
NORFOLK BICYCLING & WALKING NETWORK PLAN

Summary Report

April 3, 2020

ACKNOWLEDGEMENTS

The City of Norfolk would like to thank members of the Trail Advisory Board and the members of the community that contributed to the development of this plan to enhance walking and biking. The input received during the public engagement portion of the project provided great guidance on developing an active transportation plan that truly represents the needs of the community.

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PROJECT OVERVIEW

Development of the Norfolk Bicycling and Walking Network Plan focused on identifying bicycling and walking needs citywide, developing recommendations for expanding the biking and walking network, and conceptualizing how example streets in Norfolk could be reconfigured to better accommodate walking and biking. This plan was designed to conceptualize and develop a safer, more connected network of trails, on-street bicycle facilities, sidewalks, and street crossings in Norfolk.

Why Invest in Bicycling and Walking?

An improved walking and biking environment in Norfolk can boost the health, safety, quality of life, environment, economic vitality, and accessibility of Norfolk for its residents and visitors.

Health

Norfolk, like many communities across the United States, has high rates of inactivity and obesity: in Madison County—the county containing Norfolk—32% of adults are obese.¹ Making it easy for people to walk and bike as part of their daily routine can help Norfolk achieve recommended daily amounts of exercise.² Even moderate exercise can help reduce the risk of inactivity-related ailments such as hypertension, obesity, Type II diabetes, heart attack, and certain cancers. Additionally, research increasingly supports the link between physical activity and mental health and well-being.³

Safety

Improved walking and bicycle infrastructure can decrease the number and severity of crashes, while boosting the number of people walking and biking. Greater numbers of people walking and biking in turn further improves safety in a “safety in numbers” situation as drivers learn to watch for and anticipate the needs of other street users.⁴ Investments in sidewalks and bike facilities can increase safety directly (by reducing crashes) and indirectly (through increased use).

Quality of Life

Quality of life is influenced by physical and mental health, family and other relationships, education and employment, and built and natural environments. Decreasing dependency on automobiles can lead to improved air quality, less traffic noise, and shorter and more pleasant commutes. Bicycling and walking can also strengthen the sense of community by increasing opportunities for spontaneous interactions between residents.

Figure 1: Trail crossing under Norfolk Avenue



Environment

Increased walking and biking rates improve air quality by reducing emissions. These modes have the greatest capacity to replace shorter trips (over 40% of all trips nationwide are three miles or less in distance).⁵ Substituting even a fraction of these short driving trips with walking and biking trips can reduce air pollution as well as carbon dioxide emissions.

Economic Vitality

Making bicycling and walking attractive options for people of all ages can help to attract and retain a robust workforce. Encouraging residents and visitors to travel by foot or by bike can also support economic activity downtown and in neighborhood business districts. An Urban Land Institute report states that active transportation infrastructure boosts economic growth by fueling redevelopment, increasing real estate values, making workers healthier and more productive, helping companies score talented workers, and increasing retail visibility and sales volume.⁶

Accessibility and Transportation Choice

Whether due to mobility impairments, lack of car ownership, personal preferences, or other reasons, not all residents are able to or want to drive as their primary mode of transportation. In Norfolk, 6 percent of households lack automobiles, compared to 5.7 percent of households in the state.⁷ Furthermore, Norfolk residents who use mobility devices, such as wheelchairs, benefit greatly from well-designed sidewalks, crosswalks, and curb ramps that are safe, comfortable, and intuitive to use.

Plan Components

The plan is oriented around the following components:

1. **Community Engagement:** A multi-faceted community engagement process was implemented, utilizing both online and in-person outreach strategies designed to reach a broader portion of Norfolk’s population. The community engagement effort included gathering public input on existing trail facilities, network connectivity, and bicycle and pedestrian destinations, as well as an in-person and online visioning process to help identify future corridors for bicycling and walking facilities.
2. **Future Bicycling and Walking Networks:** Building on the community visioning results, the existing bicycling and walking networks were assessed and areas for new connections and enhancements to existing streets were identified. The project team conducted on-the-ground fieldwork to review existing conditions, identify popular destinations, and analyze bicycling and walking access and connectivity. The resulting future bicycling and walking networks will provide connectivity to destinations, neighborhoods, and existing trails once fully implemented.
3. **Complete Streets Concepts:** Design concepts were then created and assessed for corridors within the project area: Norfolk Avenue and Riverside Boulevard. These corridors were selected based on an identified need in the future bicycling and walking networks. The design concepts were developed with a lens for “Complete Streets”—a concept of designing streets to be safe and comfortable for all users, including people bicycling and walking.



PART 1: COMMUNITY ENGAGEMENT



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The City of Norfolk hosted a community meeting, two small group meetings with key stakeholders, and an online survey to gather feedback on the walking and bicycling network in Norfolk from a broad cross-section of the community.

Community Meeting

In March 2019, City of Norfolk staff and the consultant team hosted a community meeting in which an estimated **40+ people attended**. Attendees participated in activities designed to get input on the existing and future walking and bicycling network in Norfolk, including providing feedback on various bicycle facility types, walking conditions, street crossings, destinations, walking and bicycling gaps, and future walking and bicycling routes. Various activities were developed to gather feedback from meeting participants. The results of those activities are shown in the following sections.



Street Priorities

The first activity at the community meeting was designed to understand community members' values and priorities relating to street design. The activity asked participants to rank various street design characteristics and criteria from 1-4 (#1=highest priority, #4 = lowest priority). The tables below show the results of the two questions participants were asked, including the rank and average scores for each criterion or characteristic.

When investing in Norfolk's streets, how should the following be prioritized?		
Street Design Characteristic	Rank	Average Score (1-4)
Dedicated space for bicycle riders	1	1.62
Nice places to walk and safe street crossings	2	1.76
Beautification and landscaping	3	2.62
On-street parking	4	3.91

When rebuilding street in Norfolk, rank the following in terms of value to you:		
Criteria	Rank	Average Score (1-4)
Improve safety	1	1.25
Reduce speed and amount of traffic	2	2.56
Minimize travel times for automobile traffic	3	3.08
Minimize cost	4	3.19

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Existing Bicycling Conditions in Norfolk

Participants were asked to rate various existing conditions for bicycling in Norfolk on a scale from bad (-2 points) to excellent (+2 points). The average scores and the rank of each existing condition for bicycling are shown in the table to the right.

Existing Conditions for Bicycling	Rank	Average Score
Scenery while bicycling	1	0.48
Terrain for bicycling	2	0.4
Smoothness of bicycle facilities	3	0.32
Number of destinations within bicycling distance	4	0.12
Winter maintenance of bicycle facilities	5	0
Number of bicycle parking racks	6	-0.08
Frequency of automobiles parking within bike facilities	7	-0.12
Bicycle network access and connectivity	8	-0.6
Bicycle facility pavement markings	9	-0.6
Comfort while bicycling across busy streets	10	-0.92
Motorists attitude toward bicycling	11	-0.88
Comfort while bicycling along busy streets	12	-1

Existing Walking Conditions in Norfolk

Participants were asked to rate various existing conditions for walking in Norfolk on a scale from bad (-2 points) to excellent (+2 points). The average scores and the rank of each existing condition for walking are shown in the table to the right.

Existing Conditions for Walking	Rank	Average Score
Bicyclists' attitude toward pedestrians	1	0.95
Scenery/interesting locations to see while walking	2	0.66
Crosswalk marking maintenance	3	0.29
Number of destinations within easy walking distance	4	0.10
Frequency of curb ramps at intersections	5	0
Location/placement of curb ramps at intersections	6	0
Terrain for walking	7	-0.12
Extent of sidewalk network	8	-0.27
Snow/ice clearing from sidewalks, curb ramps, and crosswalks	9	-0.27
Ease of crossing busy streets	10	-0.35
Smoothness of sidewalks	11	-0.57
Motorists' attitude toward pedestrians	12	-0.86



Walking and Bicycling Network Feedback

The main activity in the community meeting was a mapping activity where participants identified walking and bicycling gaps, popular destinations, and routes where they would like to see new or improved sidewalks, trails, or bikeways. A summary of participant responses from the mapping activity was combined with the results of the online interactive map. The combined input is described in the next section.

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Street Crossings

Meeting participants were asked to rate their comfort level for walking across streets with different street crossing designs. Twenty-three participants ranked each street crossing design on a scale from 'Very Uncomfortable' (-2 points) to 'Very Comfortable' (2 points). The average scores and the rank of each street crossing design are shown in the table below.


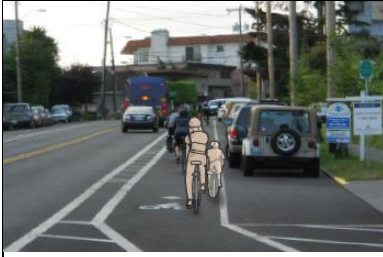






Street Crossing Design	Description	Rank	Average Score	Street Crossing Design	Description	Rank	Average Score
	Pedestrian-Activated Overhead Signal	1	1.74		Median and Yield Bar	5	0.45
	Raised Crosswalk	2	1.52		Corner Refuge Island	6	0.18
	Curb Extension	3	1.35		Well-marked Crosswalk Along Busy Street	7	0.09
	Median Island	4	0.52		Rectangular Rapid Flashing Beacon*	8	-0.09

*It is possible that participants did not recognize the distinction between the rapid flashing beacon and the always-on pulsating beacons that are currently present in Norfolk.

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Bicycle Facility Types

Another activity at the community workshop displayed six different types of bicycle facilities and included a list of characteristics of each facility. The activity was designed to educate community members on the various bicycle facility types while also gauging their comfort level while bicycling on each type of facility. Participants rated each facility type on a scale from “Too uncomfortable for me to bicycle” (0 points) to “Comfortable enough for me to bicycle with children” (3 points). The table below shows the average scores and the rank of each bicycle facility type.

Bicycle Facility Type	Description	Rank	Average Score	Bicycle Facility Type	Description	Rank	Average Score
	Shared Use Path	1	2.9		Buffered Bicycle Lane	5	2
	One-way Separated Bicycle Lane	2	2.77		Bike Lane	6	1.43
	Two-Way Separated Bicycle Lane	3	2.65		Wide Street with Shared Lanes	7	1.4
	Bicycle Boulevard	4	2.52		Downtown Street with Shared Lanes	8	0.7

Online Interactive Map Results

The project team developed an online interactive map as a tool to gather additional community member feedback from people who did not attend the community meeting. Respondents were asked to identify problem areas for bicycling and walking, popular destinations, gaps in the bicycling and walking network, and locations that lack direction signage or wayfinding. Over 80 people participated and provided over 100 comments on the interactive map between March 4 and April 7, 2019.

