



# Crossway Trails Condition Report

SEPTEMBER 2024

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**CROSSWAY TRAILS**

INDIANA + MICHIGAN



## Who Are We and What Is A Data Bike?

The Michiana Area Council of Governments (MACOG) is a voluntary organization of local governments that studies and attempts to resolve, for the benefit of each member and the region, areas of interlocal issues, which includes but is not limited to transportation, transit, economic development, environment, and other issues that impact the region.

The Crossway Trails is a growing regional trail network working to connect families, commuters, and visitors across Northern Indiana and Southwestern Michigan to improve health, safety, quality of life, and mobility for all. The Crossway Trails consists of trails crossing four counties and several different municipalities.

Trail roughness data is collected using software installed on a bicycle-mounted smartphone. This software records surface roughness and geolocation data, measuring vertical movement to assess trail roughness. The information is then integrated into a map, visualizing the surface conditions of local trails. Additionally, trail-side amenities, such as restrooms and water fountains, are documented. Photographs of trail surfaces and their surroundings are captured to help analyze areas identified as being in poor condition, aiding in determining the causes of surface variance.

MACOG aims to give municipalities and local communities a clear understanding of trail conditions. By providing access to a map that displays these conditions alongside trail-user counts, local governments can develop effective maintenance plans for their trail networks. Additionally, a map highlighting trail-side amenities and overall trail conditions enhances accessibility and helps attract more users to the trails.



## Data Bike Overview



### 360 Camera:

Provides images of the area surrounding trails. Useful for keeping track of trail conditions other than path surface: low overhanging trees, trail-side amenities and landscaping. Images are uploaded to Google street-view.

### Trek Electric Bike:

Used to maintain a constant speed necessary for accurate surface readings.

### Smartphone Running rRuf App:

rRuf is a smartphone application that utilizes the phone's internal accelerometer and gyroscope as well as vertical displacement to create a map of trail surface conditions based on the trail's Trail Roughness Index (TRI) Score.

### Trail Camera:

Geo-located images are recorded in tandem with trail-roughness readings to create an image-based map of trail conditions.



# Summary

The purpose of this survey was to create a map showing the surface conditions and trailside amenities of the existing trails in the four-county region of St. Joseph , Elkhart, Marshall, and Kosciusko. This data can be used by municipalities to better inform plans for trail maintenance and improvements. MACOG also hopes that informing the public of trail conditions and amenities will increase accessibility and encourage more trail usage.

The four-county region features over 100 miles of multi-use trails, which are utilized by tens of thousands of people each year. Studies indicate a steady increase in trail usage across Indiana<sup>1</sup>. As more individuals use these trails for transportation and recreation, the need for improved maintenance grows. In 2023 alone, MACOG recorded over 1,870,000 trail counts across just 15 locations<sup>2</sup>. Until now, few systems have been in place to monitor the surface conditions of these trails. Effective trail maintenance is essential to ensure a positive user experience and to attract new trail users.

Through the “Data Bike” project, MACOG produced a regional trails condition report. Data collection began in 2023 and was completed in the summer of 2024. We surveyed all 100+ miles of multi-use trails in the four counties. The data was converted into roughness scores and visualized in a map showing the conditions of each trail.

## To be considered a multi-use trail the trail must meet these criteria:

- 1. Paved
- 2. Physically separated from traffic
- 3. Intended for a range of non-motorized traffic

## Data Collected:

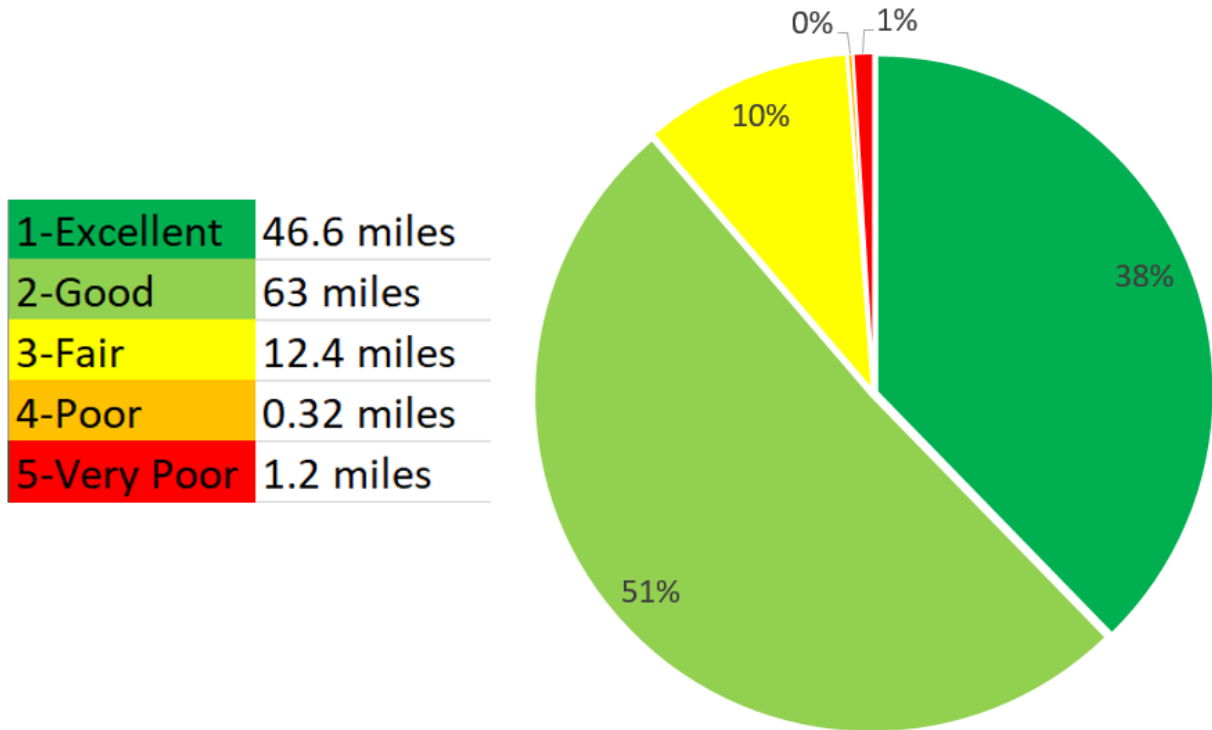
- Surface roughness readings
- 360 & Trail Photos
- Location of amenities such as restrooms, water fountains, etc



<sup>1</sup> Indiana DNR. Indiana Trail Count Analysis May 2020

<sup>2</sup> MACOG. EcoCounter Analysis 2023

## Overall Path Conditions



**MACOG surveyed over 120 miles of trails, finding that 88% were in excellent or good conditions, with 12% being fair to very poor, highlighting a potential need for maintenance or reconstruction.** To pinpoint specific trail areas needing repairs, each trail was divided into 18-foot intervals. Surveying smaller segments reduces the likelihood that large sections in good condition will obscure areas in disrepair when averaged.

# Understanding Roughness Scores

Trail conditions are based on a Trail Roughness Index (TRI) score, calculated by measuring the vertical displacement of a collection device (in this case, a smartphone) across sections of the trail. This displacement is rated on a scale that determines surface roughness: lower vertical displacement results in a lower score, while higher displacement produces a higher score. A low TRI score indicates a trail in good condition, whereas a higher score signals a need for repairs.

Recording only the surface conditions of trails overlooks other obstacles that affect the trail user experience. Issues like low-hanging branches, insufficient directional signage, and lack of amenities impact a trail's accessibility. To address this, MACOG also captured imagery of areas surrounding the trails, documenting overhead clearance and marking the locations of restrooms, water fountains, and trail signage.

Roughness scores are based on vertical displacement, regardless of surface type. As a result, uneven surfaces like gravel or boardwalks may produce higher ratings. While this can present potential issues, MACOG's surveys found that sections with wooden boardwalks or gravel still generally scored in the good to excellent range. Trail images collected by the data bike allow for verifying that any poorly rated trail section is indeed due to surface degradation rather than other factors.





**Excellent (TRI ≤ 2)**

Trail is consistently smooth and lacks significant cracks or bumps. Small imperfections may be present but do not negatively impact the user experience.



Coal Line Trail

**Good (TRI 2-3.5)**

Trail is in generally good condition but may have cracking or other imperfections here and there. Rehabilitation may be needed in isolated areas but the user experience is overall positive.



Winona Lake Heritage Trail

**Fair (TRI 3.5 - 5.5)**

Trail shows increased wear and tear through intermittent bumps, cracks, and depressions. Inconsistencies are generally tolerable to users but can reduce the quality of the experience. Rehabilitation is recommended in several areas.



Bremen Walking Path

**Poor (TRI 5.5 - 7)**

Trail is uncomfortable to ride for many users due to consistent bumps and depressions. Major rehabilitation is required to increase the quality of the user experience.



East Race Trail

**Very Poor (TRI > 7)**

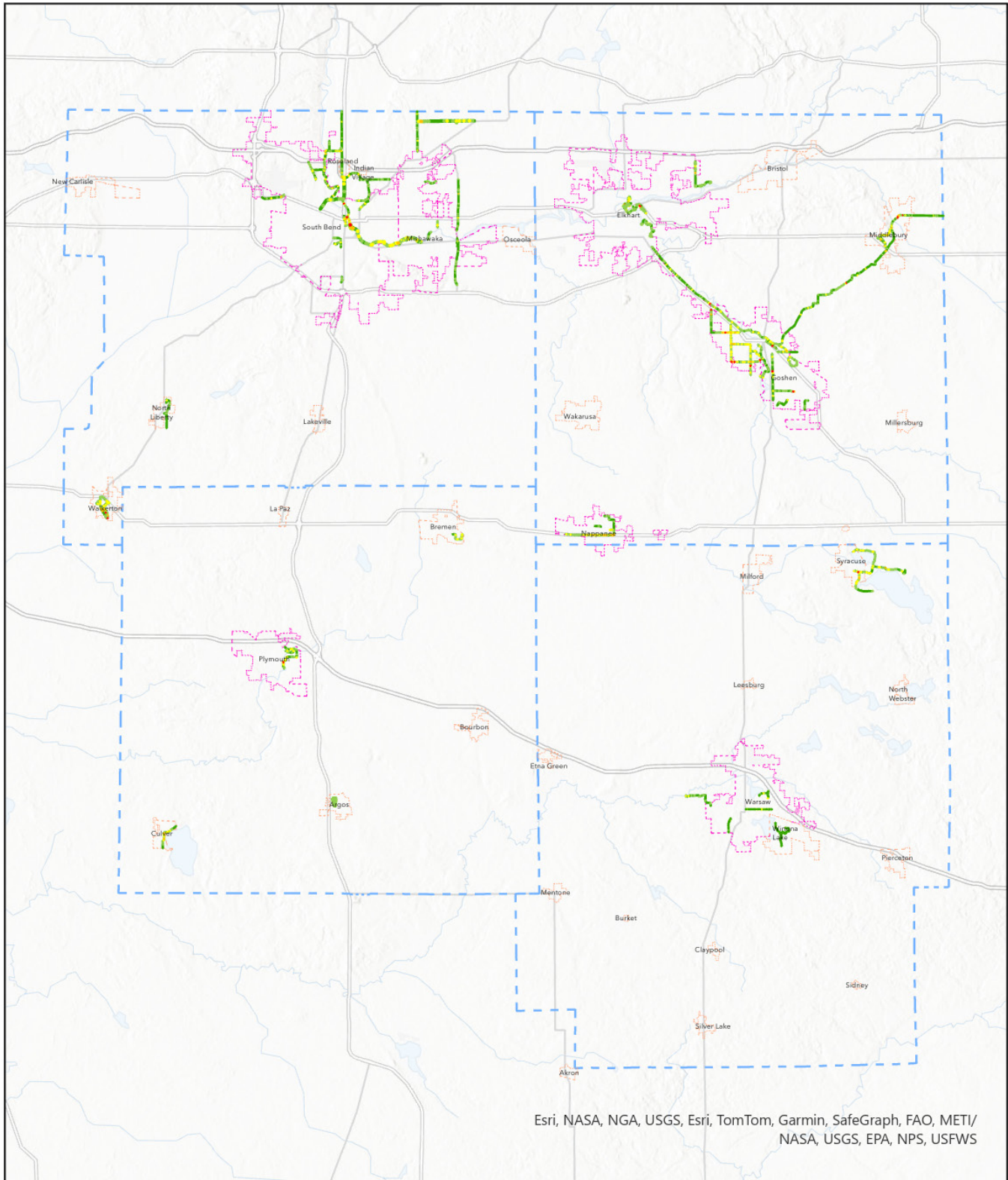
Trail has significant unavoidable bumps or depressions that cause discomfort to users and may pose safety concerns. Reconstruction is likely necessary to improve conditions.



Riverside Trail



# Overall Map



# Overall Miles by Condition

Trail Name	Legnth (mi)	Grade	Miles by Condition	Trail Name	Legnth (mi)	Grade	Miles by Condition
Angela Blvd Trail	0.6	A-		Millrace Canal Trail	2.6	A-	
Argos Community Trail	0.9	B+		Mishawaka Riverwalk	2.9	B	
Boland Dr	0.7	A+		N Byrkit Ave	0.4	B	
Capital Ave Trail	5.5	A		NIBCO Park	0.1	A-	
Central City Trail	0.9	A+		Northshore Drive	1.3	B+	
Coal Line Trail	0.6	A		Northside Trail	3.4	A-	
Conklin Bay Trail	1.7	A-		Oakland Trail	1.0	A	
Corrie Dr Trail	0.7	A+		Pickwick Road	1.3	A-	
CR 10 Path	1.0	A		Plymouth Greenway Trail	3.3	A-	
CR 15 Path	1.3	A		Portage Ave Trail	1.1	A	
Derksen Farm & Wetland Area	0.7	A+		Pumpkinvine Trail	11.8	A	
Douglas Rd Path	2.1	A+		Reliance Rd Trail	1.3	A	
East Bank Trail	2.7	A-		Ridge Run Trail	0.7	A+	
Eastshore Drive	0.8	A-		Riverside Trail	3.4	A	
Elkhart Riverwalk	4.4	B		Shanklin and Mullet Trail	0.9	B	
Essenhaus Trail	0.2	A-		South Bend Ave Trail	0.7	A	
Fidler's Pond Trail	1.5	B		SRTS Path	0.2	A+	
Granger Paths and Gumwood Trail	3.1	A		St. Patricks Park Trail	0.5	A+	
Greencroft Connector	0.1	A+		Stauffer Park Trail	0.3	A+	
Greenway Trail	1.7	A		Stellar Trail	0.9	A+	
Howard Park Trail	0.3	B		Syracuse-Wawasee Trail	2.0	A-	
La Salle Trail	4.6	A		Tamarck Trail	0.9	A+	
Lake City Greenway	3.9	A		Trinity Pl Trail	0.6	A	
Lake Max Trail	0.6	A		Twyckenham Trail	1.0	A+	
Lincolnway West Trail	1.7	A+		US 33 North Connector	0.7	A-	
Logan St Trail	0.8	A-		Walkerton Walking Path	3.4	B+	
Maple City Greenways	11.0	B-		Waterford Crossing Trail	0.9	A+	
Mapleheart Trail	4.7	A		Wayne Street Trail	0.8	B	
Market St Trail	2.5	B-		Wilden Ave Trail	3.1	A-	
Merrifield Park Trail	0.5	A		Winona Interurban Trail	1.5	A+	

More detailed trail maps can be found in Appendix A and B as well as on MACOG's online Story Map [linked here](#).

## Planning for the Future

Many trails lack a maintenance plan or budget. Developing a trail maintenance plan is essential for agencies to budget effectively, plan for upkeep, track labor for grant applications, reduce liability, and enhance the trail user experience. Maintenance costs are largely influenced by the planning process. Proper trail construction, considering environmental factors and future upkeep expenses, can substantially lower maintenance costs. Ideally, a maintenance plan and budget should be established during the trail design phase. On average, maintaining an asphalt trail costs approximately \$2,000 per mile annually<sup>1</sup>. Once a trail is built, adhering to a regular maintenance schedule reduces long term upkeep costs and ensures its longevity and usability for years.



### Effective Trail Planning Reduces Maintenance Costs

The best way to lower trail maintenance costs is through strategic trail planning. The most common trail maintenance expenses are repairing damage from tree roots and mowing grass. Tree root damage can be mitigated by installing root barriers, occasional root trenching, tree removal, or situating trails away from areas of extensive root growth. Grass mowing costs can be minimized by incorporating native plants and shrubs along the trail instead of turf grass. Designing a trail means balancing user amenities with a sustainable maintenance budget. Major trail maintenance expenses include restroom upkeep (the costliest item), mowing, plant management, trail clearing, and signage repair.

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<sup>1</sup>Rails-to-Trail Conservancy. Maintenance Practices and Costs of Rail Trails 2015 (p. 27)

## The Value of Preventative Maintenance

Preventative maintenance is more cost-effective than neglecting a trail and addressing extensive repairs later. For example, repairing ice-related damage caused by freeze-thaw cycles can be minimized with a crack-seal maintenance plan. While culvert clearing typically accounts for only 5% of maintenance costs<sup>2</sup>, neglecting this task can lead to expensive failures, potentially costing tens of thousands of dollars. Agencies can reduce costs by collaborating with volunteer groups and nonprofits to handle maintenance tasks. 58% of trails rely on volunteers for maintenance tasks<sup>3</sup>. Establishing a trail maintenance volunteer organization can be a key component of a successful maintenance strategy. Additionally, funding sources such as the Recreational Trails Program can help cover maintenance expenses. Liability insurance is another important cost, and a well planned maintenance schedule reduces the likelihood of liability issues arising.

## Planning for Sustainable Trails

Cost-effective maintenance begins with a well-designed trail construction plan. Unfortunately, many trails are built without considering the long-term need for a maintenance budget. There are preventative measures that can be taken in the trail planning stage and cost-effective maintenance techniques that can be employed on already constructed trails. The cost of trail upkeep should not discourage agencies from building trails but rather inform them to create trails that are sustainable and can be enjoyed for generations.

