.  Fair



6.  Smooth

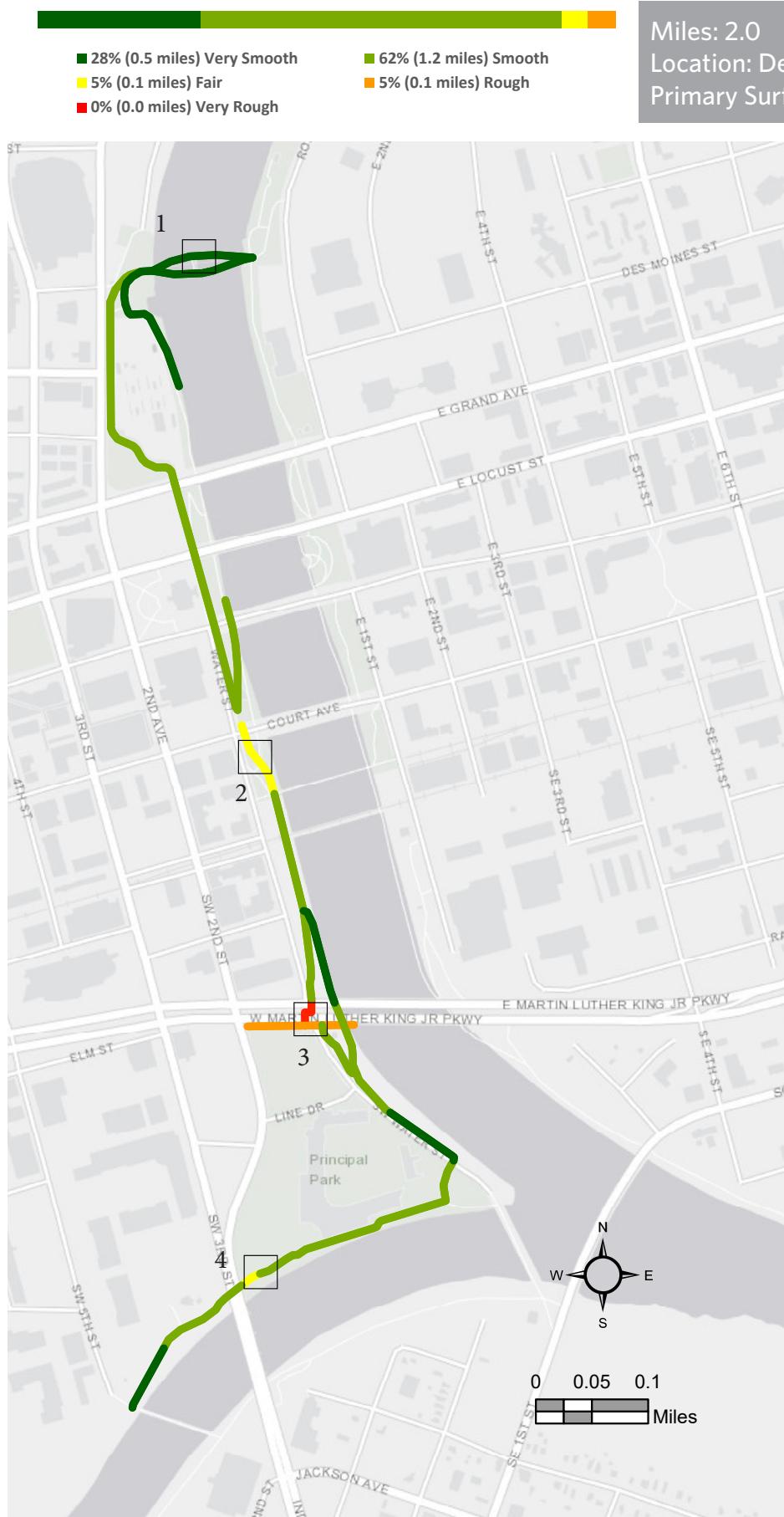
Note: Due to rounding, mileages may not be exact.

# NEAL SMITH TRAIL





# PRINCIPAL RIVER WALK



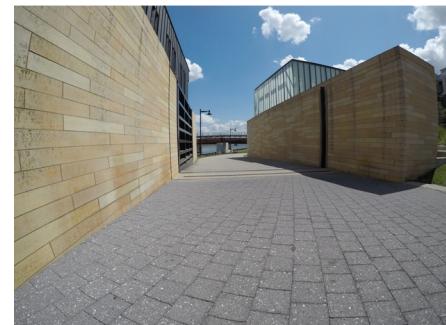
Miles: 2.0

Location: Des Moines

Primary Surface Type: Asphalt, Concrete and Brick



1. █ Very Smooth



2. █ Fair



3. █ Rough



4. █ Fair

Note: Due to rounding, mileages may not be exact.