Respondent Background

An introductory survey asked participants about their age (Figure 2), gender (Figure 3), how often they walk outside (Figure 4), how often they ride a bicycle (Figure 5), and their comfort level bicycling in various conditions (Figure 6).

Figure 2: What is your age?

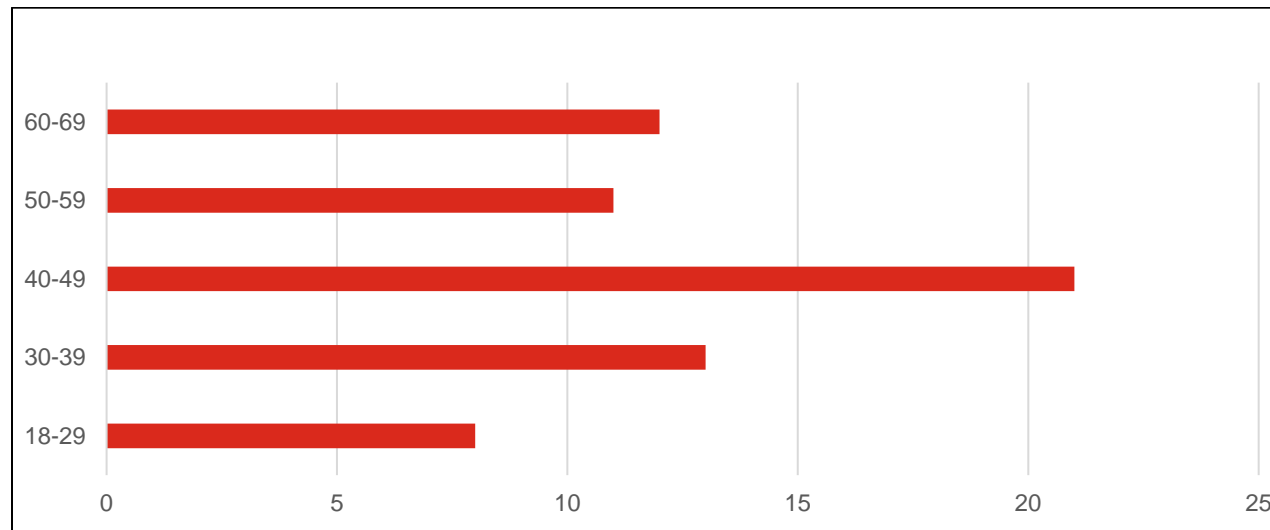
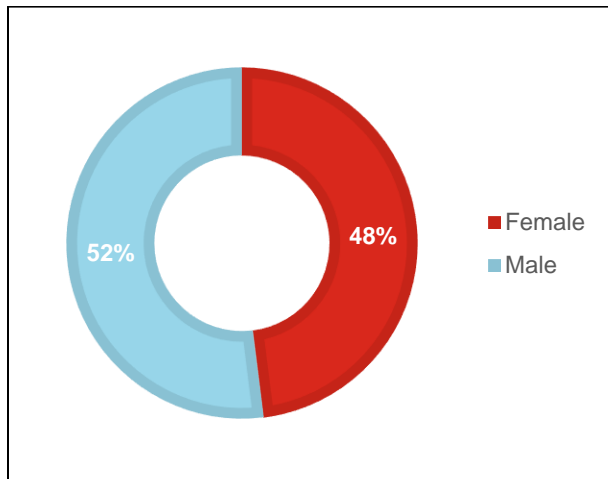


Figure 3: What is your gender?



The distribution between male and female participants in the online survey was nearly even (48 percent female). This is worth noting since in most cities, men are far more likely to participate and provide input on bicycle and pedestrian planning efforts than are women.

Figure 4: How often do you walk outside?

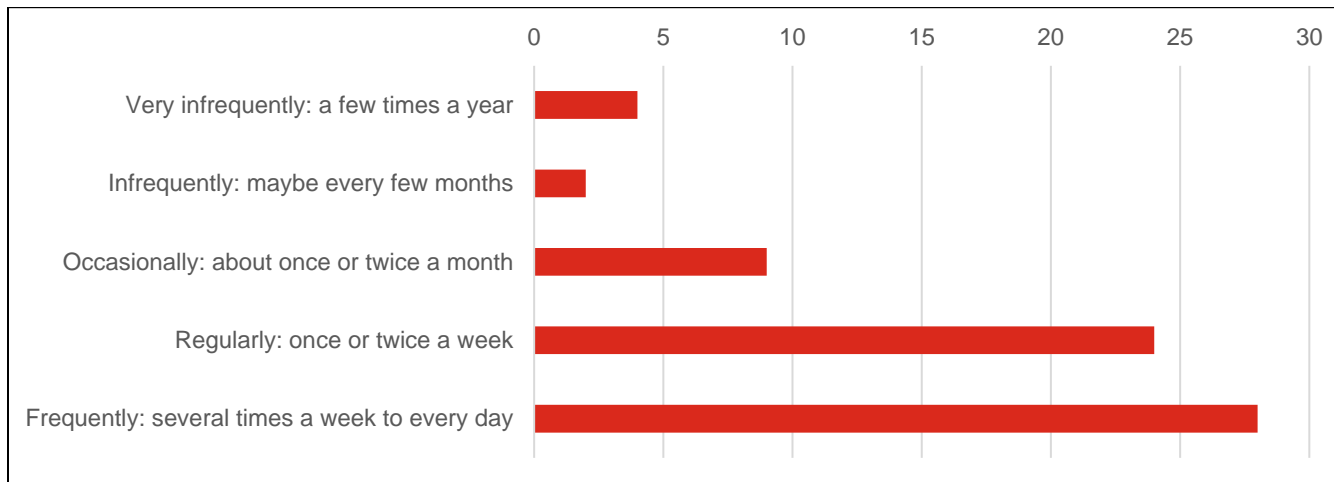


Figure 5: How often do you ride a bicycle?

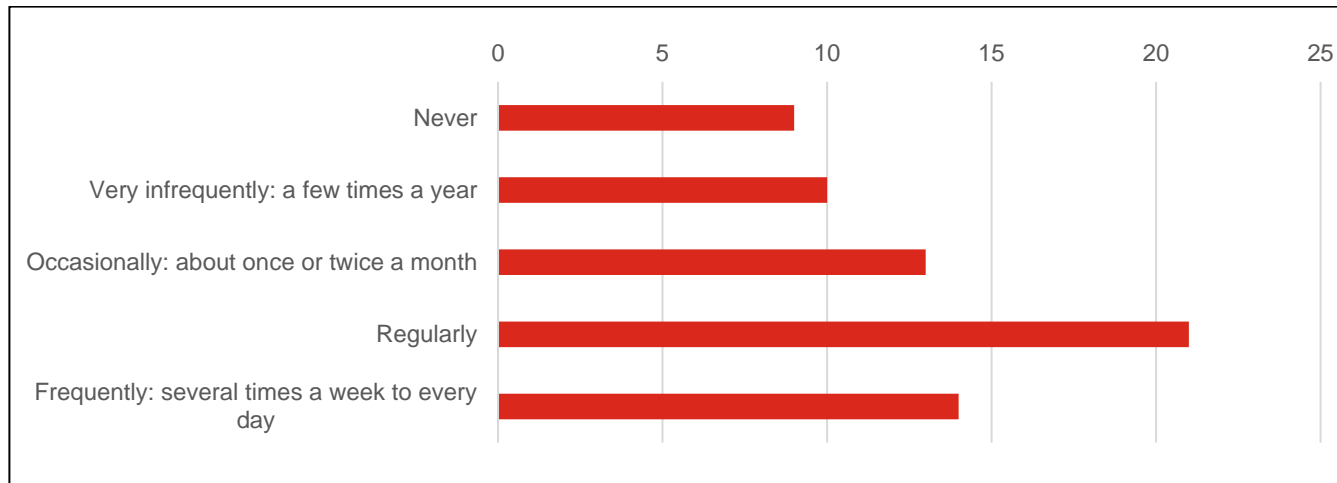
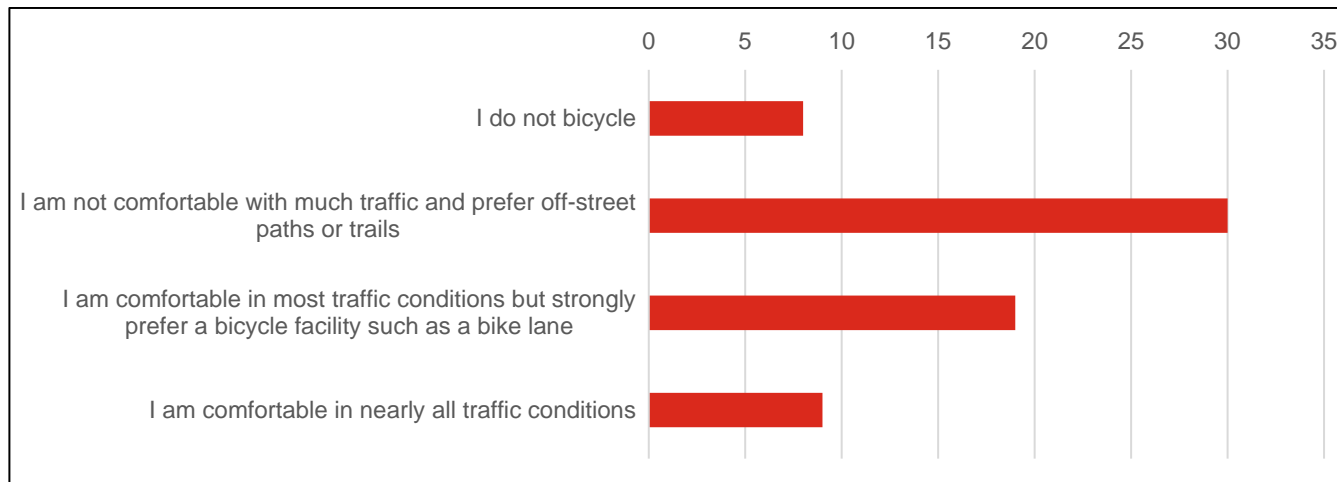


Figure 6: How comfortable are you bicycling with motor vehicle traffic?



