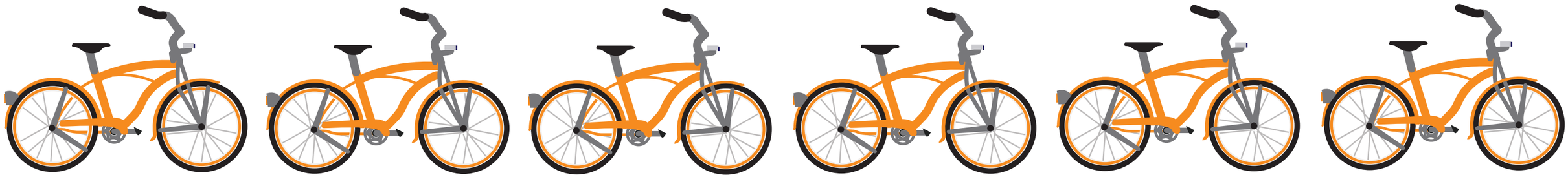
THE RENEWTON PROJECT
Two cities. One community.

NEWTON BICYCLE MASTER PLAN

JUNE 2015



HEALTHY HARVEY COALITION

NEWTON BICYCLE MASTER PLAN

JUNE 2015
FINAL DOCUMENT

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THE RENEWTON PROJECT
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HEALTHY HARVEY COALITION

ACKNOWLEDGMENTS

The Newton Bicycle Master Plan was developed with input, support and continued feedback from the Project Advisory Committee. This guidance was critical to the development of a usable plan for the City of Newton, KS. Special thanks to Lorrie Kessler, Lisa Bartel and Lynnette Redington with the Harvey County Health Department/Healthy Harvey Coalition, Suzanne Loomis with the City of Newton as well as Lester Limón and David Goering with the ReNewton Bicycle Initiative for their leadership and dedication towards the creation of this document. Citizens of Newton, KS, Harvey County and visitors from across the world will benefit from the improved bicycle facilities for daily trips, exercise and recreation in this special community.

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic (synonym: VPD)
APBP	Association of Pedestrian and Bicycle Professionals
BMP	Bicycle Master Plan
BNSF	Formerly the Burlington Northern and Santa Fe Railway
FHWA	Federal Highway Administration
KDOT	Kansas Department of Transportation
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
PVC	Polyvinyl chloride
RBI	Re-Newton Bicycle Initiative
VPD	Vehicles per Day (synonym: ADT)

DEFINITIONS

Arterial Road	A typically high capacity road which provides emphasis on mobility but intentionally limits access to other roads or property.
Collector Road	A moderate capacity road which collects traffic from residential/local roads to connect with arterial roads.
Residential/Local Road	Low capacity, low speed roads which provide excellent access to property at the expense of providing poor mobility along a corridor.

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THE RENEWTON PROJECT
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HEALTHY HARVEY COALITION

SECTION ONE
INTRODUCTION

WHY A BICYCLE MASTER PLAN?

The recommendation for physical activity for adults is 150 minutes per week; for youth the recommendation is 60 minutes per day. 82% of Kansas adults do not get the recommended amount of physical activity (2013, Behavior Risk Surveillance System). People who don't get enough physical activity are at an increased risk for developing chronic diseases such as diabetes and heart disease which costs Kansans an estimated $40 billion per year (Kansas Chronic Disease Risk Reduction Program Overview and Local Successes, KDHE). One way of combatting the lack of physical activity and the money loss associated with it is to improve the physical environment in a way that promotes active transportation, specifically bicycling, for local errands and commuting to work or school.

Beyond the health care costs, bicycling benefits local economies directly. Millennials, between the age of 18 and 36, are now one of the largest sectors of our workforce; this group of young adults is more likely to want alternative forms of transportation. According to the CEO of the Downtown Denver Partnership, the number one thing that attracts potential employees to Denver high tech industries is bike lanes. This is a trend repeated across the U.S. By choosing to use their own energy for transportation rather than automobiles, millennials are more likely to shop local. One example of this is from the 2012 New York City Department of Transportation study called "Measuring the Streets." The result of this study was a sales increase of 49% for the businesses located near protected bike lanes compared to a 3% increase in the rest of the borough.

USD 373 is encouraging their students to bicycle to school as part of their Safe and Active School Transportation grant activities. A Bicycle Master Plan which includes connectivity to school buildings would be an integral part of their plan to increase students' physical activity and reduce traffic congestion. This added layer of safety for children is another attraction for new businesses and residents.

Children are not the only group who reap the benefits of the additional safety of a planned bicycle infrastructure. Workers commuting by bicycle, the elderly who choose to use bicycle for running errands, those who cannot afford a car but still need to get to work or the grocery store, and college students all deserve the protection offered by bicycle facilities.

Improved bicycle facilities, can help save money in health care, recruit young workers and businesses, and increase local sales to help build the health and economic foundation of the community.

HOW NEWTON IS EMBRACING ITS CULTURE OF CYCLING:

1. Building the Sand Creek shared-use path
2. Organizing bicycle rides and events
3. Constructing a shared-use path along a section of S Kansas Avenue
4. Supporting an active and growing bicycling community of riders at all levels
5. Engaging the bicycle community through social media
6. Building the shared-use paths between W 1st Street & W 4th Street near the BNSF right-of-way
7. Utilizing new residential and commercial developments to construct bicycle/pedestrian accommodations

SECTION TWO
PLANNING

2.1 PLAN PURPOSE

The City of Newton's ReNewton 2030 Comprehensive Plan recognizes bicycling as a tool for providing greater accessibility to residents and visitors, improving air quality, and minimizing traffic congestion. ReNewton 2030 envisions that Newton will have a greater reliance on bicycles in the future and recognizes the need for a citywide trail system integrated with bicycle accommodating roadways. It identifies specific strategies for new bicycle routes, connections and expansions, introduces limited bicycle facility design guidelines and recommends nine pedestrian and bicycle policies. It also identifies a need for a Bicycle Master Plan (BMP) in order to advance ReNewton's recommendations.

To that end, the Harvey County Health Department, in partnership with the City of Newton, the Healthy Harvey Coalition and the ReNewton Bicycling Initiative have developed this Bicycle Master Plan to reach concurrence on priorities for future bicycle infrastructure projects.

The purpose of this Bicycle Master Plan is to identify current and future needs for bicycle lanes, shared-use lanes, and shared-use paths to meet the needs of the bicycle community within the city of Newton, Kansas.

Source: Parsons Brinckerhoff

Source: Parsons Brinckerhoff

Source: Parsons Brinckerhoff

SECTION TWO
PLANNING

2.2 PUBLIC INVOLVEMENT & PLANNING PROCESS

The Newton Bicycle Master Plan involved both public and technical aspects. The process began through the formation of a Project Advisory Committee comprised of individuals from the Healthy Harvey Coalition, Harvey County Health Department staff, City of Newton, Newton Medical Center, and the ReNewton Bicycle Initiative. The committee met monthly and assisted in processes related to defining appropriate bicycle facility types, discussing the proposed Newton Bicycle Network, reviewing public input, and designing public engagement events.

Two public engagement meetings were held at key moments in the planning process to ensure the Bicycle Master Plan fully recognizes the needs of the community. The first meeting was held on Thursday, February 12, 2015, from 5:30 – 7:00 p.m., and was attended by 31 people. Poster boards displayed the results of the Healthy Harvey Coalition online survey, as wells as past planning and policy documents related to bicycle planning and a project timeline. Participants were encouraged to draw on city roadway maps to indicate their typical bicycle routes and destinations. The second meeting was held on Thursday, April 23, 2015, from 5:30 – 7:00 p.m., and was attended by 24 people. Attendees were asked how they would kick-start Newton's bicycle infrastructure investment if given a limited amount of funds.

To ensure the Newton Bicycle Master Plan builds upon previous planning efforts, adopted local and state planning documents were reviewed. The City's zoning and subdivision regulations, and bicycle related laws, were also reviewed to ensure the plan's compatibility with existing laws. Additionally, five years of bicycle-vehicle crash data were evaluated to gain an understanding of the factors that may contribute to bicycle-vehicle crashes. Crash characteristics reviewed include the time of day, lighting conditions, weather conditions, bicyclist's age and the number of resulting injuries.

Once all information on existing conditions was compiled and analyzed, recommendations were made regarding types of bicycle facilities best suited for specific corridors. The committee reviewed these recommendations, requested revisions and ended with a finalized set of recommendations for bicycle facilities along key corridors. Additionally, a traffic study was performed on W 12th Street, from Grandview Ave. to Boyd Ave., to assist in a more specific facility design recommendation for the corridor. The recommendations were estimated for capital and ongoing maintenance costs and finally a phasing plan was recommended.

As a final step, in early May, 2015, Volunteers from 4H, the Medical Reserve Corp., and the Re-Newton Bicycle Initiative (RBI) along with City staff assisted in collecting bicycle count data at 20 locations along corridors that were being considered for bicycle facilities. The counts will serve as a baseline from which to measure the increase in cycling levels in the future.

Source: Heather Barringer, Newton Bike Shop

A graphic design student from Bethel College in North Newton, KS designed a marketing and outreach approach for promoting cycling within Newton called "Bike Newton". The work was created through a partnership with the ReNewton Bicycle Initiative.

Source: Heather Barringer, Newton Bike Shop

Source: Jeff Guy, The Newton Kansan

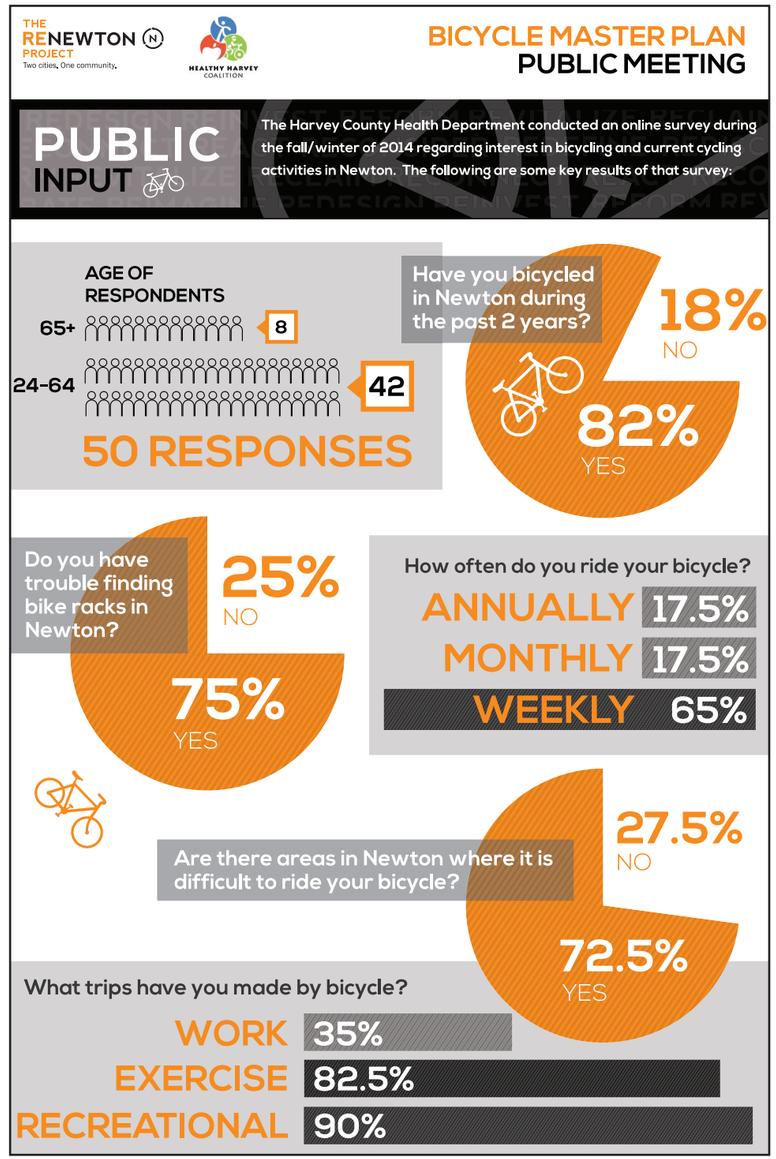


Figure 2.1 - Public Input Poster (Public Meeting, April 23, 2015)

SECTION TWO
PLANNING

2.3 VISION, GOALS & OBJECTIVES

VISION STATEMENT

"The City of Newton will provide a safe and efficient infrastructure for transportation by bicycle to better the mobility and health of its residents and the social and economic vitality of their community."

GOALS

ELIMINATE BICYCLE RELATED CRASHES.

Safety is the fundamental concern of Newton residents. Often operating within vehicle traffic, bicyclists are among the most vulnerable road users. There is also potential for crashes between bicyclists and pedestrians, and even between bicyclists themselves. This plan focuses on design features that increase the predictability of all transportation users to encourage a harmonious transportation environment.

INCREASE THE VIABILITY OF USING A BICYCLE TO GET TO COMMON DESTINATIONS.

This goal promotes the idea that bicycling should be a practical and comfortable transportation option for everyday trips. Every vehicle trip traded for a trip on a bicycle means less congestion on the streets, less air pollution, and more vehicle parking stalls. This plan guides the development of a bicycle network that connects homes with the places people travel to most.

INCREASE THE HEALTH OF THE COMMUNITY THROUGH BICYCLING.

This goal recognizes that bicycling advances public health and community vitality. The features of this plan guide the creation of an environment that helps to offer a positive and rejuvenating experience for bicyclists.

PROVIDE EQUITABLE ACCESS TO BICYCLE FACILITIES TO INCREASE THE VARIETY OF RIDERS.

Bicyclists are diverse in abilities, knowledge, experience and age. They reside in all areas of town, and some even from outside of town. This goal recognizes that the bicycle network should be as diverse and dispersed as its users. All areas of town should have convenient access to appropriate bicycle facilities, and facilities should accommodate a wide range of skill sets.

OBJECTIVES

SAFETY. Build the bicycle network in context to other road users and the structure of the built environment. As the speed differential between the different modes of transportation increases, the space or protective buffers between these modes should also increase, or the speed differential between the modes should be reduced. Facilities should be consistent with the adjacent land use and the number of access drives, as well as the expected traffic speeds, traffic volumes and vehicle types. Infrastructure should be designed to accommodate the most vulnerable users. Users should have options to select routes that accommodate their level of comfort.

AWARENESS. Encourage safe bicycling by providing bikeway signage and markings that clearly delineate the traffic responsibilities of all road users. The bicycle network should advise users of upcoming intersections, decision points, and changes in facility type to make operation within the network predictable. Signage and markings also comprise the way-finding system which should ease navigation through the network and reinforce key destinations.

INTEGRATION. Provide destination-based bicycle mobility that enables connections from neighborhoods to identified traffic generators including shops, employment centers, schools, civic activities and recreation sites. Residential and commercial developments should provide for multiple, safe, and direct bicycle connections in all directions. The network should also connect the community to medical facilities and accommodate under-served populations. Bicycle and pedestrian connections should be made between cul-de-sacs. The continuity of the bicycle network should be maintained to provide direct routes that shorten trip length and don't leave users at dead ends.

FEASABILITY. Evolve the bicycle network incrementally by linking to existing facilities that have a proven high use. By leveraging successful projects such as the Sand Creek shared-use path, new projects will be valuable immediately upon completion without relying on future projects and resources. Additionally, the costs of a facility should reflect its community benefit. The facility costs should include not only design, construction and maintenance costs, but also the costs of restricting vehicle mobility, as wells as environmental, historical, or cultural impacts.

PROMOTION. Market the bicycle network as an asset to the community and visitors. Landscaping, street furnishings, lighting, benches, and directories used in addition to signage and markings to encourage non-cyclists to use the bicycle network. U.S. Bicycle Route 76 should continue to be signed and promoted. In the project design phase, projects should demonstrate their usefulness to different interests in order to enhance public support. For instance, a facility in a shopping district may be shown to also increase business sales of the shopping district's stores.

SECTION THREE
EXISTING CONDITIONS

3.1 PAST PLANNING & POLICY DOCUMENTS

The Newton Bicycle Master Plan builds upon a strong foundation cast by past planning efforts. These efforts feature a strong public-engagement component and are directed from a variety of perspectives including health and wellness, transportation, land use, sustainability, parks and recreation, and downtown revitalization.

KANSAS RURAL HEALTH WORKS COMMUNITY HEALTH NEEDS ASSESSMENT (2013)

This document combines input from a broad set of interests with the expertise of health and other professionals, as well as community members, to identify and improve the most important health issues of Harvey County. The promotion of health, wellness, and chronic disease prevention is recognized as a fundamental priority. This priority can be achieved through health education and the encouragement of physical activity. Recommendations under this priority include encouraging health promoting activities that target under-served populations, the expansion of worksite wellness, and the development of neighborhood trails. A focus on youth health is also a priority within the plan. This document includes the latest demographic information on the City of Newton regarding lower-income areas of Newton. In these areas vehicle ownership may be low and walking and cycling may be the only available transportation options.

SOUTH KANSAS AVENUE TRAFFIC REPORT (2012 AND 2013)

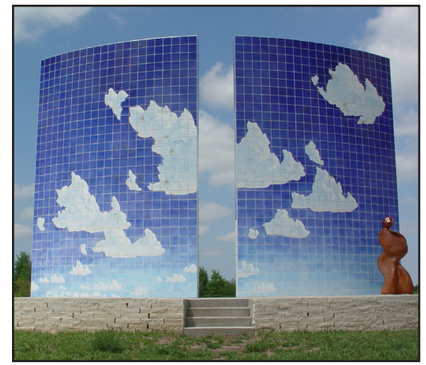
These two reports form an analysis of current conditions and recommendations for future improvements along South Kansas Avenue between SE 14th Street and SE 36th Street. Development within the vicinity is expected to be primarily single family residential with commercial and retail adjacent to the avenue. The existing shared-use path on the east side of South Kansas Avenue is attractive to cyclists and pedestrians for shorter distance trips. The path has a very limited number of street crossings and driveways intersecting with the path. Recommendations were made for expanding and extending shared-use paths throughout the City as well as extending the existing South Kansas Avenue shared-use path to SE 36th Street as development occurs along the corridor. This extension would provide a connection to Autumn Glen Parkway for local residents. The reports recognize that these types of paths encourage more active transportation and should increase the health of those who use them consistently.

RENEWTON 2030 COMPREHENSIVE PLAN (2011)

A primary policy document for Newton and North Newton, ReNewton 2030 outlines the plan for future growth and enrichment of established areas. The plan's vision includes revitalizing the Newton Main Street Historic District, and expanding quality-of-life amenities such as parks and trails, all while promoting the Midwest values of self-reliance and self-determination. Healthy living and sustainability are central to the plan's vision, and the people of Newton value the opportunity to walk or bicycle to civic activities, shopping, and job centers. Environmentally friendly transportation options are encouraged, and the plan foresees a greater acceptance of bicycles in the future. The plan's vision calls for amenities that contribute to the marketability and livability of the community including "complete streets" which enable safe street access for all users. Recommendations specific to bicycle facilities include connecting neighborhoods with the Newton Main Street Historic District, extending trails to industrial parks, connecting downtown with Bethel College, and extending the "The Trail of Two Cities" to the entirety of Sand Creek.

MASTER PLAN FOR NEWTON DOWNTOWN REDEVELOPMENT DISTRICT (2009).

This plan intends to make downtown the social center of the community by creating a critical mass of activities to bring people downtown. The master plan identifies activators or places that attract persons and create excitement in the streetscape. Identified existing activators include the Newton Public Library, the Newton Recreation Center, the County Courthouse, City Hall, and the Post Office. Proposed activators include a downtown farmers market and a downtown theater. The plan also proposes a shared-use path through a series of new parks along the southeast side of the rail corridor from E 4th Street to E Broadway. The plan recognizes U.S. Bicycle Route 76 as a community asset that should be promoted more extensively through the installation of bicycle lockers and racks along with signage of trail heads and lodging opportunities.



Blue Sky Sculpture, Centennial Park

3.2 REGULATIONS

ZONING ORDINANCE. Zoning regulations can impact the environment for bicycling in a number of different ways. By allowing for a tighter integration of land uses, distances between residences and destinations can be shortened, thereby encouraging alternative transportation. Zoning may also require bicycle parking, or promote its construction by reducing other zoning requirements. One simple strategy is to allow mandated parking stalls to be traded for bicycle parking (Bike Corrals) at a given ratio. However, if parking lot size requirements are lowered in the future, bicycle parking should be designed similar to Newton's current vehicle parking regulations which are based on the expected number employees and visitors to a facility. Newton's current zoning rules do not require or encourage bicycle parking. Zoning rules may also mandate that new or expanding nonresidential buildings with specified uses be equipped with showers, dressing areas and lockers for bicycle commuters. Currently such facilities are not required in Newton.