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<sup>2</sup> Rails-to-Trail Conservancy. Maintenance Practices and Costs of Rail Trails 2015 (p. 28)

<sup>3</sup> 3 Rails-to-Trail Conservancy. Maintenance Practices and Costs of Rail Trails 2015 (p. 8)





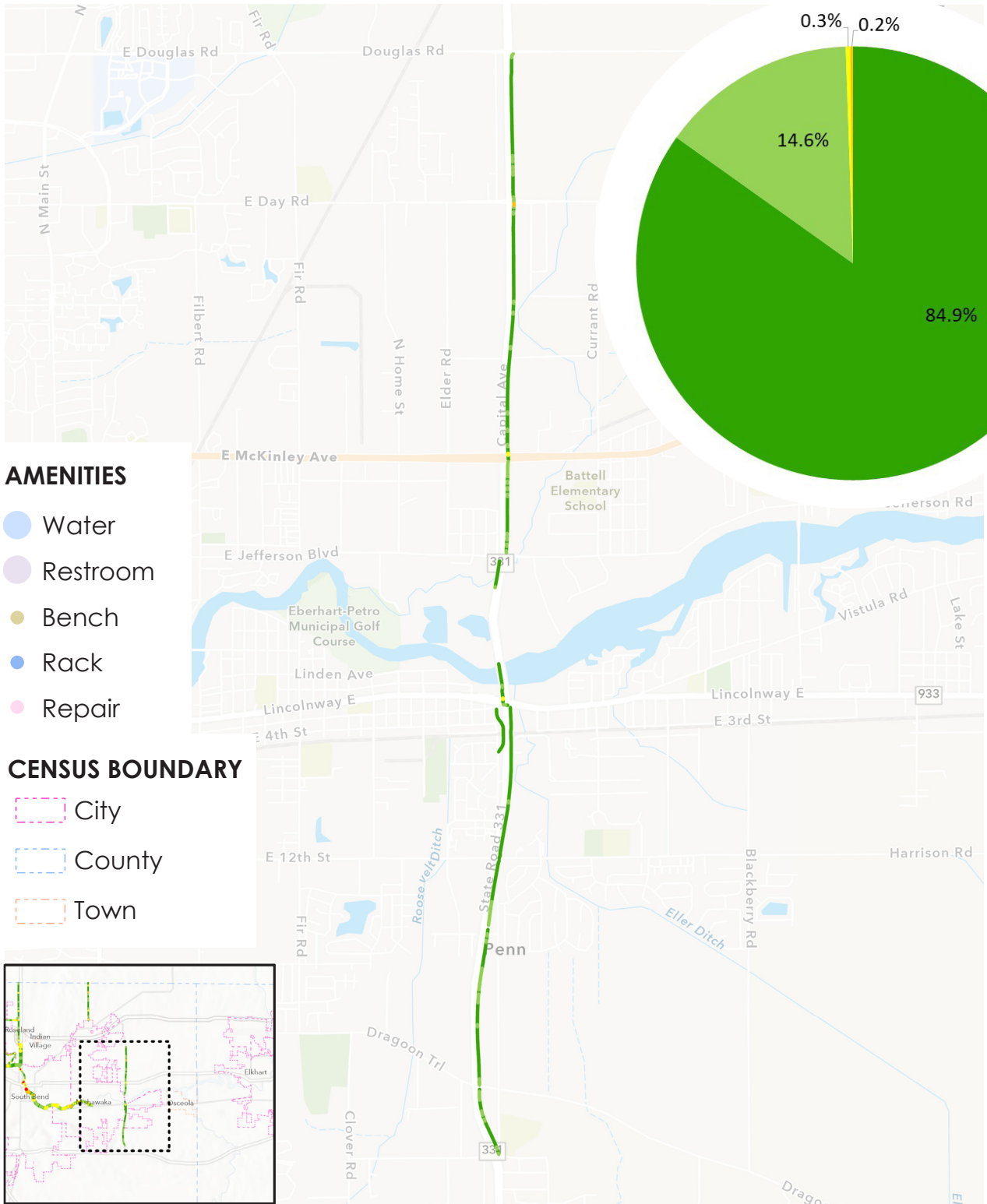
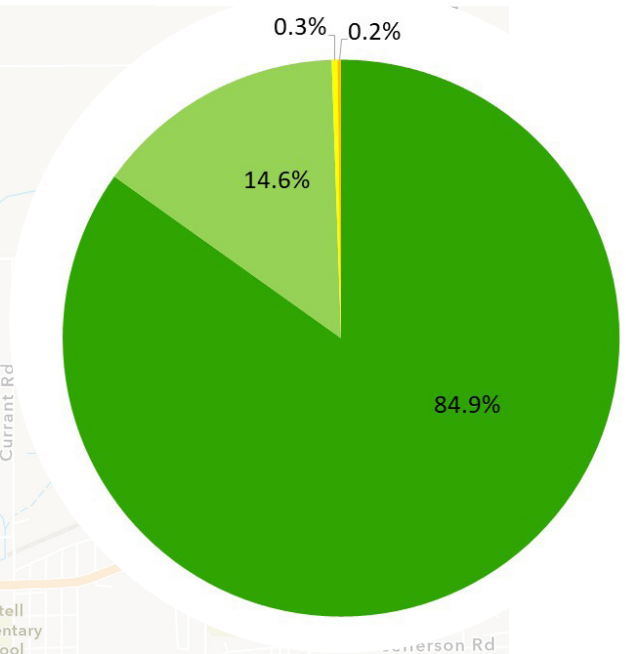
**Appendix** **A**  
INDIVIDUAL REPORTS

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# CAPITAL AVENUE TRAIL

MILES BY CONDITION

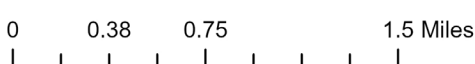
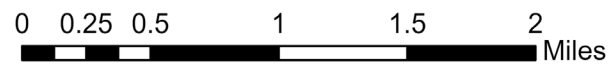
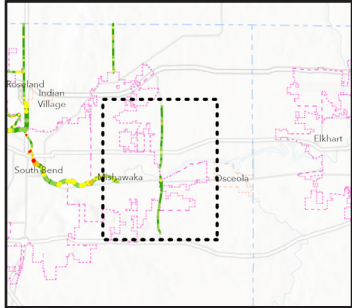


**AMENITIES**

- Water
- Restroom
- Bench
- Rack
- Repair

**CENSUS BOUNDARY**

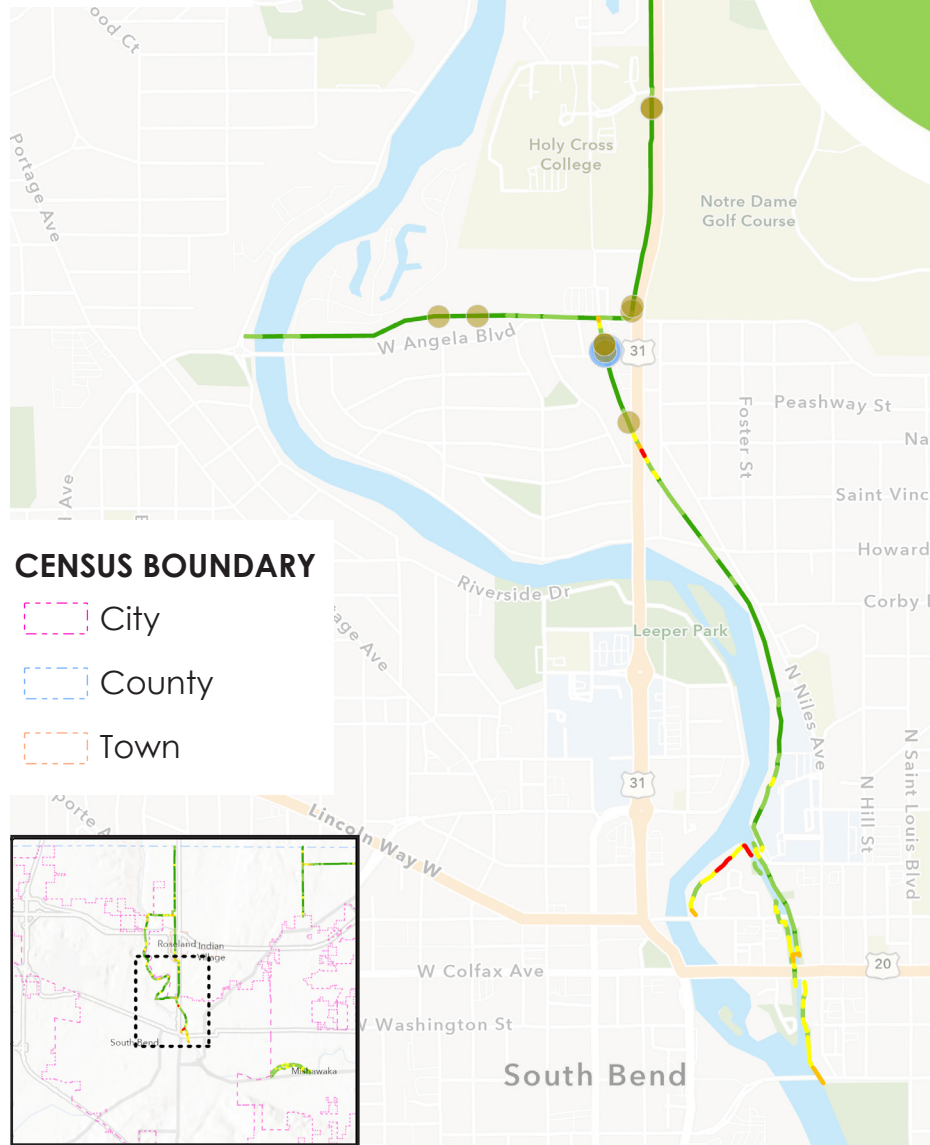
- City
- County
- Town



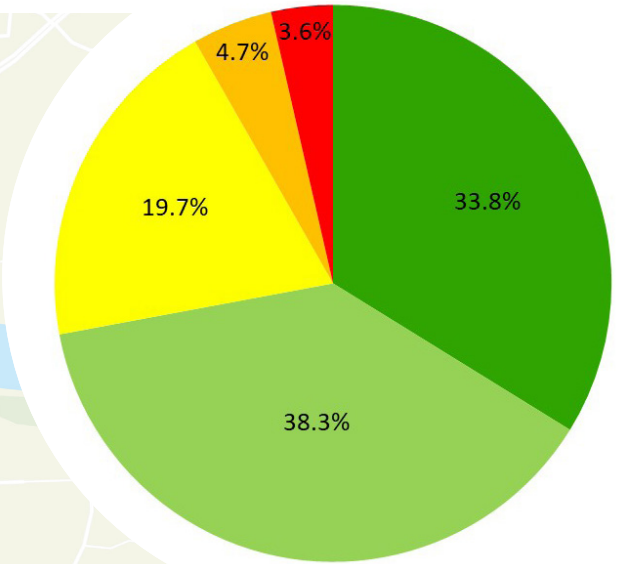
# EASTBANK TRAIL

## AMENITIES

- Water
- Restroom
- Bench
- Rack
- Repair



## MILES BY CONDITION



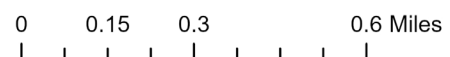
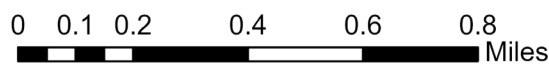
## AREAS OF MOST CONCERN



Eastbank Trail (Michigan St Bridge)



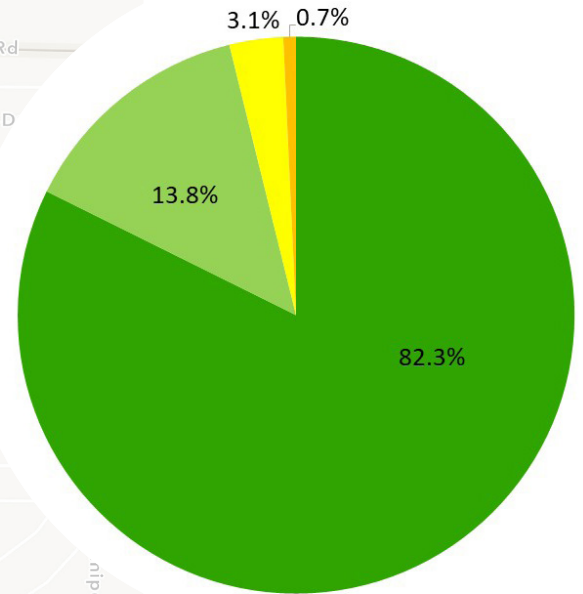
Eastbank Trail (Michigan St Bridge)





# LASALLE TRAIL

## MILES BY CONDITION



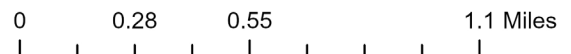
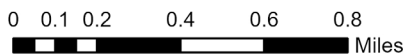
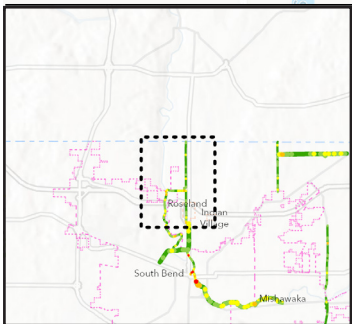
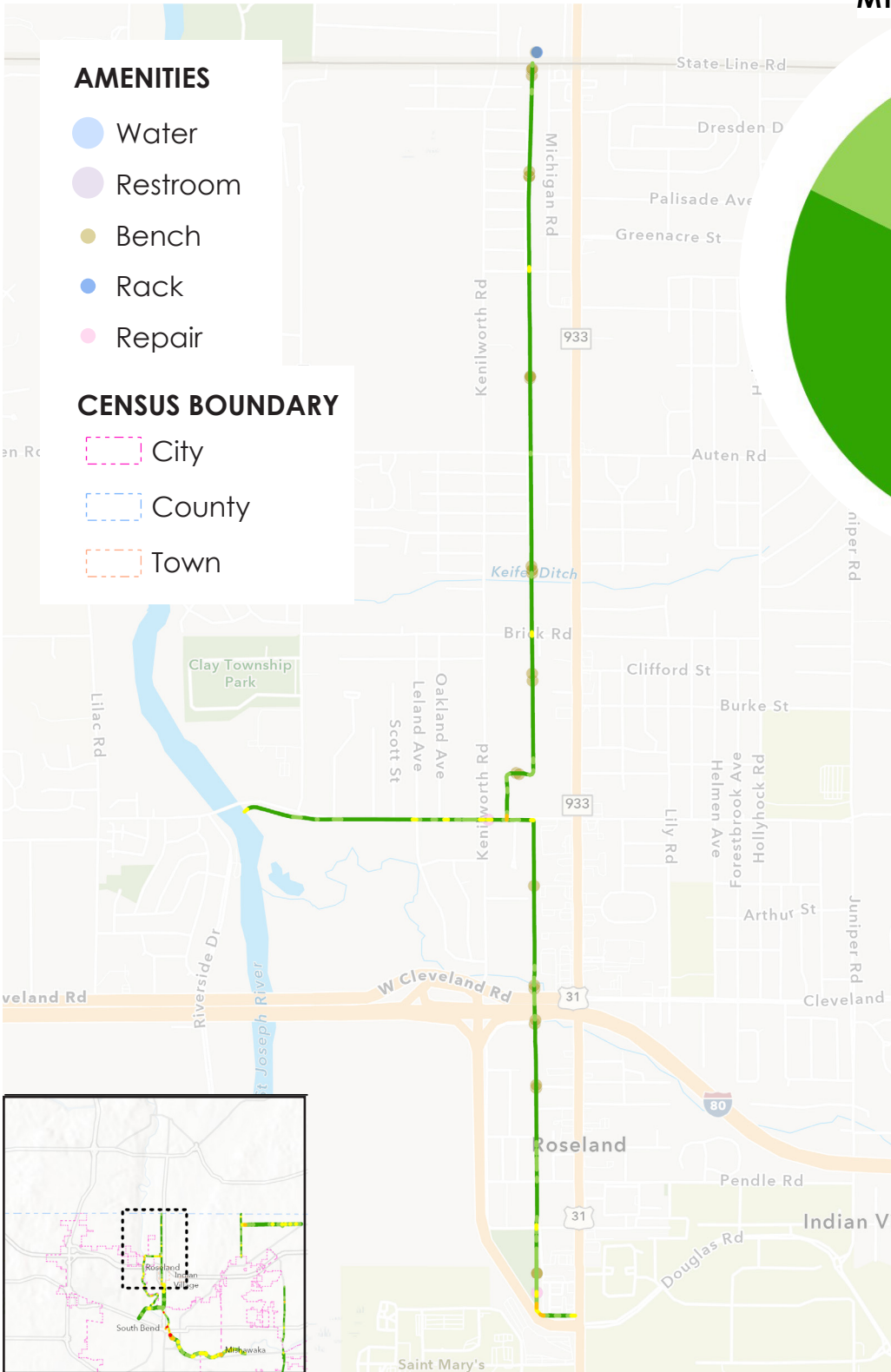
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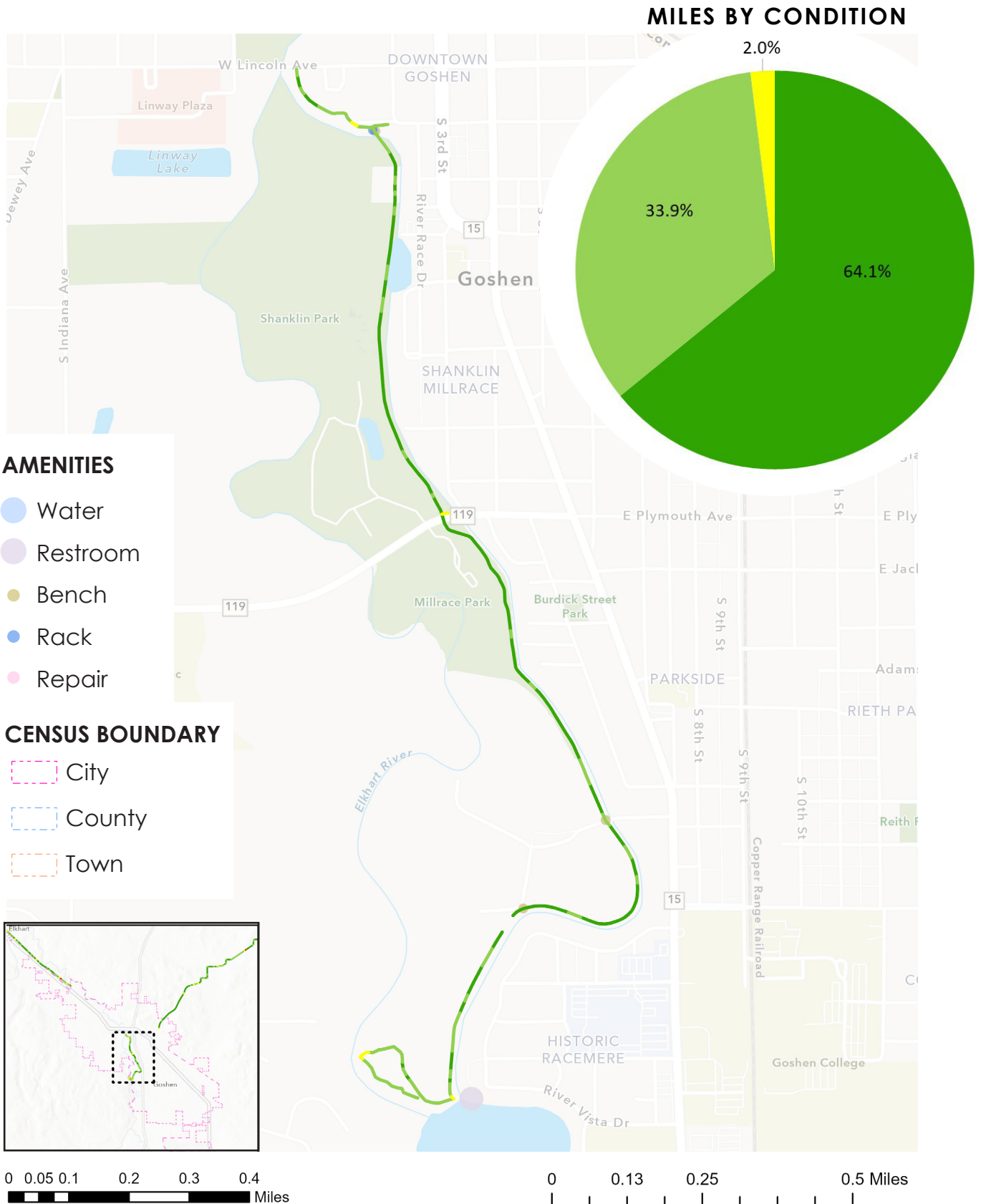
LaSalle Trail by Dublin Village



