Gillham Road Corridor Bike Connections Plan

Prepared For
Mid-America Regional Council & The City of Kansas City, Missouri

Prepared by Olsson Associates
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EXECUTIVE SUMMARY

Kansas City's midtown area is home to a diverse mix of neighborhoods and communities bound together by a network of roadways that provide users with choices as they travel across the area, whether they bike, walk, drive, or take the bus. Gillham Road, from Brush Creek on the south, to the Crossroads district on the north, forms an important spine of travel through this area. Due to the presence of one-way pairs and discontinuous roadways, Gillham Road is the only continuous north-south link between Troost Avenue on the east, and Main Street on the west. This corridor experienced significant changes in traffic patterns during the late 1990's associates with the construction of Bruce R. Watkins Memorial Drive. As such, what was once a significant north-south arterial street operates well under capacity and with lower volumes than historically present. Combined with new investments in residential development, ranging from Union Hill to the Armour Boulevard corridor to the Westport High School redevelopment, this provides an opportunity to improve bicycling conditions to support this vibrant portion of the city.

Olsson Associates was contracted by the City of Kansas City, Missouri and Mid-America Regional Council (MARC) to develop a Gillham Road corridor bike connections plan. Olsson, in conjunction with Toole Design Group (TDG) and Parson and Associates (PA), worked with the community and stakeholders to develop a feasible plan to improve biking facilities along the corridor. The corridor, from north to south, follows Grand Boulevard, 27th Street, McGee Trafficway, Gillham Road / Gillham Plaza, Gillham Road, and terminates at Harrison Street and Emanuel Cleaver II Boulevard. The plan, identified in this report, addresses the following topics: Existing plans, existing conditions, best practices, development of scenarios, public involvement, traffic analysis, final concept, and cost estimates.

The public involvement of this project was composed of two public meetings, two meetings with a working group composed of corridor stakeholders and community members, an online-survey, and two surveys distributed during the public meetings, one of which was also distributed online. In the first working group meeting and public meeting, attendees were presented with a variety of alternatives for each segment of the corridor, and asked to indicate which segment alternative they preferred. These surveys, which included a variety of responses, indicated a large preference for improving bicycle facilities in the corridor, including a preference for separated bike lanes, and overall supportive of the final concept.

Traffic analysis was performed to determine the effects on traffic throughout the midtown area on, not only if lane reductions were enacted on Gillham Road, but also if lane reductions currently being considered for other projects throughout the midtown area, were also implemented. Through this, and intersection capacity analysis, it was determined that one northbound lane of Gillham Road could be utilized for bicycle improvements throughout most of the corridor, with acceptable effects on level of service throughout the rest of the district. This would still maintain two southbound lanes of automobile travel to accommodate the high peak flow.

The final concept is a two-way separated bike lane (also known as a two-way cycle track) along the east-side of the roadway along most of the corridor. Parking along the corridor would buffer those who bicycle from automobile traffic. This would be implemented by using an existing northbound lane of traffic along most of the corridor, or in limited areas, expanding the curb lines to accommodate the bicycle facility. Due to limited right-of-way, small sections of the corridor at McGee Trafficway, and at Harrison Street, would feature sharrows or bike lanes rather than a two-way cycle track. The amount of parking along most of the corridor is preserved or expanded.

High level, conceptual cost estimates were developed for the corridor. The following table summarizes the conceptual cost estimates for the entire corridor concept.

Cost Estimates for Gillham Corridor

Corridor Segment	Price		
	Low End	Medium	High End
20th Street and Grand Boulevard to 27th Street and McGee Trafficway	$797,400	$1,442,000	$3,692,000
McGee Trafficway to Gillham Road and Armour Boulevard	$667,800	$1,099,000	$2,899,000
Gillham Road and Armour Boulevard to Gillham Road and 42nd Street	$1,188,200	$1,231,000	$2,131,000
Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard	$533,700	$226,500	$226,500
Total	$3,187,100	$3,998,500	$8,948,500

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SECTION 1: INTRODUCTION

Kansas City's midtown area is home to a diverse mix of neighborhoods and communities bound together by a network of roadways that provide users with choices as they travel across the area, whether they bike, walk, drive, or take the bus. Gillham Road, from Brush Creek on the south, to the Crossroads district on the north, forms an important spine of travel through this area. Due to the presence of one-way pairs and discontinuous roadways, Gillham Road is the only continuous north-south link between Troost Avenue on the east and Main Street on the west. This corridor experienced significant changes in traffic patterns during the late 1990's associates with the construction of Bruce R. Watkins Memorial Drive. As such, what was once a significant north-south arterial street operates well under capacity and with lower volumes than historically present. Combined with new investments in residential development, ranging from Union Hill to the Armour Boulevard corridor to the Westport High School redevelopment, this provides an opportunity to improve bicycling conditions to support this vibrant portion of the city.

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- Existing Plans,
- Existing Conditions,
- Best Practices,
- Development of Scenarios,
- Public Involvement,
- Traffic Analysis and Results,
- Final Typicals, and
- High Level Cost Summary.

Condos on Gillham Road and McGee Trafficway

Union Hill

Hyde Park

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SECTION 2: EXISTING PLANS

Section 2.1 Introduction

As the City of Kansas City, Missouri develops a new vision for bicycle connections along the Gillham corridor, a review was conducted of influential plans in the area. This allowed the project team to take into account prior efforts that may influence the available options for the implementation of bicycle treatments. Below is a list of identified plans that developed conclusions and/or recommendations related to traveling on or around the Gillham corridor.

Kansas City Area Plans

- **Greater Downtown Area Plan (2010)**
- **Midtown/Plaza Area Plan (2016)**

City Wide Plans

- FOCUS Kansas City Plan (1997)
- Kansas City Walkability Plan (2003)
- **KC Trails Plan (2008)**
- Major Streets Plan (2008)
- **Bike KC Master Plan (2018 Draft, Ongoing)**
- Kansas City Smart Cities Grant Application (2016)
- Kansas City TOD Policy (2017)
- **KCMO Complete Streets Ordinance (2017)**
- **Midtown Complete Streets Corridor Planning Sustainable Places Study (Initiated early 2018)**

Regionwide Plans

- **Metro Green (2002)**
- **Greater Kansas City Regional Bikeway Plan (2015)**
- Transportation Outlook 2040 Update (2015)
- **Smart Moves 3.0 (2017)**

After reviewing the plans above, the bolded plan titles provided the most critical information relative to the areas surrounding the Gillham corridor where bicycle facilities are planned. Relevant materials were found in documents such as area plans, and multiple plans geared towards the future development of specific modes of transportation, either specifically in Kansas City, or relative to the nine-county Mid-America Regional Council (MARC) region.

The first set of plans are the area plans adopted by the city including the Greater Downtown Area Plan and the Midtown Area Plan. These plans are just two of the 18 geographic areas where area plans are currently prepared. Area plans are used to help implement the policies of the city's comprehensive land use plan, FOCUS Kansas City Plan. The city has developed a renewable Five-Year Citywide Business Plan. The business plan includes three components, such as the City's Strategic Plan, a Financial Strategic Plan and a Five-Year Planning Model. These elements help align the city's plans with budget decisions.

Section 2.2 Review of Plans

The following section reviews the plans that were considered by the project team during the length of the project.

Greater Downtown Area Plan (2010)

The Greater Downtown Area Plan (GDAP) recommended strategies to help realize a long-range vision and provide a framework for guiding public policy on land use and development, the public realm, transportation, infrastructure, housing and neighborhood identity, revitalization, economic development, and education. The boundary defined for the greater downtown area was State Line to the west, North Kansas City to the north, Woodland Avenue to the east and 31st Street to the south. The guiding principles include five primary goals - creating a walkable downtown; doubling the downtown population; increasing employment downtown; retaining and promoting safe, authentic neighborhoods; and, promoting sustainability.

After further review, these same five goals, stated above, relate back to transportation where recommendations are made relevant to the corridor's plan.

Pursue Road Diets on Recommended Roadways

In the plan, shown in **Figure 2.1**, roadways were identified for road diets, or the removal of lanes, due to excess capacity, to provide additional space for other uses, i.e. improved bicycle and pedestrian accommodations and on-street parking. Roadways in the Gillham corridor recommended for road diets include converting corridors from four to three lanes along these specific segments;

- Oak/Gillham: from Truman Road to 25th Street,
- 18th Street: from Baltimore Avenue to Campbell Street,
- 19th Street: from Baltimore Avenue to Cherry Street, and
- 20th Street: from Southwest Boulevard to Oak Street *(Completed).*

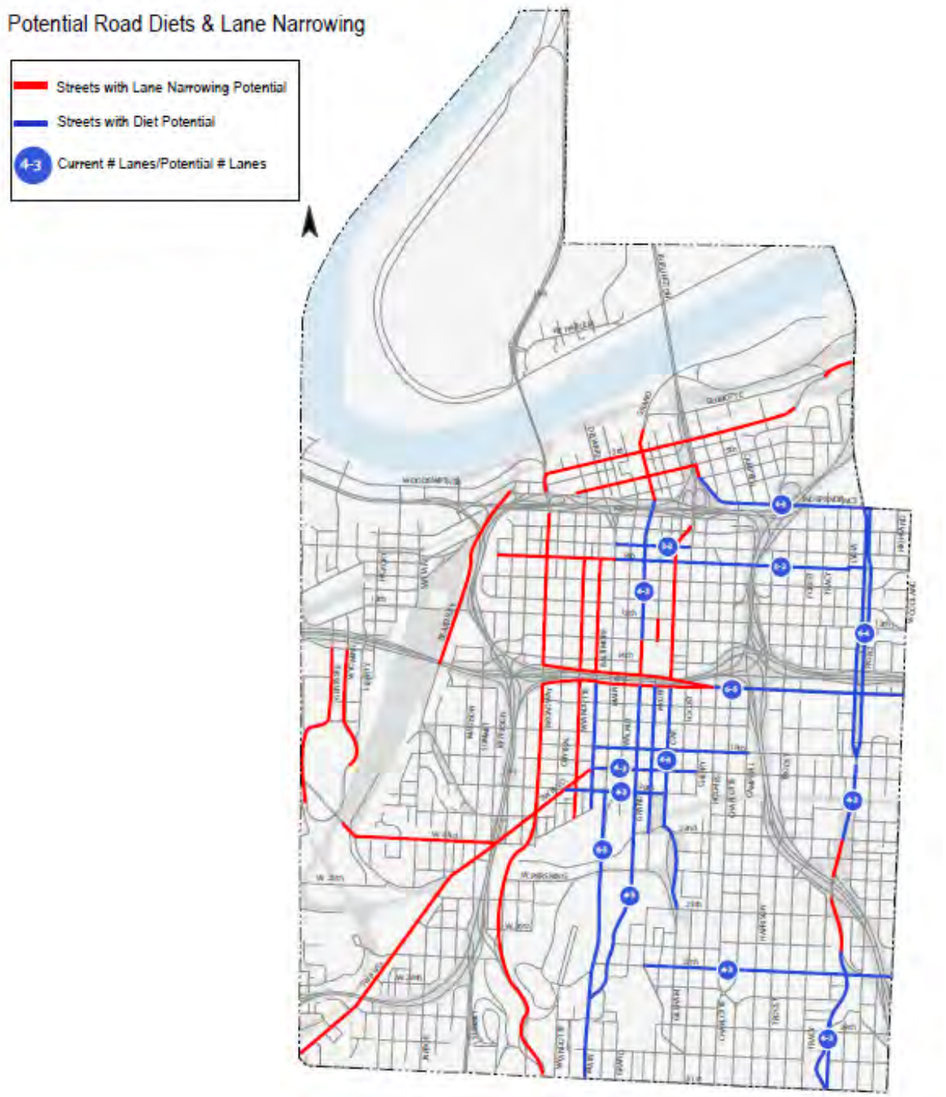
Bike Lanes

The plan recommends additional bike lanes designated in the Major Street Plan and other routes, but does not include any treatments along Gillham in the existing plans when the study was adopted. With that being said, bike lanes are recommended along those road diet segments with available width. Refer to **Figure 2.1** for the roadways recommended for potential road diets and lane narrowing.

Street Standards

In addition to revising city street standards to align with current bike safety standards, other elements to look at implementing include bicycle-friendly storm grates and traffic signal activators to detect bicyclists and scooters. These treatments should be considered during the design of future bicycle facilities.

Figure 2.1: Potential Road Diets and Lane Narrowing, GDAP



Emphasize Infrastructure

As part of the FOCUS Kansas City Plan, there was a desire to develop and implement bicycle level of service standards, just as the walkability study did for pedestrian Level of Service (LOS).

Address Access and Capacity Concerns Through Improvements

This section illustrates 13 major downtown traffic issues to be addressed. One of those locations includes access and safety issues along Gillham Road and Pershing Road. This information will be considered when analyzing the major intersections along the corridor.

Urban Design Matrix

An urban design matrix identified design recommendations based on district and street type. **Table 2.1** shows the standards for the vehicular zone, based on collector thoroughfares. Parameters defined include a bike lane width of no less than 5 feet, a minimum combined parking/bike lane width of 13 feet, as well as other vehicle related specifications.

Table 2.1: Urban Design Matrix, GDAP

Context	Downtown Residential				Downtown Mixed Use		Downtown Core	
	Residential		Dense Res./Commercial		Complete	Corridor	Complete	Corridor
	Complete	Corridor	Complete	Corridor				
Primary Building Entrance Orientation	front, side	front, side	front, side	front	front, side	front	front	front
Min. First Floor Building Facade Transparency	na	na	none	60%	40%	60%	40%	60%
Maximum Setback (from property line)	20 ft.	15 ft.	15 ft.	0 ft.	10 ft.	0 ft.	0 ft.	0 ft.
Surface Parking Access/Location (excluding driveways)	rear, side	rear, side	rear, side	rear, side	rear, side	rear, side	rear, side	rear
Pedestrian Zone								
Recommended Total Ped. Zone Width	11 ft.	13 ft.	10 ft.	17 ft.	15 ft.	23 ft.	20 ft.	26 ft.
Frontage Zone Width	na	na	na	5 ft.	5 ft.	5 ft.	5 ft.	5 ft.
Sidewalk Width	6 ft.	8 ft.	6 ft.	8 ft.	10 ft.	10 ft.	10 ft.	10 ft.
Buffer/Furnishing Zone Width	5 ft.	5 ft.	4 ft.	4 ft.	0 ft.	5 ft.	5 ft.	8 ft.
Edge Zone Width	0 ft.	0 ft.	0 ft.	0 ft.	0 ft.	3 ft.	2 ft.	3 ft.
Street Tree Spacing	50 ft.	50 ft.	50 ft.	30 ft.	50 ft.	30 ft.	30 ft.	30 ft.
Street Lighting	street	street	street	street, ped	street	street, ped	street, ped	street, ped
Vehicular Zone (based on collector thoroughfares)								
Desired Operating Speed (mph)	25	30	30	30	30	30	30	30
Design Speed	Design Speed should be a max. of 5 mph over operating speed.							
Number of Through Lanes	2	2 to 4	2	2 to 4	2 to 4	2 to 4	2 to 4	4
Lane Width	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.	10-11 ft.
Parallel On-Street Parking Width (where applicable)	7 ft.	7 ft.	7 ft.	8 ft.	8 ft.	8 ft.	8 ft.	8 ft.
Min. Combined Parking/Bike Lane Width (where applicable)	13 ft.							
Vertical Alignment	Use AASHTO minimums as a target, but consider combinations of horizontal and vertical per AASHTO Green Book							
Medians (14' where applicable)	none	none	none	painted	painted	painted, raised	painted	painted, raised
Bike Lanes (preferred min. width) (where applicable)	5-6 ft.							

Midtown/Plaza Area Plan (2016)

As was done for the Greater Downtown Area, the area plan for the Midtown/Plaza area provides a comprehensive plan for an area of the City. In this plan, policies are created to guide public decisions on subjects such as land use and development, transportation, housing and neighborhoods and economic development. The boundary defined for the Midtown/Plaza area was State Line Road to the west, 31st Street to the north, Paseo Boulevard to the east and 55th Street to the south. The area is further broken down into sub areas for the purposes of land use and development. The Gillham corridor is included in three of the four sub areas including the North Central Sub Area (31st Street to 43rd Street, Southwest Trafficway to Gillham Road), the Northeast Sub Area (31st Street to 43rd Street, Gillham Road to Paseo Boulevard) and the Plaza Sub Area (43rd Street to 55th Street, State Line Road to Paseo Boulevard).

One of the goals of the five established as core action components was particularly influential to the Gillham corridor. The goal aspired to provide integrated modes of transportation to get people from one place to another within and throughout the plan area. Guiding principles were also established for each chapter of the Plan to support the previously mentioned goals. For the transportation chapter, guiding principles included;

- Improving overall transportation system connectivity,
- Providing an environment where people want to walk,
- Providing safe, convenient routes for bicyclists,
- Making sure all have access to transit and understand how to use the system,
- Enhancing the public realm, and
- Ensuring cars can conveniently move within and through the area.

In addition to these guiding principles, recommendations were made regarding the future transportation network in the area.

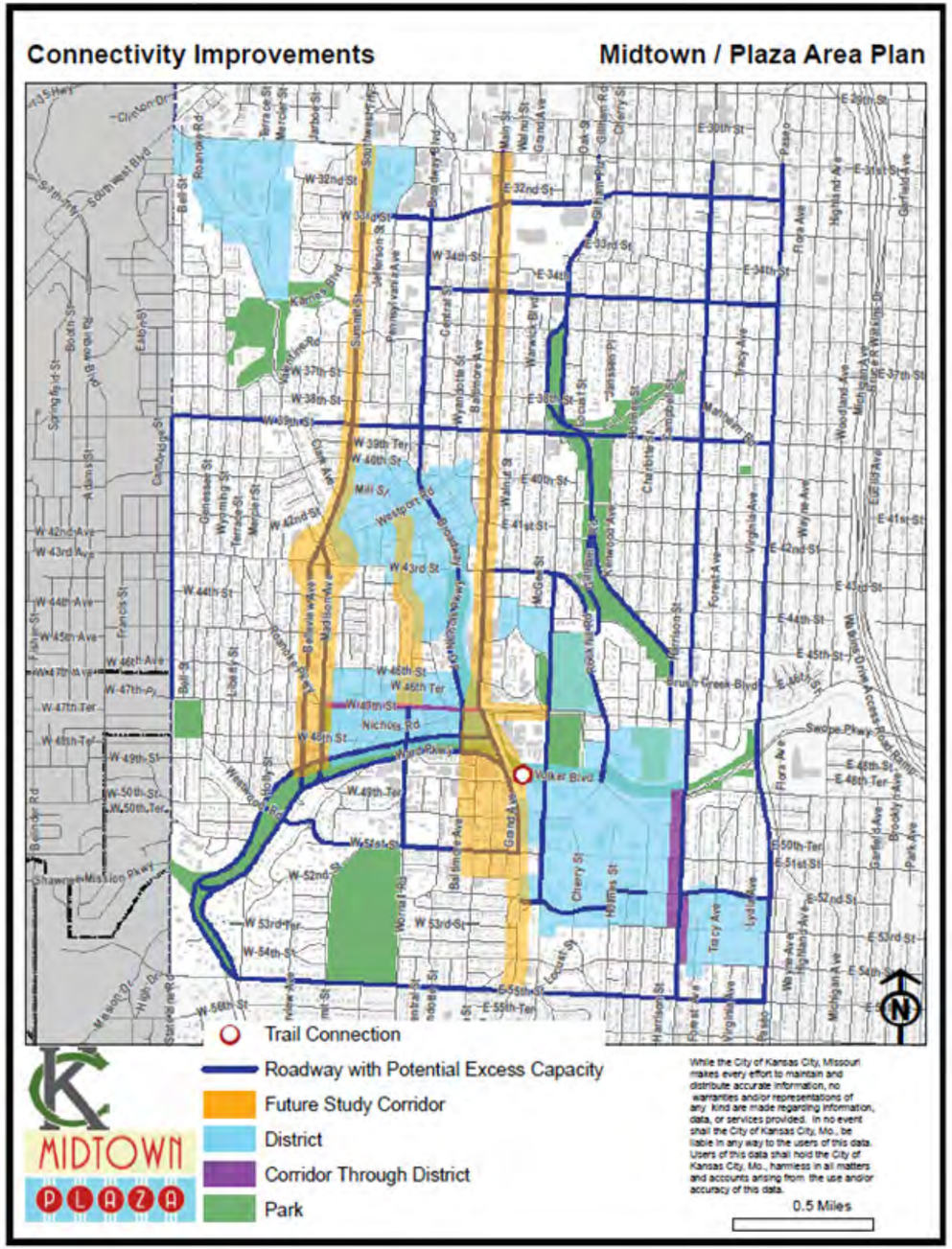
Connectivity Improvements

The plan outlines numerous corridors throughout the planning area where an analysis is recommended to determine the potential for modifying the roadways with excess capacity. Modifications consider treatments such as lane narrowing and road diets. Improvements would identify at a minimum, bike accommodations, pedestrian comfort and on-street parking needs. The corridors recommended for improvement and located within the Gillham corridor include;

- Gillham Road/Gillham Road West: from 31st Street to Rockhill Road/47th Street,
- Rockhill Road: from Oak Street to Ward Parkway,
- 39th Street: from The Paseo to State Line Road,
- Armour Boulevard: from The Paseo to Broadway Boulevard, and
- Linwood Boulevard: from The Paseo to Southwest Trafficway.

Refer to **Figure 2.2** for the corridors recommended for connectivity improvements.

Figure 2.2: Connectivity Improvements, Midtown/Plaza Area Plan



Bike and Trail Improvements

Another recommendation in the area plan concerned the availability of safe, convenient routes for bicyclists. In addition to calling for implementation of the on-street facilities and trails recommended in the Bike KC Plan and the Trails KC Plan, the area plan also identified its own specific recommendations for bicycle facilities going forward.

Planning recommendations that were singled out included items such as;

- Installing all bicycle infrastructure according to the Bike KC Master Plan,
- Providing bicycle racks within new development projects, all public parking lots and transit stops,
- Provide an approachable ranking system for bicycle routes for users to understand rider type and safety considerations, and
- Implement bike lanes whenever possible, since the residential survey identified the treatment as the most preferred bicycle facility type.

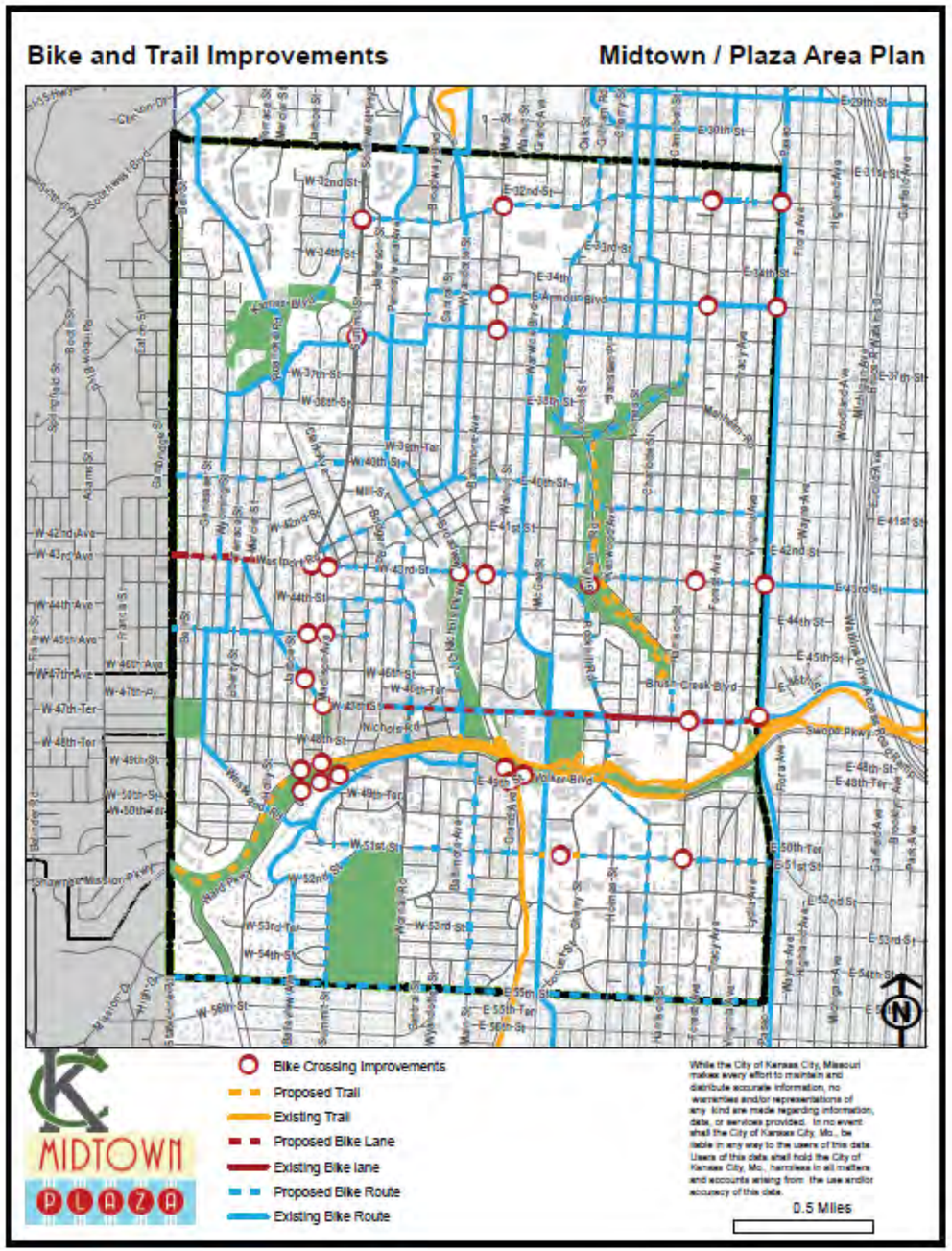
Specific recommendations were also identified for corridors where an improvement is needed or an update to what the Bike KC Master Plan had originally recommended. The recommendations affecting the Gillham corridor include;

- Gillham Boulevard is considered for off-street trails and sharrows to fill in the gaps from 31st Street to Rockhill Road/47th Street,
- Rockhill Road is considered for sharrows from Oak Street to 55th Street,
- 41st Street is considered for a signed route from The Paseo to Locust, and continuing along 40th Street to Westport Road,
- 43rd Street is considered for a bike lane, sharrow and/or a signed route from The Paseo to Westport Road, and
- Ensure safe street crossings at the intersection of Gillham Road and 43rd Street.

The area plan's bike and trail improvements can be found on **Figure 2.3**.

Details concerning bicycle accommodations are discussed in further detail in the following plans adopted by the City, including the Trails KC plan, the Bike KC plan, and the city's local Complete Street Ordinance.

Figure 2.3: Bike and Trail Improvements, Midtown/Plaza Area Plan



Trails KC Plan (2008)

The Trails KC Plan is a citywide plan used to guide the development of trails throughout Kansas City. The plan lays the groundwork for accomplishing some significant milestones within 15 years of the plan's adoption. These milestones strive to accomplish a network of 230-miles of trails as well as integrate them with the city's on-street bicycle facilities. While this plan is primarily focused towards the expansion of the city's trail system, on-street facilities are included in the guidance for design and maintenance of multi-modal infrastructure. The sections below identify specific elements that should be considered while planning for the Gillham bike corridor. Part of the Trails KC Plan is used to determine whether a trail should be an off-street or on-street treatment. The recommended system is predominantly off-street, with only 10% being on-street. Steps indicated in this section could be useful if segments of the Gillham corridor present conflicts inhibiting an off-road or on-road facility.

- **Step one** provides a tool to evaluate the number of crossings per mile. If the trail experiences more than the recommended number of crossings, alternative alignments including on-street routes can be considered as an option.
- **Step two** determines the appropriate width of a facility, if it is selected as an off-street facility. Trail widths are selected based on the city's established minimum level of service "C". Level of service is determined as a function of trail width and trail volume.
- **Step three** calls for a calculation of the Bicycle Level of Service (BLOS) for a given area if a safe off-street alignment cannot be found. The formula used to identify the bicycle level of service considers several variables in determining the perception of comfort and safety for bicyclists, such as the volume of vehicular traffic, number and width of through lanes, designated speed limit, surface conditions, type of roadway and width of paved shoulder or bike lane, among others.
- **Step four** identifies the appropriate on-street facility if that is determined as the safest treatment option. The appendix provides further guidance for design, with several options for on-street treatments can be seen below in **Figure 2.4**.

In addition to the type of facility, design guidelines for crossings are also considered. Elements of design include the level of signage, signalization and markings needed for a given situation.

Figure 2.4: Design Guidelines, Trails KC Plan

Bike KC Master Plan (2018, Draft, Ongoing)

As the Trails KC plan was to off-street trails, the Bike KC plan was intended for on-street bicycle amenities. Following the recommendation of the Bicycle and Pedestrian Advisory Committee (BPAC) to update the original Bike KC plan, the Public Works Department began the process in 2013 of updating the plan.

As of 2016 a "bikeway design toolkit" was drafted as a partial update to the Bike KC plan, however it was not until the release of a KCMO audit that a full update to the plan was undertaken. The audit report specifically recommended 13 improvements to the plan which can be developed to meet city goals, as well as incorporate BPAC's recommendations so they can eventually be considered for council adoption.

The current update identifies the entire length of Gillham in this study area as a "major separated facility". This type of facility is defined as a bikeway with some formal separation from traffic, such as a vertical barrier or side path in the draft update. **Figure 2.5** displays a draft version of the Bike KC plan facility type map.

City staff members who are working on the 2018 update to the Bike KC Master Plan are also participating in leading the Gillham Road Corridor Bike Connections Plan.

KCMO Complete Streets Ordinance (2017)

In December of 2017, Kansas City passed a local Complete Streets ordinance. This ordinance is a comprehensive policy to help integrate the Bike KC plan, sidewalks and other green infrastructure into all transportation projects, thus making it easier for all transportation users to safely access the system. The ordinance not only specifies the Complete Streets principles to be implemented citywide, but also indicates a priority towards areas with low incomes, poor health outcomes and lack of transportation access.

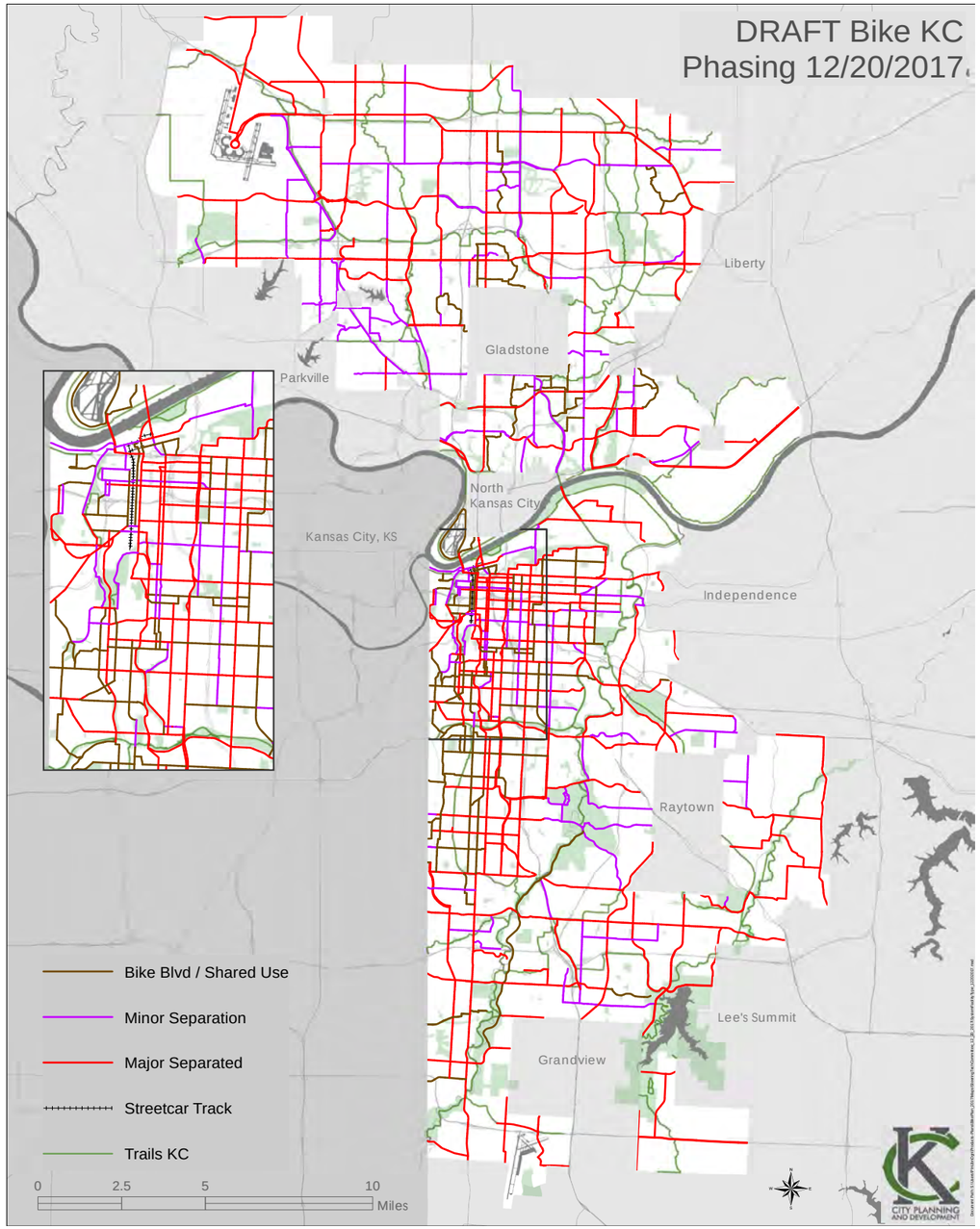
Elements of the ordinance aimed at improving how Complete Streets are integrated into the development of projects include the adoption of design guidelines, performance measures, and implementation and reporting requirements.

- The city intends to develop and update a comprehensive design manual every ten years for implementing complete streets and has adopted manuals and guides for design by approved organizations.
- Performance measures were indicated as an element for each phase of a project as well as approved resources for specific measures.
- Inter-departmental coordination was considered an important element for all activities occurring within the public right-of-way. The city not only intends to review the policy every three years, but also incorporate Complete Streets principles into specific plans and processes for all relevant departments, agencies, or committees.
- Reporting requirements set by the city indicate a priority to develop mode share goals, produce an annual report on implementing the policy and provide public education to ensure all users understand the elements of Complete Streets.

Midtown Complete Streets Corridor, Planning Sustainable Places Study (2018)

This plan analyzes the potential for implementing road diets and replacing through lanes with on-street bike lanes for multiple arterial corridors within the Midtown area including 39th Street, 43rd Street, Broadway Boulevard, Southwest Trafficway, and Wornall Road. This effort is a continuation of what was recommended in the City of Kansas City's Ordinance 140982 and the Midtown/Plaza Area Plan. While the Midtown Complete Streets Corridor study has yet to be completed, it will be important to coordinate any recommendations made for the 39th Street and Gillham Road intersection with the Gillham Road Corridor Bike Connections plan.

Figure 2.5: Draft Bike KC Plan



In addition to the citywide plans, MARC has developed several plans that are geared towards the future growth of bicycle facilities region-wide. The most influential plans for the study corridor include Metro Green, the Greater Kansas City Regional Bikeway Plan and Smart Moves 3.0.

Metro Green (2002)

The Metro Green plan, similar to Trails KC plan, was intended to guide the future development of trails, but in this case for the entire metropolitan planning boundary. While the initial plan was developed in 1991, there have been several updates to the plan over the years beginning in 2002. Metro Green not only defined corridors for alternative transportation connections, but the plan also addressed greenways and streamways in an effort to implement strategies to maintain natural corridors for both recreation and sustainability.

The proposed network of over 1,100 miles of interconnected corridors focus primarily on off-street facilities prescribed in this plan, but does have some useful resources in the appendix regarding facility design of all types, including the roadway trials – defined as facilities located within the right-of-way and serves as a connector to the Metro Green off-road network.

These facilities within the right-of-way include sidewalks, multi-use sidewalks, bike routes and bike lanes. Information detailed for each of these facilities include their purpose, where to implement them, and any additional guidelines or considerations regarding the design of the facility.

Greater Kansas City Regional Bikeway Plan (2015)

The Regional Bikeway Plan is best compared with the Metro Green plan, but its primary focus is on-street facilities, or the Metro Green facility Type 5: Bike and Pedestrian Facilities in Right-of-Way. While it is recommended to include all facility types when planning for non-motorized users the Regional Bikeway Plan further enhances Metro Green by recommending additional stream and river corridors and updated guidelines according to complete-street designs. Overall, the plan fully implemented will include a network of over 2,000 miles of on-road and off-road facilities spanning eight counties in the region.

The best practices for facilities are available in the appendix of the report. In this section of the plan, subjects include design guidance, bicycle parking strategies, count program recommendations and an overview of facility maintenance procedures. As for the design guidelines, several different facility types were provided with additional guidance including:

- Sidewalks
- Curb Ramps
- Bike Lanes
- Shared Lane Markings
- Bike Boulevards
- Buffered Bike Lanes
- Cycle Tracks
- Midblock Crossings
- Shared Use Paths

Smart Moves 3.0 (2017)

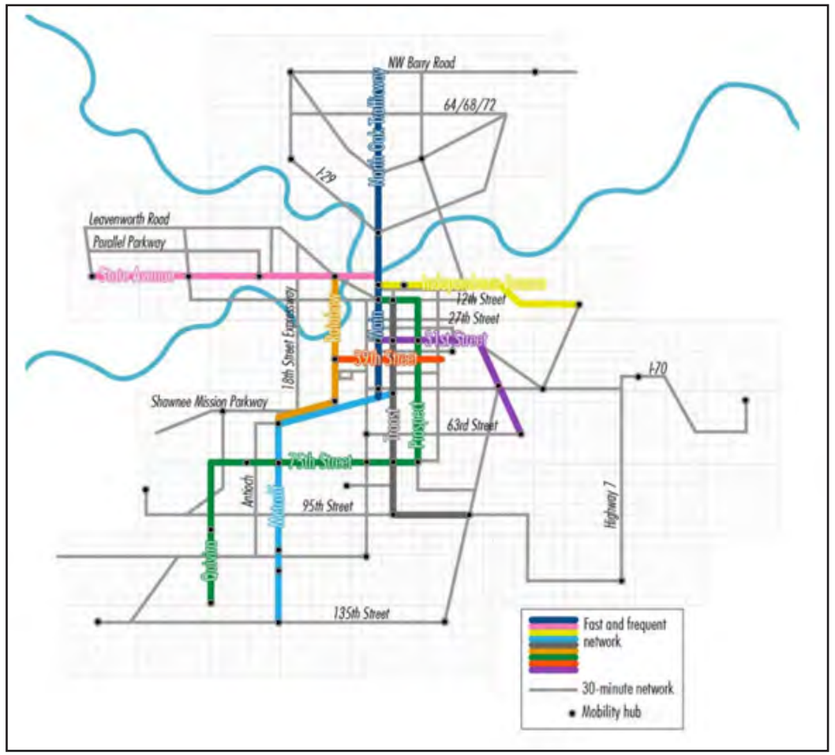
The Smart Moves 3.0 plan is meant for enhancing and expanding the regional transit and mobility services for the next 20 years. The original plan was completed in 2005, and updated in 2008. The most recent update included additional elements not previously explored in past versions of the plan such as developing a network of mobility hubs, improving access to jobs via transit and mobility services, and recommendations for taking advantage of transit-oriented development.

In the plan, non-motorized modes of transportation are not a primary focus, however, there are specific recommendations affecting the Gillham corridor and aspects specific to bicycles and pedestrians.

As part of the implementation plan, recommendations were made for all types of transportation, as well as details identifying what aspect of the plan the recommendation applies to, whose responsibility it is for implementation, potential partners for implementation and how to implement said recommendation. Phasing the completion of the non-motorized recommendations are meant for the first five years after the plan is adopted. Facility recommendations are focused primarily on transit routes and the identified mobility hubs.

One aspect of the recommendations involves improving fixed route service where there is already substantial demand for transit and propensity for future ridership. Once fully implemented, these fast and frequent routes will operate at 15-minute frequency intervals. There are two fast and frequent routes that bisect the Gillham corridor, including 31st Street and 39th Street. The Linwood corridor was also analyzed in further detail to provide additional guidance for the final layout and selection of the Fast and Frequent routes. These routes along with the other recommended service enhancements are identified in **Figure 2.6**.

Figure 2.6: Fast and Frequent and 30-minute Service, Smart Moves 3.0



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SECTION 3: EXISTING CONDITIONS

Section 3.1 Introduction

This section examines the existing conditions of the Gillham corridor. This section will be broken down into two specific areas of focus - Demand and Facilities.

Demand represents the different characteristics of a study area that will dictate the times and volume of facility uses. Areas of analysis will focus on the following;

- Existing land use,
- Future land use,
- Population, and
- Employment.

Facilities include factors that will aide in analyzing the types and modes of activity found in the corridor. This will allow examination of the suitability of existing infrastructure for future uses. Areas of analysis of facilities will focus on the following;

- Trails and bike routes,
- Functional street classification,
- Corridor characteristics,
- Average traffic flow and vehicular level of service,
- Crash incidence,
- Opportunity streets, and
- Barriers.