Walking and Bicycling Network Analysis

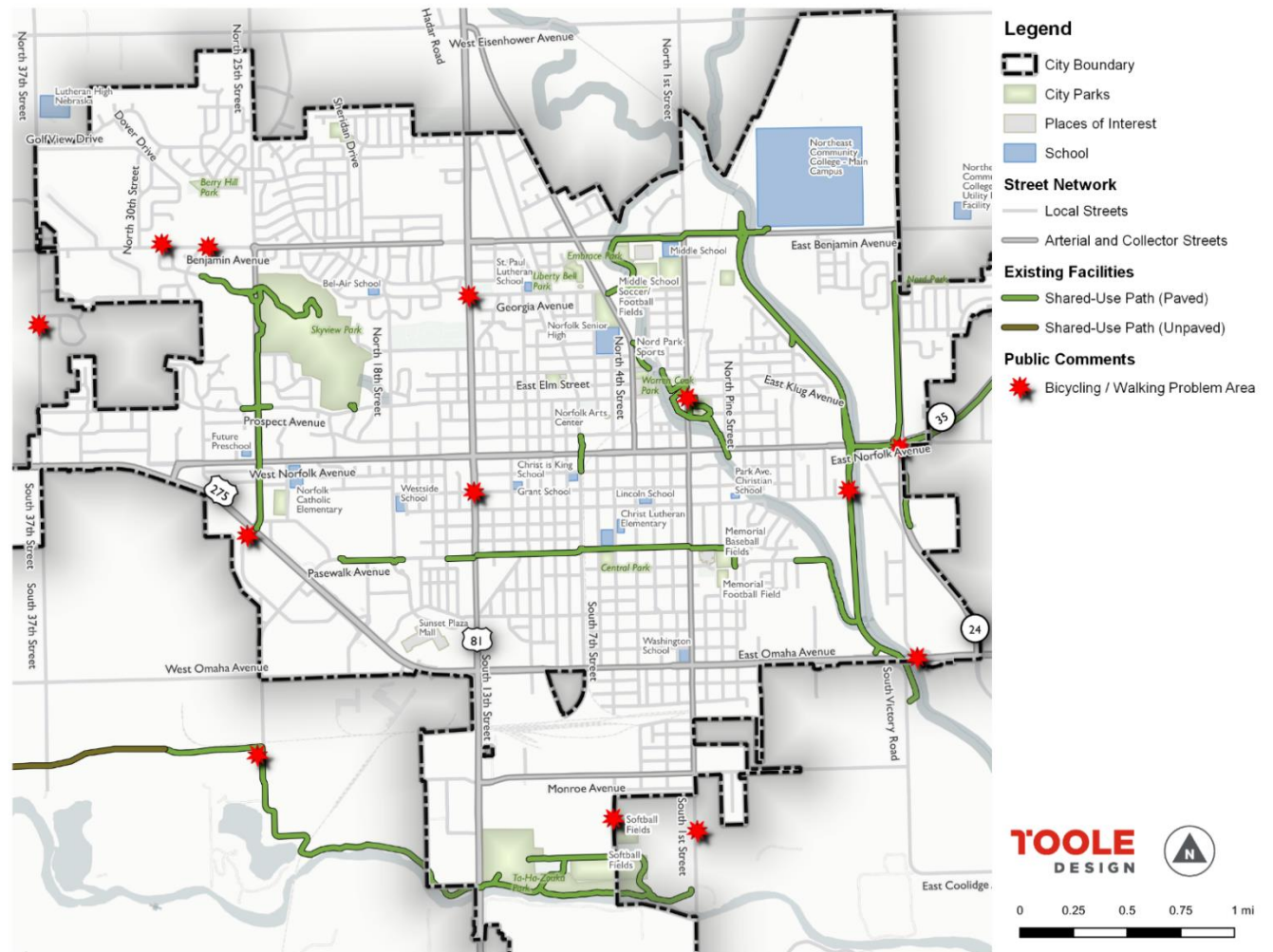
Online map respondents and participants at the in-person community meeting were asked to identify gaps for walking and bicycling in Norfolk. Respondents were asked to identify problem areas for bicycling and walking, popular destinations, gaps in the bicycling and walking network, and locations that lack direction signage or wayfinding. The sections below summarize comments received on the online interactive map as well as comments received from community members during the community meeting.

Problem Areas for Walking and Bicycling

Problems identified for walking and bicycling include gaps in the trail network, dangerous or uncomfortable street crossings, and lack of bike parking. Specific problem areas identified include:

- Along Benjamin Avenue, between 25th Ave and 30th Ave
- Along Highway 81, at the intersections of Georgia Avenue and Philip Avenue
- Adjacent to Johnson Park at the intersections of N 1st St and E Prospect Avenue and N 1st St and E Nebraska Avenue
- At the dead-end of E Park Ave and the connection to the trail along the North Fork Elkhorn River
- Access to the trail along the North Fork Elkhorn River from E Norfolk Avenue and E Benjamin Ave
- At the southern roundabout crossing at S Victory Road and E Norfolk Ave
- At the intersection of Hwy 275 and S 25th St
- Along S 5th Street and S 1st Street between Ta Ha Zouka Park and Monroe Avenue
- Near the intersection of E Omaha Ave and S Victory Road

Figure 7: Bicycling and Walking Problem Areas

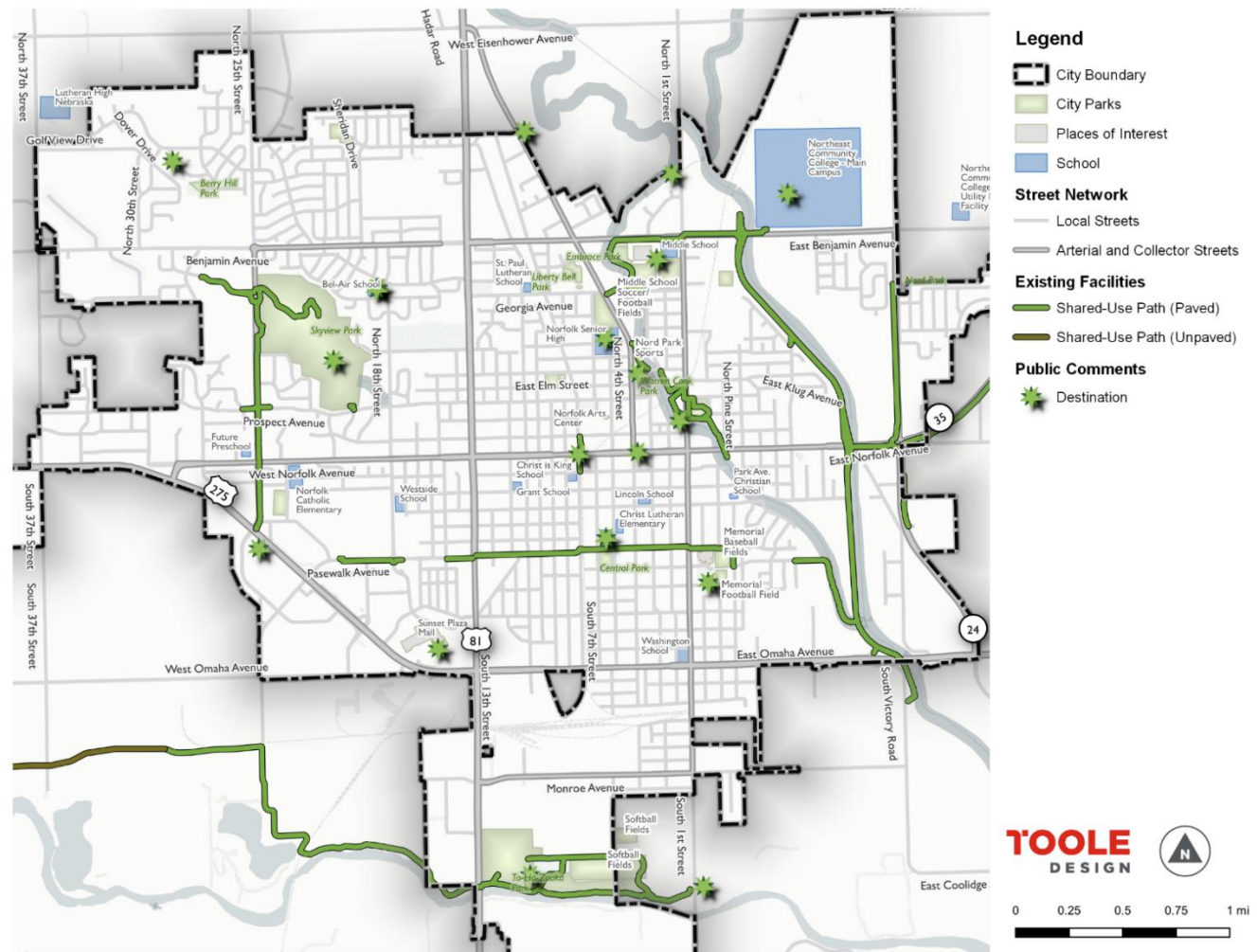


Popular Destinations

Popular destinations that participants identified include:

- Johnson Park, including the canoe/kayak landing
- Skyview Park
- Ta Ha Zouka Park
- Downtown (W Norfolk Ave)
- Cowboy Trail
- Veteran's Memorial Park
- YMCA
- Kayak/canoe landing near N 1st St north of Benjamin Avenue
- Northeast Community College
- Norfolk High School, Junior High School, and Middle School
- Sunset Plaza Mall
- Nucor Steel