LaSalle Trail by Dublin Village



# MILLRACE CANAL TRAIL



# MISHAWAKA RIVERWALK

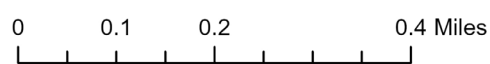
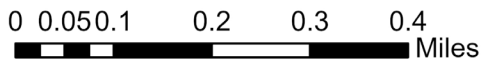
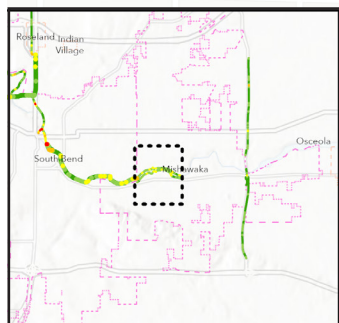
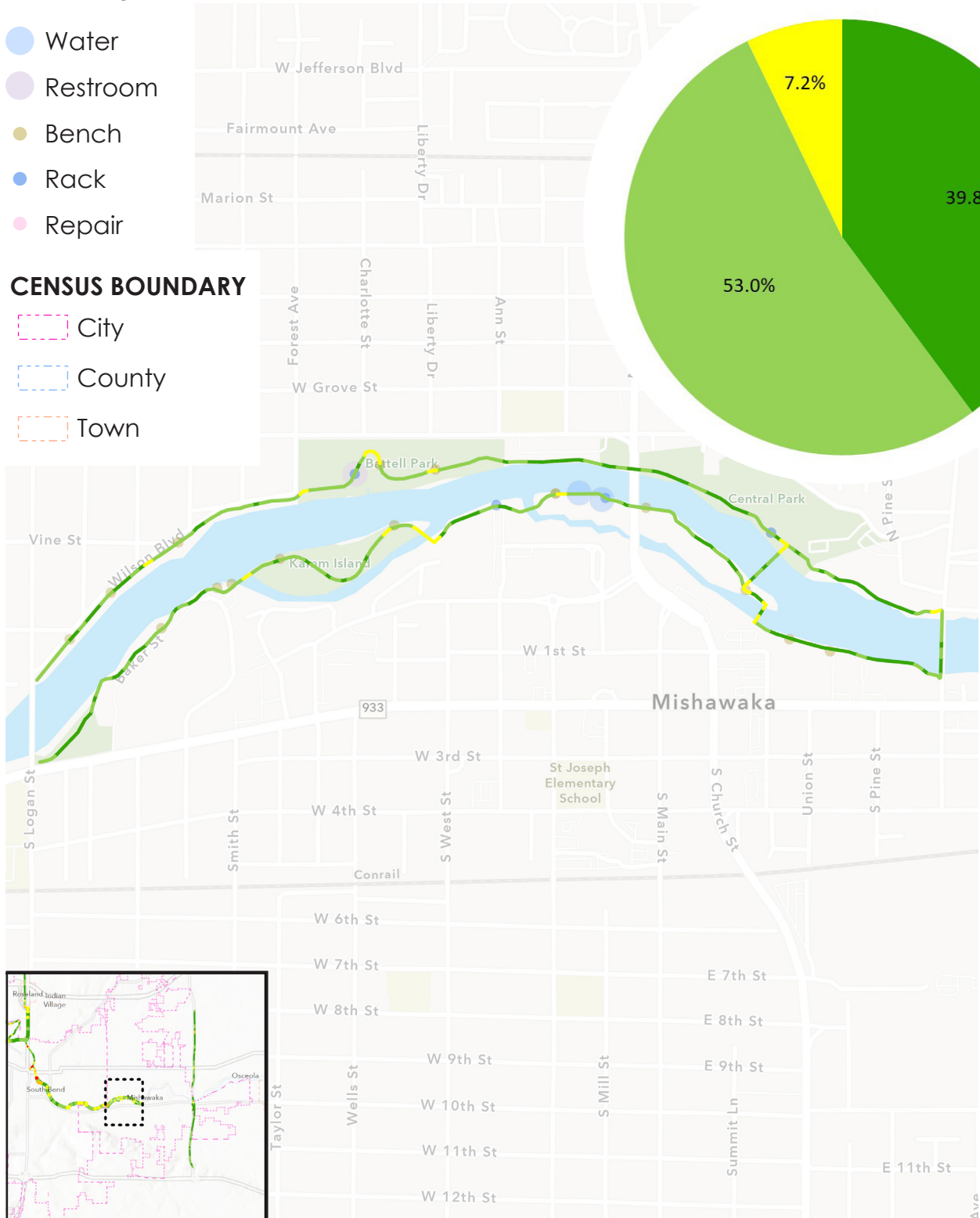
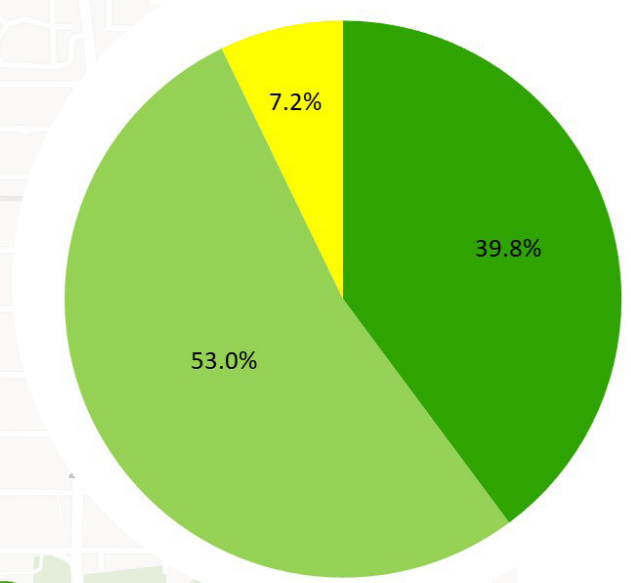
## AMENITIES

- Water
- Restroom
- Bench
- Rack
- Repair

## CENSUS BOUNDARY

- City
- County
- Town

## MILES BY CONDITION



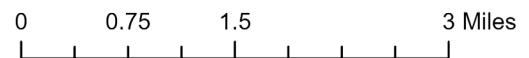
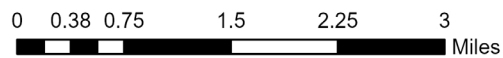
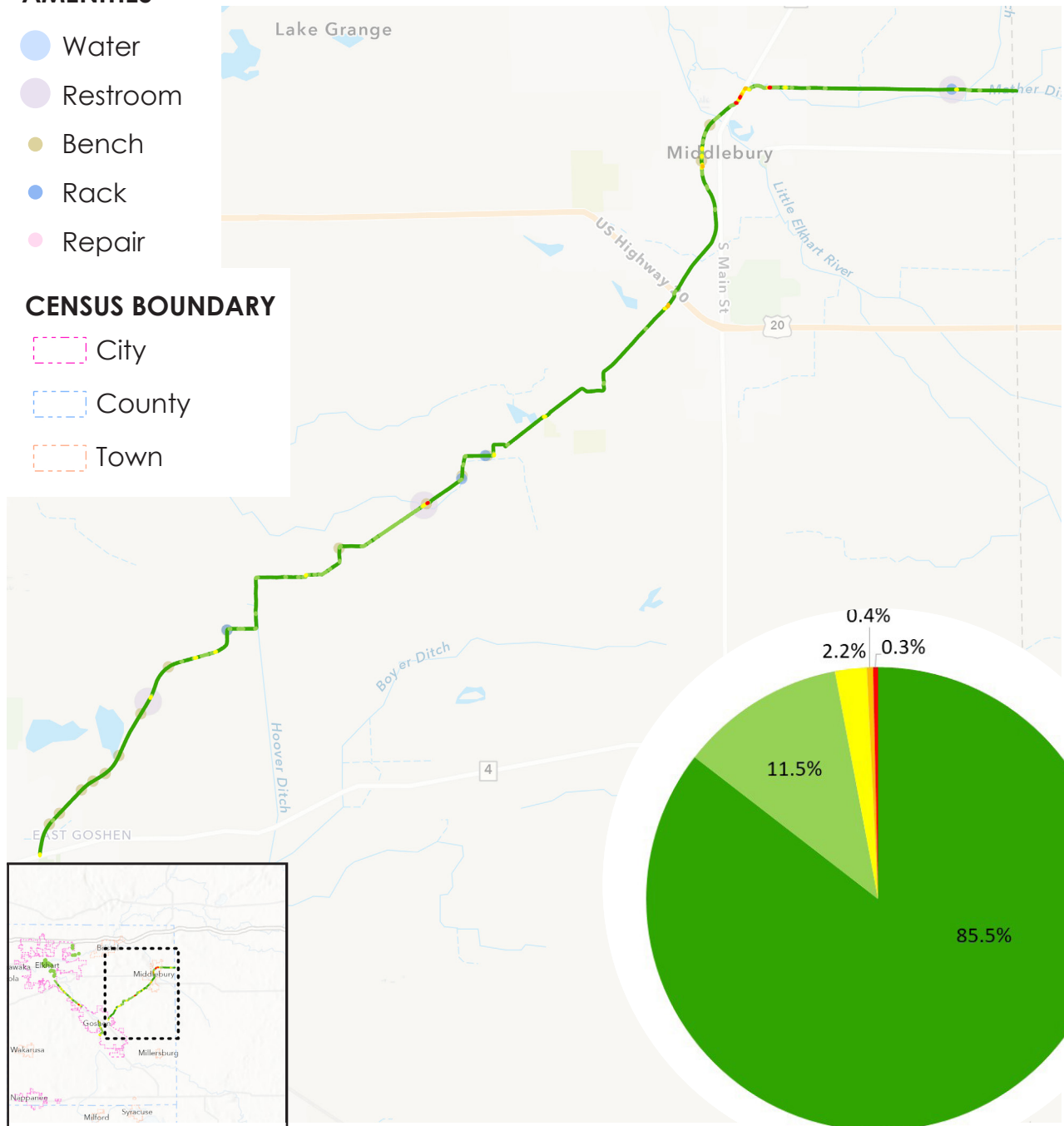
# PUMPKINVINE TRAIL

## AMENITIES

- Water
- Restroom
- Bench
- Rack
- Repair

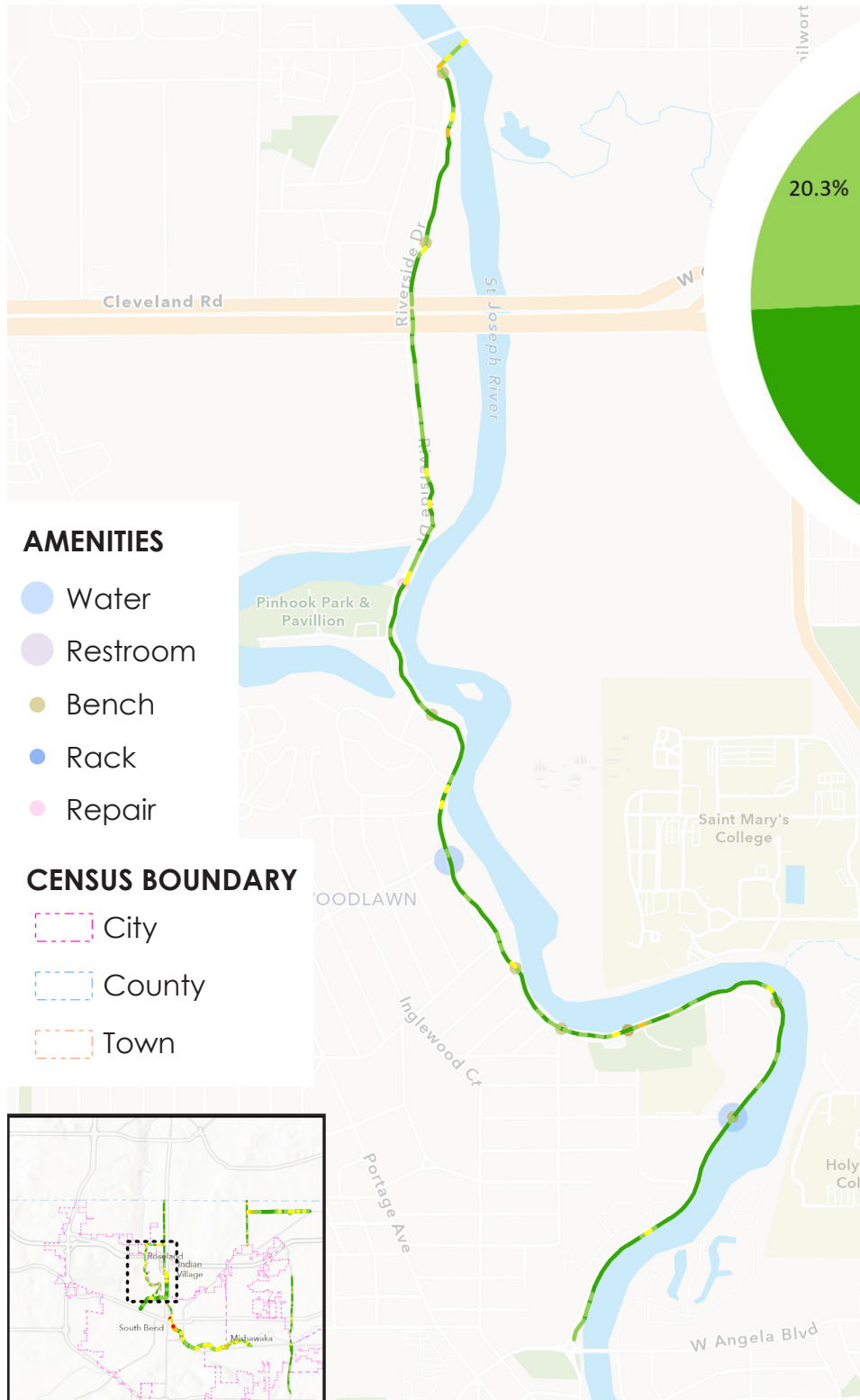
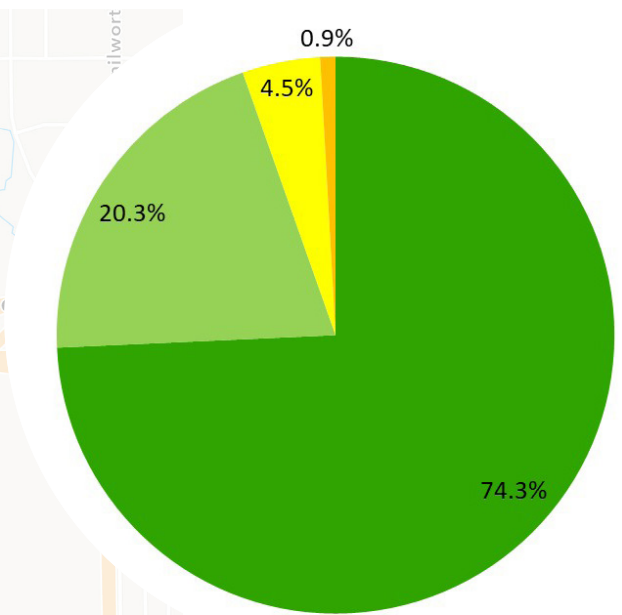
## CENSUS BOUNDARY

- City
- County
- Town



# RIVERSIDE TRAIL

## MILES BY CONDITION

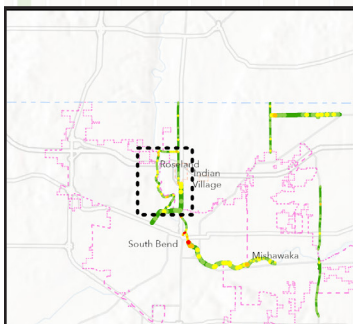


### AMENITIES

- Water
- Restroom
- Bench
- Rack
- Repair

### CENSUS BOUNDARY

- City
- County
- Town



### AREAS OF MOST CONCERN



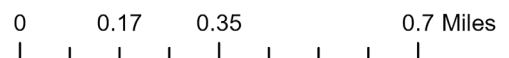
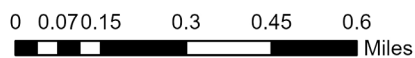
Riverside Trail at Joyce



Riverside Trail at Pinhook Park



Riverside Trail at Riverside North Apts.



# ADAMS ROAD

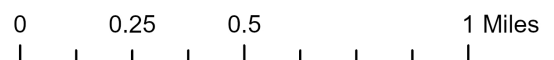
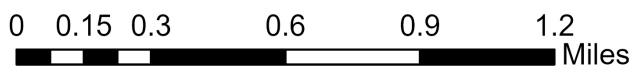
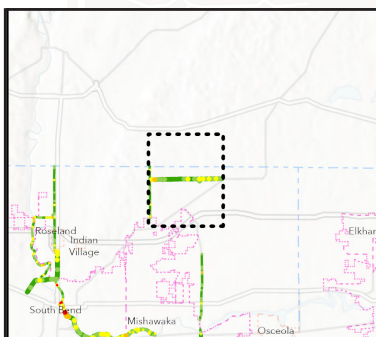
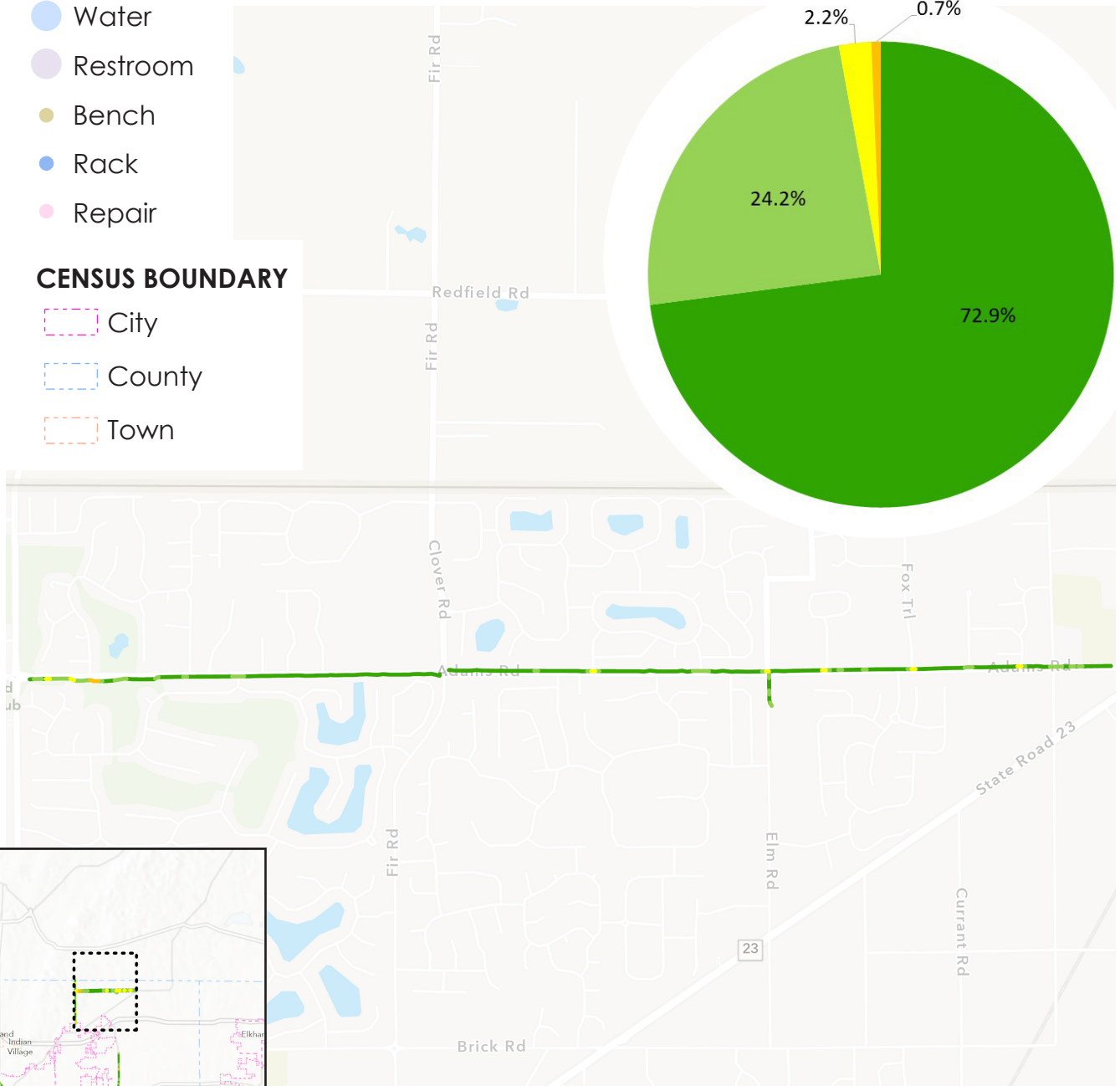
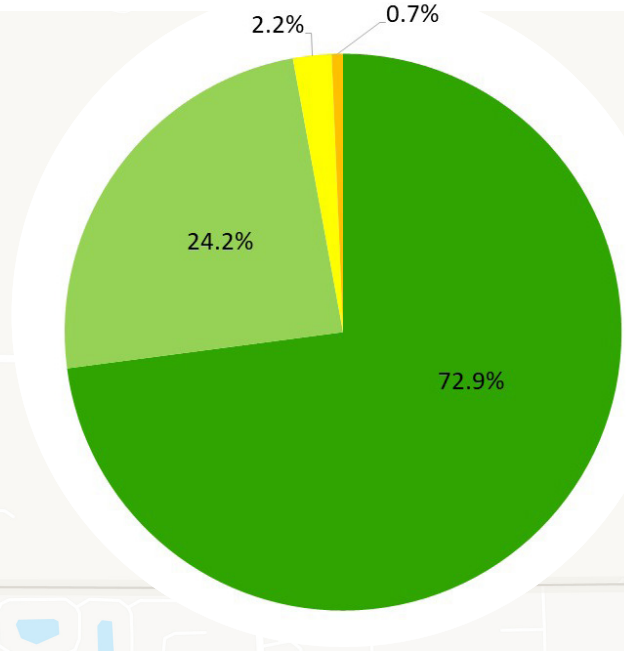
## AMENITIES

- Water
- Restroom
- Bench
- Rack
- Repair

## CENSUS BOUNDARY

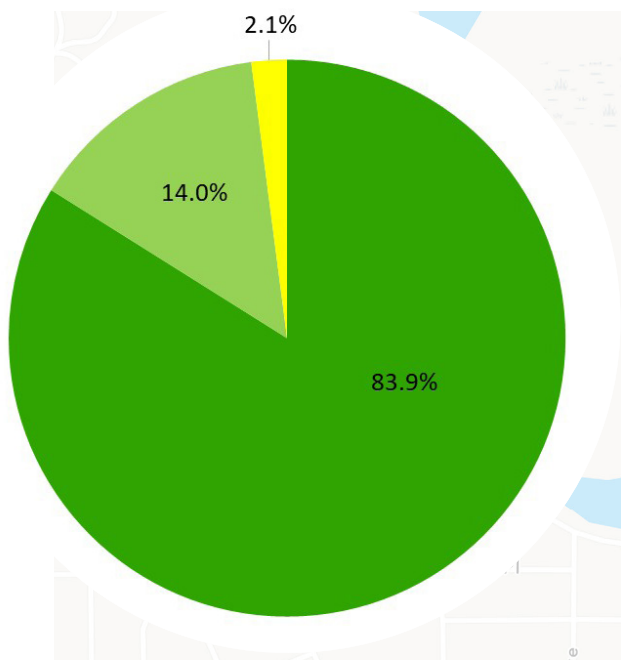
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- Town