Section 3.2 Existing Land Use

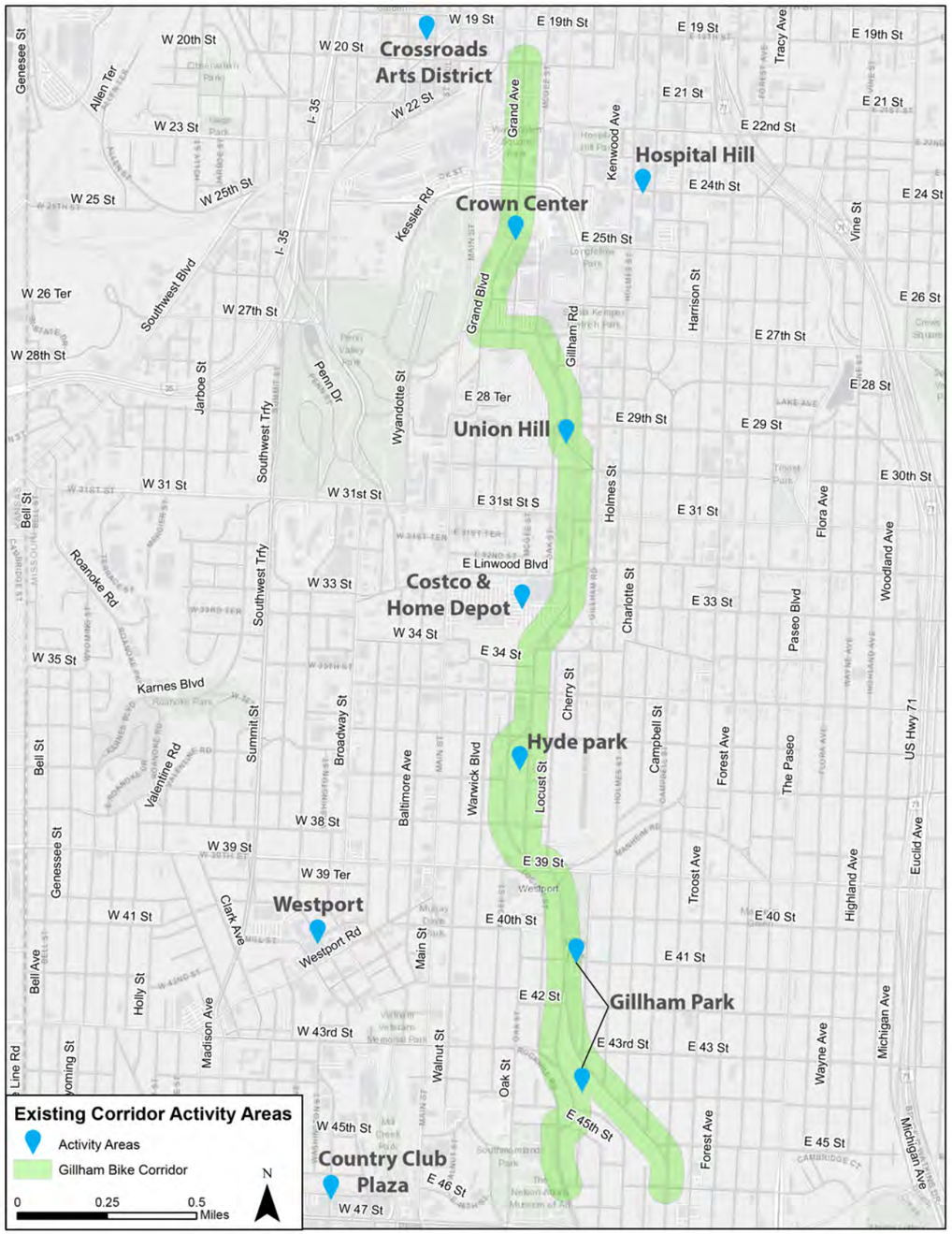
Land use patterns in the Gillham corridor determine the structure and use of the corridor's network. Items to be considered when examining the existing land use include higher density housing, large commercial concentrations, parks, and areas with high employment. The Gillham corridor passes through several key areas in Kansas City, Missouri. The most prominent of these are the Crossroads Arts District, Crown Center District, Hospital Hill, Union Hill, and the Midtown area of Kansas City, illustrated in **Figure 3.1** on the following page. Key land use factors in these areas include the following:

- The Crossroads Arts District features a large concentration of mixed-use areas. This area is bounded by I-670 to the north, I-35 to the west, and US-71 to the east, and separated railroad lines to the south. This gives a perfect opportunity for a connective corridor of active transportation. While there is a rail trench that goes through this section of the corridor, there is a separated grade crossing on Grand Boulevard with six lanes and pedestrian facilities.
- South of the Crossroads Arts District land use shows another cluster of large commercial use. This area of the corridor features Crown Center, Hospital Hill, Children's Mercy, and Truman Medical Center. To the west of Hospital Hill is Hallmark, making this area one of the most dominant attractions in the corridor when it comes to employment and commercial uses. This area also features parks such as Washington Square Park and Hospital Hill Park.
- South of Hospital Hill along Gillham Road the land uses become more focused on high and medium residential uses. This area, referred to as Union Hill, features many different multi-family housing units along with restaurants, gyms, and other commercial uses. Recent and on-going development at Union Hill is focused on mixed land uses.
- Further south of Union Hill along Gillham Road are more areas of mixed use neighborhoods and commercial uses such as Costco, Home Depot, and others. South of Linwood Boulevard, land use becomes dominated by multi-family and single-family homes through the rest of the corridor. Historic neighborhoods (Hyde Park Neighborhoods, Hanover Place, Southmoreland, and Rockhill) are present along the east and west side of the corridor. Many of these residences were built between the early 1910s to 1930s. This most southern part of the corridor also features Hyde Park and Gillham Park.

B-cycle at Crown Center

Fountains at Crown Center

Figure 3.1: Existing Corridor Activity Areas



Bike Lanes on Emanuel Clever II Boulevard, Southern End of Gillham Road Corridor Bike Connections Plan

Union Hill, Kansas City

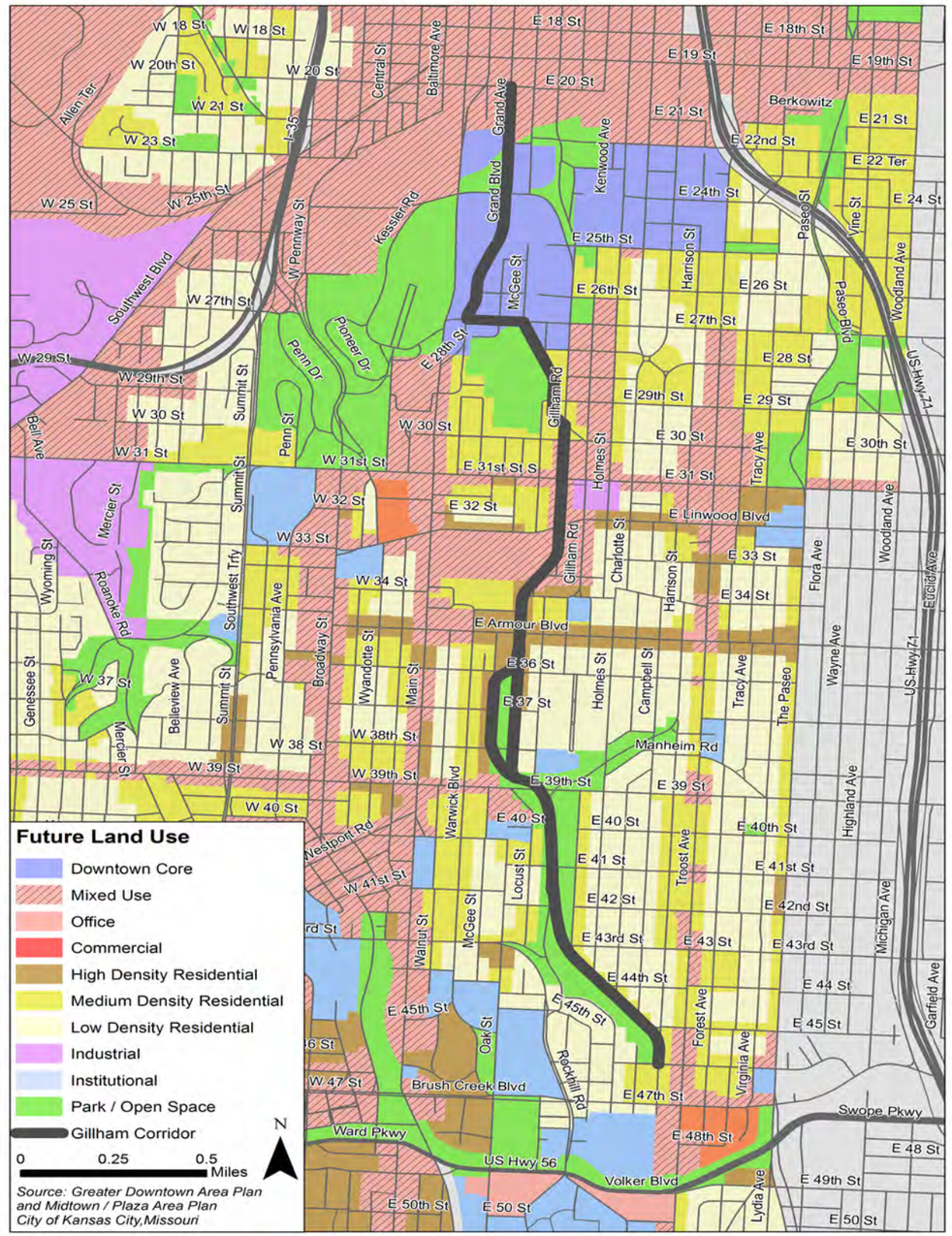
Section 3.3 Future Land Use

Current land uses surrounding the Gillham corridor look to be stable for the foreseeable future. Areas in the urban core will stay designated for mixed uses and urban core uses, as well as areas of institutional use. While there is a strong concentration of development happening in the Union Hill area, the land will keep its predominate use of mixed use and medium density residential. South of Linwood Boulevard along the corridor the land use becomes even more stable with strong areas of commercial and historic areas of single-family residential. **Figure 3.2** illustrates future land use surrounding the corridor as indicated in the GDAP and the Midtown/Plaza Area Plan.

Union Hill Apartments at McGee Trafficway and Gillham Road

Convenience Store at Linwood Boulevard and Gillham Road

Figure 3.2: Future Land Use



Section 3.4 Population Density

Population density is a measure of the concentration of persons along the corridor. **Figure 3.3** shows the concentration of persons per acre broken up by census block groups. The most dense areas of residential use are found in the southern half of the corridor where there are several block groups that have a density of greater than 20 persons per acre. The area surrounding the intersection of Gillham Road and Amour Boulevard has many different apartment complexes as well as single family housing. Areas of the Gillham corridor south of 39th street are bordered by the historic Hyde Park neighborhood where there is a large concentration of small lot single family homes.

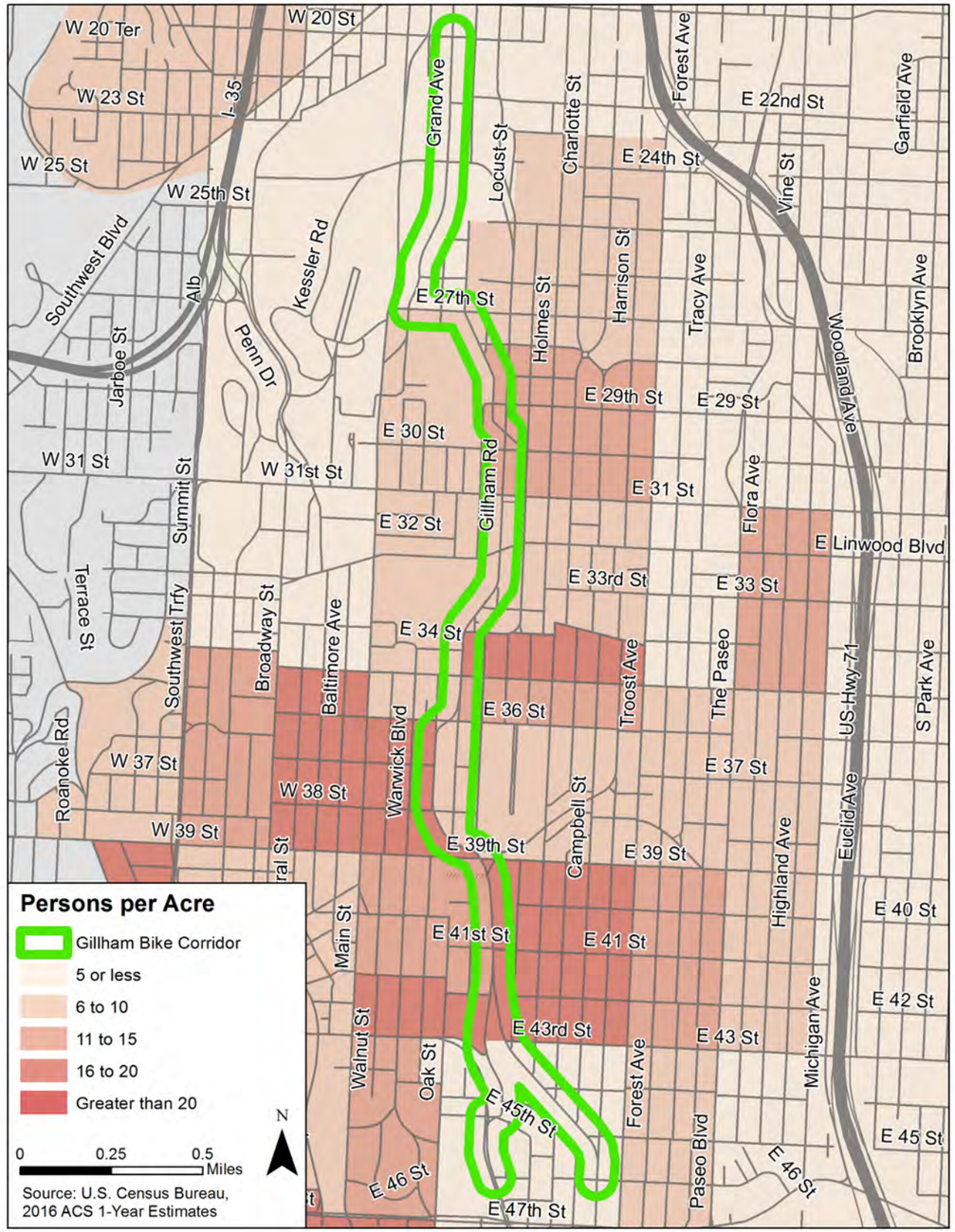
Houses at 41st Street and Kenwood Street

Apartments at Gillham Road and Armour Boulevard

Sixplexes at 41st Street and Kenwood Street

Condos at McGee Trafficway and Gillham Road

Figure 3.3: Population Density



Section 3.5 Employment Characteristics

Employment density is a measure of the concentration of employees and employment centers along the corridor. **Figure 3.4** illustrates the areas with the highest concentrations of employees. As discussed previously, some of the major employers featured on this map are in the Hospital Hill and Crossroads areas. Children's Mercy employs more than 4,000 employees while Truman Medical Center employs up to 4,000 employees. Identifying these major areas of employments helps to plan the corridor for potential users looking to access these large activity centers. The figure also shows several employment centers directly on the corridor employing between 300 and 1,000 employees. Employment concentrations are primarily on the northern portion of the corridor, and to the west of the corridor.

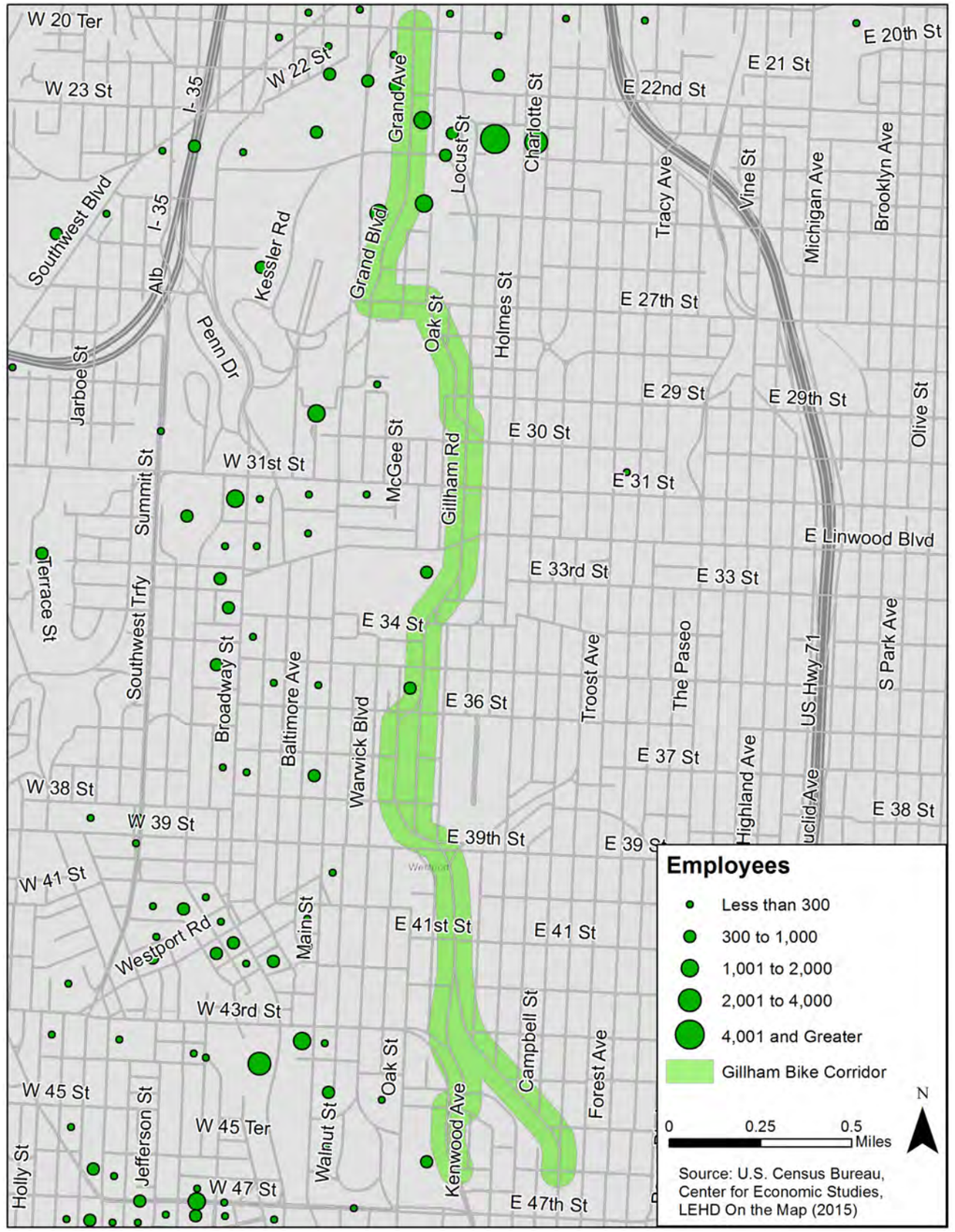
Crown Center Shopping Center

Mixed use commercial area at McGee Trafficway and Gillham Road, Union Hill

Midtown Market Place at Linwood Boulevard and Gillham Road

Children's Mercy Hospital at 22nd Street and Gillham Road

Figure 3.4: Employment Characteristics



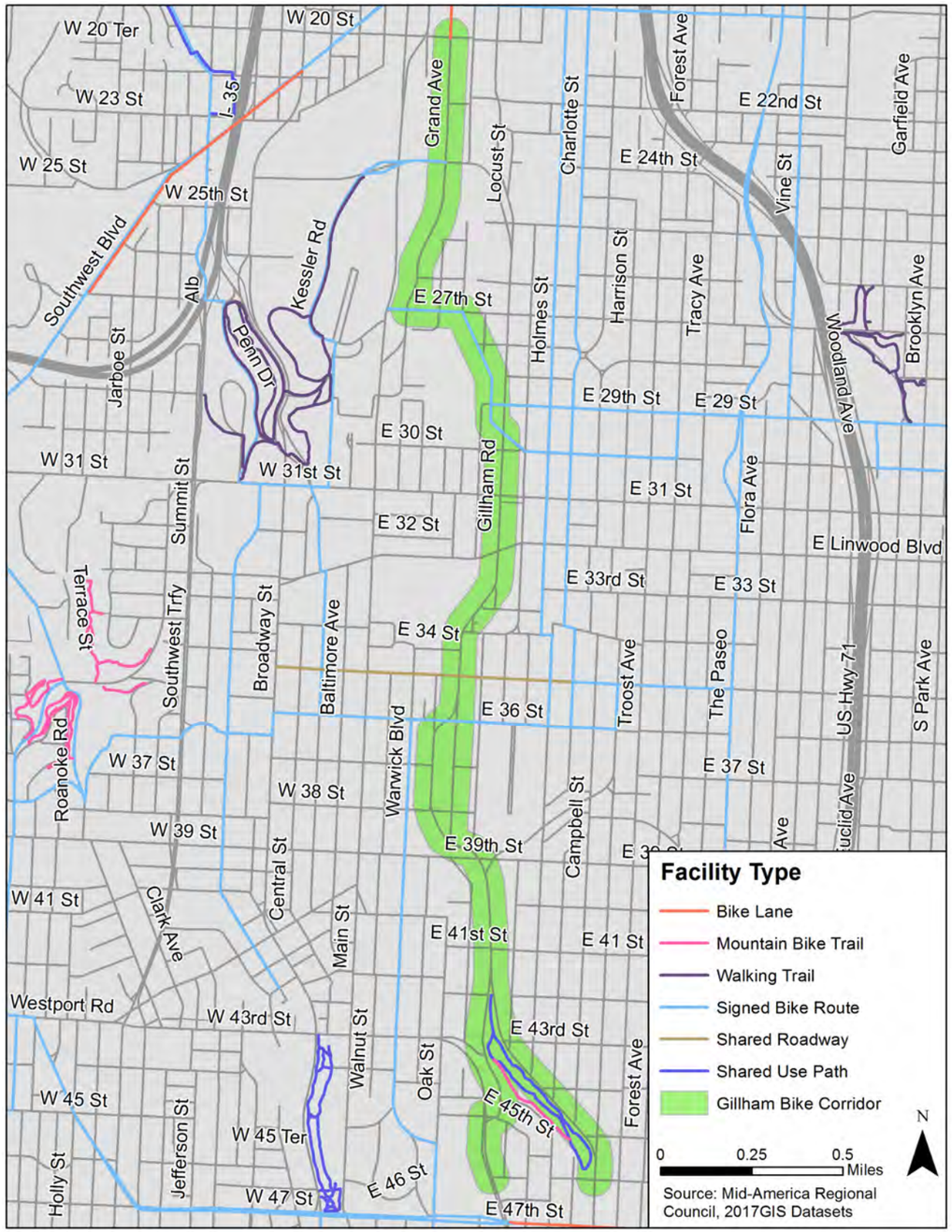
Section 3.6 Existing Trails and Bikeways

Kansas City has access to many different trails and is beginning to become a more bicycle-friendly community. As illustrated in **Figure 3.5,** the Gillham corridor passes through, or adjacent to, walking trails, signed bike routes, and shared use paths. This creates opportunities to access the new bike lanes along Grand Boulevard as well as access the bike lanes and signed routes on Brush Creek Boulevard by the Plaza. This alignment can also act as a main thoroughfare for those who will then transfer to one of the corresponding signed bike routes along Holmes Street or Warwick Boulevard.

Grand Boulevard, buffered bike lane

Emanuel Cleaver II Boulevard, conventional bike lane

Figure 3.5: Existing Trails and Bikeways (as of 2017)



Section 3.7 Existing Transit Ridership

While no current bus routes operate along the entire corridor, there are several routes with alignments near the study area. Ride KC route 85 runs along part of this corridor, and several routes cross it, such as route 39, route 35, and route 31. There are also routes operating along Grand Boulevard at Crown Center. These routes include the Main Max, route 77, 201, 229, 235, 236, 237, 404, 435, 519, 535, 563, 569, and 595.

Table 3.1 displays which bus stops experience the highest recorded ridership along the corridor. Bus stop data was only gathered for stops along the proposed Gillham corridor and excludes stops for the east/west routes crossing the corridor. Bus ridership is also illustrated along the corridor in **Figure 3.6** Bus routes on the map were only included if the route's alignment was along or adjacent to the proposed Gillham corridor and excludes some routes that otherwise would be displayed on the map.

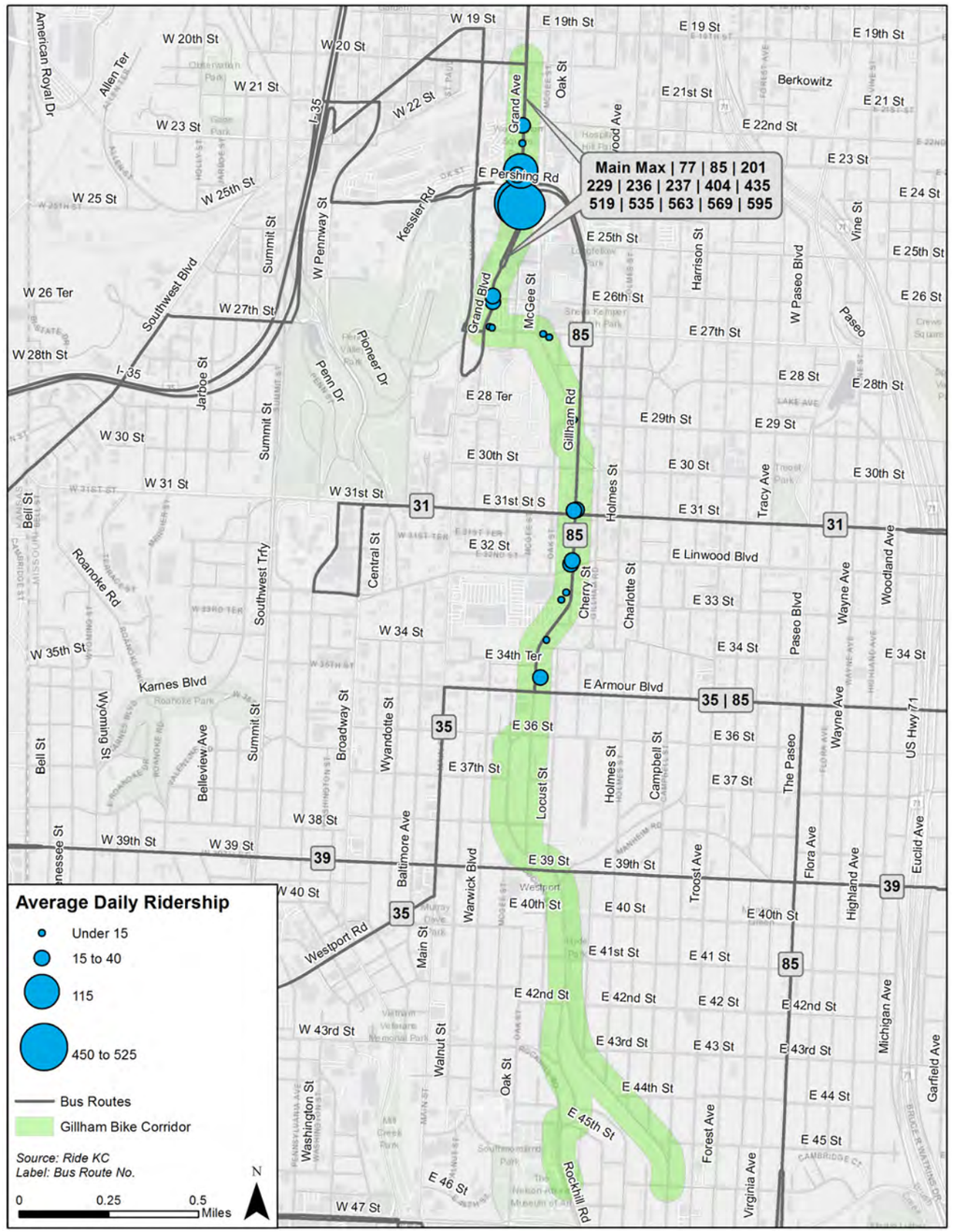
Table 3.1: Top Ten Highest Ridership Bus Stops

No.	Intersection	Average Daily Boardings
1	On Grand at Crown Center Southbound	527
2	On Grand Across from Crown Center Northbound	436
3	On Grand at Pershing Farside Northbound	115
4	On Gillham at Armour Northbound	40
5	On Grand at 26th Northbound	37
6	On Gillham at 31st Northbound	36
7	On Grand at 16th Northbound	29
8	On Grand at Pershing Southbound	27
9	On Grand at 26th Southbound	26
10	On Gillham at 31st Southbound	25

Source: Ride KC

Note: Ridership data was gathered only for stops along the proposed Gillham corridor and excludes stops for the east/west routes crossing the corridor.

Figure 3.6: Existing Transit Ridership



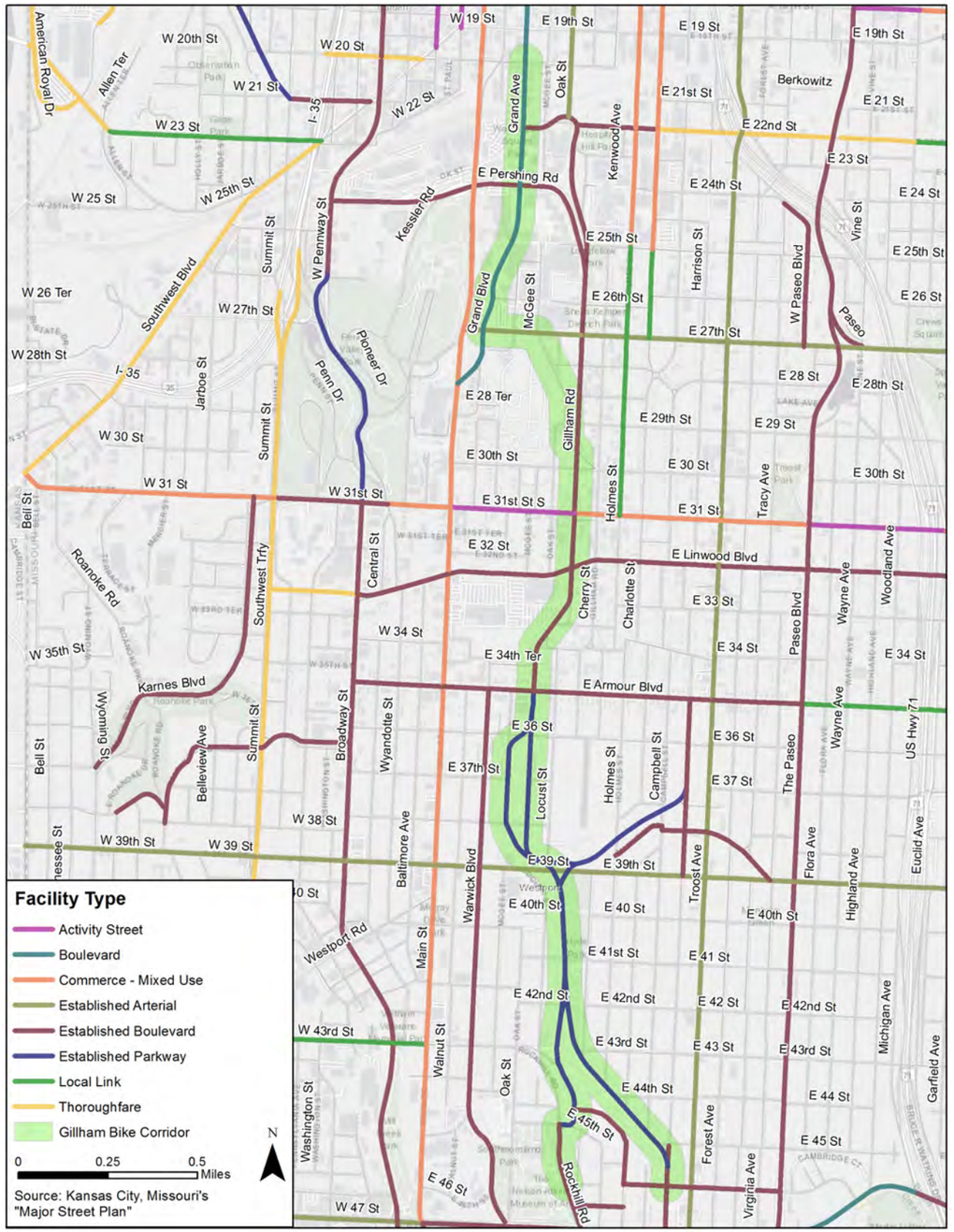
Section 3.8 Existing Street Types

This section focuses on the different road infrastructure within and around the Gillham corridor. Knowledge of the different classifications of streets helps to predict the type and amount of use each facility experiences from automobiles, buses, and other modes of transportation. **Figure 3.7** shows the many different types of streets that make up the study area. According to Kansas City's Major Street Plan, the Gillham corridor is currently made up of established boulevards (Grand Boulevard and Gillham Road north of Armour Boulevard) and parkways (Gillham Road south of Armour Boulevard). It is largely surrounded by local collector streets (Holmes Street and Charlotte Street), referred in the plan as "links", and other boulevards (Warwick Boulevard, Linwood Boulevard, and Armour Boulevard). Boulevards are known by their wide, multi-lane features and often act as thoroughfares. Parkways function similar to Boulevards, but typically have a wider right-of-way and connect the City's parks and recreation opportunities. Both street classifications normally exclude large freight trucks and other heavy vehicles.

Gillham Road south of Linwood Boulevard

Gillham Road north of 39th Street

Figure 3.7: Existing Streets and Classifications



Section 3.9 Corridor Characteristics

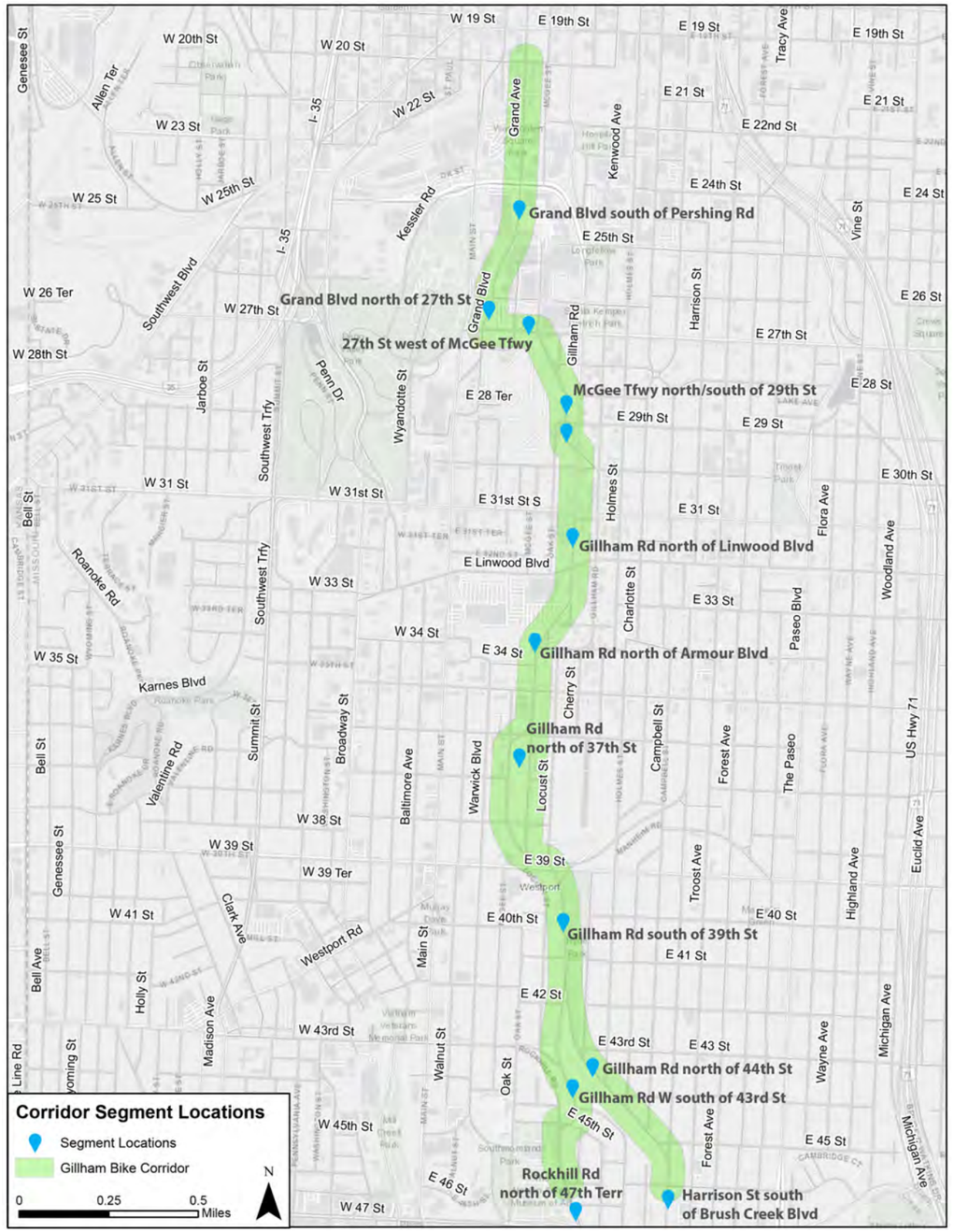
In order to understand the Gillham Road corridor, this section outlines the characteristics of specific segments where enhanced bicycle facilities are being considered. While the original corridor northern terminus was located at 18th Street and Oak Street, discussion with City staff regarding the significant elevation changes and challenging intersections caused the alignment to move a few blocks west to Grand Boulevard. This updated alignment not only takes advantage of the Crown Center activity node, but also the newly implemented bike lanes stretching from 20th Street and Grand Boulevard to the River Market. The 3.5-mile-long Gillham Corridor has several variations in its characteristics, so specific segments were identified to describe corridor nature from its northern terminus at 20th Street and Grand Boulevard to its southern terminus at Oak Street and Volker Boulevard. Refer to **Figure 3.8** for locations of the illustrated corridor segments. **Table 3.2** provides a roadway inventory for the corridor.

Table 3.2: Roadway Characteristics Summary

Roadway Segment	Through Lanes	Middle Turn Lane	Sidewalks	Southbound On-Street Parking	Northbound On-Street Parking
Grand Blvd.(north of Pershing Rd.)	6	Yes	2-side	1-hour (7 am - 4 pm)	No parking
Grand Blvd.(south of Pershing Rd.)	4	No	2-side	No parking	No parking
Grand Blvd. (north of 27th St.)	4	Yes	1-side	No parking	No parking
27th St. (west of McGee Tfwy.)	2	Yes	2-side	No parking	No parking
McGee Tfwy (south of 27th St.)	2	No	2-side	Allowed all day	Allowed all day
McGee Tfwy (south of 29th St.)	2	No	2-side	Allowed all day	Allowed all day
Gillham Rd. (north of Linwood Blvd.)	4	No	2-side	No parking	No parking
Gillham Rd. (north of Armour Blvd.)	5	No	2-side	No parking (4 pm to 6 pm)	No parking
Gillham Rd. (north of 37th St.)	4	No	2-side	No parking (4 pm to 6 pm)	No parking (7 am to 9 am)
Gillham Rd. (south of 37th St.)	4	No	2-side	Allowed all day	Allowed all day
Gillham Rd. (south of 39th St.)	4	No	2-side	No parking	Only Weekends
Gillham Rd. (north of 44th St.)	4	No	2-side	No parking	Allowed all day
Harrison St. (south of Brush Creek Blvd.)	2	No	2-side	Allowed all day	Allowed all day
Gillham Rd. West (south of 43rd St.)	3	No	None	No parking	No parking
Rockhill Rd. (north of 47th Terr.)	4	No	2-side	No parking	No parking

Note: Some roadway segments vary in parking restrictions throughout the segment. Table represents the majority of the segment.

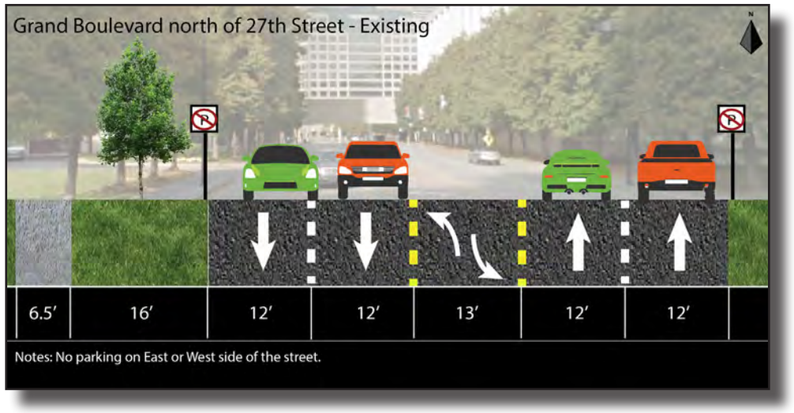
Figure 3.8: Corridor Segment Locations



Grand Boulevard (north of 27th Street)

This segment is comprised of two separate locations split up by Crown Center Square. The northern location, near Washington Square Park, is comprised of one center turn lane and six through lanes. The outside southbound lane is also used for on-street parking for one-hour between 7 a.m. and 4 p.m. on weekdays. On-street parking is prohibited from 4 p.m. to 6 p.m. on weekdays and an adjacent 1,300 space off-street parking garage is located on the northbound side of the roadway. The southern location, illustrated in **Figure 3.9**, is located near the Shook, Hardy and Bacon building, just north of 27th Street. This segment includes four through lanes and a center turn lane, but does not allow on-street parking. A 675-space parking garage sits on the southbound side of the roadway with one entrance located on Grand Boulevard and the other on Main Street.

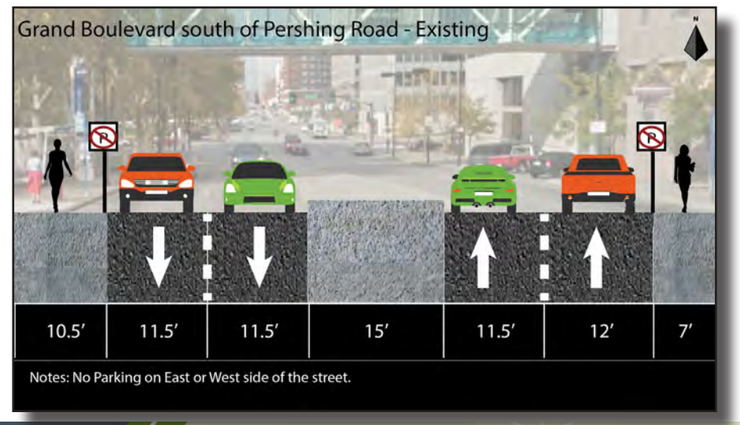
Figure 3.9: Grand Boulevard north of 27th Street



Grand Boulevard (south of Pershing Road)

With the exception of the crossing facility from Crown Center Shops to the square, this segment is comprised of four through lanes and a raised median. No on-street parking is allowed, except for some short-term dedicated angled and parallel parking. A 750-space parking garage is located south of the Crown Center Square and a 470-space garage sits south of the Crown Center garage serving the nearby residential high-rise. Additional parking garages are located in the area with various entrance/exits. Refer to **Figure 3.10** for the street typical.