SUBDIVISION REGULATIONS. Similar to zoning ordinances, these regulations may also help shorten trip length. Maximum building setbacks from the public right-of-way, maximum block lengths, and requirements for connected cul-de-sacs all help increase connectivity for cyclists and reduce trip length. Additionally, land developers should be asked to provide bicycle accessibility provisions within a streets and circulation plan. These provisions require developers to demonstrate a logical circulation plan for bicycles within the development as well as integration with adjacent land uses and adjacent existing or planned bicycle facilities. These plans can help ensure that street patterns are designed for the needs of bicyclists, pedestrians and motor vehicles alike. Currently, a chapter within Newton's subdivision regulations is reserved for bicycle and linear trail routes; however the regulations contain no bicycle specific regulations. The city currently has the option to require pedestrian easements in order to facilitate pedestrian access from the streets to schools, parks, playgrounds, or other streets.

SECTION THREE
EXISTING CONDITIONS

3.3 INFRASTRUCTURE

The existing city of Newton bicycle infrastructure primarily consists of four shared-use path facilities. The first runs from the Sand Creek dam (W 1st Street) to the north city limits of Kansas Avenue (Sand Creek shared-use path). The second runs along the east side of South Kansas Avenue (SE 14th Street south to north of Autumn Glen Parkway). The third is between W 1st Street and W 4th Street either side of the Burlington Northern Santa-Fe (BNSF) railroad yard, and the fourth trail (uncompleted) runs from Old Main St. at Sheffield St. westward approximately three-eighths of a mile. A map of the four bicycle facilities are shown in Figure 3.1 in yellow.

Sand Creek shared-use path is "a paved walking/jogging/biking path that runs along Sand Creek from Athletic Park to Centennial Park." This section of the shared-use path is approximately 2.5 miles long. This shared-use path is on independent right-of-way along Sand Creek. This type of bicycle infrastructure is great for recreational riders and will attract such riders to the facility.

The second piece of the Sand Creek shared-use path is on independent right-of-way along Sand Creek in the southwest part of town. This section of the Sand Creek shared-use path runs from SW 14th Street to the Sand Creek Station Golf Course where riders must exit on to Meadowbrook Drive. This section of the shared-use path is approximately 0.7 miles long. There is currently a large gap in the Sand Creek shared-use path between SW 14th Street and W 1st Street as a result of BNSF right-of-way.

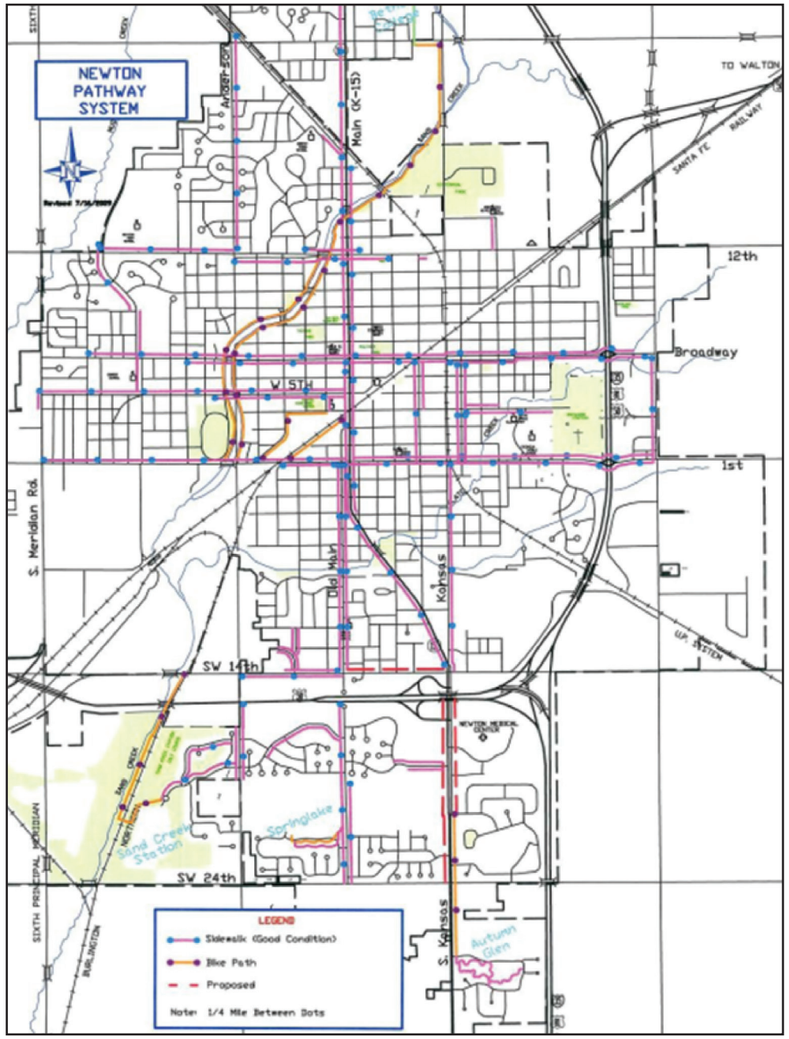


Figure 3.1 - Existing Bicycle Path and Sidewalk Map

The South Kansas Avenue shared-used path extends from SE 14th Street to just north of Autumn Glen Parkway. The shared-use path is not in an exclusive right-of-way, and crosses approximately six streets and four driveways at-grade along the 1.3 mile length.

There are also two smaller and shorter bicycle facilities within the city. One is a shared-used path in independent right-of-way which parallels SW 24th Street approximately 0.2 miles north of SW 24th Street with access from Old Main Street (entrance just north of Sheffield Street). This shared-use path currently ends in an empty field awaiting future development in the area. The other shared-use path in independent right-of-way parallels the railroad tracks between W 1st Street and W 4th Street, as well as between W 1st Street and Main Street for a total distance of approximately 0.4 miles.

The U.S. Bicycle Route 76 runs through Newton. The U.S. Bicycle Route 76 is a cross-country bicycle route that extends 4,228.0 miles from Astoria, OR to Yorktown, VA. This is one of many cross-country bicycle routes listed by the Adventure Cycling Association. Generally cyclists ride long distances each day and bring their camping supplies with them on their bicycle. Figure 3.2 shows the U.S. Bicycle Route 76 through Newton, which utilizes W 12th Street, N Main Street, and E 1st Street.

US-76 Bike Route (TransAmerica Trail) sign - Newton, KS
Source: Parsons Brinckerhoff

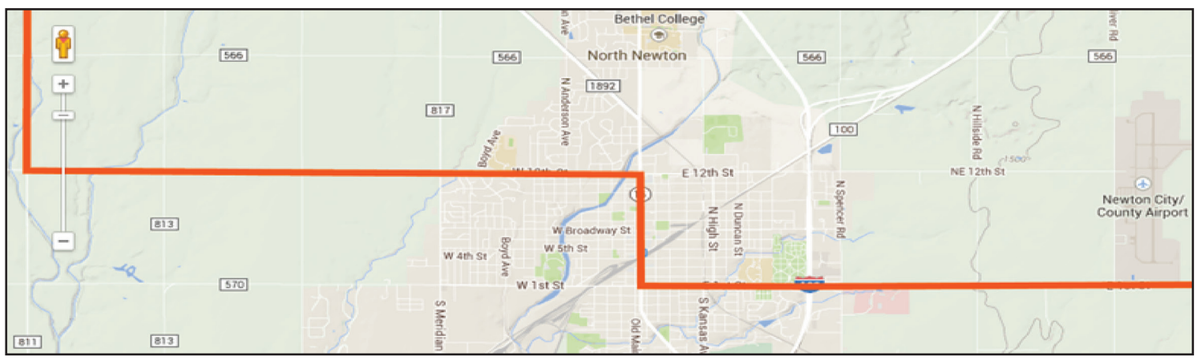


Figure 3.2 - U.S. Bicycle Route 76

SECTION THREE

EXISTING CONDITIONS

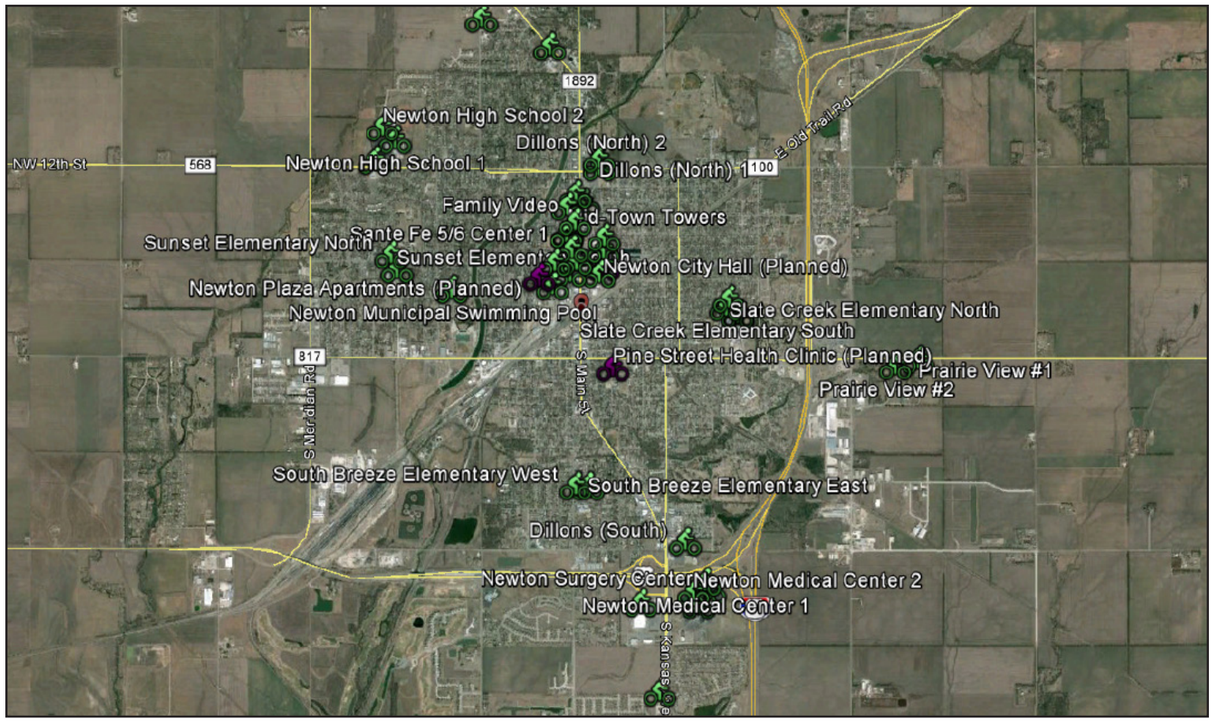


Figure 3.3 - Google Map of Existing Bicycle Parking Locations in Newton, KS

There is bicycle parking at a number of facilities throughout the city of Newton. Most of these facilities are located in the downtown district, along with school, health, and recreation locations (Figure 3.3). Retail, commercial, and government buildings are noticeably lacking in bicycle parking facilities.

There are a variety of bicycle parking structures in Newton which are used to secure bicycles. Most of the existing bicycle storage facilities are of the "Grid," or "Comb" design although they are referred to by other names as well (Figure 3.4 and Figure 3.5). The Grid or Comb designs are considered to be very low quality storage facilities as they typically attempt to space bicycles too closely together, provide minimal means to secure bicycles, and do not provide two points of contact to hold bicycles upright. The city also has a limited number of higher quality design bicycle racks such as the "Post and Ring" type bicycle racks (Figure 3.6) (Association of Pedestrian and Bicycle Professionals, 2010). Perhaps the most common and intuitive rack design is the "Inverted U" bicycle rack (Figure 3.7).

Figure 3.8 - Harvey County Bicycle Passing Sign

Figure 3.9 – Permissible Bicycle Passing Sign

Source: Parsons Brinckerhoff

There are several signs which address bicycle usage on roads within the city limits of Newton as well as outside the city limits within Harvey County. The Harvey County bicycle passing sign (Figure 3.8) is not currently included in the Manual on Uniform Traffic Control Devices (MUTCD). The sign the City of Newton uses (Figure 3.9) is permissible per the MUTCD. While K-15 (Washington Street / Main Street) is a Kansas state highway, and under KDOT's jurisdiction, under the State of Kansas' "Home Rule" statutes and regulations, the City of Newton would be able to post the permissible signs on K-15. However, on rural state highways (outside of city limits), "Home Rule" does not apply, and Harvey County would not be able to post their bicycle passing sign on rural state highways outside of city limits.

Figure 3.4 - Grid Type Bicycle Rack at the Mid-Town Towers (Poor Design)

Figure 3.5 - Grid Type Bicycle Rack at Chisolm Middle School (Poor Design)

Figure 3.6 - Post and Ring Type Bicycle Rack at AT&T (Excellent Design)

Figure 3.7 - "Inverted U" Bicycle Rack (Excellent Design)

Source: Lester Limón, ReNewton Bicycle Initative

SECTION THREE
EXISTING CONDITIONS

3.4 BICYCLE COUNTS

Bicycle count data was collected by the City of Newton and volunteers from 4H, the Medical Reserve Corp., and the Re-Newton Bicycle Initiative (RBI), on Tuesday, May 5, 2015. The screen line counts tallied cyclists crossing 20 set locations throughout the city from 5:00 to 7:00 p.m. (Figure 3.11). Additional attributes of the observed cyclists were also tallied including: gender, cycling location within the corridor, and age (child, young adult (13 – 21) and adult). The completed bicycle count form can be found in Section 3 Appendix of this plan. The form includes instructions as well as examples for specific situations. The results of the bicycle counts are shown in Table 3.1.

		Gender	Cycling Attributes			Age		
	Cyclist	Female	Sidewalk Riding	Sand Creek Shared-Use Path (between N Ash St. & N Elm St.)	Wrong Way Riding (On Street)	Child	Young Adult (13-21)	Adult
Total	105	17	34	24	0	10	26	69
Percentage		16%	32%	23%	0%	10%	25%	66%

Table 3.1 – Observed Cyclists and Attributes

During the count period, observed cyclists at all count locations within the city peaked at 21 from 5:45 to 6:15 p.m. In total, 105 cycling observances were made. A line chart of the observances are shown in Figure 3.10. The number of cyclists declined after 6:15 p.m. This decline correlates with the time at which rain began and continued through the remainder of the count period. Knowledge of the advancing storm front (through radar, dark clouds, moderate wind, etc.) may have kept some cyclists from riding before the rain began.

THE BICYCLE COUNT DATA APPEAR TO SUGGEST:

- A great majority of those cycling are male.
- Cycling on the wrong side of the street was never observed.
- Cycling on the sidewalk is common.
- One-third of those cycling are children and young adults.
- Sand Creek shared-use path had the highest observed count location.

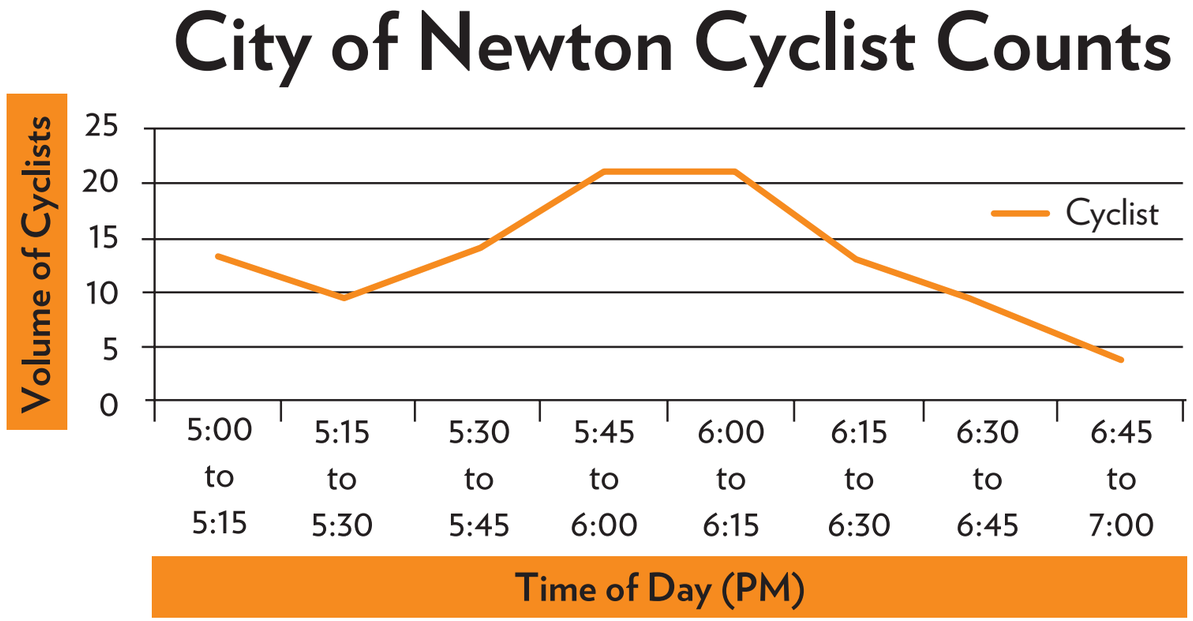


Figure 3.10 – Number of Observed Cyclists by Time of Day

Sand Creek Shared-Use Path

SECTION THREE

EXISTING CONDITIONS

COUNT LOCATIONS (MAY 2015)

1. Anderson Road between SW 14th Street & Meadowbrook Drive
2. N Walnut Street between E 8th Street and E 9th Street
3. Sand Creek Trail between N Ash Street and N Elm Street (Both Sides of Creek)
4. South Kansas Avenue between Windward Drive and Medical Center Drive
5. E 1st Street between Allison Street and N Oak Street
6. W Broadway between N Ash Street and N Plum Street
7. E 12th Street between Kansas Avenue/Main Street and N Oak Street
8. SE 14th Street between S Plum Street and S Poplar Street
9. Old Main Street between SE 7th Street and SE 8th Street
10. North Kansas Avenue just north of E 14th Street
11. Boyd Avenue between W Broadway Street and W 6th Street
12. N Meridian Road between W 5th Street and W 6th Street
13. N Anderson Avenue between Westchester Lane and Northridge Road
14. Sand Creek Trail between US-50 and Meadowbrook Drive (Adjacent/ Within Golf Course next to Railroad)
15. K-15/Main Street between 8th Street and 9th Street
16. N Poplar Street between W 6th Street and W 5th Street
17. N Spencer Road between Plaza Lane and E 3rd Street
18. E 8th Street between N Logan Street and N Blaine Street
19. SE 24th Street between S Anderson Road and Old Main Street
20. W 12th Street between Boyd Avenue and Grandview Street

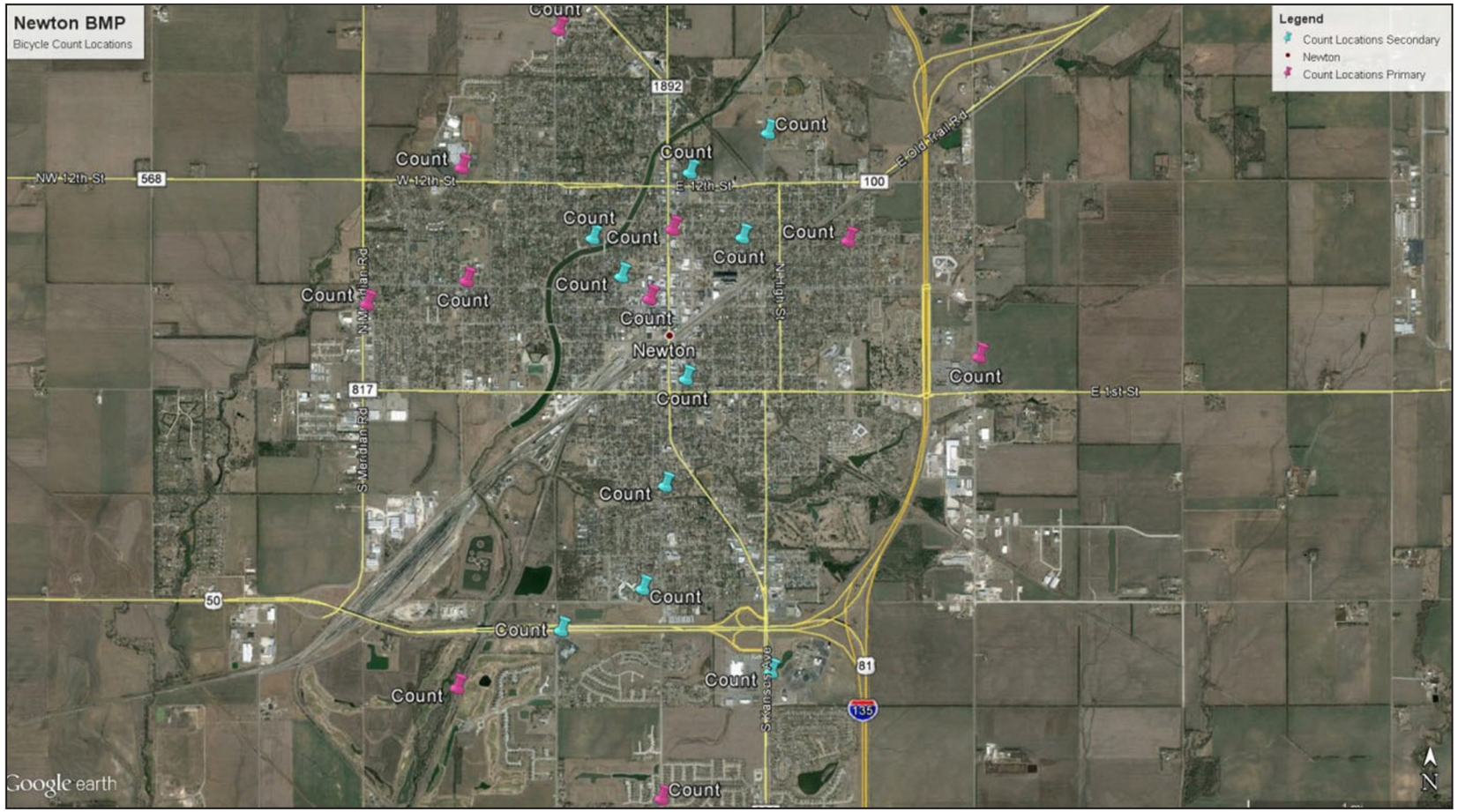


Figure 3.11 - Newton BMP Count Locations in May 2015

SECTION THREE

EXISTING CONDITIONS

3.5 BICYCLE RELATED CRASHES

From 2009 to 2013, a total of 23 bicycle-vehicle crashes occurred in the city of Newton (Figure 3.12). Approximately 60% of all bicycle-vehicle crashes happened on K-15 (Washington Street / Main Street), a high traffic volume corridor primarily comprised of businesses, restaurants and religious facilities (Figure 3.13). Nearly half of all crashes occurred at, or near, intersections, and over a quarter of all crashes occurred along sidewalks with parking or driveway access (Figure 3.14). Nearly all of the intersection-related crashes occurred at crosswalks or along streets with no crosswalks. Some crashes occurred on sidewalks when drivers were entering or leaving parking lots, driveways or alleys.