Figure 8: Bicycling and Walking Destinations

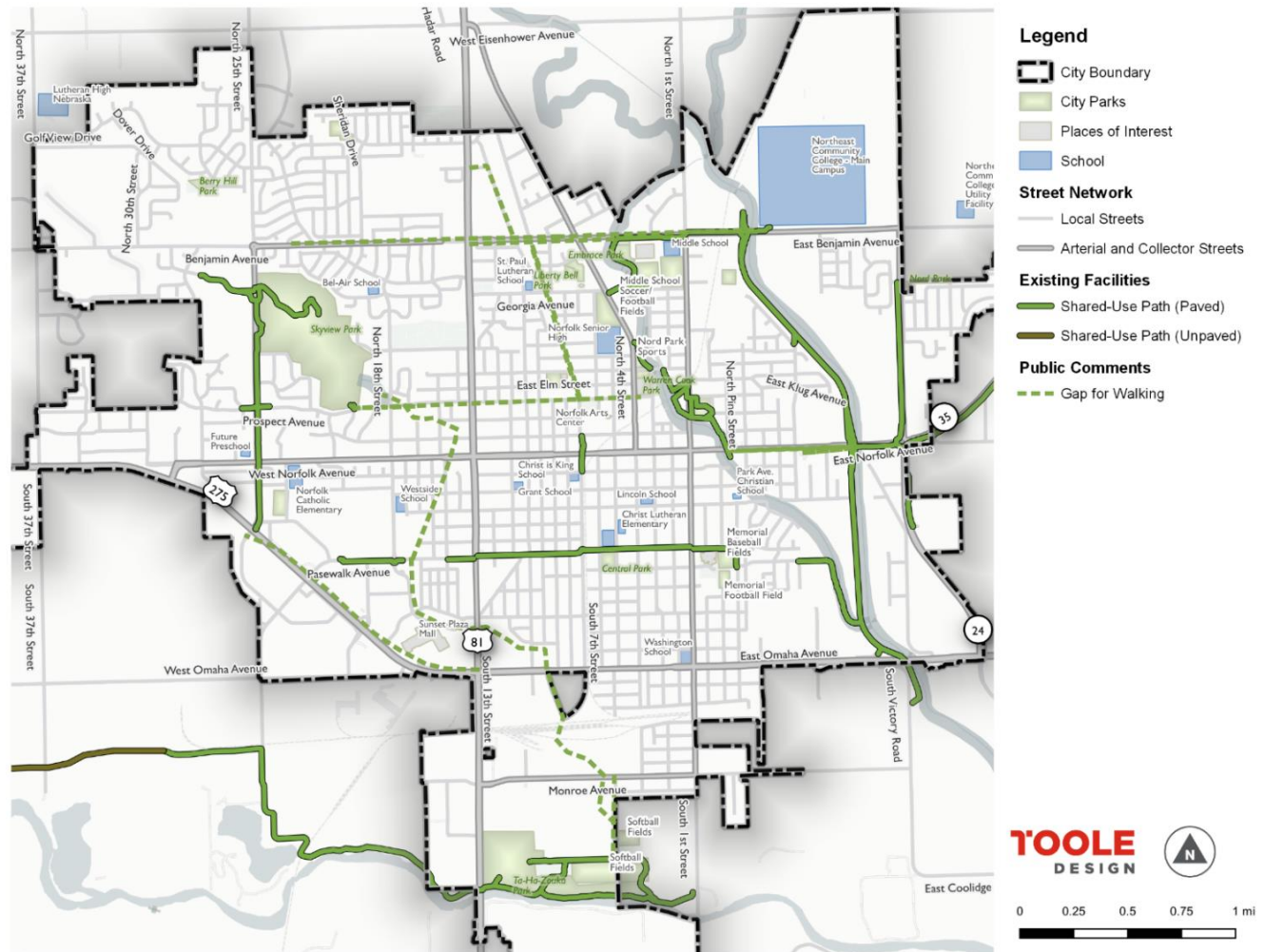


Gaps for Walking

Gaps that participants identified for walking include:

- North side of Benjamin Ave from NECC to Hillview Dr
- South side of Norfolk Ave between the river and N Cottonwood St
- Along Prospect Avenue between N 4th Street and Skyview Park
- Along Hwy 275 between S 25th St and Johnny Carson Blvd
- Along S 5th St between Ta Ha Zouka Park and Monroe Ave
- Investigate use of Corporation Gulch as walking/rec trail from Skyview to Ta Ha Zouka
- Along Square Turn Blvd between W Benjamin Ave and Galeata Ave

Figure 9: Walking Gaps

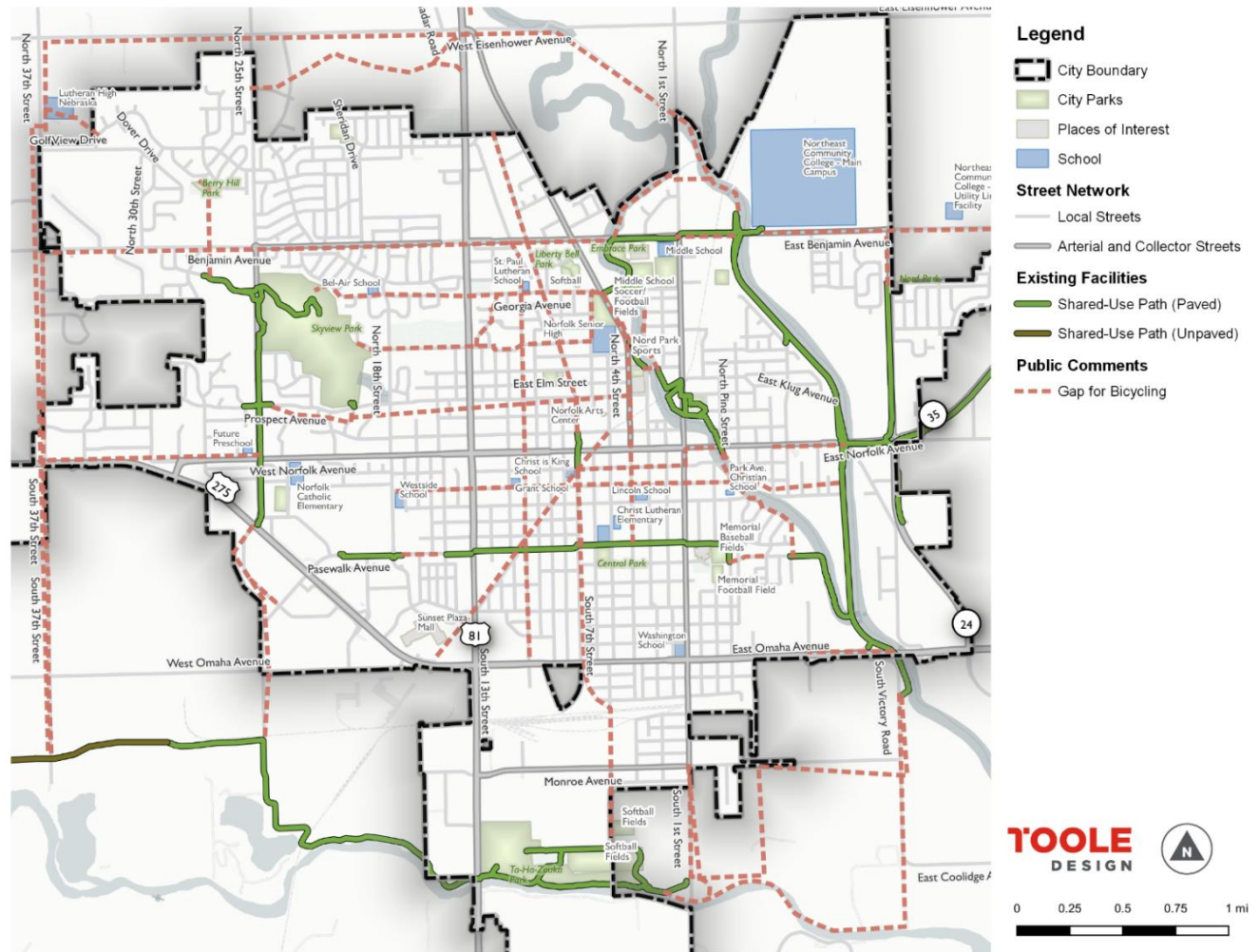


Gaps for Bicycling

Gaps that participants identified for bicycling include:

- Between Ta Ha Zouka Park/Cowboy Trail and downtown Norfolk, potentially along S 5th St and S 7th St
- Between the Cowboy Trail's eastern terminus and the flood control trail
- Benjamin Avenue between the YMCA and N 49th St
- Georgia Avenue between Skyview Park and Riverside Blvd
- N 37th St between the Cowboy Trail and W Eisenhower Ave
- W Eisenhower Ave from N 37th St to the North Fork Elkhorn River
- Along E Benjamin Ave between N 1st St and Hwy 35
- 557th Ave between E Benjamin Ave and Nord Park
- Georgie Ave/Skyline Dr between Riverside Blvd and Skyview Park
- Prospect Ave between N 4th St and Skyview Park
- Maple Ave between N 6th St/high school and Skyview Park
- Queen City Blvd between Alaska Ave and Braasch Ave
- Phillip Ave and Madison Ave generally between S 18th St and 1st St
- Between the trail terminus at Norfolk Ave/N Cottonwood St and the North Fork Elkhorn River Trail connection, via E Park Ave
- Norfolk Ave between S Hickory St and the North Fork Elkhorn River Trail
- E Bluff Ave between Willow St and Logan St
- Pasewalk Ave between S 14th St and S 18th St