# RACCOON RIVER VALLEY TRAIL

- 70% (7.8 miles) Very Smooth
- 1% (0.2 miles) Fair
- 0% (0.0 miles) Very Rough

- 29% (3.2 miles) Smooth
- 0% (0.0 miles) Rough

Miles: 11.1

Location: Waukee, Clive, Polk County and Dallas County

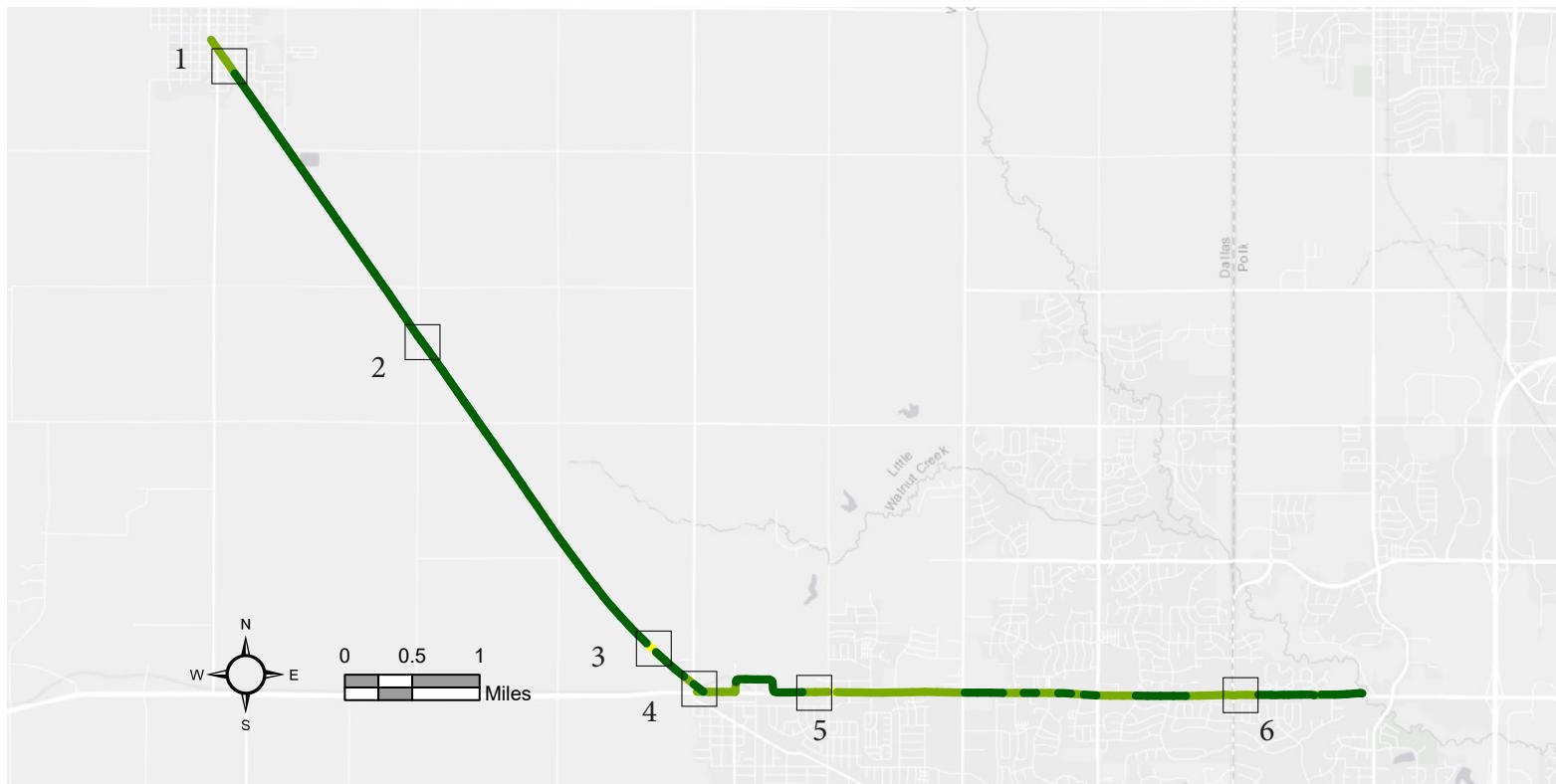
Primary Surface Type: Asphalt and Concrete