All of the crashes occurred between the hours of 7:00 a.m. and 9:00 p.m. The afternoon hours between 2:00 and 4:00 p.m. showed a large increase (Figure 3.15). Lighting conditions did not appear to have any significant effect on the crashes as 82% of the crashes occurred during hours of daylight. Weather conditions also appear to have rarely contributed to crashes.

Younger bicyclists between the ages of 11 and 15 and 26 to 30 appeared to have the highest bicycle related crashes (Figure 3.16). Of all crashes, 70% resulted in injuries.

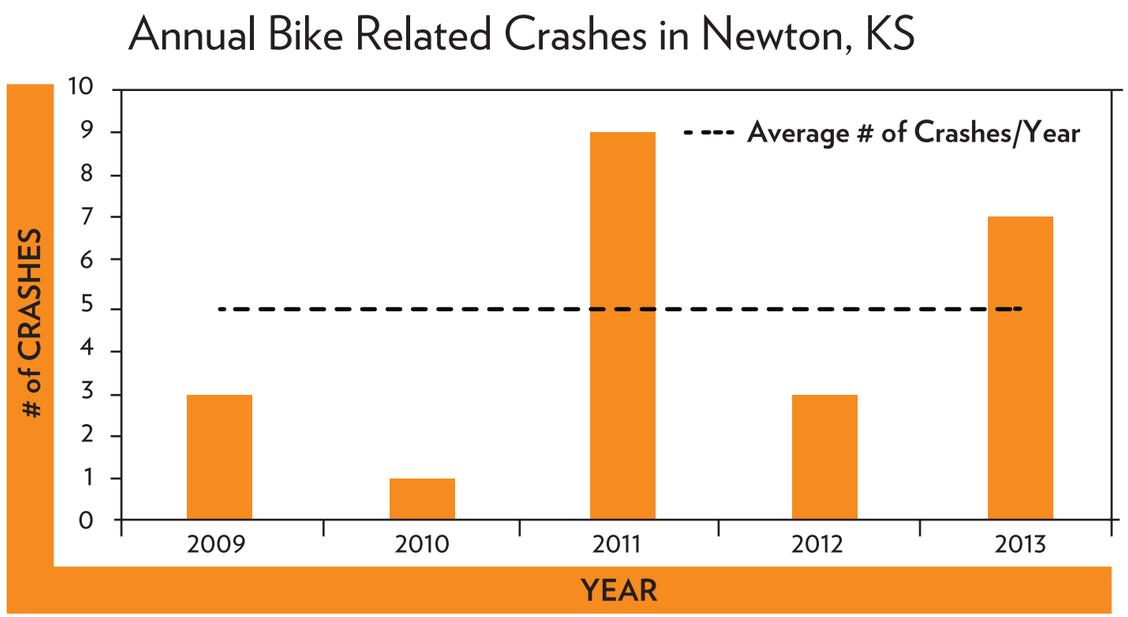


Figure 3.12 - Total Annual Bicycle Related Crashes in Newton, KS (2009 – 2013)

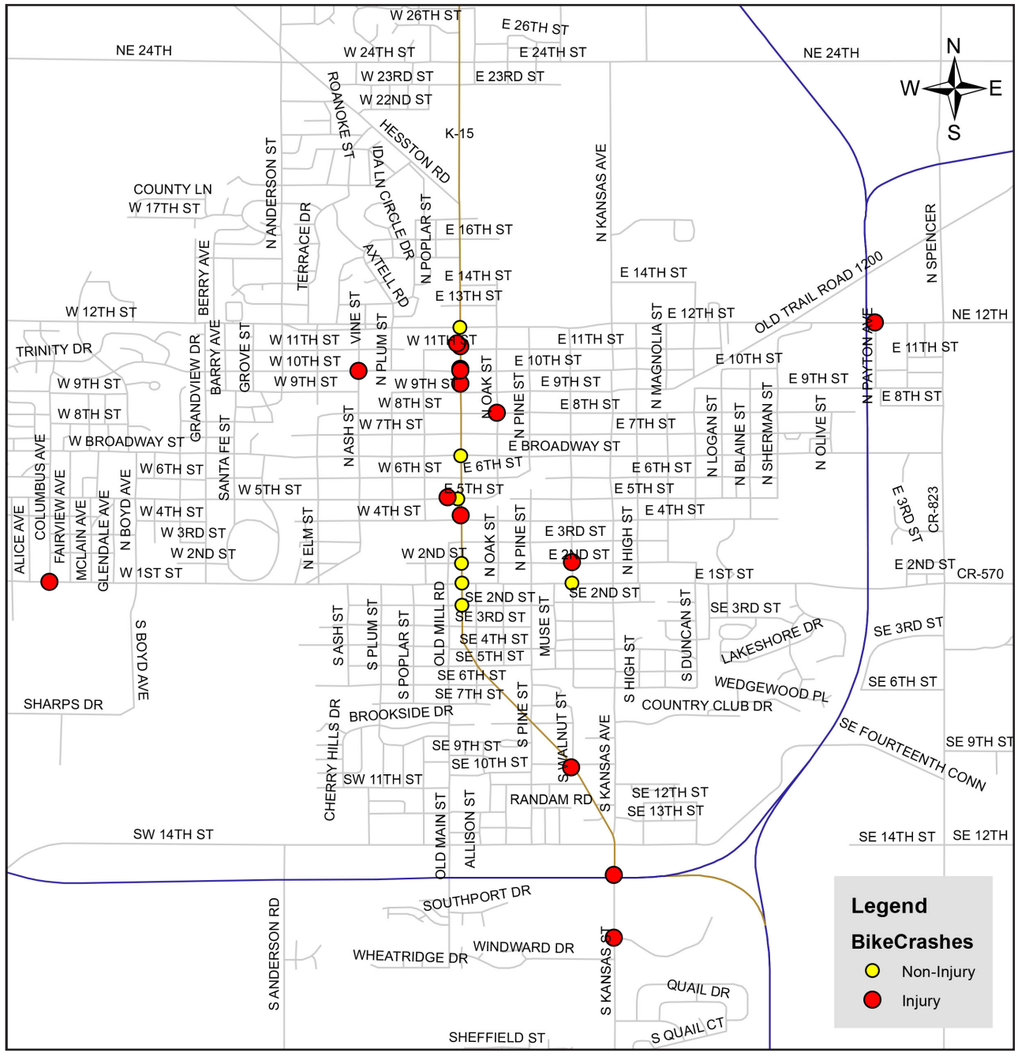


Figure 3.13 - Locations and Severity of Bicycle Related Crashes in Newton, KS (2009 - 2013)

SECTION THREE

EXISTING CONDITIONS

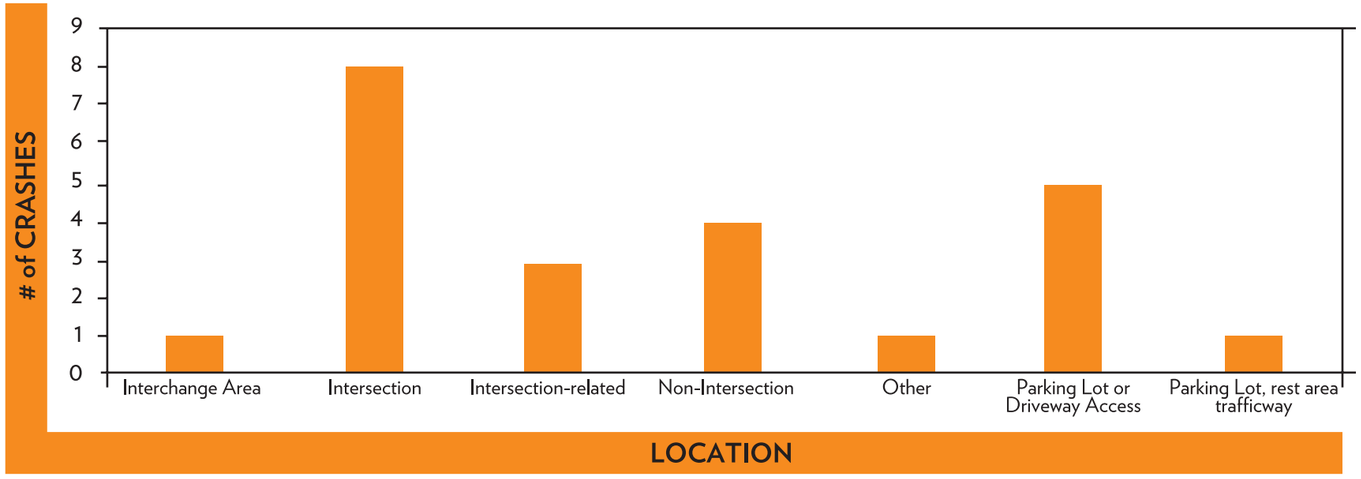


Figure 3.14 - Bicycle related Crash Locations in Newton KS (2009 - 2013)

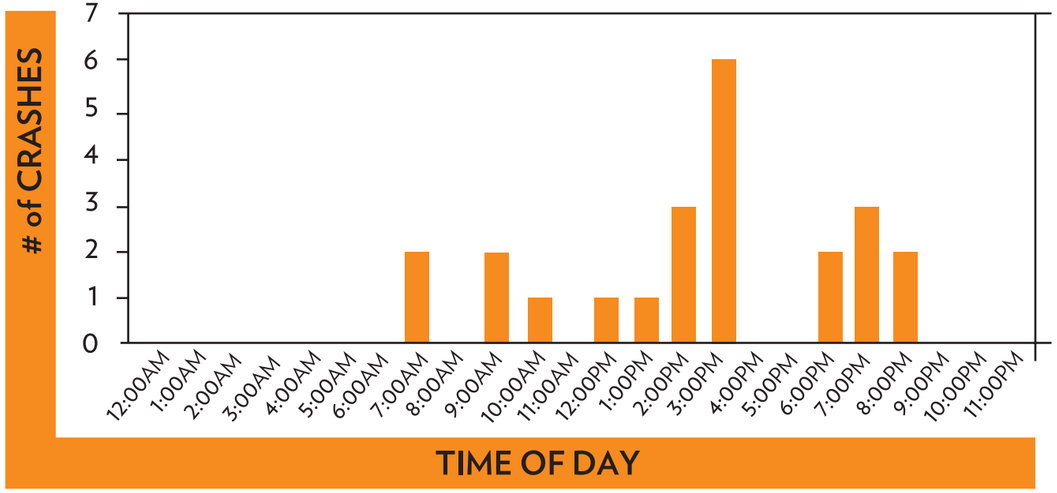


Figure 3.15 - Five year Bicycle Related Crashes in Newton, KS by Time of Day (2009 – 2013)

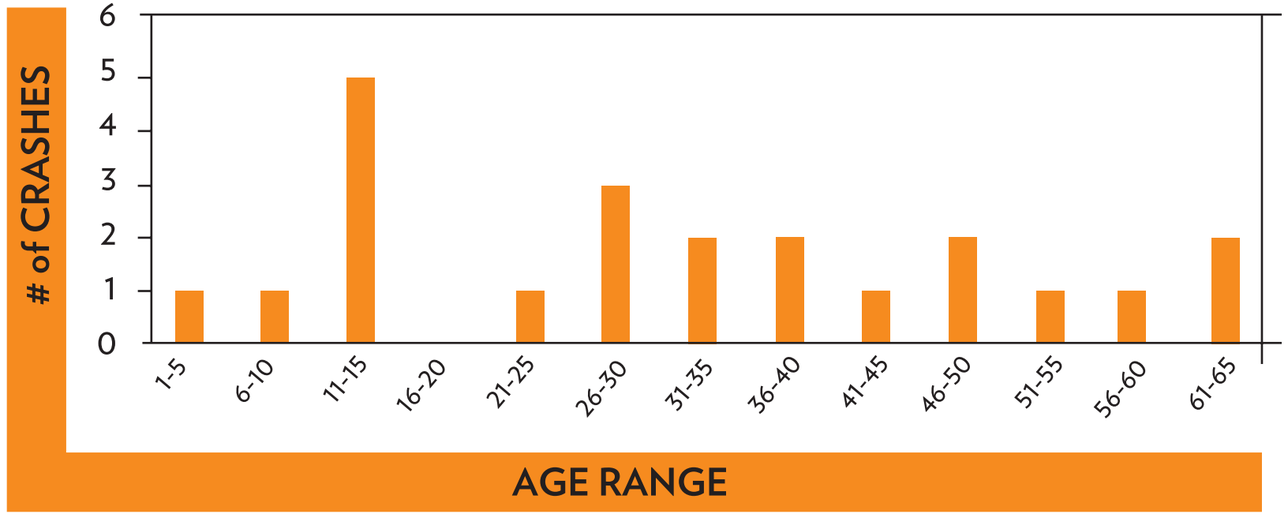


Figure 3.16 - Five year Bicycle Related Crashes in Newton, KS by Age of Bicyclist (2009-2013)

SECTION FOUR
TRAFFIC ANALYSIS

4.1 RIGHTSIZING ROADS

Rightsizing, often referred to as road diets, consists of converting existing four-lane undivided roadways to three-lane roads with bicycle lanes. "Road diets are often conversions of four-lane undivided roads into three-lanes (two through lanes and a center turn lane). The fourth lane may be converted to bicycle lanes, sidewalks, and/or on-street parking. In other words, existing space is reallocated; the overall area remains the same... Under most Average Daily Traffic (ADT) conditions tested, road diets have minimal effects on vehicle capacity, because left-turning vehicles are moved into a common two-way left-turn lane. However, for road diets with ADTs above approximately 20,000 vehicles, there is a greater likelihood that traffic congestion will increase to the point of diverting traffic to alternate routes" (University of North Carolina Highway Safety Center, 2004).

The Federal Highway Administration's Road Diet Information Guide lists some safety and operational benefits of rightsizing based on various lessons learned, research, and studies and are shown in (Table 4.1).

Category	Problem	Rationale
Safety	Rear-end crashes with left-turning traffic due to speed discrepancies	Removing stopped vehicles attempting to run left from the through lane could reduce rear-end crashes
	Sideswipe crashes due to lane changes	Eliminating the need to change lanes reduces sideswipe crashes
	Left-turn crashes due to negative offset left turns from the inside lanes	Eliminating the negative offset between opposing left-turn vehicles and increasing availale sight distance can reduce left-turn crashes
	Bicycle and pedestrian crashes	Bicycle lanes separate bicycles from traffic; pedestrians have fewer lanes to cross and can use a refuge area, if provided
Operational	Delays associated with left-turning traffic	Separating left-turning traffic has been shown to reduce delays at signalized intersections
	Side street delays at unsignalized intersections	Side-street traffic requires shorter gaps to complete movements due to the consolidation of left turns into one lane
	Bicycle operational delay due to shared lane with vehicles or sidewalk use	Potential for including a bike lane eliminates such delays
Other	Bicycle and pedestrian accommodation due to lack of facilities	Opportunity to provide appropriate or required facilities, increasing accessibility to non-motorized users
	Unattractive aesthetic	Provisions can be made for traversable medians and other treatments
	Vehicles speeds discourage pedestrian activity	Potential for more uniform speeds; opportunity to encourage pedestrian activity

Table 4.1 - Benefits of Road Diets - Source: FHWA Road Diet Information Guide

SECTION FOUR
TRAFFIC ANALYSIS

4.2 W 12TH ST., BOYD AVE. TO GRANDVIEW AVE, TRAFFIC STUDY

A traffic study was performed along W 12th Street, between Boyd Avenue and Grandview Avenue, to determine the impacts on peak traffic operations before and after the conversion of this roadway section from the existing four-lane undivided section (two lanes in each direction) to a proposed three-lane cross section with bike lanes (one vehicle lane in each direction, a Two-Way Left-Turn Lane, and two five foot bicycle lanes in each direction). Five intersections were analyzed and are shown in Figure 4.1. Additional tables and methodology details may be found in the Section 4 Appendix.

Drivers are not currently utilizing the accesses to the High School on W 12th Street as intended per a phone call with the Newton High School Administrator. The analysis assumed that by the year 2030, drivers utilizing the High School main entrance and parking lot accesses would use them as intended and shown in Figure 4.2. Drivers wanting to travel west on W 12th Street are asked to exit the school facilities onto Boyd Avenue in the northwest edge of the property. Based on the traffic data collected, approximately 74 drivers exited the school property from the main access (wrong-way maneuver) during the AM Peak and 172 drivers during the PM Peak. Subsequently, one driver turned right out of the parking lot access (restricted maneuver) during the AM Peak and 28 drivers during the PM Peak. The majority of drivers wanting to turn east from the school grounds utilized the one-way entrance as an exit instead of turning from the parking lot access. For the purposes of analysis, it is assumed that drivers in the future will utilize the accesses as intended.

Figure 4.1 – W 12th Street Traffic Count and Analysis Locations

W 12th Street at Newton High School entrance
Source: Parsons Brinckerhoff

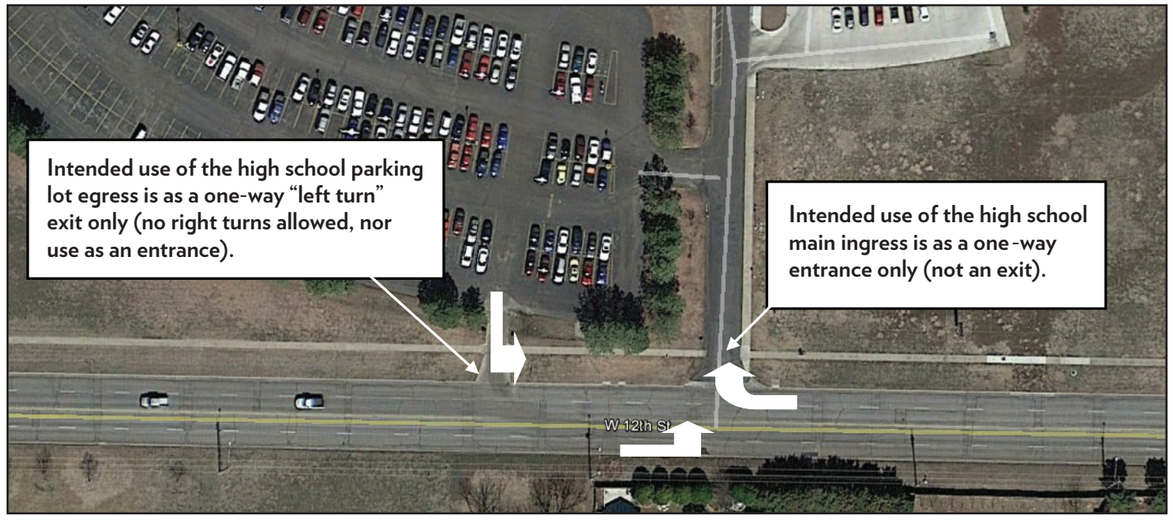


Figure 4.2 - W 12th Street Intended Use of High School Main Ingress and Parking Lot Egress

SECTION FOUR

TRAFFIC ANALYSIS

McTrans's Highway Capacity Software (HCS 2010) was the primary tool used for the traffic analysis at all of the five stop controlled intersections. The delay and LOS were analyzed and compared for three scenarios:

- Existing (2015) conditions (four-lane section)
- 2030 traffic volumes with no roadway changes (four-lane section)
- 2030 traffic volumes with rightsizing (four-lane section converted to three-lanes with bike lanes)

Level of Service (LOS) is defined by the 2010 Highway Capacity Manual (HCM) as "a quantitative stratification of a performance measure or measures that represent quality of service" (Transportation Research Board, 2010, pp. 5-1). Vehicular LOS calculations are based on the driver's perception of the traffic conditions. LOS A is the best operating condition from the driver's perspective and LOS F has the longest delays, making it the worst operating condition. LOS D or better is considered acceptable in most urban settings during the peak hour. None of the vehicular LOS indicators take into account the user's perspective from other modes such as pedestrians, cyclists or transit users (Table 4.2).

