Marathon County Rural Bike Network & Technical Guidance

Prepared for the Wausau MPO, Marathon County Parks Department, & Marathon County Highway Department

James Hughes, Spring 2022

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MARATHON COUNTY

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Executive Summary

Marathon County is a county located in central Wisconsin which hosts outdoor recreation activities year-round. Anchored by its largest city, Wausau, the area is known as a gateway to northern Wisconsin. The county hopes to expand its rural biking program in the future, as they currently only offer bike-focused amenities in the Wausau metro area. In partial completion of a Master's in Urban Planning, I assisted the Wausau MPO analyze current levels of rural ridership and develop new guidelines to increase the number of rural bicyclists. This report creates a proposal for future bike infrastructure in ArcGIS based on national standards for bicycle safety, Average Daily Travel (ADT) metrics and pavement type.

To fine tune the proposed network, public input was additionally collected from multiple known Marathon County cyclist groups on their written text opinions about routing changes to the original proposal. Approximately 50 responses were collected with significant amounts of positive feedback for routing changes and overall encouragement of this network. The public input process informed final network decisions that helped write implementation technical guides for both Marathon County Highway and Parks Departments.

The highway department will be tasked with the physical implementation and installation of bike facilities, and national best practice particularly surrounding average daily traffic and shoulder condition, is provided to install the proper cyclist facility for a given stretch of road. The Parks department should then be tasked with the marketing and outreach efforts to continue with their current mission of connecting people to places. Marketing and outreach messaging should center on health, recreation, and continued connection of existing bike infrastructure.

With the creation of a formal rural biking network, the county is able to offer another recreation activity for residents and visitors that should emphasize safety for all road users to the best capability of the highway department. The report in the following pages are organized in chronological order of how the network was formed beginning with a literature review for readers to understand the key differences in planning for rural cycling versus urban.

Introduction + Context

Introduction + Context

Existing County Assets & Goals

Marathon County is primarily rural, with a low population density of 86 people per square mile and has a population of approximately 136,000 residents, with 39,000 of those residents living in the City of Wausau. (United States Census Bureau 2021) Currently, there is a disparity between the bike infrastructure available to Wausau residents and those in the rest of the county. Residents in the Wausau metro area have access to a growing network of dedicated on-road bike facilities for both commuting and recreation purposes. (Wausau Metropolitan Planning Organization 2015) However, a majority of Marathon County residents live outside of the Wausau metro area in smaller towns and villages that are spread ten to twenty miles apart. These residents are not well connected to the Wausau network, nor do they have access to dedicated rural bicycle infrastructure.

Marathon County is well-positioned to develop rural bike routes. The county has a significant number of natural amenities especially close to Wausau, like Rib Mountain State Park, which currently does not allow biking on site. The topography of the surrounding region though is encouraging for cycling with rolling hills, visually attractive forests as well as other recreation amenities like skiing and hiking. These natural amenities add value to the community for recreation, health, and economic stimulus that would benefit from increased bicycle access.

In the 2015 bike and pedestrian plan, Marathon County shared desire to increase access to cycling in rural areas. Cycling network additions then must consider connectivity to desirable destinations, safe facilities, and increased awareness by staff to understand the facilities that are needed to grow the overall network. In rural Marathon county, an understanding of cycling in rural, small, and low-density places (RSLD) must also be incorporated and promoted

View from Rib Mountain State Park, Marathon County. https://www.travelwisconsin.com/state-parks-forests/rib-mountain-state-park-203669

differently due to their distinct differences in built environment and socio-political contexts. (McAndrews, Okuyama, and Litt 2017) Literature and research thus far has largely focused on analyzing urban bicycle ridership, and research on cycling in rural areas remains limited. However, recent research has shed new light on the motivations, strategy, and reach of cyclists in RSLD spaces. The literature has found differences in attitudes generally about cycling, programming preferences, and political affiliation—which must be considered in a successful design of the network.

In this report, the following section presents further context and research evidence on bike network design for rural and low-density spaces to understand the different needs of RSLD cyclists. Following this section, methods are presented for designing a rural cycling network for Marathon County.

Recreational Cyclists in Marathon County. Source: https://www.ironbull.org/red-granite-grinder-details

Rural Cycling Guidance Literature Review

The reliance on cars in RSLD spaces significantly reduces demand for cycling trips. The car has grown to be the primary solution to problems of mobility and access in RSLD communities. Rural residents often view cars as necessary to their communities' economic success, with a limited scope of other transportation alternatives. (McAndrews, Tabatabaie, and Litt 2018) These opinions about car reliance cannot be changed quickly, though cycling can be marketed as an added mobility and health option rather than a replacement for a vehicle. Two different attitudes about bikes either being primarily for recreation or could supplement car trips were found in a study in Colorado, when towns were given a grant to invest in cycling infrastructure and collect community responses. Of the 10 municipalities studied, towns located in more rural areas tended to push cycling as an improvement of quality of life and health, while the towns closer to metro regions pushed for investments in the overall transportation network. (McAndrews, Tabatabaie, and Litt 2018)

Residents may also have concerns about cycling investments without any considerable evidence that cyclists would use new facilities. This hesitation can be addressed by examining some of many successful rural cycling investments throughout the United States. These include the Cowboy Trail in northern Nebraska, which is one of the longest bike trails in the country and is a recreation and tourist asset to the state and the Tour de Farm trail in Georgia, which promotes the region's agriculture industry and local economies; closer to home, the Elroy Sparta trail is one of the most popular trails in the country due to its unique long-running tunnels. (McAndrews, Okuyama, and Litt 2017; Wisconsin Department of Natural Resources 2022) These rural bike trails have succeeded in drawing significant economic investment and tourist attraction that benefit the adjacent communities (Wisconsin Department of Natural Resources 2022). Planners who wish to develop RLSD projects must effectively communicate the potential benefits of bicycle infrastructure to skeptical rural communities.

The cultural attitudes that make rural communities reluctant to embrace cycling also cause unique preferences in bicycle programming and sociopolitical affiliation. Though before addressing bike programming, a stigma associated with cycling may also possibly need to be addressed between cyclists and political affiliations. A 2011 study of 78 London residents who either regularly associated regularly biking with left -leaning political and environmental values, and a propensity for vegetarianism. (Steinbach et al. 2011) While not every cyclist on the road is a radical lefty vegitarian, there is still the acknowledgement that cycling tends to take place most prominently in cities where liberal thought is more widely accepted and can be the dominant political affiliation. Bike and multi-modal planners in Marathon County may have to combat these stereotypes to

clarify the value that rural cycling investments bring the community.

Rural residents are less likely to use bicycle routes for everyday mobility needs, and instead see cycling as a pastime connecting them to areas of historical, economic, or environmental interest. RSLD bike development tends to emphasize dedicated infrastructure like recreation paths and other programming like historic preservation attractions and economic history of the region. Marathon County could increase interest in bike ridership by highlighting local attractions and historically important sites. Many leading examples of rural cycling attractions unfortunately center around dedicated bike paths and guideways which is out of the immediate scope of this project, though historic and economic attractions could still serve as a reason for residents to use the built facilities. Attractions in rural Marathon County that could be emphasized in the bike plan include historical sites linked to the logging industry, early European settlement sites, indigenous land recognitions, and places of modern industry that support the county and region today.

Example of RSLD Development
Source: https://communityarchitectdaily.blogspot.com/2016/09/condemned-to-sprawl.html

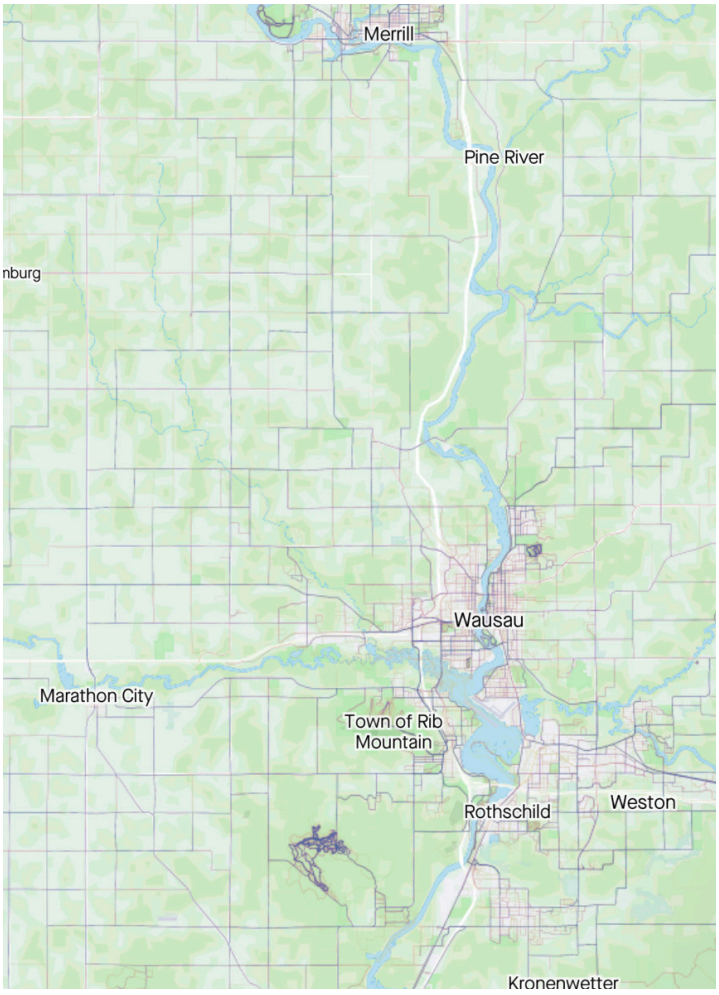
The addition of rural bicycle infrastructure is also the positive impact to community health. Goals to advertise healthy lifestyles and to reduce obesity were set in place in the 2015 Marathon County Bike Plan, and emphasis on this goal in rural bike proposals are another avenue that emphasizes importance that does not necessarily carry messaging of wanting rural residents to commute by bike, rather increase safety and recreation options for county residents and visitors.