## MILES BY CONDITION



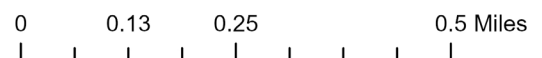
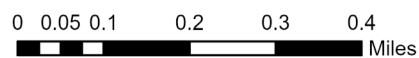
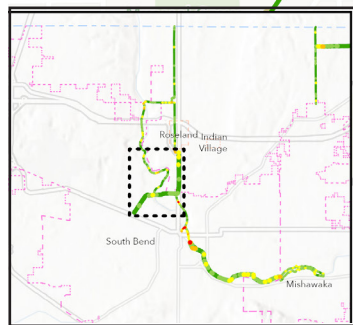
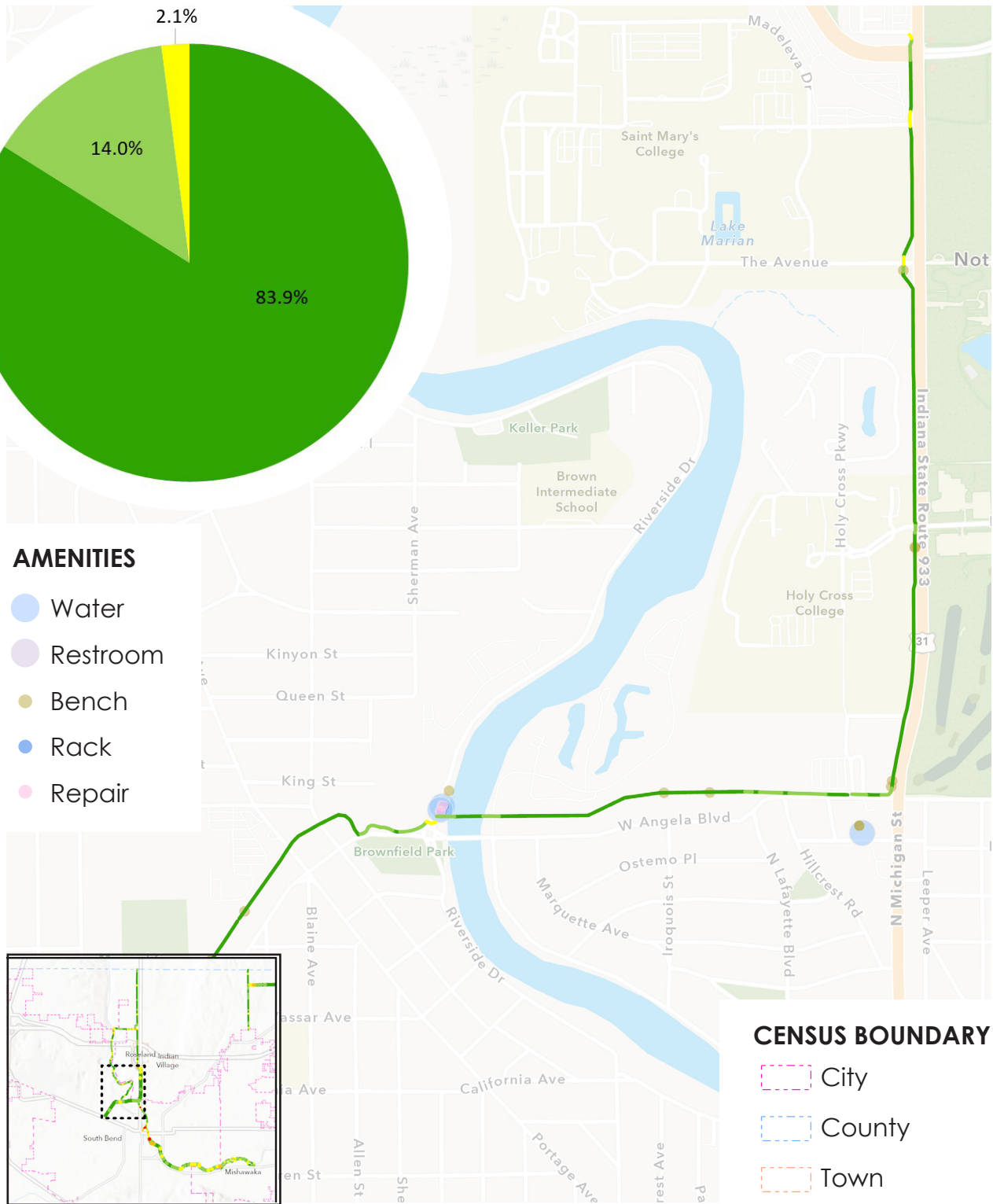
# COAL LINE TRAIL

## MILES BY CONDITION



## AMENITIES

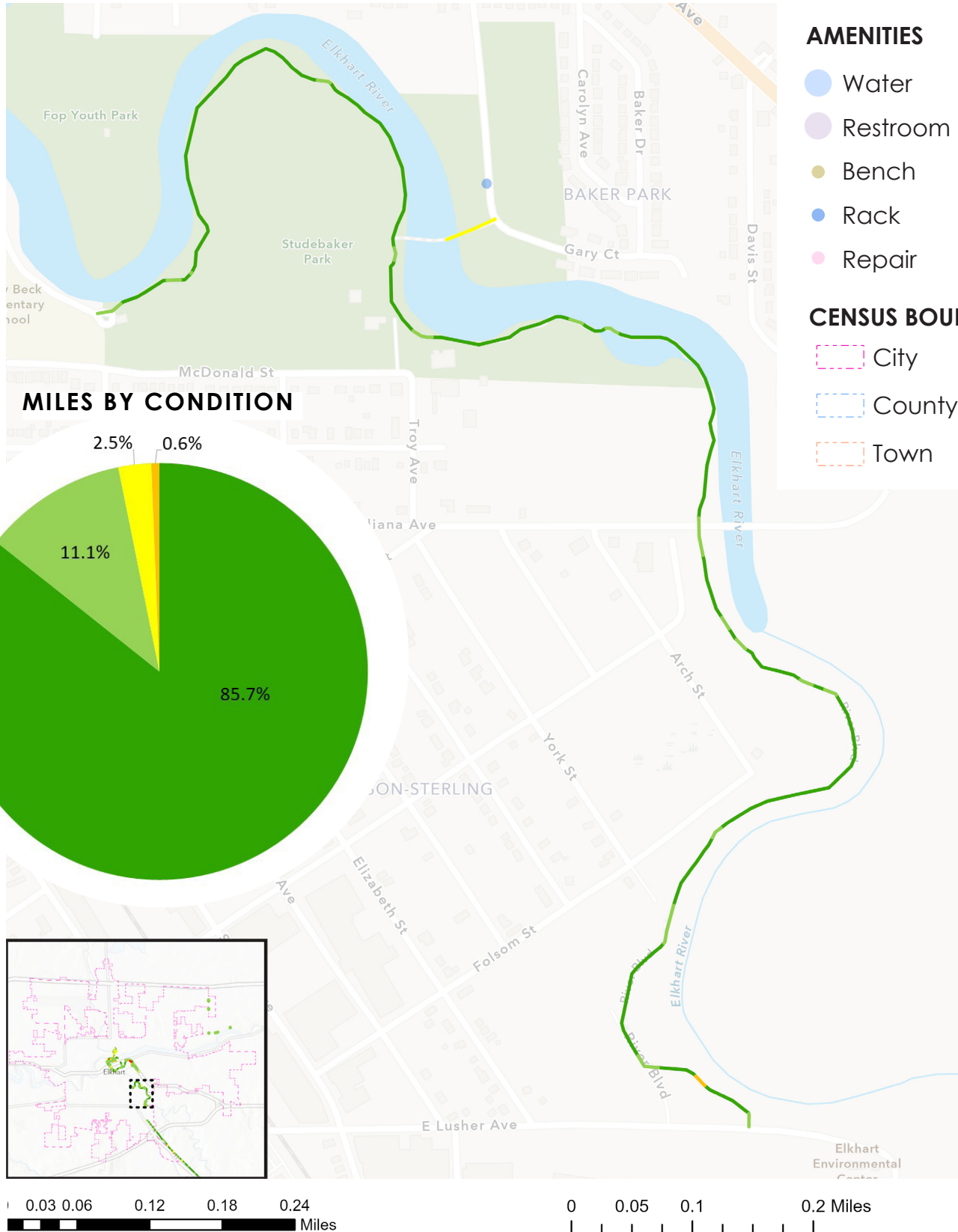
- Water
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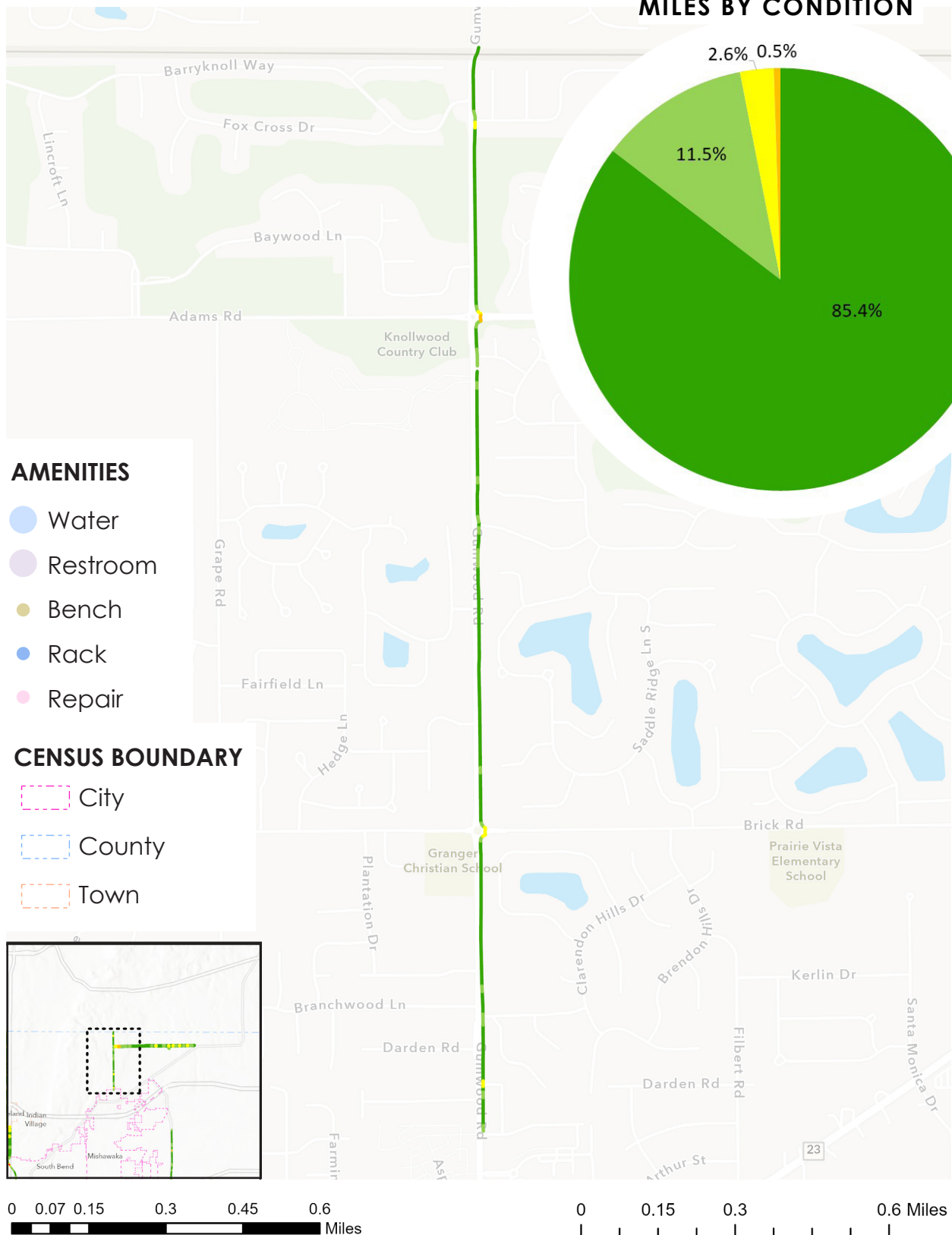
- City
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# GREENWAY TRAIL

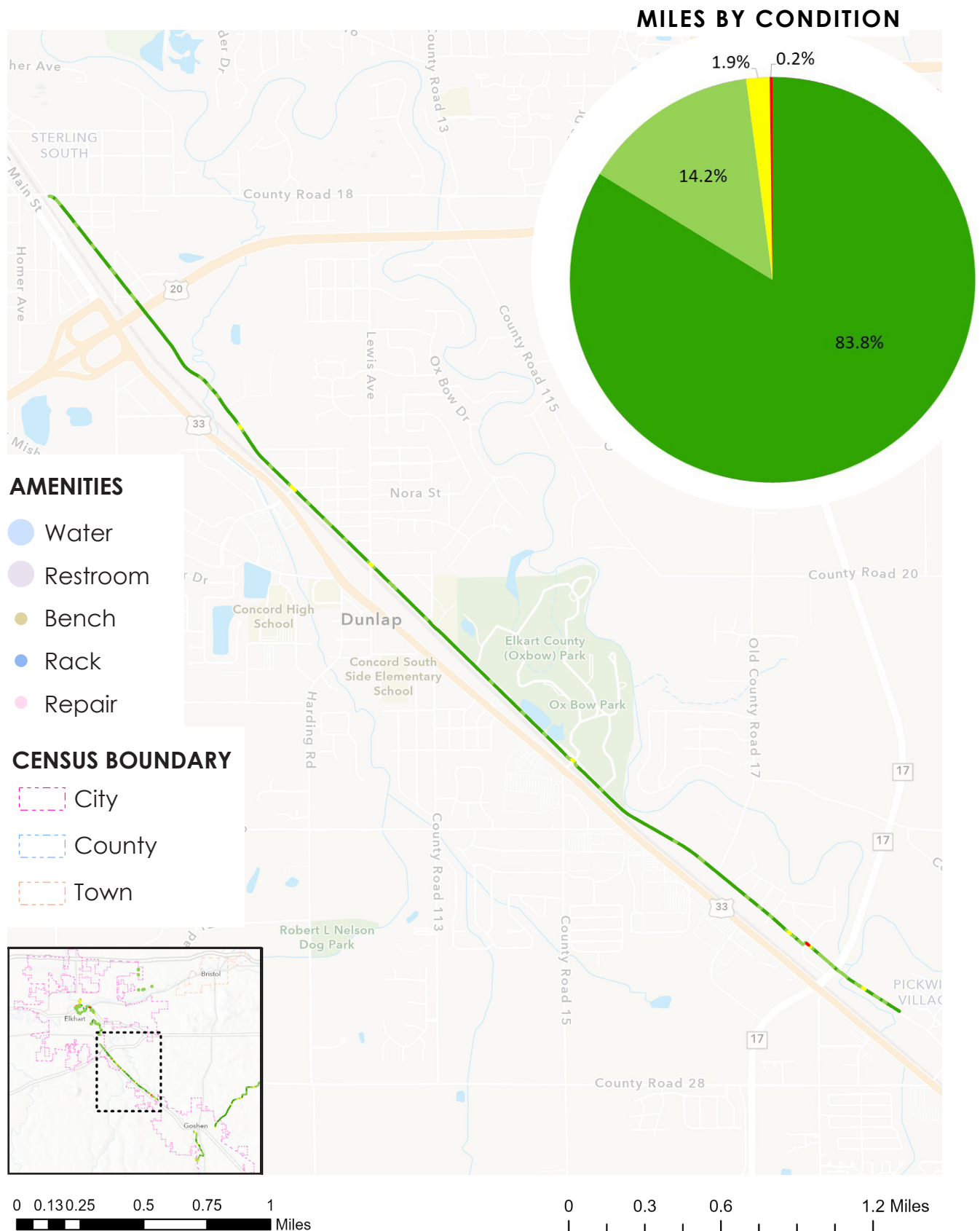




# GUMWOOD ROAD TRAIL



# MAPLE HEART TRAIL

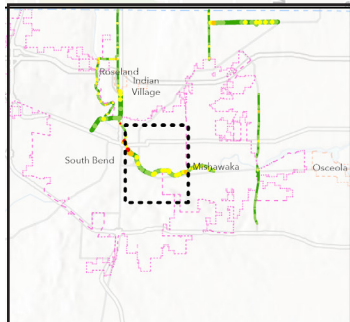
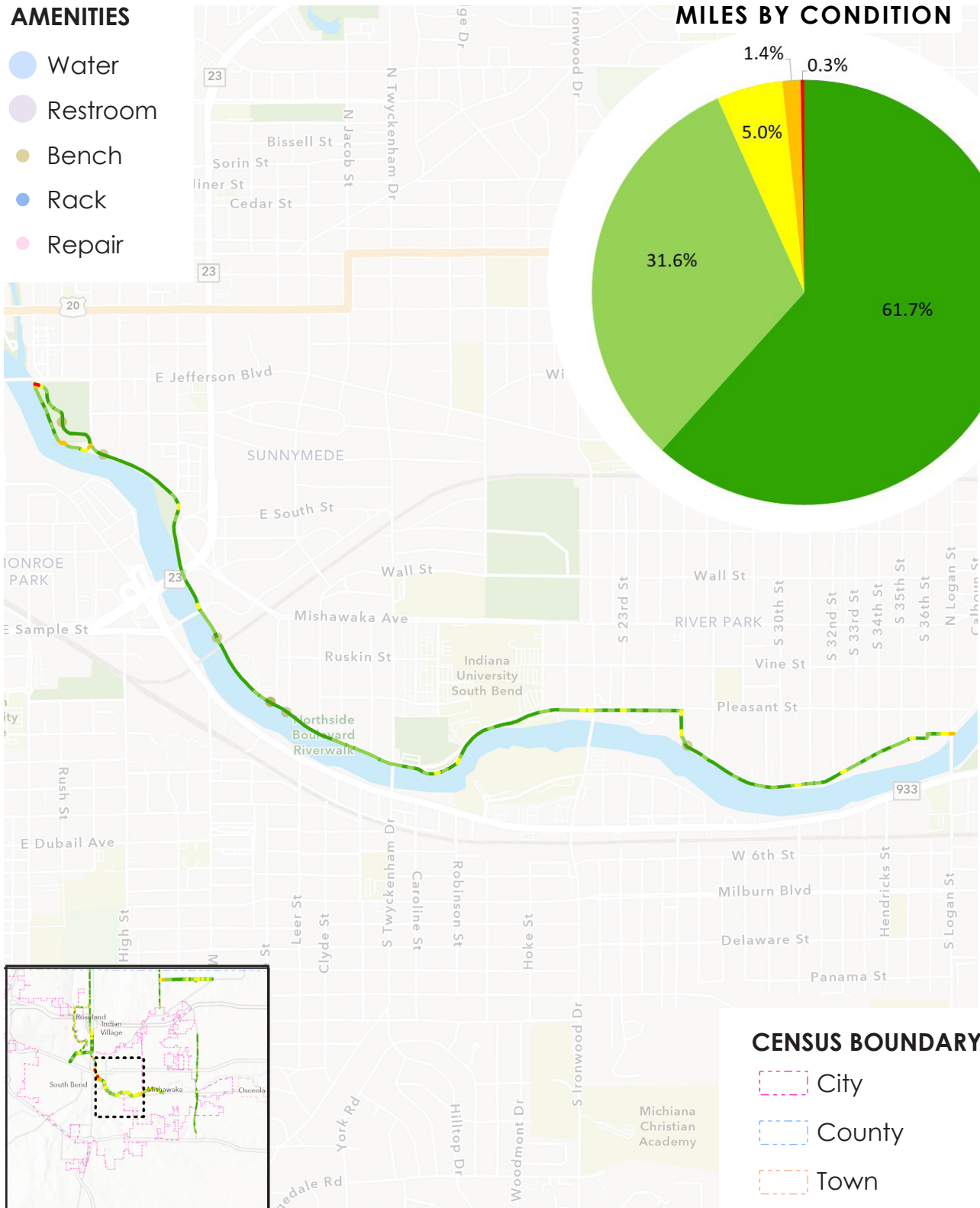
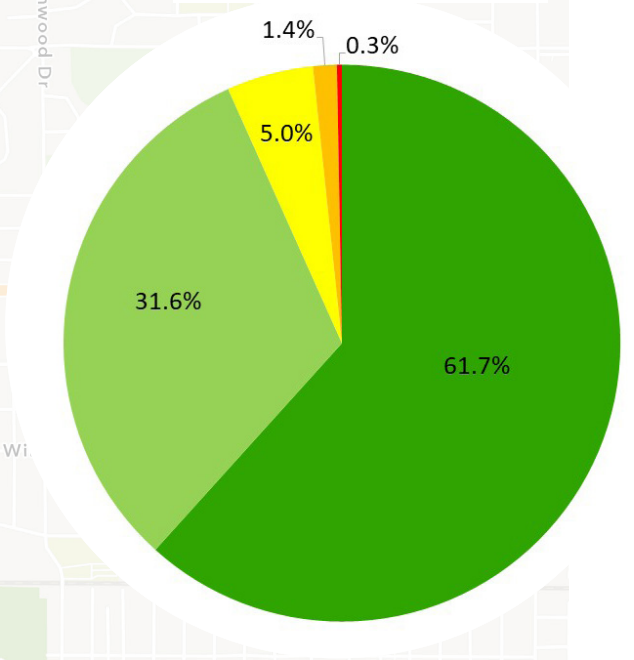