Figure 10: Bicycling Gaps

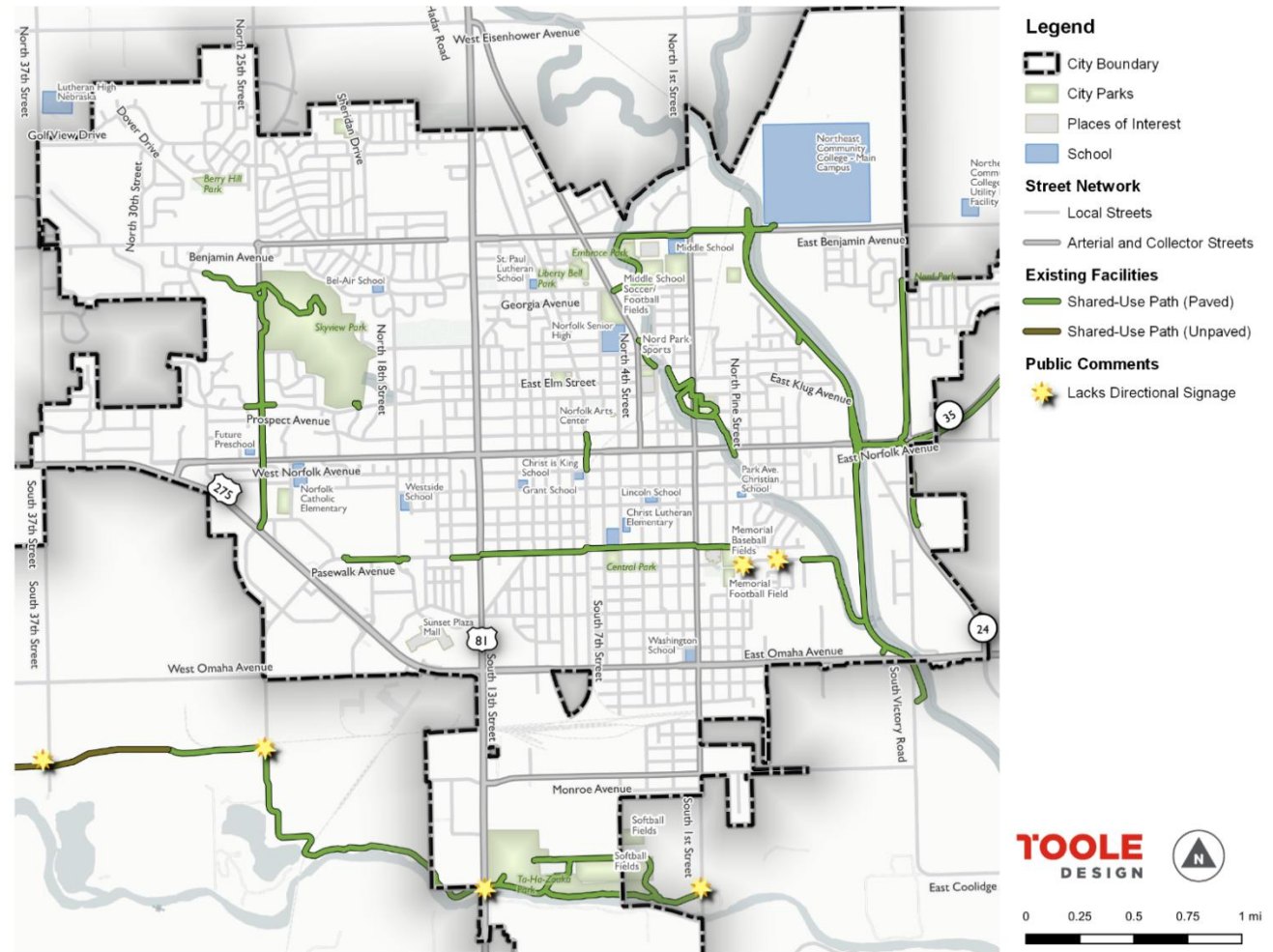


Lacks Directional Signage

Participants identified the following areas as places that lack directional signage/wayfinding:

- Along the Cowboy Trail at Broken Bridge Road to identify street crossing
- Along the Cowboy Trail at S 37th St to identify street crossing
- Along the Cowboy Trail at S 25th St to identify street crossing
- Along the Cowboy Trail at the underpass with Hwy 81/13th St to identify street crossing
- Along the Cowboy Trail at the trail terminus at 1st St
- At Logan St and E Bluff Ave (near AquaVenture Water Park) to direct bicyclists to the east along E Bluff Ave to connect to the Levee Trail.
- At E Bluff Ave and S Boxelder St, directing bicyclists to the west along E Bluff Ave to connect to the AquaVenture Water Park Trail

Figure 11: Locations Lacking Directional Signage



Summary of Key Findings

The following describes key findings gathered from community member input received during the open house and from the online interactive map. The key findings informed the development of the future bicycling and walking networks and the Complete Streets concepts and should also inform future additional initiatives by the City of Norfolk and local partners.

Complete the Loop Trail System

One of the most frequent comments received from community members is the desire to develop a loop trail system that circles the periphery of the city by linking together existing trails. Open house participants noted that the City already has components of a loop trail system in place on the south side of the City (Cowboy Trail) and the east side of the City (along the river and flood control), so making connections between the existing trail segments should be a high priority. Most participants feel that the northern portion should follow W Eisenhower Ave, with W Benjamin Ave as another potential alignment. Participants identified N 25th Street and N 37th Street as two potential western loop trail system alignments, noting that N 25th Street already has a portion of existing trail from Highway 275 to Skyview Park.

Connect the Cowboy Trail to Downtown

Several meeting and online map participants noted the popularity of the Cowboy Trail for tourists and non-residents, but they also mentioned the disconnectedness between the Cowboy Trail and downtown Norfolk. One of the top priorities for the City should be identifying and developing one or more bicycle connections between the Cowboy Trail and Norfolk Avenue.

Enhance Bicycle and Pedestrian Facility Design

The quality and consistency of bicycle and pedestrian facility designs can have a major impact on the comfort and safety of people bicycling and walking, which also encourages more people to walk and bike. Three of the four most poorly rated 'bicycling conditions' from the community meeting related to the design of streets and bicycle facilities: comfort while bicycling *across* busy streets, comfort while bicycling *along* busy streets, and bicycle facility pavement markings. The City can develop and adopt improved standards to enhance the design of walking and bicycling facilities, which will encourage more people to walk or bike and improve safety and comfort.

Work Towards Complete Streets

Safety and comfort of people walking and bicycling is critically important. When participants at the community meeting were asked about their values when rebuilding streets in Norfolk, the #1 priority was increasing safety. Similarly, community members' top two street design characteristics were 1) dedicated space for bicyclists and 2) nice places to walk and safe street crossings. Developing Complete Streets will make streets safer for all users while also encouraging more people to walk and bicycle.

Develop a Wayfinding System

To help people walking and bicycling navigate their way around town, the City should consider developing a branded wayfinding system. The wayfinding system can include directional signage at key locations displaying the estimated amount of time it takes to walk or bicycle to popular destinations in the City, such as downtown, shopping areas, parks, or the Cowboy Trail. The system can also be used as a way to name and identify various parts of the trail system.

Improve Bicycling and Walking Facilities Along Benjamin Avenue

Community meeting and online interactive map participants identified opportunities to improve both walking and bicycling facilities along Benjamin Avenue. At the community open house, participants discussed opportunities for improvement along the corridor in conjunction with the upcoming Benjamin Avenue reconstruction project. Participants noted the importance of accessing popular destinations and schools along Benjamin Ave, such as the Middle School, YMCA, and Northeast Community College. Participants also identified Benjamin (as well as Georgia/Maple Ave and Eisenhower Ave) as a potential east-west element of the loop trail system.



**PART 2: FUTURE BICYCLING
AND WALKING NETWORKS**



Network Planning Approach

Based on community outreach and a study of existing conditions and needs, the future bicycling and walking networks were developed. Once implemented, the planned future trails, sidewalks, and on-street bikeways will provide connectivity to destinations, neighborhoods, and existing trails. Special attention was made to improve facilities near schools.

Future Bicycling Network

Norfolk already has good conditions for bicycling along many of its streets, especially ones with low traffic volumes and low speed limits. As part of the City's interconnected street grid, low-traffic and low-speed streets provide numerous opportunities for low-stress bicycling. In many cases, minimal investments in signage and minor pavement markings can further enhance such streets and encourage more bicycle use. However, one cannot currently reach many areas within the community solely using low-traffic streets. For this reason, this Plan identifies corridors for future shared use path construction and locations along busier streets to which on-street bicycle facilities (such as bike lanes) can be added to form a community-wide network that is coherent, visible, and interconnected.

Future Walking Network

Norfolk's walking network is composed of sidewalks and shared use paths (often referred to as paved trails). The new shared use paths shown on the walking network plan are the same as those shown on the bicycling network plan. The walking network plan identifies priority walking routes that create an interconnected network and then highlights the missing priority segments that should be constructed in the future, rather than identify every street without sidewalks.

Flexibility in Implementation

As with any master plan, the proposed networks identified were analyzed at a planning level and do not represent detailed, site-specific study. While the recommended treatment (bike lane, sidewalk, trail, etc.) defined for each alignment in the network is established as the City's goal, different decisions might be made as each project advances based on important factors such as right-of-way, public support, construction cost, and overall mobility goals. That said, the City should seek to provide the most comfortable and safe walking and bicycling facility possible for each alignment.