Building a strong rural cycling culture in Marathon County presents challenges to planners, due to current car dependency and expected hesitation to significant investments in on-road bike infrastructure. To meet the county's goal of increasing rural bike ridership in hopes to secure funding for future expansion projects, recreational cyclers and where they live are not intensely studied, though we know that these residents tend to be car owners that do not commute by bike often if ever, though see the bicycle as a form of exercise and a way to sightsee. Capturing the value of riding a bike as a recreational activity that introduces residents to parks, historic sites, and provides health benefits are all potential avenues to investigate for attracting ridership to new rural bike facilities.

Network Creation Methods

Network Creation Methods + First Round Proposal

When approaching the creation of the rural network, considering the distinctive needs of RSLD communities was a significant priority. Low-stress routes were identified that would appeal to a rural, recreational cyclist. Existing roadways were analyzed via GIS to build a series of proposed rural network cycling routes. These routes are to be used as a tool for the Marathon County Highway Department to prioritize future roadway improvements that allow for improved rural bicycle connectivity to recreation areas, surrounding communities, and the Wausau metro.



Strava heatmap data presented visually, darker colors indicate higher activity areas. Source: metroview.strava.com

To summarize current cycling trends in rural portions of the county, I identified recreational points of interest (POIs) and existing cycling routes from multiple sources of recreation data. First, Strava heatmap data was visually inspected, an exercise phone application that records activity of users via GPS and publishes anonymously to show where activity is highest. Second, the recreational biking sites provided on the County's biking and outdoor recreation website was scoped to understand current cycling sites and their locations. (Marathon County, Wisconsin 2021) Third, other park space in Marathon County that is not formally identified as bike-friendly, though access to a bike network near the park or forest may provide recreation opportunities in the future was inspected. Identifying connections to Wausau metro bike facilities, current behavior, and rural recreational spaces allowed for initial understanding of potential routes throughout rural Marathon County and quantitative data about roadways would further advance decisions about routing choices.

To design the preliminary network, connections into the Wausau metro bike network were mapped based on information from the 2015 Wausau MPO Bike Plan. Connection points were placed

Network Creation Methods + First Round Proposal

at the termini of existing local bike routes, off-street paths, and some rural-suburban transition areas, indicated by the Chainlink images in Figure 2. (Wausau Metropolitan Planning Organization 2015) A second layer was created to indicate previously mentioned recreation areas in the county that may be attractive to cyclists. These recreation sites include Marathon County Forest-Nine Mile Unit, Rib Mountain State Park, Edgar Railroad corridor, and Big Eau Pleine Reservoir, indicated by the recreation area logos in Figure 2.

The most significant analysis to create the proposed rural bike network and recommendations was the use of existing Marathon County and Wisconsin Department of Transportation (WisDOT) GIS traffic data, which consisted of average daily traffic information, roadway condition and surface, and shoulder details like width and material type. Unique, symbolized layers were built in GIS to display roads that were paved with concrete or asphalt, and with ADT observations at <500, <800, <1000, and <1,500. Figure one displays these characteristsics that provided the backbone of the network creation. These ADT count separations were developed based on research from WisDOT's Rural Bicycle Planning Guide, and the American Association of State Highway and Transportation Officials (AASHTO) Bicycle Facilities Guide. (American Association of State Highway and