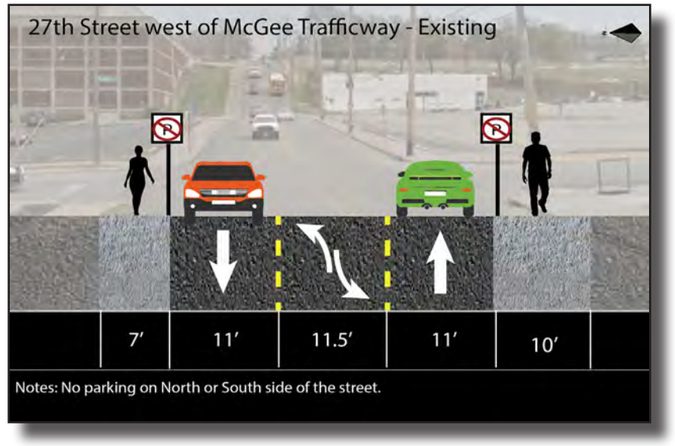
Figure 3.10: Grand Boulevard south of Pershing Road



27th Street (west of McGee Trafficway)

This segment is located near the existing surface parking lots serving the Crown Center office district. The roadway, illustrated in **Figure 3.11**, is comprised of two through lanes, a center turn lane, and prohibits on-street parking at all times.

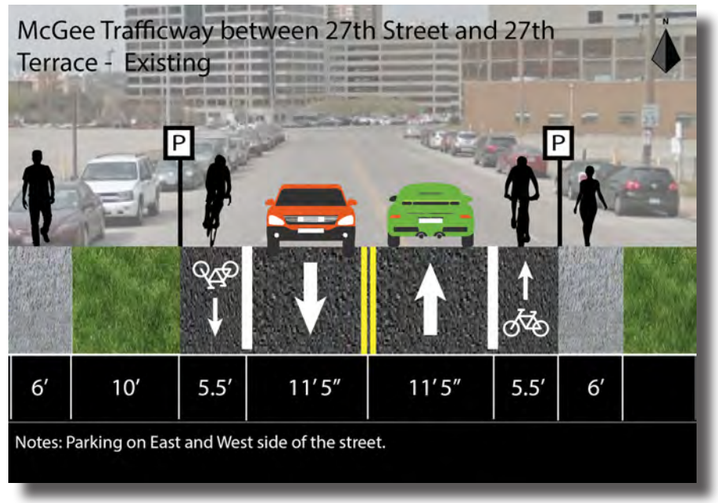
Figure 3.11: 27th Street west of McGee Trafficway



McGee Trafficway (south of 27th Street)

This segment of the corridor is temporarily closed due to the 27th and Gillham multi-family project under construction. The planned construction of this roadway segment, illustrated in **Figure 3.12**, includes two through lanes with five-foot wide bike lanes. Parking is only available in curb bump outs on both sides of the roadway.

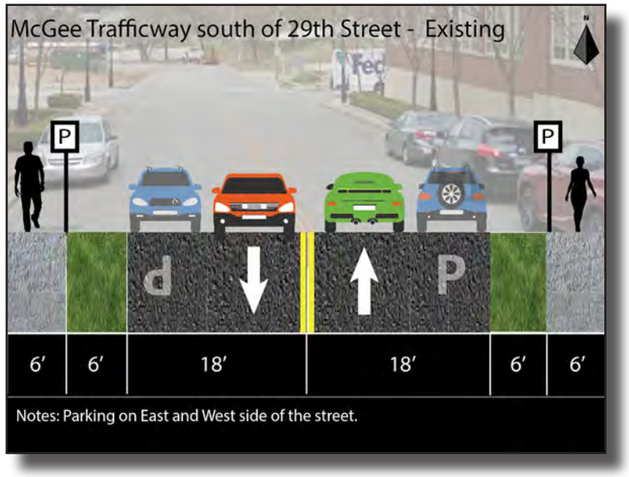
Figure 3.12: McGee Trafficway north of 29th Street



McGee Trafficway (south of 29th Street)

This segment is located in the Union Hill mixed-use development. The roadway, illustrated in **Figure 3.13**, includes two through lanes with both on-street parking and some angled dedicated parking, with no time restrictions.

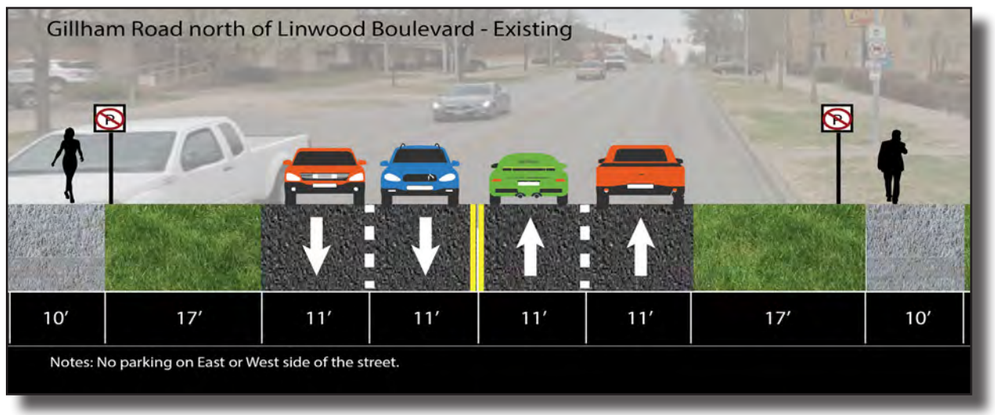
Figure 3.13: McGee Trafficway south of 29th Street



Gillham Road (north of Linwood Boulevard)

This segment is located just south of the Martini Corner district at 31st Street. The roadway, illustrated in **Figure 3.14**, includes four through lanes and does not allow any on-street parking. The only area allowing on-street parking near this area is the southbound outside lane adjacent to the McGee building and the dedicated short-term parallel parking adjacent to the McCoy building in Union Hill. The on-street parking is prohibited from 4 p.m. to 6 p.m. on weekdays.

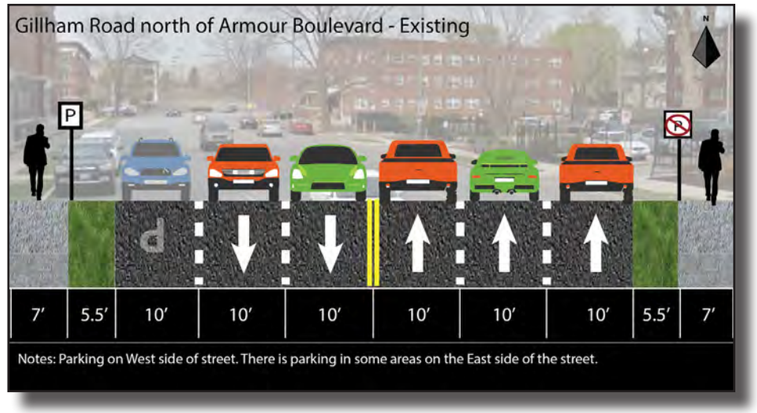
Figure 3.14: Gillham Road north of Linwood Boulevard



Gillham Road (north of Armour Boulevard)

This segment is located south of Home Depot and Costco and adjacent to the multi-family buildings. The roadway, illustrated in **Figure 3.15**, includes six through lanes. The northbound lanes prohibit parking at all times, but the southbound lane is only restricted from 4 p.m. to 6 p.m. on weekdays. These characteristics continue south along Gillham Road until 36th Street. Northbound on-street parking is allowed between Armour and 36th Street, unless it is within the restricted period of 7 a.m. to 9 a.m. on weekdays. The posted time restrictions coordinate with the directional peak traffic volumes; northbound in the morning peak and southbound in the p.m. peak.

Figure 3.15: Gillham Road north of Armour Boulevard



Gillham Road (north of 37th Street)

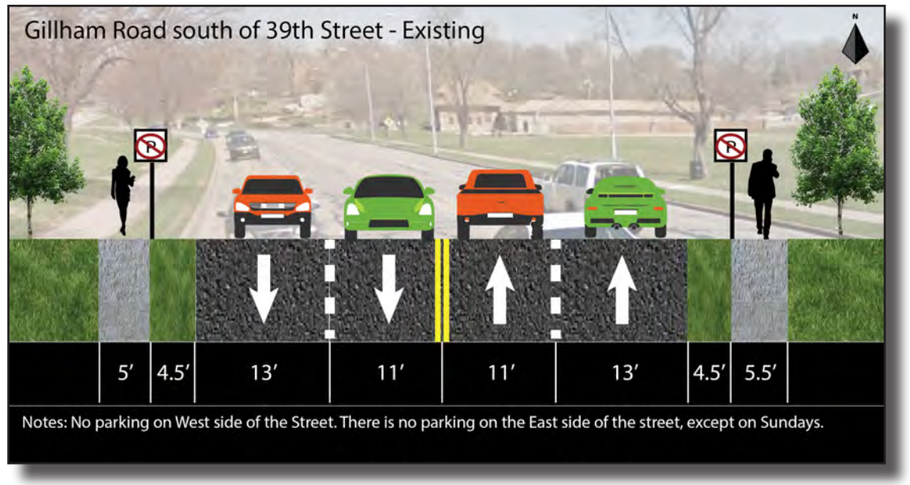
This segment, surrounding Hyde Park, is the only section of the corridor where the roadway splits into separate one-way facilities. Each facility is comprised of two through lanes and a third lane dedicated for on-street parking, illustrated in **Figure 3.16**. While on-street parking is allowed along most of this segment, there are some restrictions between 37th Street and Armour. Northbound on-street parking is restricted from 7 a.m. to 9 a.m. on weekdays and the southbound lane is restricted from 4 p.m. to 6 p.m. on weekdays.

Figure 3.16: Gillham Road north of 37th Street

Gillham Road (south of 39th Street)

This segment of the corridor is located adjacent to Gillham Park and its athletic fields. The roadway, illustrated in **Figure 3.17** is comprised of four through lanes. Parking is prohibited on the southbound lanes, but the northbound lanes allow on-street parking on weekends.

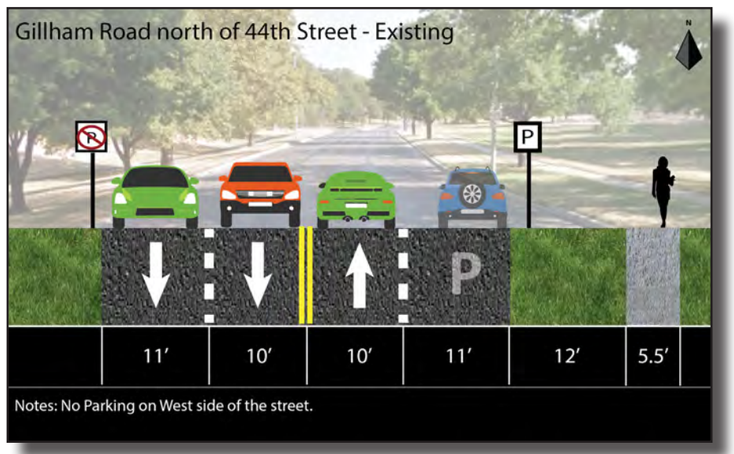
Figure 3.17: Gillham Road south of 39th Street



Gillham Road (north of 44th Street)

This segment is located adjacent to the southern section of Gillham Park and its walking trail. The roadway, illustrated in **Figure 3.18**, includes four through lanes. The southbound lanes prohibit on-street parking, but on-street parking is allowed along the northbound segment, south of Kenwood Street.

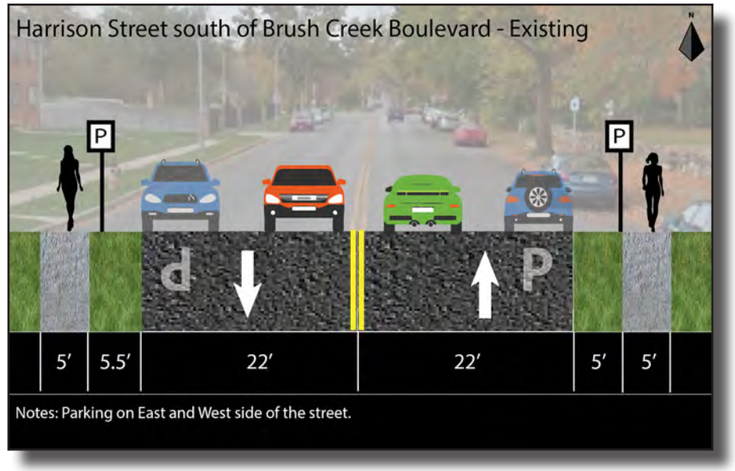
Figure 3.18: Gillham Road north of 44th Street



Harrison Street (south of Brush Creek Boulevard)

This segment is located just north of Emanuel Cleaver II Boulevard. The roadway, illustrated in **Figure 3.19**, is where both Gillham Road and Harrison Street converge. There are two through lanes both allowing on-street parking, with some ADA required parking on the northbound lane.

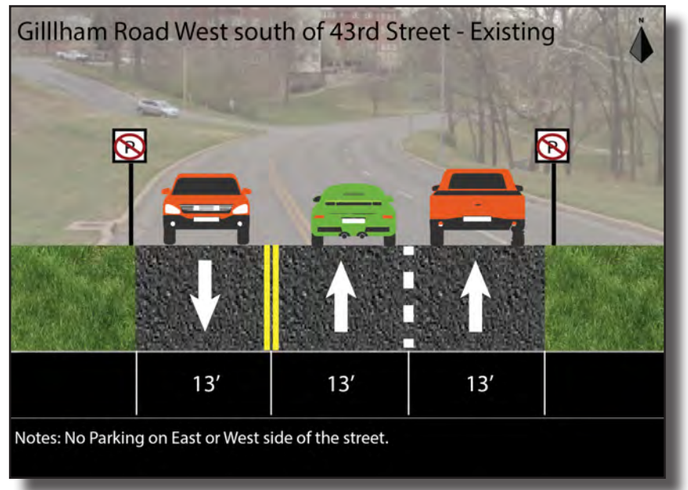
Figure 3.19: Harrison Street south of Brush Creek Boulevard



Gillham Road West (south of 43rd Street)

This segment is located on top of the hill, adjacent to the southern portion of Gillham Park. The roadway, illustrated in **Figure 3.20**, includes two northbound through lanes and one southbound through lane. No parking is allowed at any time.

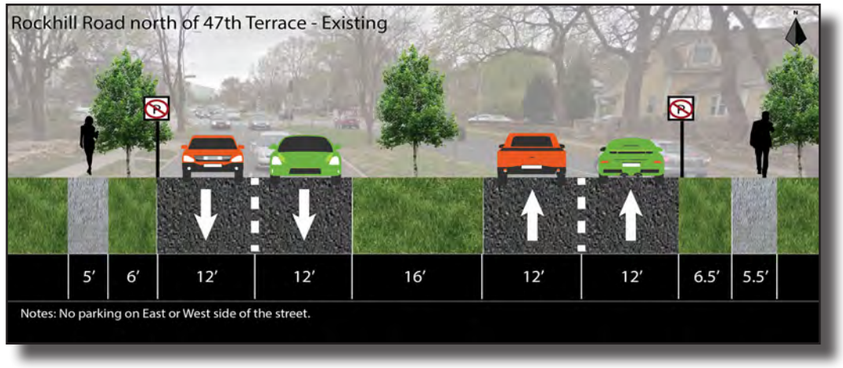
Figure 3.20: Gillham Road West south of 43rd Street



Rockhill Road (north of 47th Terrace)

This segment is located near the Nelson Atkins Museum. The roadway north and south of Emanuel Cleaver II Boulevard are similar in design with four through lanes and a raised median. No parking is allowed at any time. Refer to roadway segment's characteristics illustrated in **Figure 3.21**.

Figure 3.21: Rockhill Road north of 47th Terrace



Gillham Road at 31st Street looking south

Gillham Road at Brush Creek Boulevard looking north

Gillham Road at 31st Street looking north

Section 3.10 Traffic Characteristics

This section of the report examines the current characteristics of the Gillham Corridor and the interaction with automobiles. This corridor serves as a prime commuting thoroughfare for many in the area. **Figures 3.22** discuses crash data along the corridor. **Figure 3.23** and **3.24** describe the AM and PM traffic flows while **Figures 3.25** and **3.26** describe AM/PM existing Level of Service (LOS) along the corridor.

Vehicle crash data was provided by the city and includes a five-year period throughout the corridor (2013-2017). During this time period, six pedestrian crashes occurred along Gillham Road; four at Armour Road and two at Linwood Boulevard. One bicycle crash occurred near the intersection of Gillham Road and 39th Street. None of the bicycle or pedestrian crashes during this time period were fatal. As seen in **Figure 3.22** the intersections with the most average crashes per year were 39th Street and Gillham Road (17), 31st Street and Gillham Road (14), Rockhill Road and 47th Street (10.4) and Swope Parkway and Rockhill Road (10.4).

Gillham Road near 39th Street

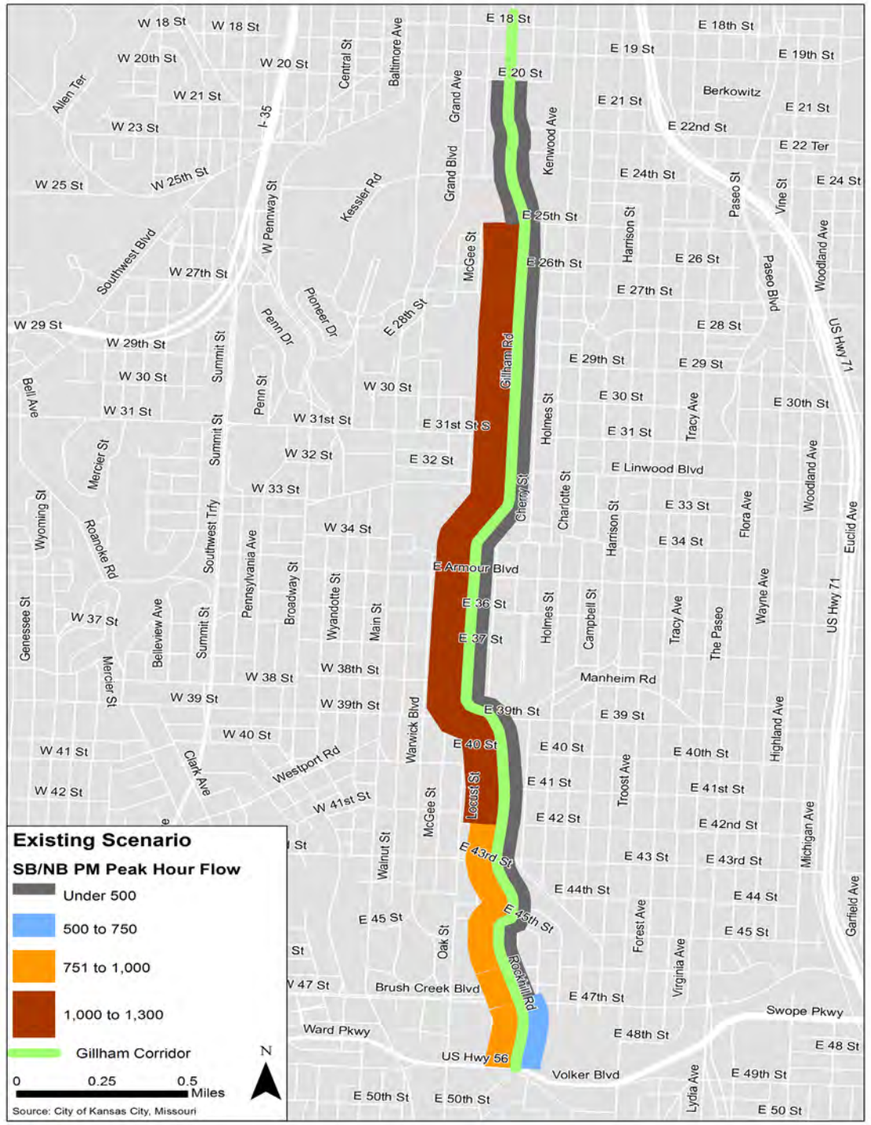
Gillham Road near 27th Street

Figure 3.22: Average Vehicle Crashes per Year

Figures 3.23 and **3.24** display the peak vehicular traffic volumes along the corridor. Traffic volumes strongly reflect peak direction, with heavier traffic northbound in the mornings, and southbound in the evenings. The strongest traffic flows along Gillham Road occur northbound between 33rd Street and 28th Street in the morning and southbound between 25th Street and 42nd Street in the evening. In general, Gillham Road experiences more congestion in the afternoon hours than the morning hours.

Figure 3.23: Existing AM Traffic Flow

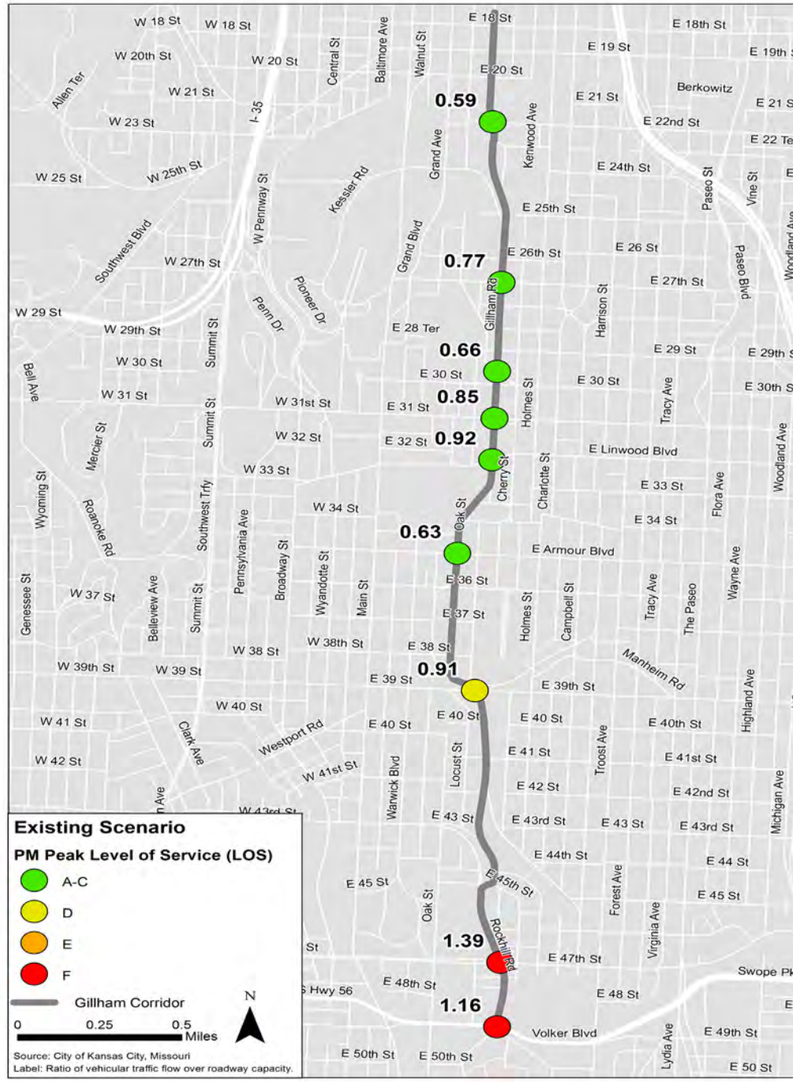
Figure 3.24: Existing PM Traffic Flow



Vehicular Level of Service (LOS) was analyzed in the corridor. Vehicular LOS is a quantitative measure, ranging from LOS A to F, used to categorize different traffic delays, at intersections. **Figures 3.25** and **3.26** illustrate the existing LOS along the corridor. The LOS values depict a ratio between the existing vehicle volume over the existing capacity of the roadway. In the morning peak hour, LOS D is seen on Gillham Road at 27th street, and at Rockhill Road at Volker Boulevard. In the afternoon peak hour, lower levels of LOS are seen at 39th Street, and on Rocklhill Road at 47th Street and at Volker Boulevard.

Figure 3.25: Existing AM Vehicular Level of Service

Figure 3.26: Existing PM Vehicular Level of Service



Bicycle Level of Traffic Stress (LTS) was also analyzed for this corridor. This analysis is consistent with the LTS analysis conducted for the Bike KC Master Plan (2018 Draft, Ongoing) The LTS method was developed by the Mineta Transportation Institute to determine the relative level of stress that may be perceived by people who bicycle along a particular facility. This method recognizes that a primary deterrent to bicycling is the high level of stress people who bicycle may feel riding with high volume or high speed automobile traffic. This stress may be present even when a bike lane is provided.

Previous efforts to determine level of service for people who bicycle include the Bicycle Level of Service (BLOS), and was adopted by the Highway Capacity Manual as a method for determining multimodal Level of Service. The BLOS method requires a significant amount of localized data, requiring, among others, lane widths, land use, presence of a parking lane, amount of operating space afforded to bikes, and traffic volume. This data is fed into a series of complicated formulas that hinder the ability for users to relate a particular road with its corresponding Bicycle Level of Service. Additionally, the BLOS reliance on an A, B, C, D, E or F classification of a roadway's suitability for bicyclists does not readily correspond to how bicyclists perceive the roadway. Bicyclists or transportation managers may not readily understand the differentiation between a road classified as B to one classified as C.

LTS on the other hand features four classifications, ranging from LTS 1, which is suitable for children, to LTS 4, which is suitable for riders who are comfortable sharing the road with automobiles traveling 35 mph or more. LTS scores 1 and 2 are the target scores for attracting bicyclists who are interested in cycling more, but are concerned about their safety. The data inputs are limited to number of lanes, ADT, prevailing or posted speed, presence and width of bike lanes or shoulders, presence of parking next to bike lanes, and if present, the width of the combined bike lanes and parking lanes. LTS criteria is further described in **Table 3.3**.

Table 3.3: Level of Traffic Stress Criteria

LTS 1	LTS 2	LTS 3	LTS 4
Presenting little traffic stress and attractive enough for a relaxing ride. Suitable for children trained to safely cross intersections Separated from traffic or in a shared road with only occasional vehicles.	Presents little traffic stress but may not be suitable for children. 1 or 2 through lanes per direction Either physically separated or in an exclusive bicycling zone with adequate clearance from parking zone. Intersection crossings are not difficult for most adults.	Less stress than integrating with multi-lane traffic. Cyclists have either a bike lane next to moderate-speed traffic, or shared lanes on streets that have moderately low speed and not multi-lane. Crossings may be longer or across higher-speed roads, but still considered acceptably safe for most adult pedestrians.	A level of stress beyond LTS 3.

Gillham Road south of 44th Street looking North

The original 2012 LTS criteria was updated in 2017 by an author of the original report to incorporate more quantitative values across a matrix. **Table 3.4** displays this matrix for those bike segments in a mixed traffic criteria.

Table 3.4: Level of Traffic Stress Matrix

Number of lanes	Effective ADT*	Prevailing Speed ≤ 20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50+mph
Unlaned 2-way street (no centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
1 thru lane per direction (1-way, 1-lane street or 2-way street with centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
2 thru lanes per direction	0-8000	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	8001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
3+ thru lanes per direction	any ADT	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

* Effective ADT = ADT for two-way roads; Effective ADT = 1.5*ADT for one-way roads

A LTS link analysis was performed for segments of the Gillham Corridor between 18th street and Volker Boulevard. This is illustrated in **Table 3.5** and **Figure 3.27**. Level of Traffic Stress along the corridor was LTS 3 along the northern part of the corridor at Oak Street, and LTS 4 along the remainder of the corridor. LTS 3 is characterized by shared lanes with moderate levels of traffic at moderate speeds. The LTS 4 designation is the result of the prevalent 35 mph posted speed limit, multiple lanes of traffic, high traffic volumes, and lack of bicycle facilities. Refer to **Appendix A** for the full Level of Stress Matrix.

Table 3.5: Existing Level of Traffic Stress by Segment

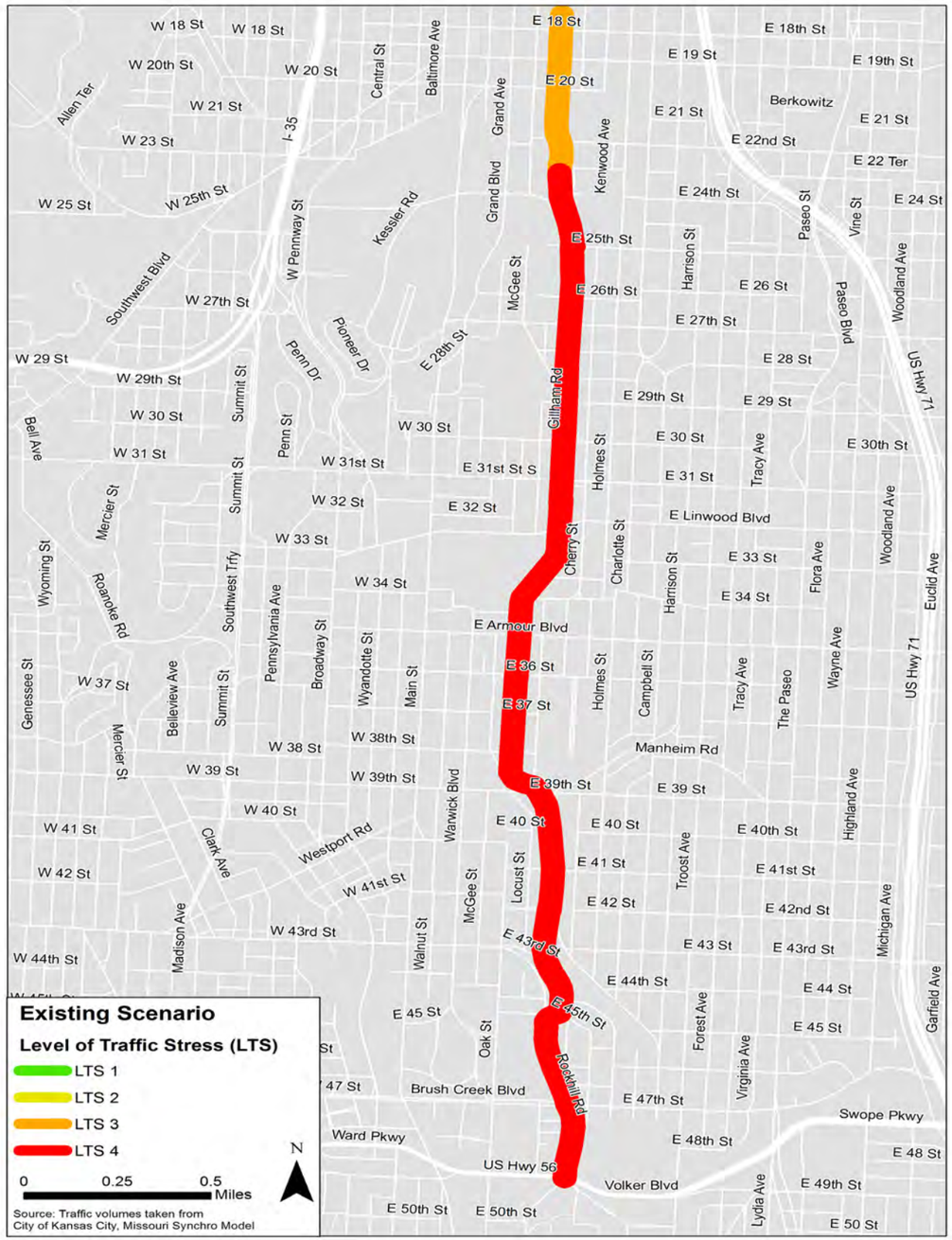
Segments	Two-Way** ADT	South-bound Lanes	North-bound Lanes	Posted Speed Limit	Level of Traffic Stress (LTS)
Oak Street between 18th Street and 22nd Street*	6,900	2	2	30	LTS 3
Gillham Road between 22nd Street and 25th Street	15,000	2	2	35	LTS 4
Gillham Road between 25th Street and 27th Street	13,600	2	2	35	LTS 4
Gillham Road between 27th Street and McGee Trafficway	14,300	2	2	35	LTS 4
Gillham Plaza between McGee Trafficway and 31st Street	13,800	2	2	35	LTS 4
Gillham Road between 31st Street and Linwood Plaza	16,500	3	3	35	LTS 4
Gillham Road between Linwood Plaza and Armour Boulevard	12,800	3	3	35	LTS 4
Gillham Road between Armour Boulevard and 36th Street	15,000	2	2	35	LTS 4
Gillham Road between 36th Street and 39th Street	13,300	2	2	35	LTS 4
Gillham Road between 39th Street and Gillham Road West	15,000	1	2	35	LTS 4
Rockhill Road between Gillham Road West and 47th Street	12,700	2	2	30	LTS 4
Rockhill Road between 47th Street and Volker Boulevard	14,900	2	2	30	LTS 4

Notes:

(*) Gillham Road / Oak Street and 22nd Street traffic flow

(**) Peak flow multiplied by 10

Figure 3.27: Existing Level of Traffic Stress



Gillham Road at Linwood Boulevard

Gillham Road at Gillham Park

Section 3.11 Opportunity Streets

One way of developing bicycle network connections is identifying those local streets that would not be considered major streets, yet have a contiguous length of over a half mile, or preferable a mile, and are signal controlled at major intersections. In the Gillham corridor, many of the streets that would be considered opportunity streets are already identified as recommendations for bike routes or bike facilities in the draft "Bike KC Route Network," expected to be finalized and adopted in 2018. However, additional streets may provide opportunities for bike travel along parts of the corridor, seen in **Figure 3.28**. These include streets such as Cherry Street, McGee Street, and Kenwood Avenue. However, it would be difficult to combine these facilities as a single path along the entire length of the corridor, due to the discontinuous nature of the segments, and lack of signal control when they reach major cross streets.

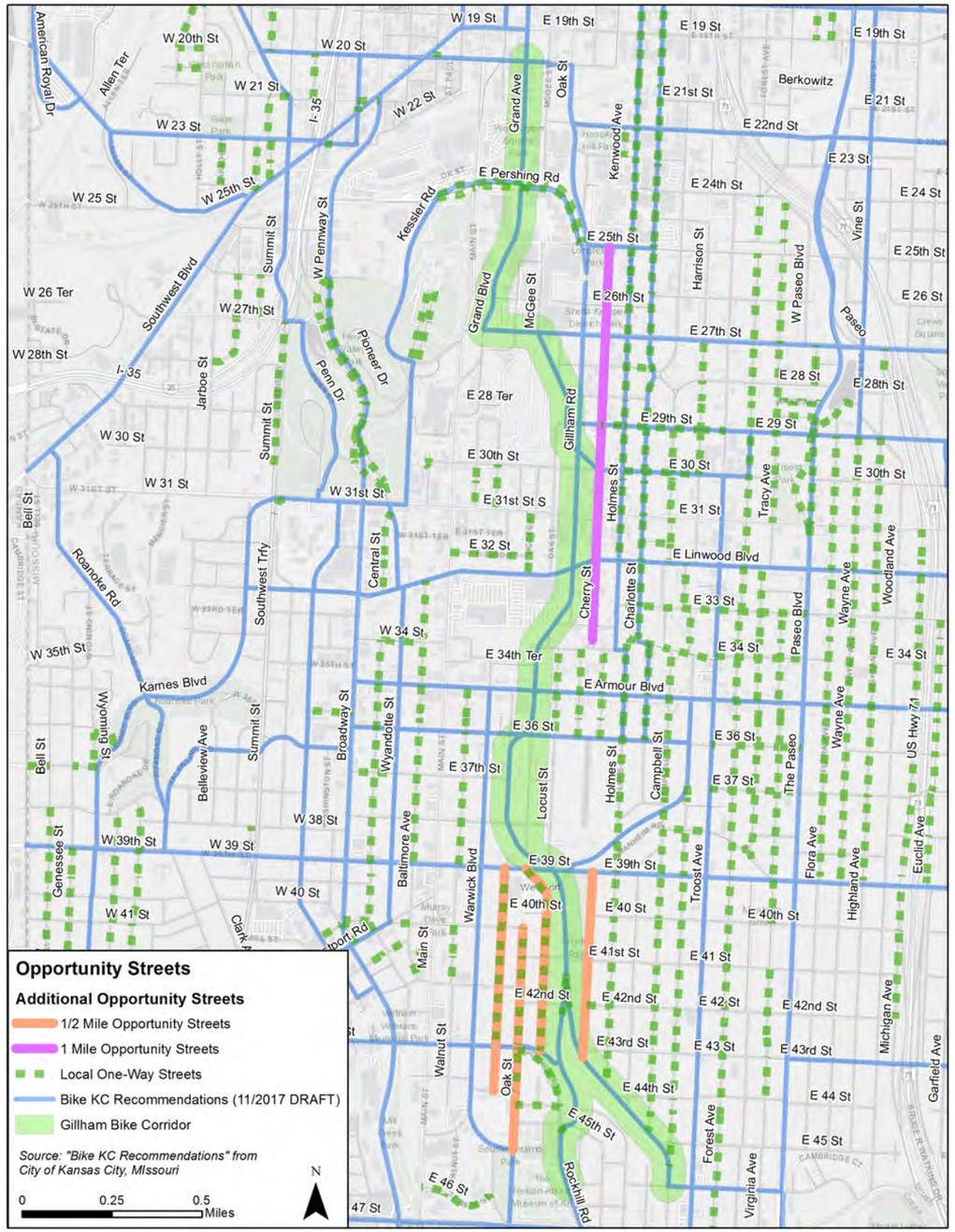
The Gillham corridor area has several one-way streets, which have both positive and negative aspects. In the fine-grained roadway network of the Gillham corridor, one-way streets are typically alternating or paired with each other. This provides choices for bicyclists traveling through the area. However, one-way streets may encourage automobile traffic to travel at higher speeds than if the same facility was two-way. One way streets also require bicyclists to travel longer distances to get to destinations, or alternatively, travel unsafely (and illegally) against one-way automobile traffic. Several one-way streets in the Gillham corridor allow parking on both sides of the street, restricting the available width for bicycles and cars to safely share the road while also allowing bicyclists to avoid the door zone.

Warwick Boulevard and 41st Street

Oak Street at 18th Street

Cherry Street at 27th Street

Figure 3.28: Opportunity Streets



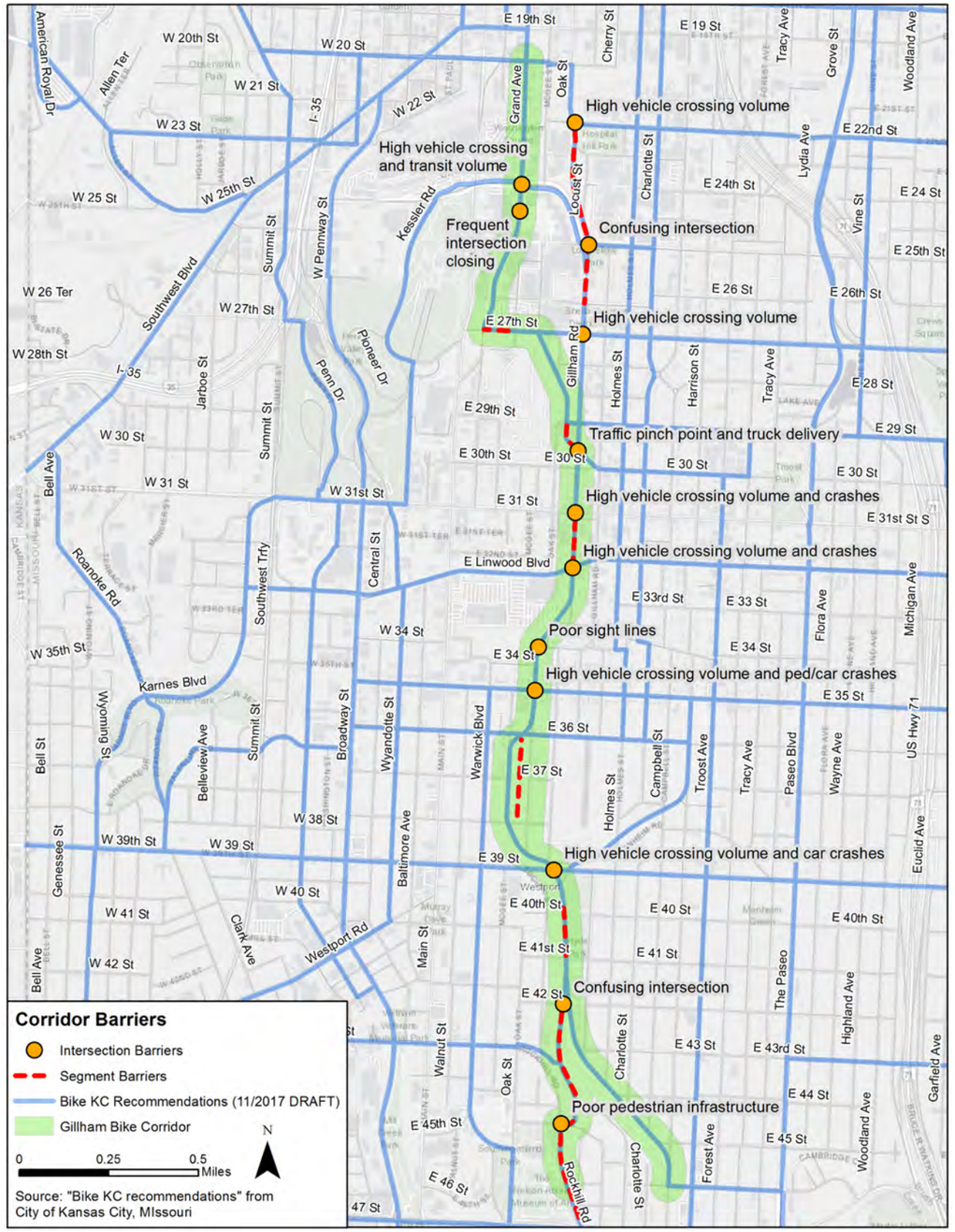
Section 3.12 Barriers

Barriers regarding the enhanced bicycle facilities were identified by intersections and segments along the corridor, further described in **Table 3.6** and illustrated in **Figure 3.29**. The intersections with the most common barriers include areas with significantly high volumes of either peak hour traffic, transit frequency or crash rates. Other difficulties observed in the corridor relate to poor sight lines and confusing intersections. Barriers concerning limited right-of-way, steep elevation change and difficult crossings were observed along multiple segments of the corridor. The steep elevation along Gillham Road at Hospital Hill warranted the evaluation of other potential routes for bicycle travel, such as Grand Boulevard and McGee Trafficway. This modification also provided an opportunity to continue the recently completed Grand Boulevard bike lanes. While these barriers are intended to identify concerns related to evaluating potential enhanced bicycle facilities, the locations requiring additional consideration will also support the preservation of safety for all transportation users in the corridor.