Figure 12: Bicycling Network Plan

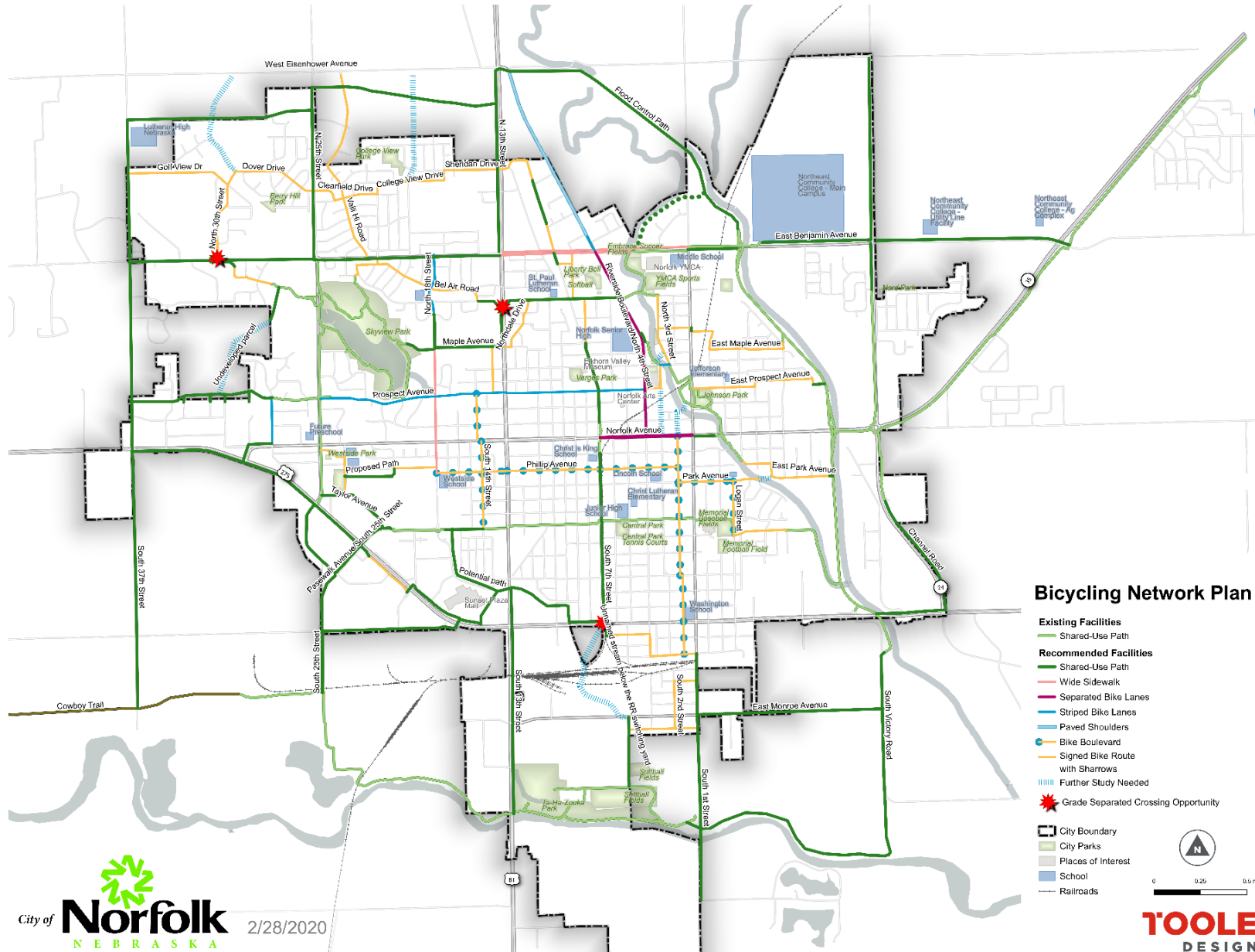
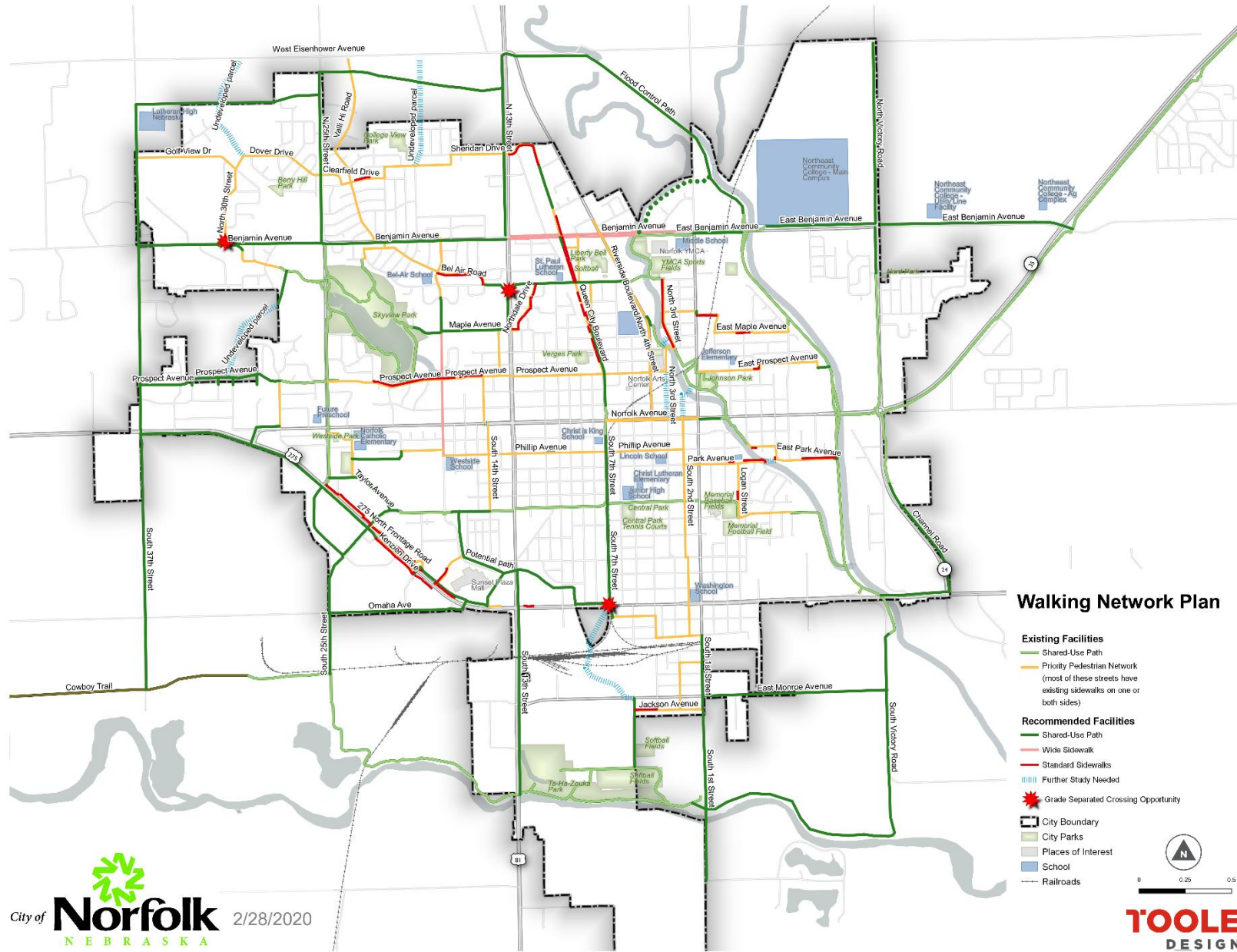


Figure 13: Walking Network Plan



Facility Types

The bicycling and walking network plans specify a facility type—described below—for each identified alignment. For the bicycling network plan, the type of facility selected was based on the Federal Highway Administration’s *Bikeway Selection Guide*, published in 2019. The *Bikeway Selection Guide* recommends specific bicycle facilities based on approximate ranges of traffic speeds and volumes for urban, suburban, and rural contexts. These recommendations were used as a starting point and were evaluated based on local conditions including parking utilization and the presence of truck routes.

Shared-Use Path



- Sometimes referred to as a “paved trail”
- Intended for shared use by a variety of groups, including pedestrians, bicyclists, and joggers
- Can be alongside a street or in its own alignment (such as along a river)
- Can have separate footpath in areas of high bicycle traffic
- Major road crossings may have signals, warning beacons, refuge islands, or bridges and underpasses

Separated Bike Lanes (One-Way Variant)



- A bike lane separated from motor vehicle traffic by vertical elements such as flexposts or raised medians
- Provides vertical and horizontal separation between bicycle riders and passing traffic
- If parking is present, it is typically placed between the bike lane and travel lane
- Typically complemented by an opposite-flow one-way separated bike lane on the other side of the street

Separated Bike Lanes (Two-Way Variant)



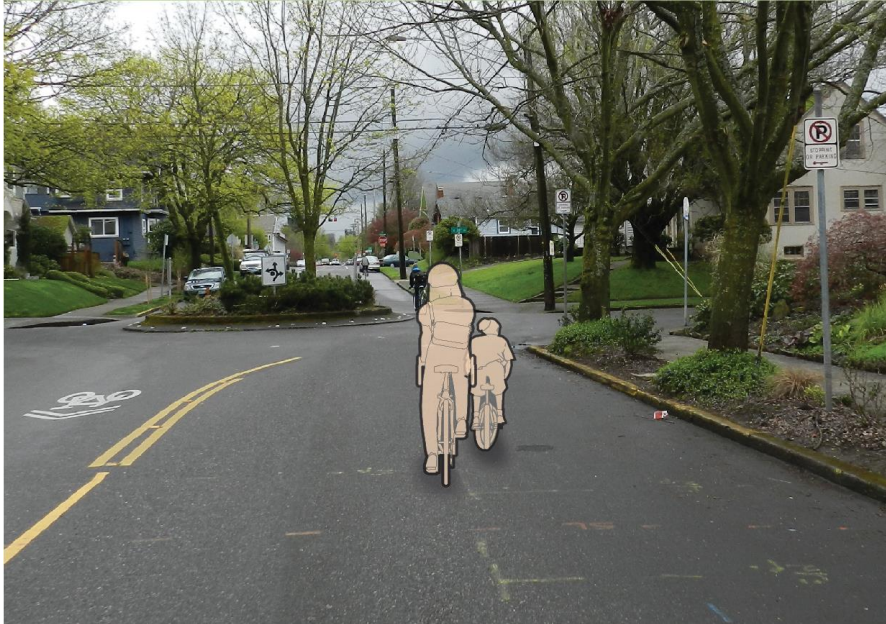
- A two-way bike lane along a street that is vertically separated from motor vehicle traffic by a curb, flexposts, and/or parking
- Provides vertical and horizontal separation between bicycle riders and passing traffic
- Can take up less space than a pair of one-way separated bike lanes
- Requires careful design at intersections and driveways to minimize conflicts with motor vehicle traffic

Striped Bike Lanes



- An on-street bicycle facility designated by striping, signage, and pavement markings
- Bike lanes are separated from travel lanes by solid white lines
- Reduce the need for people riding bicycles and people driving cars to negotiate for space on the roadway
- A variation of a Standard Bike Lane is the Buffered Bike Lane, which includes one or more painted buffers to increase lateral separation between bicyclists and motor vehicles. The optional buffer can be placed in multiple locations:
 - Between moving car traffic and bicyclists, providing additional separation from moving traffic
 - Between bicyclists and parked cars, reducing the hazard of opening car doors
 - On both side of the bike lane, if space allows

Bike Boulevard



- A street with low motorized traffic volumes and speeds, designated to give bicyclists travel priority
- Used on low-traffic side streets, usually with traffic calming to reduce speeds
- May include traffic diverters to reduce motorized through-traffic
- Usually in residential neighborhoods
- Major road crossings may have signals, warning beacons, or refuge islands

Signed Bike Route with Sharrows



- A street without dedicated space for bicycling
- Wide enough for drivers to pass people biking
- May be designated as a bike route
- May have on-street parking
- May include “Bicycles May Use Full Lane” sign
- May include Shared Lane Markings (or “sharrows”) on the pavement, providing wayfinding guidance to bicyclists and alerting drivers that bicyclists are likely to be operating in mixed traffic



PART 3: COMPLETE STREETS CONCEPTS



Approach to Implementation

The City of Norfolk has a record of successfully applying for and winning grant funding to build walking and biking facilities, including shared use paths. It should and will continue to aggressively pursue grant funding to help build out the planned networks.

Beyond grant funding, a highly cost-effective and coordinated way to implement bicycle and pedestrian infrastructure (bike lanes, sidepaths, sidewalks, curb extensions, etc.) is as part of a larger roadway reconstruction, rehabilitation, or repaving project. Conversely, it is not typically cost-effective or even feasible to widen roadways as a stand-alone project solely for accommodate bicycle infrastructure (especially in locations with curbs and gutters, storm sewer inlets, and constrained rights-of-way).

The City of Norfolk can implement this strategy within its incorporated area by adopting a Complete Streets policy that applies to new construction, reconstruction, and 3R (resurfacing, restoration, or rehabilitation) projects on all streets and roads in the community. The Complete Streets approach emphasizes designing streets to prioritize safety and comfortably accommodate all types of transportation that may occur along the street, including bicycling and walking. Cities that commit to Complete Streets principles do not necessarily design every single street to serve all users. However, they design most streets to serve people walking and biking so that the street network as a whole can serve all users.