Level of Service	DESCRIPTION	Average Control Delay per Vehicle (seconds/vehicle)
A	Little or no delay.	≤ 10
B	Short traffic delays.	> 10-15
C	Average traffic delays.	> 15-25
D	Long traffic delays.	> 25-35
E	Very long traffic delays.	> 35-50
F	Demand exceeds capacity resulting in extreme delays and queuing.	> 50

Table 4.2- Two-Way and All-Way Stop Controlled Intersection Level of Service Criteria
Source: Highway Capacity Manual (HCM), 2010

TRAFFIC OPERATIONS ANALYSIS RESULTS

In order to determine the extent of any operational changes if the roadway section was converted to three-lanes with bike lanes by the year 2030, a capacity analysis including approach and movement Level of Service (LOS) and delay, under existing conditions and for the future year 2030, were analyzed.

Table 4.3 and Table 4.4 show the resulting delay and Level of Service (LOS) for each approach at the intersections on W 12th Street. Based on these results, converting the four-lane section to three-lanes with bicycle lanes would have minimal effects on drivers' LOS or roadway operations when compared to maintaining the existing geometries. Certain movements showed high delays and poor LOS for the year 2030. The shared northbound left/right movement at the W 12th Street and Grandview intersection (east junction) in the AM (2030) resulted in poor LOS from the driver's perspective. It was determined that rightsizing W 12th Street would significantly reduce the delays at these movements improving the LOS from E to C. The shared southbound left/through movement at the W 12th Street and Boyd Avenue Intersection showed poor LOS both in the AM (2030) and PM (2030). Rightsizing would decrease delays and improve the LOS in the AM (2030) however; the southbound Boyd Avenue approach would still be over capacity in the PM by the year 2030 resulting in high delays regardless of the lane conversion. Much of the advantage of using a three-lane cross section with a two-way left-turn lane is drivers on the minor street making a left turn are able to use the two-way left turn lane (TWLTL) to complete their left turn by merging into traffic. The advantage of the three-lane cross-section for drivers on W 12th Street, in addition to the inclusion of bike lanes, is that left-turning drivers can move out of the way of through traffic and store in the TWLTL until they find a gap in traffic and complete the left-turn.

SECTION FOUR

TRAFFIC ANALYSIS

AM	12th Street & Boyd		12th Street & HS Parking Exit	12th Street & HS Main Entry	12th Street & Grandview (WJ)	12th Street & Grandview (EJ)
	NB	SB	SB	SB	SB	NB
2015 Existing Conditions						
Delay	14.4	13.7	8.7	16.6	12.3	18.2
LOS	B	B	A	C	B	C
2030 Volumes No Road Diet						
Delay	20.2	29	12.9	N/A	15	37.2
LOS	C	D	B		B	E
2030 Volumes with Road Diet						
Delay	19.3	20.1	13.3	N/A	14.7	19.6
LOS	C	C	B		B	C

Table 4.3 - AM Approach LOS and Delay

PM	12th Street & Boyd		12th Street & HS Parking Exit	12th Street & HS Main Entry	12th Street & Grandview (WJ)	12th Street & Grandview (EJ)
	NB	SB	SB	SB	SB	NB
2015 Existing Conditions						
Delay	18.4	46.3	9	44.4	12.8	16.8
LOS	C	E	A	E	B	C
2030 Volumes No Road Diet						
Delay	30.2	238.7	21	N/A	16	32.6
LOS	D	F	C		C	D
2030 Volumes with Road Diet						
Delay	30.2	53.3	19.8	N/A	15.5	20.3
LOS	D	F	C		C	C

Table 4.4 - PM Approach LOS and Delay

SECTION FOUR

TRAFFIC ANALYSIS

TRAFFIC OPERATIONS RECOMMENDATIONS

Based upon the traffic study performed, it is recommended that the section of W 12th Street, between Boyd Avenue and Grandview Avenue, be converted from a four-lane undivided roadway section (two vehicle lanes in each direction) to a three-lane cross section with bike lanes (one vehicle lane in each direction, a Two-Way Left-Turn Lane, and two five foot bicycle lanes in each direction). A dedicated eastbound left turn lane is recommended at the intersection of W 12th Street and Boyd Avenue due to high traffic volumes turning north into Boyd Street during the AM. This eastbound left turn lane would require widening on W 12th Street west of Boyd Avenue. The rightsizing of W 12th Street will allow the implementation of the proposed bike lanes along W 12th Street while not compromising vehicular traffic LOS and operations during existing conditions or in projected 2030 conditions. The three-lane section should also improve traffic safety along W 12th Street by moving left-turning traffic out of the through traffic stream. It also provides a place for minor road traffic to turn into before they merge with through traffic to complete their left-turn maneuver.

SIGNING RECOMMENDATIONS

The intended traffic flow configuration to and from the high school may not be the most optimal configuration, but enhanced signing and pavement markings would better inform drivers of the intended traffic flow patterns until further analysis is undertaken. Signing and pavement marking improvements are recommended and should include a series of Do Not Enter, Wrong Way, Left Turn Only and One Way signs, removal of the existing Stop Sign at the high school main access on 12th Street, as well as the addition of pavement markings to the access roads as shown in Figure 4.3. It is recommended that law enforcement be utilized for a few days following the implementation of the signage and pavement markings to alert or warn drivers who may otherwise not heed the signage.

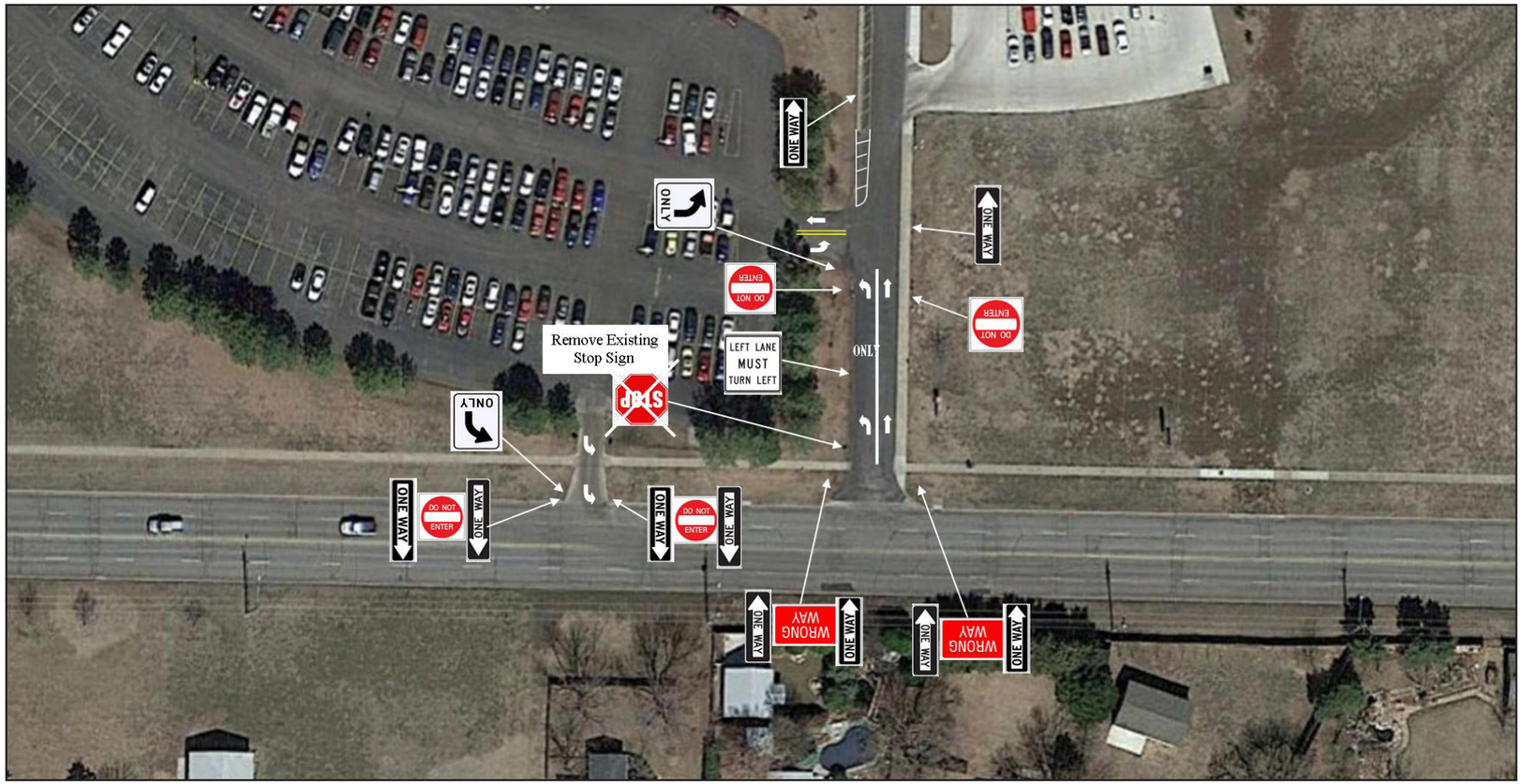


Figure 4.3 - Recommended Improvements in Traffic Signs and Pavement Markings Showing Newton High School Primary Ingress and Egress

SECTION FIVE
BICYCLE FACILITY TYPES

5.1 BICYCLE FACILITY TYPE RESOURCES

A significant portion of the Newton Bicycle Master Plan will be realized through the construction and maintenance of bicycle accomodating roadway features. The features described in this section are not exhaustive of the features that exist in nationally recognized standards or that are seen in other municipalities, but are specific to advancing the goals and objectives of this plan. Future efforts may add to this catalog, and may investigate concepts such as intersection treatments, bicycle traffic signals, traffic calming, and protected bike lanes. The features selected for this plan are cost effective and quickly implementable. They can be applied in new construction to expand the bicycle network into developing areas of town, or retrofitted on the existing streets to strengthen connections between popular routes.

The concepts and guidelines offered in this section are consistent with nationally recognized standards, and have been adapted to fit the specific bicycling environment found in Newton.

- US Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD, 2009)
- National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide, 2nd Edition
- American Association of State Highway Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, 4th Edition
- Association of Pedestrian and Bicycle Professional (APBP) Bicycle Parking Guidelines, 2nd Edition.

5.2 SHARED-USE MARKINGS / SIGNAGE

Within the City of Newton, cyclists are legally permitted to ride among vehicles on all roadways except I-135. Shared-Use Markings, or “sharrows,” along with “Share the Road,” and “Bicycle Route” signage are used together within a roadway corridor to help remind motorist and cyclists of the need to share these permitted streets (see Section Five Appendix for more details). By targeting specific corridors, shared-use markings may encourage cyclists to use streets that have low vehicular speeds and volumes, and may also serve to recommend continuous routes that have connectivity with other bicycle friendly streets. Shared-use markings should not be considered a substitute for bike lanes, or shared-use paths.

WHERE IT’S BEST USED:

- Local and collector streets
- Low traffic volume
- Vehicle speeds of less than 25 mph
- Streets with on-street parking
- Used to bridge discontinuous bicycle facilities
- Provides “wayfinding” along winding routes

Shared-Use Markings help cyclists safely position themselves to the right of traffic but left of the area where doors of parked cars open.
Source: Parsons Brinckerhoff (Lincoln, NE)

SECTION FIVE
BICYCLE FACILITY TYPES

5.3 BICYCLE LANE

A bicycle lane is a linear space within a roadway designated for the exclusive use of bicycles. Bicycle lanes are typically placed to the right of the outside driving lane on both sides of the street and cyclists travel in the same direction as traffic. Cyclists using a bicycle lane are separated from vehicle traffic through lane markings. At a minimum, bicycle lane markings include a solid white line and periodically placed bicycle symbols with an arrow indicating travel direction (see Section Five Appendix for more information). Bicycle lanes may be buffered from vehicle traffic with a painted median located between the bicycle lane and traffic lane. Some bicycle lanes are painted green to be further distinguished. Newly constructed streets with bicycle lanes should be at minimum six feet wide, and 8.5 feet should be given to on-street parallel parking where applicable. Streets where the pavement has been redistributed between modes through modified pavement markings may have bicycle lanes as narrow as five feet, with seven feet for on-street parallel parking. Bike lanes increase bicyclist comfort and confidence on busy streets.

WHERE IT'S BEST USED:

- Medium to high traffic volume
- Regular truck traffic
- Streets with wide existing lanes
- Vehicular speeds above 25 mph

5.4 SHARED-USE PATH

This type of facility allows cyclists to share a ten foot wide path with other non-motorized users. These paths may be located within roadway, waterway, or abandoned or active railroad corridors, as wells as in parks and open spaces. Examples of current shared-use paths in Newton include the Sand Creek shared-use path (north of W 1st Street and south of SW 14th Street), and along the east side of South Kansas Avenue (SE 14th Street south to north of Autumn Glen Parkway). The cyclist must be attentive at roadway intersections/ driveways, and for that reason shared-use paths are best used where roadway and driveway crossings are minimal. Shared-use paths may also be known as "multi-use trails", and the term "sidepath" is often used for shared-use paths adjacent to roadways.

WHERE IT'S BEST USED:

- Adjacent to minimal access arterial streets
- Waterways, railroad corridors, parks
- Adjacent to high traffic volume or truck volume roadways
- Adjacent to roadways with higher vehicle speeds

This bicycle lane design in Lincoln, Nebraska took advantage of the existing wide width of the street to give motorist ample space to park and swing open doors.
Source: Parsons Brinckerhoff (Lincoln, NE)

Shared-use paths offer cyclists a high degree of separation from vehicles, and are often used by cyclists of varied skill levels.
Source: Parsons Brinckerhoff (existing shared-use path along S. Kansas Avenue, Newton, KS)

SECTION FIVE
BICYCLE FACILITY TYPES

5.5 BICYCLE PARKING

Just as vehicles generally require dedicated parking spaces, so do bicycles. Providing abundant, secure bicycle parking will encourage bicycle use. A lack of bicycle parking facilities may force cyclist to attach bicycles to fixtures unintended for that use such as trees, trash receptacles and street furniture. This may result in damage to these fixtures, as well as a disorderly pedestrian right-or-way, all while not provide adequate security for the parked bicycle.

For short-term bicycle parking needs (less than two hours), bicycle racks provide a simple and secure way to park a bicycle while maximizing space for other uses. Side-by-side racks should be spaced four feet apart, and end to end racks should be spaced six feet apart. Racks should also have adequate clearance from fixed objects (See Section Five Appendix).

Racks come in many shapes and sizes. Round tubing should be avoided due to its vulnerability to cutting, and the rack's mounting should be tamperproof. A galvanized bicycle rack finish is recommended due its comparative low costs, high durability, and low maintenance. Powder coats and vinyl (PVC) jackets should be avoided since such finishes deteriorate quickly and require on-going maintenance.

Long-term bicycle parking facilities such as bicycle lockers fully enclose parked bicycles to provide greater security and weather protection than bicycle racks. However, bicycle lockers are more costly than bicycle racks, use more space, and typically require more maintenance.

WHERE IT'S BEST USED:

- Common destinations including schools, libraries, employment centers, shopping areas, apartment complexes, recreation centers or walkable environments.

5.6 ON-STREET BICYCLE PARKING (BIKE CORRALS)

The "Bicycle Parking Guidelines (2nd Edition (2010))" published by the Association of Pedestrian and Bicycle Professionals (APBP), states:

"An alternative method for providing greater quantities of short-term bicycle parking is to consolidate the racks which would typically be placed on the sidewalk and locate them in the traditional auto on-street parking lane, along the curb. This approach is commonplace in European cities with high bicycle mode share and is rapidly gaining support in the United States.

On-street bicycle parking is particularly attractive in commercial corridors where the high demand for bicycle parking begins to crowd available space within the sidewalk right-of-way. Depending on sidewalk width, this typically occurs when parking for 10 or more bicycles is desired".

In-Street Bicycle Parking (Bike Corral): Convenient and secure parking in downtown Fairfax, Virginia
Source: fabb-bikes.blogspot.com

"COMMUNITY BENEFITS OF ON-STREET BICYCLE PARKING

FOR BUSINESSES: Corrals can provide an average of eight customers to one parking space and advertise their bicycle friendliness. They also improve the outdoor cafe seating environment by removing locked bicycles from the sidewalk.

FOR PEDESTRIANS: Corrals clear the side walk and provide de facto curb extensions.

FOR CYCLISTS: Corrals increase the visibility of bicycling.

FOR VEHICLE DRIVERS: Corrals improve the visibility of intersections by eliminating the opportunity for larger vehicles to park at street corners."

SECTION SIX

PROPOSED NEWTON BICYCLE NETWORK

6.1 PROPOSED BICYCLE NETWORK MAP

REVIEW OF PROPOSED BICYCLE NETWORK

The process of selecting locations for the proposed bicycle network started by reviewing the roadways and the roadway attributes in the city and trying to match them with the various bicycle facilities attributes. Roadways were selected to attempt to create a complete network in a grid format within the City. In this manner, although the facility type may change, a bicyclist can ride on a roadway with a bicycle facility from one location to another with confidence that the route has been reviewed and will provide some level of consistency. After the initial matching the bicycle facility type with specific roadways/locations, the initial suggestions were presented to the Project Advisory Committee for their review and comments. Many helpful comments and suggestions were received, generally consisting of changing the bicycle facility type, or recommendations to shift the bicycle facility to an adjacent street that has more favorable bicycle characteristics. These suggestions were reviewed and incorporated into the proposed bicycle network map. The Project Manager for Consultant Team also toured many of the suggested routes on his bicycle with the guidance of a local community leader. After all of the various inputs were reviewed, the proposed bicycle network was identified as shown in Figure 6.1 and Table 6.1.