Table 3.6: Barriers

Intersect	Barrier
Gillham and 22 Street	High vehicle crossing volume
Grand and Pershing Road	High vehicle crossing and transit volume
Crown Center Plaza	Frequent intersection closing for events
Gillham and 25 Street	Confusing intersection
Gillham and 27 Street	High vehicle crossing volume
Gillham and McGee Trafficway	Traffic pinch point and truck delivery
Gillham and 31 Street	High vehicle crossing volume and crash rates
Gillham and Linwood Boulevard	High vehicle crossing volume and crash rates
Gillham Plaza and Gillham Road	Poor sight lines
Gillham and Armour Boulevard	High vehicle crossing volume and ped/car crashes
Gillham and 39 Street	High vehicle crossing volume and crash rates
Gillham and 42 Street	Confusing intersection
Gillham Road West and 45 Street	Poor pedestrian infrastructure
Segment	**Barrier**
Gillham Road from 22 to 26 Street	Steep elevation change
27 Street from Grand Ave to Warwick Tfwy	Limited ROW for bike facility
McGee Tfwy from Gillham Rd to 29 St	Limited ROW for bike facility
Gillham between Linwood and 31 Street	Limited ROW for bike facility
Hyde Park Trail	Steep elevation change in park area
Gillham Road from 40 to 41 Street	Difficult to cross for park amenities
Gillham Road West / Rockhill Road from 42 to 47 Street	Steep elevation and no sidewalk

Figure 3.29: Barriers



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SECTION 4: BEST PRACTICES

Section 4.1 Introduction

The Gillham corridor is a diverse area with varying right-of-way, adjacent land uses, and travel patterns. The area studied included, among others, Gillham Road, Gillham Plaza, McGee Trafficway, and 27th Street. The following are best practices related to bicycle facility design for consideration of the Gillham Road bike facility.

Section 4.2 Facility Selection

Accommodations for bicycle transportation vary widely in form and function and have evolved significantly over the past decade. There is not one facility type that is considered best. The most appropriate type of facility for a corridor segment depends on constraints, corridor characteristics, and the role of the bikeway within the broader bicycle transportation network. Just as streets and highways are assigned functional classifications based on their role within the roadway network, bikeways exist on a similar continuum of function, from local access to higher speed throughput. For example, a trail loop within a park or a signed bike route through a residential subdivision may serve mainly to provide access to recreation or connect homes to the bicycle transportation network. Meanwhile, a trail alongside a freeway or a trunk route connecting between neighborhoods may place a greater emphasis on reducing delays at roadway crossings and minimizing conflicts with driveways and turning vehicles.

To more deliberately consider the role of a bicycle facility within the broader network, planners and designers sometimes refer to different categories of bicycle riders, shown in **Figure 4.1**, ranging from those that are “interested but concerned” to those riders that are “experienced and confident”. To create a low-stress network for bicycling, facilities should be designed to appeal to the broadest range of users. The Gillham Road bicycle facilities will likely take the form of some combination of on-street bicycle lanes and separated bikeways. The design considerations presented in this section have been tailored to this understanding. Other design considerations should be considered for other bicycle facility types. **Figures 4.2** through **4.5** illustrate aspects of the different types of bicycle facilities.

Figure 4.1: Range of Bicycle Riders

Figure 4.2: Shared Roadway

USA | Source: Toole Design Group

Shared Roadway

- Street designed to mix bicycle travel with other vehicles
- Requires additional measures to make low-stress on most streets
- Always high-stress if speed and volumes thresholds exceeded

Options to Make Low-Stress

- Use traffic diversion and calming to achieve sufficiently low speeds and volumes (less than 20 mph or fewer than 2,000 vehicles per day)
- Provide raised medians, curb extensions, button-activated warning beacons, or signals to assist with major roadway crossings

Other Optional Characteristics

- Orient stop signs to cross streets to better accommodate through bicycle travel

Figure 4.3: On-Street Bike Lane

Portland, OR | Source: Toole Design Group

On-Street Bike Lane

- Lane on roadway reserved for bicycle use
- May require additional measures to make low-stress, depending on roadway speeds and volumes

Options to Make Low-Stress

- Add buffer space and/or separation between bike lane and traffic on streets with higher speeds or volumes
- Mitigate conflicts with turning vehicles
- Consider removing or relocating parking

Other Optional Characteristics

- May transition to shared lane (or “mixing zone”) to accommodate right-turning vehicles, bus stops, steep downhills, or constrained sections
- Minimum lane widths depend on roadway characteristics

Figure 4.4: Separated Bike Lane

Saint Paul, MN | Source: Toole Design Group

Separated Bikeway

- One or two-way facility reserved for bicycle use and physically separated from roadway and sidewalk
- Low-stress between intersections

Options to Make Low-Stress

- Extend median buffers through crosswalks to tighten radii of turning vehicles and provide space and visibility to encourage yielding
- Use signals to mitigate conflicts with turning vehicles
- Mitigate conflicts at driveways using signs and/or colored pavement

Other Optional Characteristics

- Bus stops and parking, if present, are located between the bikeway and roadway
- Minimum bikeway width dependent on maintenance vehicles

Figure 4.5: Shared-Use Path

Washington, DC | Source: Toole Design Group

Shared-Use Path

- Travelway that excludes motorized vehicles
- Low-stress between intersections

Options to Make Low-Stress:

- Provide raised medians, curb extensions, button-activated warning beacons, or signals to assist with major roadway crossings
- Minimize roadway and driveway crossings

Other Optional Characteristics:

- Orient stop or yield signs to cross streets to better accommodate through bicycle travel
- Use of yield or stop control at roadway and driveway crossings depends on sight lines and stopping sight distance
- Path width and separation of uses vary based on context and design constraints

Section 4.3 Design Considerations

The following section outlines the different aspects that were kept in mind as the project team moved forward in designing the appropriate bicycle infrastructure for the Gillham corridor.

General Guidance

Signs, markings, and signals should conform to those published in the Manual on Uniform Traffic Control Devices (MUTCD) and Federal Highway Administration (FHWA) Interim Approvals. To use traffic control devices with Interim Approval status, jurisdictions must file a letter with FHWA confirming that their use will conform to the conditions of interim approval.

Standard and guidance presented here is drawn primarily from the resources listed at the end of this best practices review, as noted in parenthetical references.

Union Hill looking north on Gillham Road

Separation of Traffic

Bicycle and automobile traffic can be separated from each other by having each mode use the same space at different times, such as in shared lanes or in mixing zones near intersections; or each mode can use a different part of the roadway at the same time, such as a bike lanes or separated bike lanes running parallel to automobile lanes.

Shared Lane/Mixing Zone

Shared lanes are streets designed to mix both automobile traffic and people biking. A variant of this are mixing zones. Mixing zones typically occur at intersections or at transit stops where automobile traffic crosses over a separated bike facility such as a bike lane, to access a right-turn lane or transit stop.

Standards:

Motor vehicle traffic may only merge into bikeways that are one way in the same direction of travel as motor vehicle traffic *(per state law).*

Guidance:

Transitions to shared lanes may be accompanied by shared lane markings and/or MUTCD R4-11 (bicycles may use full lane) signs, illustrated **Figure 4.6.** (MUTCD).

Mixing zones may be used to facilitate cross-over movements for buses or turning vehicles (see following sections).

Figure 4.6: Transition to Shared Lane Sign

Roslindale, MA | Source: Toole Design Group

Bike Lane Adjacent to Traffic

A bike lane is a lane on the roadway reserved for people biking, as illustrated below.

Standards:

Minimum bike lane width adjacent to curb is 4 feet (not including gutter pan) (AASHTO). Recommended minimum width is 5 to 7 feet.

Minimum bike lane width is 5 feet when used between travel lanes and on-street parking (AASHTO).

Guidance:

Greater widths are recommended in locations with high volumes of bicyclists, parking turnover, vehicle speeds, traffic volumes, or heavy trucks or buses.

Painted buffers, shown in **Figure 4.7,** are recommended where space permits and may expand the appeal of bike lanes to additional users. Buffers also help distinguish wide bike lanes from general travel lanes, as illustrated below.

Figure 4.7: Painted Buffers (top: conventional; bottom: buffered)

Boston, MA | Source: Toole Design Group

Seattle, WA | Source: Toole Design Group

Seattle, WA | Source: Toole Design Group

Physical Separation

Physically separated bikeways, shown in **Figure 4.8 through 4.10**, run parallel to a road, and are separated from automobile traffic by either a curbed buffer or vertical delineation.

A wide range of options are available to separate bikeways from other uses. Most are not considered traffic control devices. Guidance is instead based primarily on practical considerations of constructibility, maintenance, and aesthetics. In surveys and other outreach, the project team has conducted in other communities, users tend to prefer separation that is both substantial and aesthetically pleasing, such as planted medians or modular planter boxes. Other options include, but are not limited to, vertical curbs, parking wheel stops, rigid bollards, concrete barriers, or flexible delineators. Private vendors increasingly offer a variety of off-the-shelf products for constructing separated bikeways.

Standards:

The color and reflectivity of channelizing markers shall comply with Section 3H.01 of the MUTCD.If used on high-speed roadways, policies and standards for roadside fixed objects must be observed.

Figure 4.8: Physical Separation

Salt Lake City, UT | Source: Salt Lake City Government

Cambridge, MA | Source: Toole Design Group

Guidance:

- Signage and markings may be used to encourage driver yielding at intersections and driveway crossings (MassDOT).
- If parking is located adjacent to a separated bikeway, at least 3 feet of separation is recommended to accommodate people exiting vehicles (MassDOT and FHWA).
- A detectable edge—either planted buffer, street furnishings, or curb—should be present between the sidewalk and bikeway (MassDOT and FHWA).
- If curbs are used adjacent to bikeways, an angled curb face or 2 or 3-inch curb is recommended to reduce the risk of pedal strikes (MassDOT).
- Optimal bike lane elevation (street, sidewalk, or intermediate-level) depends on retrofit versus reconstruction, drainage, accessibility requirements, and local agency or public preference (MassDOT).
- Bikeways bordered by curbs or other vertical elements on both sides are usually 7 to 10 feet in width for one-way and 10 to 14 feet in width for two-way facilities to accommodate bicycle passing movements and street sweeping and snow plowing equipment. Constrained bike lanes that are not immediately bordered by vertical elements may be as narrow as 4 feet (one-way) or 8 feet (two-way) (MassDOT).

Figure 4.9: Physical Separation

Seattle, WA | Source: Toole Design Group

Both one-way and two-way operation are possible, with each having advantages and disadvantages:

One-way operation:

- Provides a greater range of options for mitigating conflicts at intersections and bus stops
- Better conforms to driver expectations
- Legible route for bicycle rider expectations and access to destinations

Two-way operation:

- Can save space by making a greater proportion of width usable and requiring only one buffer to separate from motor vehicle traffic instead of two
- Can provide bicycle riders with more direct routes to destinations on one side of a street
- Can provide for more social interaction
- Typically require a greater level of intervention to mitigate conflicts at intersections and bus stops

Costs:

Cost estimates of bikeway separation vary widely between corridors and communities. Whether a project is a retrofit to an existing roadway surface, a full reconstruction, or a partial reconstruction significantly alters cost considerations. Retrofit treatments, in particular, are less costly to install and maintain in communities where the necessary materials, equipment, and installation protocols are already established. Maintenance practices and costs vary widely depending on local preference, public expectations, and resource availability.

Figure 4.10: Physical Separation

Saint Paul, MN | Source: Toole Design Group

Mitigating Conflicts with Turning Vehicles

Intersections increase the exposure of people biking to vehicle collisions. Right-turning cars must cross over the space used by people biking through the intersection. Intersections and mixing zones can be designed to have turning vehicles cross over well before the intersection, or delaying the vehicle's turn until it has already slowed down to make the turn. These mitigation efforts increase the visibility of people biking to the vehicle driver.

Turn Lane with Crossover Before Intersection

Positioning a crossover before the right turn lane of an intersection allows people biking to correctly position themselves to the left of the right-turn lane, and signifies an appropriate location for drivers to safely merge across the bike lane into the turn lane, illustrated below.

Standards:

Vehicles may only merge across bike lanes that are one way in the same direction of travel as the motor vehicle traffic (per state law).

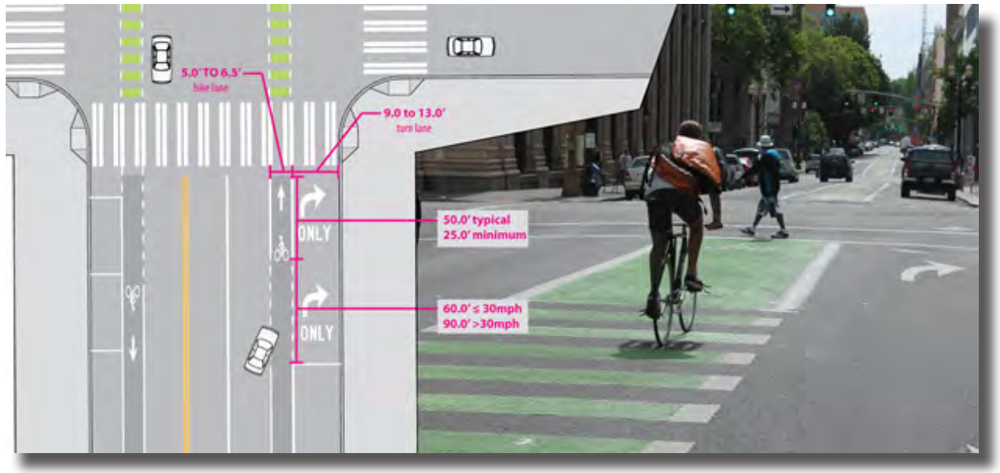
Guidance:

A MUTCD R4-4 (Begin Right Turn Lane; Yield to Bikes) sign may be used where motor vehicles cross the bike lane (MUTCD).

Typical dimensions are noted in **Figure 4.11** (guidance adapted from MUTCD for the Seattle Right-of-Way Improvements Manual).

Some potential bicycle riders may not be comfortable with vehicles merging across the bike lane.

Figure 4.11: Turn Lane with Crossover Before Intersection



Graphic: Seattle Right-of-Way Improvements Manual | Photo: Portland, OR
Source (both): Toole Design Group

Mixing Zone

A mixing zone, illustrated in **Figure 4.12** is where both cars and people biking share a lane as the car prepares for a right turn. The mixing zone encourages motorists to yield to bicyclists crossing, and guides people biking to the part of the turn lane which tends to have lower speed traffic, rather than the higher speed through lanes.

Standards:

Motor vehicle traffic may only merge into bikeways that are one way in the same direction of travel as motor vehicle traffic (per state law).

Guidance:

If used, mixing zones should be relatively short (25-50 feet, plus taper length) (MassDOT).

Optional yield markings, accompanied by a MUTCD R1-2 or R4-4 sign, may be used where vehicles enter the shared lane.

Some potential bicycle riders may not be comfortable with mixing zones.

Figure 4.12: Mixing Zone

Graphic from Seattle Right-of-Way Improvement Manual | Source: Toole Design Group

Protected Intersections

A protected intersection extends physical separation between people biking and motorists further into the intersection. The resulting configuration, illustrated in **Figure 4.13** means motorists have slowed down to make the turn prior to crossing the bike lane.

Guidance:

Where physical separation is present between the bikeway and traffic, this separation may be extended past the crosswalk and into the intersection to cause drivers to cross the bike lane after slowing down to make their turn.

Bike lanes should be offset from the adjacent through travel lane by 6 to 16.5 feet to provide space for vehicles to yield outside the path of through traffic (MassDOT).

Protected intersections may be used with either one-way or two-way bikeways.

Leading bicycle or bicycle only signal phases may optionally be considered at intersections with either one-way or two-way bikeways.

Table 4.1 shows the recommended motor vehicle volume thresholds to consider separating bicycle and turning motor vehicle movements using signal phasing (MassDOT).

Figure 4.13: Protected Intersections

Photo: Salt Lake City, UT | Graphic: Seattle Right-of-Way Improvement Manual | Source (both): Toole Design Group

Table 4.1: Thresholds for Time Separated Bike Movements

Protected Bikeway Operation	Motor Vehicles per Hour Turning Across Protected Bikeway		
	Right Turn	Left Turn Across One Lane	Left Turn Across Two Lanes
One-way	150	100	50
Two-way	100	50	0

Transit Stops

People biking often ride in the same area of the roadway used by transit vehicles to pick up or drop off passengers. Special consideration should be made in corridors where a high level of transit usage (typically more than four buses per hour) may conflict with bicycle traffic.

Mixing Zones

Mixing zones occur where transit vehicles crosses over a bike facility, such as a bike lane, to allow passengers to board or disembark at a transit stop, illustrated in **Figure 4.14**. If used on a one-way separated bikeway, vertical protection is removed at transit stop locations and the bikeway becomes shared space with transit vehicles (FHWA).

Standards:

Buses may only merge into or across the bikeway to access the curb if the bikeway is one way in the same direction as bus travel (per state law).

Guidance:

For facilities designed for all ages and abilities, bus stop mixing zones are recommended only where bus service is infrequent (about four buses per hour or fewer) (FHWA).

Figure 4.14: Transit Stop Mixing Zones

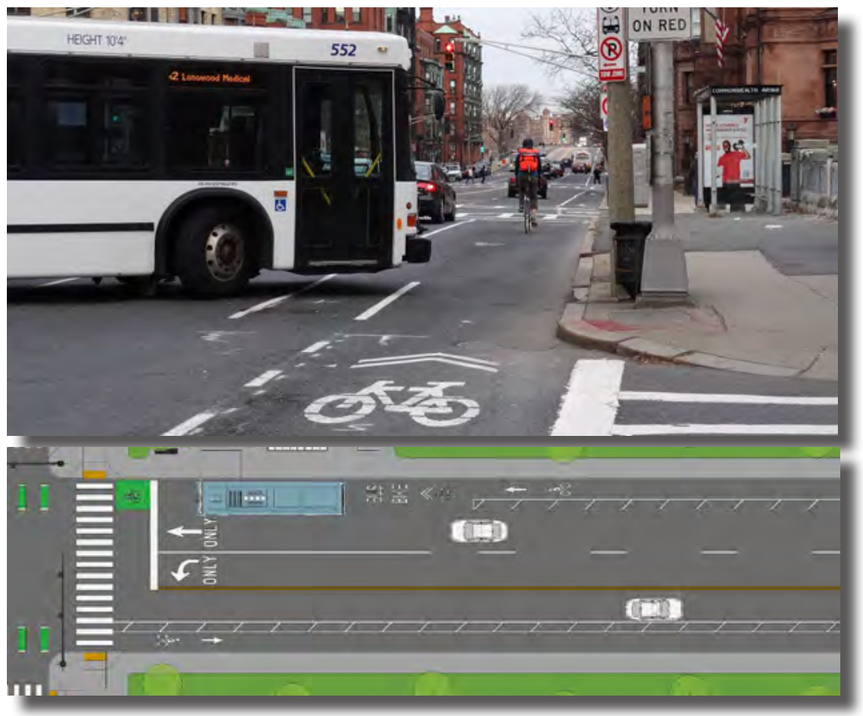


Photo: Boston, MA | Graphic: Rhode Island Public Transit Authority Bus Stop Guidelines
Source (both): Toole Design Group

Bus Stop/Floating Bus Stop

Some locations experience heavy bicycle or transit usage that increase the potential for conflicts, or have two-way bicycle facilities. Floating bus stops, illustrated in **Figure 4.15**, provide a platform from which passengers can board or disembark the bus, while preventing the need for transit vehicles to cross over bicycle facilities. This also identifies locations for pedestrians to cross the bicycle facility.

Standards:

Required for two-way bicycle facilities where conflicting bus stops are present (FHWA).

If bus stop platforms are located between the bikeway and roadway, a minimum 5-foot (along street) by 8-foot (perpendicular to street) level landing area aligned with the front door of the bus shall be provided (FHWA).

Other key design features are presented in **Figure 4.16.**

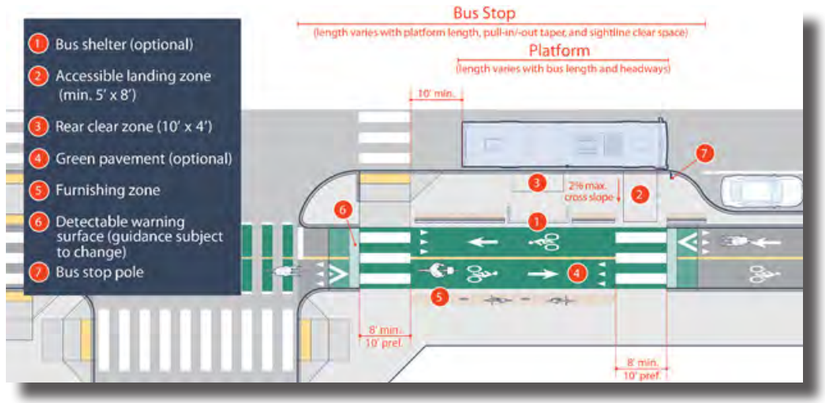
Guidance:

On one-way streets, bus stop conflicts with bikeways can also be avoided by designing the bikeway to run along the left-hand side of the roadway.

Figure 4.15: Bus Stop Platform

Graphic: MassDOT Separated Bike Lane Planning and Design Guide | Photo: Vancouver, BC
Source (both): Toole Design Group

Figure 4.16: Floating Bus Stop Platform



Graphic adapted from AC Transit Multimodal Corridor Design Standards | Source: Toole Design Group

Section 4.4 Summary

The process of planning and designing bicycle facilities begins with consideration of the intended range of users. Increasingly, agencies and jurisdictions seek to implement facilities designed to serve users of all ages and abilities, particularly the interested but concerned bicyclist. Such facilities may employ a range of methods to manage conflicts at intersections, driveways, and bus stops and separate users from busy roadways. The most appropriate form of the bikeway depends on a range of factors and may vary between corridor segments. While some of the terminology and details of bikeway infrastructure implementation are new and evolving, the underlying design and engineering principles are rooted in longstanding practices for designing travelways for any other type of vehicle. A wealth of guidance documents have reached completion and publication in recent years to synthesize these underlying principles and standards in detailed elements of design. A selection of the most relevant recent design guidance is compiled below.

Recommended Resources for Additional Information

- **MassDOT:** Separated Bike Lane Planning & Design Guide (2015) Massachusetts Department of Transportation: https://www.mass.gov/lists/separated-bike-lane-planning-design-guide
- **FHWA:** Separated Bike Lane Planning and Design Guide (2015) Federal Highway Administration: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/page00.cfm
- **FHWA (2):** Achieving Multimodal Networks: Applying Design Flexibility & Reducing Conflicts (2016) Federal Highway Administration: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks
- **MUTCD:** Manual on Uniform Traffic Control Devices (2009) Federal Highway Administration: https://mutcd.fhwa.dot.gov/htm/2009r1r2/html_index.htm
- **AASHTO:** Guide for the Development of Bicycle Facilities (4th Ed.) (2012; 2018 edition in progress) American Association of State Highway and Transportation Officials: https://bookstore.transportation.org/collection_detail.aspx?ID=116
- **NACTO:** Urban Bikeway Design Guide (2012) National Association of City Transportation Officials: https://nacto.org/publication/urban-bikeway-design-guide/
- **NACTO (2):** Designing for All Ages & Abilities: Contextual Guidance for High-Comfort Bicycle Facilities (2017 addendum to Urban Bikeway Design Guide) National Association of City Transportation Officials: https://nacto.org/publication/urban-bikeway-design-guide/designing-ages-abilities-new/

Bike Boulevard, San Louis Obisbo
Source: Toole Design Group

Buffered Bike Lane
Source: Toole Design Group

Bike Lane on Neighborhood Street
Source: Toole Design Group

Nickerson Street Bike Lane
Source: Toole Design Group

SECTION 5: DEVELOPMENT OF SCENARIOS

Section 5.1 Introduction

The following section examines the process and development of the scenarios along the Gillham corridor. The project team worked together to develop facility treatments for segments along the length of the corridor.

Section 5.2 Development of Scenarios

The original corridor included the portion of Gillham Road north of McGee Trafficway, including the area known as “Hospital Hill” and into the Crossroads district where Gillham Road becomes Oak Street. The alignment of the corridor moved to Grand Boulevard, 27th Street, and McGee Trafficway. This alignment modification addressed several issues. Bicyclists prefer to avoid Hospital Hill and instead handle the topography change by traversing on Grand Boulevard, 27th Street, and McGee Trafficway to Gillham Road. This has been the preferred bicycle route between Gillham Road and the Crossroads district. Also, the off-set intersection of Gillham Road, 25th Street, and Pershing Road in the original corridor presents a combination of steep topography changes, high automobile speeds, uncontrolled intersections, and limited sight distances that challenge automobile drivers, as well as bicyclists. Making turning movements at this off-set intersection safer for people who bicycle would require likely require significant intersection reconstruction. Modifying the alignment to McGee Trafficway, 27th Street, and Grand Boulevard addresses both concerns about the topography and the Gillham Road, 25th Street, and Pershing Road intersection.

A variety of alternatives were developed for each section of the corridor based on an evaluation of existing conditions and best practices for bike facilities. These alternatives varied depending on the adjacent land use, existing traffic volumes and speeds, current right-of-way, and the existing configuration of travel and parking lanes, sidewalks, and buffer strips. Each alternative typical was intended to be applied over a length between one to several blocks within a segment, rather than over the entire corridor. This allowed feedback to be gathered specific to an alternative at a location, and allowed the project to accommodate the uniqueness of the corridor at different points. These alternatives were developed understanding the importance of connecting the different alternatives into a final corridor concept, and that transitions between the different types of bicycle facilities would require attention during the design and construction phase of a future project.

The working group reviewed an initial set of alternatives at their November 15th, 2018 meeting, and the resulting modified alternatives were presented at the public meeting #1 on January 30th, 2018. These public meetings will be discussed in the Public Involvement Section of this report. The alternatives presented at this first public meeting are displayed in **Figures 5.1** through **5.4** on the following pages.

20th Street and Grand Boulevard to 27th Street and McGee Trafficway (Figure 5.1)

This segment included options that repurposed a traffic lane in each direction for cycle tracks or buffered bike lanes (Typicals set A or B) or removed a center turn lane to accommodate bike lanes or cycle tracks (Typical set C). In many instances, such as bike lanes on 27th Street and on McGee Trafficway, development currently underway are already planning to install a similar level of bicycle infrastructure.

McGee Trafficway to Gillham Road and Armour Boulevard (Figure 5.2)

The alternatives developed for this segment included cycle tracks (Typical E1 and I2) buffered bike lanes (Typical H1) and two-way cycle tracks on the east side of the road (Typical H2 and I1). Sharrows on the downhill side (east) and a buffered bike lane on the uphill side (west) was an alternative for McGee Traffiwcay (Typical G1). In most cases these alternatives limited the impact to existing parking and repurposed a travel lane in each direction.

Gillham Road and Armour Boulevard to Gillham Road and 42nd Street (Figure 5.3)

This segment, running along Hyde Park and Gillham Park, had alternatives that featured a two-way cycle track on the east side of the road (Typicals J1 and K2), a cycle track on either side of the road (J2), or a buffered bike lane (K1). Some alternatives maintained the existing number of travel lanes (J3), while other alternatives maintained existing weekday parking (J2).

Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard (Figure 5.4)

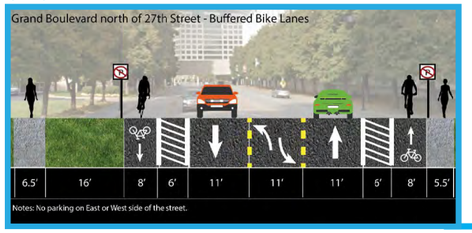
Alternatives in these segments featured bike lanes (Typicals L1 and M1), or buffered bike lanes (Typicals M2 and O1) along Gillham Road or Gillham Road west. A 2-way cycle track on the east side is an alternative on Gillham Road (Typical L2). Sharrows were identified on Harrison Street (Typical N1) to maintain current parking, and in recognition of that street segments relatively low automobile traffic speed and volume. Alternatives were also shown on Gillham Road West and Rockhill Road, although the very steep slope on Gillham Road West makes this an unlikely preferred route for bicyclists.

Gillham Road at 39th Street

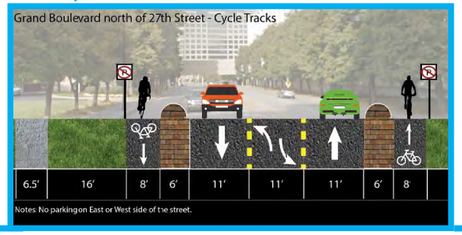
Figure 5.1: 20th Street and Grand Boulevard to 27th Street and McGee Trafficway

Gillham Road Corridor Bike Connections Plan - 20th Street and Grand Boulevard to 27th Street and McGee Trafficway

(B1) Buffered Bike Lanes



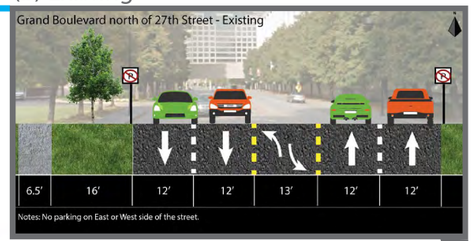
(B2) Cycle Tracks



(D) Existing

These options may include reduction of travel lanes which will have to be analyzed for city wide impacts.

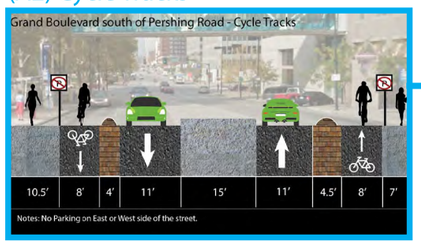
(B) Existing



(A1) Buffered Bike Lanes

(A) Existing

(A2) Cycle Tracks



(C1) Bike Lanes*

(C) Existing

(C2) Cycle Tracks*

OLSSON ASSOCIATES

0 250 500 Feet N

* Requires widening of street

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Figure 5.2: McGee Trafficway to Gillham Road and Armour Boulevard

Figure 5.3: Gillham Road and Armour Boulevard to Gillham Road and 42nd Street

Gillham Road Corridor Bike Connections Plan - Gillham Road and Armour Boulevard to Gillham Road and 42nd Street

(J1) 2-Way Cycle Track with Removed NB Parking

(J2) Cycle Tracks with Parking

(J3) Cycle Tracks with Removed Parking

These options may include reduction of travel lanes which will have to be analyzed for city wide impacts.

(J) Existing

(K) Existing

(K1) Buffered Bike Lanes

(K2) 2-Way Cycle Track

(K3) Cycle Tracks

OLSSON ASSOCIATES

0 250 500 Feet

N

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Figure 5.4: Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard

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SECTION 6: PUBLIC INVOLVEMENT PART 1

Section 6.1 Introduction

The following section summarizes the first round of public involvement. Forms of public involvement included;

- Surveys (both online and distributed at meetings),
- Stakeholder Meetings (Working Group Meetings),
- Public Meetings, and
- Presentations to neighborhood associations and community groups.

Full surveys, questionnaires and results can be seen in **Appendix C**.

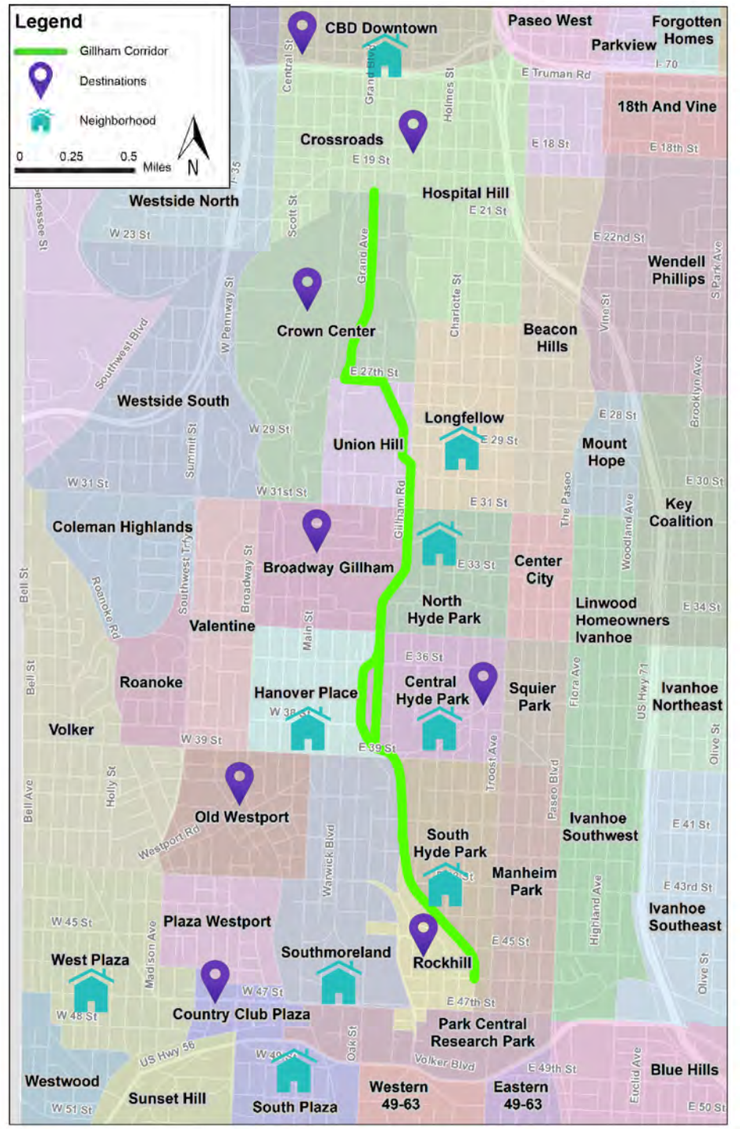
Section 6.2 Online Survey Results

The survey was conducted from December 12, 2017 to January 5, 2018. This survey was a much larger and more comprehensive survey meant to gather data while surveys discussed in following sections attempted to receive feedback and opinions regarding bicycling along the corridor and options presented during public meetings. Below is a summary of the findings that were retrieved from the online survey. Approximately 200 people took part in this survey, and 155 completed it.

Origin Destination

Figure 6.1 illustrates the neighborhoods and destinations that the people in the area access. According to the figure, the most popular origin of trips is in the South Park Neighborhood area (18 percent), and the most frequent destinations are the Crossroads (23 percent) and Downtown KC (12 percent)

Figure 6.1: Origins and Destinations



Priorities

According to results approximately 84 percent of survey respondents indicated that improving the comfort of biking and walking along the corridor should be prioritized. Twelve percent thought that while bicycle improvements should be made, cars should remain the focus on Gillham Road. **Figure 6.2**, below, illustrates these results.

Reasons to Ride

When riders were asked why they ride, there was a variance of responses. The most popular reason was for the Regular Exercise (67 percent). Other popular answers included Social Visits (54 percent), Commuting (54 percent), Parks or Recreational Facilities (51percent), and Routine Errands (48 percent). The remaining results can be seen in **Figure 6.3.**

Figure 6.2: Priorities

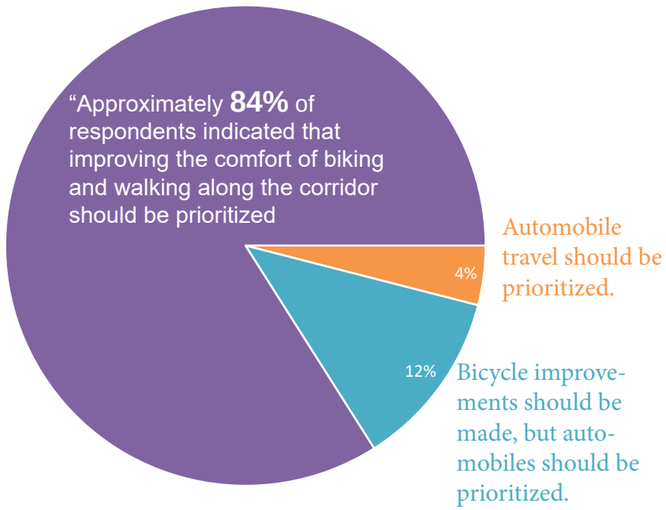
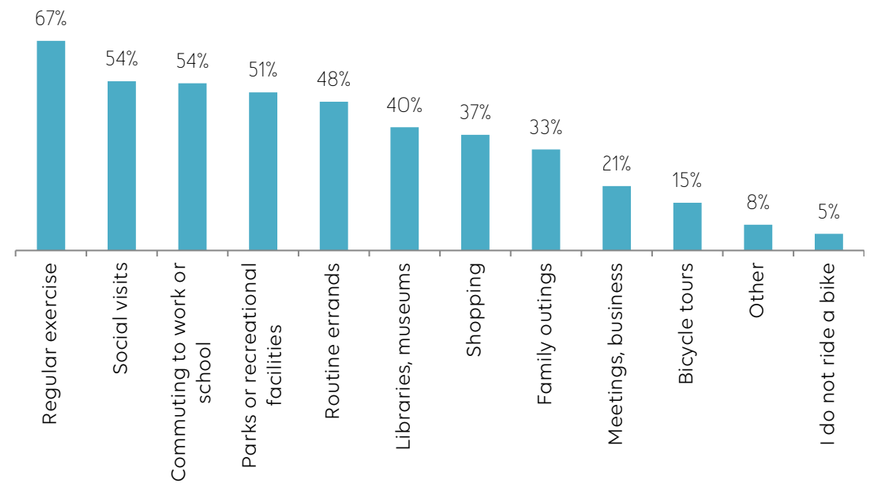


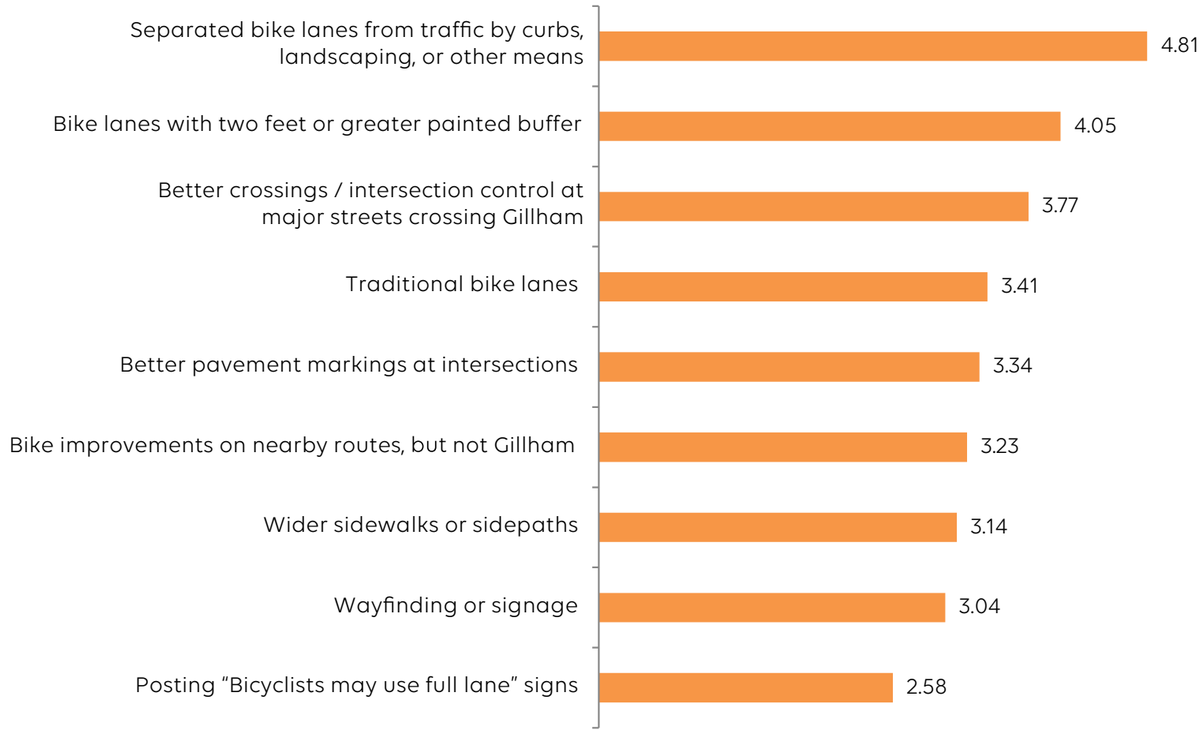
Figure 6.3: Why Do You Bike?



Effectiveness of Improvements

Respondents were asked which improvements they felt were the most effective at increasing bicycling on the Gillham corridor. The respondents rated the treatments 1 through 5, with 5 being very effective. The treatments that people felt would be most effective were Separated Bike Lanes (4.81), Bike Lanes with Two Feet or Greater Painted Buffer (4.05), and Better Crossing/Intersection Control at Major Streets Crossing Gillham (3.77). **Figure 6.4** displays these findings.

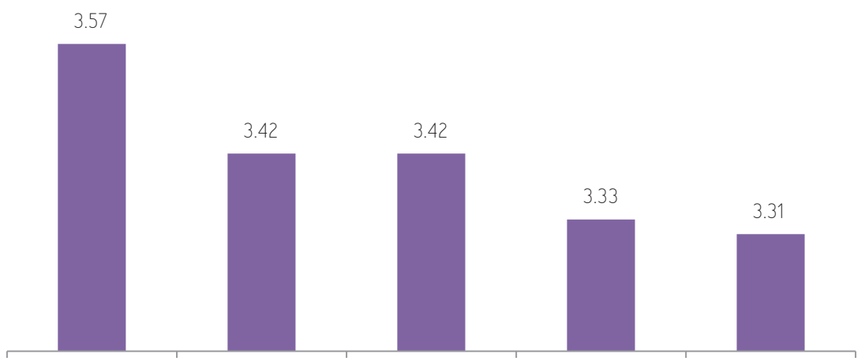
Figure 6.4: Effectiveness of Improvements



Popularity of Routes

There are a number of routes and streets currently used by bicyclists along and near the Gillham corridor. Respondents were asked how they use specific routes on a scale from 1 to 5, with 5 being “Very Often”. The routes with the highest ratings were Warwick/Oak (3.57), Amour Boulevard (3.42), and Gillham Road (3.42). **Figure 6.5** illustrates the results.