# NORTHSIDE TRAIL

## AMENITIES

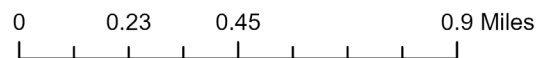
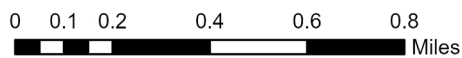
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- Restroom
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## MILES BY CONDITION



## CENSUS BOUNDARY

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- County
- Town

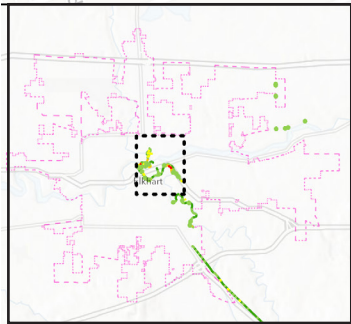
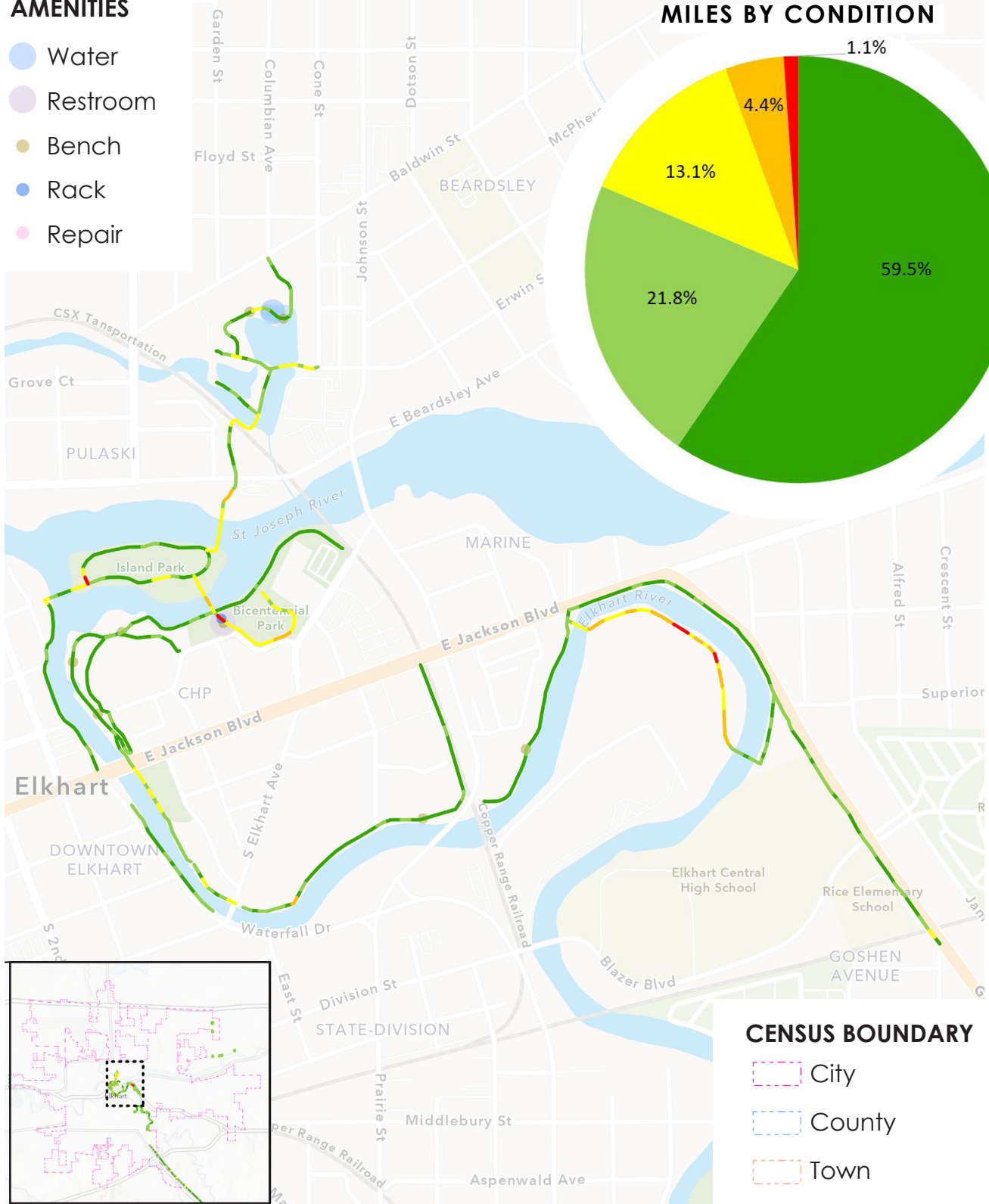
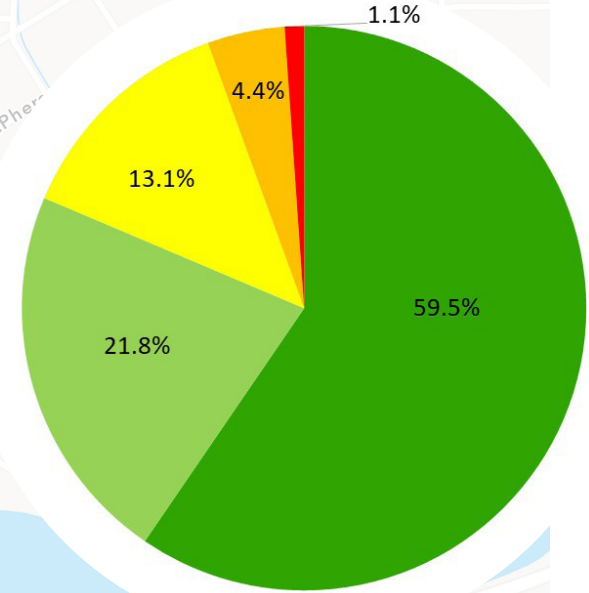


# RIVERWALK TRAIL

## AMENITIES

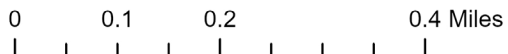
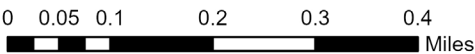
- Water
- Restroom
- Bench
- Rack
- Repair

## MILES BY CONDITION



## CENSUS BOUNDARY

- City
- County
- Town





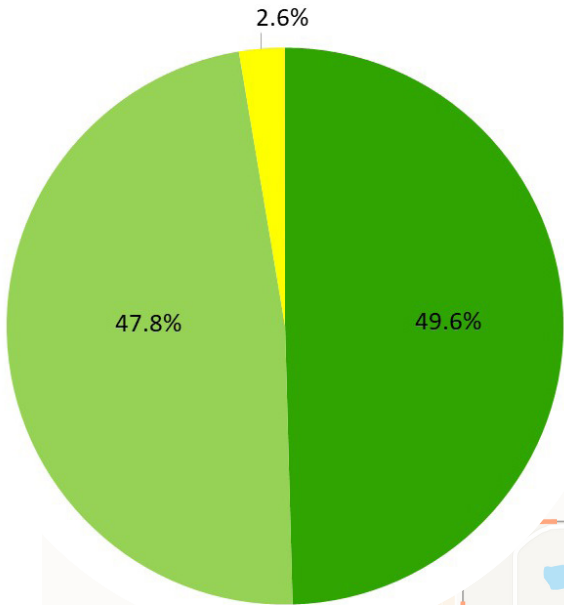
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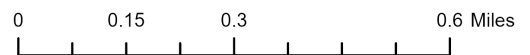
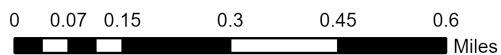
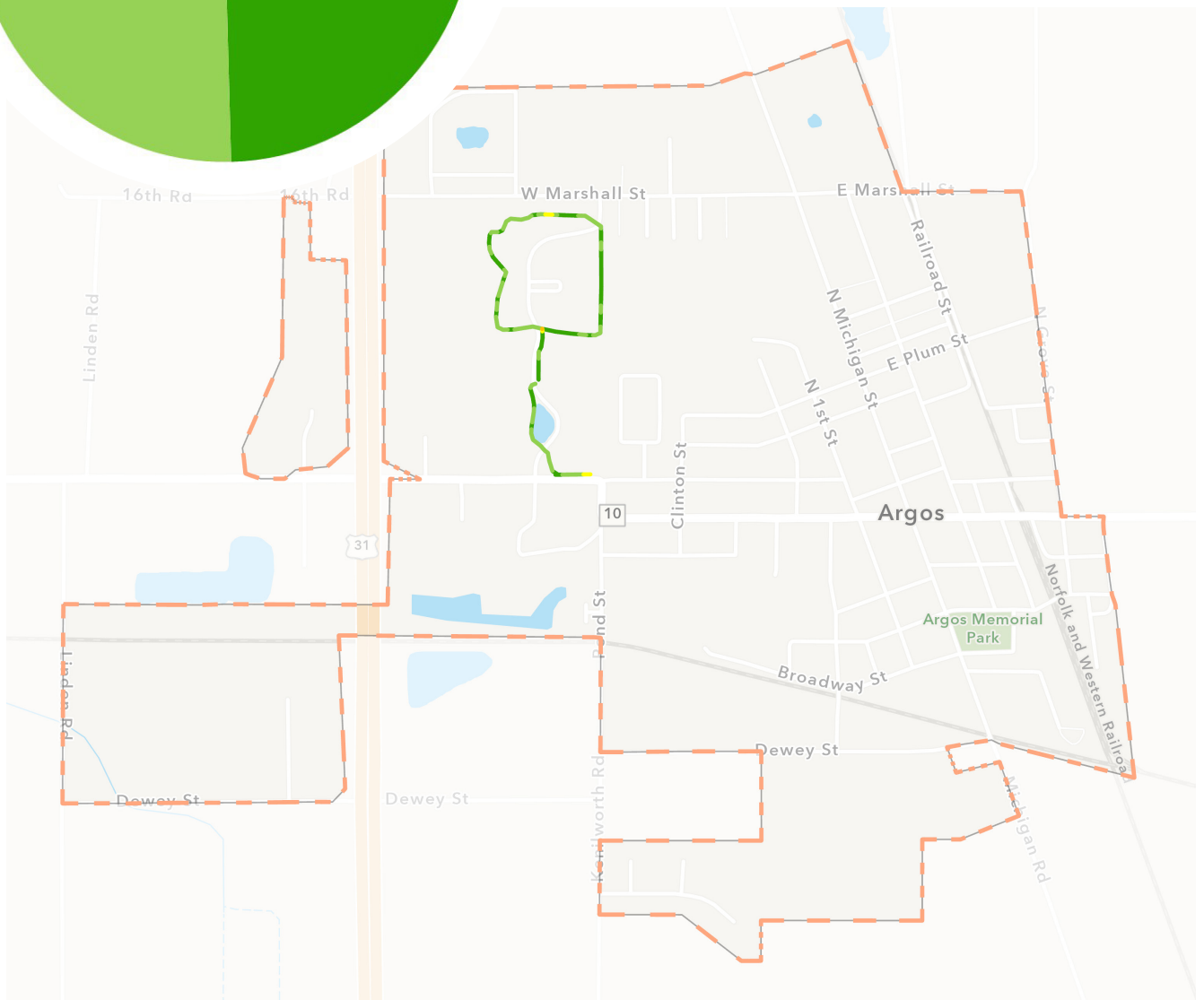
# ARGOS

## MILES BY CONDITION



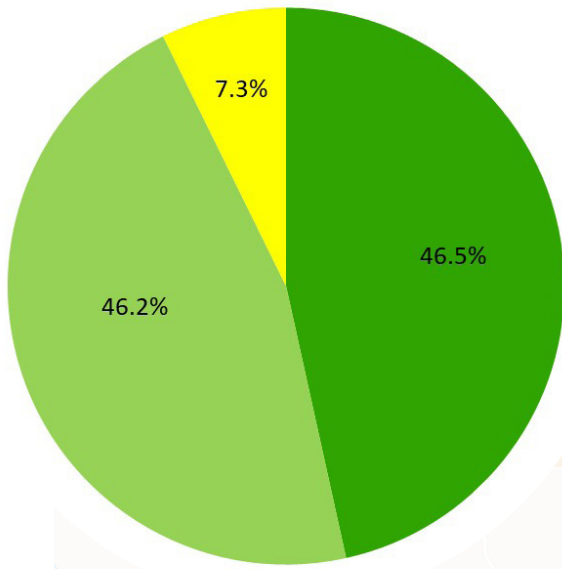
### CENSUS BOUNDARY

- City (dashed pink line)
- County (dashed blue line)
- Town (dashed orange line)



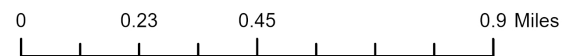
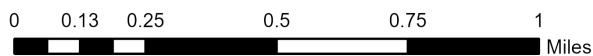
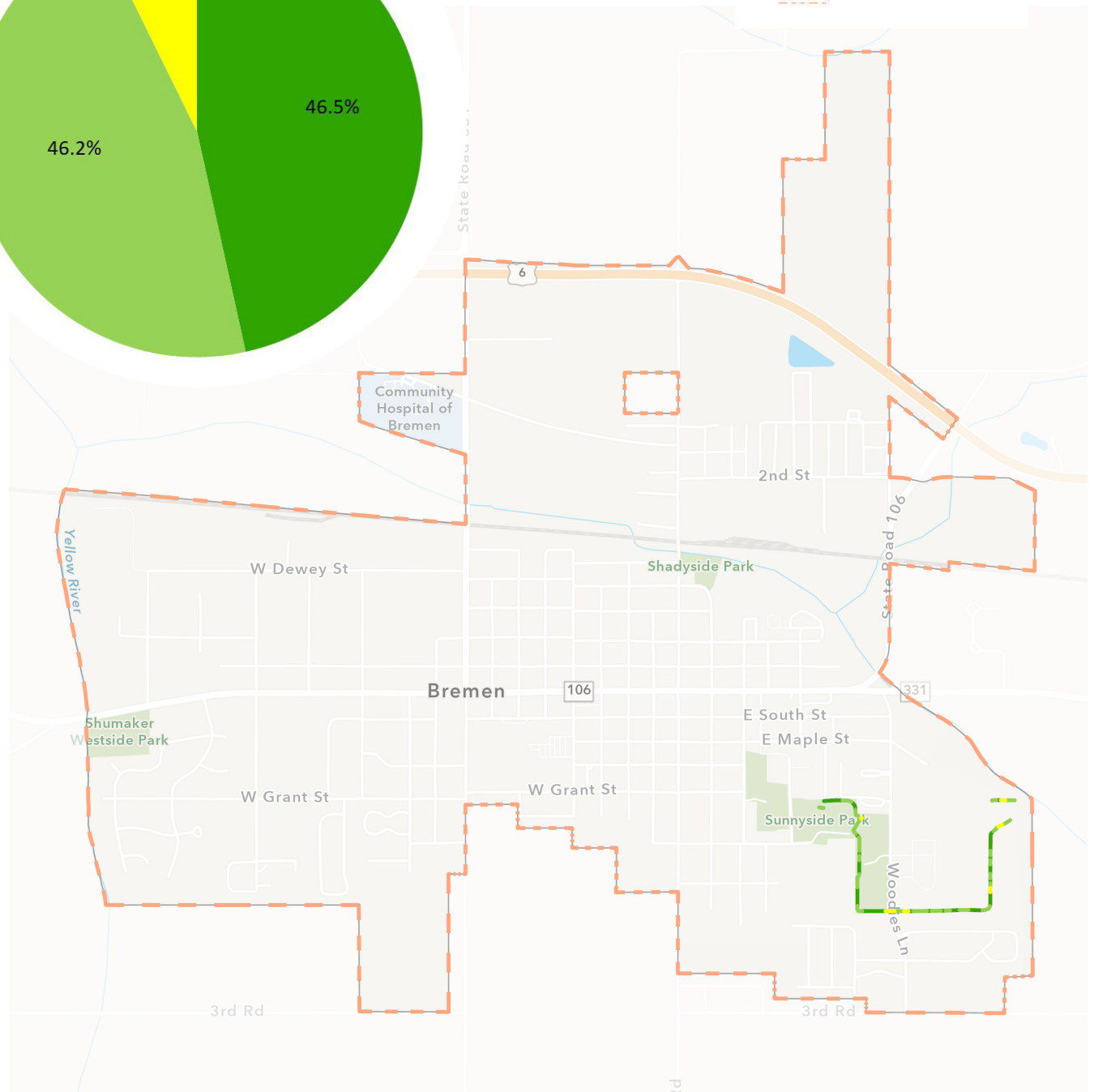
# BREMEN

## MILES BY CONDITION

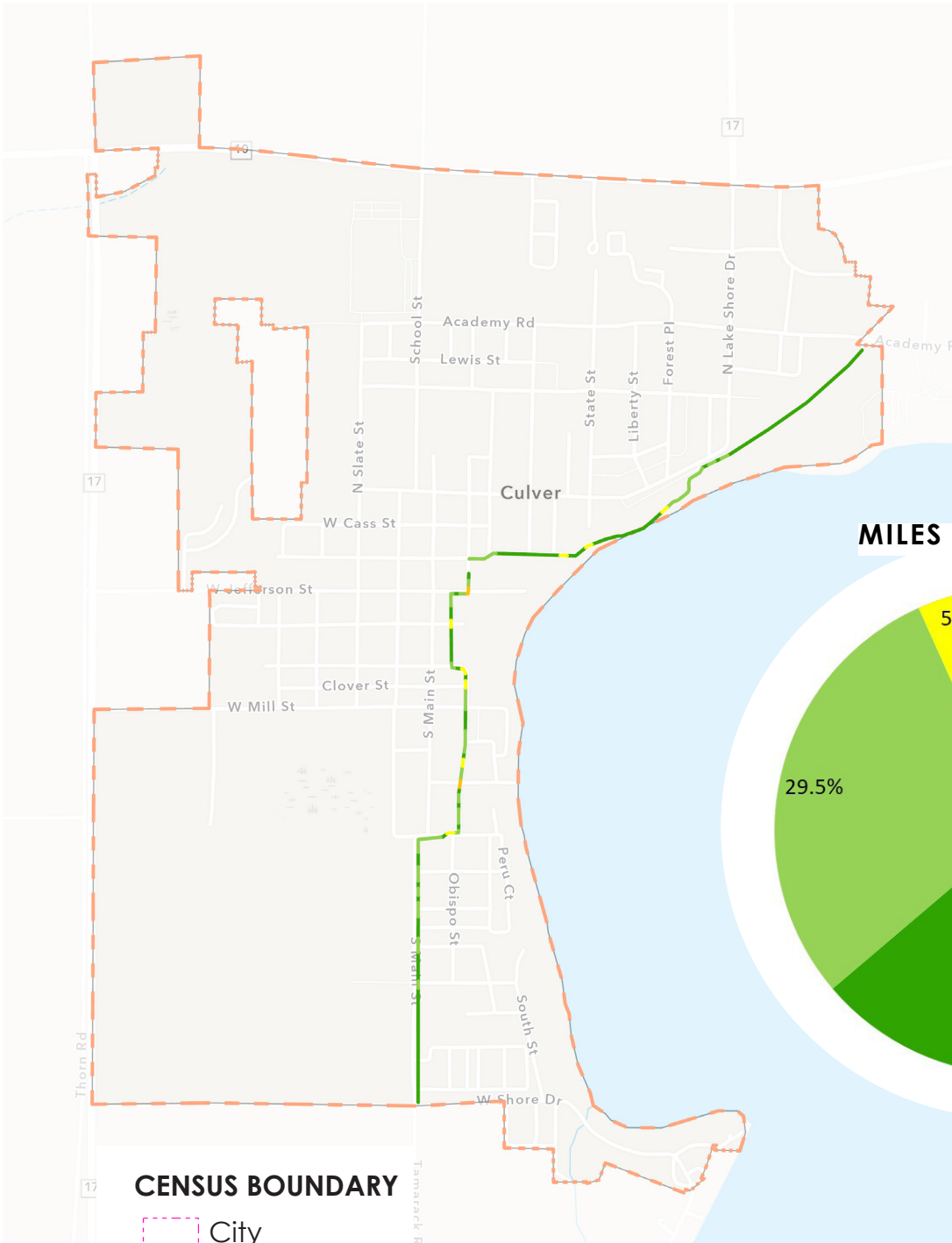


## CENSUS BOUNDARY

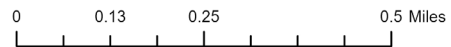
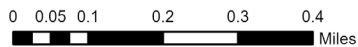
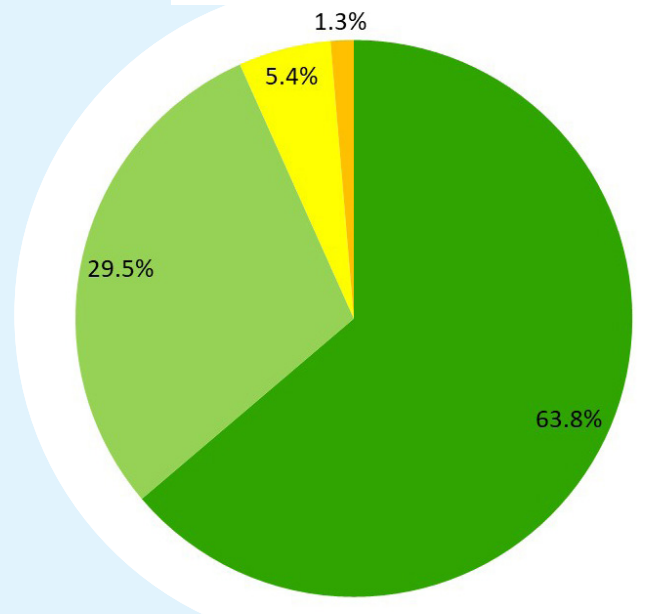
- City (Pink dashed line)
- County (Blue dashed line)
- Town (Orange dashed line)