1.  Smooth

2.  Very Smooth

3.  Fair



4.  Very Smooth



5.  Smooth

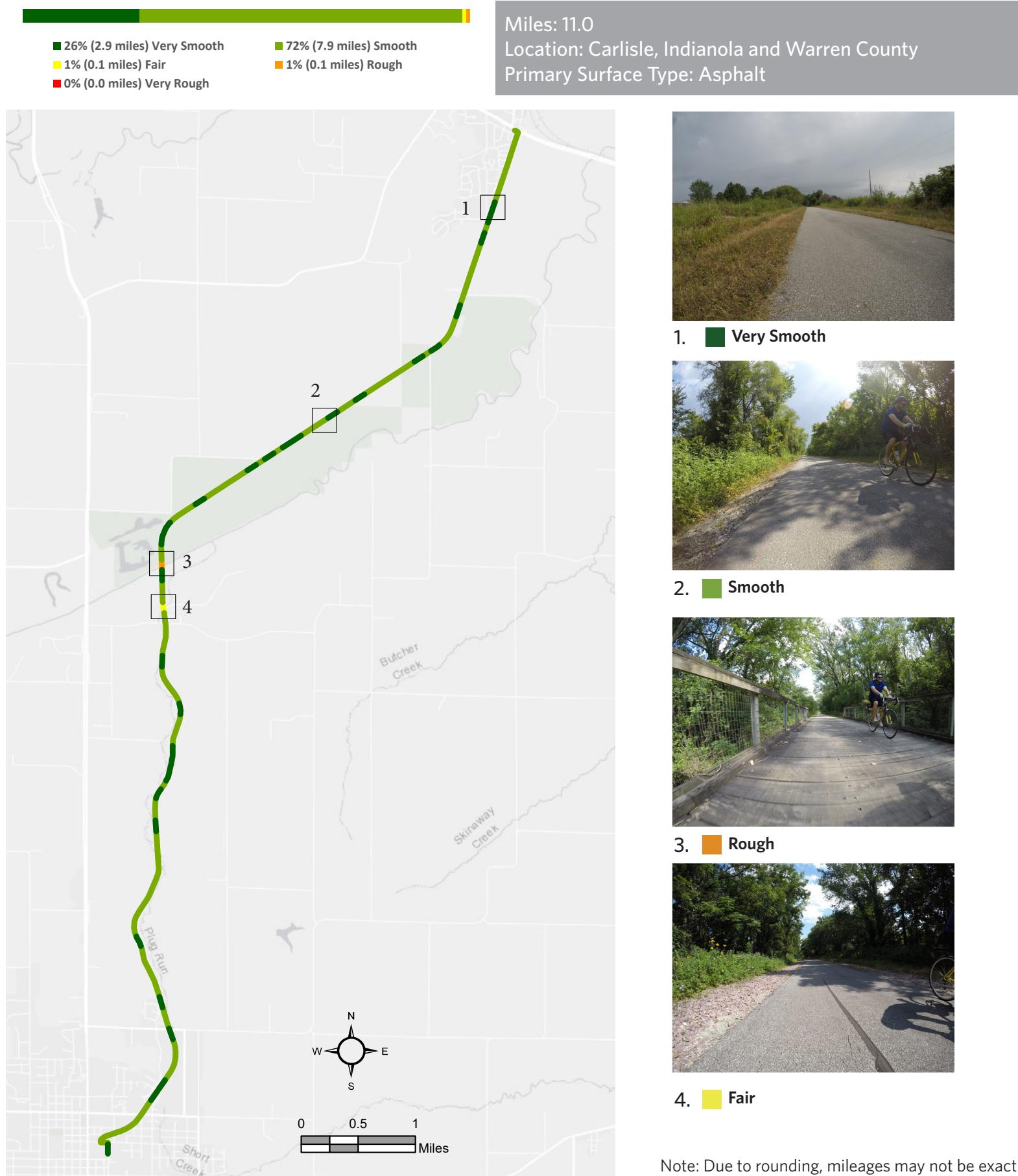


6.  Smooth

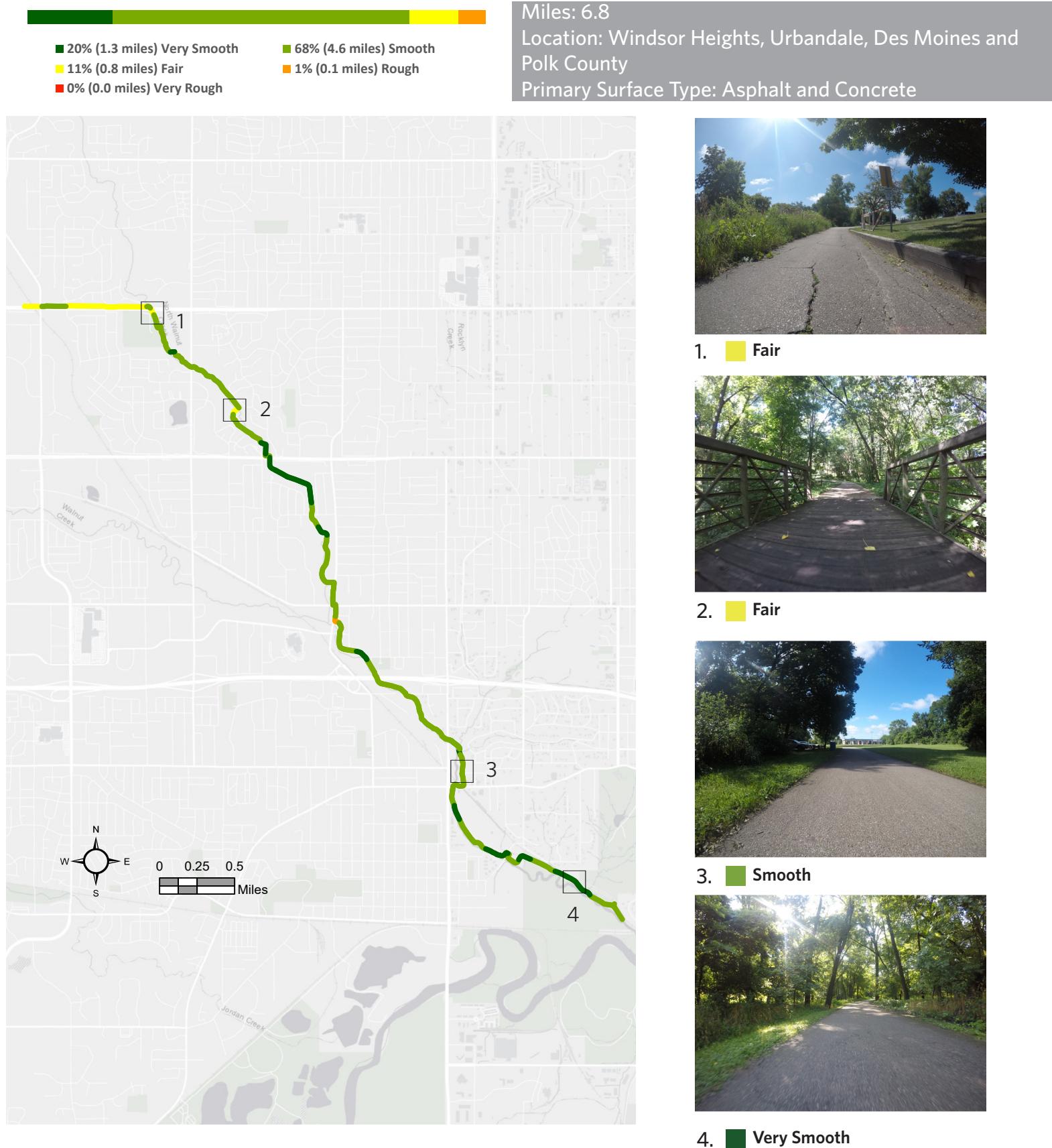
Note: Due to rounding, mileages may not be exact.



## SUMMERSET TRAIL



# WALNUT CREEK TRAIL



Note: Due to rounding, mileages may not be exact.



## Meet the 2019 Data Bike Volunteers

According to the Des Moines Area MPO's Public Participation Plan, there is "...a process that provides citizens, stakeholder groups, and other interested parties to be involved in the transportation planning process." This participation typically comes in the form of public review and comment on the Des Moines Area MPO's publications. However, the Des Moines Area MPO recognized that the Data Bike initiative provided a more engaging public participation opportunity: riding the Data Bike! The Des Moines Area MPO worked with the Street Collective of Greater Des Moines to gather a team of Data Bike volunteers through social media outreach. Many Iowans utilize the trails network for recreation and commuting, so there was no shortage of enthusiastic volunteers to help with the Data Bike this year.