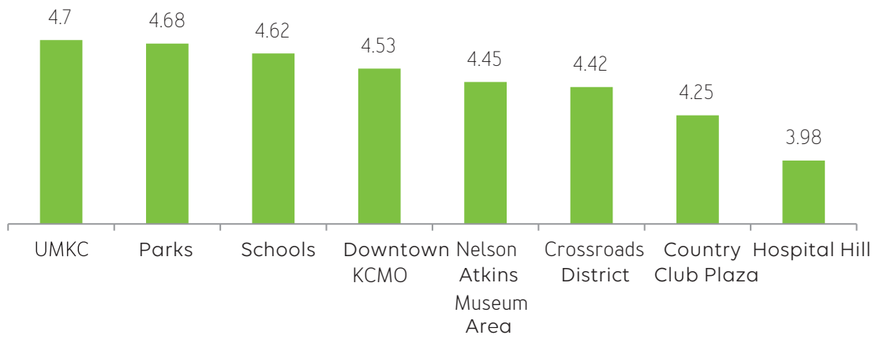
Figure 6.5: Popularity of Routes



Importance of Bicycle Access

A person’s access to popular destinations is another important part of determining the usability of bicycle infrastructure along the Gillham corridor. Respondents were asked to rate the importance of bicycle access at different destinations from 1 to 5, with 5 being the most important. The three destinations that were rated the most important were UMKC (4.7), Parks (4.68), and Schools (4.62). **Figure 6.6** shows the results.

Figure 6.6: Importance of Bicycle Access



Gillham Road West at Rockhill Road

Rockhill Road at Volker Boulevard

Section 6.3 Working Group Meeting #1

Stakeholders from the community that live or work along the corridor were convened into a working group and met with the project team twice over the course of the project. This working group provided an opportunity to provide input and feedback to the project team as alternatives were discussed and developed, prior to concepts being presented at wider public meetings. The working group first met on November 15th, 2017 at the offices of BikeWalkKC. They and the project team discussed the existing conditions and constraints present in the corridor, and reviewed an initial set of alternatives for various corridor segments. Those invited to the meeting are listed below.

- Joe Blankenship, Kansas City, Missouri, Planning Department
- Eric Bunch - BikeWalkKC
- Laura Burkhalter - Southmoreland Neighborhood
- John Dewitt - Children's Mercy
- Kyle Elliot - Kansas City, Missouri, Planning Department
- Bob Frye - Union Hill
- Nathan Guffey - Hallmark
- Saundra Hayes - Manheim Neighborhood
- Jenna Hillyer - Kansas City Area Transportation Authority
- Coletta Hummel - Longfellow Neighborhood
- Shannon Jaax - Union Hill
- Jake Jacobson - Children's Mercy
- Andrew Johnson - Pilgrim Chapel
- Travis Kiefer - Kansas City, Missouri, Parks and Recreation Department
- Matt Levi - Hyde Park Neighborhood
- Jeff Martin - Kansas City, Missouri, Public Works Department
- Wes Minder, Kansas City, Missouri, City Manager's Office
- DuRon Netsell - Old Hyde Park Neighborhood
- Dave Roesler - Hallmark
- Andy Shear - Notre Dame de Sion
- Bob Simmons - University of Missouri, Kansas City
- Lou Steele - Plexpod
- Shawn Strate - Kansas City Area Transportation Authority
- Judy Swason - Union Hill Properties
- Nick Ward-Bopp - Property Owner at 31st and Cherry
- Steve Waterman - Nelson Atkins
- Gerald Williams - Kansas City, Missouri, Planning Department

The working group was split into two groups. One group looked at the southern end of the corridor while the other looked at the north end. All were engaged in a discussion to understand what where the opportunities presented and what bicycle facility treatment would be appropriate or not preferable. Below were the most common comments.

South End of the Corridor (Feedback)

- Gillham Park between 39th and 42nd is very active in the evening at the same time that SB traffic is heavy. Crossing difficult
- Great opportunity for this project to address traffic and safety problems. Not surprising that there are a lot of crashes at 39th. Terrible intersection
- 39th and Harrison seems like a good opportunity for two-way cycle track
- Consistency in the bike facility important. Don't want a lot of different treatments
- Pedestrian connections and slowing traffic important
- Lots of students from these schools coming from north Hyde Park on east side of Gillham. Access to this facility from Gillham is important
- City would like 7 foot facility for ease of snow removal with existing vehicles. When City can clear with standard equipment, it can be done more quickly
- Emanuel Cleaver bike lanes feel "squeezed".

North End of the Corridor (Feedback)

Further north on-street parking is more important, different types of constraints than on south end.

- Crown Center has frequent closures for events, festivals etc. Need to address that issue. When street closes become pedestrian plaza. A protected bikeway would interrupt this flow. Also, a lot of bus traffic in this area. Needs to be considered
- Struggling with how to get everything in the limited ROW space
- Businesses would be okay with busier traffic, if that increased pedestrian traffic and slow vehicular traffic. There is a preference towards predictability in parking and lanes along the corridor. It changes frequently now.
- Need to prioritize the way the road works through Union Hill
- There's an approved plan for a shared use path on the north side of 27th and bike lanes on McGee through the development
- Consider the money and work needed for maintenance to facilities.

After the groups addressed their ends of the corridor, everyone came together to report their findings and concerns. Together the groups arrived at the following **priorities** for the Gillham Road Corridor.

- Importance of consistency along the corridor
- Vertical barriers for bicyclists/pedestrians
- Maintaining a parking lane versus an additional lane of travel was still a concern to some.

Working Group at BikeWalkKC

Section 6.4 Public Meeting #1

The first public meeting was held on January 31st, 2018 at Cornerstones of Care in Midtown Kansas City. A total of 49 meeting participants signed in. The meeting was informational and gave the public a chance to examine the results of the project team while voicing their opinions and concerns. Members of the project team were on location to facilitate discussion and involvement with members of the community.

At the meeting, the team distributed a project survey consisting of one multiple choice question and four open ended questions. A total of 20 participants completed the survey. Results are described on the following pages.

Public Meeting at Cornerstones of Care

Public Meeting at Cornerstones of Care

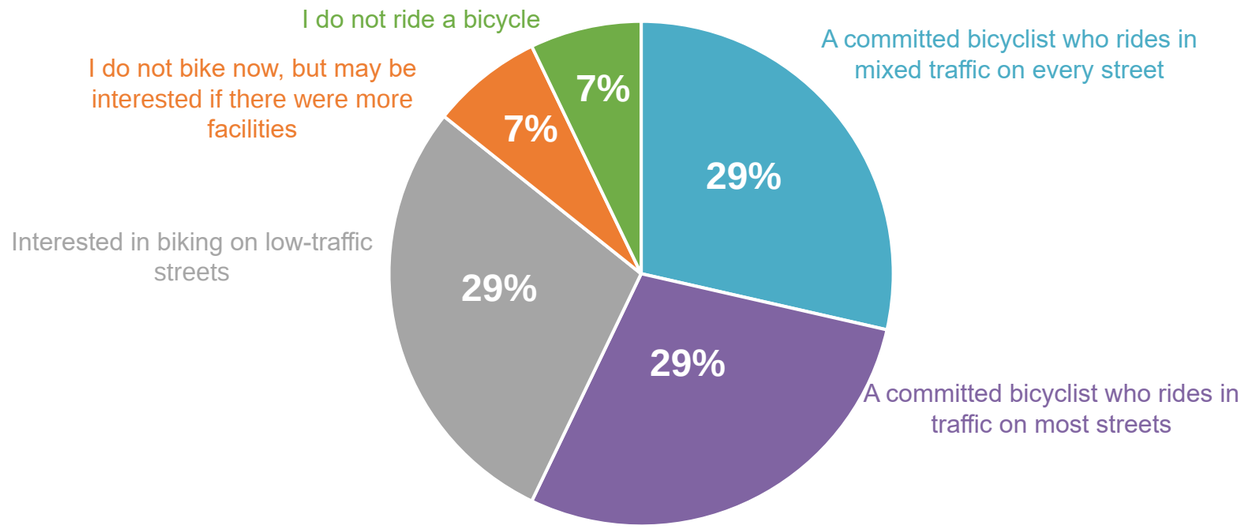
Public Meeting at Cornerstones of Care

Public Meeting Flier

Type of Bicyclist

Participants were asked to choose what type of bicyclist they were from several options. “A committed bicyclist who rides in mixed traffic on every street”, “a committed bicyclist who rides in traffic on most streets”, and “interested in biking on low-traffic streets” were each chosen by 29 percent of respondents. Results can be seen in **Figure 6.7**.

Figure 6.7: Type of Bicyclist



Open Ended Questions

Participants were asked what they think about possible improvements on four segments of the Gillham Corridor. The key takeaways are as follows;

- Cycle tracks are supported in the corridor,
- If cycle tracks are added, it should be consistent throughout the corridor for safety reasons,
- Sharrows are not preferred in the corridor,
- Buffered bike lanes are supported in the corridor, and

Open ended responses regarding individual sections are below.

Grand Avenue to 19th Street

Cycle tracks were the most supported option for this section of the Corridor. Three respondents noted that if cycle tracks were added in the corridor, they should be consistent throughout as transitioning from one-way to two-way cycle tracks could be problematic.

29th Street to Armour Boulevard

Cycle tracks were preferred in this section. In sub-section I (Grand Avenue north of Armour Boulevard), respondents overwhelmingly preferred cycle tracks, but not a two-way cycle track. Two other respondents preferred cycle tracks in general in this section of the corridor. Consistency of cycle tracks were also mentioned as important.

Armour Boulevard to Gillham Road West

Cycle tracks were preferred in this section. In sub-section J (Gillham Road north of 37th Street), respondents preferred cycle tracks with parking, and there was no support for a two-way cycle track with removed northbound parking. In sub-section K (Gillham Road south of 39th Street), cycle tracks were preferred over buffered bike lanes, but not a two-way cycle track. Other respondents supported cycle tracks in general in this sub-section. Respondents expressed the need for safety improvements for bicyclist.

Gillham Road West to Brush Creek

Cycle tracks were overwhelmingly approved for sub-section O (Rockhill Road north of 47th Street), as opposed to buffered bike lanes. In sub-section L (Gillham Road north of 44th Street), a two-way cycle track was preferred. In sub-section M (Gillham Road West south of 44th Street), buffered bike lanes were preferred. Only one respondent preferred sharrows in sub-section N (Harrison Street south of Bush Creek Boulevard) and two respondents stated “no sharrows”. Respondents mentioned the challenge of hills in this section of the corridor. They also mentioned the dangerousness of intersections and vehicle speed.

Public Meeting at Cornerstones of Care

SECTION 7: TRAFFIC ANALYSIS AND RESULTS

Section 7.1 Introduction

The following section details the traffic analysis conducted by the project team in order to understand the effects of the different recommended facilities and lane reductions.

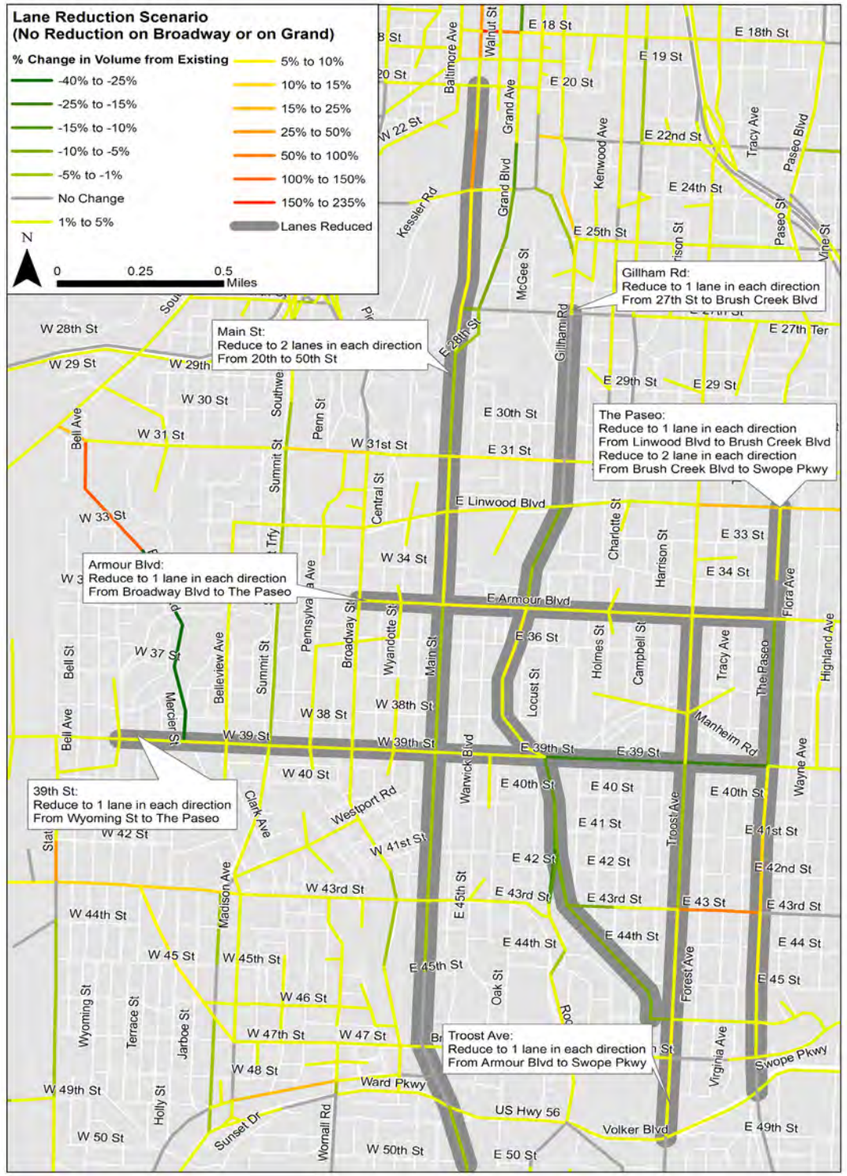
Section 7.2 Traffic Analysis and Lane Reduction

An alternative considered for this project would have used a travel lane in each direction on Gillham Road for cycle facilities. At the same time, several projects in the midtown area were being considered that may impact travel lanes on other corridors in the area. The potential projects impacting the number of travel lanes include streetcar expansion on Main Street, BRT, and bike lane optimization on Troost Avenue, and bike lane improvements on 39th Street, Armour Boulevard, Broadway Street, Grand Avenue, and the Paseo. The Mid-America Regional Council's (MARC's) regional transportation forecasting model was used to determine the impact on midtown traffic if one travel lane in each direction was reduced on several corridors, including on Gillham.

Lane reductions in both directions on Gillham Road would have redirected traffic to other corridors, particularly in the evening. The impact on change in volume from existing is shown in **Figure 7.1**. The analysis was refined to maintain the number of existing lanes on Broadway Street and Grand Avenue. This is shown in **Figure 7.2**. Lane reductions on Gillham Road were limited to only a single northbound lane which sees less concentrated traffic than the southbound lanes. With this configuration, traffic flow would still be able to function throughout the system, even with lane reduction projects in other midtown corridors. Details of the traffic analysis have been included in **Appendix C**.

Figure 7.1: Scenario With Lanes Reduced On Eight Corridors

Figure 7.2: Scenario Without Lane Reductions on Broadway Boulevard or Grand Avenue



Gillham Road at 31st Street looking north

SECTION 8: PUBLIC INVOLVEMENT PART 2

Section 8.1 Introduction

The following section reviews and discusses the second round of public involvement for the project.

Section 8.2 Working Group Meeting #2

The working group met a second time on May 10th, 2018 at the Mid-America Regional Council. The project team presented the public comments and survey results received as well as the results of the traffic analysis presented in Traffic Analysis Section of this report. Working group members provided input on a draft corridor concept, and reiterated the need to maintain current parking and vegetation areas along the corridor. The concept was then revised prior to the second public meeting. Those invited to the meeting are listed below.

- Joe Blankenship, Kansas City, Missouri, Planning Department
- Eric Bunch - BikeWalkKC
- Laura Burkhalter - Southmoreland Neighborhood
- John Dewitt - Children's Mercy
- Kyle Elliot - Kansas City, Missouri, Planning Department
- Bob Frye - Union Hill
- Nathan Guffey - Hallmark
- Saundra Hayes - Manheim Neighborhood
- Jenna Hillyer - Kansas City Area Transportation Authority
- Coletta Hummel - Longfellow Neighborhood
- Shannon Jaax - Union Hill
- Jake Jacobson - Children's Mercy
- Andrew Johnson - Pilgrim Chapel
- Travis Kiefer - Kansas City, Missouri, Parks and Recreation Department
- Matt Levi - Hyde Park Neighborhood
- Jeff Martin - Kansas City, Missouri, Public Works Department
- Wes Minder, Kansas City, Missouri, City Manager's Office
- DuRon Netsell - Old Hyde Park Neighborhood
- Dave Roesler - Hallmark
- Andy Shear - Notre Dame de Sion
- Bob Simmons - University of Missouri, Kansas City
- Lou Steele - Plexpod
- Shawn Strate - Kansas City Area Transportation Authority
- Judy Swason - Union Hill Properties
- Nick Ward-Bopp - Property Owner at 31st and Cherry
- Steve Waterman - Nelson Atkins
- Gerald Williams - Kansas City, Missouri, Planning Department

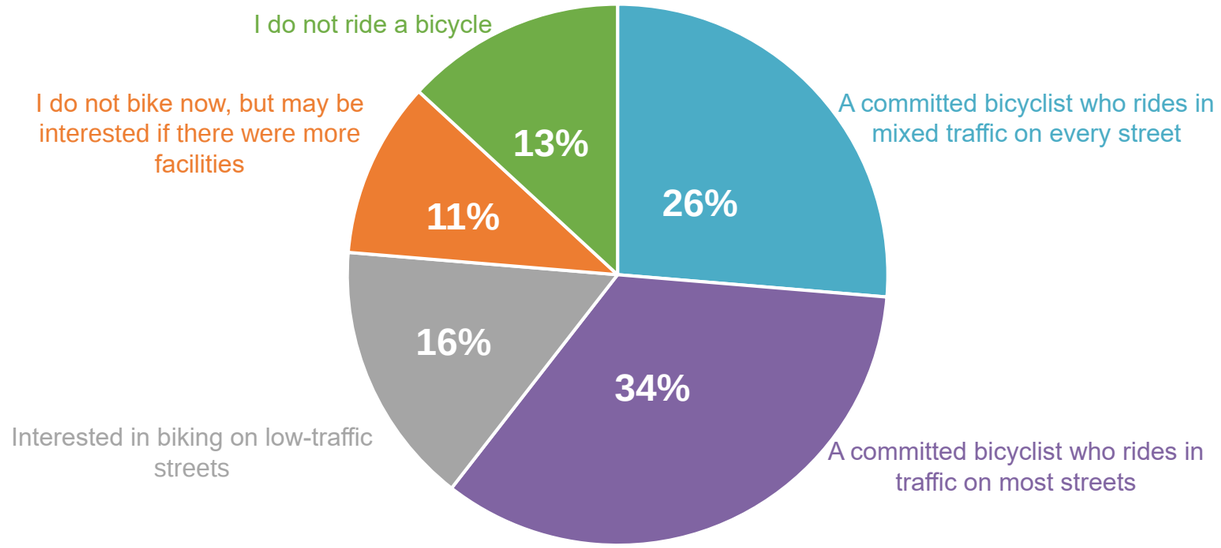
Section 8.3 Public Meeting #2

The second public meeting was held on May 23, 2018 at El Torreon in Midtown Kansas City Missouri. The purpose of this meeting was to present a final concept for the Gillham corridor. A total of 48 meeting participants signed in. The team distributed another survey that consisted of two multiple choice questions and an opportunity to comment on particular corridor segments. A total of 40 participants completed the form. The following sections describe the results.

Type of Bicyclist (2nd Meeting)

Participants were asked to choose what type of bicyclist they were from several options. The most popular answer chose by participants was that they were "A committed bicyclist who rides in traffic on most streets" (34 percent). The second most popular choice for participants was that they were "A committed bicyclist who rides in traffic on all streets"(26 percent). Results can be seen in **Figure 9.1**.

Figure 8.1: Type of Bicyclist

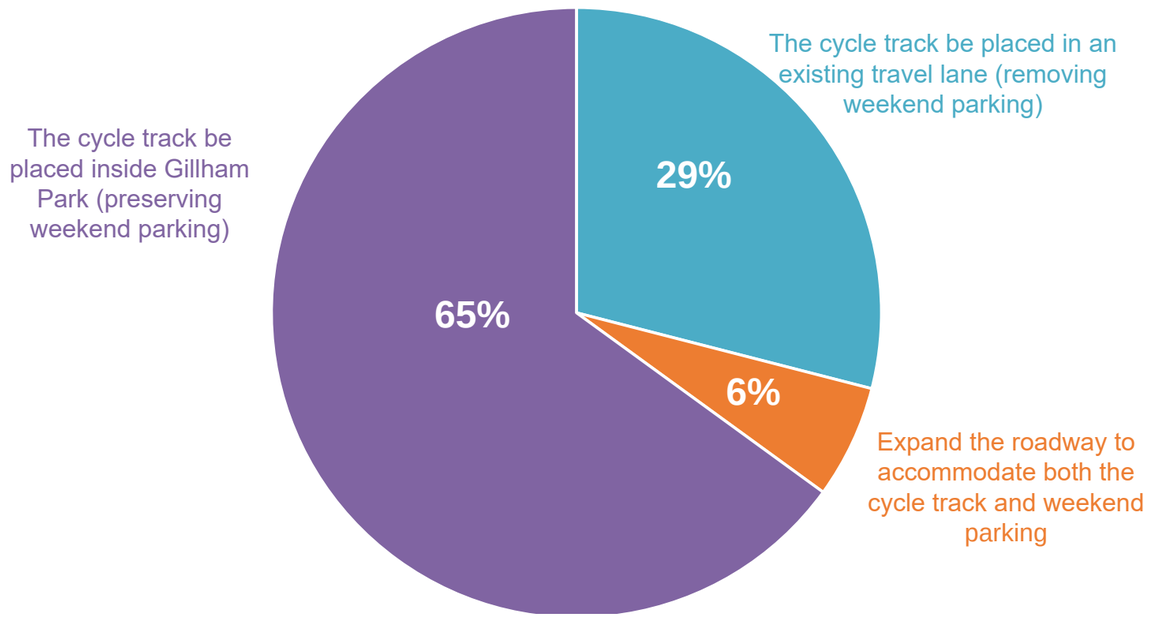


Bicycle Infrastructure at Gillham Park

Participants were presented with three options for bike facility types along Gillham Park, and asked to select their preference. Sixty-five percent of respondents preferred that the cycle track be placed inside Gillham Park, preserving weekend parking. The results can be seen in **Figure 9.2**. Some people did have general comments regarding the corridor. These can be seen below.

- Positive
  - Continue to Cleaver II
  - My concern is two-way cycle tracks on the one side. Would prefer on each side. If it has to be on one side, need to protect cyclists who would be moving from that street to another when going south.
  - Support reduction of travel lanes to calm traffic, reduce crossing distances and reduce cost
  - Parking protected bike lanes/avoid conflict zones
- Negative
  - I think Gillham is the wrong corridor. This process seems predetermined. It will displace traffic into mid-town neighborhoods. Cyclists will not be safe.
  - Too major of an artery to reduce lanes for bikes; a major morning and end of workday to get home or south to take lanes away; This will be at the expense of the commuters.

Figure 8.2: Preferred Bicycle Facility Along Gillham Park



Open Ended Questions

Participants were asked to provide their thoughts and opinions of the different recommended bicycle improvements along certain segments of the Gillham corridor. Below is an analysis of what was provided. It should be known that not all 40 participants completed the open ended questions.

Grand Avenue to 29th Street

A total of 21 out of 40 participants expressed general approval of the options of buffered bike lanes/cycle tracks for this segment with five specifically mentioning the need for protected bike lanes and four specifically mentioning cycle tracks.

There were some concerns about the transition to cycle tracks (3). Some participants would like to continue the project to Grand (2).

29th Street to Armour Boulevard

A total of 10 out of 40 participants generally approved the final concept of sharrows on McGee Trafficway and two-way cycle track on Gillham Road.

Four participants indicated disapproval of sharrows. Some participants mentioned the need to protect on-street parking (3) and protect green space (3). A few mentioned their concern with transitioning from cycle tracks to sharrow and the other way around (2).

Armour Boulevard to Gillham Road West

A total of 8 out of 40 participants generally approved of the final concept of a two-way cycle track on this segment. Four participants mentioned the need to preserve parking, while one participant desired that parking be removed. Two participants questioned how cyclists would get to Gillham Road West.

Gillham Road and Gillham Road West to Harrison Street

A total of 11 out of 40 participants generally approved of the final concept of bike lanes and sharrows on this segment. Two participants mentioned the desire to have the route go through the park.

SECTION 9: FINAL TYPICALS

Section 9.1 Preferred Concept

A final, preferred concept was developed for the Gillham corridor. This preferred alternative was based on comments received from the public on the January 30th, 2018 public meeting #1 and the associated survey distributed at that meeting and online, and the working group meeting on May 10th, 2018. Comments about the project were also received through email, and at individual meetings with stakeholders along the corridor. Project team members also shared broad outlines of the concept at neighborhood association meetings, where the second public meeting was also advertised.

The final concept incorporates outcomes from the traffic analysis that shows restricting travel lanes in each direction would have significant impacts on automobile travel both within the corridor and throughout the wider area once potential lane reductions along other corridors were considered. The traffic analysis also showed that one northbound automobile travel lane could be repurposed along much of the corridor with acceptable impacts on lane capacity and intersection level of service.

The need to preserve parking and vegetation strips along the corridor was also stressed in discussions at the second working group meeting. Resident along Hyde Park and Gillham Park already experience park visitors using adjacent neighborhoods as overflow parking, because of existing weekday restrictions on parking along Gillham Road. Preserving areas along Gillham Road with greenery and trees also reflect Gillham Road's status as a boulevard.

The working group reviewed a preliminary draft of the concept at their May 10th, 2018 meeting. Revisions were made to reflect the desire to preserve parking and green space along the corridor.

Care was taken to ensure that this concept is feasible related to constraints imposed by right-of-way, requirements of bicycle facility types, and traffic impacts. However, further will analyses will be required in the design and construction of the project.

The final concept was distributed electronically to the working group, and presented to the public at the second public meeting on May 23rd, 2018. The concept is presented in **Figures 8.1** through **8.4**, with the blue-outlined sections reflecting the preferred alternatives

20th Street and Grand Boulevard to 27th Street and McGee Trafficway (Figure 8.1)

This segment features a two-way cycle track on the east side of Grand Boulevard through Crown Center (Typical A). Two lanes of travel in each direction are maintained by reducing the center median to eight feet wide. The two-way cycle track continues on the north side of 27th Street. In areas without sufficient median on Grand Boulevard, and on 27th Street, widening beyond the existing curblines may be required. The facility would transition to bike lanes on McGee Trafficway that are already under construction.

McGee Trafficway to Gillham Road and Armour Boulevard (Figure 8.2)

The bike lanes on McGee Trafficway would have transitioned to sharrows at 29th street until Gillham Road (Typical G). This would maintain existing parking. At Gillham Road, the bike facility will become a two-way cycle track on the east side of the road, as shown in Typical P. This would repurpose an existing northbound automobile lane between 30th and 31st Street. Between 31st Street and Linwood Boulevard, part of an existing 17 foot vegetation buffer would be repurposed for a the ten foot cycle track with two foot buffer (Typical H). The cycle track would use an existing northbound automobile travel lane between Linwood Boulevard and Armour Boulevard (Typical Q). On Street parking on both sides of Gillham Road/Plaza would be permitted (Typical I), although no on street parking would be provided near Linwood Boulevard.

Gillham Road and Armour Boulevard to Gillham Road and 42nd Street (Figure 8.3)

The east side, two-way cycle track would continue along Hyde Park. As shown in Typical J, the configuration of the northbound lanes of Gillham Road in this concept would be a single northbound lane, with parking, and a cycle track. The existing planting strip and sidewalk would remain. South of 39th Street, participants at Public Meeting #2 were shown three options (typicals K1, K2, and K3). Participants overwhelmingly preferred the option of the cycle track going through Gillham Park. This segment could function with one northbound automobile travel lane, providing the possibility of allowing full-time on-street parking. This could support the Splash Park currently being installed in Gillham Park south of 41st Street. Alternatively, the existing parking provided between 39th Street and 41st Street could be relocated south of 41st Street where there's currently no parking. South of 42nd Street, the two-way cycle track would continue. Gillham Road south of the turn-off to Gillham Road West could be served by one automobile travel lane in each direction. This would allow on-street parking to continue, as well as a the two-way cycle track (Typical L shown in both **Figure 8.3** and **Figure 8.4**).

Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard (Figure 8.4)

Figure 8.4 shows the two-way cycle track on the east side of Gillham Road continuing, with one automobile travel lane in each direction, and on-street parking provided (Typical L). The two-way cycle track would terminate at Brush Creek Boulevard. Sharrows in each direction on Harrison Street (Typical N) would connect to the on-street bike lanes on Emanuel Cleaver II Boulevard.

Figure 9.1: 20th Street and Grand Boulevard to 27th Street and McGee Trafficway

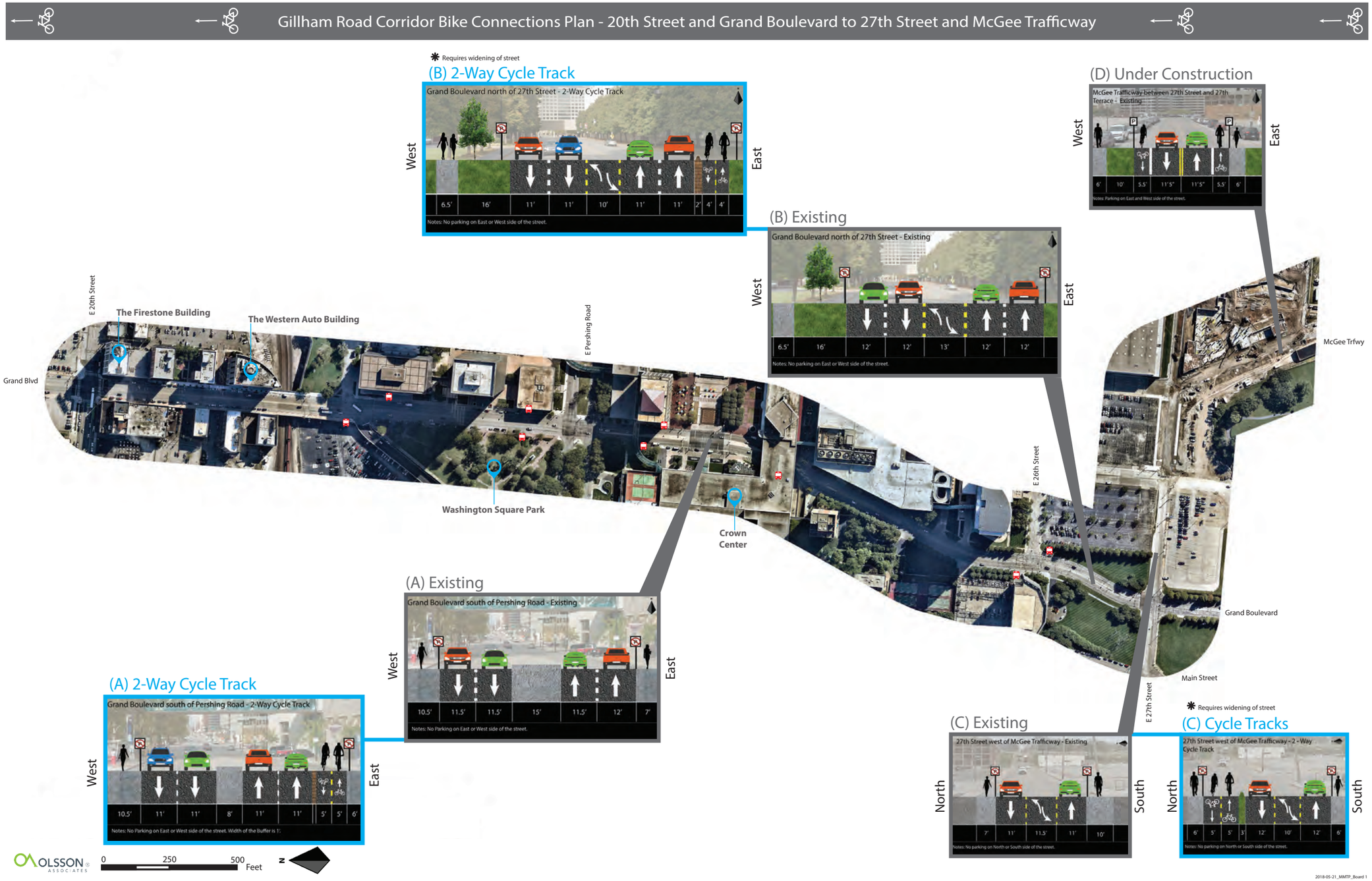


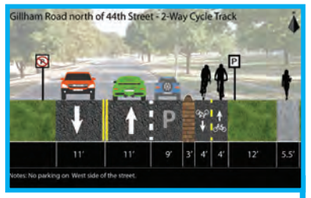
Figure 9.2: McGee Trafficway to Gillham Road and Armour Boulevard

Figure 9.3: Gillham Road and Armour Boulevard to Gillham Road and 42nd Street

Figure 9.4: Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard

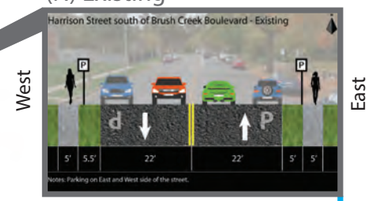
Gillham Road Corridor Bike Connections Plan - Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard

(L) 2-Way Cycle Track



(L) Existing

(N) Existing



(N) Sharrows

0 250 500 Feet

N

2018-05-21_MMTP_Board 4

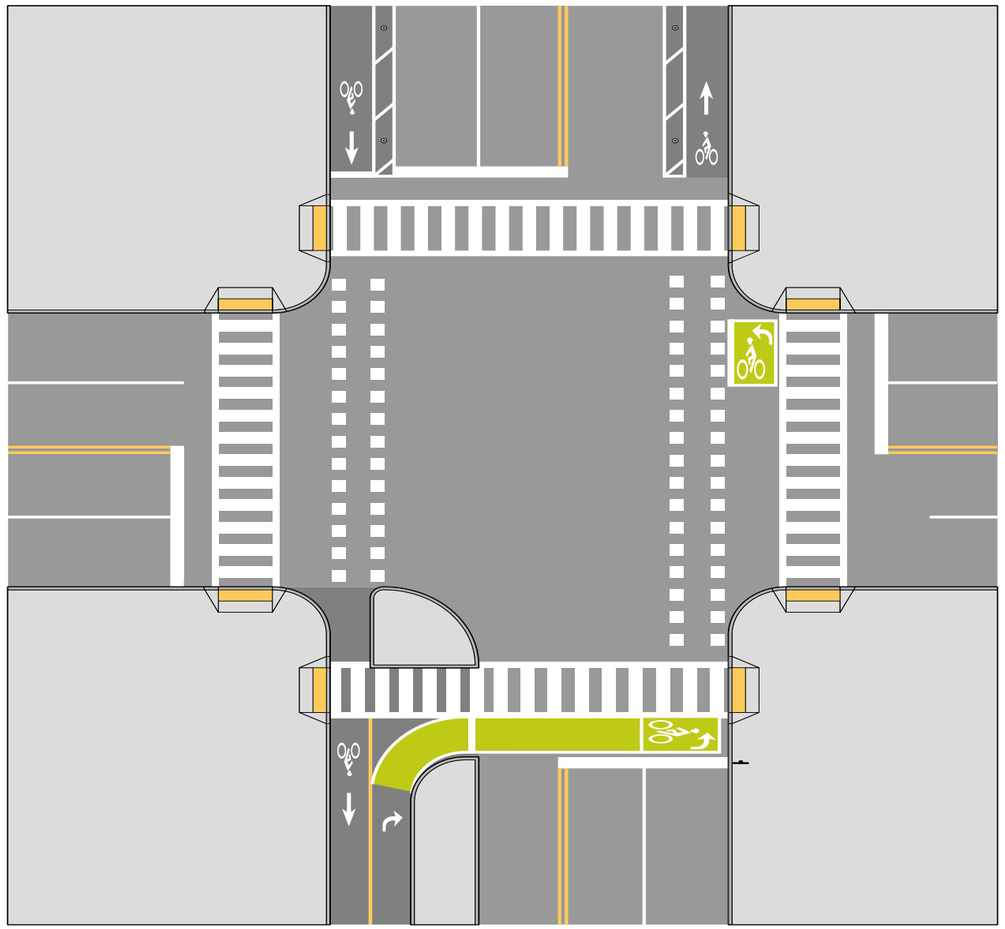
Section 9.2 Intersection Treatments

Intersections are key points for any bicycle corridor. In corridors with separated cycle tracks where bikes operate in a completely segregated space, and are protected from automobile travel lanes by physical barriers such as concrete medians and parked cars, intersections represent an area where bicycles and cars operate in the same space. In addition, there are various points in the Gillham Corridor where bicycle facilities transition between operating on a single side of the street to operating on both sides of the street. These transition points would occur on McGee Trafficway at both 27th Street, and at Gillham Road; and at Gillham Road and Brush Creek Boulevard. In addition, Grand Boulevard currently has buffered bike lanes on either side of the street north of 20th Street. Those will eventually need to transition to the east side of the street to connect with the preferred concept shown in the previous section. **Figures 8.5 through 8.7** display intersection treatments for transitioning between one-way separated bike lanes and two-way separated bike lanes.

There are several intersections where the two-way cycle track would cross on Gillham. **Figure 8.8** illustrates two possible intersection treatments.