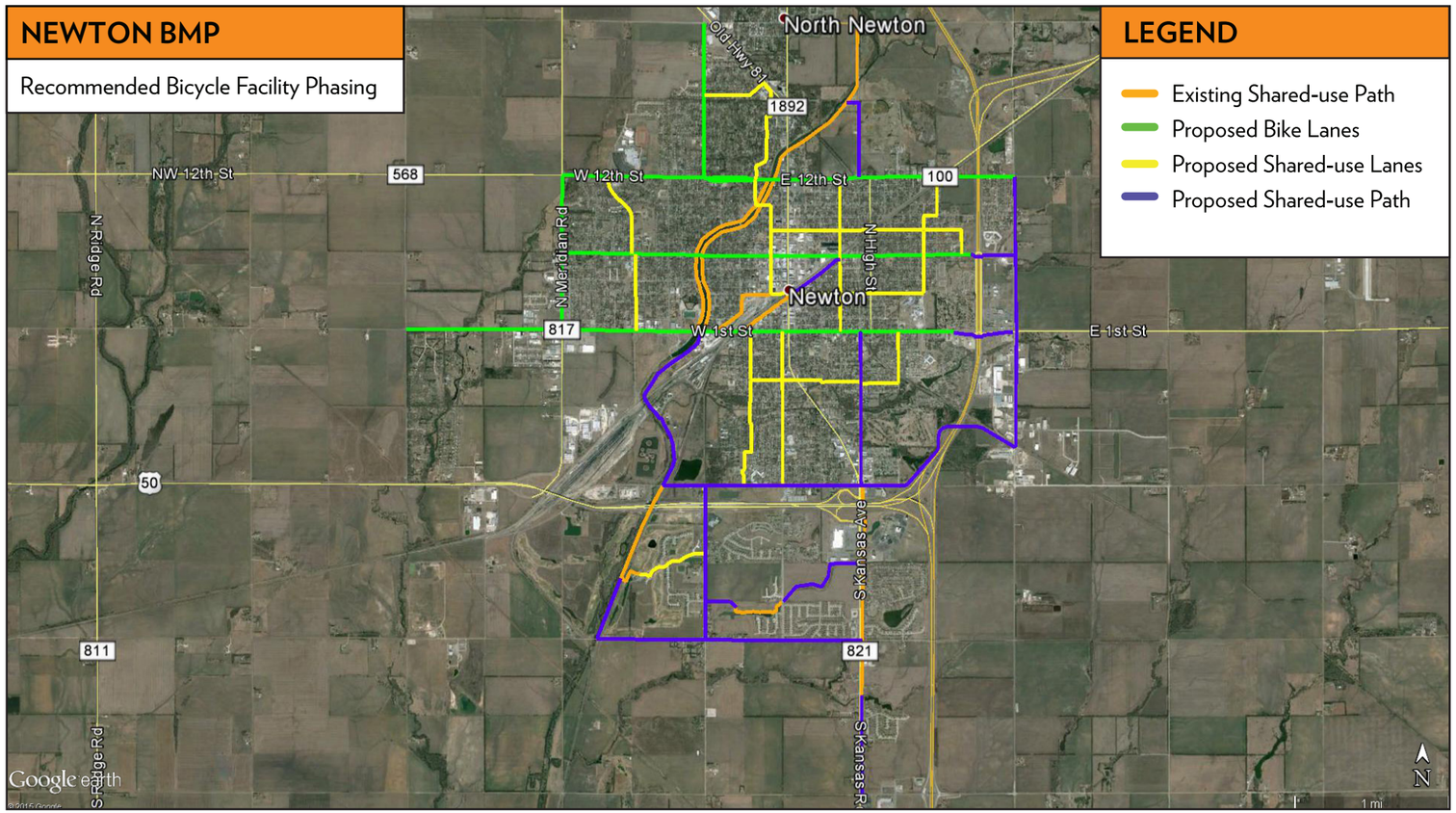


Figure 6.1 - Existing and Proposed Bicycle Network

SECTION SIX

PROPOSED NEWTON BICYCLE NETWORK

RECOMMENDATIONS FOR EACH CORRIDOR IN THE PROPOSED BICYCLE NETWORK

Corridor Name	From	To	Recommended Facility Type	Total Corridor Distance (miles)	Notes
Spencer Road	SE 14th Street Connector	NE 12th Street	Shared-Use Path	1.75	Located on east side of road. Limit additional access points.
N Walnut Street	E 1st Street	E 12th Street	Shared-Use Lanes	1.00	
South Kansas Avenue	Autumn Glen Pkwy, N. of	SE 36th Street	Shared-Use Path	0.65	Extension of existing shared-use path south to SE 36th Street
N Poplar Street	W 4th Street	W 12th Street	Shared-Use Lanes	1.00	Tie north to W 12th Street via Plum Street, and tie east to K-15 at W 4th Street.
Undeveloped ROW Shared-Use Path	S Anderson Road	South Kansas Avenue	Shared-Use Path	0.90	New path from Goldspike to existing Shared-Use Path and from Old Main to Wheatridge (proposed)
Old Main	SW 14th Street	1st Street	Shared-Use Lanes	1.00	
Boyd Avenue	W 1st Street	W 12th Street	Shared-Use Lanes	1.10	
S Anderson Avenue	SW 24th Street	SW 14th Street	Shared-Use Path	1.00	East side of S Anderson recommended
N Anderson Avenue	W 12th Street	NW 24th Street	Bike Lanes	1.00	Install crosswalk at N 12th Street & N Anderson Avenue.
N Meridian Road	W 1st Street	W 12th Street	Bike Lanes	1.00	North of W Broadway would only occur after roadway widening
SW 24th Street	Sand Creek	South Kansas Avenue	Shared-Use Path	1.75	South side of S 24th Street
SW 14th Street	Sand Creek	South Kansas Avenue	Shared-Use Path	1.30	
1st Street	West Street	N Spencer Road	Bike Lanes	4.00	Shared-Use Path used near roundabout. Install additional bike lanes with future expansion of W 1st Street.
Broadway Street	N Meridan Road	N Spencer Road	Bike Lanes	3.00	Shared-Use Path used near roundabout.
8th Street	N Poplar Street	N Olive Street	Shared-Use Lanes	1.40	Install Shared-Use Lanes on N Olive Street from E 8th Street to E Broadway.
12th Street	N Meridian Road	N Spencer Road	Bike Lanes	3.00	
North Kansas Avenue	E 12th Street	Centennial Park	Shared-Use Path	0.60	Located on east side of road.
N Blaine Street	E 4th Street	E 8th Street	Shared-Use Lanes	0.40	
SE 14th Connector	S Kansas Ave	S Spencer Rd	Shared-Use Path	1.30	The Proposed Shared-use path would be long term and expensive to implement.
Sand Creek Trail (extension)	W 1st Street	SW 14th Street	Shared-Use Path	1.30	Must cross railroad tracks.
Sand Creek Trail (extension)	Meadowbrook Drive	SW 24th Street	Shared-Use Path	0.50	
Normandy Road	N Anderson Avenue	Windsor Drive	Shared-Use Lanes	0.40	
N Plum Street / Windsor Drive	Normandy Road	W 12th Street	Shared-Use Lanes	0.75	
BNSF Railroad (extension)	E 4th Street	N Walnut Street	Shared-Use Path	0.40	Located on south side of railroad right-of-way
E 4th Street	N Main Street	N Blaine Street	Shared-Use Lanes	0.90	
N Blaine Street / N Sherman Street	E 8th Street	E 12th Street	Shared-Use Lanes	0.50	
S Plum Street	SW 14th Street	W 1st Street	Shared-Use Lanes	1.10	
S Kansas Avenue (extension)	E 1st Street	SE 14th Street	Shared-Use Path	1.00	Located on east side of road.
S Duncan Street	E 1st Street	SE 5th Street	Shared-Use Lanes	0.35	
SE 5th Street	S Plum Street	S Duncan Street	Shared-Use Lanes	1.00	Required study of K-15 (Washington Street/Main Street) crossing prior to installation.
Meadowbrook Drive	Sand Creek	S Anderson Road	Shared-Use Lanes	0.50	

Table 6.1 - Proposed Bicycle Network - Newton, KS

SECTION SIX

PROPOSED NEWTON BICYCLE NETWORK

6.2 ON-ROAD CONCEPTS

On-Road Concepts were developed to showcase the three recommended facility types (Bicycle Lanes, Shared-Use Markings and Shared-Use Paths) at specific locations on the proposed bicycle network (Figures 6.2 to 6.7). The dimensions shown under each figure describe the specific widths of each component of the transportation system per location.

Rightsizing, often referred to as road diets, consists of converting existing four-lane undivided roadways to three-lane roads with bicycle lanes. Rightsizing typically occurs for roadways that have excess capacity for the current vehicular demand and where current volumes are less than 20,000 vehicles per day. A general guideline is that a four-lane to three-lane rightsizing could be implemented without notable issues on roadways with less than 10,000 ADT (average daily traffic). At around 15,000 ADT, there may be a discussion needed to decide if a traffic study should be conducted. At around 20,000 ADT, a traffic study should be conducted to determine the effects of the rightsizing. A traffic study associated with rightsizing proposal should review selected intersections to determine the effects on the intersection's Level of Service (LOS) along with a general review of the corridor at a minimum. The city officials should assist in determining what an acceptable LOS is within their jurisdiction in order to accommodate cycling infrastructure. It may be that in order to keep a specific LOS, additional vehicle lanes would be required.

It is likely that in order to implement some bike lanes, removal of existing parking locations will be required. A bike lane that is being created from an existing roadway should have a minimum width of 5 feet. The 5 foot width shall be measured from outside the curb and gutter. Vehicle travel lanes may be narrowed to 10 feet wide on low speed facilities per the American Association of Transportation Officials' A Policy on Geometric Design of Highway and Streets. The upper speed limit for low speed facilities is 45 mph. A bike lane next to parallel parking should have a desirable reach from the curb face to the edge of the bike lane (including the parking lane, bike lane, and optional buffer) of 14.5 feet, with an absolute minimum of 12 feet. In some areas with low parking lane usage, removal of a few vehicles to side streets should be possible.

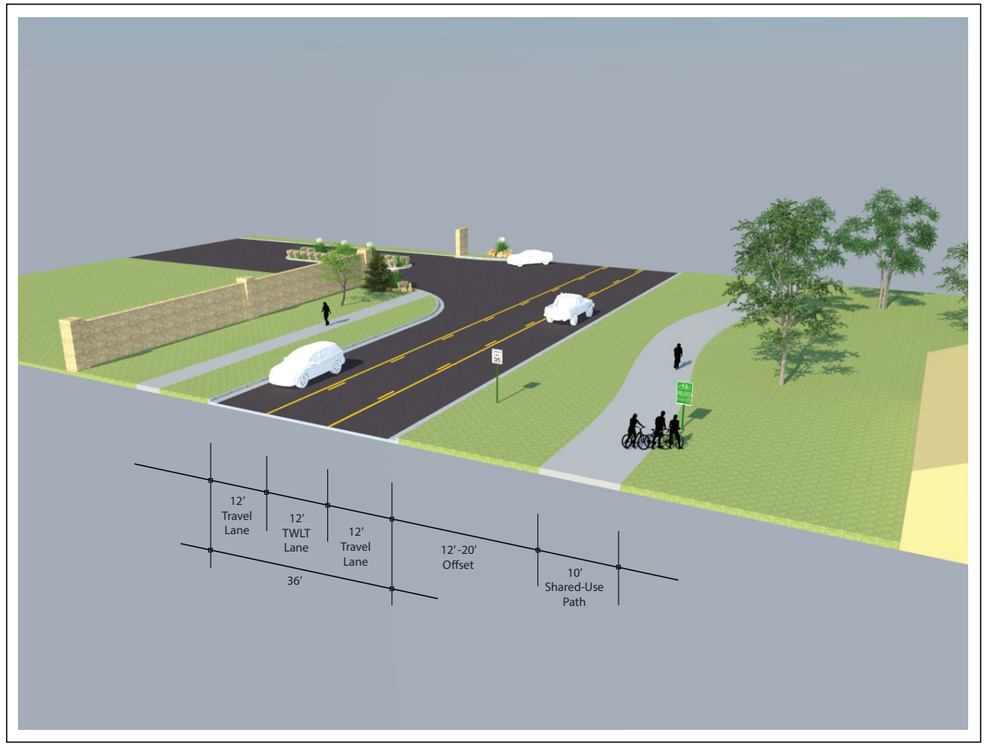


Figure 6.2 - S Anderson Rd., near Goldspike, - Shared Use Path (No On-Street Parking)

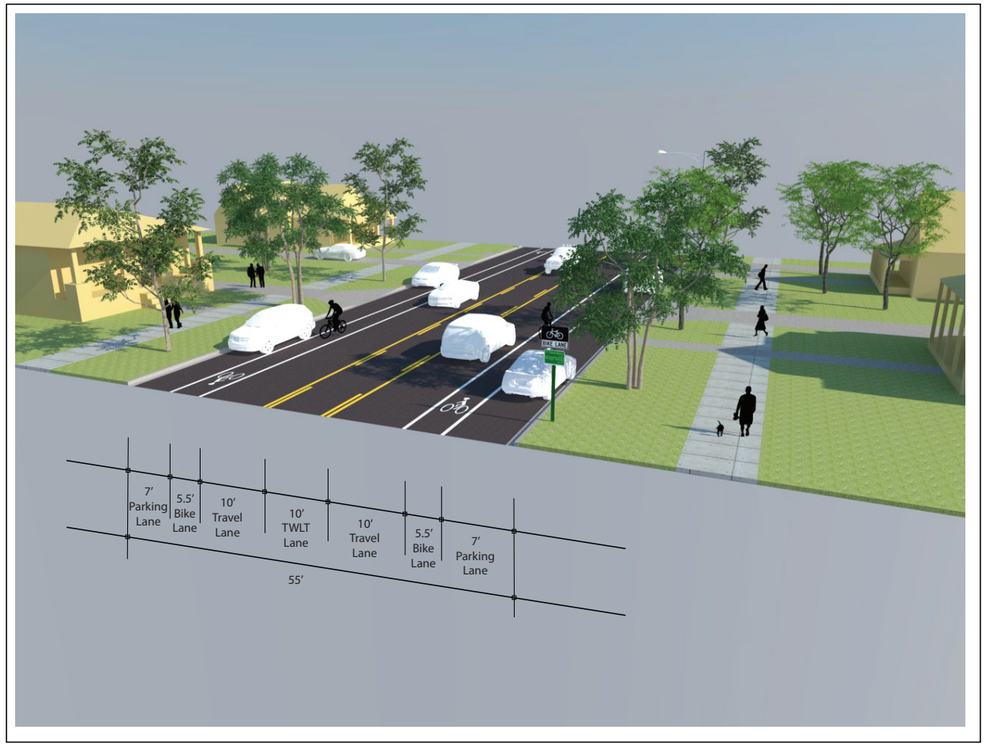


Figure 6.3 -W Broadway St., between N Elm St. and N Ash St. - Rightsizing from Four-Lane Section to Three-Lane Section with Bicycle Lanes and On-Street Parking

SECTION SIX

PROPOSED NEWTON BICYCLE NETWORK

Figure 6.4 - Old Main St. & SE 9th St. - Shared-Use Markings with On-Street Parking

Figure 6.5 - N Meridian Road., near W 5th St. - Rightsizing from Four-Lane Section to Three-Lane Section with Bicycle Lanes (No On-Street Parking)

SECTION SIX

PROPOSED NEWTON BICYCLE NETWORK

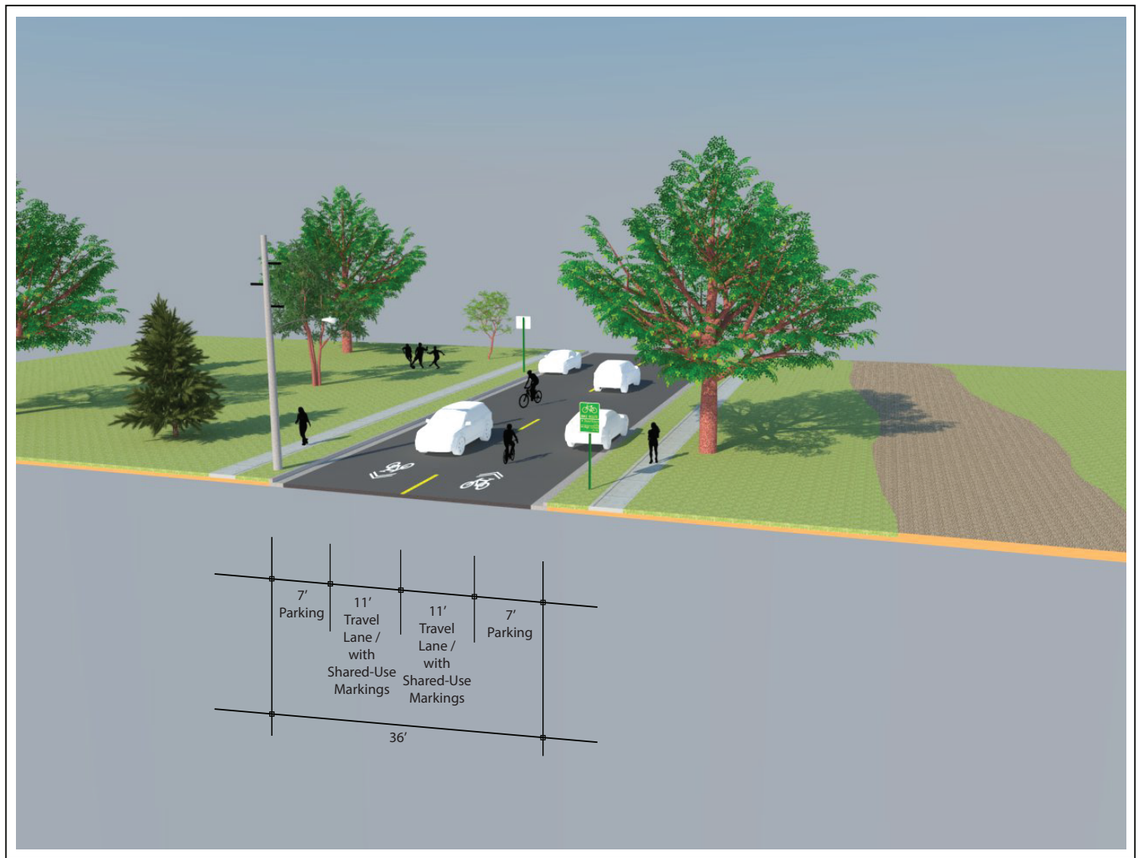


Figure 6.6 - N Poplar St., South of W 8th St. - Shared-Use Markings (No On-Street Parking)

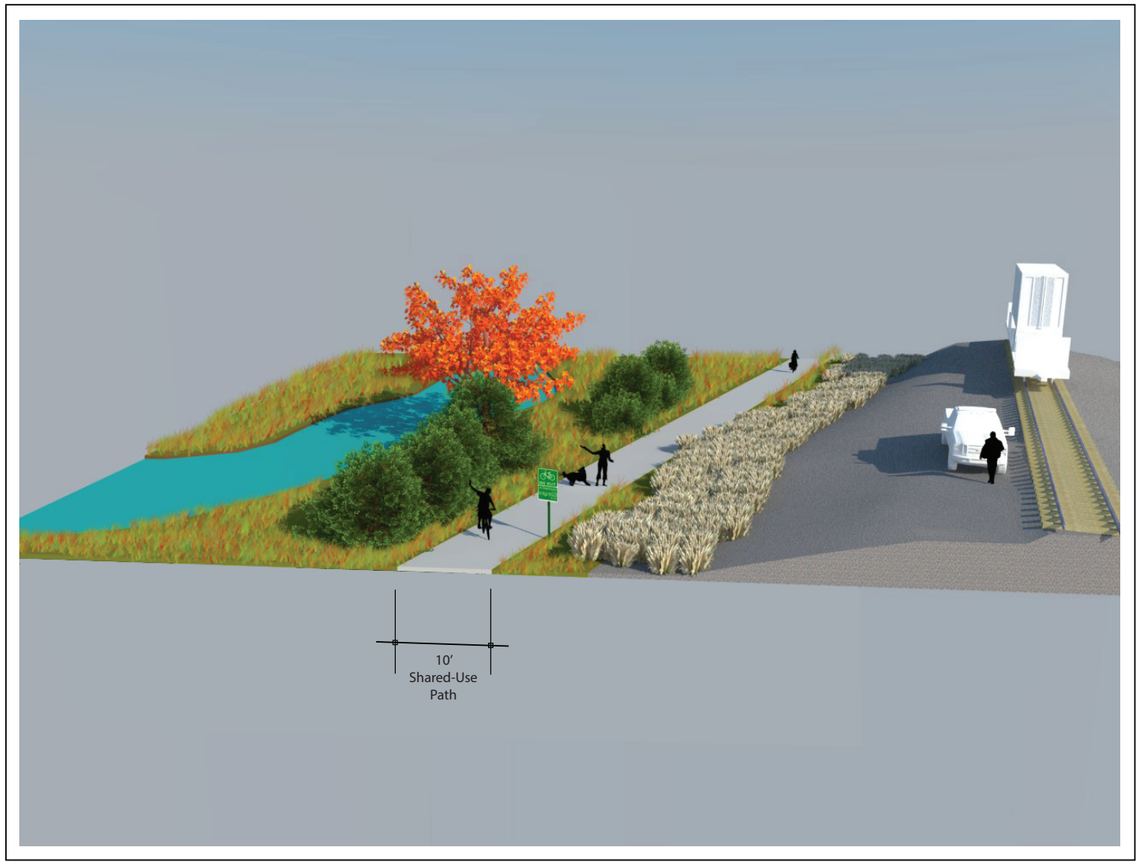


Figure 6.7 - Sand Creek Shared-Use Path Extension from Railroad Underpass to SW 24th St.

SECTION SEVEN

IMPLEMENTATION

7.1 PHASING

The recommended bicycle network was divided into smaller projects based on length of facility, existing roadway conditions, and priority of the bicycle facility segment. In general, higher priority (Phases 1 & 2) was given bicycle facilities that provide exclusive bicycle use, were centrally located, provided connections between existing destinations, and could be created relatively quickly. The middle priority (Phases 3 & 4) was given to recommended bicycle facilities which would connect either existing or high priority facilities in order to form a network within the City. Lower priority (Phase 5) included bicycle facilities on the outskirts of the community, where there is little to no existing development, or the existing roadway would not support to type of facility recommended currently. Figure 7.1 through Figure 7.6 show the existing facilities with the recommended new facilities added to the map during each phase. Table 7.1 through Table 7.5 show the recommended facilities for Phases 1 through 5.

The proposed bicycle network is recommended to be implemented over the next 10 years. The estimated total cost to implement Phases 1 through 5 is approximately $9.3 million dollars. Proposed corridors in any phase may be implemented when the opportunity presents itself and are not exclusive to a specific phase. This equates to an average budgeted value of $930,000 a year over a 10 year time period. Value to the city can be utilized if implementing these improvements as part of existing roadway or development projects. Proposed developments should be required to implement bicycle facilities adjacent to their properties as part of their development project.