# CULVER



**MILES BY CONDITION**



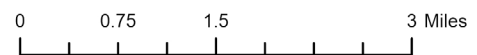
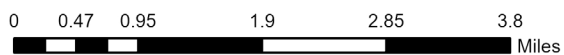
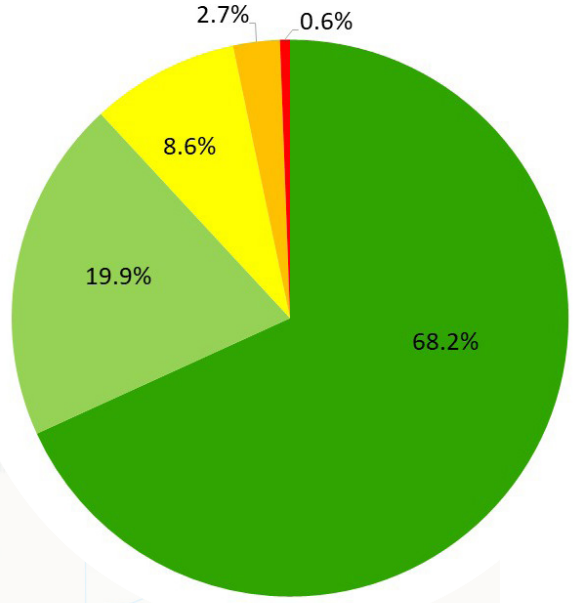
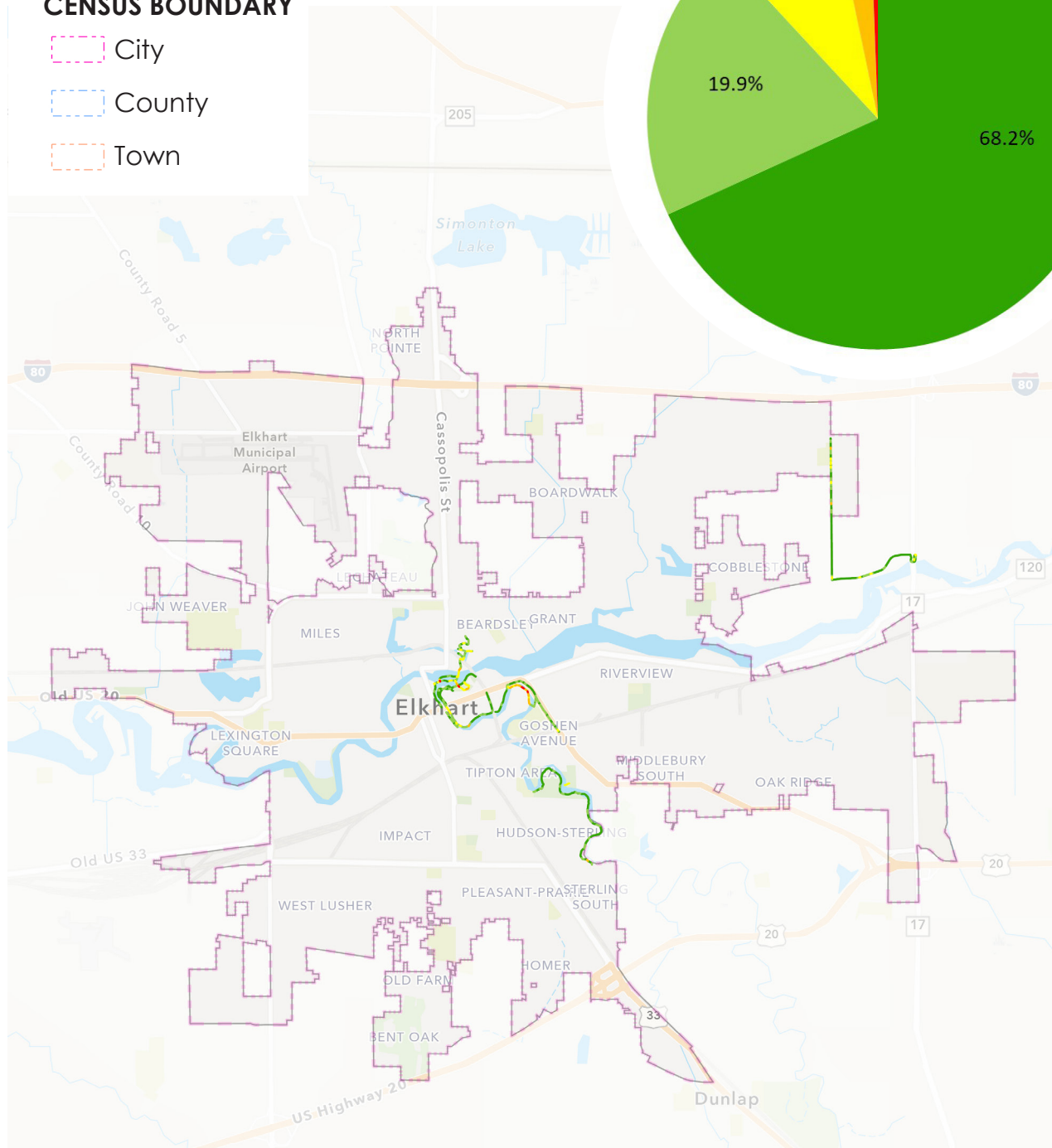


# ELKHART

## MILES BY CONDITION

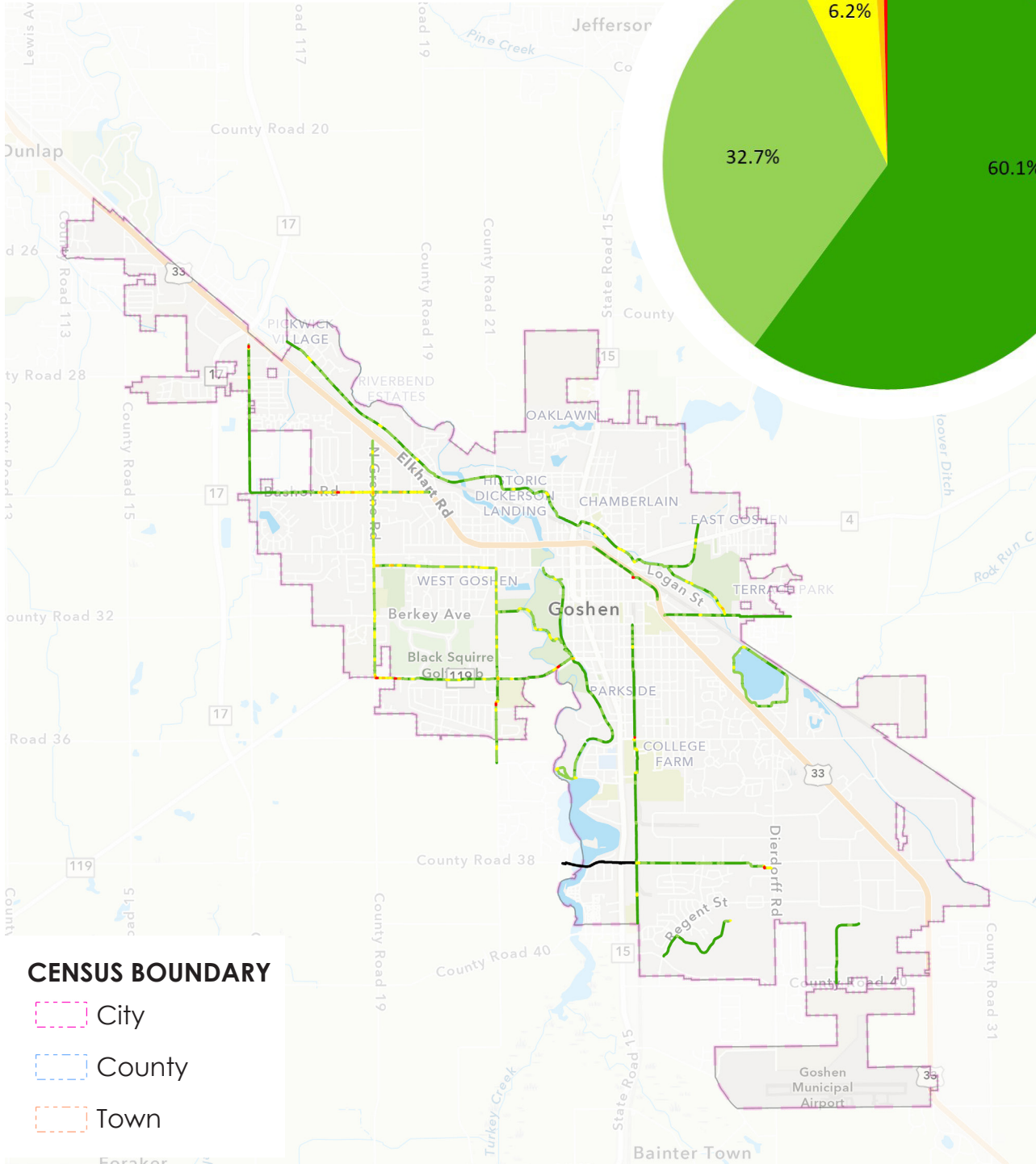
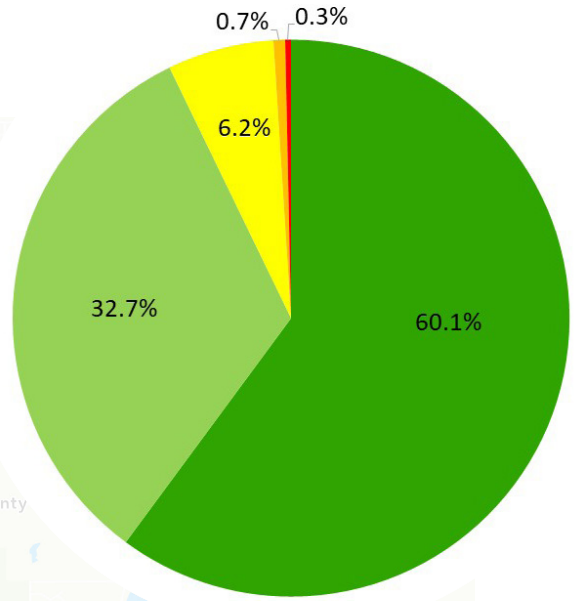
### CENSUS BOUNDARY

- City
- County
- Town



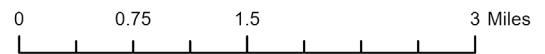
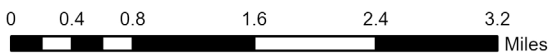
# GOSHEN

MILES BY CONDITION



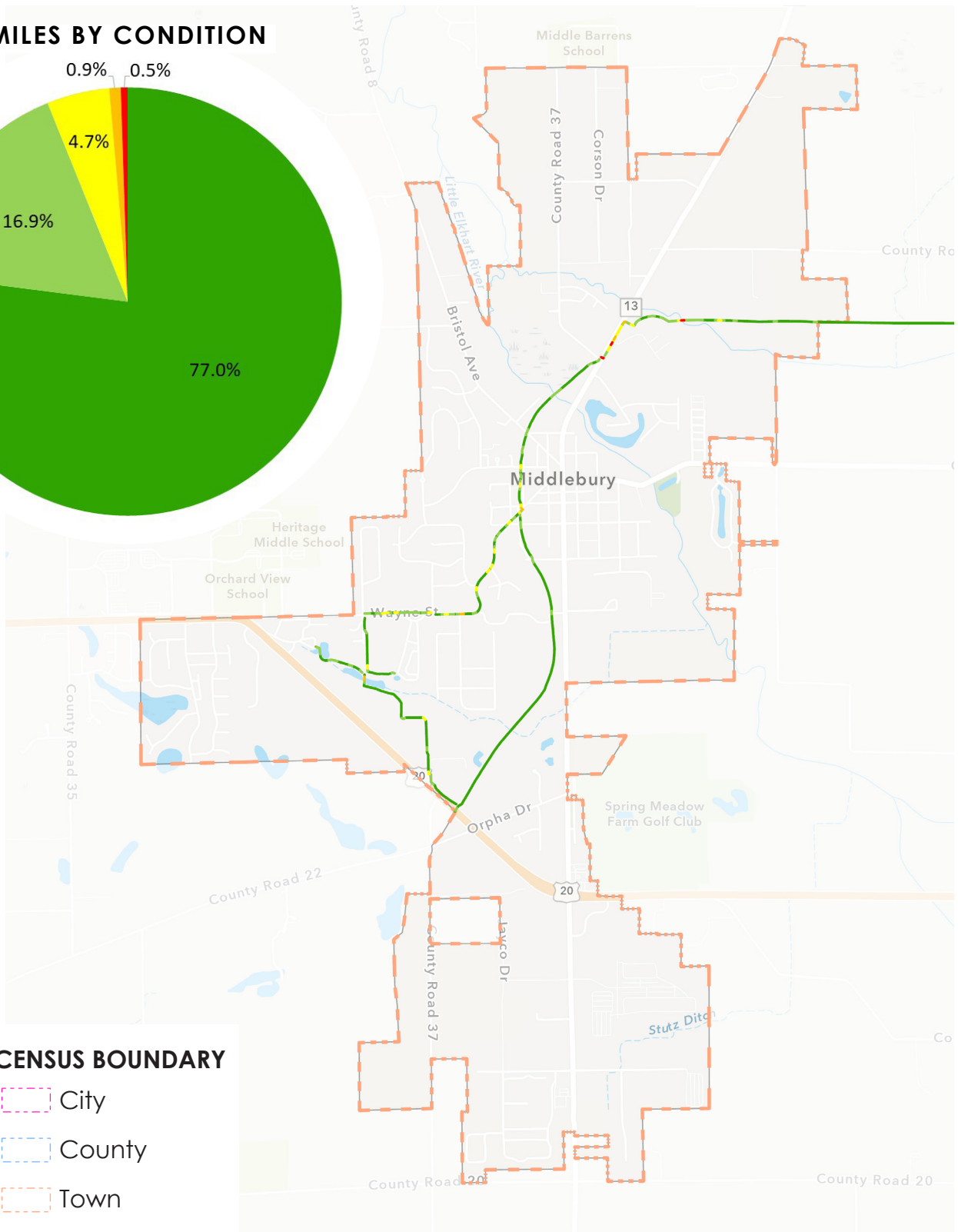
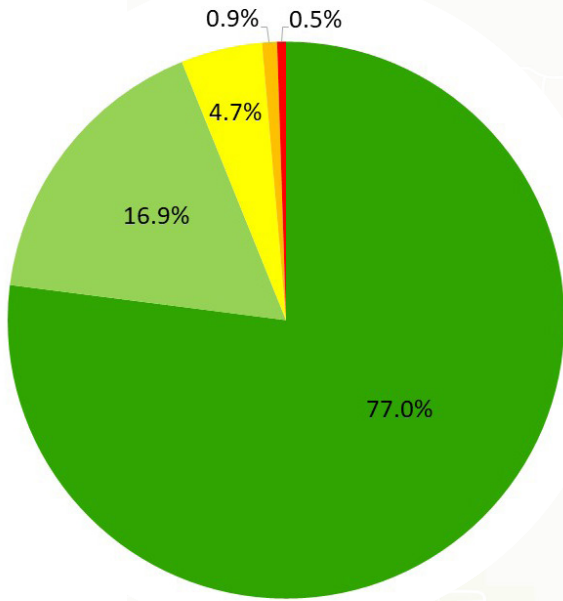
**CENSUS BOUNDARY**

- City
- County
- Town



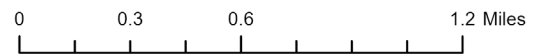
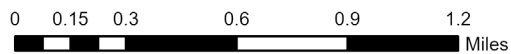
# MIDDLEBURY

## MILES BY CONDITION



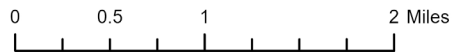
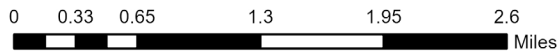
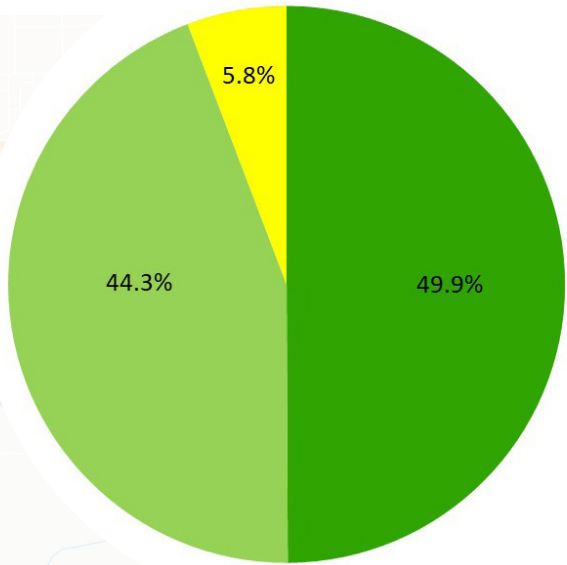
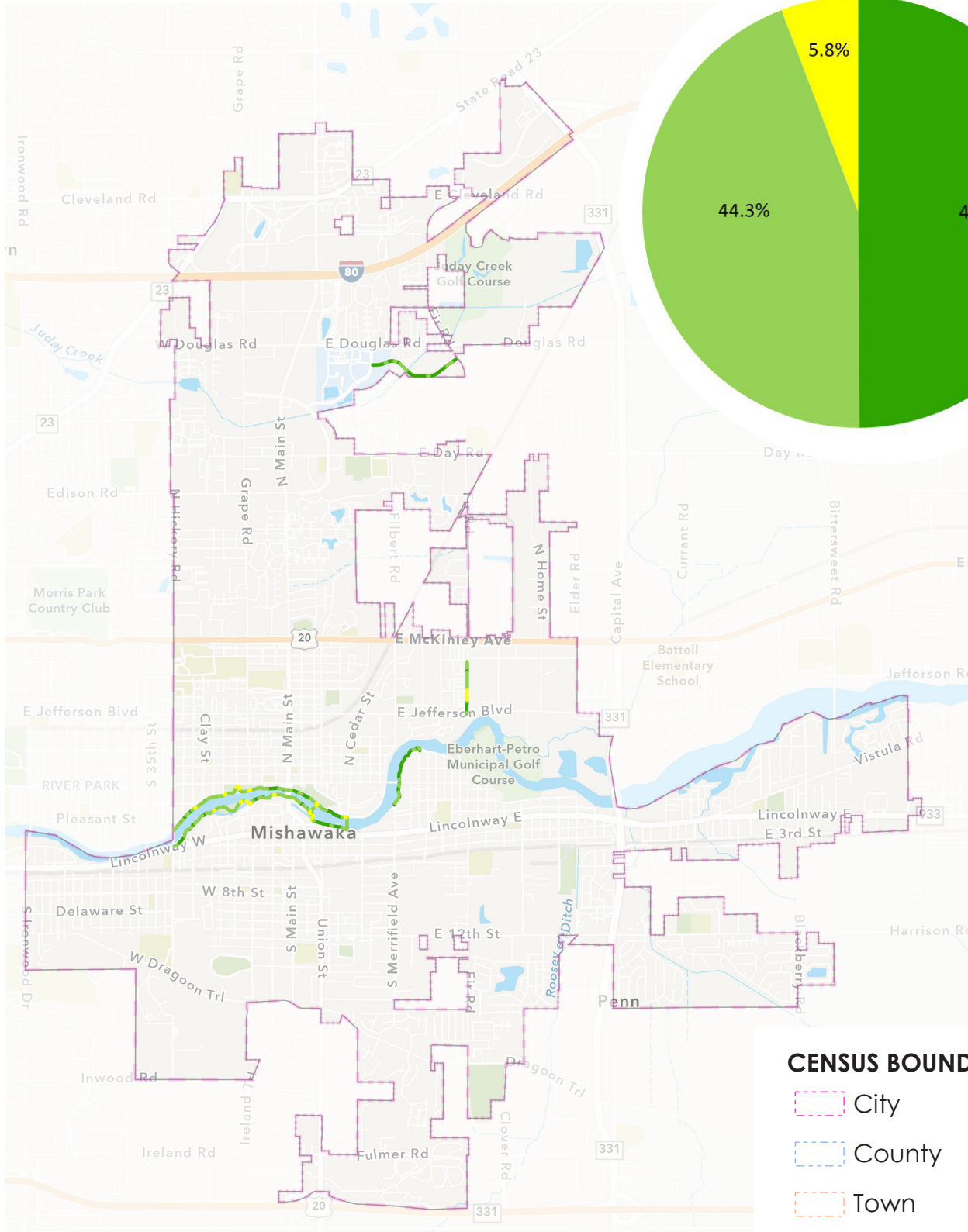
## CENSUS BOUNDARY