Figure 9.5: Separated Bike Lane Intersection Treatments

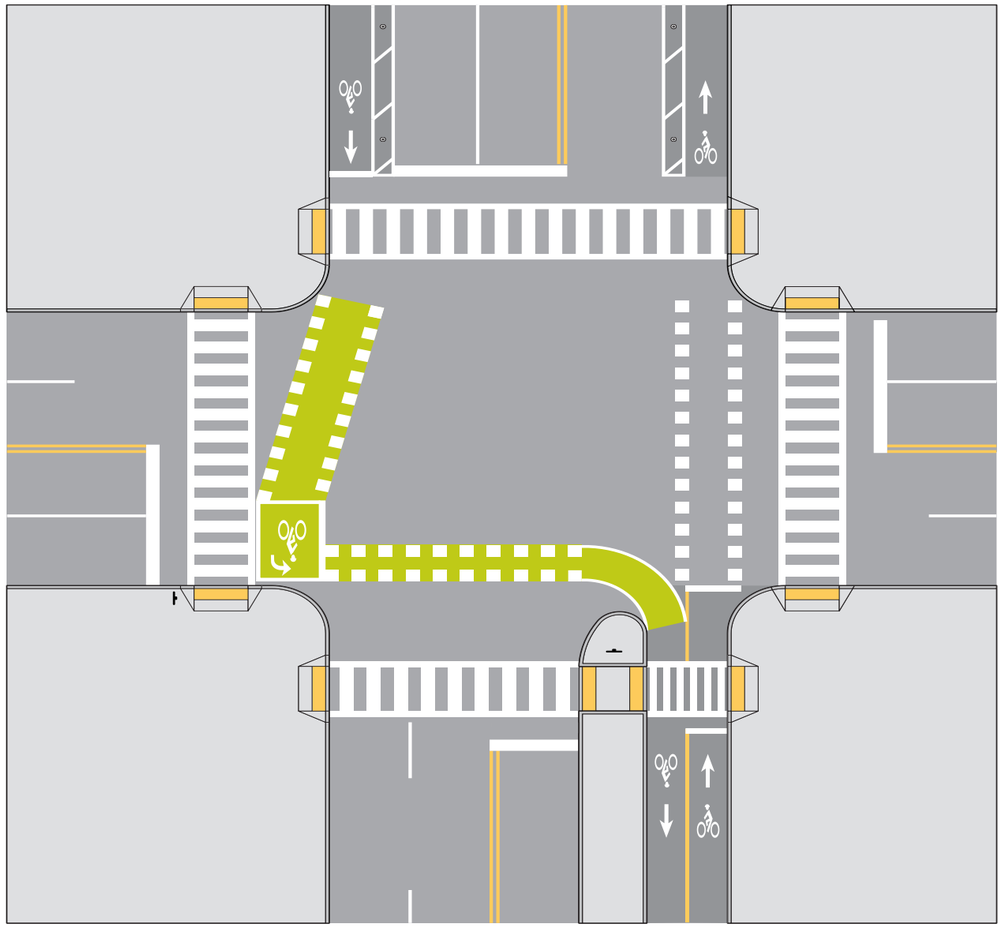
Transition: Two-Way Seperated Bike Lane to One-Way Seperated Bike Lane



Graphic developed by Tool Design Group for the Mass DOT Separated Bike Lane Planning and Design Guide

Figure 9.6: Separated Bike Lane Intersection Treatments #2

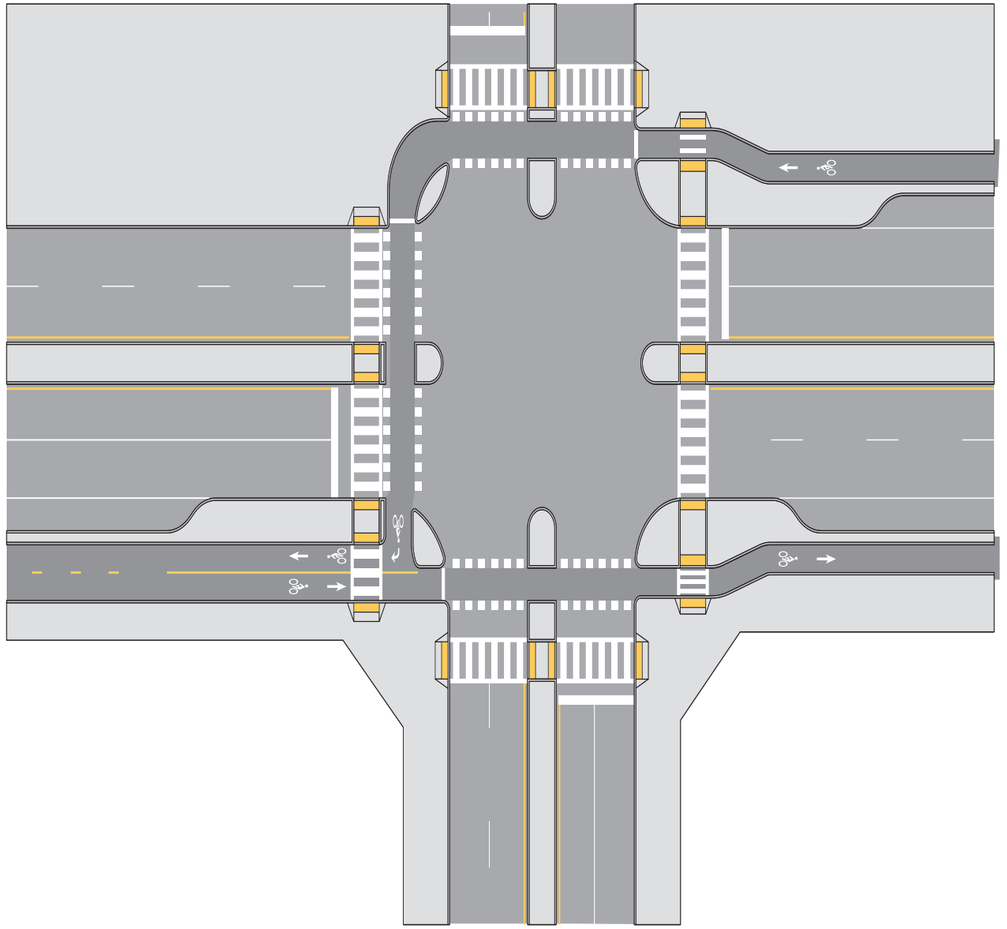
Transition: One-Way Separated Bike Lane to Two-Way Separated Bike Lane



Graphic developed by Tool Design Group for the Mass DOT Separated Bike Lane Planning and Design Guide

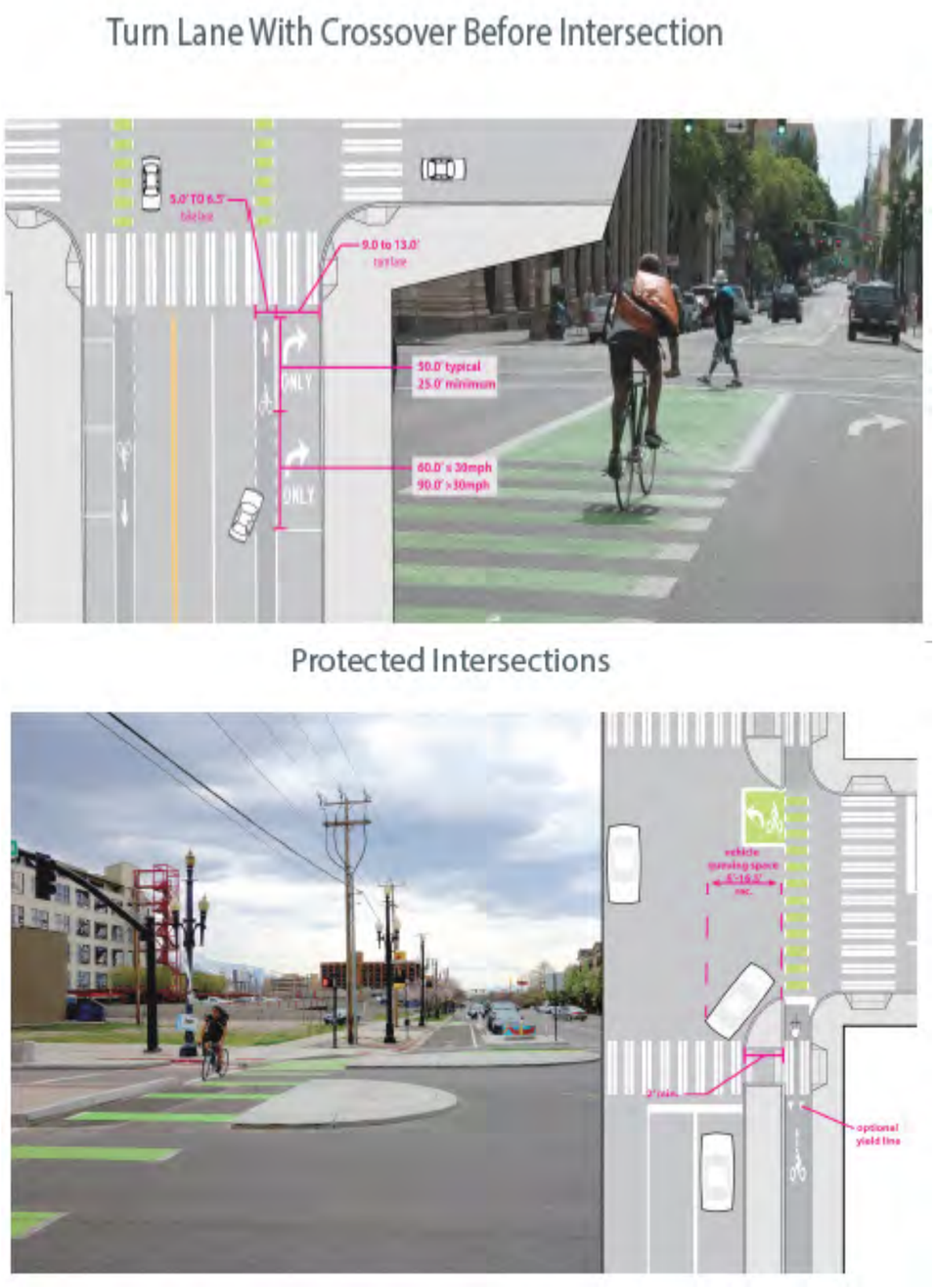
Figure 9.7: Separated Bike Lane Intersection Treatments #3

Transition: Two-Way Separated Bike Lane to One-Way Separated Bike Lane



Graphic developed by Tool Design Group for the Mass DOT Separated Bike Lane Planning and Design Guide

Figure 9.8: Two-Way Cycle Track Intersection Treatments



Section 9.3 Transit

The Main Street MAX has a transit stop at Crown Center. Floating bus stop medians with at least 8 feet of lateral width are required where transit stops operate on cycle tracks. **Figure 8.9** shows an example of a floating bus stop with a two-way cycle track.

Figure 9.9 Floating Bus Stop

Graphic developed by Toole Design Group for the MassDOT Separated Bike Lane Planning & Design Guide

SECTION 10: CONCEPTUAL COST ESTIMATES

Section 10.1 Introduction

This section briefly discusses a high-level conceptual cost estimate the corridor's preferred concept described in Section 8. This concept is primarily a two-way cycle track on the east side of Gillham Road, with some variations due to adjacent land use and right-of-way limitations. In some segments, this concept can be constructed in an existing travel lane. In other areas, portions or all of the cycle track will have to be constructed outside the existing curb lines. The conceptual cost range also incorporates very high level estimates for intersection treatments along the corridor. More detailed cost estimates can be developed during a later project development phase.

Section 10.2 Conceptual Cost Estimate Inputs

The following table, **Table 10.1** shows the inputs that were used to create the conceptual cost estimates for each facility type.

The assumptions for each facility type are described below.

Two-Way Separated Bike Lane within curb lines

- Assumed 3-foot wide concrete traffic island as roadside buffer.
- Assumed centerline, signs and sharrows in the SBL.
- Added 40% for lump sum items and 25% for contingencies/design.

Two-Way Separated Bike Lane with roadway widening

- Assumed removing and relocating curb and gutter 10 feet.
- New subbase and asphalt pavement installed in widened area.
- Assumed centerline, signs and sharrows in the separated bike lane.
- Added 40% for lump sum items and 25% for contingencies/design.

Two-Way Sidepath Through Park

- Assumed removal of existing sidewalk on one side and replaced with a 12-foot wide asphalt sidepath.
- Added 40% for lump sum items and 25% for contingencies/design.

Sharrows

- Cost is for thermoplastic symbol.
- Cost includes 25% for contingency and design

Illustrative cost estimates for the each segment are displayed in **Tables 10.2** through **10.5**. An illustrative cost estimate for the entire corridor is displayed in **Table 10.6**.

Table 10.1: Conceptual Cost Estimate Inputs

Facility Type	Price	Unit
Two-way Separated bike lane within curb lines	$375,000	Mile
Two-Way Separated Bike Lane with road-way widening	$1,300,000	Mile
Two-Way Sidepath Through Park	$760,000	Mile
Sharrows	$750	Each
Intersections		
High end (replacing traffic signal)	$625,000	Per Intersection
Medium (existing or no traffic signal)	$175,000	Per Intersection
Low end	$9,600	Per Crossing
Source: Toole Design Group, recent bid tabs on similar projects		

Section 10.3 Cost Estimates for Corridor Segments

The following tables feature a low end, medium, and high end cost estimates.

Conceptual costs also incorporate illustrative intersection treatments. These assumptions are described here:

Low-end intersection treatment

- Green pavement markings through intersection (4 crossings per intersection)
- Includes mobilization and traffic control
- 25% contingency

Medium level intersection treatment

- New high visibility crosswalks
- New pedestrian ramps
- Green pavement payments
- Protected intersection
- Mobilization, landscaping, drainage, traffic control, utility adjustments
- 25% contingency

High-end intersection treatment

- Adds new traffic signal to medium level treatment.

igure 10.2: Segment 1 High-Level Cost Estimates

Table 10.2: 20th Street and Grand Boulevard to 27th Street and McGee Trafficway Conceptual

Facility Type	Amount	Unit	Price
Two-way Separated bike lane within curb lines	0.68	Mile	$255,000
Two-Way Separated Bike Lane with roadway widening	0.24	Mile	$312,000
Two-Way Sidepath Through Park	0	Mile	$-
Sharrows	0	Each	$-
Intersections			
High-end Treatment	5	Each	$3,125,000
Medium Treatment	5	Each	$875,000
Low-end Treatment	24	Each	$230,400
	Low End	**Medium**	**High End**
Segment Sub-Total	**$797,400**	**$1,672,400**	**$3,992,400**

Table 10.3: McGee Trafficway to Gillham Road and Armour Boulevard Conceptual

Facility Type	Amount	Unit	Price
Two-way Separated bike lane within curb lines	0.54	Mile	$202,500
Two-Way Separated Bike Lane with roadway widening	0.15	Mile	$195,000
Two-Way Sidepath Through Park	0	Mile	$-
Sharrows	2	Each	$1,500
Intersections			
High-end Treatment	4	Each	$2,500,000
Medium Treatment	4	Each	700,000
Low-end Treatment	28	Each	$268,800
	Low End	**Medium**	**High End**
Segment Sub-Total	**$667,800**	**$1,367,800**	**$3,167,800**

Table 10.4: Gillham Road and Armour Boulevard to Gillham Road and 42nd Street Conceptual

Facility Type	Amount	Unit	Price
Two-way Separated bike lane within curb lines	0.6	Mile	$225,000
Two-Way Separated Bike Lane with roadway widening	0.3	Mile	$390,000
Two-Way Sidepath Through Park	0.35	Mile	$266,000
Sharrows	0	Each	$-
Intersections			
High-end Treatment	2	Each	$1,250,000
Medium Treatment	2	Each	350,000
Low-end Treatment	32	Each	$307,200
	Low End	**Medium**	**High End**
Segment Sub-Total	**$1,188,200**	**$1,538,200**	**$2,438,200**

Table 10.5: Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard Conceptual

Facility Type	Amount	Unit	Price
Two-way Separated bike lane within curb lines	0.6	Mile	$225,000
Two-Way Separated Bike Lane with roadway widening	0	Mile	$-
Two-Way Sidepath Through Park	0	Mile	$-
Sharrows	2	Each	$1,500
Intersections			
High-end Treatment	0	Each	$-
Medium Treatment	0	Each	-
Low-end Treatment	32	Each	$307,200
	Low End	**Medium**	**High End**
Segment Sub-Total	**$533,700**	**$533,700**	**$533,700**

Section 10.4 Summary

Table 10.6 summarizes the conceptual cost estimates for the entire corridor concept.

Table 10.6: Corridor Level Conceptual Cost Estimates

Corridor Segment	Price		
	Low End	Medium	High End
20th Street and Grand Boulevard to 27th Street and McGee Trafficway	**$797,400**	**$1,672,400**	**$3,992,400**
McGee Trafficway to Gillham Road and Armour Boulevard	**$667,800**	**$1,367,800**	**$3,167,800**
Gillham Road and Armour Boulevard to Gillham Road and 42nd Street	**$1,188,200**	**$1,538,200**	**$2,438,200**
Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard	**$533,700**	**$533,700**	**$533,700**
Total	**$3,187,100**	**$5,112,100**	**$10,062,100**

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APPENDIX A: FULL LEVEL OF STRESS MATRIX

Level of Traffic Stress Criteria for Road Segments, version 2.0, June, 2017

Mixed traffic criteria

Number of lanes	Effective ADT*	Prevailing Speed ≤ 20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50+mph
Unlaned 2-way street (no centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
1 thru lane per direction (1-way, 1-lane street or 2-way street with centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1500	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4
	1501-3000	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	3000+	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
2 thru lanes per direction	0-8000	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	8001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
3+ thru lanes per direction	any ADT	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

* Effective ADT = ADT for two-way roads; Effective ADT = 1.5*ADT for one-way roads

Bike lanes and shoulders not adjacent to a parking lane

Number of lanes	Bike lane width	Prevailing Speed ≤ 25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
1 thru lane per direction, or unlaned	6+ ft	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 ft	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
2 thru lanes per direction	6+ ft	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 ft	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
3+ lanes per direction	any width	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4

Notes 1. If bike lane / shoulder is frequently blocked, use mixed traffic criteria.
2. Qualifying bike lane / shoulder should extend at least 4 ft from a curb and at least 3.5 ft from a pavement edge or discontinuous gutter pan seam
3.Bike lane width includes any marked buffer next to the bike lane.

Bike lanes alongside a parking lane

Number of lanes	Bike lane reach = Bike + Pkg lane width	Prevailing Speed ≤ 25 mph	30 mph	35 mph
1 lane per direction	15+ ft	LTS 1	LTS 2	LTS 3
	12-14 ft	LTS 2	LTS 2	LTS 3
2 lanes per direction (2-way)	15+ ft	LTS 2	LTS 3	LTS 3
2-3 lanes per direction (1-way)		LTS 2	LTS 3	LTS 3
other multilane		LTS 3	LTS 3	LTS 3

Notes 1. If bike lane is frequently blocked, use mixed traffic criteria.
2. Qualifying bike lane must have reach (bike lane width + parking lane width) ≥ 12 ft
3.Bike lane width includes any marked buffer next to the bike lane.

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APPENDIX B: SURVEY RESULTS AND QUESTIONNAIRES

Gillham Road Corridor Bike Connections Study
Online Survey Summary
January 2018

The Gillham Road Corridor Bike Connections Study team consisting of Olsson Associates, Parson + Associates, and Toole Design Group, conducted an electronic survey to gather input from the public to assist the City of Kansas City, Missouri and the Mid-America Regional Council (MARC) in identifying potential improvements for a bicycle corridor between Brush Creek on the south to 18th Street on the north.

Survey links were sent electronically to the Gillham Road Corridor Bike Connections Study working group who in turn distributed the link to their respective constituencies. The link was shared via social media by the City of Kansas City, MARC and BikeWalk KC.

The survey was available on SurveyMonkey from December 12, 2017 to January 5, 2018. A total of 190 participants took part with 155 of them completing the survey to the end. The survey took approximately 10 minutes to complete.

Residency

Respondents were asked to indicate the location of their residence referring to a labeled map of the corridor. Those who participated resided in 27 of the 45 labeled areas. While approximately 14% of respondents indicated they lived in areas other than the choices offered, the Residence Map shows approximate percentages of respondent residences.

Below are the largest percentage of respondents' neighborhoods:

- 18% - South Hyde Park
- 8% - North Hyde Park
- 6% - Central Hyde Park and Central Business District (Downtown)
- 5% - Southmoreland

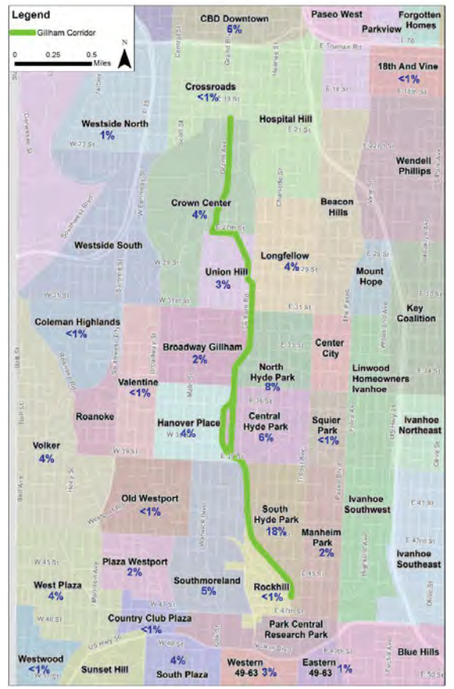
Respondents were asked to indicate their most frequent destination. The Destination Map shows percentages of participants who chose each destination.

Destinations

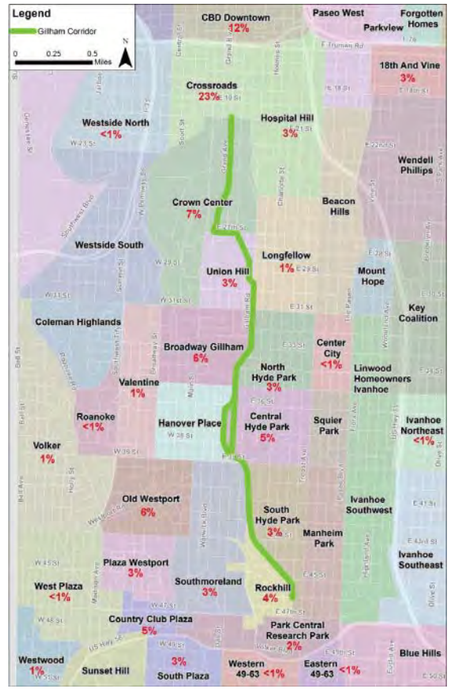
Below are the destinations indicated by the largest percentage of respondents:

- 23% - Crossroads
- 12% - Central Business District – Downtown
- 7% - Crown Center
- 5% - Country Club Plaza and Central Hyde Park

Residency Map



Destination Map



Corridor Travel Priority

Respondents were asked how travel should be prioritized on Gillham Road in the future. Approximately 84% indicated that improving the comfort of biking and walking along the corridor should be prioritized. 13% felt that bicycles should be accommodated but automobile travel should remain the priority. Only 4% indicated that automobile travel should remain the primary function.

Frequency of Bicycling

Respondents were asked how often they ride a bicycle along the Gillham Corridor. Most of the survey respondents ride bicycles on the corridor several times a week (25%) or once a month (28%). 13% indicated they never ride their bicycle on the corridor.

Reasons for Bicycling

Respondents were asked to indicate if they ride their bicycle in the corridor, for what reasons do they do so. The most frequent reason was for regular exercise (67%). Respondents were allowed to choose multiple reasons for riding their bike. Below are the most frequent reasons indicated for bicycling in the corridor:

- 67% - Regular exercise or workout
- 54% - Social visits
- 54% - Commuting to work or school
- 50% - Trips to parks or recreational facilities
- 47% - Errands
- 37% - Shopping
- 33% - Family outings

Importance of Bike/Ped Facilities in Kansas City

Respondents were asked to rate how important they thought good bicycle/pedestrian access is to a list of area destinations. The destinations are ranked below according to their weighted average.

1. UMKC
2. Parks
3. Schools
4. Downtown KCMO
5. Nelson-Atkins Museum Area
6. Crossroads District
7. Country Club Plaza
8. Hospital Hill

What best describes you as a bicyclist?

Respondents were asked what best described them as a bicyclist. Most survey respondents indicated they were committed bicyclists (53%) who ride in mixed traffic on streets and believe new bike facilities and improvements are needed in the Gillham Corridor, or they are interested in bicycling (36%) and use low-traffic streets, but are concerned about the safety of riding in traffic with

automobiles and believe more bike lanes and routes would increase the number of trips they make by bicycle.

Frequency of Use of Select Routes

Respondents were asked how often they use certain routes (Warwick/Oak, Armour Road bike lanes, Gillham Road with traffic, Cherry Street, Armour Boulevard). Their weighted averages were roughly all the same with a slight increase for Warwick/Oak.

Preferred Bicycle Facility Improvements

When asked to rate how effective certain improvements would be at increasing bicycling along the Gillham Corridor, the highest rated improvement was separated bike lanes from traffic with curbs, landscaping or other means. Improvements are ranked below according to their weighted average:

1. Separated bike lanes from traffic by curbs, landscaping or other means
2. Bike lanes with 2 feet or greater painted buffer
3. Better crossings/intersection control at major streets crossing Gillham
4. Traditional bike lanes
5. Better pavement markings at intersections
6. Bike improvements on nearby routes but not on Gillham
7. Wider sidewalks or side paths
8. Wayfinding signs
9. Posting "Bicyclists May Use Full Lane" signs

Feedback on Bicycling Locations in the Corridor

Respondents were shown photos of locations in the corridor with brief descriptions of traffic patterns and bicycle/pedestrian amenities at each location. They were asked to rank how comfortable they feel /would feel bicycling at each location. Based on respondent rankings, a weighted ranking was determined for each option. Routes are ranked below from those deemed most comfortable to those deemed least comfortable for survey respondents.

1. Charlotte Street near 29th Street (two-lane, one way, parking on both sides)
2. Warwick Blvd. near 41st Street (two-way street with parking on one side)
3. Cherry Street near 27th Street (two-way street with parking on both sides)
4. McGee near 41st Street (one-way street, parking on both sides
5. Gillham Road northbound near 37th Street (major street, two lanes, one-way, parking on one side)
6. Oak Street near 18th Street (three lanes in each direction, off-peak parking)
7. Gillham Road near 27th Street (major street, two lanes in each direction, no parking)
8. Gillham Plaza near 33rd Street (commercial street, three lanes in each direction, off-peak parking)
9. Gillham Road near 23rd Street (two lanes in each direction, next to Childrens Mercy and Crown Center)
10. Gillham Road near 39th Street (major street, two lanes in each direction)

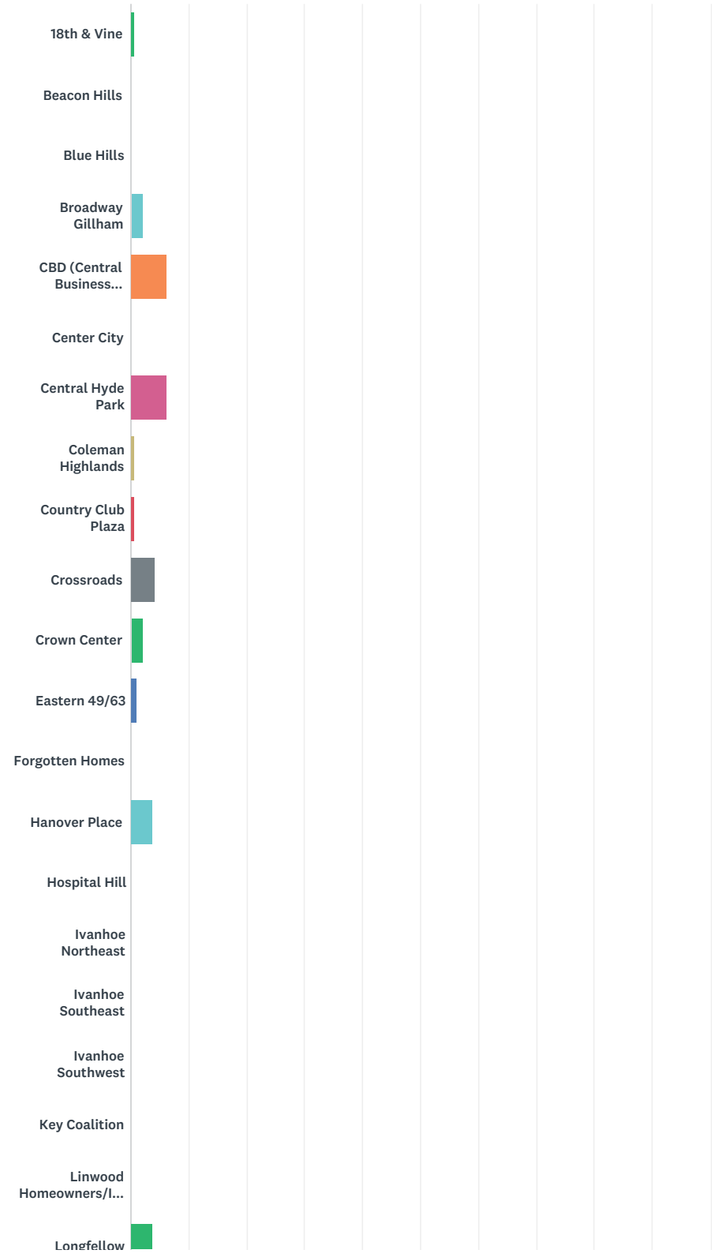
Feedback on Bicycle Facilities in Other Cities

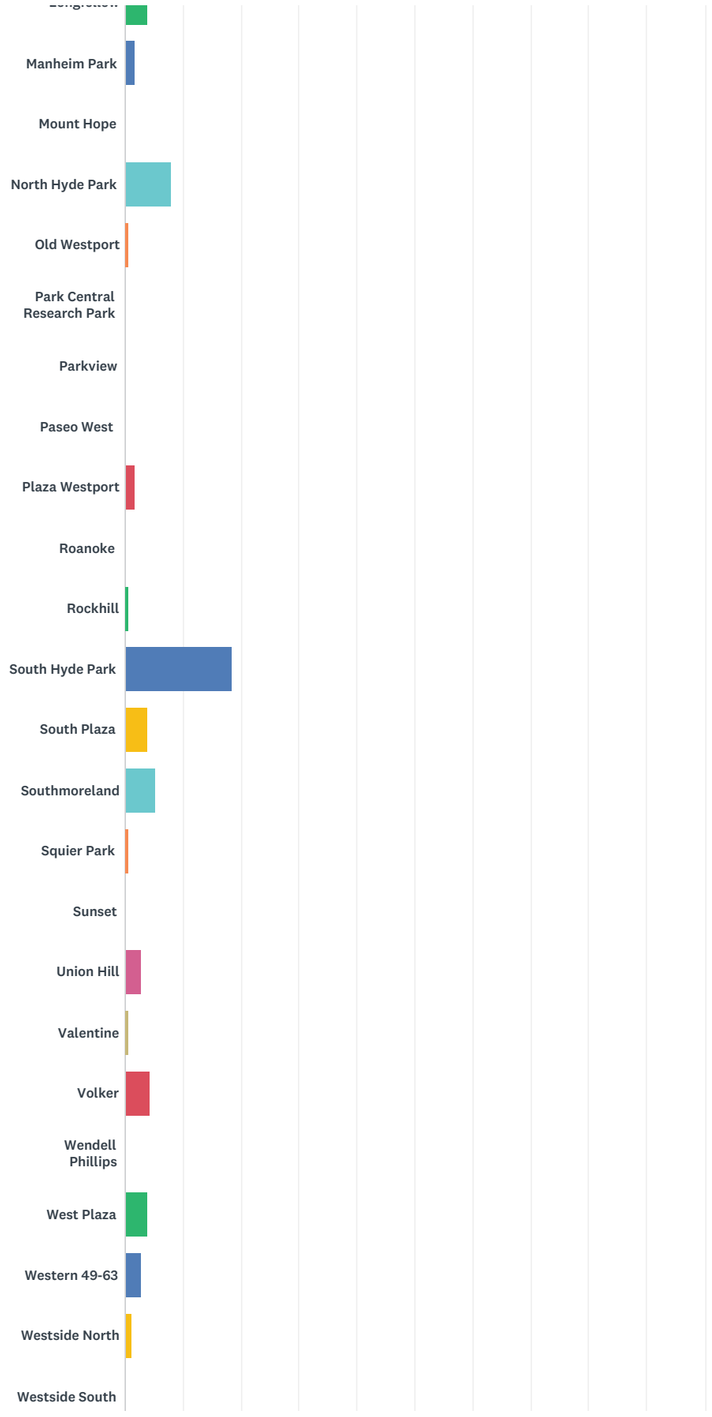
Respondents were shown photos of bicycle/pedestrian facilities in other cities and asked to rank how comfortable they would feel if they were bicycling at that location. Based on respondent rankings, a weighted ranking was determined for each option. Routes are ranked below from those ranked most comfortable to those ranked least comfortable for bicycling.

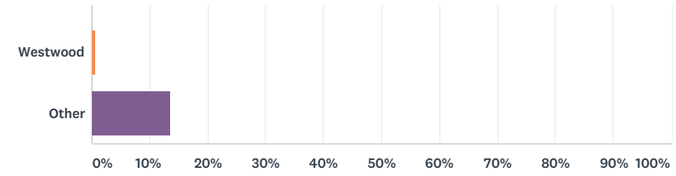
1. Off-street separated bike lane
2. Separated bike lane buffered from traffic by parking
3. Two-way cycle track
4. Separated bike lane with curbing between the bike lane and the traffic lane
5. Multi-use trail
6. Green bike lane
7. Bike lanes on a neighborhood street
8. Buffered bike lane (no vertical delineation)
9. Bike lanes with painted crossing zones
10. Bike lane built using a four- to three-lane conversion
11. Bicycle boulevard

Q1 Refer to the map below and indicate where in the corridor you live.Choose one location.

Answered: 190 Skipped: 0





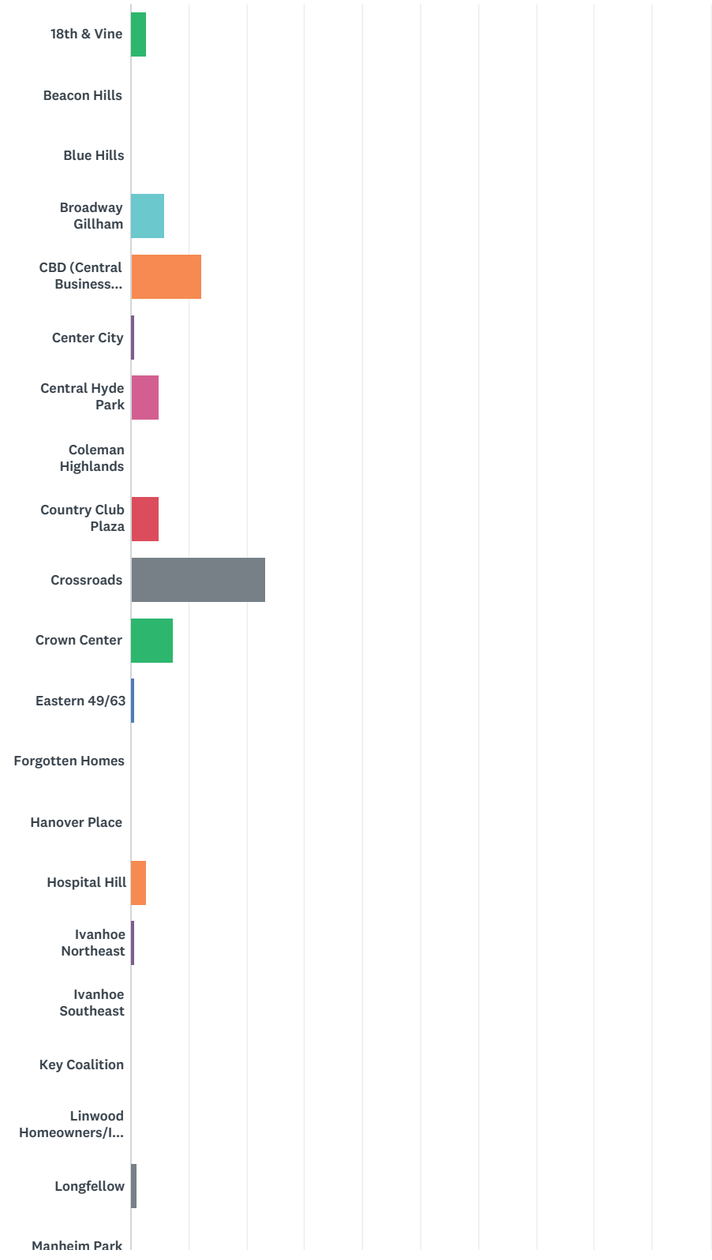


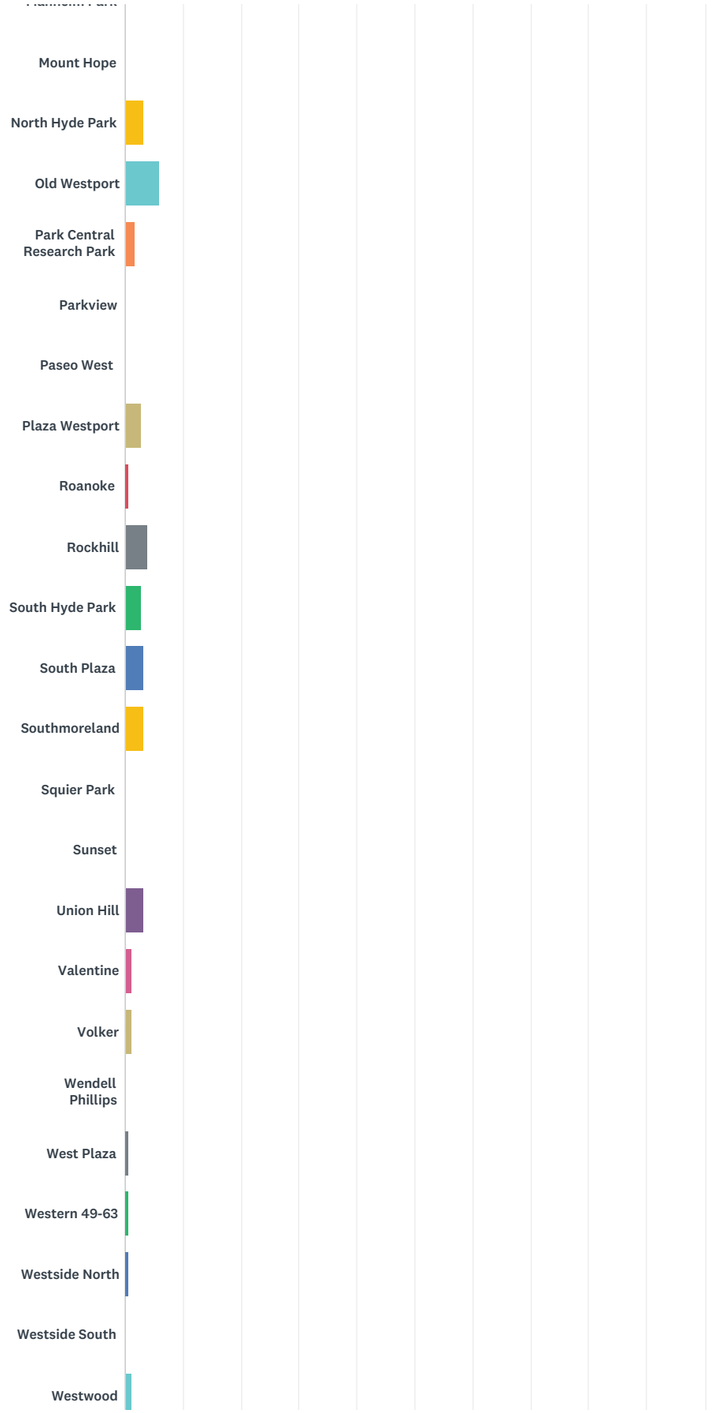
ANSWER CHOICES	RESPONSES	
18th & Vine	0.53%	1
Beacon Hills	0.00%	0
Blue Hills	0.00%	0
Broadway Gillham	2.11%	4
CBD (Central Business District) Downtown	6.32%	12
Center City	0.00%	0
Central Hyde Park	6.32%	12
Coleman Highlands	0.53%	1
Country Club Plaza	0.53%	1
Crossroads	4.21%	8
Crown Center	2.11%	4
Eastern 49/63	1.05%	2
Forgotten Homes	0.00%	0
Hanover Place	3.68%	7
Hospital Hill	0.00%	0
Ivanhoe Northeast	0.00%	0
Ivanhoe Southeast	0.00%	0
Ivanhoe Southwest	0.00%	0
Key Coalition	0.00%	0
Linwood Homeowners/Ivanhoe	0.00%	0
Longfellow	3.68%	7
Manheim Park	1.58%	3
Mount Hope	0.00%	0
North Hyde Park	7.89%	15
Old Westport	0.53%	1
Park Central Research Park	0.00%	0
Parkview	0.00%	0
Paseo West	0.00%	0
Plaza Westport	1.58%	3
Roanoke	0.00%	0
Rockhill	0.53%	1
South Hyde Park	18.42%	35

South Plaza	3.68%	7
Southmoreland	5.26%	10
Squier Park	0.53%	1
Sunset	0.00%	0
Union Hill	2.63%	5
Valentine	0.53%	1
Volker	4.21%	8
Wendell Phillips	0.00%	0
West Plaza	3.68%	7
Western 49-63	2.63%	5
Westside North	1.05%	2
Westside South	0.00%	0
Westwood	0.53%	1
Other	13.68%	26
TOTAL		190

Q2 Refer to the map below and indicate where your most frequent destination is located.Choose one location.

Answered: 190 Skipped: 0



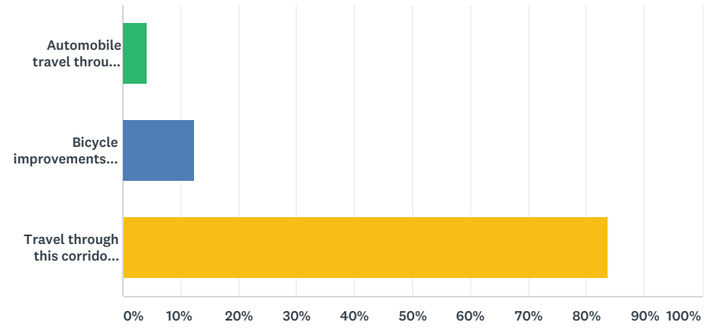


ANSWER CHOICES	RESPONSES	
18th & Vine	2.63%	5
Beacon Hills	0.00%	0
Blue Hills	0.00%	0
Broadway Gillham	5.79%	11
CBD (Central Business District) Downtown	12.11%	23
Center City	0.53%	1
Central Hyde Park	4.74%	9
Coleman Highlands	0.00%	0
Country Club Plaza	4.74%	9
Crossroads	23.16%	44
Crown Center	7.37%	14
Eastern 49/63	0.53%	1
Forgotten Homes	0.00%	0
Hanover Place	0.00%	0
Hospital Hill	2.63%	5
Ivanhoe Northeast	0.53%	1
Ivanhoe Southeast	0.00%	0
Key Coalition	0.00%	0
Linwood Homeowners/Ivanhoe	0.00%	0
Longfellow	1.05%	2
Manheim Park	0.00%	0
Mount Hope	0.00%	0
North Hyde Park	3.16%	6
Old Westport	5.79%	11
Park Central Research Park	1.58%	3
Parkview	0.00%	0
Paseo West	0.00%	0
Plaza Westport	2.63%	5
Roanoke	0.53%	1
Rockhill	3.68%	7
South Hyde Park	2.63%	5
South Plaza	3.16%	6
Southmoreland	3.16%	6
Squier Park	0.00%	0
Sunset	0.00%	0

Union Hill	3.16%	6
Valentine	1.05%	2
Volker	1.05%	2
Wendell Phillips	0.00%	0
West Plaza	0.53%	1
Western 49-63	0.53%	1
Westside North	0.53%	1
Westside South	0.00%	0
Westwood	1.05%	2
TOTAL		190

Q3 Past corridor improvements have focused on prioritizing automobile travel through the corridor. In the future, how should travel along Gillham Road be prioritized?

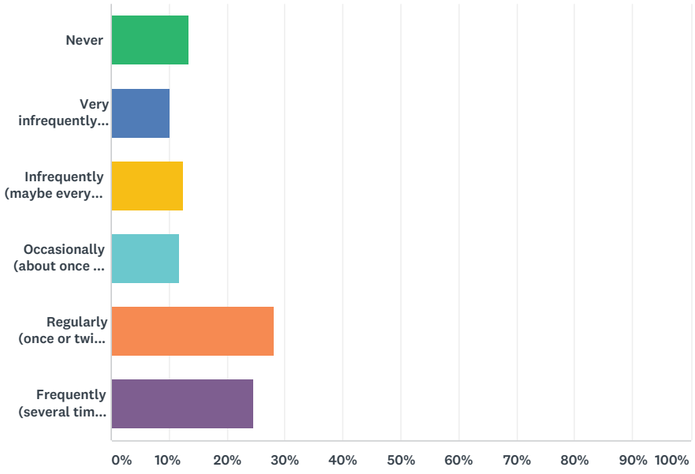
Answered: 171 Skipped: 19



ANSWER CHOICES	RESPONSES	
Automobile travel through the corridor should continue to be the primary function.	4.09%	7
Bicycle improvements should be made, but automobile travel should continue to be prioritized.	12.28%	21
Travel through this corridor should consider the surrounding park and neighborhood uses, so improving the comfort of biking or walking along the corridor should be prioritized.	83.63%	143
TOTAL		171

Q4 How often do you ride a BICYCLE along the Gillham corridor for enjoyment or travel to destinations?

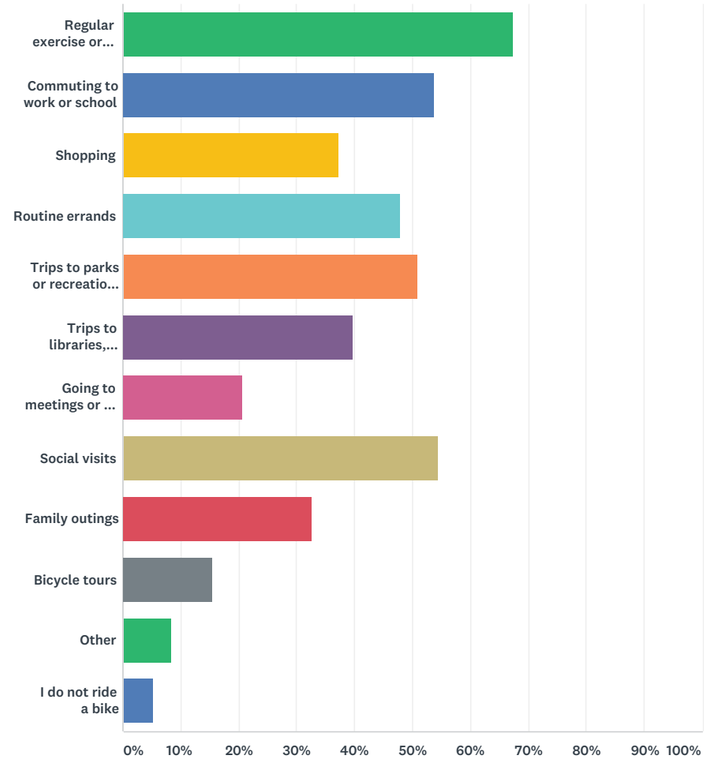
Answered: 171 Skipped: 19



ANSWER CHOICES	RESPONSES	
Never	13.45%	23
Very infrequently (a few times a year)	9.94%	17
Infrequently (maybe every few months)	12.28%	21
Occasionally (about once or twice a month)	11.70%	20
Regularly (once or twice a month)	28.07%	48
Frequently (several times a week to every day)	24.56%	42
TOTAL		171

Q5 If you ride a BICYCLE, which of the following describes why? Check all that apply.