Figure 7.1 - Existing Facilities

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IMPLEMENTATION

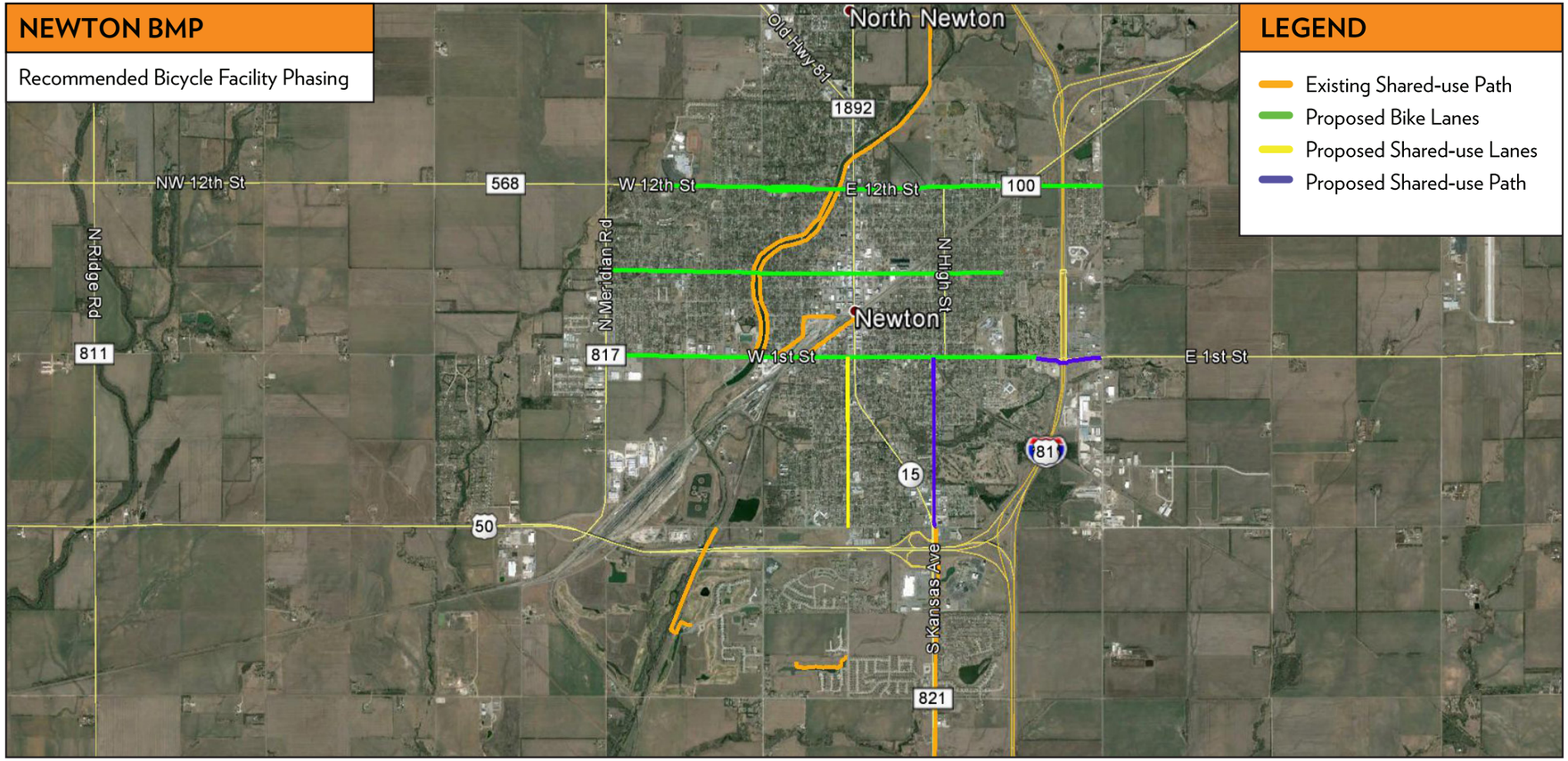

Figure 7.2 - Phase 1

Corridor Name	From	To	Recommended Facility Type	Notes	Construction Length (miles)	Estimated Cost
Old Main	SW 14th Street	W 1st Street	Shared-Use Lanes		1	$ 62,000.00
Broadway Street	N Meridian Road	N Blane Street	Bike Lanes		2.4	$ 83,000.00
1st Street	N Meridian Road	E Spencer Road	Bike Lanes	Shared-Use Path used near roundabout. Install additional bike lanes with future expansion of 1st Street.	3	$ 241,000.00
N 12th Street	Boyd Avenue	E Spencer Road	Bike Lanes		2.7	$ 102,000.00
S Kansas Avenue	E 1st Street	SE 14th Street	Shared-Use Path	East side of South Kansas Avenue. No replacement of bridges included.	1.00	$ 461,000.00

Table 7.1 - Phase 1 Recommendations

PHASE 1 TOTAL: $949,000.00

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IMPLEMENTATION

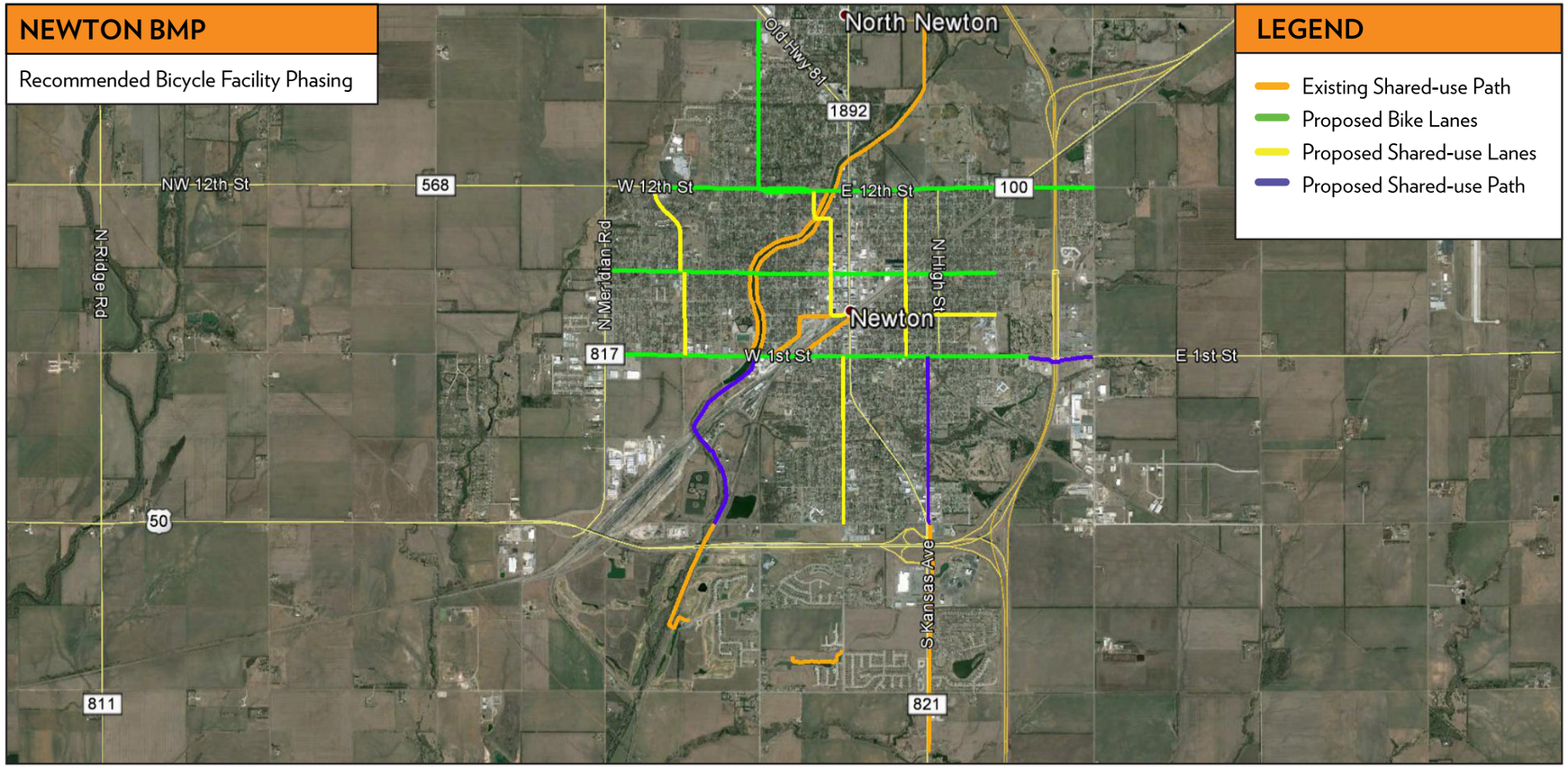

Figure 7.3 - Phase 2

Corridor Name	From	To	Recommended Facility Type	Notes	Construction Length (miles)	Estimated Cost
N Walnut Street	E 1st Street	E 12th Street	Shared-Use Lanes		1	$ 62,000.00
N Poplar Street	W 4th Street	W 12th Street	Shared-Use Lanes	Tie north to W 12th Street via N Plum Street, and tie east to K-15 at W 4th Street.	1	$ 62,000.00
Boyd Avenue	W 1st Street	W 12th Street	Shared-Use Lanes		1.1	$ 68,000.00
N Anderson Avenue	W 12th Street	NW 24th Street	Bike Lanes	Install crosswalk at N 12th Street & Anderson Avenue.	1	$ 36,000.00
Sand Creek Trail (Extension)	SW 14th Street	W 1st Street	Shared-Use Path	Connect existing segments of Sand Creek Trail. May require bridges and retaining walls. One side of creek only.	1.25	$1,130,000.00
E 4th Street	N Main Street	N Blaine Street	Shared-Use Lanes		0.90	$ 56,000.00

Table 7.2 - Phase 2 Recommendations

PHASE 2 TOTAL: $1,414,000.00

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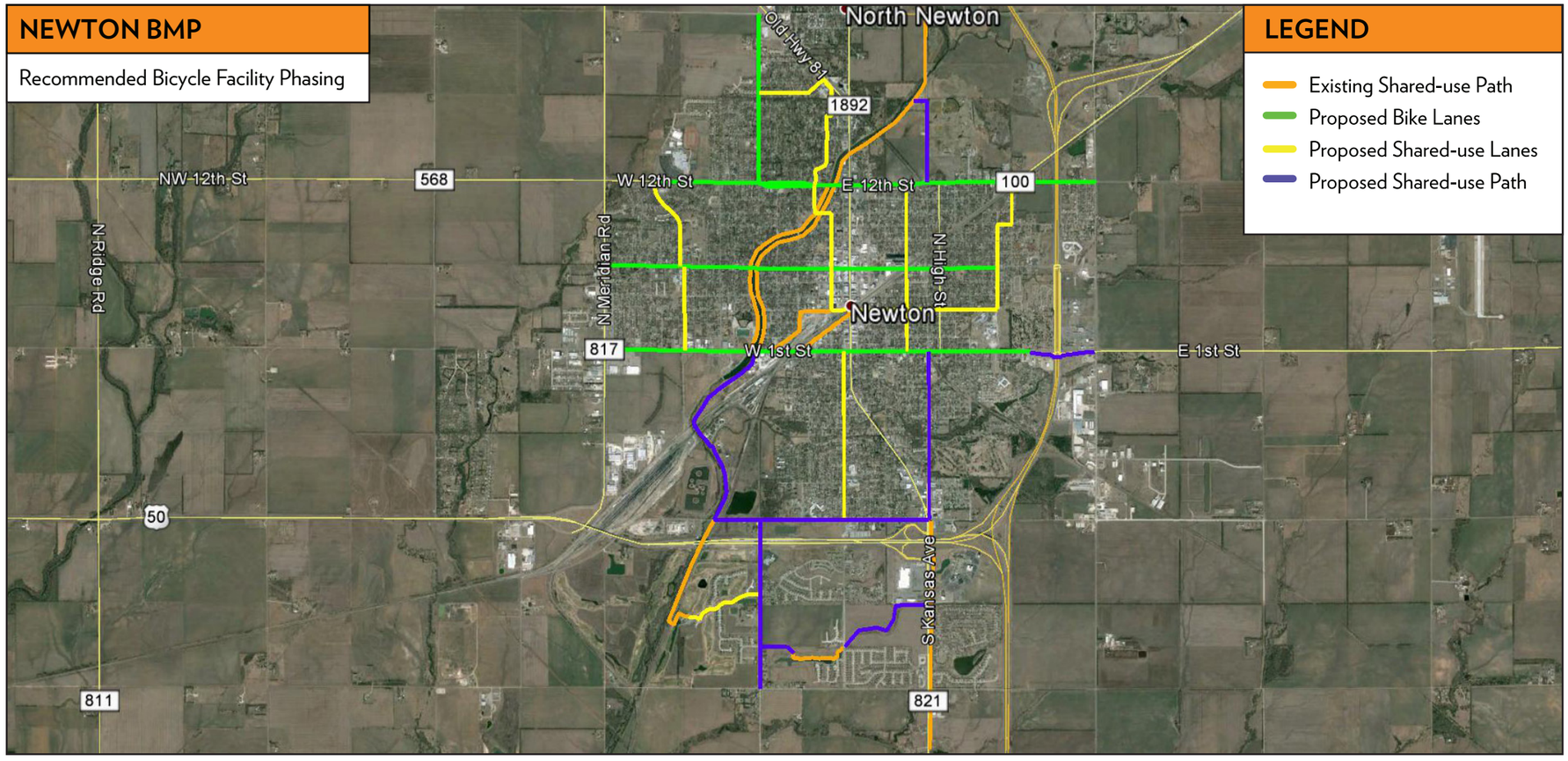

Figure 7.4 - Phase 3

Corridor Name	From	To	Recommended Facility Type	Notes	Construction Length (miles)	Estimated Cost
Undeveloped ROW Shared-Use Path	S Anderson Road	South Kansas Avenue	Shared-Use Path	New path starts near S Anderson Avenue & Goldspike road on the west and connects to existing shared-use path. On east side, parallel proposed Wheatridge Drive on the south side.	0.9	$ 439,000.00
S Anderson Avenue	SW 24th Street	SW 14th Street	Shared-Use Path	East side of S Anderson recommended.	1	$ 419,000.00
SW 14th Street	Sand Creek Trail	South Kansas Avenue	Shared-Use Path		1.3	$ 545,000.00
North Kansas Avenue	E 12th Street	Centennial Park	Shared-Use Path		0.6	$ 252,000.00
N Blaine Street	E 4th Street	E 8th Street	Shared-Use Lanes		0.4	$ 25,000.00
Normandy Road	N Anderson Avenue	Windsor Drive	Shared-Use Lanes		0.40	$ 25,000.00
N Plum Street / Windsor Drive	Normandy Road	W 12th Street	Shared-Use Lanes		0.75	$ 46,000.00
N Blaine Street / N Sherman Street	E 8th Street	E 12th Street	Shared-Use Lanes	Use E 9th Street for one block.	0.50	$ 32,000.00
Meadowbrook Drive	Sand Creek Trail	S Anderson Road	Shared-Use Lanes		0.50	$ 32,000.00

Table 7.3 - Phase 3 Recommendations

PHASE 3 TOTAL: $1,815,000.00

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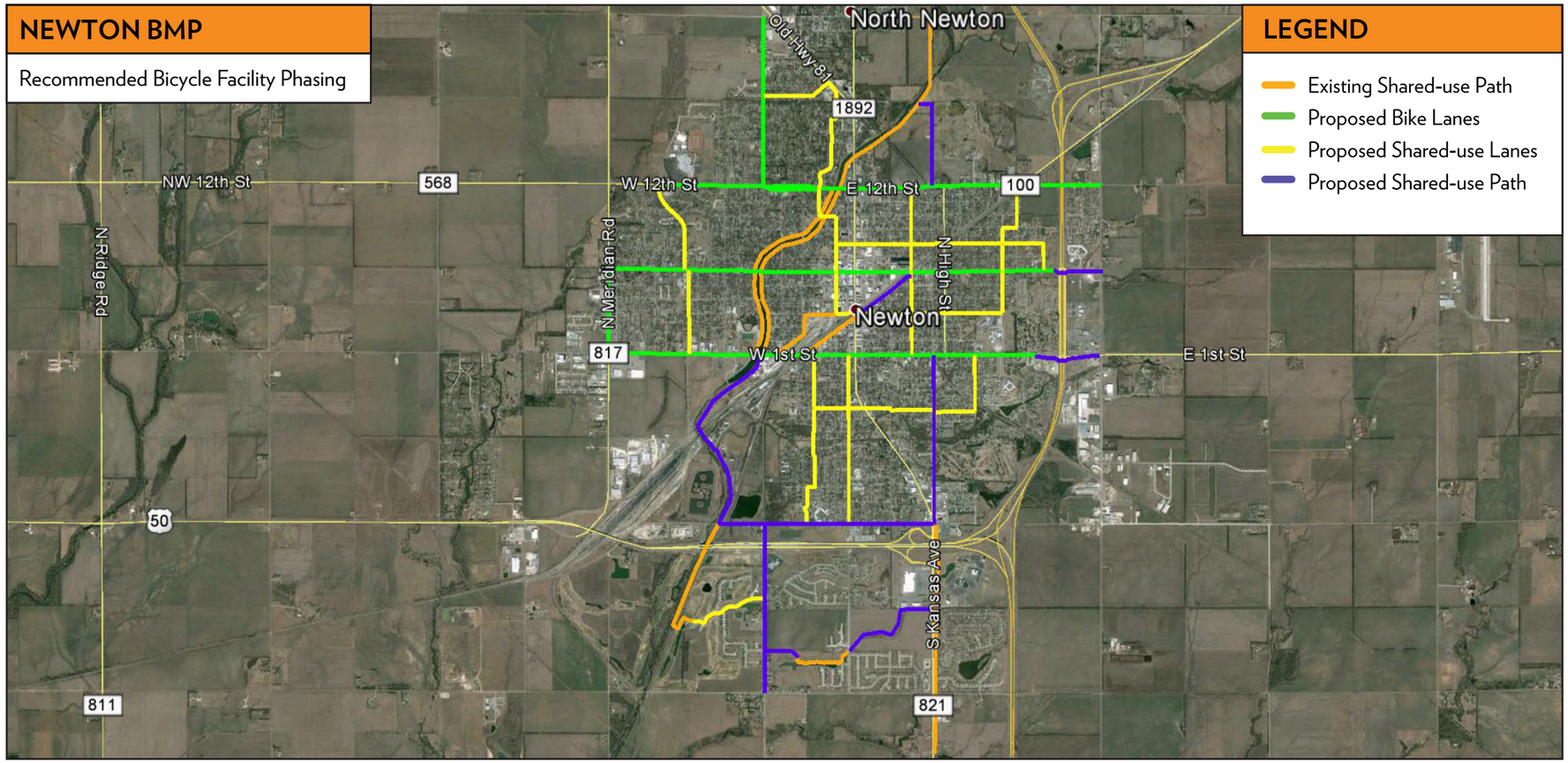

Figure 7.5 - Phase 4

Corridor Name	From	To	Recommended Facility Type	Notes	Construction Length (miles)	Estimated Cost
N Meridian Road	W 1st Street	W Broadway	Bike Lanes		0.5	$ 49,000.00
8th Street	N Poplar Street	N Olive Street	Shared-Use Lanes	Install Shared-Use Lanes on N Olive Street from 8th Street to Broadway.	1.4	$ 86,000.00
Broadway Street	N Blane Street	N Spencer Road	Bike Lanes	Shared-Use Path used near roundabout.	0.6	$ 115,000.00
BNSF Railroad	E 4th Street	N Walnut Street	Shared-Use Path	Includes fence costs. Extension of existing shared-use path.	0.40	$ 432,000.00
S Plum Street	SW 14th Street	W 1st Street	Shared-Use Lanes		1.10	$ 68,000.00
S Duncan Street	E 1st Street	SE 5th Street	Shared-Use Lanes		0.35	$ 22,000.00
SE 5th Street	S Plum Street	S Duncan Street	Shared-Use Lanes	Requires traffic study of Washington Street / K-15 crossing prior to installation.	1.00	$ 166,000.00