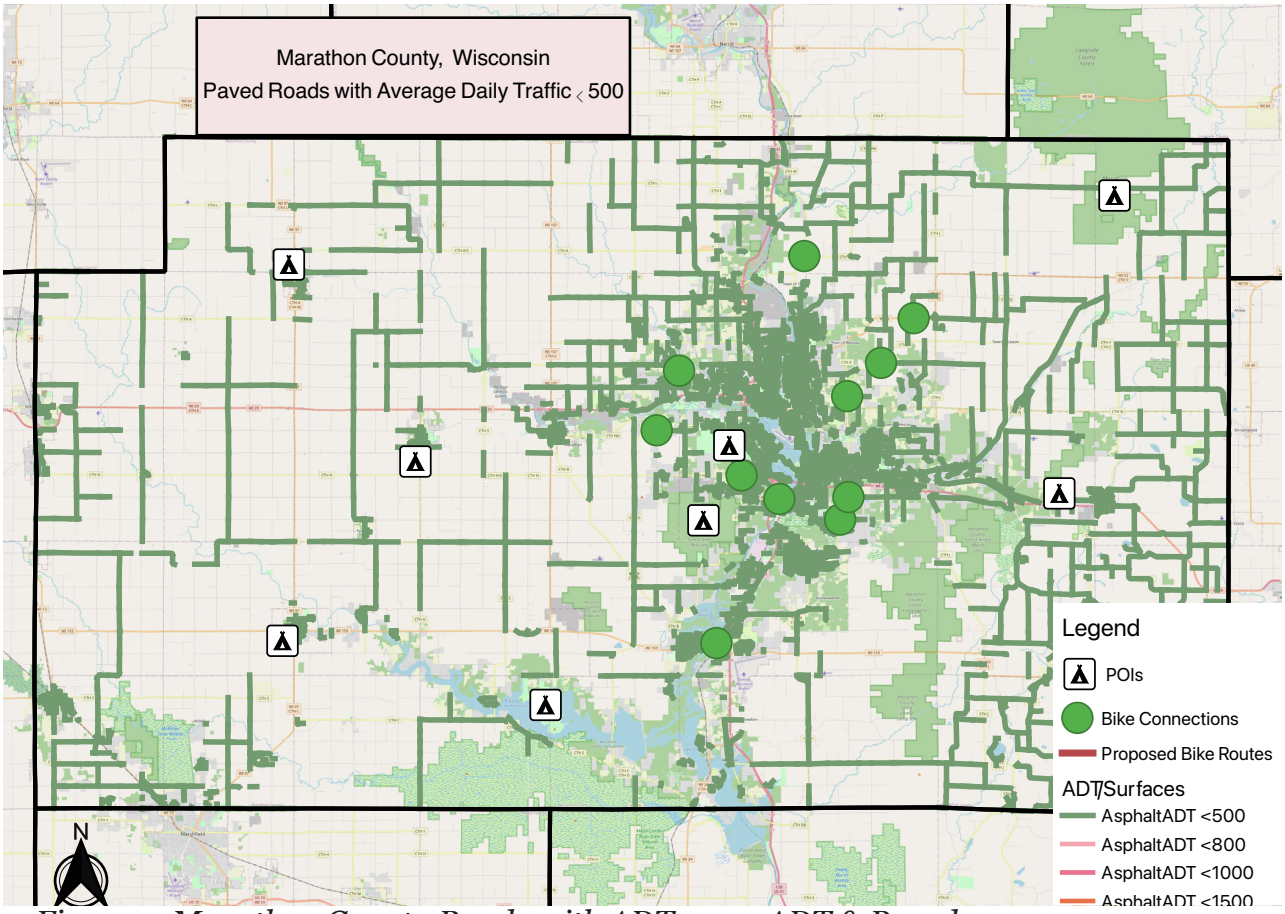


Figure 1: Marathon County Roads with ADT <500 ADT & Paved

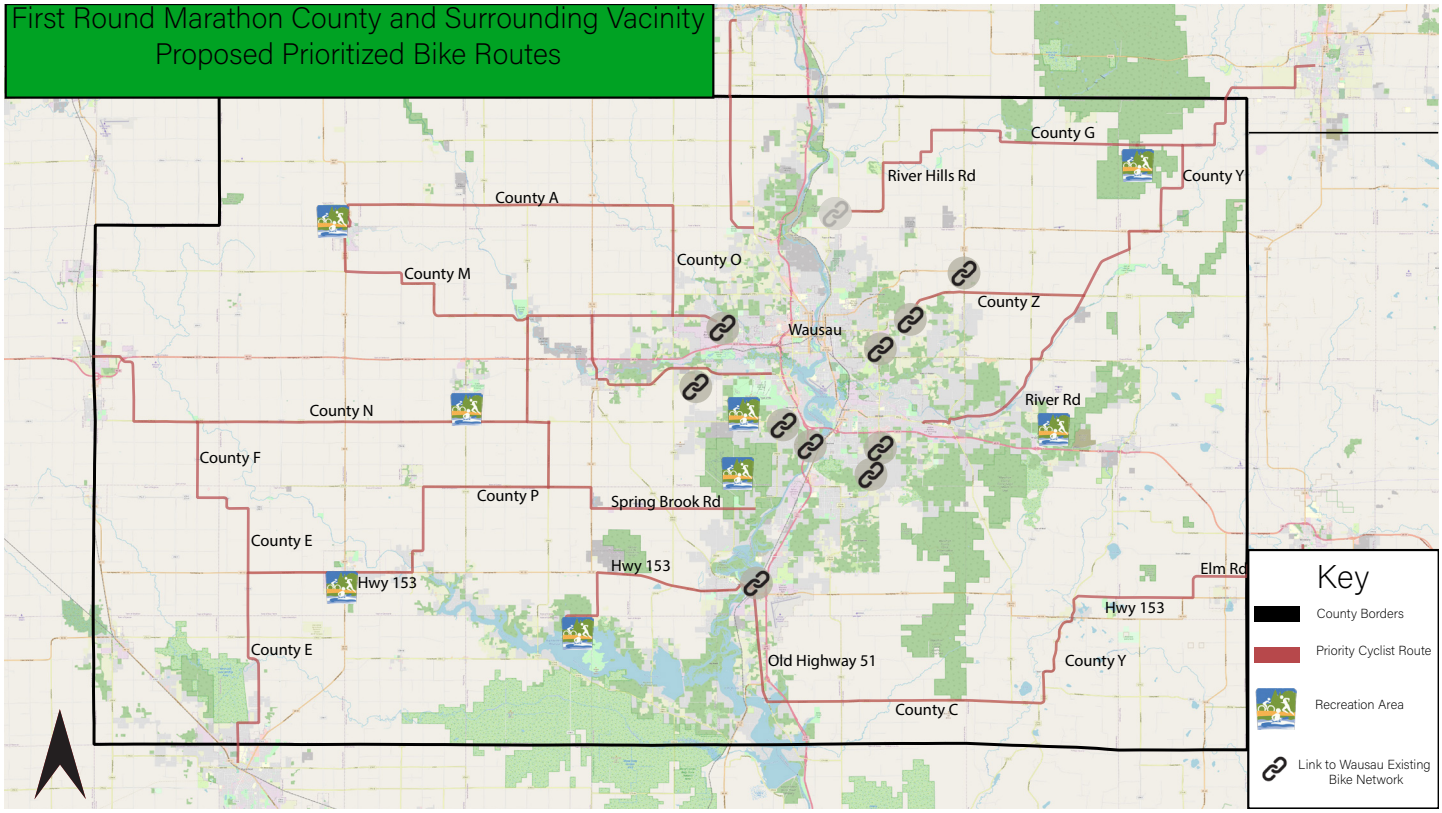


Figure 2: First Round Rural Network Proposal via GIS Analysis & Local Context

Transportation Officials 2012; Wisconsin Department of Transportation 2006)
After creation of the unique layers, routes were traced using the lowest ADT (500) with intent of connecting POIs and providing general east/west and north/south travel connections. When a gap in the 500 ADT network was observed and could not be completed on roadways with <500 ADT, higher ADT layers were turned on to identify the closest alternative. Routes with observed traffic >1500 were either avoided, or special note was taken for those routes to be prioritized when considering roadway upgrades.

With areas of potential cycling interest and a first-round rural cycling network infrastructure plotted utilizing GIS, I created recommendations for specific infrastructure improvements following the guidelines provided by WisDOT and AASHTO. WisDOT and AASHTO provided two different rural biking models that were balanced to provide realistic solutions for Marathon County. WisDOT tended to be more relaxed with recommending bike lanes with paved shoulders and other safety devices on roads with high ADT, while AASHTO recommends more aggressive cyclist accommodations, citing that any roadway with a speed limit higher than 45 MPH should be accompanied with a paved shoulder 4 to 5 feet in width. (American Association of State Highway and Transportation Officials 2012) To balance these two guidance documents and with knowledge that most rural and town roads in Marathon County have posted speed limits greater than 45 MPH, ADT and roadway width rather than posted speed limit were the largest factor to determining a standard guidance for prioritized bike routes. This determination was made due to the understanding that Marathon County's highway department does not have the available funds to install paved shoulders on all necessary routes and is not completely realistic

Network Creation Methods + First Round Proposal

with current ridership.

From this analysis the first-round map was produced to present to known cyclist groups for their input mostly surrounding routing choices. From this process, some general findings about the Marathon County Highway System were found:

ADT count observed in rural Marathon county ranged from the low hundreds to approximately 15,000 on State Highway 29, excluding Interstate 39/Highway 51. The vast majority of roads were under 2,000 ADT in casual observation. With guidance using WisDOT and AASHTO, ADT counts under 500 vehicles per day would require minimal roadway changes, with additions to signage and painted lines being the largest accommodation needed. This layer (Paved Roadway, <500 ADT) was used to establish any main east/west and north/south roads that could be utilized as priority bike facility routes for the future. (500 ADT Map)

Notable routes with <500 ADT in Marathon County that would provide significant backbone support to a rural bike network is County P stretching from Highway 107 to County E west of Wausau, Eau Claire River Road from County J to Hwy 52 on the eastern side of the county, and County M from Fenwood to Athens stretching north/south.

Example of a <500 ADT route that would require little additional bike accomodation, potentially near Rib Mountain State Park that commuters or commercial traffic would not utilize.
Source: https://pixabay.com/photos/road-landscape-autumn-highway-fall-6745746/

Example of a >800 ADT route that would require the addition of a bike facility to safely accomodate a cyclist. Routes without a shoulder at all should be avoided.
Source: maps.google.com, streetview.

Public Input + Network Refinement

Public Input + Network Refinement

After the development of the original network routes, public input was collected from multiple known active cyclist groups in the county to revise routing choices. These groups were selected by the MPO due to their above average knowledge of the county and routes frequented by recreational cyclists. A broad survey to the public was never considered due to the small nature of the project, and the wide variance of responses that would have been received and would be too much data to process for one individual.

The survey focused on written text responses with critiques on routing choices for the network and included questions about rider demographics and characteristics. Data was collected using an ArcGIS Online webpage to host a description of the data collection effort, and the embedded survey for simplicity. The survey was open for nine days, from Friday February 4th, 2022 to Sunday February 13th, 2022 and received 48 responses.

A complete list of questions, link, and image of the website are available in Appendix 1.

Demographics and Rider Characteristics

Demographic and other basic data that was collected from participants were pertaining to their comfort riding in Marathon County, confidence riding in mixed traffic, as well as age and zip code. Questions presented are below:

1. *Where do you typically ride your bike in Marathon County? Please rank your answers. Answers possible were: Rural Marathon County (Outside of the Wausau Metro), In the Wausau Metro, and At Recreation Facilities like State, County, and Local Parks.*

2. How comfortable are you riding your bike in rural Marathon County? Answers possible were: I do not ride in rural Marathon County, Very uncomfortable, Somewhat uncomfortable, Neutral, Somewhat comfortable, and Very comfortable.

3. How would you describe your cycling confidence level riding in mixed traffic? Answers possible were: High, Medium, and Low Confidence

4.Age Request: (Average Age, Insert)