- City
- County
- Town



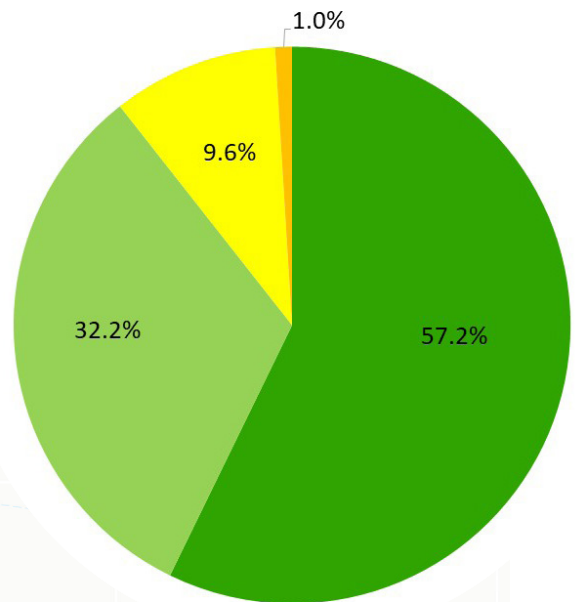
# MISHAWAKA

## MILES BY CONDITION



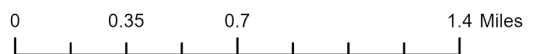
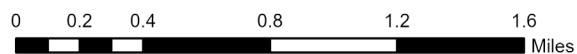
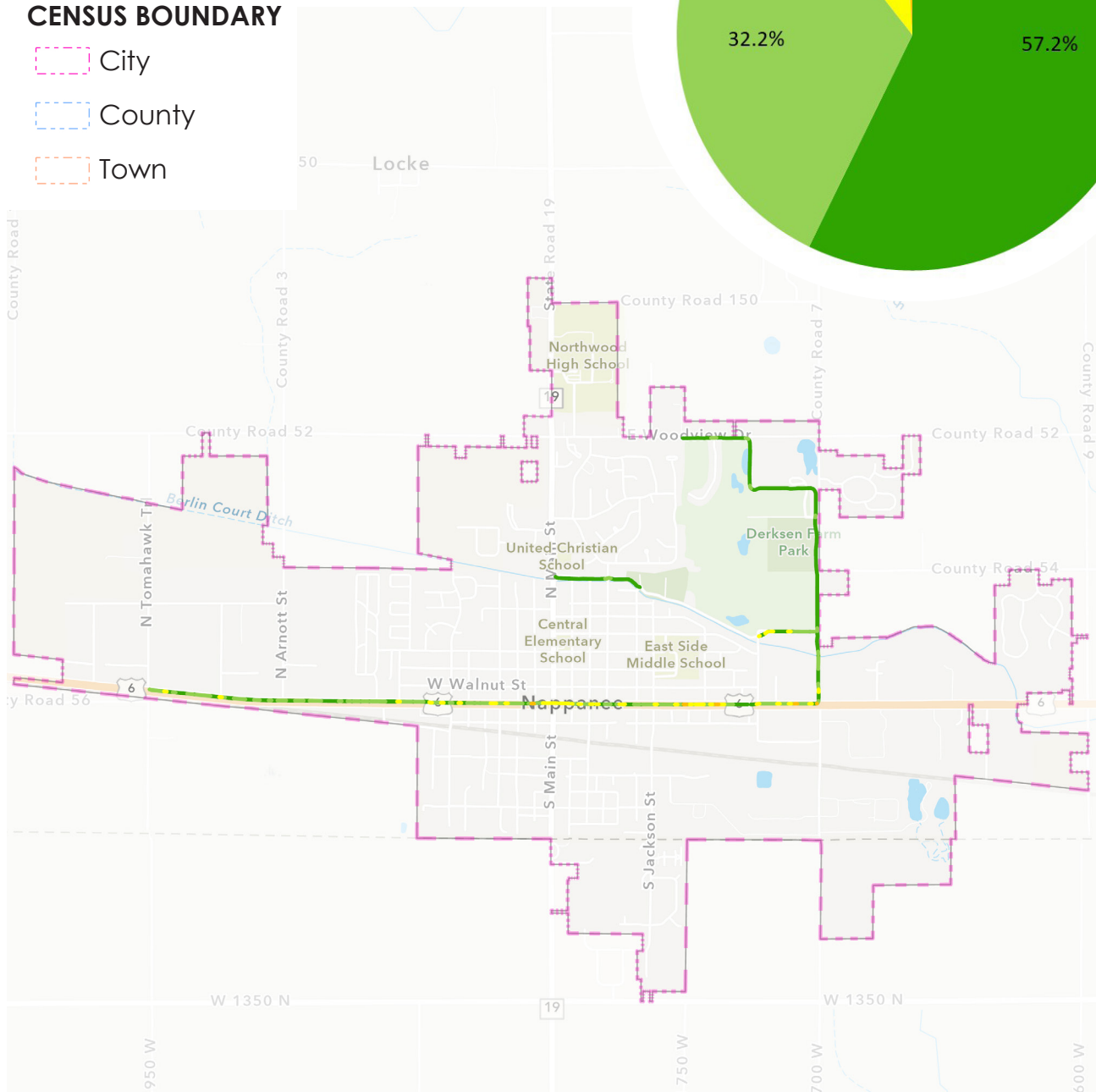
# NAPPANEE

### MILES BY CONDITION



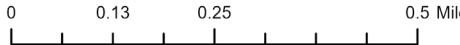
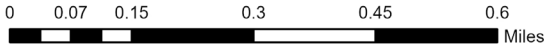
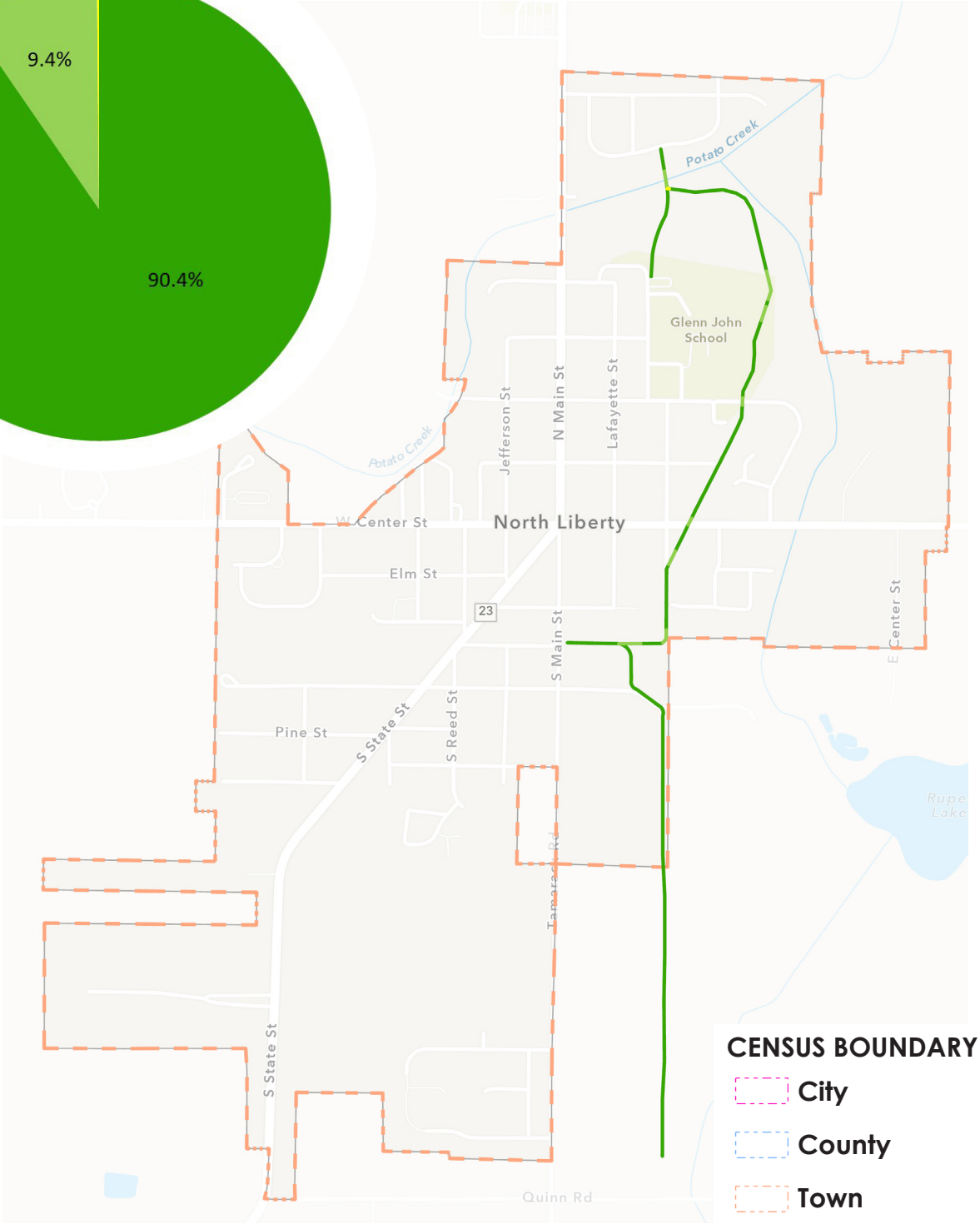
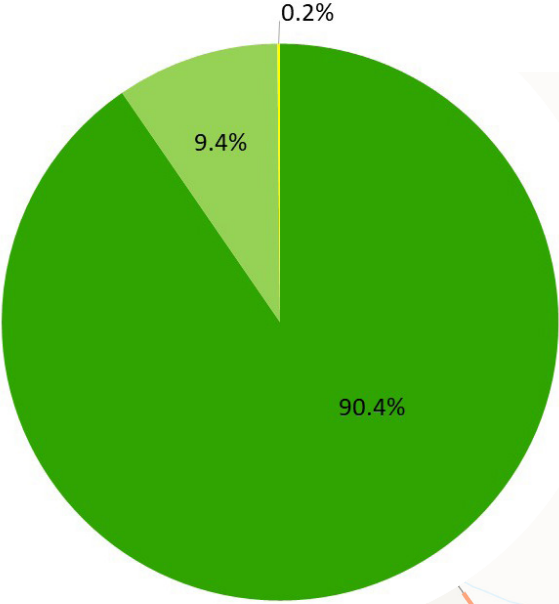
### CENSUS BOUNDARY

- City
- County
- Town



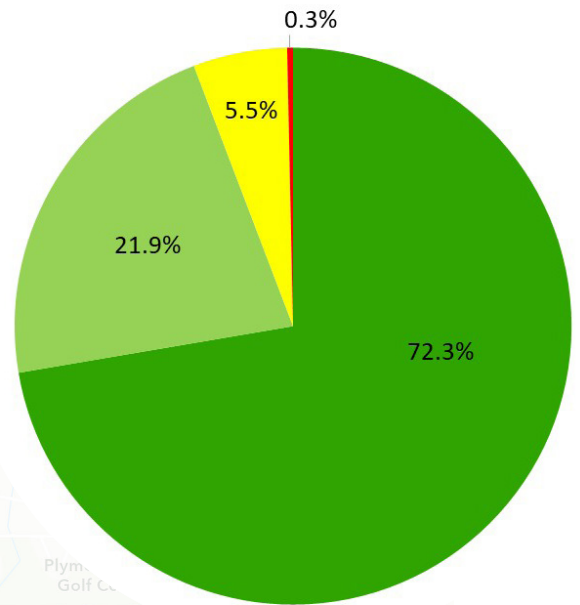
# NORTH LIBERTY

## MILES BY CONDITION



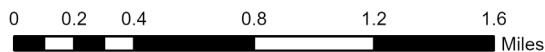
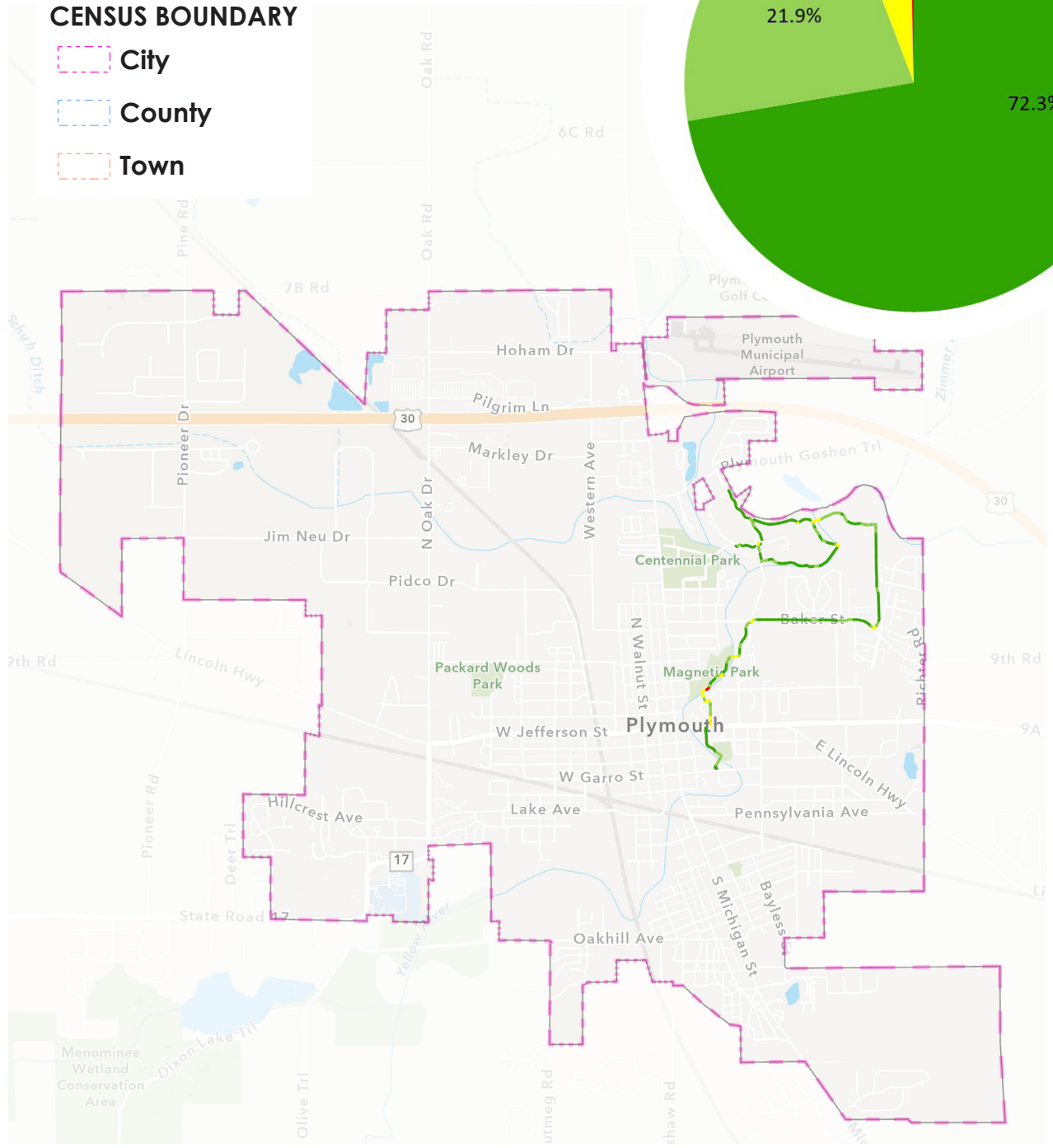
# PLYMOUTH

## MILES BY CONDITION



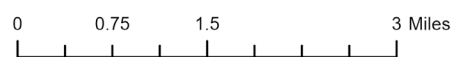
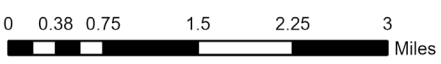
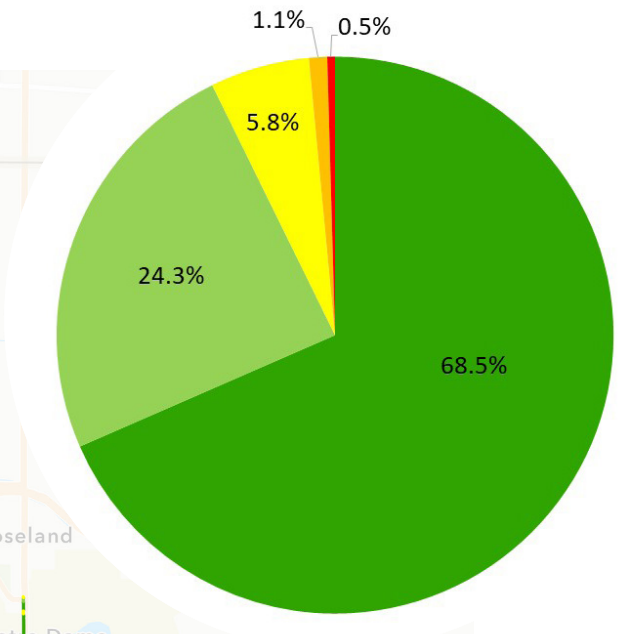
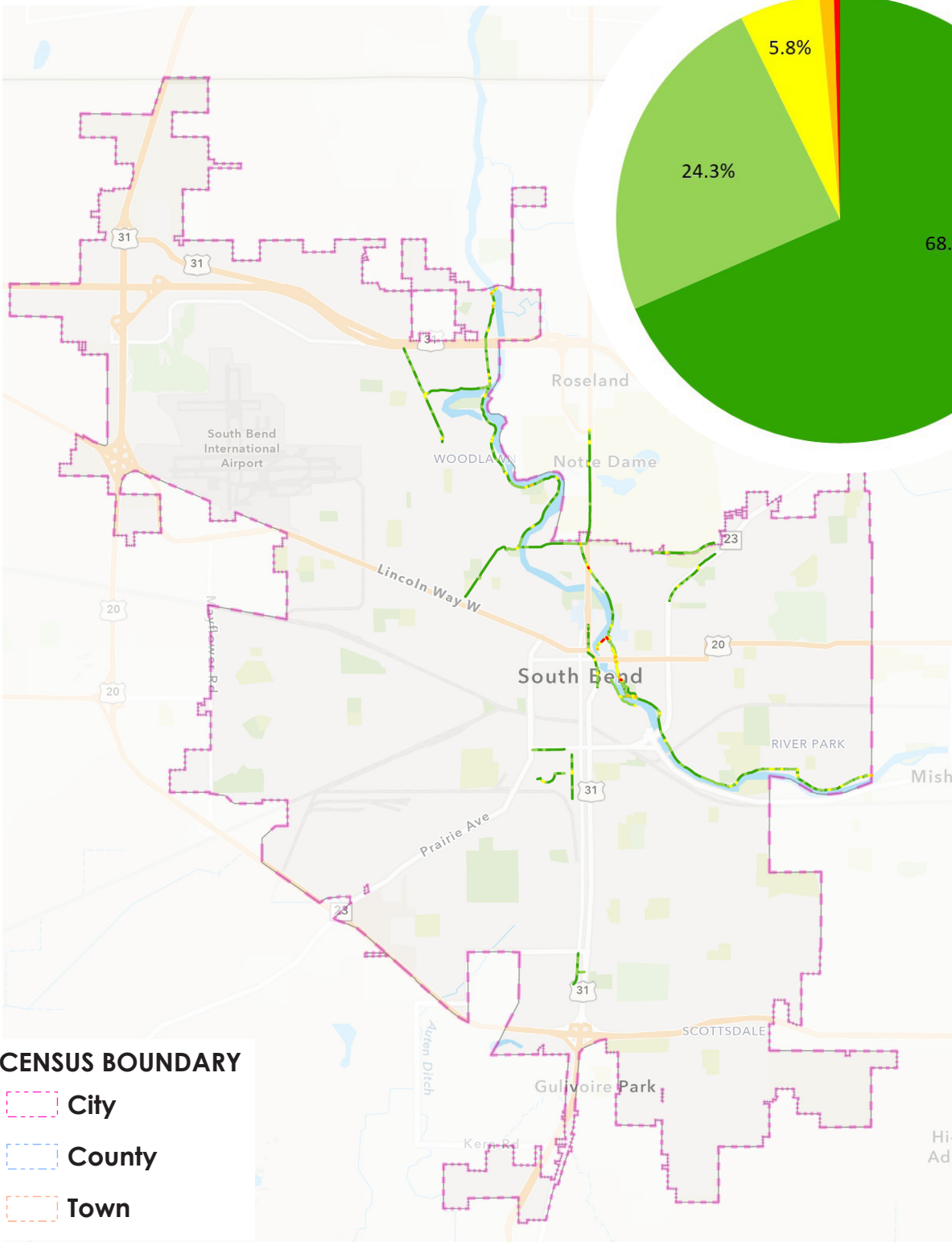
### CENSUS BOUNDARY