For projects that affect Norfolk but cross jurisdictional boundaries, the City should seek opportunities to collaborate with the Nebraska Department of Transportation, Madison County, and surrounding communities in order to achieve the desired outcomes for bicycle and pedestrian accommodations.

Complete Streets Concepts

To illustrate how elements of the bicycling and walking network plan can be implemented, design concepts were created for two corridors in Norfolk (Norfolk Avenue and Riverside Boulevard). These concepts—shown on the following pages—were developed through the lens of Complete Streets. Key points are shown for each alternative, as well as advantages and disadvantages.

Norfolk Avenue (1st Street to 6th Street)

Figure 14: Norfolk Avenue, Existing Conditions

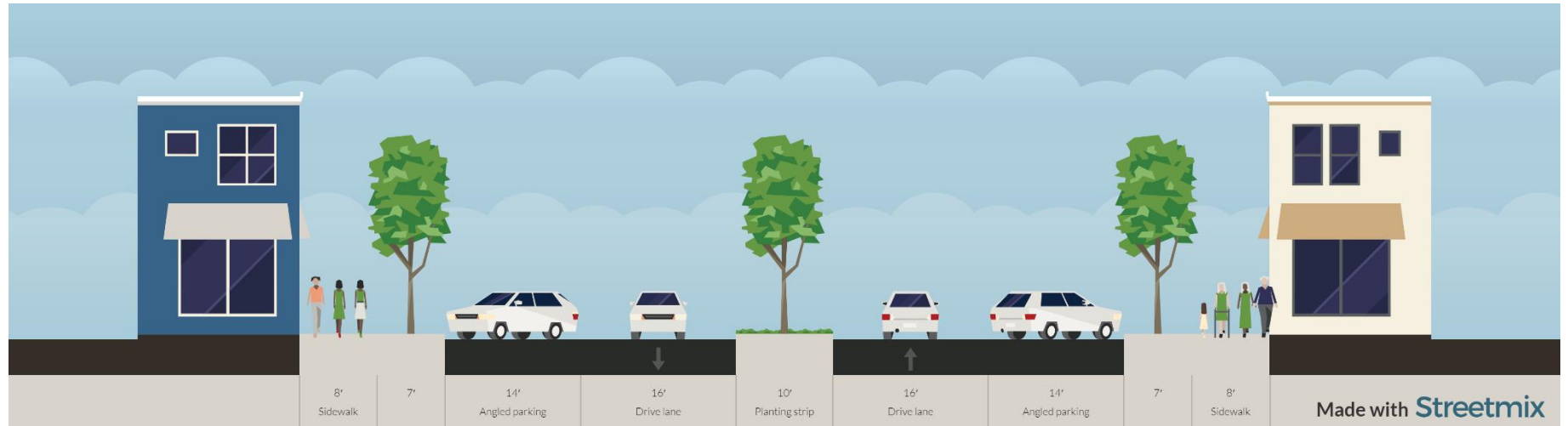
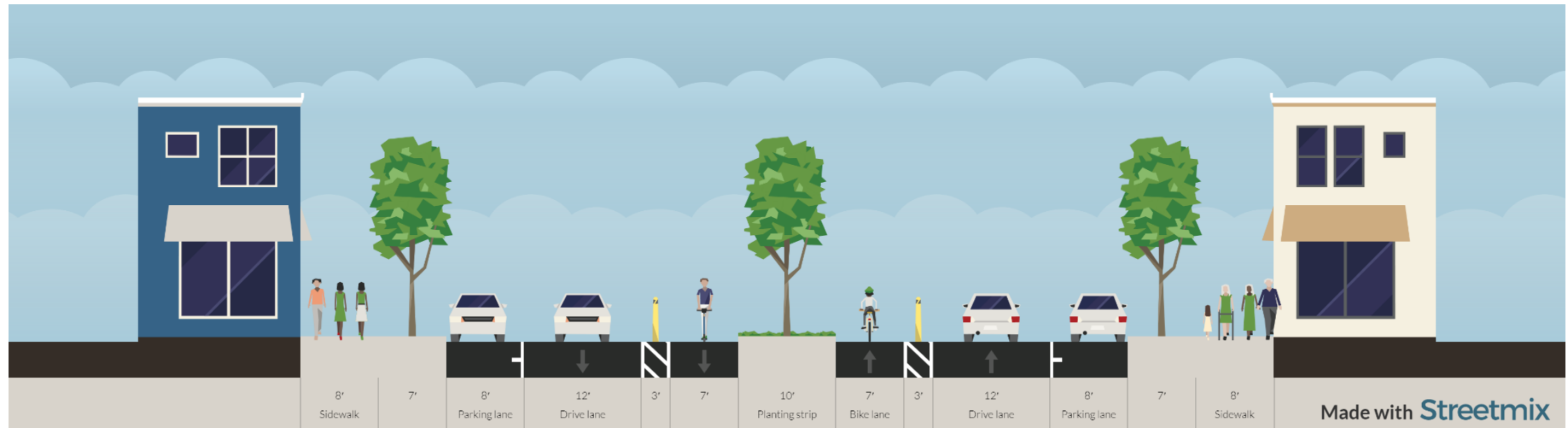


Figure 15: Norfolk Avenue, Alternative 1



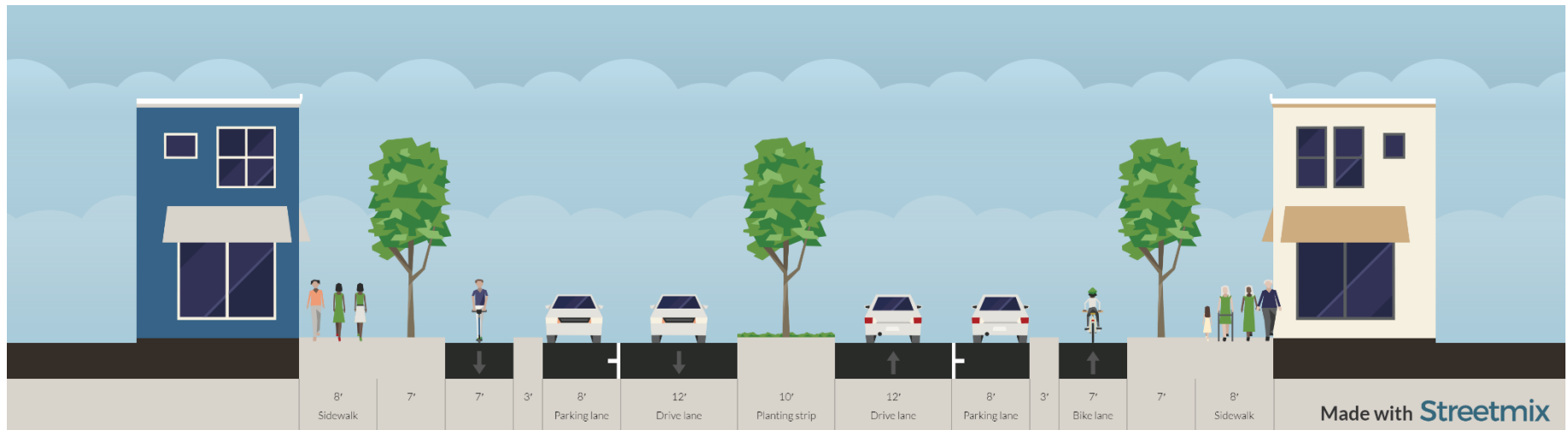
- Narrow through lanes (from 16' to 10') to provide a bicycle lane (6')

Figure 16: Norfolk Avenue, Alternative 2



- Narrow through lanes (from 16' to 12')
- Change diagonal parking to parallel parking, which increases space for bicyclists
- Create a 7' separated bike lane (SBL) with a 3' buffer area on either side of the median

Figure 17: Norfolk Avenue, Alternative 3



- Narrow through lanes (from 16' to 12')
- Change diagonal parking to horizontal parking, which increases space for bicyclists
- Create a 7' separated bike lane with a 3' buffer area (flexible bollard or concrete median (shown)) between parking and the sidewalk

Norfolk Avenue Alternatives Analysis

Alternative	Advantages	Disadvantages
# 1	<ul style="list-style-type: none"> • Retains diagonal parking • Does not require significant street reconstruction • Slows through traffic by narrowing lanes 	<ul style="list-style-type: none"> • Provides a traditional bike lane that may be less comfortable for less confident bicyclists • Angled parking can decrease visibility among drivers when backing out
# 2	<ul style="list-style-type: none"> • Retains parking • Provides separation between drivers and bicyclists with posts • Slightly wider bicycle lanes (compared to Alt. 1) • Does not require street reconstruction (just repainting and post installation) • Slows through-traffic by narrowing lanes (although not as much as in Alt. 1) 	<ul style="list-style-type: none"> • Decrease in number of parking spaces because of the move from diagonal to parallel parking
# 3	<ul style="list-style-type: none"> • Retains parking • Slows through-traffic by narrowing lanes (although not as much as in Alt. 1) • Provides the most separation between drivers and bicyclists (optionally with concrete) • Slightly wider bicycle lanes (compared to Alt. 1) 	<ul style="list-style-type: none"> • Decrease in number of parking spaces because of the move from diagonal to parallel parking • Optional concrete buffer would cost significantly more than other treatments, if selected

Riverside Boulevard (Walnut Avenue to Benjamin Avenue)