Table 7.4 - Phase 4 Recommendations

PHASE 4 TOTAL: $938,000.00

SECTION SEVEN

IMPLEMENTATION

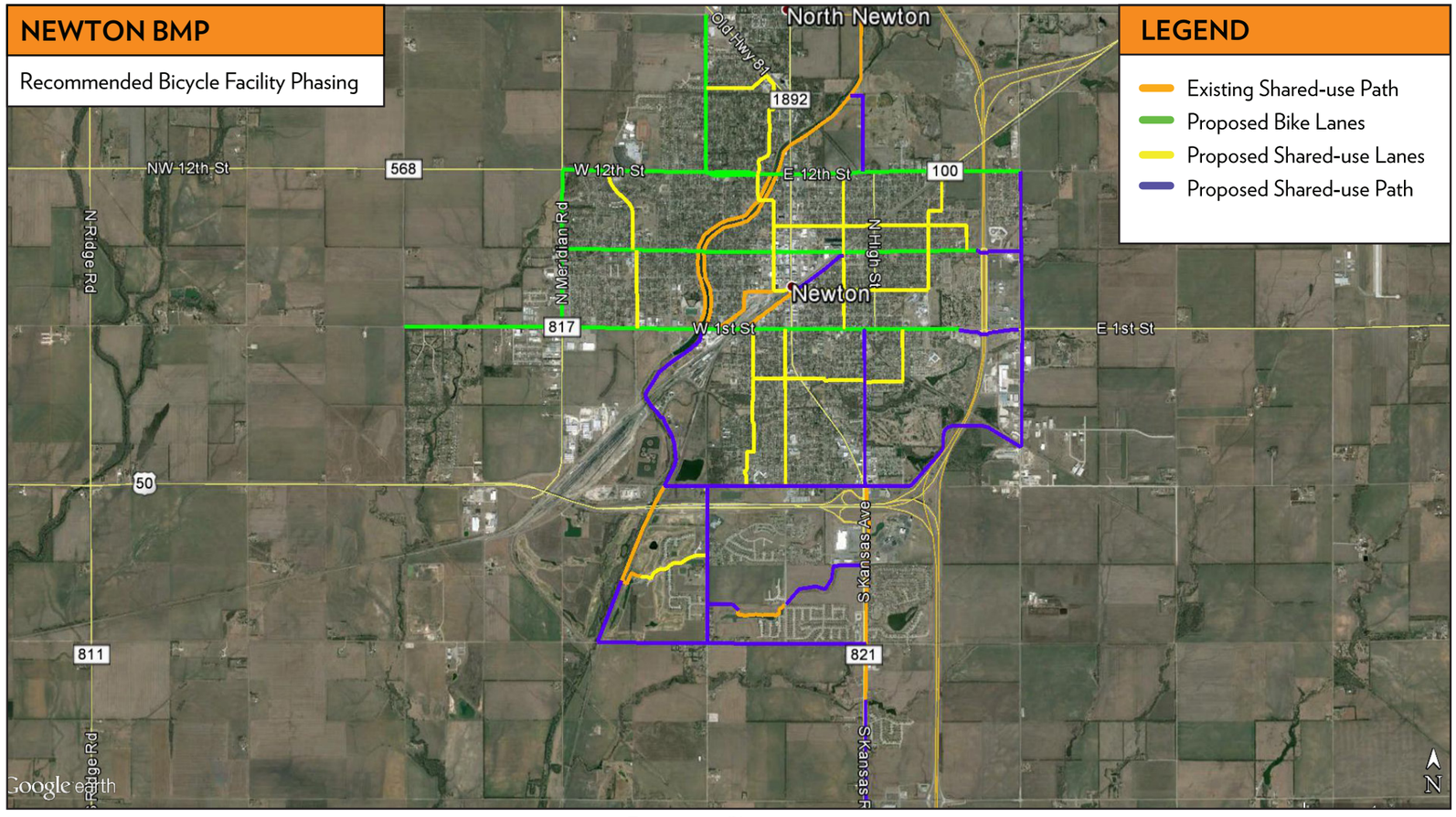

Figure 7.6 - Phase 5

Corridor Name	From	To	Recommended Facility Type	Notes	Construction Length (miles)	Estimated Cost
N Spencer Road	E Broadway Street	NE 12th Street	Shared-Use Path	Located on east side of road. Limit additional access points.	0.5	$ 210,000.00
South Kansas Avenue	Autumn Glen Pkwy, N of	SE 36th Street	Shared-Use Path	Extension of existing shared-use path south to 36th Street.	0.65	$ 273,000.00
SW 24th Street	Sand Creek Trail	South Kansas Avenue	Shared-Use Path	South side of 24th Street. Must address RR crossing.	1.75	$1,237,000.00
W 1st Street	West Street	S Meridian Road	Bike Lanes	Install with future widening.	1	$ 455,000.00
12th Street	N Meridian Road	Boyd Avenue	Bike Lanes		0.3	$ 138,000.00
SE 14th Connector	S Kansas Ave	S Spencer Rd	Shared-Use Path	The Proposed Shared-use path would be long term and expensive to implement.	1.3	$ 902,000.00
N Meridian Road	W Broadway	W 12th Street	Bike Lanes	Install with future widening.	0.5	$ 228,000.00
N Spencer Road	E 1st Street	E Broadway Street	Shared-Use Path	Located on east side of road. Limit additional access points.	0.5	$ 210,000.00
S Spencer Road	SE 14th Street Connector	E 1st Street	Shared-Use Path	Located on east side of road. Limit additional access points.	0.75	$ 315,000.00
Sand Creek Trail (Extension)	Meadowbrook Drive	SW 24th Street	Shared-Use Path	One side of creek only.	0.5	$ 245,000.00

Table 7.5 - Phase 5 Recommendations

PHASE 5 TOTAL: $4,213,00.00

SECTION EIGHT

FUTURE BICYCLE COUNTS

Government agencies typically count what matters to them. In most cases, transportation agencies or public works departments often have an ongoing vehicular count program so they know how many drivers are using various roadways throughout their jurisdiction. Similarly, bicycles can be counted within a jurisdiction. Temporary or one-day counts consisting of a few hours are helpful, but a permanent count station has some advantages. Permanent count stations can track changes in bicycle activity over time and help evaluate the effects of new infrastructure on bicycle activity. A permanent count station can help supply expansion factors which can be applied to short-duration counts to estimate volumes over longer periods of time. There are a number of different technologies that can be used to count cyclists, including inductive loops or piezoelectric strips. It is recommended that a permanent bicycle counter be installed on the Sand Creek shared-use path with additional counters installed as needed. The equipment for this installation is likely to be under $5,000, however, with the design and installation may run closer to $30,000.

Figure 8.1 - Permanent Bicycle Count Stations
Source: Washington Area Bicyclist Association website - www.waba.org

Bikers in Newton, KS
Source: Parsons Brinckerhoff

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APPENDIX

GOALS AND POLICIES WITHIN THE RENEWTON 2030 THAT RECOGNIZE THE VALUE OF BICYCLE TRANSPORTATION INCLUDE:

TRANSPORTATION CITYWIDE GOAL

Expand and enhance pedestrian and bicycle mobility to enable safe and inviting access to shopping, work, schools, and recreation.

SUSTAINABILITY GOAL

Design a community development pattern to enable people to walk and bicycle.

NEIGHBORHOOD LAND USE POLICIES

POLICY 3. Pedestrian movement within the neighborhood and between neighborhoods should be identified and provided; this includes sidewalks, linear trails, and bikeways.

Parks and Recreation Policies

POLICY 2. Work with developers and property owners to connect subdivisions and retail activities with bicycle and jogging trails.

POLICY 9. Explore the creation of a bicycle route connecting to Hesston.

Transportation Policies: Pedestrians and Bicycles

POLICY 1. Continue developing the Sand Creek Trail Bicycle Path.

POLICY 2. Continue the "Safe Routes to Schools" program.

POLICY 3. Investigate the advisability of creating a Newton-North Newton Bicycle and Pedestrian Advisory Committee. This citizens' committee would assist with the planning, development, and implementation of bicycling and walking programs and facilities.

POLICY 4. Identify major traffic generators and destinations for potential bicycle and pedestrian trips —such as Bethel College, public buildings, the downtown district, parks, schools, places of employment, and other attractions — and plan for pedestrian and bicycle connections among them.

POLICY 5. Designate official bicycle and pedestrian routes in the community through proper signage and pavement markings.

POLICY 6. Incorporate the "complete streets" design principles into zoning and subdivision regulations, as well as Public Works design standards and specifications.

POLICY 7. Ensure that private developments adjacent to the Sand Creek trail system, or planned extensions of the citywide trail system, provide for public access to the trail.

POLICY 8. Ensure that residential subdivisions or multi-family developments are designed and built to provide for multiple, safe, and direct bicycle and pedestrian connections in all directions, as well as provide connectivity of land uses within the neighborhood and to areas outside the neighborhood.

POLICY 9. Ensure that commercial developments are designed and built to accommodate safe and direct bicycle and pedestrian connections, including bicycle parking facilities.

KANSAS BICYCLE AND PEDESTRIAN TRANSPORTATION PLAN: KDOT BUREAU OF TRANSPORTATION PLANNING 1995.

This plan provides an early look at the state's intermodal transportation planning process which outlined the physical and financial barriers to bicycle use, the benefits of bicycling for commuting and short trips, and the methods to overcome common barriers. Foremost, the plan establishes the need to consider bicyclists and pedestrians in the design of any transportation facility. Facility specific recommendations include:

- A 14 foot outside lane for arterial streets identified as having potential for significant bicycle traffic.
- Grade-separated intersections for multi-use paths.
- One-way bicycle lanes that run in the same direction as traffic.

CITY CODE. Chapter XXI Traffic, Article 3. Bicycles, Skateboards, Roller Skates, Coasters and other Similar Devices provides the primary regulations governing the registration, rental, and operation of bicycles within the City. A provision provides a way bicycles may be registered which may assist in there identification if stolen. Bicycles may be operated on public streets and parking lots, provided they follow lawful operation, the rider is not wearing headphones, and the bicycle is not ridden "at a speed that is faster than is reasonable and prudent under the circumstances in relation to the safety of the rider or operator and in relation to the safety of other persons or their property". Bicycles are prohibited on sidewalks within the Central Business District and on private property if property if signed to prohibit bicycle use. Parked bicycles on sidewalks may not obstruct pedestrian traffic or entrances to property. Bicycles on public streets or sidewalks thirty minutes after sunset and thirty minutes before sunrise must have a headlight and a rear reflector.

2013 KANSAS STATUTE – CHAPTER 8: AUTOMOBILES AND OTHER VEHICLES.

Recent changes to state law enhance and further define the rules of the road for cyclists and motorists. The law applies whenever a bicycle is operated on a highway, or path set aside for bicycles. The law provides that:

- Bicyclists have the same rights and responsibilities as drivers.

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- Drivers must pass to the left of bicycles at a distance of three or more feet.
- Cyclists riding slower than traffic must ride as near to the right side of the roadway as practicable, except when overtaking, preparing for a left turn, or avoiding obstacles.
- Cyclists may ride as near to the left side of one-way highways with two or more traffic lanes.
- Cyclists must not ride more than two abreast on roads.
- Cyclists must use the path adjacent to the roadway if one is provided.
- Cyclists must have at least one hand on the handle bars.
- Cyclists must not cling to other vehicles.
- Bicycles must have seats, and the number of people on a bicycle must not exceed the number of users the bicycle was designed for.
- Bicycles operating at night must be equipped with a white front head lamp visible at 500 feet, and a red rear reflector visible between 100 to 600 feet by a motorist with headlights on. All sold bicycle pedals must have reflectors.
- Bicycles must have brakes.
- A cyclist may proceed through a steady red signal, subject to other traffic rules governing right of way if the red light has failed to change to green within a reasonable period of time because the signal has malfunctioned or has failed to detect the vehicle. ("Dead Red" Law)

Bicycle Data Collection - Screenline Count Form Date: _____

Location: _____ (Street/Path)

Between _____ and _____

Name: _____ Phone #: _____

Instructions: Count for two hours in 15 minute increments. Count bicyclist who ride on the sidewalk.
Count all bicyclists crossing your screen line under the appropriate categories.
The most important data is the number of Cyclists, additional attributes are secondary.
Count the number of people on the bicycle, not the number of bicycles.
e.g. A tandem bicycle counts as two cyclists, indicate two tally marks.
Sidewalk riding is riding on the sidewalk in either direction of travel.
Shared-use path riding is using the shared-use path adjacent to a roadway.
Wrong way riding is a bicyclist riding in the street in the opposite direction of vehicle travel.
Total the tally marks for the column in the bottom row when complete and return form.
Use tally marks.
Cyclists are assumed to be male unless tally mark is present.

		Gender	Cycling Attributes			Age		
Time	Cyclist	Female	Sidewalk Riding	Shared Path Riding	Wrong Way Riding (On Street)	Child	Young Adult (13-21)	Adult
5:00 - 5:15								
5:15 - 5:30								
5:30 - 5:45								
5:45 - 6:00								
6:00 - 6:15								
6:15 - 6:30								
6:30 - 6:45								
6:45 - 7:00								
Total								

Counter Comments: _____

Contact Information

Counting Questions (Cell Phone Numbers):
Brian Geiger, Traffic Engineer, Parsons Brinckerhoff: (913) 221-2614
Luke Pitts, Environmental Planner, Parsons Brinckerhoff: (785) 760-7072

General Emergency Contacts (Cell Phone Numbers):
Suzanne Loomis, City Engineer/Director of Public Works, City of Newton: (316) 772-6923
Lynnette Redington, Director, Harvey County Health Department: (316) 283-1637
Brian Geiger, Traffic Engineer, Parsons Brinckerhoff: (913) 221-2614
Luke Pitts, Environmental Planner, Parsons Brinckerhoff: (785) 760-7072

Example Cyclist Tally Marks		Gender	Cycling Attributes			Age		
Cyclist Description	Cyclist	Female	Sidewalk Riding	Shared Path Riding	Wrong Way Riding (On Street)	Child	Young Adult (13-21)	Adult
Adult male riding on street in direction of vehicle traffic	I							I
Teenage female riding on the sidwalk	I	I	I				I	
Tandem bicycle, two adult males, riding against traffic	II				II			II
Adult female pulling male child in bike trailer on sidepath	II	I		II		I		I

Figure A3.1 - Bicycle Count Form Examples

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W 12TH ST., BOYD AVE. TO GRANDVIEW AVE., TRAFFIC STUDY

EXISTING CONDITIONS AND DATA COLLECTION

The Average Daily Traffic (ADT) along W 12th Street within this roadway section was obtained from the Kansas Department of Transportation's (KDOT) City of Newton Traffic Count Map published in October 2012 and carried between 3,000 and 5,600 vehicles per day (Figure A4.1).

Traffic counts were collected along W 12th Street intersections with Boyd Avenue, Newton High School main entrance, Newton High School parking lot access (obtained as a result of adjacent counts), Grandview Avenue east, and Grandview Avenue west. The counts were collected on Wednesday, April 15, 2015, in the AM (6:30 to 8:30 a.m.) and the PM (2:30 to 4:30 p.m.). The AM and PM peak hour traffic counts were determined and the peak hour factor calculated for use in the traffic analysis. Table A4.1 through Table A4.9 shows the existing traffic volumes at the intersections.

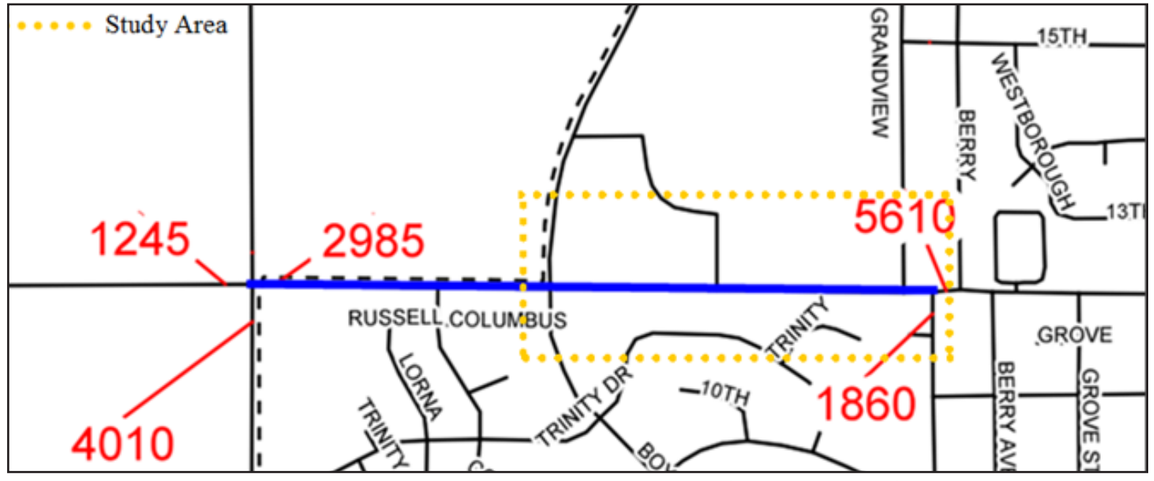

Figure A4.1 - Average Daily Traffic Map at W 12th Street, Newton, KS

		Boyd Avenue			W 12th Street			Boyd Avenue			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	7:30 - 7:45	15	0	22	6	12	9	1	10	9	16	49	1
	7:45 - 8:00	14	9	25	6	29	23	1	9	6	19	37	1
	8:00 - 8:15	15	8	22	5	16	15	1	4	6	36	58	1
	8:15 - 8:30	16	7	24	1	19	19	0	13	4	38	53	0
A.M. PEAK	7:30 - 8:30	60	24	93	18	76	66	3	36	25	109	197	3

Table A4.1 - AM 15 Minute Traffic Counts at the Intersection of W 12th street and Boyd Avenue

		Boyd Avenue			W 12th Street			Boyd Avenue			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	15:15 - 15:30	28	0	25	6	52	17	0	1	13	7	39	3
	15:30 - 15:45	61	1	83	10	57	1	1	25	7	4	59	1
	15:45 - 16:00	21	3	25	14	62	11	1	17	6	3	38	2
	16:00 - 16:15	4	6	8	2	38	4	1	2	2	7	58	1
P.M. PEAK	15:15 - 16:15	114	10	141	32	209	33	3	45	28	21	194	7

Table A4.2 - PM 15 Minute Traffic Counts at the Intersection of W 12th street and Boyd Avenue

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		HS Main Entance			W 12th Street						W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	7:30 - 7:45	20	0	1	0	34	71	0	0	0	13	54	0
	7:45 - 8:00	29	0	0	0	54	70	0	0	0	24	46	0
	8:00 - 8:15	20	0	0	0	30	110	0	0	0	24	43	0
	8:15 - 8:30	5	0	0	0	40	66	0	0	0	14	63	0
A.M. PEAK	7:30 - 8:30	74	0	1	0	158	317	0	0	0	75	206	0

Table A4.3 - AM 15 Minute Traffic Counts at the Intersection of W 12th street and High School Main Entrance

		HS Main Entance			W 12th Street						W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	15:15 - 15:30	36	0	2	0	71	33	0	0	0	11	43	0
	15:30 - 15:45	84	0	8	0	64	24	0	0	0	5	117	0
	15:45 - 16:00	42	0	5	0	55	13	0	0	0	6	56	0
	16:00 - 16:15	10	0	3	0	38	9	0	0	0	2	53	0
P.M. PEAK	15:15 - 16:15	172	0	18	0	228	79	0	0	0	24	269	0

Table A4.4 - PM 15 Minute Traffic Counts at the Intersection of W 12th street and High School Main Entrance

		HS Parking Exit			W 12th Street						W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
A.M. PEAK	7:30 - 8:30	0	0	1	0	159	0	0	0	0	0	282	0
P.M. PEAK	15:15 - 16:15	0	0	28	0	246	0	0	0	0	0	336	0

Table A4.5 - AM & PM 15 Minute Traffic Counts at the Intersection of W 12th street and High School Parking lot Exit

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		Grandview West			W 12th Street						Grandview West		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	7:30 - 7:45	4	0	1	0	103	1	0	0	0	0	65	0
	7:45 - 8:00	2	0	2	0	122	1	0	0	0	1	78	0
	8:00 - 8:15	1	0	3	0	108	0	0	0	0	1	60	0
	8:15 - 8:30	2	0	3	0	132	1	0	0	0	3	59	0
A.M. PEAK	7:30 - 8:30	9	0	9	0	465	3	0	0	0	5	262	0

Table A4.6 - AM 15 Minute Traffic Counts at the Intersection of W 12th street and Grandview Avenue (West Junction)

		Grandview West			W 12th Street						Grandview West		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	15:15 - 15:30	1	0	4	0	98	11	0	0	0	3	87	0
	15:30 - 15:45	7	0	1	0	81	3	0	0	0	2	155	0
	15:45 - 16:00	2	0	3	0	60	4	0	0	0	4	81	0
	16:00 - 16:15	2	0	2	0	42	2	0	0	0	2	61	0
P.M. PEAK	15:15 - 16:15	12	0	10	0	281	20	0	0	0	11	384	0

Table A4.7 - PM 15 Minute Traffic Counts at the Intersection of W 12th street and Grandview Avenue (West Junction)

					W 12th Street			Grandview East			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	7:30 - 7:45	0	0	0	16	92	0	18	0	11	0	60	12
	7:45 - 8:00	0	0	0	11	112	0	19	0	13	0	67	10
	8:00 - 8:15	0	0	0	2	100	0	17	0	11	0	50	10
	8:15 - 8:30	0	0	0	6	114	0	16	0	6	0	49	8
A.M. PEAK	7:30 - 8:30	0	0	0	35	418	0	70	0	41	0	226	40

Table A4.8 - AM 15 Minute Traffic Counts at the Intersection of W 12th street and Grandview Avenue (East Junction)

					W 12th Street			Grandview East			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
	15:15 - 15:30	0	0	0	5	77	0	19	0	16	0	90	8
	15:30 - 15:45	0	0	0	18	78	0	7	0	9	0	113	41
	15:45 - 16:00	0	0	0	21	72	0	5	0	6	0	72	21
	16:00 - 16:15	0	0	0	6	41	0	1	0	22	0	50	5
P.M. PEAK	15:15 - 16:15	0	0	0	50	268	0	32	0	53	0	325	75

Table A4.9 - PM 15 Minute Traffic Counts at the Intersection of W 12th street and Grandview Avenue (East Junction)

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FUTURE TRAFFIC PROJECTIONS AND ANALYSIS

The 2030 traffic forecasts were projected using a 2% annual growth rate applied to existing peak hour volumes based on the City of Newton's growth expectations. Table A4.10 through Table A4.14 shows the resulting 2030 volume projections at the intersections. Table A4.15 and Table A4.16 show the LOS and delay expected by movement at each of the five intersections analyzed.