- City
- County
- Town



# SOUTH BEND

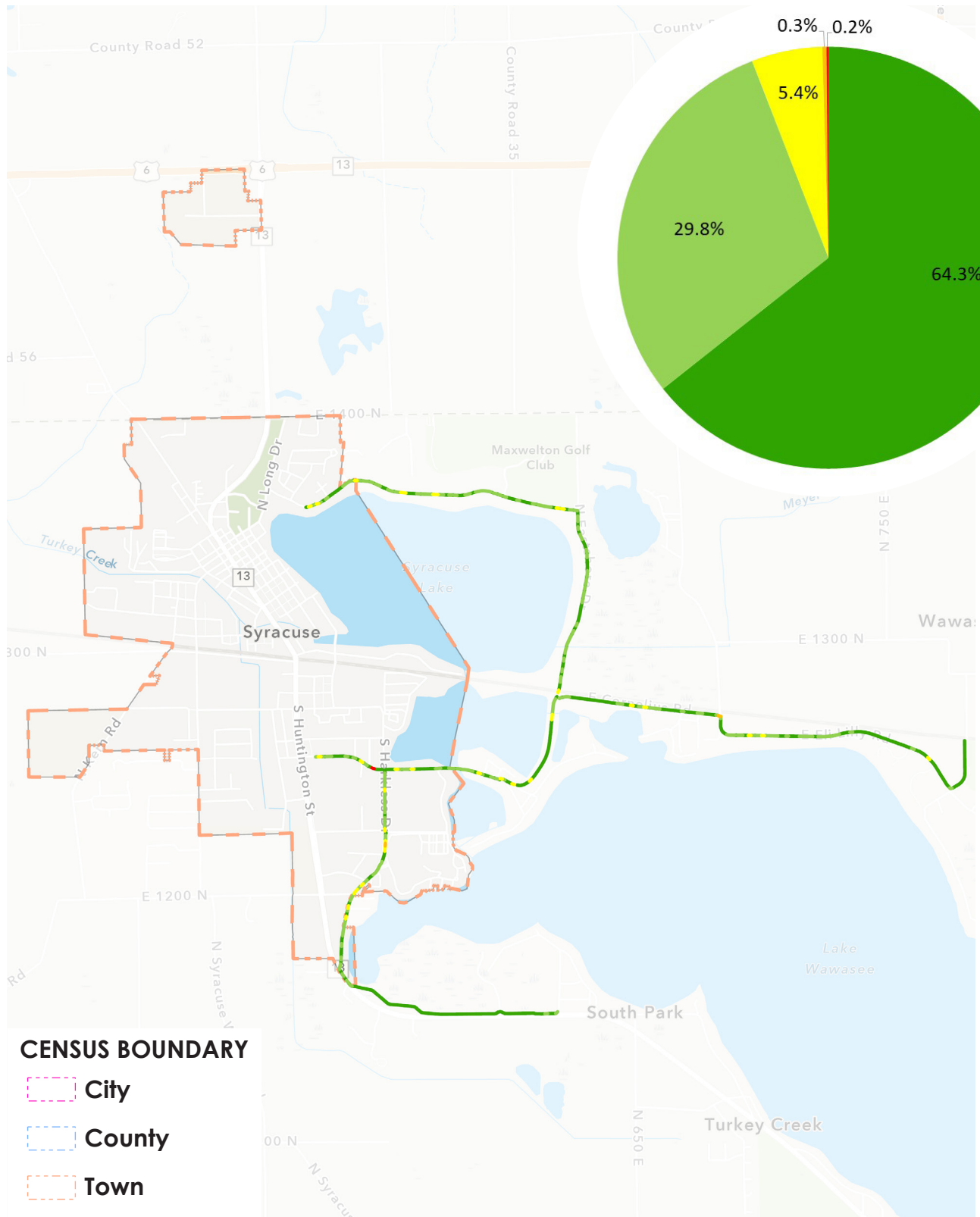
### MILES BY CONDITION





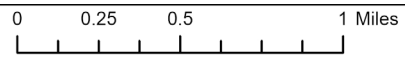
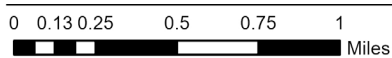
# SYRACUSE

## MILES BY CONDITION



### CENSUS BOUNDARY

- City
- County
- Town

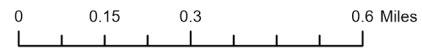
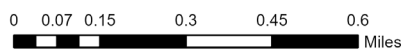
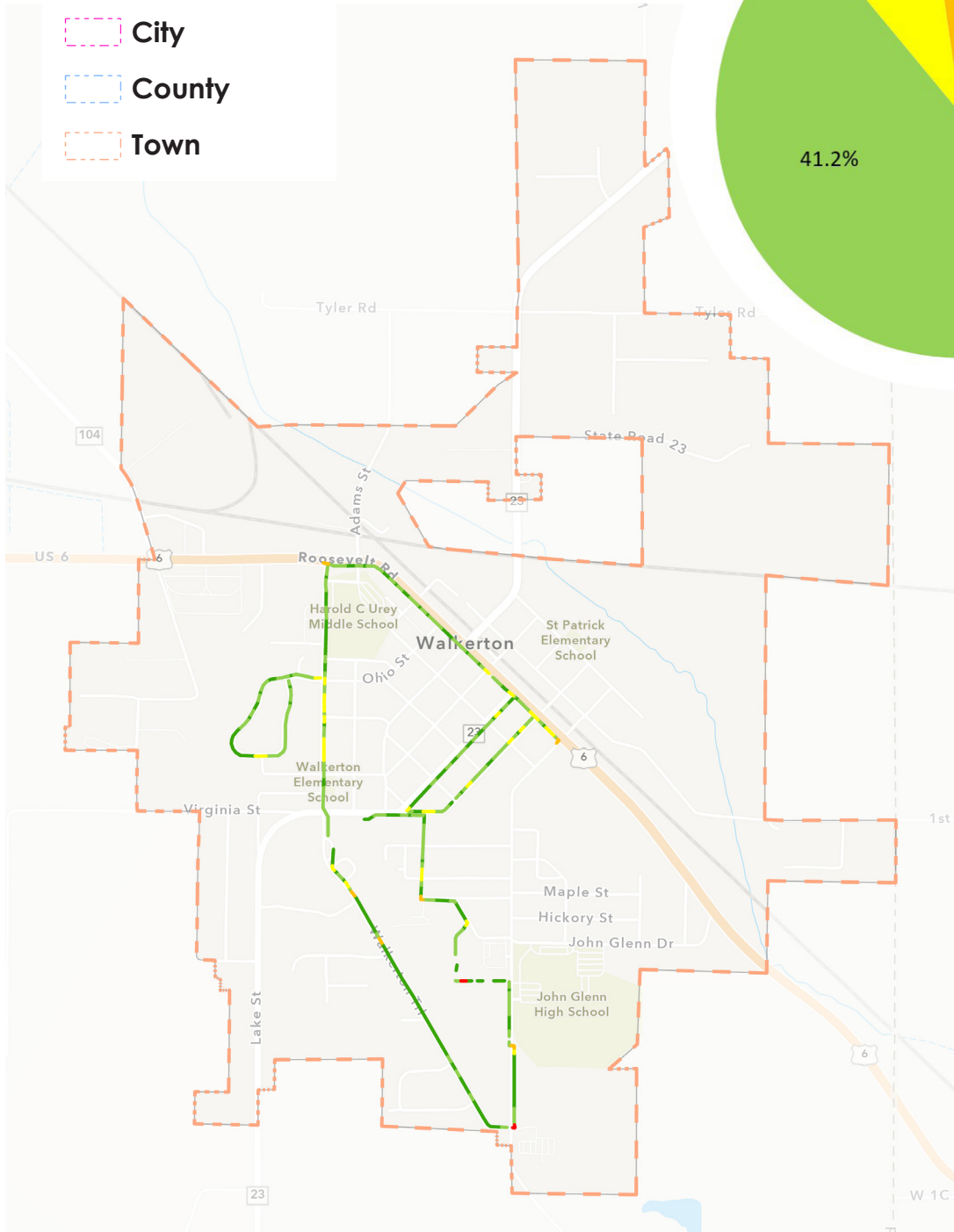
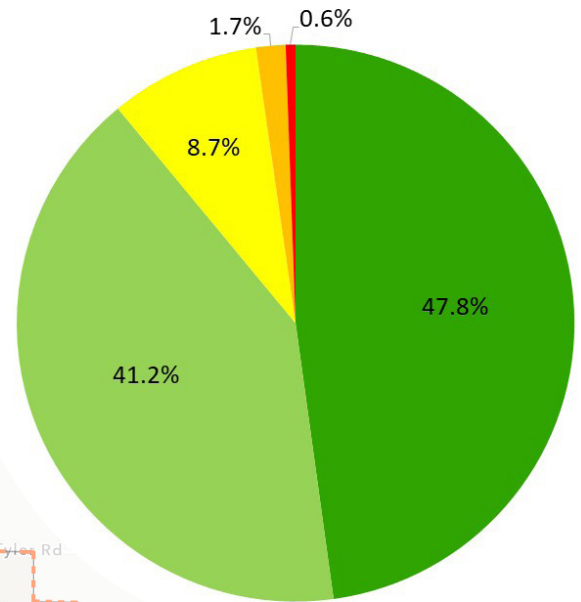


# WALKERTON

## MILES BY CONDITION

### CENSUS BOUNDARY

- City
- County
- Town

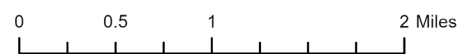
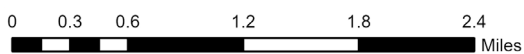
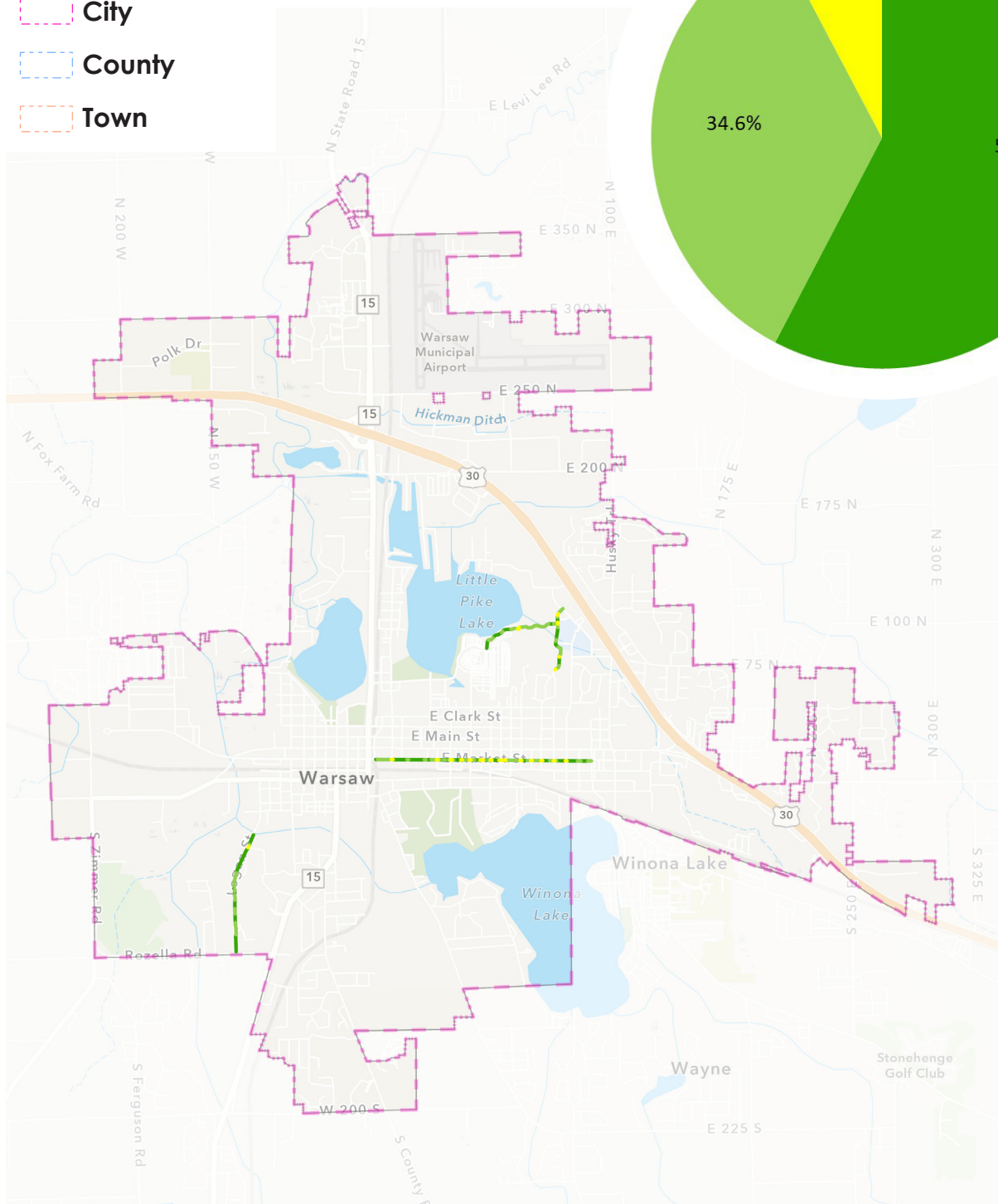
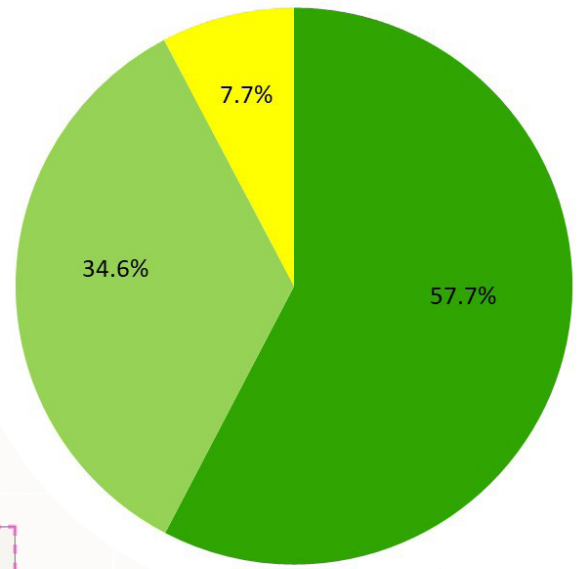


# WARSAW

## MILES BY CONDITION

### CENSUS BOUNDARY

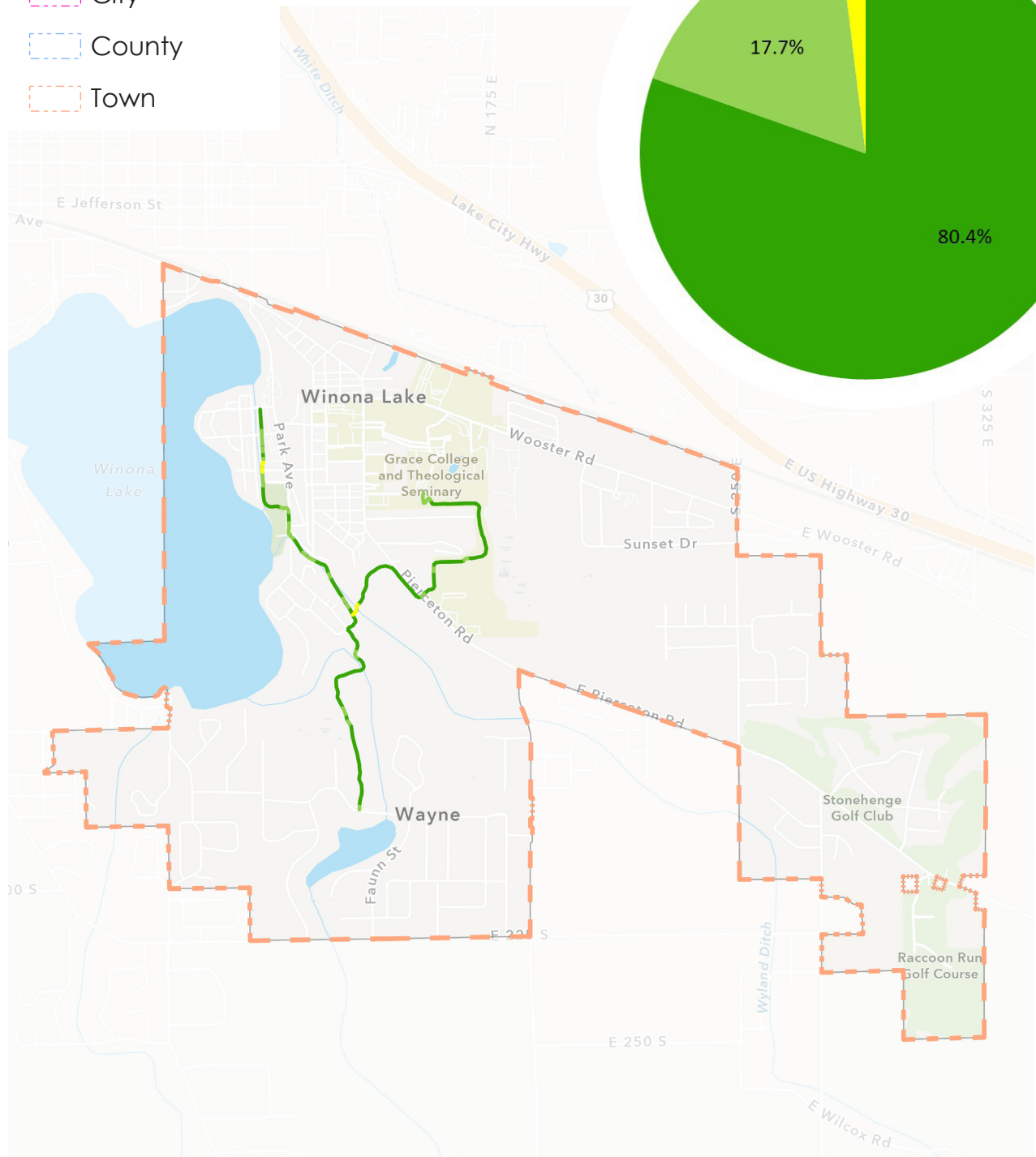
- City
- County
- Town



# WINONA LAKE

## CENSUS BOUNDARY

- City
- County
- Town



## MILES BY CONDITION