Five volunteers participated, collecting approximately 86 of the 112 total miles of trails included in this report. An overview of the project and equipment setup demonstration took place at the Des Moines Area MPO office to prepare each Data Bike volunteer before they rode their respective trails. Many volunteers were somewhat familiar with e-bikes, but the Data Bike warranted specific instruction because it is nearly seven feet long and required the management of the rRuf app, GoPro camera, and Samsung Gear 360 camera while riding. No volunteer had used an app to collect georeferenced photos or pavement conditions data prior to this experience. Photos captured during the trail rides are available on Google Street View, and the pavement roughness is included in this report to better inform local governments, communities, and individuals of the existing conditions and necessary maintenance of the Central Iowa trails network.

Distributing the time-consuming work of collecting trails data between Des Moines Area MPO staff and volunteers served an educational purpose for both parties: the Data Bike volunteers gained planning knowledge from the perspective of a data collector rather than a public commenter, and the Des Moines Area MPO gained useful feedback about how to improve the initiative for future trials. Because this experience was so successful and rewarding for both the MPO and the volunteers, it is likely that the next run of the Data Bike will utilize volunteer riders again.



Zhi Chen, Sreyoshi Chakraborty, and Kristine Jimenez smile with the Data Bike before riding the Clive Greenbelt Trail on August 15, 2019.

- "I was inspired to be a Data Bike volunteer
- because of my love of cycling, Central Iowa, and
- our trail system. It was an easy and fun way for
- me to help with future planning of our region's
- infrastructure to make it a more bike-friendly
- area."
- - Sonya Staudt, volunteer



Zhi Chen and Kristine Jimenez prepare the Data Bike for riding the High Trestle Trail on August 7, 2019.

## Volunteer Statements



I came across a post on Facebook looking for Data Bike volunteers, and knew right away I'd want to give it a try. I'm interested in random technology, and hadn't ridden an e-bike up to that point. My favorite part of riding the data bike was the interest shown from other riders. I met a group of people who were riding back north on the Great Western Trail, returning from a weekend spent at the Hinterland Music Festival. The camera's monopod latch wasn't working, so it was difficult to keep the camera extended fully while riding the Data Bike. My favorite trail to ride is the Chichaqua Valley Trail.

- Ben Bjork, Great Western Trail volunteer



My favorite part of being a Data Bike volunteer was getting to try the electric bike and also explore a new trail that I had not had the chance to ride on prior to that day. I also enjoyed learning more from the Des Moines Area MPO employees about the process and data retrieval and analysis. The only challenge I had when riding the Data Bike was that one of the phone apps kept shutting down. I have two favorite trails that I like to ride on in Iowa. If I want a quick ride, or more social ride, I head to the High Trestle Trail. If I want a beautiful, scenic, peaceful, reflective ride, I head out on the Chichaqua Valley Trail.

- Sonya Staudt, Summerset Trail and Chichaqua Valley Trail volunteer



A year prior I weighed 300 pounds. Many small changes and a growing circle of friends led me to successfully lose weight and gain a life worth living. I began to enjoy being active, especially biking. This experience sparked my joy to bike more. Doors opened, and friends ushered unique opportunities my way. I was able to jockey a pedicab, take local nursing home residents on rides and participate in the Data Bike initiative. It was enjoyable to experience unfamiliar trails, riding a motorized bike was new to me. The Data Bike data brings value to the trail system. The technology is fascinating! The hardest part is maintaining a slow enough speed to gather the data.

Finishing the route early did provide some time for joy riding. I rode two trails, and I enjoyed exploring unknown territory to me. I look forward to getting to go back on these trails again in the spring.