5. Zip Code Request: (List most common zips)

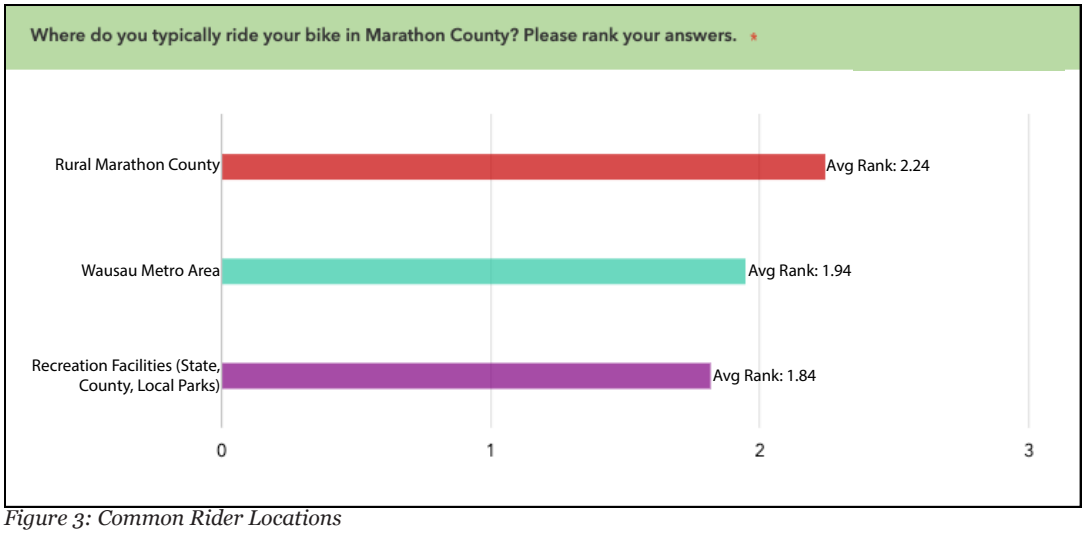


Figure 3: Common Rider Locations

Figure 4: Average Participant Age

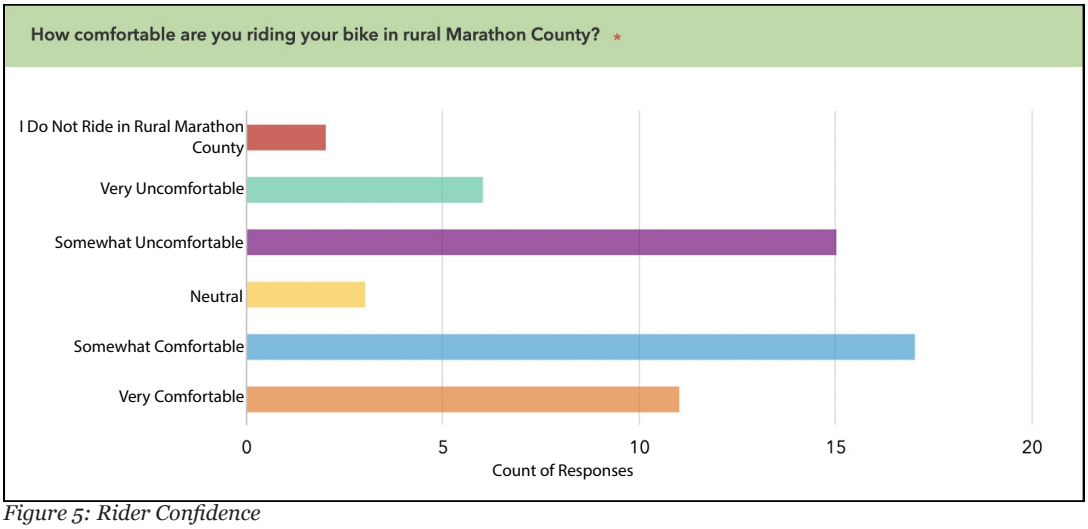


Figure 5: Rider Confidence

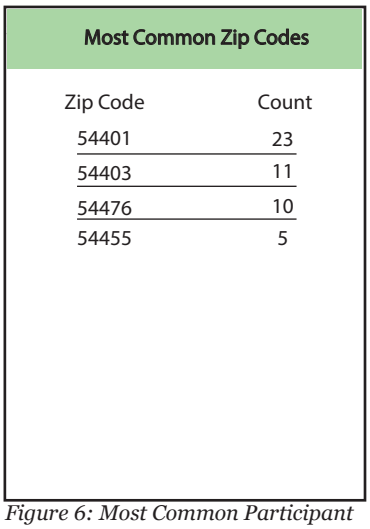


Figure 6: Most Common Participant Zip Codes

Written Response Interpretation

Written text from the survey was analyzed by turning each comment into a virtual index "card" and sorted, noted, and filed. All responses were sorted into two categories: Roadway Improvements and Network Improvements.

Roadway Improvements

Roadway improvement comments all covered similar themes: Desire for increased signage on bike routes, driver re-education efforts, painting bike lanes, and other on-road improvements. These recommendations were aggregated to eliminate duplicates and the exact text is available in Appendix 1. These elements are some of the cheapest options compared to the construction of paved shoulder or dedicated path right of way (ROW), which may be beneficial to the county highway department budget and require minimum planning. Roadway change efforts are also beneficial for driver awareness if a new sign design or green road paint was to be used and remind a driver to take extra care when driving on the rural cycling network.

Public Input + Network Refinement

Network Improvements

The remaining comments received through public comment were changes to the originally proposed routing of the rural network. A significant number of comments pointed towards local roads that are popular with recreational cyclists, in replacement of county roads, especially in the eastern portion of the county. Town roads cannot be used in a significant manner on the western portion of the county due to most being gravel. Gravel routing was mentioned though in a few comments, requesting a gravel network to be considered as "gravel" bikes and other large tire bikes become more popular among cyclists. A gravel network could be an addition to the rural network plan proposed here and then enable the public to know about the network and its marketing by the County or MPO.

Comments that did not fit into roadway and network improvements as categories were read but not integrated into the network recommendation and plan. Comments in this category were either discussing the Wausau Metro bike network which was outside the scope of this project, or general recommendations to the county about bike friendliness. These comments were not discarded and are available in Appendix 1.

From the network improvements, the map was able to be solidified as the final Marathon County proposed rural cycling network. The routes highlighted should then be used as a guiding tool for pointing the public to the safest routes in rural portions of the county and internally at county offices to indicate higher levels of attention to roadway maintenance and potential upgrades.

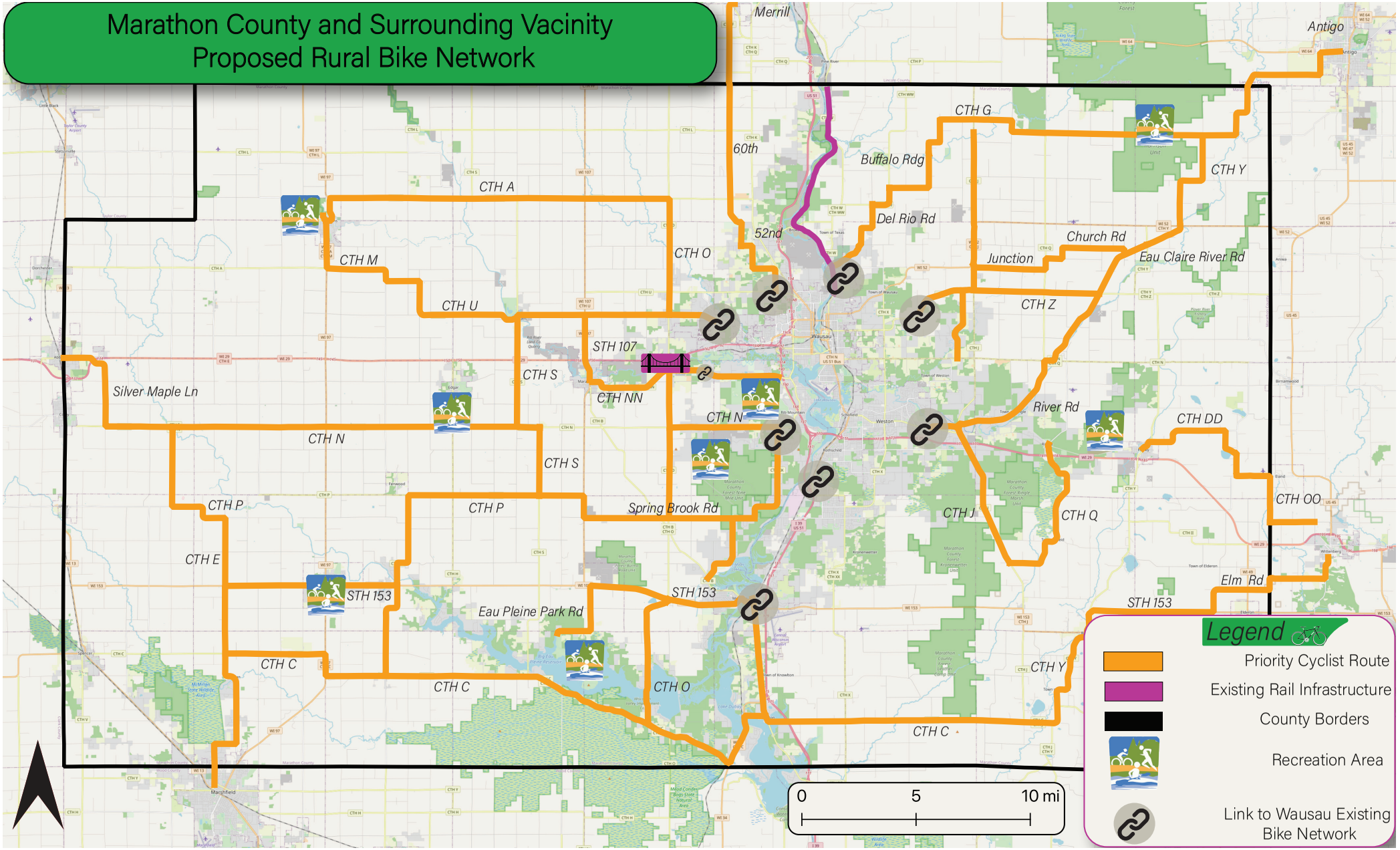


Figure 7: Final Marathon County Rural Bike Network

Conclusion

Closing Statement

The presented methodology and network is a groundwork tool to allow for a full-scale rural bike plan to be written and successfully implemented. The presented network was created using all available local resources at the time, including current bike facility mapping, social data analysis, parks and recreation consideration, and the input of local cyclist groups. In Marathon County, this plan should be used to guide rural biking decisions in upcoming years and specifically influence the highway department to install more robust on-road cyclist facilities.

Local knowledge should take precedence over this plan in situations where traffic levels may be higher than reported or heavy commercial traffic may significantly threaten cyclist safety. From public input collection, rural cyclists typically prefer to be on a paved, local route that may have a few more turns to reach a destination over riding on a county road with more traffic and narrow paved shoulder. This knowledge should guide future routing choices to install bike route designation signs or other visual products to improve cyclist visibility and wayfinding.

To aid choices of visibility, wayfinding, construction best practice, and marketing strategy, the provided technical guides to the Marathon County Parks & Highways Departments will help decision making as the rural bike network becomes more robust. While the network cannot be implemented immediately, partnership of these two organizations and the Wausau Area MPO are critical to protect the safety of all road users, utilize existing county resources, and provide another recreation activity for residents and tourists of Marathon County.

As a side, I would like to additionally thank Andy with the Wausau MPO for working with two U.W. M.S. URPL students this semester, and allowing us to gain professional experience while providing a helpful tool for future planning. A thanks is also owed to Gavin Luter with the UniverCity Year program at UW-Madison, which through his dedication and hard work has allowed for many UW students to be connected with real-world clients that help us substantially with graduation requirements, skill enhancement, and portfolio building.

Thank you to the both of you, and all at Marathon County & the MPO!

Technical Guidance

To implement the proposed network and begin incremental change to increase rural cycling, communication and understanding outside of the MPO and multimodal offices need to be formed with additional county offices. Specifically, the Highways and Parks department should be used as resources and allies for this project, as highways would be responsible for changing the physical infrastructure while parks should be responsible for marketing, advocacy, and community outreach.

Recommendations and technical guidance for each department are presented in their own sections that can be used as individual documents to help guide decision making.

Marathon County Parks Department

People + Places

The Marathon County Parks Department should be used as a catalyst for the public success of the rural network using connections and community health based marketing. To provide this service to the public, many strategies can be used both in the long and short term to ensure that enjoyable and safe county facilities are being promoted by the department. To guide the promotion and partnership with the County Highway Department, the County Parks department's slogan "Connecting People to Places" should be used to ensure that the rural cycling network is providing useful spaces and beneficial community outcomes.