		Boyd Avenue			W 12th Street			Boyd Avenue			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
2030 AM Peak	7:30 - 8:30	81	32	125	24	102	89	4	48	34	147	265	4
2030 PM Peak	15:15 - 16:15	153	13	218	43	281	44	4	61	38	28	261	9

Table A4.10 - Projected Traffic Volumes for the year 2030 at the Intersection of W 12th Street & Boyd Avenue

Table A4.11 - Projected Traffic Volumes for the year 2030 at the Intersection of W 12th Street & Newton High School Entrance

		HS Main Entance			W 12th Street						W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
2030 AM Peak	7:30 - 8:30	100	0	1	0	213	427	0	0	0	101	277	0
2030 PM Peak	15:15 - 16:15	231	0	24	0	307	106	0	0	0	32	362	0

		HS Parking Exit			W 12th Street						W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
2030 AM Peak	7:30 - 8:30	100	0	0	0	213	0	0	0	0	0	380	0
2030 PM Peak	15:15 - 16:15	231	0	0	0	307	0	0	0	0	0	452	0

Table A4.12 - Projected Traffic Volumes for the year 2030 at the Intersection of W 12th Street & Newton High Parking Lot Exit

Table A4.13 - Projected Traffic Volumes for the year 2030 at the Intersection of W 12th Street & Grandview Avenue (West Junction)

		Grandview West			W 12th Street						Grandview West		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
2030 AM Peak	7:30 - 8:30	12	0	12	0	626	4	0	0	0	7	353	0
2030 PM Peak	15:15 - 16:15	16	0	13	0	378	27	0	0	0	15	517	0

					W 12th Street			Grandview East			W 12th Street		
	Time	SB Left	SB Thru	SB Right	WB Left	WB Thru	WB Right	NB Left	NB Thru	NB Right	EB Left	EB Thru	EB Right
2030 AM Peak	7:30 - 8:30	0	0	0	47	563	0	94	0	55	0	304	54
2030 PM Peak	15:15 - 16:15	0	0	0	67	361	0	43	0	71	0	437	101

Table A4.14 - Projected Traffic Volumes for the year 2030 at the Intersection of W 12th Street & Grandview Avenue (East Junction)

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AM

	W 12th Street & Boyd					W 12th Street & HS Parking Exit			W 12th Street & HS Main Entry			W 12th Street & Grandview (West Junction)			W 12th Street & Grandview (East Junction)		
	EB (L,T,R)	WB (L,T,R)	NB (L,T,R)	SB (L,T)	SB (R)	EB (T)	WB (T)	SB(L)	EB (L,T)	WB (T, R)	SB	EB (L,T)	WB (T,R)	SB (L,R)	EB (T,R)	WB (L,T)	NB (L,R)
2015 Existing Conditions																	
Delay	7.8	7.7	14.4	20.8	9	N/A	N/A	8.7	8.7	N/A	16.6	8.4	N/A	12.3	N/A	8.0	18.2
LOS	A	A	B	C	A			A	A		C	A		B		A	C
2030 Volumes No Road Diet																	
Delay	8.0	8.0	20.2	51.1	9.4	N/A	N/A	12.9	9.6	N/A	N/A	9.0	N/A	15.0	N/A	8.3	38.0
LOS	A	A	C	F	A			B	A			A		B		A	E
2030 Volumes with Road Diet																	
Delay	8.0	7.9	19.3	31.8	9.8	N/A	N/A	13.3	9.5	N/A	N/A	9.0	N/A	14.7	N/A	8.3	19.6
LOS	A	A	C	D	A			B	A			A		B		A	C

Table A4.15 - AM Movement LOS and Delay

PM

	W 12th Street & Boyd					W 12th Street & HS Parking Exit			W 12th Street & HS Main Entry			W 12th Street & Grandview (West Junction)			W 12th Street & Grandview (East Junction)		
	EB (L,T,R)	WB (L,T,R)	NB (L,T,R)	SB (L,T)	SB (R)	EB (T)	WB (T)	SB(L)	EB (L,T)	WB (T, R)	SB	EB (L,T)	WB (T,R)	SB (L,R)	EB (T,R)	WB (L,T)	NB (L,R)
2015 Existing Conditions																	
Delay	8.1	8.0	18.4	87.4	10.5	N/A	N/A	9.0	8.6	N/A	44.4	8.2	N/A	12.8	N/A	8.7	16.8
LOS	A	A	C	F	B			A	A		E	A		B		A	C
2030 Volumes No Road Diet																	
Delay	8.2	8.3	30.2	582.3	12.5	N/A	N/A	21.0	9.2	N/A	N/A	8.7	N/A	16.0	N/A	9.5	32.6
LOS	A	A	D	F	B			C	A			A		C		A	D
2030 Volumes with Road Diet																	
Delay	8.2	8.3	30.2	109.8	16.1	N/A	N/A	19.8	9.2	N/A	N/A	8.6	N/A	15.5	N/A	9.5	20.3
LOS	A	A	D	F	C			C	A			A		C		A	C

Table A4.16 - PM Movement LOS and Delay

SECTION FIVE
APPENDIX

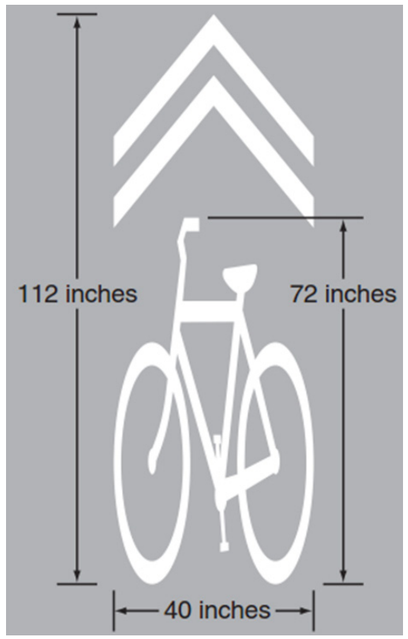
BICYCLE FACILITY TYPES

SHARED-USE MARKINGS / SIGNAGE

Typical guide sign (D1-2C) for bicycle facilities (MUTCD, 2009)

Bike Route (D11-1) sign (MUTCD, 2009)

Share the Road sign (W16-P) (MUTCD, 2009)



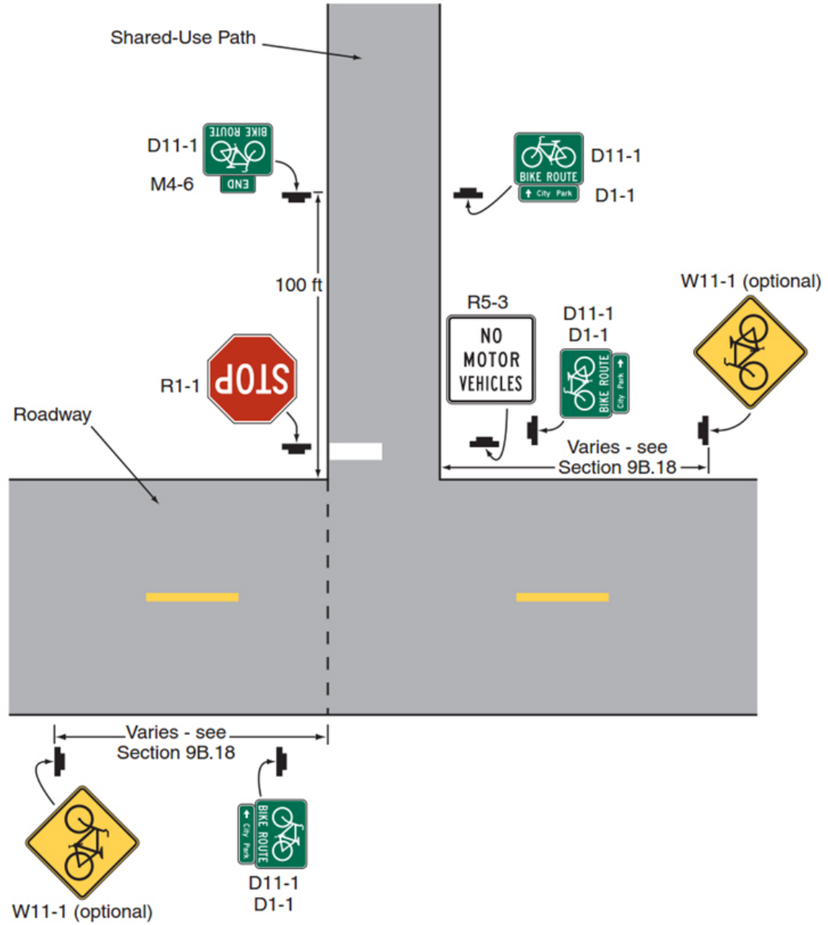
Shared-Use Marking (MUTCD, 2009)

Example Street Name Sign for Shared-Use Lanes in Manhattan, KS

STREET NAME SIGNS

Modifying street name signs can help both bicyclists and drivers recognize a street with bicycle amenities on it such as bike lanes or a shared-use lane. Common methods of branding including placing a logo of a bicycle above or beside the street name on the street name sign.

SHARED-USE PATH MARKINGS / SIGNAGE



Example of Signing for the Beginning and End of a Designated Bicycle Route on a Shared-Use Path
Source: Figure 9B-5, MUTCD, 2009 Edition

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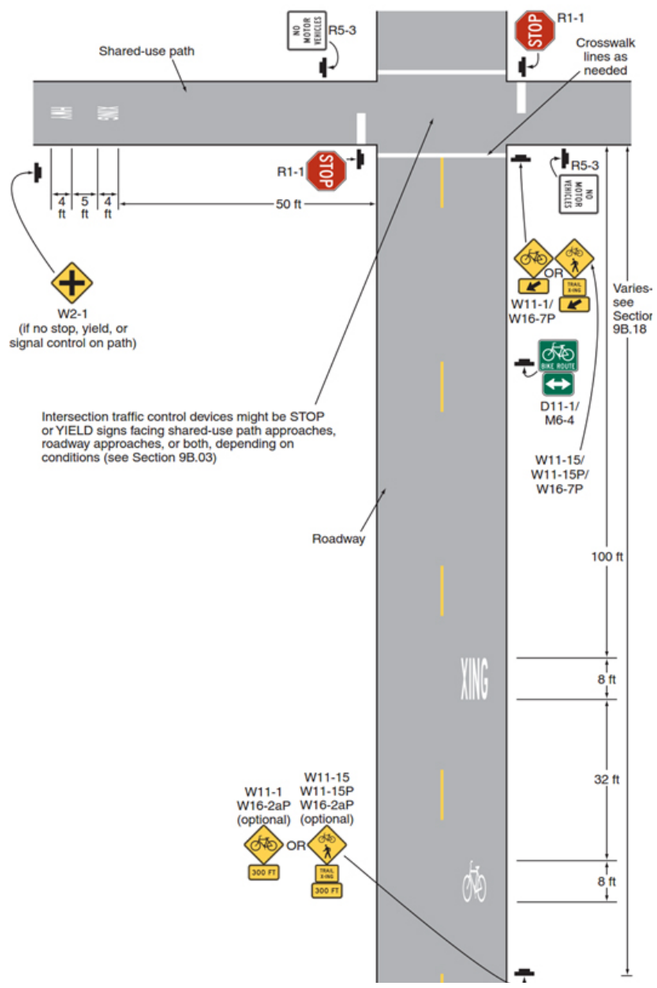
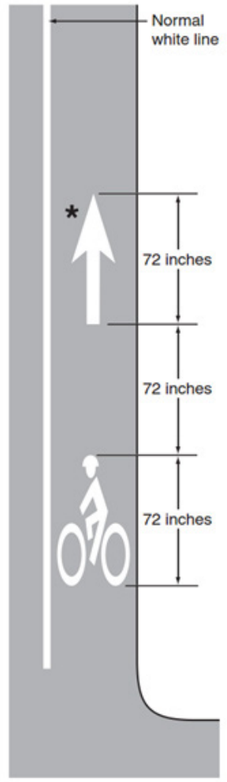
SHARED-USE PATH MARKINGS / SIGNAGE (CONT.)



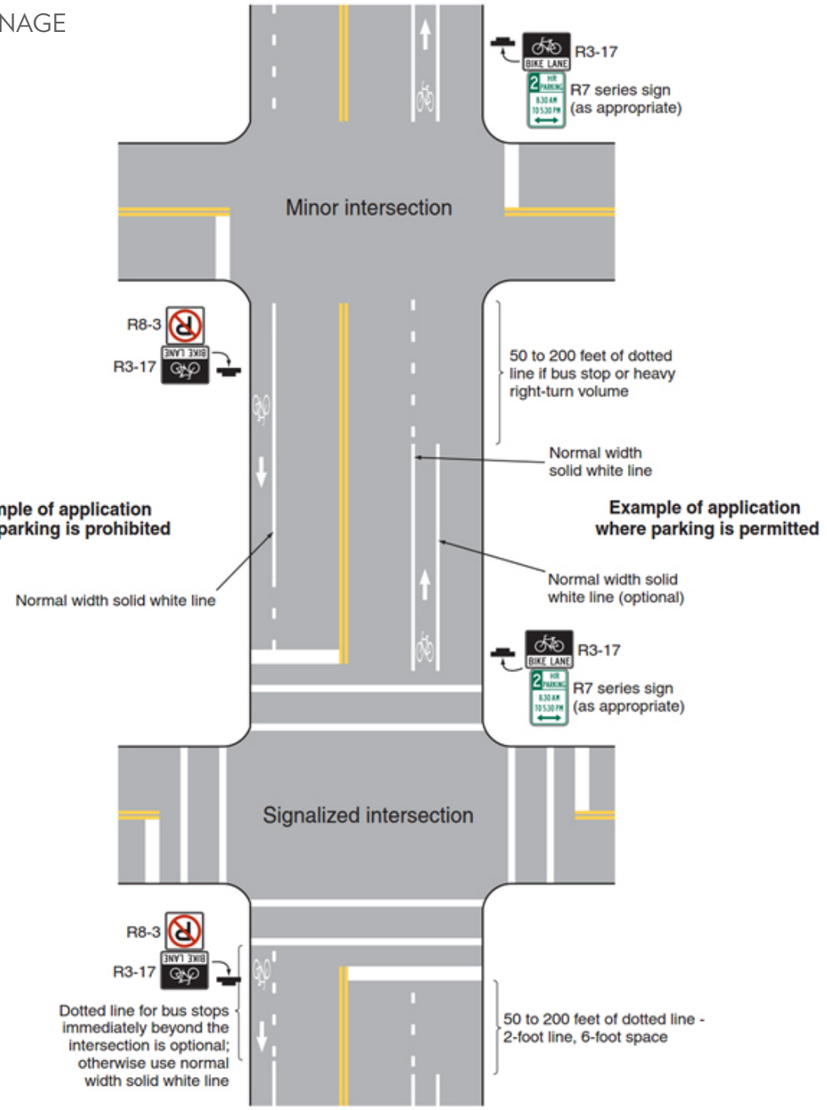
Examples of Signing and Markings for a Shared-Use Path Crossing
Source: Figure 9B-7, MUTCD, 2009 Edition

BICYCLE LANE MARKINGS / SIGNAGE



Helmeted Bicyclists Symbol and arrow for a bicycle lane (MUTCD)

Bike Lane sign (R3-17) (MUTCD, 2009)



Example of Pavement Markings for Bicycle Lanes on a Two-Way Street
Source: Figure 9C-6, MUTCD, 2009 Edition

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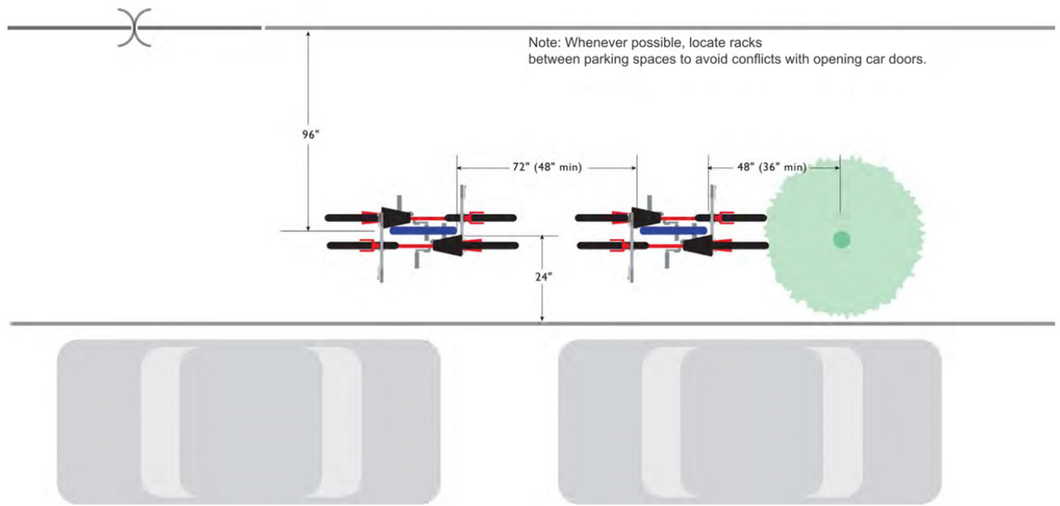
These "Inverted U" racks support a bicycle in two locations rather than just the wheel and are intuitive for users. Although the tubing is round, its thickness provides good strength.

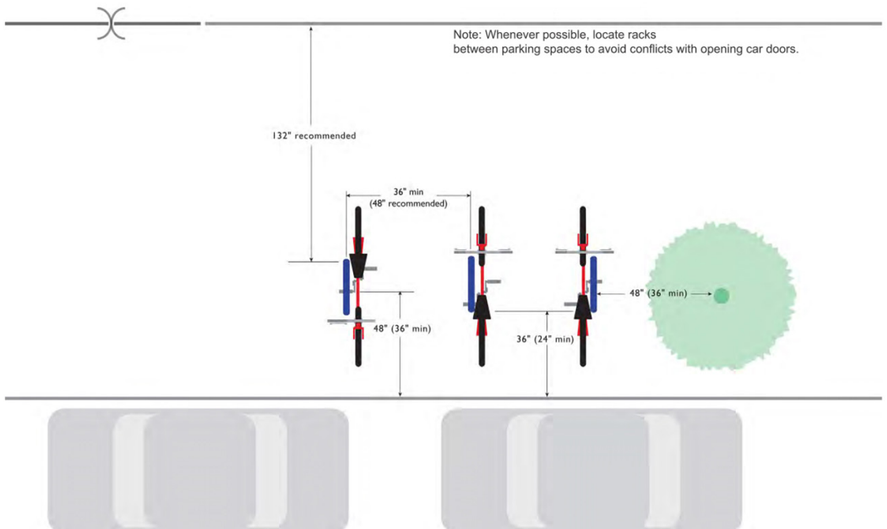
Source: www.columbusunderground.com



Sample layout of racks parallel to curb from the APBP Bicycle Parking Guide (2013)

By supporting a bicycle at only one location, this grid rack puts pressure on the rim of a bicycle. Due to the spacing of the rack, the handlebars of different bicycles are likely to tangle.

Source: Lester Limón (ReNewton Bicycle Initiative)



Sample layout of racks perpendicular to curb from the APBP Bicycle Parking Guide (2013)

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CONSTRUCTION COST ESTIMATES

Shared-use path cost estimates generally assume a 10' wide asphalt path 6" thick on one side of the road adjacent to an existing roadway. Additional costs have been added to specific paths where railroad or water crossings may be needed, or additional grading will be required.

Bicycle lane cost estimates always include the solid white pavement marking line for the bicycle lane along with five bicycle lane signs and ten pavement marking symbols per mile on each side of the road. Additional costs were added for some 4-lane to 3-lane road diets where additional pavement markings for the two-way-left-turn-lanes are needed. Bicycle lanes which are recommended for future implementation as part of future roadway widening include the cost of the 5' of pavement for each side of the roadway, but not the grading associated with that as it would all be conducted at the same time as the road widening.

Shared-use lane cost estimates include twenty-one pavement marking symbols and twenty-one signs per mile on each side of the road.

All construction cost estimates have a 30% contingency built into them to account for minor unexpected issues.

MAINTENANCE

Ongoing maintenance for the life of the each type of bicycle facility will be needed. Bicycle lanes will need the lane lines replaced along with the pavement marking symbols on a regular basis. The bicycle lane signs will need to be checked for retro-reflectivity just as every other sign in the city and replace as needed (several different methods are approved by the FHWA). The pavement for bicycle lanes should be overlaid or reconstructed on the same schedule as the adjacent vehicle and parking lanes. Shared-use markings will need to be replaced as they become worn, and the associated signs also cared for. Shared use paths will likely need the least amount of ongoing maintenance, but do occasionally need to be repaved or reconstructed after many years of Kansas's freeze-thaw cycles on the pavement.