Figure 18: Riverside Boulevard, Existing Conditions

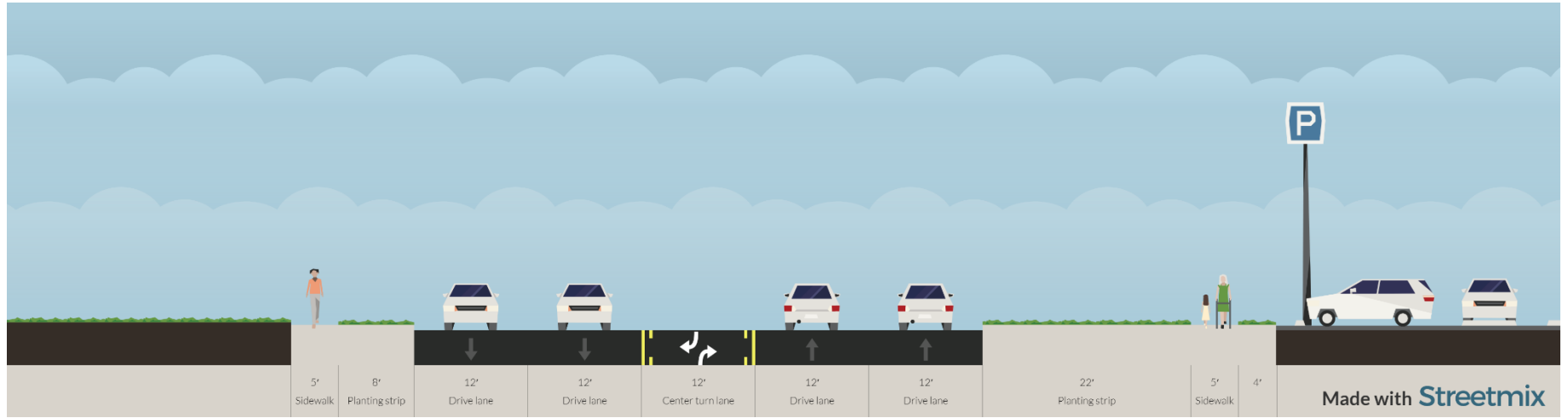
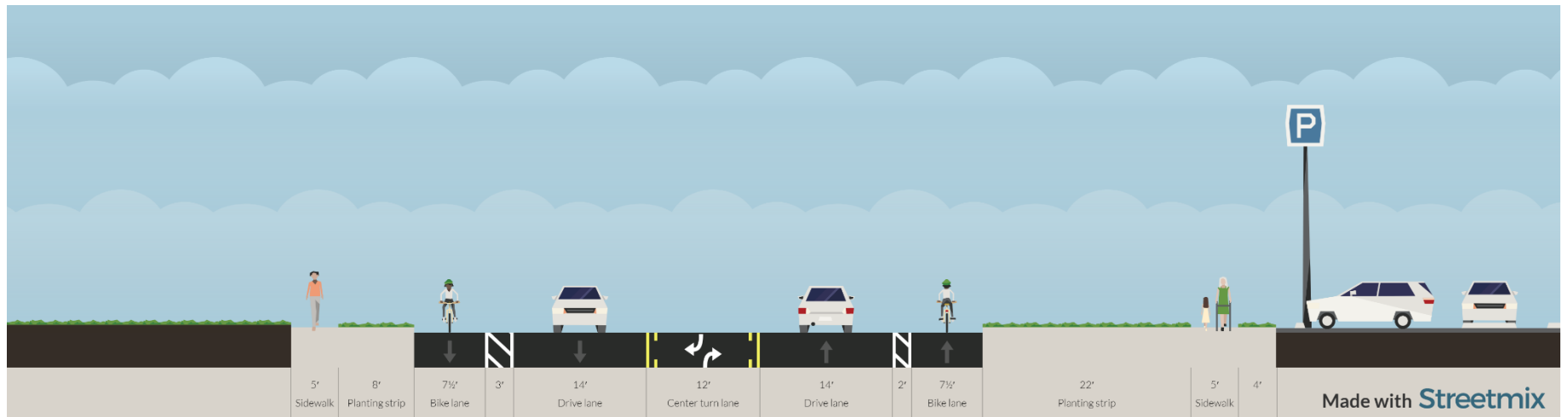
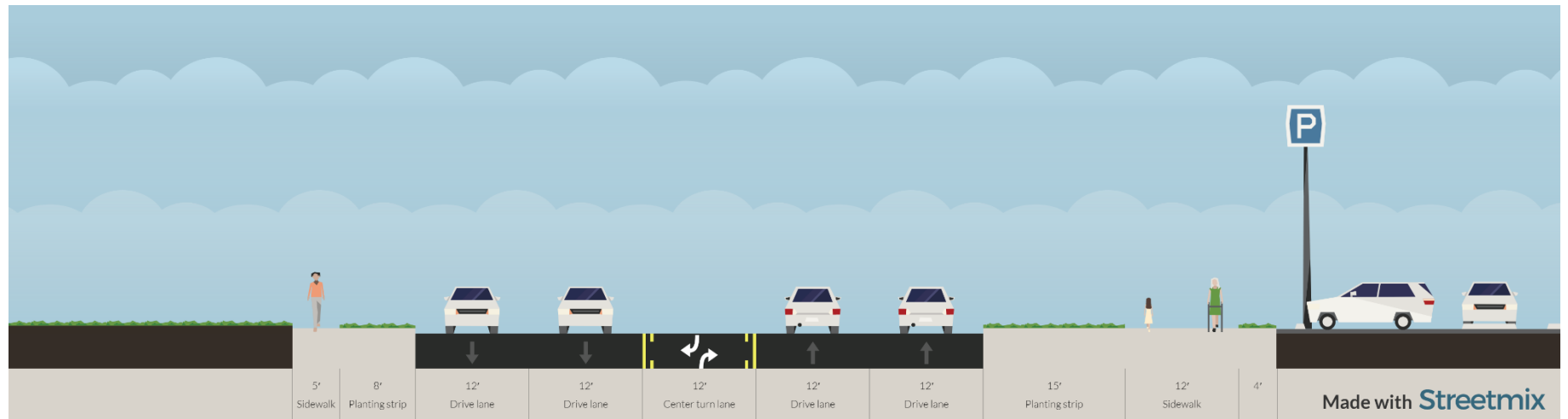


Figure 19: Riverside Boulevard, Alternative 1



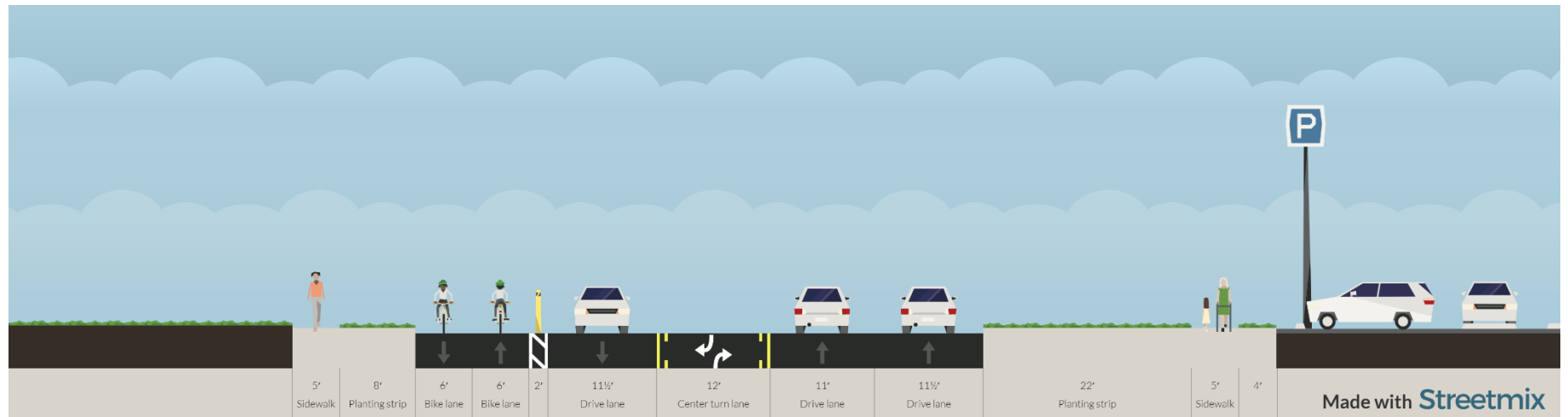
- Remove one through lane and widen remaining through lanes (from 12' to 14')
- Install buffered bicycle lane (7.5') with a 2-3' buffer (this could optionally be designed as a separated bike lane by adding flexible bollards to the buffer area)

Figure 20: Riverside Boulevard, Alternative 2



- Leave roadway configuration as-is and widen existing sidewalk on one side (from 5' to 12') to create a shared use path

Figure 21: Riverside Boulevard, Alternative 3



- Remove one through lane and narrow the remaining lane on the same side (from 12' to 11.5')
- Narrow both through lanes on the other side (from 12' to 11.5')
- Create a two-way separated bike lane on one side with a total width of 12' (plus a 2' buffer with flexible bollards or optionally a concrete median)

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Riverside Boulevard Alternatives Analysis

Alternatives	Advantages	Disadvantages
# 1	<ul style="list-style-type: none"> • Retains center turn lane • Provides a buffered bike lane, which offers bicyclists some horizontal separation from fast-moving vehicles • Does not require street reconstruction (only repainting) 	<ul style="list-style-type: none"> • Removes a through lane of traffic in each direction; however, this is unlikely to increase traffic congestion in typical situations • Widens existing through lanes, which can encourage speeding
# 2	<ul style="list-style-type: none"> • Has little to no impact on motor vehicle traffic • Provides maximum separation between bicyclists and pedestrians, and drivers 	<ul style="list-style-type: none"> • Widening of sidewalk is expensive • Potential increase in conflicts with drivers crossing the path to enter/exit parking lots
# 3	<ul style="list-style-type: none"> • Retains center turn lane • Slows through-traffic by narrowing lanes • Provides separation between drivers and bicyclists with flexible bollards 	<ul style="list-style-type: none"> • Removes a through lane of traffic in one direction; however, this is unlikely to increase traffic congestion in typical situations

ENDNOTES

¹ Robert Wood Johnson Foundation, County Health Rankings and Roadmaps: Nebraska, 2019, Retrieved from <https://www.countyhealthrankings.org/app/nebraska/2019/rankings/madison/county/factors/overall/snapshot>

² U.S. Department of Health and Human Services, 2008, Retrieved from <https://health.gov/paguidelines/2008/summary.aspx>

³ Krumholz, Harlan M, Krystal, et al., 2018, The Lancet, Association between physical exercise and mental health in 1.2 million individuals in the USA between 2011 and 2015: a cross sectional study, Retrieved from [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(18\)30227-X/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(18)30227-X/fulltext)

⁴ Jacobsen, P.L. 2003, Safety in numbers: more walkers and bicyclists, safer walking and bicycling, Retrieved from <https://injuryprevention.bmj.com/content/9/3/205>

⁵ Federal Highway Administration, 2009, National Household Travel Survey, Retrieved from https://nhts.ornl.gov/tables09/fatcat/2009/vt_TRPMILES.html

⁶ Urban Land Institute, 2016, Active Transportation and Real Estate – The Next Frontier, Retrieved from <http://uli.org/wp-content/uploads/ULI-Documents/Active-Transportation-and-Real-Estate-The-Next-Frontier.pdf>

⁷ US Census American Fact Finder, 2018, Household Size by Vehicles Available: 2011-2015 American Community Survey 5-Year Estimates, Retrieved from <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>