Promoting the New Rural Network

When the rural network is adopted and known about within Marathon County, a first step is to promote the network. Since the rural network is slowly evolving, in different conditions depending on location, and isn't in one specific place in the county, a "soft-launch" or smaller marketing campaign is recommended. A marketing effort for the rural network could include elements like website availability near other biking resources, social media posts, and some printed media for targeted distribution at events where many recreational cyclists may be present. Additionally, loops and connections to existing bike infrastructure within the Wausau metro area could be made similar to Columbia County. These loops could then be an additional marketing tool and visual to help draw ridership to the rural network.

Comments and reactions to the rural network should also be noted and passed along to appropriate officials, as the network should be viewed as a living document that is able to change with new natural attractions, construction projects, and other long-term changes that would be worth adjusting the network for. The rural network would also be complimented by other County level efforts to acquire right-of-way (ROW) for dedicated cycling paths to accommodate all cyclists and increase recreational economic drivers.

Rails to Trails Conversions

Indicated by Strava activity on small stretches of abandoned railway ROW throughout the county and especially the section south of Edgar, leads that cyclist in the rural portions of the County are interested in dedicated cycling facilities. Additionally, with the creation of the rural network, two different rural cycling demographics may require different attention. One may be experienced rural riders who may ride for training and health purposes typically on road bikes throughout the nice weather months. A second demographic may be residents who are not entirely comfortable riding on-road for long stretches, though enjoy dedicated paths. These two demographics should be

considered when making decisions about the network, and specifically when considering additions to a dedicated cyclist path.

Indicated in Figure 7 with purple color, indicates the active and non-active/abandoned rail lines in the County that could be converted to a cycling path. An aforementioned railroad bridge located south of Highway 29 to cross Big Rib River (44°56'31.0"N 89°45'12.8"W) is also a key piece of infrastructure to be used in a potential rails to trails buildout, due to the difficulty of building a new bridge under WI Department of Natural Resources guidance.

Government law and guidance will determine if a project is worthwhile while considering regulation surrounding ROW purchasing, negotiation, and the use of eminent domain. It is commonly known that under current Wisconsin statute, eminent domain power cannot be used to acquire cyclist and pedestrian facilities. (Wisconsin State Legislature 2017) This law may be changing after the passage of the Infrastructure Investment and Jobs Act (The Federal Infrastructure Bill) and its emphasis on active transportation—allowing for the Governor to strike the current law and allow for active transportation funds to be used on dedicated facilities. (Jeremy S. Young 2022) The current County Parks supervisor and supervisors in the future should keep a close eye on changing regulatory environments that may allow for public investments in private land and/or allow the County to condemn previously privately held land. Additional statewide guidance may be available later in 2022 and 2023 after the full implications of the infrastructure bill are realized, though guidance to help the rural network and small steps are available now.

Eau Claire Dells, north-central Wisconsin. Source: https://www.wpr.org/marathon-county-first-wisconsin-pass-sulfide-mining-ordinance

Statewide Guidance

A document of significance to reference for future decisions pertaining to the rural network is the Wisconsin Department of Health Services Active Community Toolkit. The toolkit provides low, medium, and high resource suggestions for adaptations to a community to accommodate more cyclists and pedestrians. Elements mentioned in the toolkit may be useful if working with smaller communities in the county that are resource constrained and may not know how to effectively accommodate more cyclists in their town. Elements in the toolkit are broken into short, medium, and high resource solutions that would be helpful for the Parks department and surrounding communities to understand best practice in active community policy. A low resource example from the toolkit is to perform a bike facilities inventory or encourage the installation of public bike racks. Medium and high resource examples are implementing traffic calming measures and ensuring connected roadways respectively.

Conclusion

To ensure an appropriate yet successful launch of Marathon County's rural bike network that is ever evolving, guidance from locals to statewide offices and marketing strategy must be undertaken by the County Parks department. Parks is the ideal place to advertise this effort due to the visibility of the department and instant recognition by residents of Parks department responsibilities.

Marathon County Highways Department

This technical guide was prepared for the Marathon County Highways Department in preparation for the implementation and advertisement of the rural bike network. In this guide you will find technical assistance to guide decision making for the implementation of bicycle accommodations/facilities on rural routes. Theses recommendations were constructed from guidance provided from the Wisconsin Department of Transportation, and the American Association of State Highway and Transportation Officials (AASHTO).

The most common accommodation needed on county bike routes would be the addition of signage, paint, and driver re-education campaigns to change motorists' perception and attention to cyclists. Specific attention is paid to ADT levels, roadway drop-offs and driveways, rumble strips, commercial vehicle guidance, and bike route designation requirements.

Facility Guidance Table for Future Roadway Projects

To help guide bike facility build-out on Marathon County prioritized routes, three types of roadway adaptations and accommodations should be most common.

- Increased use of signs and roadway paint for heightened driver attention
- Shared Lanes: Cyclists ride in mixed traffic due to low ADT counts
- Paved Shoulders (Varying Widths): Road shoulders paved with asphalt or concrete that are separated by paint or a physical barrier accompanied with increased signage for driver awareness. Widths vary due to ADT and presence of rumble strips.

In rural Marathon County and especially west of Wausau, a significant number of roadways have low enough ADT counts (<500 vehicles per day) that would allow for most cyclists to feel comfortable riding in shared lanes without feeling threatened by drivers. (Wisconsin Department of Transportation 2006) See Figure 1 for a map of roads with ADT counts <500. According to AASHTO's bike facility guide, the number of cars present on a roadway and the driver's speed are the two of the largest factors of a cyclist feeling safe on the roadway. (American Association of State Highway and Transportation Officials 2012) To accommodate for these needs, standards have been developed using guidance from WisDOT and AASHTO for application in Marathon County. These standards were developed considering guidance from both agencies while understanding the priority and financial costs of bike facility improvements in the rural portions of the county.

To utilize the table below, the 'Acceptable ADT Range' column should be used to determine the type of appropriate bike facility

that should be considered for a road project. ADT should be the primary determinant of the type of bike facility that is installed.

To continue, determinations should be made of whether the roadway will feature side-running rumble strips or not, which will increase the shoulder width of the roadway overall if strips are used. Another important consideration is whether the roadway is regularly used by commercial traffic that could easily scare and discourage cyclists from using the route. At the time this report was gathered, differences in ADT counts between private and commercial truck traffic was not available, though avoiding known truck routes in bike planning may be helpful until more detailed data is available. Other recommendations are offered additionally to warn drivers about increased cyclist presence. Most commonly these warning devices are signs and pavement markings, but additional funding can be spent on physical dividers between the shoulder and bike lane, green paint and striping, and steep ditch barrier protection.

Facility Type	Acceptable ADT Range	Paved Shoulder Width (ft)		Other Recommended Accommodations
		With Rumble Strips*	W/O Rumble Strips	
Shared Lanes	<500	N/A	N/A	Increased signage notifying driver's of cyclist presence
Paved Shoulders	500-800	5	4	Increased signage, pavement markings
Paved Shoulders	800-1200	6	5	Increased signage, pavement markings
Paved Shoulders	1200+	6	6	Increased signage, pavement markings

*Width from outside edge of rumble strip to the edge of roadway leading to ditch or gulch

Figure 8: Bicycle Facility Guidance Matrix with ADT Count

After determining the appropriate facility to install during a roadway improvement project, additional safety treatments for cyclists should be considered, especially for hazards that are heavily present in rural areas. Most frequently, these hazards are caused by driveways and ditches, as a cyclist is at risk for falling due to lose gravel or steep grades.

Roadway Dropoff and Driveway Treatments Guidance

To decrease the chance of a cyclist, pedestrian, or motorist from falling into a steep ditch that are common in rural areas, safety accommodations are recommended. These safety features and guidance come from a mix of sources due to a lack of comprehensive documentation from a single source. Resources are combined from: the Iowa Department of Transportation Pedestrian facilities design guide, AASHTO Bike Guide, and the National Cooperative Highway Research Program.

Slope Guidance

When a project occurs in an area with a steep drop off to the side of the roadway, a safety rail is suggested to be installed for the safety of cyclists. Depending on requirements of roadway travel, the treatment area may also be suitable for beam-guard/guardrail installation to prevent vehicles from falling into the ditch, especially in a curve. Otherwise, safety rail that would prevent a cyclist or pedestrian from falling would be suggested, that is less heavy

Figure 9: Example of Cyclist Beam Guard to aid on Slopes, not fit to stop a vehicle. Source: NCHRP, Determination of Appropriate Railing Heights for Bicyclists

duty than beam guard. An example of this gaurd can be seen in Figure 9.

The installation of safety rail should be heavily considered when the adjacent slope of the ditch is more than 1:3 with considerations of nearby canals, vegetation, utility infrastructure, or other fencing. (American Association of State Highway and Transportation Officials 2012) The pedestrian safety rail should be at minimum the height of 54 inches, the height of which a cyclist could reach out and grab the guard to prevent a fall. (Clough, Harbour & Associates LLP 2004) The safety guard should be installed in the vegetation or gravel shoulder that does not impede on the width of the paved shoulder or shared lane where cyclists would be present.

Guidance for this cyclist safety feature was collected from sources planning for shared-use paths and not necessarily for use in shared roadway applications, though the protection these accommodations provide may help encourage cyclists by providing additional safety measures.