- Kristine Jimenez, High Trestle Trail and Clive Greenbelt Trail volunteer

# Google Street View Trails Photos

29



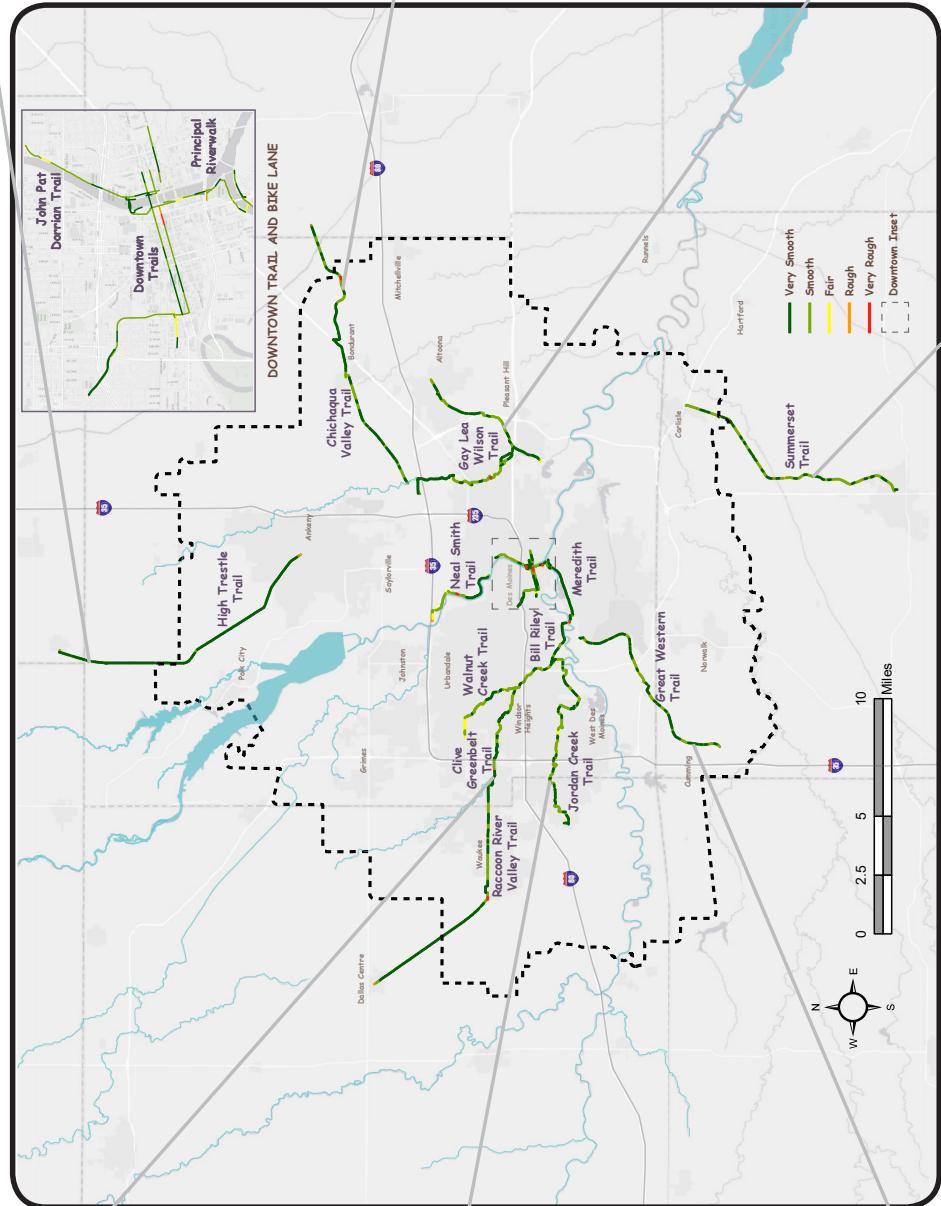
Clove Greenbelt Trail  
Kristine Jimenez  
August 15, 2019



Jordan Creek Trail  
Zach Steele  
July 31, 2019



Great Western Trail  
Ben Bjork  
August 5, 2019



A series of 360° photos along all Central Iowa trails in the MPO region are available on Google Street View. These panoramas are useful for assessing various characteristics along the trails, such as the frequency of intersections, restrooms, signage, drinking fountains, bike racks, seating (benches, picnic tables), trash bins, bike repair stations, canopy cover and vegetation.



High Trestle Trail  
Kristine Jimenez  
August 7, 2019



Chichaqua Valley Trail  
Sonya Staudt  
August 9, 2019



Gay Lea Wilson Trail  
Angie McBiel  
August 14, 2019



Summerset Trail  
Sonya Staudt  
August 8, 2019

Volunteers collected data for seven out of the 14 total trails updated in this report. Their photos add to the existing collection of trails photos from the Data Bike's first run in 2017, all of which are available to view online. Drop the Street View icon onto any Central Iowa trail on Google Maps to explore these photos and see how much the trails conditions have changed.

# CENTRAL IOWA TRAIL CONDITION

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## 2019 REPORT



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