Rumble Strip Guidance

Rumble strips are an effective method for reducing run-off crashes and alerting drowsy drivers of drifting, but can be a significant challenge to navigate for cyclists. There were multiple public comments while developing the rural network that were opposed to the installation of rumble strips on popular cyclist routes, and they are a hazard to navigate across especially when riding on paved shoulder. Best practice to install rumble strips and accommodate cyclists while on the roadway is ensuring there are minimum gaps in the rumble strips that allow a cyclist to exit the paved shoulder and enter the travel lane.(American Association of State Highway and Transportation Officials 2012)

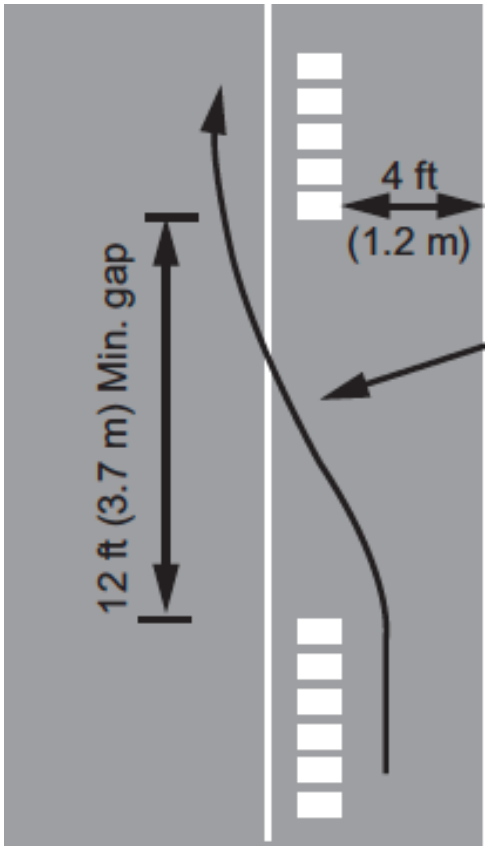


Figure 10: AASHTO Rumble Strip Guidance, Source: AASHTO Bike Facilities Guide

Guidance from the AASHTO bicycle facilities guide provides an example like the image shown to ensure that both cyclists and motorists are accommodated on county maintained roadways. Placement and the spacing of rumble strips is the best solution

currently to still allow for their use without creation of a large hazard especially for cyclists with thin tires/wheels that can cause a fall and potential injury.

Installation of Bike Maintenance Stations at County Owned Land

A final recommendation that should be adopted as standard practice at the Highway as well as Parks Department when improving or creating bike facilities is the installation of bike maintenance towers like the below example that are self-service and contain basic tools on a cable, a tire pump, and rack to get a bike off the ground to work. These stations can be installed at the entrances to parks where bikes are welcome, larger intersections that are indicated popular cyclist routes, or on sidewalks in smaller towns and villages throughout the county.

Self Serve Bike Maintenance Station
Source: https://www.sarisinfrastructure.com/post/blog-16-bike-fixtation-joins-saris-cycling-group-family-of-brands

Heavy Commercial Traffic Considerations

When planning for cycling in rural locations, commercial and heavy vehicle traffic needs to be considered to determine whether to encourage cyclists on a route or if no other feasible option exists, provide a bike facility that places the cyclist many feet from the travel lane (4+ Feet). Commercial vehicle traffic can heavily discourage cyclists due to their weight and size, and local expertise paired with traffic data should be used when determining if a roadway is suitable for a bike route designation. WisDOT additionally collects traffic data about commercial vs private vehicle activity through their traffic counts program if the County does not have suitable data to make a decision on in-house data alone. WisDOT data in abbreviated form is additionally available in the GIS project for this report and available with Andrew Lynch.

Bike Route Designations

During an in-progress meeting with the Parks and Highways department, question was

raised about whether the county would have to be prepared to make immediate changes to roadways if they were to be designated as official bike routes. Information to answer these questions was researched in the Wisconsin DOT Facilities Development Manual and Wisconsin Bicycle Facility Design Handbook. Overall, there are no strict laws that would hold Marathon County liable to immediately change infrastructure if a road is designated as a bike route, though hold important safety recommendations that are critical to consider before posting a bike route.

Additionally, the phrases “Bicycle Accommodation” and “Bicycle Route” are commonly used by WisDOT. Their differences should be made clear to properly interpret the guidance below.

• Bicycle Accommodation: To provide a physical space for bikes to operate and for motorists to safely pass them
• Bicycle Route: Bicycle routes are a wayfinding feature to connect two points of significance that are regarded as safe to operate a bike on following state guidance.

FDM 11-46 Complete Streets (wisconsindot.gov)
• Section 1.3.1.4.2 Bikeways outlines general guidance on providing bike accommodations (though doesn’t discuss officially signing a bikeway as a bike route)

FDM 11-35 Structures (wisconsindot.gov) – Section 1.6.2 Bicycle Accommodations (page 5)
• If a bridge or approaching highway has either pavement-marked bike lanes, or is signed as a bicycle route, and the bicycle accommodation is immediately adjacent to the bridge railing, the railing height should be a lower minimum of 42-inches”

Wisconsin Bicycle Facility Design Handbook (wisconsindot.gov) – Bike Route Designation (page 245)
• These signed routes indicate a preference for bicyclists for one or more of the following reasons:
• The route provides continuity to other bicycle facilities such as bike lanes and shared paths;
• The road is a common route for bicyclists because of its directness or land uses it serves;
• There is a need to assist bicyclists between two points with wayfinding devices because of the complexity of a particular route;
• In rural areas, the route is preferred for bicycling due to low volumes of motor vehicle traffic, directness, or its ability to help bicyclists safely overcome an upcoming barrier;

• The route runs parallel to a major roadway which has not yet been treated with wide curb lanes, bike lanes, or paved shoulders.
• The following criteria should be considered prior to signing a route:

The route provides through and direct travel from one destination to another;

The route connects discontinuous segments of shared use paths, bike lanes, and/or bike routes;

An effort has been made, if necessary, to adjust traffic control devices to give greater priority to bicyclists on the route, as opposed to other parallel streets. This could include placement of bicycle-sensitive loop detectors where bicyclists stop at signals.

Wisconsin Bicycle Planning Guidance (wisconsindot.gov) – Bicycle Mapping and Signing (page 26)

• Some segments of a community's or MPO's bike route system will be suitable for bicycle transportation with little or no improvements. These segments can be mapped as 'bicycle routes.' Other segments of the proposed system may need to first be improved to make them suitable for bicycle transportation…In many cases, bike route signing is used as a first or interim step toward providing a system of more advanced facilities.
• Arterial highways with shoulders less than 4 feet wide normally should not be signed as bikeways or bike routes. (p. 40)

Paved Shoulder Cost Estimation

To merge best practice and cost estimation, rough costs were developed for installing paved shoulders in Marathon county. These costs should be used for estimation, as throughout the pandemic a significant inflation of construction materials has been observed and felt across all industries. There are 586 miles of total rural network, and double the quantity to 1,172 to count for both sides of the road. Cost was additionally broken down to priority areas, such as highway 153 between CTH E & M, and areas where the bike network crosses a state highway. These areas are dangerous to cyclists due to high ADT and mixed auto movement where cyclists can be caught in drivers' blind spots.

Paved Shoulders			
Mileage Total		586.329	
Mileage Total x2		1172.658	
Priority Mileage		28.7	
Specific Routes (Priority)	**Mileage**		**Mileage x2**
153 b/w CTH E & M		7.6	15.2
Crossing State Highways		2.2	4.4
		0.5	1
		1.4	2.8
		1.15	2.3
		1	2
		0.5	1
Cost Estimates			
4' Paved Shoulder (ArDOT, 2018)	$	113,000	Per Mile
6' Paved Shoulders (Iowa, 2018)	$	106,938	Per Mile
Average Cost per Mile	$	109,969	
Cost to Marathon County (Priority Only)	$	3,156,110	

Conclusion

To reiterate, this technical guide is to be used as a decision making tool for installing the best rural bicycle facilities that are within reach of the Highways Department while following industry best practice. While 6+ foot paved shoulders may require an entire roadway widening project, this guide should provide solutions that can be introduced gradually while positively influencing current thought trends about cyclist facilities in rural Marathon County.

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Appendix 1: Public Input Data

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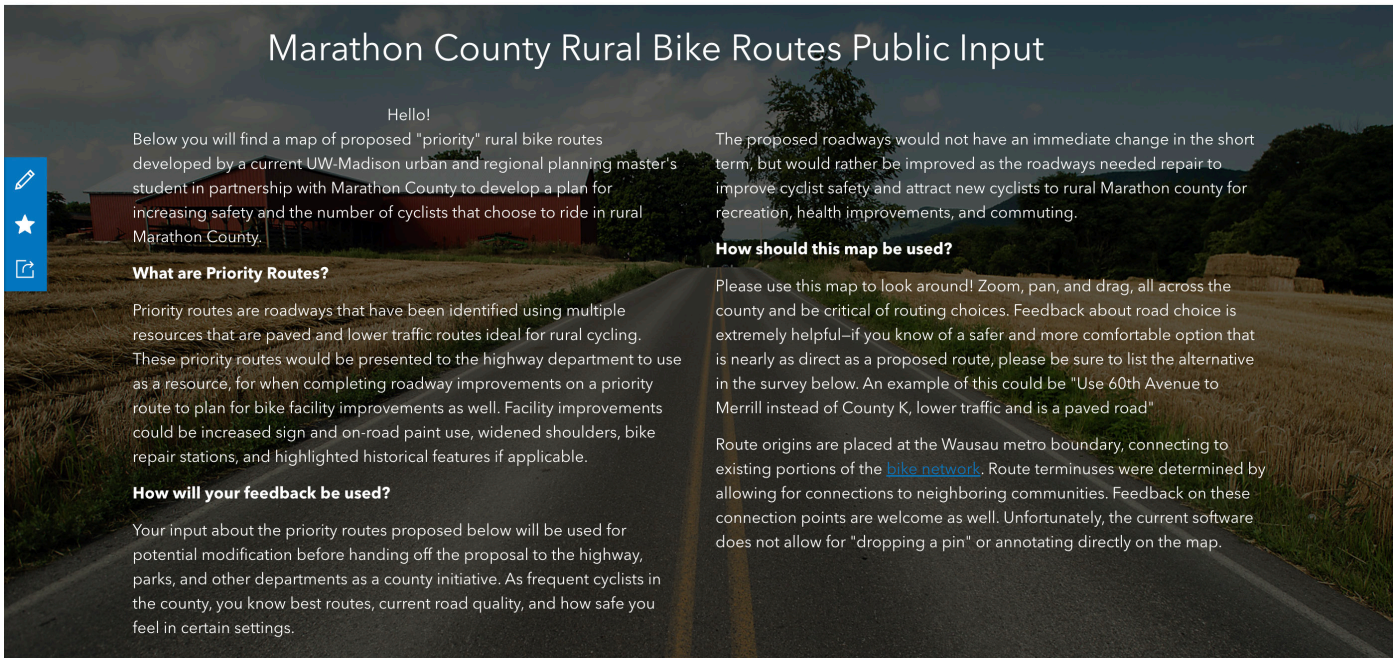
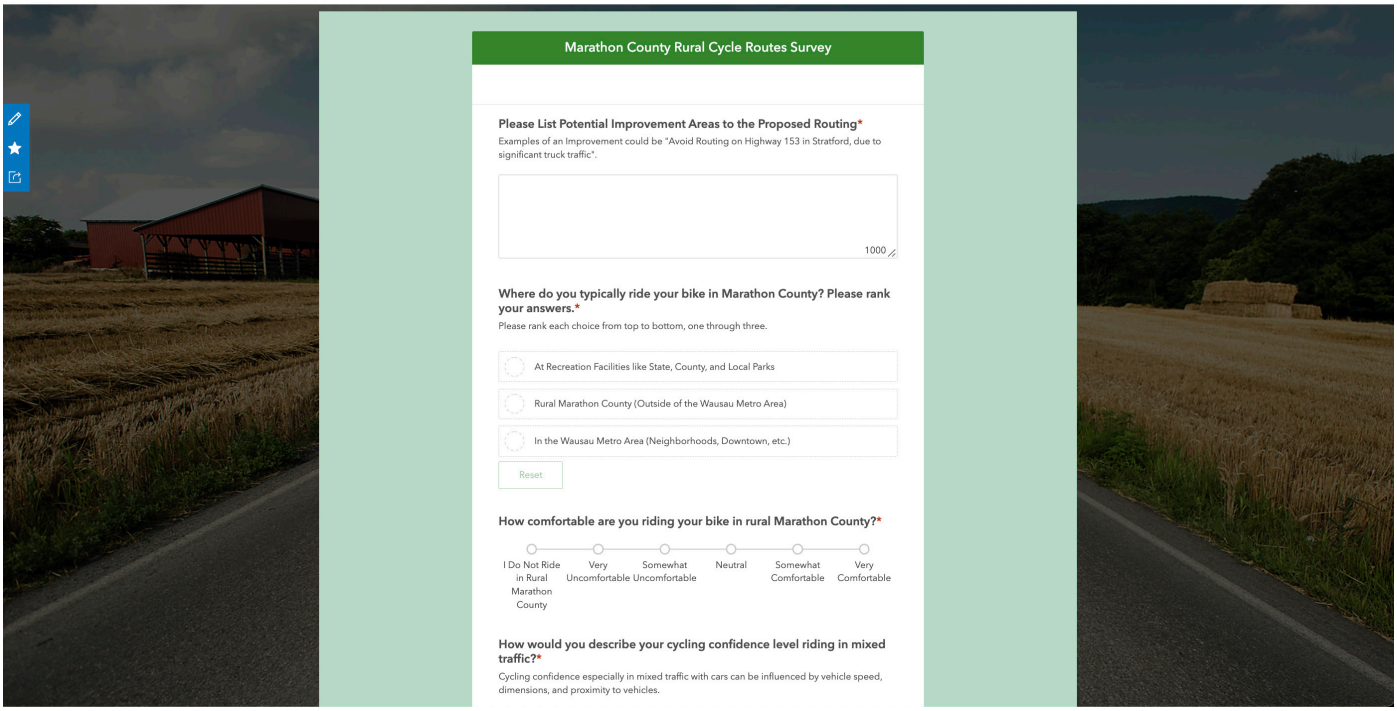
Marathon County Rural Bike Public Input



Marathon County Rural Bike Public Input



Quantitiative survey data is available in the project files transferred to Andrew Lynch in the Spring of 2022.

Question Posed: Please List Potential Improvement Areas to the Proposed Routing

County Z is quite narrow, especially between J and Q. I think some other routes had used local roads more by taking Z to J to Junction Road, Q, Glenview, Church, Echo, Eau Claire River Road to Y.

Appendix 1: Public Input Data

-
County N has a lot of trucks and I avoid it and use other local roads whenever possible.
-
Highway 153 has trucks and poor pavement.
-
Use local paved roads whenever possible instead of county and state highways.
Consider CTH XX, CTH X and CTH J. CTH XX because it generally leads to the WI RI bridge and access to FoxGlove and CTH NN.
-
I'm not familiar enough with the rural areas to comment. I just don't like riding in the country because of fear of getting nailed by a careless, speeding driver. I'm also old and don't do steep hills well and avoid them.
-
Putting cycling specific signs throughout the area to make vehicles better aware of cyclists not just route #signs
-
Any country road would do if if is maintain.
-
More Consistent pavement surface on Martin rd between hwy J and creek rd.
-
I would not ride on County roads
-
Bike paths instead of bike lanes or no lanes
Bike lanes and signs clearly marked — also a way to get from the southeast side to downtown without Grand Ave!
-
I'm interested in how gravel roads in Marathon County could be incorporated into this route system. The gravel roads in western Marathon County are spectacular and extremely low traffic. I find gravel-riding to be much safer than road riding. With "gravel bikes" become a standard in the cycling industry, we should be encouraging people to ride gravel roads. I try to avoid any County or State Highways for prolonged periods.
-
County Z would need a better shoulder, road gets a bit busy. In general the county highway roads are a little scary to ride on. There are some gorgeous paved side roads that should be consider, for example, Eau Claire River Rd is one of the best for cycling.
-

Old Highway 51 b/w Mosinee and Highway 34 has horrible pavement, & it is dangerous (hills and speed) without a paved shoulder. It is nearly impossible to bike close to the fog line due to potholes. I would be thrilled if this was redone with paved shoulders.

-

A wider shoulder on Highway 153 would be safer; sometimes vehicles don't move over at all, & that's too close with the narrow paved shoulders. This is mostly between Stratford & Mosinee. It isn't as bad east of Mosinee.

-

County Road N west of Highway 107 is also dangerous without paved shoulders - traffic & hills. I was not happy when they re-paved County Road B. I pushed for paved shoulders. That road is curvy and hilly. Many cyclists ride on it.

-

County Road O also sees significant cycling traffic, but it seems that most drivers are good on that road. Due to the hills on that road north of Highway 29, paved shoulder would be appreciated by all. The County Road O bridge over the Eau Pleine Reservoir is narrow, and it curves.

-

Having bike lanes when's its new construction.

-

Paved shoulder on local county highways such as J.

-

Wider shoulders. No rumble strips.

-

I generally have had a good experience with most of my cycling in the area. I do feel more comfortable on any road that has larger paved shoulders even if it's busier than a lower traffic road that doesn't. My only real concern is that I've heard some of the beautiful roads I've ridden on were proposed to get shoulder rumble strips. I hope dangerous changes like that won't be made.

-

Outlined routs are ideal for cyclist to get from Wausau to another nearby city, however these routs from my experience are not used "daily". Majority of cyclists in the Wausau metro area use "back roads" to get miles in. Commuting daily from a nearby city to Wausau is slightly unrealistic as most cities by car are 15+ miles one direction and riding is only applicable 3/4 months out of a year at most. Putting more effort into local routs for everyday cyclists to ride/route would be ideal. Future outlook on expanding to nearby cities would then be promoted based on our local drive/comfortability with routes in Wausau metro area (approx. 15 miles in

each direction). There is no route outlined from Wausau to Mosinee, would be nice to see this expand. Overall, great to see effort being placed into the thought of improving/expanding routes.
-
County Rd KK from N to B is a popular cycling route

County Rd N from County Rd O to Rib Mountain Drive is a popular route and allows for a ride around the perimeter of Rib Mountain State Park that includes Hummingbird and County Rd NN

County Rd C from County Rd M in Rozelville to Rangeline Rd is a popular route with cyclists in southwestern Marathon County
-
Most county highways leave little room for motor traffic & bicycles - add in heavy trucks and if becomes dangerous. The trails in the south metro are awesome. Quite town roads are another asset that makes for enjoyable rides.
-
Add KK and N. Note NN has too much truck traffic.
-
Overall, more connections in system and more paved off road trails.
Connect routes on Spring Book Road and NN for a loop with access to 9 mile.
Connect Mountain Bay Trail to western routes with clear paths through Wausau.
-
Comment on mixed use question below. I feel pretty comfortable riding in traffic, but noticed that many drivers on the county hwys are not. In other communities, riding rural highways felt a lot safer as drivers were more accustomed to sharing the road with bikes.
-
Avoid Grand Ave
Instead of dead-end destination points, it would be nice to look at loops. For example the routes dead end at Marshfield, Abbotsford, Merril, Antigo, and Wittenberg. Perhaps consider looping some of these routes to make for alternate routes, and more selection. For example; Add a connector from Marshfield to Cty Rd S or O ... a connector from Wittenberg back towards Hatley, Norrie or Eau Claire Dells.
-
A route that connects more north and south is needed between Wausau and Stevens Point and Merrill. Bike lanes should be included in all paving projects.
-

label the lines on the map

-

Avoid routing through the interchange with USH 51 on Highways K and Business 51 as there is a significant level of traffic through the interchange.

-

The rumble strips on Hwy H south of Edgar are cut all the way to the granite forcing road bikes to either go around into traffic or drop off the black top onto the granite which is always 2 to 4 inches compacted below the black top do to heavy farm equipment. I think the straps should be black topped smooth near the shoulder to allow bikes to cross them safely. As should all rumble straps. They dangerous to cyclist. Also the shoulders should be better maintained in heavy farm equipment traveled areas. We need at least a small smooth area to cross rumble strip. Please consider installing a smooth crossing for bicycles on the rumble strips south of Edgar at the intersection of Hwy H and Hwy N. There are a lot of cyclist in this area. Thank you, Steve Guralski 715-506-1598. stevegnorthstar@gmail.com.

-

Cth KK. Not sure why not listed. Already high volume of riders. There are stretches of this hwy that need safety improvements. Would also connect two or three of the routes on the map to form loops. Plus loops with trails in Mosinee, Kronenwetter and Rothschilds.
B from Mosinee to Marathon is the best way to get between the munis via a bike.

-

Add Buffalo Ridge Road to the routes.

-

KK from Rib mountain to B .

-

County O from B to NN should be added.
Wider lane's in the city of Wausau

-

None

-

Avoid Hwy. KK south section. Many curves, cars rarely slow and bike lane is narrow.

-

Make wide shoulders on all roads like Hwy Q south of Hwy 29. This is a fantastic place to ride!
Need bike path on old hwy 51 south. Too narrow and many cars.

-

Can't think of any

-

Map not able to be visualized

-

County Rd KK bypass option to Mosinee 9 mile. County N addition Rib Mountain West. Continue the new Foxglove RD trail to Mosinee.

-

Bike lanes or sharrows through schofield to connect to grand ave.

-

Bike lanes over I-90 highway connecting kronenwetter and Weston

Na

-

Bike awareness campaign to make motorists more aware of traffic laws for bike and pedestrian safety at crosswalks.

-

bike paths on road sides to avoid motor traffic

-

My main improvement would be to create/designate a true gravel bike/hike path that would run from Merrill to Rothschild.

-

Marathon County Hwy Dept wants to put rumble strips on some of our most rideable roads. I was the President of the Wausau Wheelers for 5 years, on the MPO sub committee for 10 plus years and are opposed to the rumble strips!!! Additionally if the county could sweep, blow off the shoulders to the roads to get rid of road debris please!! Lots of flats because of all the junk that gets pushed to the side.

-

I feel 153 overall is too narrow for bikes and high speed traffic west of Mosinee.

-

The route ending on county road K at hillcrest dr would be much better to turn south at 52nd ave down to Falcon and then east to 44th and then down to Decator and go east to N28th and then south to hwy U, or from Decator go south all the way to hwy U and then into town.

-

The route ending going to Cty Rd W from the east on WW is much nicer to turn off of WW a few miles earlier at Buck trail Rd and take that west 3/4mi to Del Rio Rd and take that south all the way to Radar Rd or Restlawn Rd and go down into town on restlawn rd.

-

There are a lot of trucks in the round about area of Mosinee. It would be nice to have a better bike path along Old 51. I often see bikers and walkers along the shoulder up to Maple Ridge-not

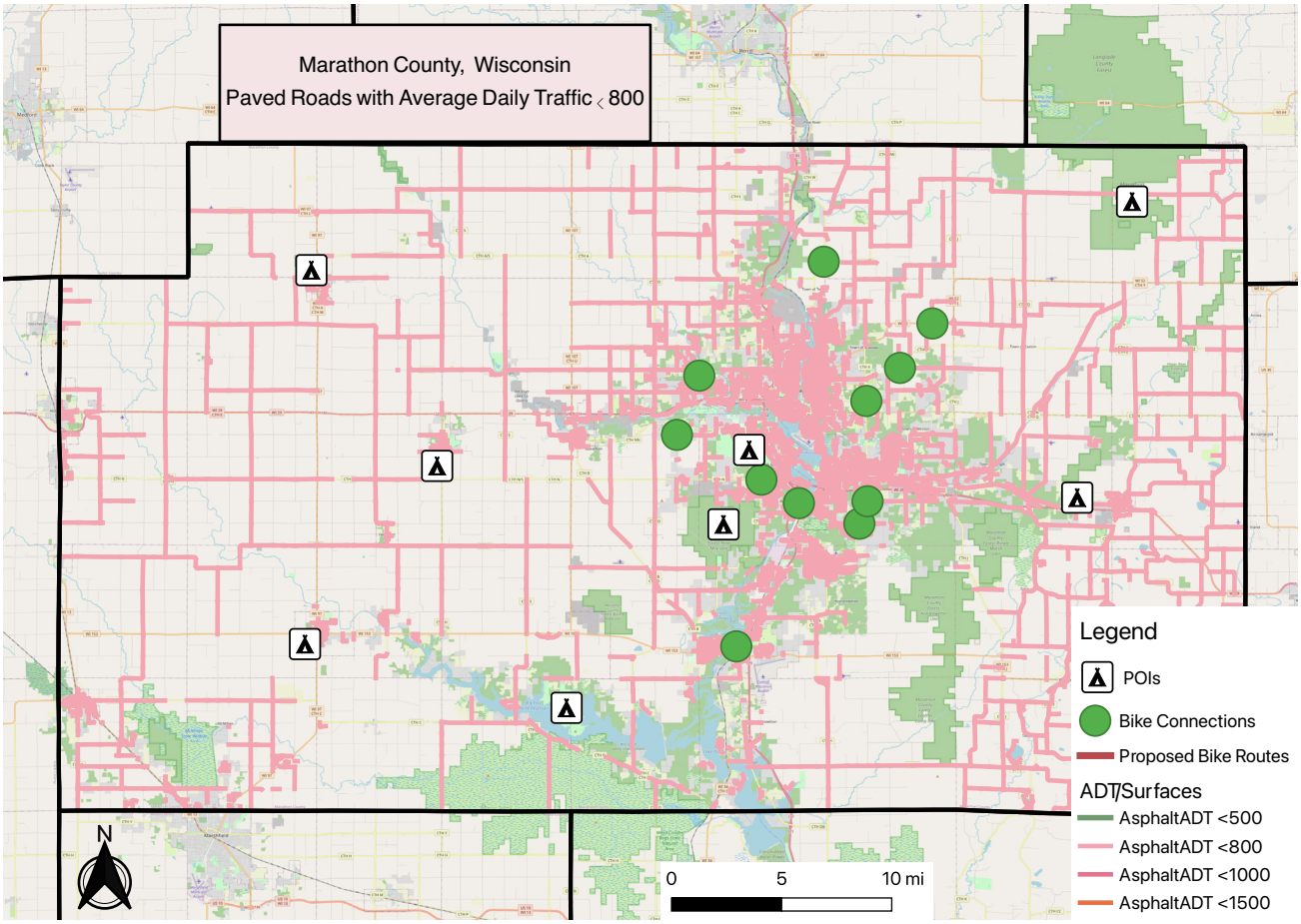
reflective or with enough light in early mornings and nighttime. A wider shoulder would be nice as they are not going along the River or in the pull-off area of the paper mill.
-
CTH NN in Rib Mountain priority route should continue eastbound to connect at the intersection of CTH NN/CTH R. Current proposal has it stop at Partridge Avenue.
-
County roads V and F on the west side of the county are traveled regularly. They are in good shape now but do received a lot of use. I ride this part of the county and Hwy 153 between Hwy 13 and HWY 97 not rideable with a bike at this time. There is no safe place left on this highway to safely ride a bike that is not in traffic. You have to use county roads to ride around this Hwy, F, P, and E. Much less truck traffic on the county roads. Hwy V is used a lot by riders coming out of Marshfield and Clark county. Thanks for asking for our input.
-
Avoid routing on highway 52 due to high traffic. Just stay on Eau Claire River road when it comes to County Y (by the Dells of Eau Claire), it is a nice paved very low traffic and scenic route that comes right out to county Y and highway 52 intersection.

End of Public Comment Text

Appendix 2: Other Maps & Data

Appendix 2: Other Maps & Data

These maps are provided to add understanding of how the Marathon County Network was plotted based on roadways that were paved and were recorded with the lowest possible ADT to protect cyclists. In the long run, plotting the network on low ADT roadways enables the Highways Department to invest less money in bike facilities projects according to guidance, as rural cyclists tend to feel riding within the lane of traffic if ADT is lower than approximately 800. These maps & layers were toggled on/off to identify low-stress routes to build into (if necissary) routes existing on roadways with ADT >1500.



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