Answered: 169 Skipped: 21

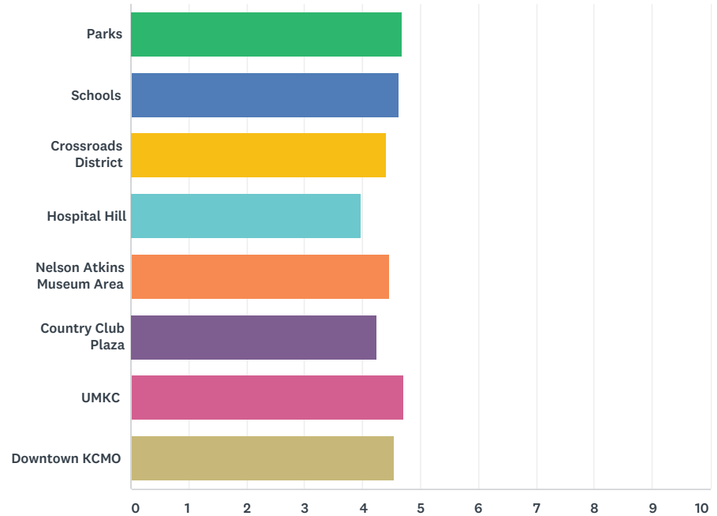


ANSWER CHOICES	RESPONSES	
Regular exercise or workout	67.46%	114
Commuting to work or school	53.85%	91
Shopping	37.28%	63
Routine errands	47.93%	81
Trips to parks or recreational facilities	50.89%	86
Trips to libraries, museums, or similar places	39.64%	67
Going to meetings or in the conduct of business	20.71%	35
Social visits	54.44%	92
Family outings	32.54%	55
Bicycle tours	15.38%	26
Other	8.28%	14

I do not ride a bike	5.33%	9
Total Respondents: 169		

Q6 Please rate how important you think good bicycle and/or pedestrian access is to each of the following destinations or groups of destinations.

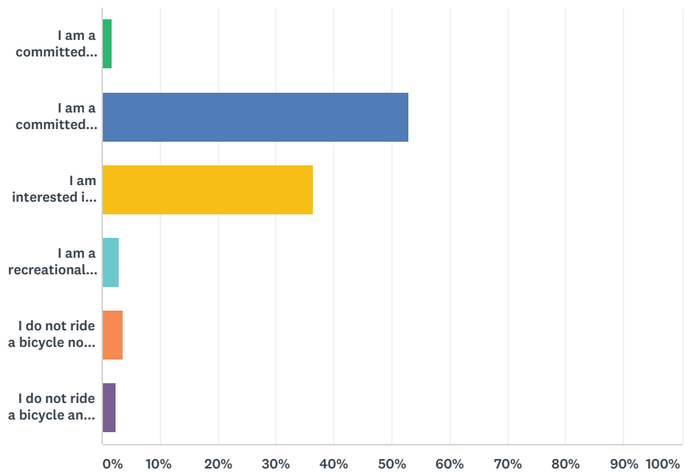
Answered: 170 Skipped: 20



	UNIMPORTANT	NEUTRAL	MODERATELY IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL	WEIGHTED AVERAGE
Parks	0.00% 0	1.76% 3	5.29% 9	16.47% 28	76.47% 130	170	4.68
Schools	1.18% 2	1.78% 3	6.51% 11	15.38% 26	75.15% 127	169	4.62
Crossroads District	0.59% 1	2.94% 5	10.00% 17	26.47% 45	60.00% 102	170	4.42
Hospital Hill	2.37% 4	7.69% 13	20.12% 34	28.99% 49	40.83% 69	169	3.98
Nelson Atkins Museum Area	1.18% 2	1.18% 2	6.47% 11	34.12% 58	57.06% 97	170	4.45
Country Club Plaza	1.76% 3	5.29% 9	12.35% 21	27.65% 47	52.94% 90	170	4.25
UMKC	0.59% 1	1.18% 2	4.71% 8	14.71% 25	78.82% 134	170	4.70
Downtown KCMO	1.76% 3	2.35% 4	7.65% 13	17.65% 30	70.59% 120	170	4.53

Q7 Which of the following best describes you as a BICYCLIST?

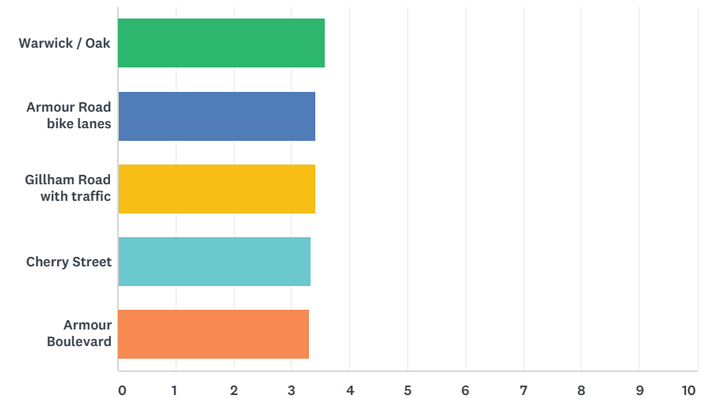
Answered: 170 Skipped: 20



ANSWER CHOICES	RESPONSES	
I am a committed bicyclist who rides in mixed traffic on every street. I don't believe that any significant further action on bicycle facilities is necessary.	1.76%	3
I am a committed bicyclist who rides in mixed traffic on most streets, but believe that new facilities like bike lanes, bike routes, and other bike amenity improvements are needed to improve the Gillham corridor's biking environment for me and encourage other people to ride more often.	52.94%	90
I am interested in bicycling and use low-traffic streets, but am concerned about the safety of riding in traffic with automobiles. More bike lanes and bike routes would increase the number of trips I make by bicycle.	36.47%	62
I am a recreational or occasional bicyclist and ride primarily on trails. I am unlikely to ride on city streets even with bike lanes.	2.94%	5
I do not ride a bicycle now, but might be interested if there were more bike routes or facilities in the Gillham corridor that met my needs and made me feel safer.	3.53%	6
I do not ride a bicycle and am unlikely ever to do so.	2.35%	4
TOTAL		170

Q8 How often do you use the following bicycle routes in the Gillham Corridor? (refer to map)

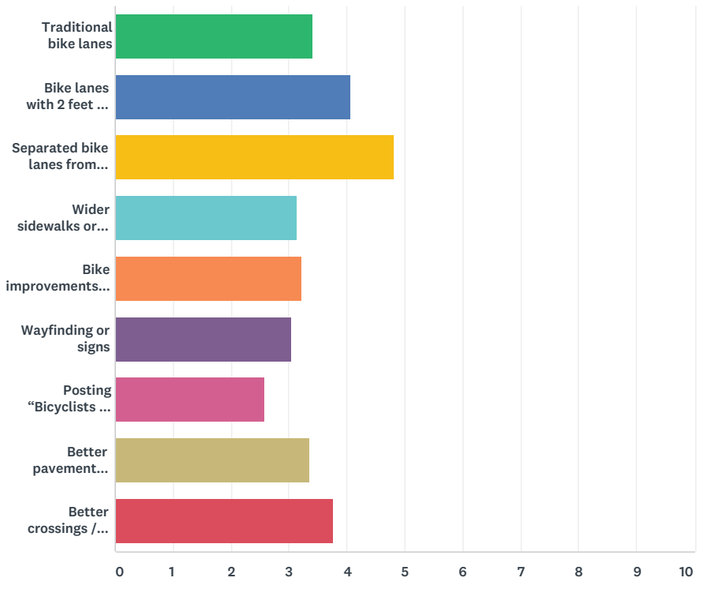
Answered: 169 Skipped: 21



	NEVER	VERY INFREQUENTLY OR A FEW TIMES PER YEAR	INFREQUENTLY OR MAYBE EVERY FEW MONTHS	OCCASIONALLY OR ABOUT ONCE OR TWICE PER MONTH	REGULARLY OR ONCE OR TWICE PER WEEK	FREQUENTLY (SEVERAL TIMES PER WEEK OR EVERY DAY)	DON'T KNOW THE TRAIL	TOTAL	WEIG AVER
Warwick / Oak	13.69% 23	11.90% 20	17.26% 29	30.36% 51	15.48% 26	10.12% 17	1.19% 2	168	
Armour Road bike lanes	22.02% 37	14.29% 24	14.88% 25	21.43% 36	9.52% 16	11.90% 20	5.95% 10	168	
Gillham Road with traffic	21.89% 37	13.61% 23	11.24% 19	21.89% 37	17.75% 30	12.43% 21	1.18% 2	169	
Cherry Street	20.96% 35	17.96% 30	10.18% 17	26.35% 44	10.18% 17	11.38% 19	2.99% 5	167	
Armour Boulevard	21.30% 36	17.75% 30	13.61% 23	20.71% 35	11.24% 19	13.02% 22	2.37% 4	169	

Q9 How effective do you believe each of the following improvements would be at increasing bicycling along the Gillham corridor?

Answered: 168 Skipped: 22



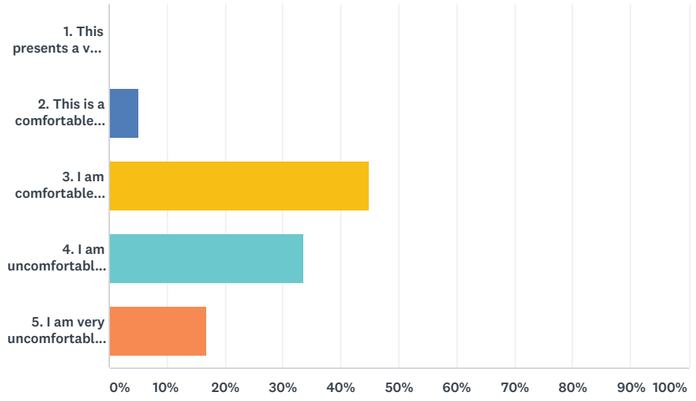
	COMPLETELY INEFFECTIVE	RELATIVELY INEFFECTIVE	NEUTRAL	EFFECTIVE	VERY EFFECTIVE	N/A	TOTAL	WEIGHTED AVERAGE
Traditional bike lanes	6.67% 11	15.76% 26	18.79% 31	47.27% 78	11.52% 19	0.00% 0	165	3.41
Bike lanes with 2 feet or greater painted buffer	2.38% 4	4.76% 8	8.33% 14	54.17% 91	29.76% 50	0.60% 1	168	4.05
Separated bike lanes from traffic by curbs, landscaping, or other means	0.60% 1	1.19% 2	2.38% 4	8.33% 14	87.50% 147	0.00% 0	168	4.81
Wider sidewalks or sidepaths	13.86% 23	19.88% 33	21.08% 35	27.71% 46	16.87% 28	0.60% 1	166	3.14
Bike improvements on nearby routes, but not on Gillham.	10.24% 17	15.06% 25	27.11% 45	32.53% 54	12.65% 21	2.41% 4	166	3.23
Wayfinding or signs	12.65% 21	20.48% 34	25.30% 42	26.51% 44	11.45% 19	3.61% 6	166	3.04
Posting “Bicyclists may use full lane” signs	28.31% 47	28.92% 48	12.05% 20	18.07% 30	12.65% 21	0.00% 0	166	2.58
Better pavement markings are intersections	8.33% 14	15.48% 26	25.00% 42	34.52% 58	15.48% 26	1.19% 2	168	3.34

Better crossings / intersection control at major streets crossing Gillham	2.38% 4	10.12% 17	19.64% 33	43.45% 73	23.81% 40	0.60% 1	168	3.77

#	OTHER (PLEASE SPECIFY)	DATE
1	Please institute bicycle friendly and supportive laws that find motorists that harass and endanger bikers.	1/17/2018 12:35 PM
2	SanFran. paints their roads for better visibility to the lane differences.	1/10/2018 3:05 PM
3	Street lights or highlighted roads for pedestrian safety	12/22/2017 12:01 PM
4	The three that I marked as neutral are important as part of the total environment, but by thenselves they would do little. Couple them with buffered or protected bike lanes.	12/20/2017 3:10 PM
5	Use Warwick, 36th Street, Charlotte and Holmes.	12/18/2017 5:39 PM
6	Amour boulevard is not safe to ride. With designated bike signs, drivers do not yield. That road is so badly patched it it’s painful to ride.	12/18/2017 5:00 PM
7	No one will stop for crosswalks currently and right turns by autos are a constant danger.	12/18/2017 11:17 AM
8	More traffic-calming built environment to slow down traffic would be very effective. Posted speed limits don't work unless motorists feel uncomfortable speeding.	12/18/2017 10:51 AM
9	The bike lanes need to be fairly clear of gravel and glass to ride in safely	12/18/2017 9:03 AM
10	More bike share stations	12/18/2017 4:26 AM
11	LAWS AGAINST CELLPHONES!!!	12/17/2017 1:28 PM
12	The streets are small, there is not room for bikes with traffic with the roads as is. 39th is overused and has become a hazard. 39th and Gilham intersection is a death trap.	12/16/2017 6:56 AM
13	This is an incredibly dangerous city to ride a bicycle. The drivers here HAVE to be among the worst in the country. Please keep them away from cyclists. Also, I thought it was illegal to ride a bicycle in the sidewalk...	12/15/2017 5:50 PM
14	decrease to 1 lane of vehicle traffic in each direction	12/15/2017 3:30 PM
15	Major typos in this survey	12/15/2017 3:05 PM
16	Bike lanes with permanent barriers away from vehicles are the only way to ensure cyclists the best in safety and create a city that is 100% bike friendly.	12/15/2017 2:01 PM
17	There are two bad intersections on Gillham that will need serious consideration when this is evaluated: 39th and gillham; and Gillham and 42nd. 42nd is a place of multiple wrecks and it is difficult to cross the street when walking. No light, but 42nd runs north of the playground.	12/15/2017 12:47 PM
18	Facilities for bikes at intersections and separated lanes that feel safe should help. No bikes on sidewalks and no sidepaths.	12/15/2017 11:04 AM

Q10 Gillham Road near 23rd Street(two lanes in each direction, next to Childrens Mercy and Crown Center)

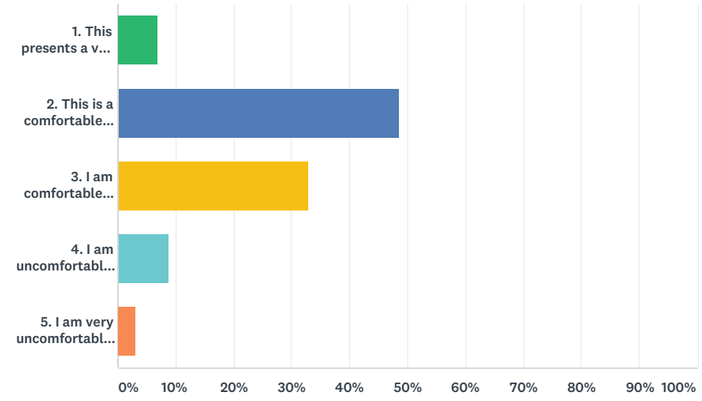
Answered: 161 Skipped: 29



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	0.00%	0
2. This is a comfortable cycling route for most users	4.97%	8
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	44.72%	72
4. I am uncomfortable with this street, but might use it for very short distances	33.54%	54
5. I am very uncomfortable riding here, and would never ride it.	16.77%	27
TOTAL		161

Q11 Charlotte Street near 29th Streettwo-lane, one-way, with parking on both sides)

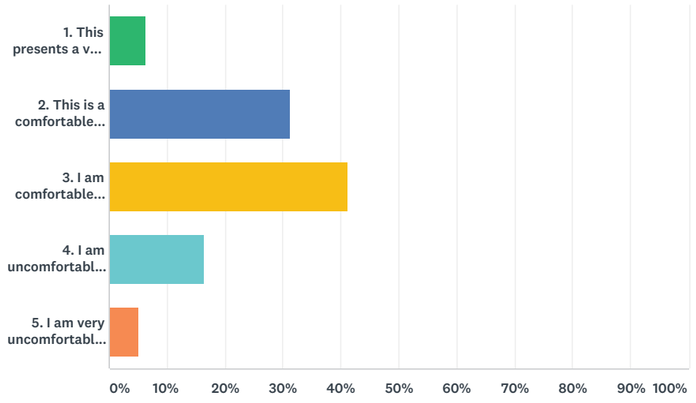
Answered: 161 Skipped: 29



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	6.83%	11
2. This is a comfortable cycling route for most users	48.45%	78
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	32.92%	53
4. I am uncomfortable with this street, but might use it for very short distances	8.70%	14
5. I am very uncomfortable riding here, and would never ride it	3.11%	5
TOTAL		161

Q12 Cherry Street near 27th(two-way street, with parking on both sides)

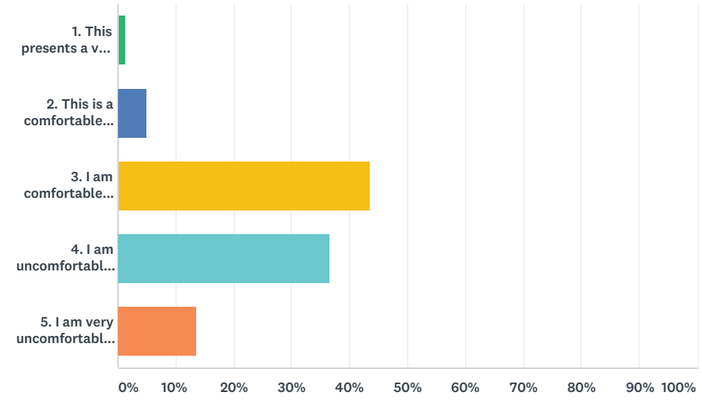
Answered: 160 Skipped: 30



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	6.25%	10
2. This is a comfortable cycling route for most users	31.25%	50
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	41.25%	66
4. I am uncomfortable with this street, but might use it for very short distances	16.25%	26
5. I am very uncomfortable riding here, and would never ride it	5.00%	8
TOTAL		160

Q13 Gillham Road near 27th Street(major street, two lanes in each direction, with no parking)

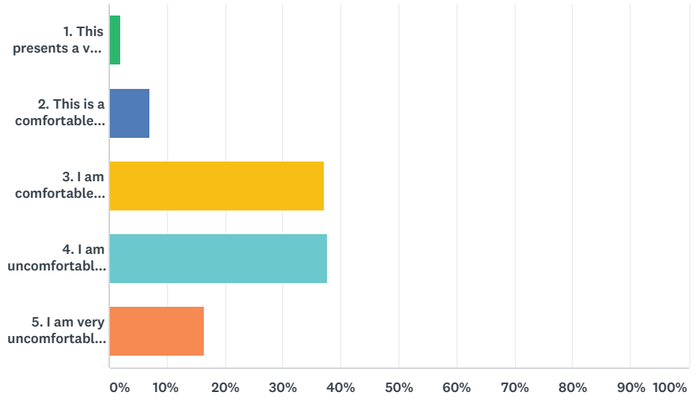
Answered: 161 Skipped: 29



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	1.24%	2
2. This is a comfortable cycling route for most users	4.97%	8
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	43.48%	70
4. I am uncomfortable with this street, but might use it for very short distances	36.65%	59
5. I am very uncomfortable riding here, and would never ride it	13.66%	22
TOTAL		161

Q14 Gillham Plaza near 33rd Street(commercial street, three lanes in each direction, with off-peak parking)

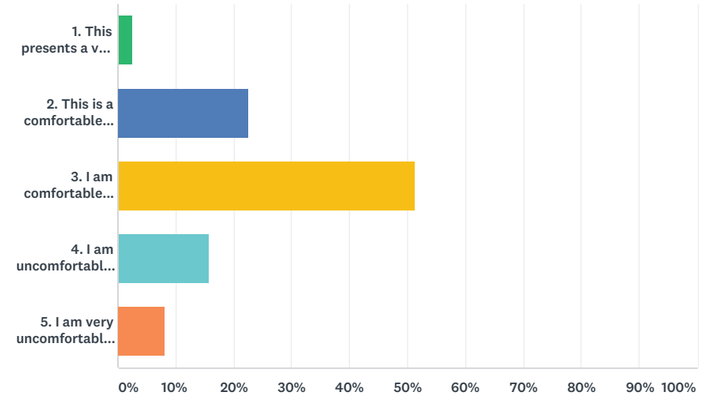
Answered: 159 Skipped: 31



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	1.89%	3
2. This is a comfortable cycling route for most users	6.92%	11
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	37.11%	59
4. I am uncomfortable with this street, but might use it for very short distances	37.74%	60
5. I am very uncomfortable riding here, and would never ride it	16.35%	26
TOTAL		159

Q15 Gillham Road northbound near 37th Street(major street, two lanes, one-way, with parking on one side)

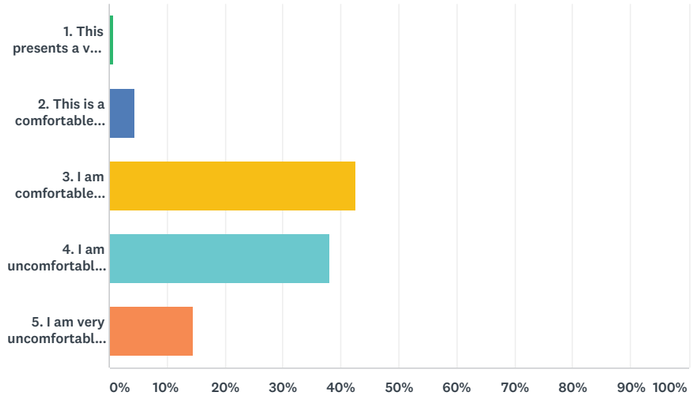
Answered: 160 Skipped: 30



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	2.50%	4
2. This is a comfortable cycling route for most users	22.50%	36
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	51.25%	82
4. I am uncomfortable with this street, but might use it for very short distances	15.63%	25
5. I am very uncomfortable riding here, and would never ride it	8.13%	13
TOTAL		160

Q16 Gillham Road near 39th Street(major street, two lanes in each direction)

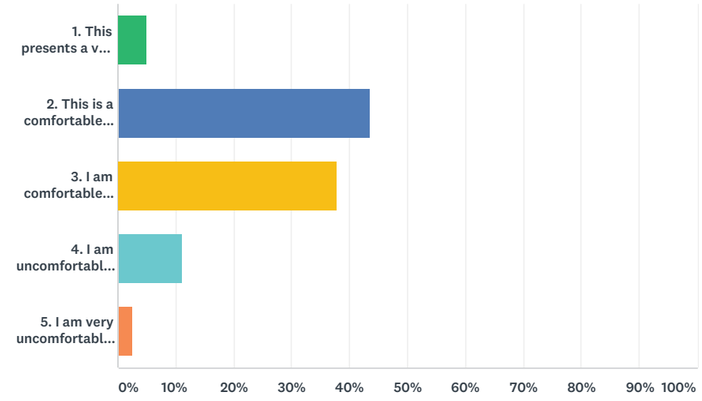
Answered: 160 Skipped: 30



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	0.63%	1
2. This is a comfortable cycling route for most users	4.38%	7
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	42.50%	68
4. I am uncomfortable with this street, but might use it for very short distances	38.13%	61
5. I am very uncomfortable riding here, and would never ride it	14.37%	23
TOTAL		160

Q17 Warwick Boulevard near 41st Street(two-way street with parking on one side).

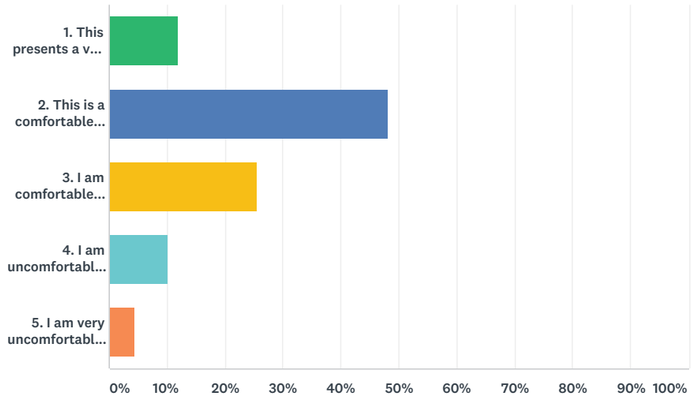
Answered: 161 Skipped: 29



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	4.97%	8
2. This is a comfortable cycling route for most users	43.48%	70
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	37.89%	61
4. I am uncomfortable with this street, but might use it for very short distances	11.18%	18
5. I am very uncomfortable riding here, and would never ride it	2.48%	4
TOTAL		161

Q18 McGee near 41st Street(one-way street, parking on both sides)

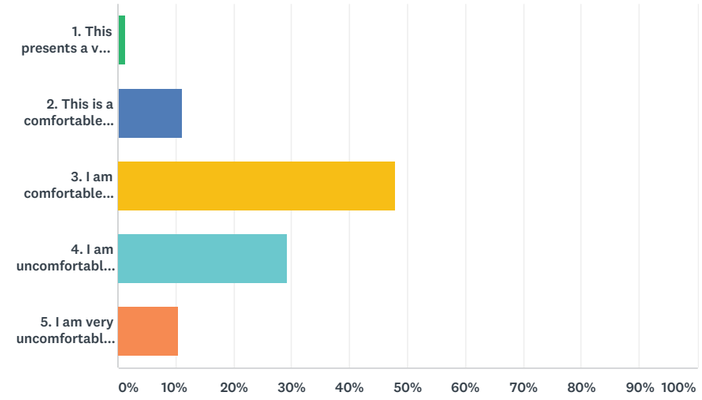
Answered: 160 Skipped: 30



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	11.88%	19
2. This is a comfortable cycling route for most users	48.13%	77
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	25.62%	41
4. I am uncomfortable with this street, but might use it for very short distances	10.00%	16
5. I am very uncomfortable riding here, and would never ride it	4.38%	7
TOTAL		160

Q19 Oak Street near 18th Street(three lanes in each direction, with off-peak parking)

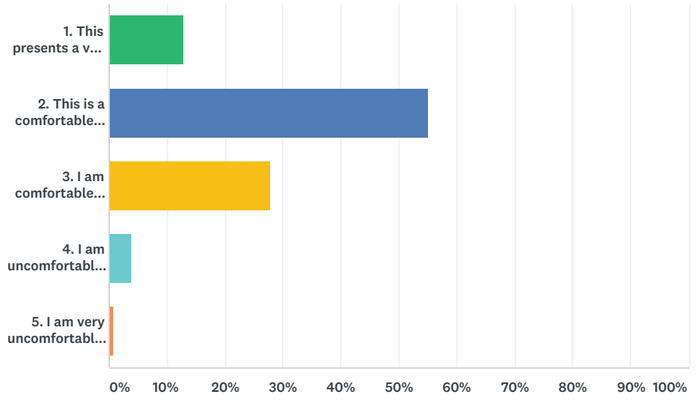
Answered: 161 Skipped: 29



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	1.24%	2
2. This is a comfortable cycling route for most users	11.18%	18
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	47.83%	77
4. I am uncomfortable with this street, but might use it for very short distances	29.19%	47
5. I am very uncomfortable riding here, and would never ride it	10.56%	17
TOTAL		161

Q20 Bike lanes with painted crossing zones

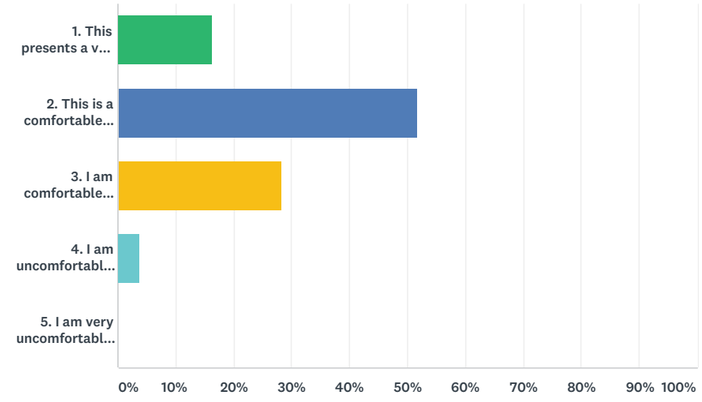
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	12.66%	20
2. This is a comfortable cycling route for most users	55.06%	87
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	27.85%	44
4. I am uncomfortable with this street, but might use it for very short distances	3.80%	6
5. I am very uncomfortable riding here, and would never ride it	0.63%	1
TOTAL		158

Q21 Buffered bike lane (no vertical delineation)

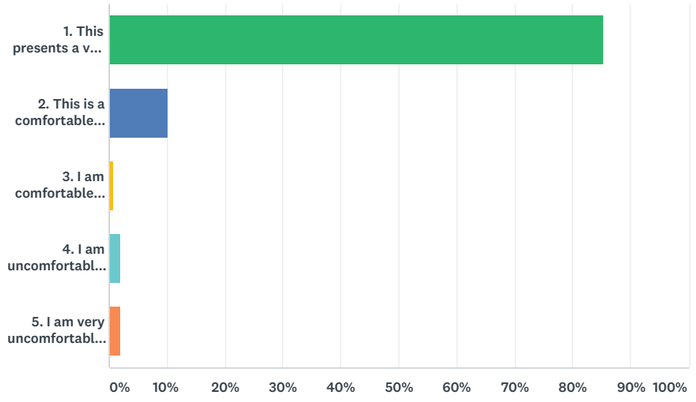
Answered: 159 Skipped: 31



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	16.35%	26
2. This is a comfortable cycling route for most users	51.57%	82
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	28.30%	45
4. I am uncomfortable with this street, but might use it for very short distances	3.77%	6
5. I am very uncomfortable riding here, and would never ride it	0.00%	0
TOTAL		159

Q22 Off-Street separated bike lane

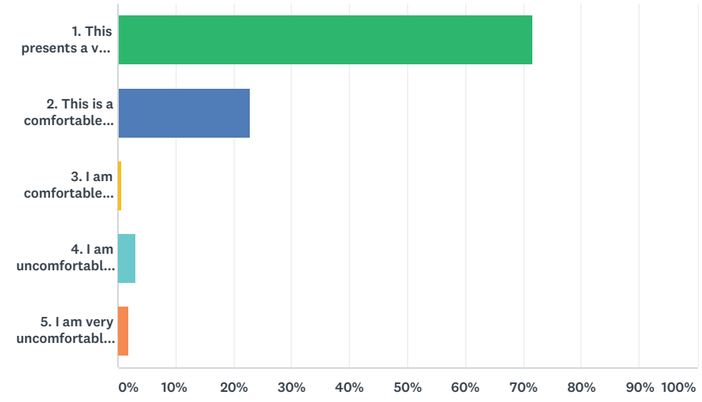
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	85.44%	135
2. This is a comfortable cycling route for most users	10.13%	16
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	0.63%	1
4. I am uncomfortable with this street, but might use it for very short distances	1.90%	3
5. I am very uncomfortable riding here, and would never ride it	1.90%	3
TOTAL		158

Q23 Multi-use trail

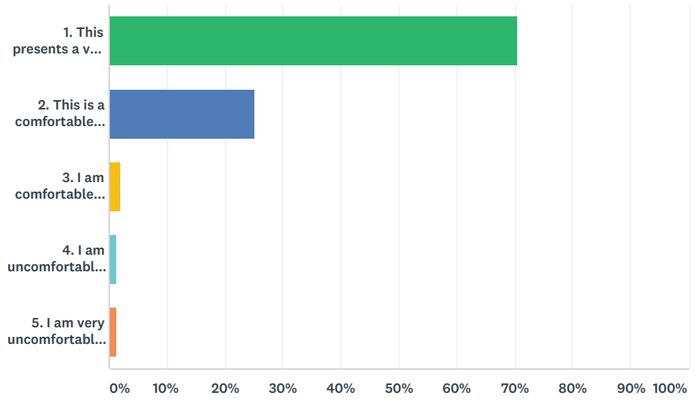
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	71.52%	113
2. This is a comfortable cycling route for most users	22.78%	36
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	0.63%	1
4. I am uncomfortable with this street, but might use it for very short distances	3.16%	5
5. I am very uncomfortable riding here, and would never ride it	1.90%	3
TOTAL		158

Q24 Separated bike lane buffered from traffic by parking

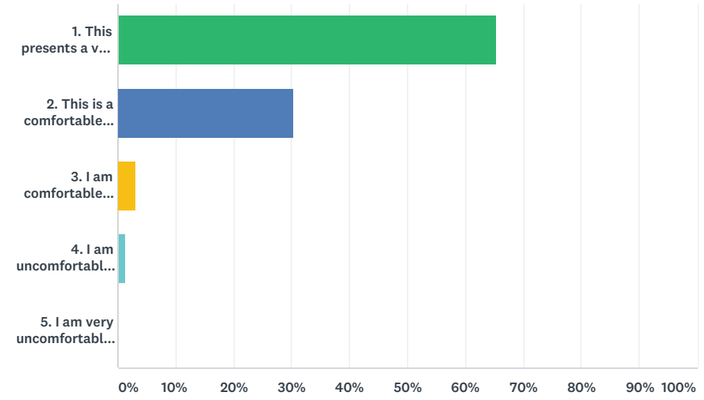
Answered: 159 Skipped: 31



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	70.44%	112
2. This is a comfortable cycling route for most users	25.16%	40
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	1.89%	3
4. I am uncomfortable with this street, but might use it for very short distances	1.26%	2
5. I am very uncomfortable riding here, and would never ride it	1.26%	2
TOTAL		159

Q25 Separated bike lane with curbing between the bike lane and the traffic lane

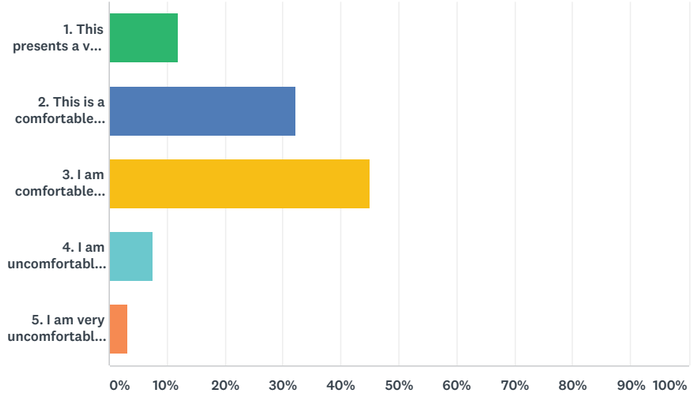
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	65.19%	103
2. This is a comfortable cycling route for most users	30.38%	48
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	3.16%	5
4. I am uncomfortable with this street, but might use it for very short distances	1.27%	2
5. I am very uncomfortable riding here, and would never ride it	0.00%	0
TOTAL		158

Q26 Bicycle Boulevard

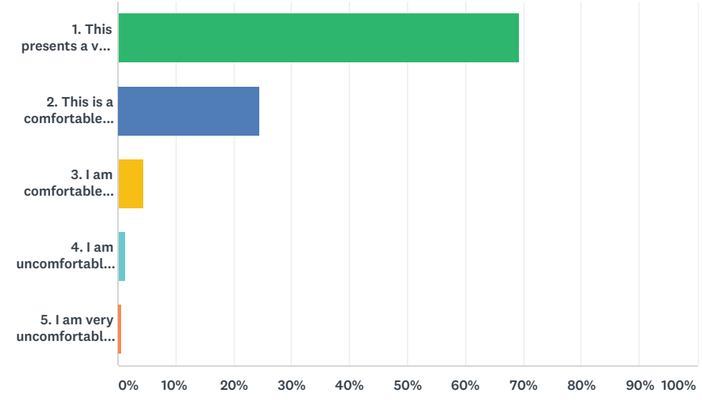
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	12.03%	19
2. This is a comfortable cycling route for most users	32.28%	51
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	44.94%	71
4. I am uncomfortable with this street, but might use it for very short distances	7.59%	12
5. I am very uncomfortable riding here, and would never ride it	3.16%	5
TOTAL		158

Q27 Two-way Cycle Track

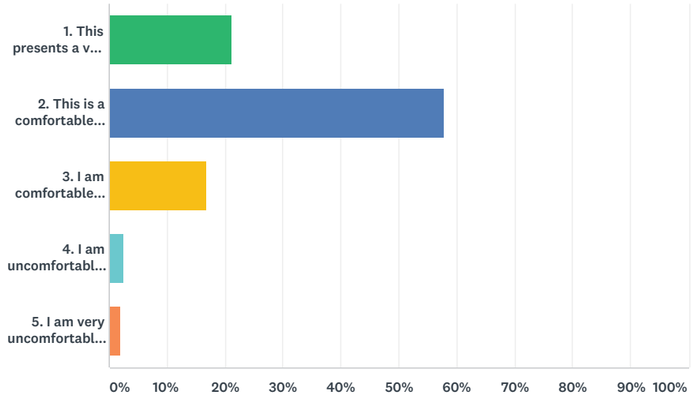
Answered: 159 Skipped: 31



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	69.18%	110
2. This is a comfortable cycling route for most users	24.53%	39
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	4.40%	7
4. I am uncomfortable with this street, but might use it for very short distances	1.26%	2
5. I am very uncomfortable riding here, and would never ride it	0.63%	1
TOTAL		159

Q28 Bike lanes on a neighborhood street

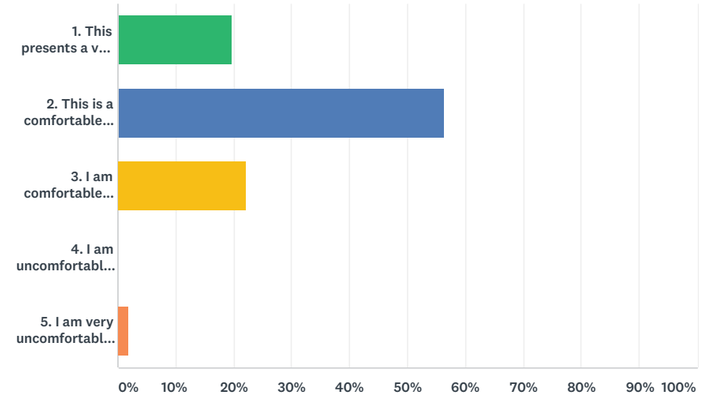
Answered: 156 Skipped: 34



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	21.15%	33
2. This is a comfortable cycling route for most users	57.69%	90
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	16.67%	26
4. I am uncomfortable with this street, but might use it for very short distances	2.56%	4
5. I am very uncomfortable riding here, and would never ride it	1.92%	3
TOTAL		156

Q29 Green bike lane

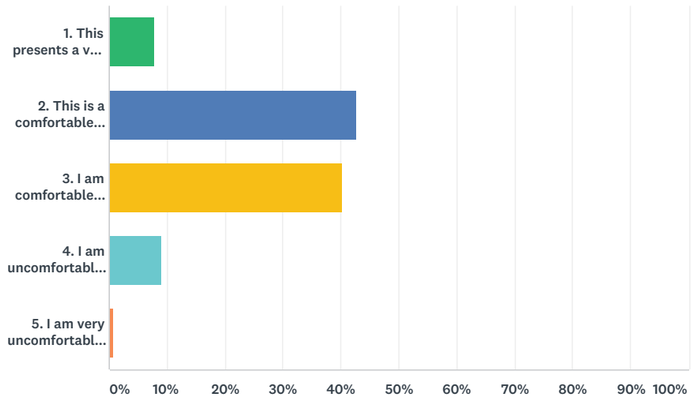
Answered: 158 Skipped: 32



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	19.62%	31
2. This is a comfortable cycling route for most users	56.33%	89
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	22.15%	35
4. I am uncomfortable with this street, but might use it for very short distances	0.00%	0
5. I am very uncomfortable riding here, and would never ride it	1.90%	3
TOTAL		158

Q30 Bike lane built using a four- to three-lane conversion

Answered: 157 Skipped: 33



ANSWER CHOICES	RESPONSES	
1. This presents a very safe route that can be used by all people with little hesitancy	7.64%	12
2. This is a comfortable cycling route for most users	42.68%	67
3. I am comfortable using this street myself, but would not recommend it for less experienced or younger riders	40.13%	63
4. I am uncomfortable with this street, but might use it for very short distances	8.92%	14
5. I am very uncomfortable riding here, and would never ride it	0.64%	1
TOTAL		157

Q32 Additional comments:

Answered: 49 Skipped: 141

#	RESPONSES	DATE
1	I think traffic laws that prefer biker rights and anti-hassling are important as well.	1/17/2018 12:42 PM
2	Thank you for working to improve cycling in Kansas City, Missouri. Though I cycled on Grand daily for years before they were there, I love the new bike lanes from downtown to Crown Center!!	12/23/2017 11:15 AM
3	Thank you!	12/22/2017 12:06 PM
4	I would greatly appreciate bike/ped improvements along Gillham that would work in harmony with auto traffic. I see more and more people bike in my neighborhood now. I would also love to see street crossings become safer for the older and disabled population.	12/21/2017 11:28 AM
5	I am glad to see this survey. I bike from my home to NKC at least three times per week and utilize most of the roads in this corridor survey. Definitely could be made more bicycle friendly.	12/21/2017 11:07 AM
6	Protected bike lanes please!!!!	12/21/2017 6:37 AM
7	Seperated bike facilities are a necessity due to high travel speeds of autombiles. Whether this is parked cars, curbs, landscaping,etc. that protection is need for most bicyclists given the current state of automobile travel.	12/20/2017 3:22 PM
8	Thanks!	12/20/2017 7:02 AM
9	This is a good survey, thanks!	12/19/2017 10:10 PM
10	I am looking forward to any and all improvements in this corridor. It has the potential to link downtown and midtown!	12/19/2017 7:43 PM
11	Looking forward to this project! Been travelling a lot and seeing so much better biking infrastructure in other cities and glad we are looking to make improvements in our own.	12/19/2017 4:12 PM
12	Protect all bike lanes, and paint them green!	12/19/2017 10:40 AM
13	Good luck.	12/19/2017 10:34 AM
14	Preference for riding is to find a route that has less cross traffic and busy driveways. Also less parallel traffic. I think that many of the designs give a cyclist too high a level of comfort and a feeling of safety, that may lead to inattentive concerns for surroundings. Always take the low volume residential street first.	12/18/2017 5:48 PM
15	I believe bike lanes are a must. There needs to be designated spot for cyclists. Most drivers and cyclist get frustrated with each other because the laws are not clear. They tend to be reckless unintentionally and cyclists will feel in danger . I believe sidewalks are also dangerous because pedestrians are the primary one to use that space. Cyclist will go to fast and in danger those trying to use the sidewalk.	12/18/2017 5:05 PM
16	I think the city should optimize bike lanes for the average cyclist. I believe we have a lot of people interested in biking more frequently, but the state of our current bike lines (Grand included) discourage cyclists. If the city took hard steps to make biking a safe transportation option for most/all (e.g. buffered bike lanes, separated two-way cycle tracks, etc) as opposed to a melange of "meh" (sharrows and paint), I think they'd see a spike in bicyclists. As it is, the Melange of Meh yields frustrating "solutions" to safety for cyclists, as well as frustrating signals to motorists. In order to shift motorist's behaviors, the city needs to have a strong, unified plan/approach. Why have an unused bike-box, that motorists don't respect, but not have parking-buffered bike lanes to get the cyclists to that bike-box?	12/18/2017 2:10 PM
17	The biggest challenge is the speed differential between cars and bikes if they are sharing facilities. Even unbuffered bike lanes are treated as a suggestion and so are shared just like a wide single lane. with our hilly terrain this will always be a challenge!	12/18/2017 1:24 PM
18	Gillham is a commuter route that is unlikely to change with or without bicycle improvements. Topography and vehicle speeds make it less preferred. Dedicated bicycle facilities on Warwick would be most effective. Also need to directly connect to Brush Creek/Trolley Track Trail.	12/18/2017 12:51 PM
19	I live on Gillham Road, and it's too busy and dangerous for bikers in the street. A bigger sidewalk or track would be the best solution.	12/18/2017 11:40 AM
20	Thank you for collecting this information.	12/18/2017 11:20 AM

21	My niece and I ride from 40th and Warwick to Academie Lafayette on Cherry St. most days of the week. We ride in the street on Warwick and cut over to the sidewalk on Armour. Warwick traffic is too fast for an "8-80" bike route, and Armour is too fast and to busy for "8-80" sharrows. We limit our sidewalk time because sidewalks keep pedestrians safe from wheels, but also because motorists can't see us crossing driveways and intersections when we're on the sidewalks. Areas around schools should be prioritized for real, protected bicycle infrastructure. That said: I also commute to work, and I want to have a safer daily ride as well!	12/18/2017 11:04 AM
22	Thank you for doing this. I want to ride my bike to work, but the traffic is intimidating as I am a fairly novice bike rider. I would use Gillham rd from 39th street to Children's Mercy	12/18/2017 11:03 AM
23	It is good to see that city planners are concerned about the cycling safety of the plaza to crossroads corridor. Lots of improvement is needed currently, and I look forward to hearing about future updates. Thank you!	12/18/2017 11:01 AM
24	Thanks for all of your hard work.	12/18/2017 10:25 AM
25	More protected facilities for cyclists please!	12/18/2017 10:07 AM
26	I am a cyclist who rides 3-4 thousand miles a year in all types of traffic. Gillham is a great route if you are comfortable in traffic with the two lanes and space along the side. Many cyclists are not near as comfortable in traffic and don't think about all the concerns of being a good cyclist in traffic. The other streets have less traffic but get narrow, especially with car doors coming open and so cyclists want to ride in the middle. I am okay with what I have to do but many may not be. Warwick is not as comfortable on the non-parking side and I spend the least amount of time on that stretch for that reason. Besides going up Hospital Hill these are all very doable stretches and great for getting between the Plaza and Downtown to me. The other safety factor on Gillham are the open pipes around 31st and the sewer drains. They could be marked for safety or design change. They will eat a bike tire and maybe a rim. Thanks for collecting info to make cycling Kansas City even better!	12/18/2017 9:26 AM
27	I have a lot of friends who will only bike on trails since they do not like biking with traffic, even if I have routes planned on low volume streets. Adding protected bike lanes would increase their comfort of biking in the urban core.	12/17/2017 9:01 PM
28	Please Gillham Road a great example of bike infrastructure!	12/17/2017 3:05 PM
29	1. As long as drivers are clueless and unregulated re: cyclicts, it is all about car speed. Around here, about 25-30 mph is the limit to feel safe riding alongside passing cars. Streets in your survey where cars drive 40+ are extremely dangerous in KCMO, because locals are so unaware and careless. A very large factor of this is the staggering inattention and unawareness of some drivers, among the many that I see every day. 2. KCMO has to outlaw cell phones. Drivers are totally distracted and many cities have already addressed this problem with strictly enforced laws. Meanwhile KCMO suffers people pawing cell phones with two hands while waiting for their light, rolling through stop signs while texting, texting while they pass a couple of feet from me, sometimes missing stop signs completely. I watch for cell phone usage, and it seems like there are five safe, cautious and courteous drivers for each dangerously distracted driver. It's about a 1:5 or at best 1:10 ratio. About me: I am best described as a daily cyclist traveling between westport and ward parkway mall, going through Brookside. I usually take Bellview and Oak streets north & south because of their low traffic speed and density. I do not own or use a car or any public transportation; I only bike. The relatively low population density of kcmo allows for seriously dangerous and negligent behavior by drivers -- in a bigger city I don't think they would make it two blocks. It needs to stop, drivers need magnitudes more education about dangers and risks, safe driving and awareness of the rights and vulnerability of cyclists. I will add another comment about the survey response, "I am comfortable but would not recommend for casual bikers" or to that effect. Here's the thing. The element of routine is a major factor in safe cycling. As a daily cyclist using the same route, I learn every pothole, slipperly spot, tricky intersection, and traffic patterns. Riding somewhere you have never been greatly raises the risks for crashes small to large, and for getting into tight traffic situations. This is what I realized after 10-15 years of almost-daily biking (I'm 36). Anndd one final thing about so-called "bike lanes." Typically, on the edge of a street near the curb you will find any of the following: gravel & sand; chunks of asphalt; broken glass, car parts; drainage grates; curb lips and gaps; branches & piles of leaves(!!!); plastic single serve Fireball whisky bottles (yep I had a crash because one of those got under my wheel); you get my point. So painting a stripe there is really just a bad joke and it gets worse: drivers think that since the lane stripe is there, like an invisible barrier now they can whiz by within a few feet of you going 50. Not to be dramatic but this is all really true, think about it!! I hate "bike lanes" in quotation marks! THANK YOU for reading my comments. I know that KCMO cares about cyclists and promoting a healthy environment. You have opened up your portal to hear from all the cranks out there, and maybe I am one. I look forward to hearing the consensus about all of these issues and new ideas for the future direction of this city.	12/17/2017 2:21 PM

30	There's a typo in the question about biking on the "Armour Road bike lanes": it should be "Armour Boulevard". Many of the questions are unclear, and in particular it's not clear whether they're asking about riding in the street specifically or whether, e.g., riding on Gilham Road includes riding on the sidewalk/path adjacent to the road in the park. In my opinion, the best improvements to bike routes on minor side streets would be to modify the traffic-control signs to minimize the the need for cyclists to brake or stop in momentum-killing situations (e.g., a stop sign at the bottom of a hill); these changes can substantially reduce the energy required to cycle on these routes, and because many cyclists treat these situations as "rolling stops", i.e., they don't actually stop, changing the signage to eliminate the stops (making cross-traffic stop instead) can make cyclists' behavior better predictable to other users of the roads. On the other hand, greatly improved cycling infrastructure is sorely needed on major streets, as it is typically difficult or impossible to reach your final destination without riding on one at least for a short distance. All multi-lane streets in Kansas City without bike lanes are very dangerous to ride on, due mainly to the combination of high speeds, inattentiveness, and lack of experience sharing the road with cyclists on the part of drivers. I ride as my primary means of transportation and consider myself a strong and confident cyclist, but I avoid riding on any multi-lane road in this city except the handful that have bike lanes; even many of those are uncomfortable and fairly dangerous to ride on, as the bike lanes are often full of debris and potholes, may be blocked by illegally parked cars or construction, or end abruptly, while cars meanwhile are flying past at speeds far greater than even a strong cyclist can maintain. And since many drivers seem to believe that the presence of a bike lane means cyclists must stay in it, it is dangerous to leave the bike lane in the many situations where you're forced to.	12/16/2017 12:12 PM
31	On SWBlvd, the bike lanes have gotten me to ride there, but I am very uncomfortable (mostly as a driver but I do worry when I'm biking) where there is a right turn and yield to bikes in lane area, esp by the Quick Trip at 31st. It is marked where we are to merge but doesn't make sense since there is an entrance to QT and then immediately a right turn, so slowing down and getting in the bike lane happens way earlier than marked on the street...because this is a new thing since most of us who drive are too old to have had this in driver's ed. I suggest adding this to questions when getting license renewed, or simply informing people at that time. Also, I have always been curious who chooses posted Bike Routes on city streets and why. Some make sense and lead us off the main drag (like not going south on Oak) but others take us through parts of town that do not know how to deal with bikes AT ALL and I avoid those, even though the streets are wide. A bike route shouldn't go through a part of town where most drivers have no idea how to deal with a bike in their lane so they just ignore us or, worse, honk for no reason.	12/16/2017 9:14 AM
32	Too many bike riders ride two and three abreast down Gillham paying little attention to traffic laws!	12/16/2017 9:05 AM
33	Separate bike lanes with a buffer on most streets would be great. It would be phenomenal to have separate bike roads (such as they do in Chicago and in DC) for main corridors such as Gilham. Our streets are old, have more lanes packed in them than they intended, and are dangerous for driving let alone biking. Traffic redirection and traffic calming would be ideal (Linwood vs 39th as a major east west route, calming 39th street east of Main)	12/16/2017 7:02 AM
34	Glad KC is finally becoming more bike friendly.	12/16/2017 6:28 AM
35	I would love for the city to consider doing bike lanes along Paseo or Prospect instead of Gillham to encourage growth and development, safety and community, ease biker commuting and recreation further east.	12/15/2017 7:24 PM
36	In 2010 I was traveling north on Gilliam by bicycle when I was hit by a car that was heading south and attempting to turn left on to 25th. My injuries required a trip to the ER via ambulance but fortunately I did not suffer long-term damage. I worked on Hospital Hill at the time and had seen a large number of drivers confused by this intersection, particularly as I would approach it by bicycle. There has got to be a better design for this particular intersection. Many people travel to the hospitals there from outside of the area and are not familiar with the unusual street layout. It is fair to assume that people traveling to Hospital Hill may be under stress. This stress and lack of familiarity, along with the confusing street layout, make for a very dangerous intersection. A more intuitive system would be greatly beneficial. In addition, as a South Hyde Park resident and daily cyclist, a comprehensive system of bicycle infrastructure along this corridor would be life-changing. Please tell the car-fetishists to go jump in a lake by implementing such a plan. Thanks! - Tom Meyer	12/15/2017 5:05 PM
37	In regards to question 7, for clarification, I answered "I am a committed bicyclist who rides in mixed traffic on every street. I don't believe that any significant further action on bicycle facilities is necessary." because it best fits my cycling but I fully believe significant action on bicycle facilities is necessary for others with lesser skills and confidence.	12/15/2017 4:37 PM
38	Glad to see some change possibly coming. Gillham could be a great bike corridor, especially since it is lined by parks along one stretch. I'd like to see the 4 lanes in front of my house become 2 lanes of traffic, one land of street parking (for park access) and two bike lanes. If that can all fit.	12/15/2017 3:40 PM
39	Do something, anything would be better	12/15/2017 2:45 PM

40	Every day my partner, our two-year-old, and I cycle. We've recently gone car free and quite literally cycle for everything. In my eyes every day is a successful day if all three of us make it home safely. However on a daily basis we are all nearly hit, harassed, or followed home by people in cars who see it fit to be intimidating for no reason. Unfortunately just this year alone I have been hit by cars multiple times while bicycling in Kansas City and every time the drivers never stopped. As mentioned previously, the only way to ensure cyclist safety and ease of use is to overhaul the current roadway infrastructure of Kansas City and create more room for cyclists in the safest ways possible. By doing so, the city would also showcase it's determination in making way for a better, cleaner, and more friendly city to locals and tourists alike. Please note, painted partitions, partitions made by parked vehicles, and curbs, do nothing for my safety and the safety of my family and friends who cycle. People in cars in Kansas City do not respect painted partitions, painted crossings, or painted "sharrow" signs at all. It is an extreme waste of money to continue painting "partitions". Please stop doing so and build proper bike infrastructure instead. Permanent large partitions are in my opinion the only option. Once in place, large partitions also increase drivers awareness of the cyclists in the city. There are many of us, and we need your help in making us and the cycling community safer. Thank you for your time.	12/15/2017 2:40 PM
41	Thanks for doing this work!	12/15/2017 2:22 PM
42	This is EXCITING to me! I live at 40th and Holmes and use Gillham to commute by bike every single day (usually going South, as my job is at UMKC.) The idea of getting protected bike lanes or a cylcepath on Gillham is extraordinary and much needed.	12/15/2017 1:02 PM
43	As a homeowner along Gillham in SHP, this project is of great interest to me. I think these improvements would be well received. Many bikers currently use Gillham as a North-South thoroughfare, so this would build on that already existing use.	12/15/2017 12:57 PM
44	Great job on this survey. Using photos for examples is important since the terminology regarding bike infrastructure is not standardized or well known.	12/15/2017 12:47 PM
45	Gillham is a HUGE opportunity for improving cycling in KC, but for god's sake, no sharrows or rinky dink bike lanes like on Grand. Do it right--there's enough space.	12/15/2017 12:05 PM
46	I am interested in providing further feedback.	12/15/2017 11:55 AM
47	This survey needs a proofreader. Not included was the Charlotte/Holmes route on the map. I take this most frequently. Also answers weren't nuanced enough for me. Sidepaths are not a good solution and make people feel safer than they really are especially at intersections. Some kind of barrier-separated bike lane seem to keep most of the people feeling safe as does slowing the traffic and making corners with a smaller diameters to slow the cars. Just copy Holland. They know what they're doing. Also law enforcement could help but make sure police know the law regarding bicycling. We need to prioritize walking too. In some places I can hardly cross Gillham.	12/15/2017 11:16 AM
48	Improved bike and pedestrian infrastructure is essential for bringing Kansas City into the 21st century.	12/15/2017 11:07 AM
49	Thanks!	12/14/2017 4:52 PM

Gillham Road Corridor Bike Connections Study
Meeting and Survey #2 Summary
January 31, 2018

The Gillham Road Corridor Bike Connections Study team hosted the first Community Meeting for the Study on January 31, 2018 at 4:30-6:00 p.m. at Cornerstones of Care, 300 E. 36th Street in Kansas City, Missouri. The purpose of the meeting was to further assist in the City of Kansas City, Missouri, the Mid-America Regional Council and BikeWalk KC by gathering feedback from the community regarding bicycle improvement options in the Gillham Road Corridor from 18th Street to Brush Creek. A total of 49 meeting participants signed in.

At the community meeting, the Study team of Olsson & Associates, Parson + Associates and Toole Design were on hand to provide information and answer questions from the public. The team distributed a second project survey consisting of one multiple choice question and four open-ended questions. A total of 20 meeting participants completed Survey #2. Results are as follows:

Types of Bicyclists

Participants were asked to choose the option below that most fits them:

4 - A committed bicyclist who rides in mixed traffic on every street
4 - A committed bicyclist who rides in traffic on most streets
4 - Interested in biking on low-traffic streets
0 - A recreational/occasional bicyclist who rides primarily on trails
1 - I do not ride a bike now, but may be interested if there were more bike routes or facilities
1 - I do not ride a bicycle

The one respondent who mentioned they do not ride a bicycle noted that they were "a concerned pedestrian, though". Five respondents did not answer the question.

Open-ended Questions

Participants were asked what they think about possible improvements on four segments of the Gillham Corridor. Key takeaways are as follows:

- Cycle Track is supported in the Corridor.
- If Cycle Track is added, it should be consistent throughout the Corridor for safety reasons.
- Sharrows are not preferred in the Corridor.
- Buffered lanes are supported in the Corridor.

Open-ended responses regarding individual sections are below. Table maps should be used as reference for labels.

Grand Avenue to 19th Street

Cycle Track was the most supported for this option for this section of the Corridor. Two others preferred Cycle Track in general in this section. Three respondents noted that if Cycle Track is added in the Corridor it should be consistent throughout as transitioning from one-way to two-way Cycle Track could be problematic.

OPTION	NUMBER OF MENTIONS
A1-Buffered Bike Lanes	5
A2-Cycle Track	6
B1-Buffered Bike Lanes	1
B2-Cycle Tracks	3
C1-Bike Lanes	0
C2-Cycle Tracks	6

Other comments on this section are as follows:

- 27th Street doesn't reflect needs for a turn lane in proposals.
- It (is) already a good section to bike, but it will be a good improvement to have more bike infrastructure.
- Separate lanes of traffic will improve ridership.
- C – Non-starter for Crown Center without a turn lane; plenty of right of way; outside of curb-to-curb.
- Gillham is a neighborhood full of families, students and cycling patrons who would use separated facilities.
- A physical separation is necessary for the entire length of the corridor.
- I am not a fan of the two-way cycle track on one side throughout the corridor.
- Please prioritize safety above all. That's the only way we'll get more riders out there. Sharrows and bufferless lanes are not enough. Lanes must have a buffer, preferably a physical barrier.
- (McGee Trafficway) is the best southbound route.
- Coming up the hill can be slow going so additional buffers are great for my lifestyle as a daily rider.
- Due to costs, prefer buffered bike lanes.
- No sharrows.
- People park (on Grand Boulevard south of Pershing) temporarily all the time.
- There is a huge rush hour traffic out of garage (at McGee Trafficway).
- Overall, buffered bike lanes throughout the corridor is an absolute must. The corridor is through residential so there is an active group wanting to bike. Also needed is the re-evaluation of intersections and stoplights. This area has way too many unsafe intersections and fast driving cars. Until Crown Center, bus service is limited as well.
- Prefer as much protection as possible on Gillham and connection to lanes on 20th & Grand.
- Extending Grand Street lanes is key.
- Crossing 27th (whether on Gillham, Grand, Main, etc.) on a bike is very difficult now.

29th Street to Armour Boulevard

Cycle Track is preferred in this section. In sub-section I, respondents overwhelmingly preferred Cycle Track, but not Two-way Cycle Track. Two other respondents prefer Cycle Track in general in this section of the Corridor. Consistency of Cycle Track was also mentioned.

OPTION	NUMBER OF MENTIONS
E1-Cycle Tracks	3
F1-Additional Parking	1
G1-Sharrow-Buffered Bike Lanes	2
H1-Buffered Bike Lanes	1
H2-Cycle Tracks	3
I1-Two-way Cycle Tracks	0
I2-Cycle Tracks	7

Other comments on this section are as follows:

- The need for on-street parking needs to be considered near Union Hill. It appears that some parking is lost.
- Could use two-way cycle track if land is available.
- (McGee Trafficway & Gillham) From this point to Linwood southbound, this is a very tough section to bike. The lane is narrow and there is no shoulder. We sprint this section. We still bike this currently, but we take it with lots of caution.
- I tend to avoid this section and use a longer bike route on neighborhood streets.
- Would consider bike boxes at major intersections.
- Consider lower speed in this section.
- What happens on Gillham, McGee Trafficway to 31st to Linwood?
- Bike improvements should enhance/support pedestrian improvements along various development projects.
- No two-way cycle track.

Armour Blvd to Gillham Road West

Cycle Track is preferred in this section. In sub-section J, respondents preferred Cycle Track with parking or with removed parking and there was no support for Two-way Cycle Track with removed northbound parking. In sub-section K, Cycle Track is preferred over buffered bike lanes, but not Two-

way Cycle Track. Other respondents support Cycle Track in general in this sub-section. Respondents expressed the need for safety improvements for bicyclists in this section due to dangerous intersections, crossing and the need for traffic calming.

OPTION	NUMBER OF MENTIONS
J1-Two-way Cycle Tracks with removed northbound parking	0
J2-Cycle Track with parking	4
J3-Cycle Track with removed parking	4
K1-Buffered Bike Lanes	2
K2-Two-way Cycle Track	1
K3-Cycle Track	4

Other comments on this section are as follows:

- Good for one-way cycle tracks
- 41st & Gillham tough intersection for bikers, walkers and runners. We always bike fast from 29th to 42nd because of traffic concerns.
- Cycle tracks are great, especially if they are long and continuous. Don't lay two way cycle tracks unless they are very long; limit how often cars and bikes have to mix in order to navigate intersections.
- At night I'll use this section often. I'm reflective and well lit always but think some areas could use more lighting.
- Two-way cycle track, no sharrows.
- Intersection at 42nd is extremely dangerous switching over.
- (39th & Gillham) This intersection is awful.
- Traffic calming is key thoroughfare.
- East-west pedestrian crossings currently very difficult.
- Build connections here for more western destinations (e.g. Warwick)
- Lower speed west and east on 39th (in Gillham Corridor)

<u>Gillham Road West to Brush Creek</u>

Cycle Track is overwhelmingly preferred sub-section O, as opposed to Buffered Bike Lanes. In sub-section L, two-way Cycle Track is preferred. In sub-section M, buffered bike lanes are preferred. Only one respondent preferred Sharrows in sub-section N and two respondents stated "No Sharrows". Respondents mentioned the challenge of hills in this section of the Corridor. They also mentioned the dangerousness of intersection and vehicle speed.

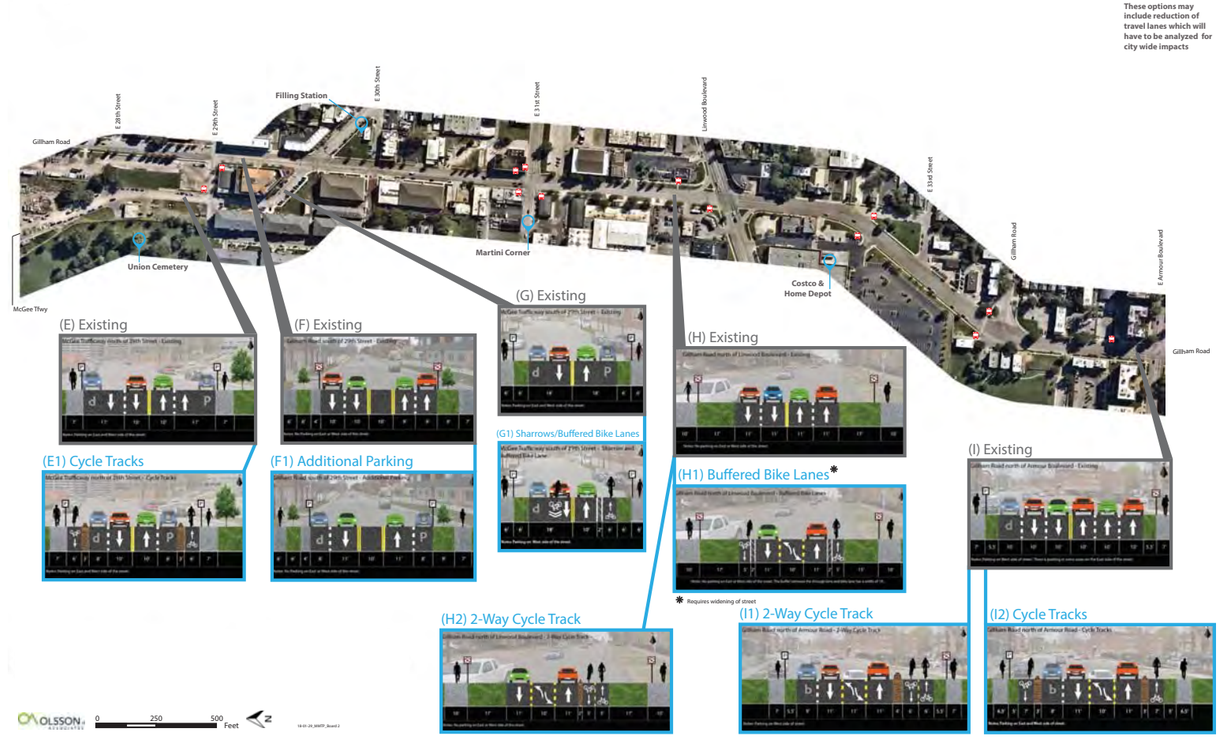
OPTION	NUMBER OF MENTIONS
L1-Bike Lanes	1
L2-Two-way Cycle Track	3
M1-Bike Lanes	1
M2-Buffered Bike Lanes	3
N1-Sharrows	1
O1-Buffered Bike Lanes	1
O2-Cycle Track	7

Other comments on this section are as follows:

- Would like to see improvements at Harrison & Emanuel Cleaver, crossing Emanuel Cleaver.
- I would not ride up Gillham to Rockhill.
- Climbing toward Nelson on Rockhill is dangerous for cyclists; improvements need to provide ample space.
- (Rockhill & Emanuel Cleaver) this intersection is awful.
- Focus capital investment on problematic/dangerous intersections; then bike lanes; then buffered bike lanes.
- Travel lane 10 foot; bike lane 8 foot.
- For safety, consistency, visibility, level of comfort and increased activity/use consider cycle track (protected facility) wherever possible.
- I would like to ride Rockhill more often. It's beautiful but seems like a freeway to most cars.
- 45th & Rockhill is problem intersection for cars. If they have trouble with the intersection, how will they respond to the addition of bikes?
- Great for a two-way cycle track in the center of ROW.
- The uphill route appears to be difficult to bike.

Gillham Road Corridor Bike Connections Plan - 20th Street and Grand Boulevard to 27th Street and McGee Trafficway

Gillham Road Corridor Bike Connections Plan - McGee Trafficway to Gillham Road and Armour Boulevard



Gillham Road Corridor Bike Connections Plan - Gillham Road and Armour Boulevard to Gillham Road and 42nd Street

(J1) 2-Way Cycle Track with Removed NB Parking

(J2) Cycle Tracks with Parking

(J3) Cycle Tracks with Removed Parking

These options may include reduction of travel lanes which will have to be analyzed for city wide impacts.

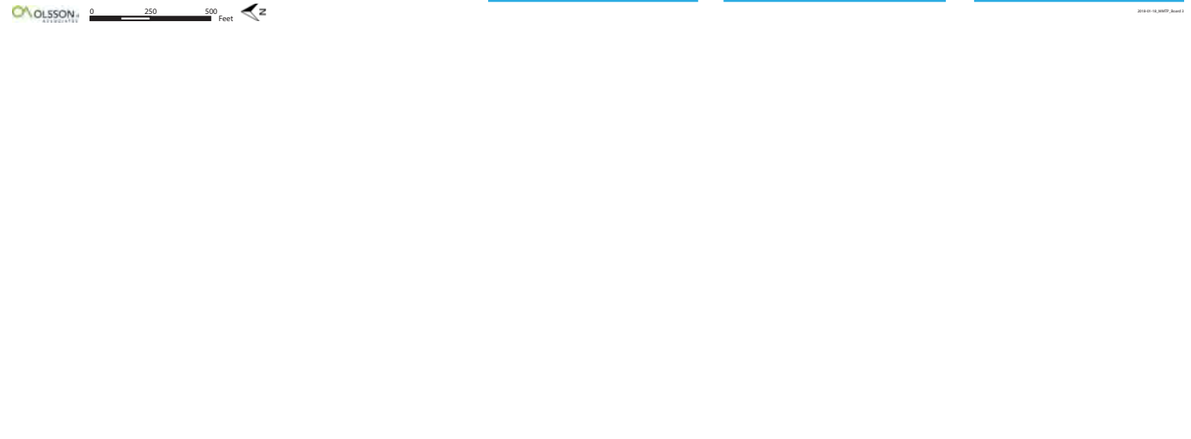
(J) Existing

(K) Existing

(K1) Buffered Bike Lanes

(K2) 2-Way Cycle Track

(K3) Cycle Tracks



2018-01-18_MMTF_Board 3

Gillham Road Corridor Bike Connections Plan - Gillham Road and Gillham Road West to Harrison Street and Emanuel Cleaver II Boulevard

(L1) Bike Lanes

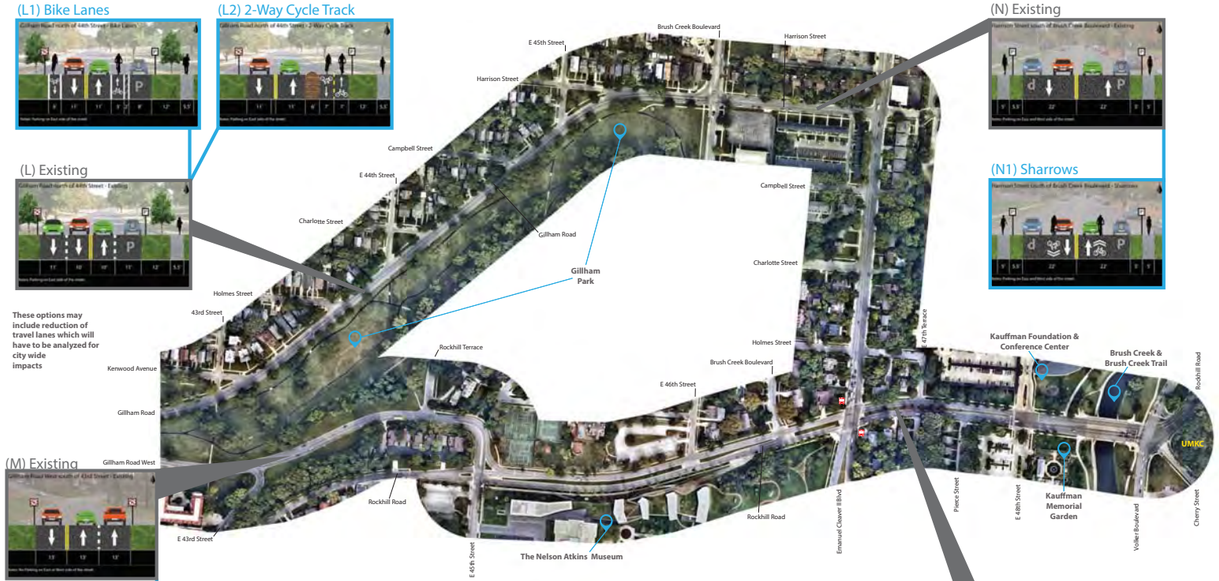
(L2) 2-Way Cycle Track

(N) Existing

(L) Existing

(N1) Sharrows

These options may include reduction of travel lanes which will have to be analyzed for city wide impacts



(M) Existing

(M1) Bike Lanes

(M2) Buffered Bike Lanes

(O2) Cycle Tracks

(O1) Buffered Bike Lanes

(O) Existing

2018-01-24_MMTF_Board 4

EXISTING ROADWAY CONDITIONS

Level of Traffic Stress

Level of Traffic Stress (LTS) determines the relative level of stress that may be perceived by people who bicycle along a particular facility. LTS features four classifications, ranging from LTS 1, which is suitable for children, to LTS 4, which is suitable for riders who are comfortable sharing the road with automobiles traveling 35 mph or more. LTS 1 and 2 are the target scores for attractive people who want to cycle but are concerned about safety.

Interested and Concerned		Somewhat Confident	Highly Confident
LTS 1	**LTS 2**	**LTS 3**	**LTS 4**
• Presenting little traffic stress and attractive enough for a relaxing ride. • Suitable for children trained to safely cross intersections • Separated from traffic or in a shared road with only occasional vehicles.	• Presents little traffic stress but may not be suitable for children. • 1 or 2 through lanes per direction • Either physically separated or in an exclusive bicycling zone with adequate clearance from parking zone. • Intersection crossings are not difficult for most adults.	• Less stress than integrating with multi-lane traffic. • Cyclists have either a bike lane next to moderate-speed traffic, or shared lanes on streets that have moderately low speed and not multi-lane. • Crossings may be longer or across higher-speed roads, but still considered acceptably safe for most adult pedestrians.	• A level of stress beyond LTS 3.

LOS - A } *Free-flow*
LOS - B } *of Traffic*

LOS - C } *Typical Urban*
LOS - D } *Conditions*

LOS - E } *At Capacity*

LOS - F } *Over Capacity*

Vehicular Level of Service

Vehicular Level of Service (LOS) is a quantitative measure, ranging from LOS A to F, used to categorize different traffic delays, at intersections.

Cleaver II Boulevard

Volker Boulevard

Vehicular Level of Service

Bicycle Level of Traffic Stress

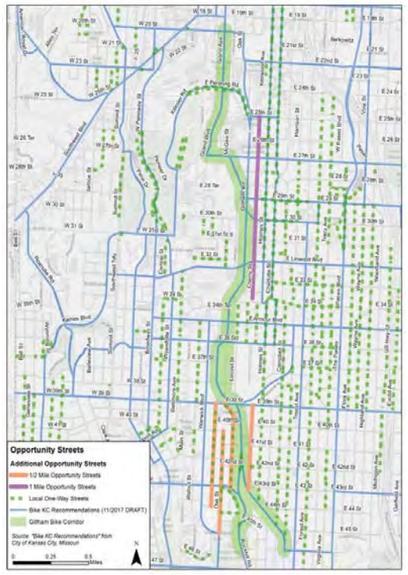
OPPORTUNITIES & BARRIERS

Opportunities

One way of developing bicycle network connections is identifying those local streets that would not be considered major streets, yet have a contiguous length of over a half mile, or preferable a mile, and are signal controlled at major intersections. There are many of these streets in the Gillham Corridor.

Barriers

The intersections with the most common barriers include areas with significantly high volumes of either peak hour traffic, transit frequency or crash rates. While these barriers are intended to identify concerns related to evaluating potential enhanced bicycle facilities, the locations requiring additional consideration will also support the preservation of safety for all transportation users in the corridor.



Intersection	Barrier
Gillham and 22nd St	High vehicle crossing volume
Grand and Pershing Rd	High vehicle crossing and transit volume
Crown Center Plaza	Frequent intersection closing for events
Gillham and 25th Street	Confusing intersection
Gillham and 27th Street	High vehicle crossing volume
Gillham and McGee Tfwy	Traffic pinch point and truck delivery
Gillham and 31st St	High vehicle crossing volume and crash rates
Gillham and Linwood Blvd	High vehicle crossing volume and crash rates
Gillham Plaza and Gillham Rd	Poor sight lines
Gillham and Armour Blvd	High vehicle crossing volume and ped/car crashes
Gillham and 39th St	High vehicle crossing volume and crash rates
Gillham and 42nd St	Confusing intersection
Rockhill Rd and 45th St	Poor pedestrian infrastructure
Segment	**Barrier**
Gillham Road from 22nd to 26th St	Steep elevation change
27th St from Grand Ave to Warwick Tfwy	Limited ROW for bike facility
McGee Tfwy from Gillham Rd to 29th St	Limited ROW for bike facility
Gillham between Linwood and 31st St	Limited ROW for bike facility
Hyde Park Trail	Steep elevation change in park area
Gillham Rd from 40 to 41 St	Difficult to cross for park amenities
Gillham Rd W / Rockhill Rd from 42nd St to 47th St	Steep elevation and no sidewalk

Gillham and 31 Street

Gillham and Linwood

Gillham and 39 Street

Hyde Park Trail

Gillham and 42 Street

Rockhill and 45 Street

PROJECT BACKGROUND

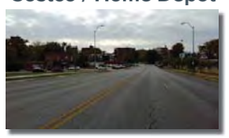
The city is planning a bicycle facility to connect the downtown area of Kansas City with Brush Creek. The Gillham Road corridor is a potential way to connect these two activity centers. The study area along Gillham Road stretches from approximately 18th Street on the north to Brush Creek on the south. This is a diverse corridor with varying right-of-way, adjacent land uses, and travel patterns. The exact route of the bicycle facility has not been determined, and may include sections of McGee Trafficway, 27th Street, Oak Street, and/or Pershing Road on the north end of the corridor and Rockhill Road and/or Charlotte Street on the south end of the corridor. Currently this study is funded, but implementation of the facility is not. Following completion of the study, the city will prioritize the planned bicycle facility's construction as funds become available.

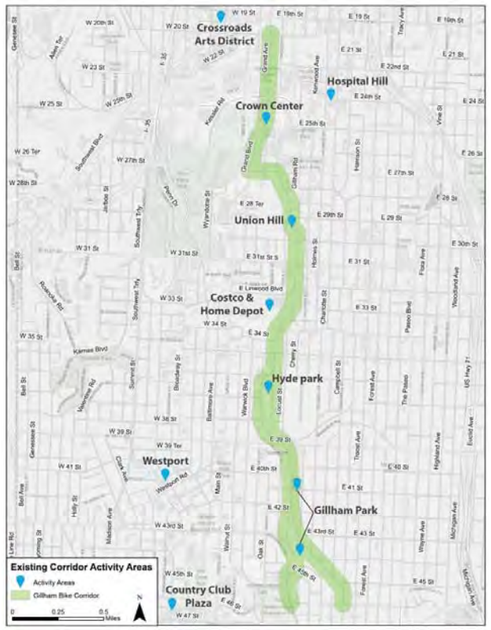
Crossroads

Crown Center

Union Hill

Costco / Home Depot





Armour Boulevard

Hyde Park

Gillham Park

Cleaver II Boulevard

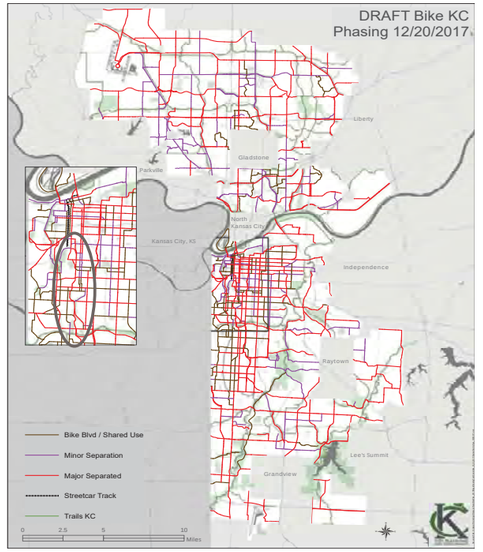
Project Schedule	August	September	October	November	December	January	February	March
Project Kickoff								
Review Existing Plans								
Evaluate Current ROW Conditions								
Summarize Best Practices								
Prepare Conceptual Alternatives								
Final Concept Plan, Cost Estimate, Implementation Plan								
Public Engagement								
Survey					Survey #1		Survey #2	

Key:
Working Group Meeting ( ) Public Meeting ( )

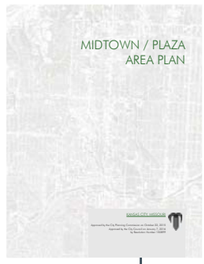
PROJECT CONTEXT

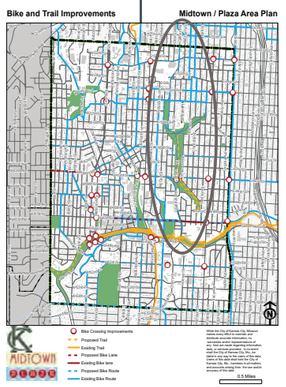
KCMO Complete Streets Ordinance Excerpt

"The City shall develop a safe, reliable, efficient, integrated, and connected multimodal transportation system that will promote access, mobility, and health for all users and will ensure that the safety and convenience of all users of the transportation system are accommodated, including pedestrians, wheelchair users, bicyclists, public transportation users, motorists, and people of all ages and disabilities"

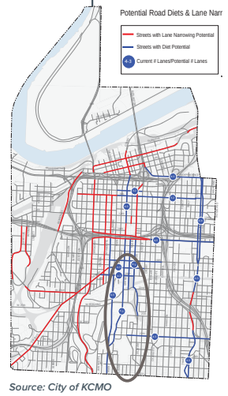


Kansas City Area Plans



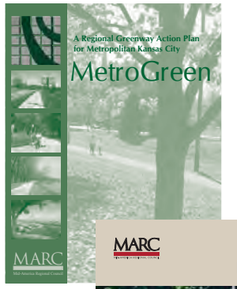


Source: City of KCMO



Source: City of KCMO

MARC Regionwide Plans



Smart Moves 3.0

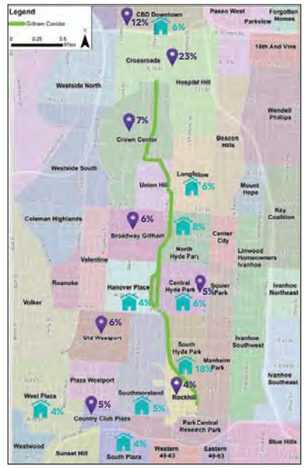
Source: MARC

SURVEY RESULTS

190 participants took part in the survey that was conducted Dec. 12, 2017 - Jan. 5, 2018; 155 completed the survey to the end

WHERE DO YOU LIVE?

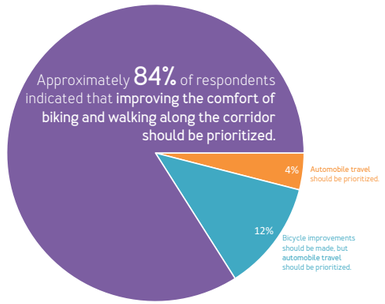
What is your MOST FREQUENT DESTINATION?



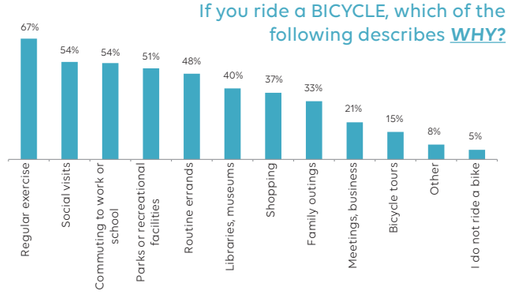
Respondents were asked their ***most frequent destination*** in the Corridor. Below are the top three choices:

- 23% Crossroads
- 12% Downtown KC
- 7% Crown Center

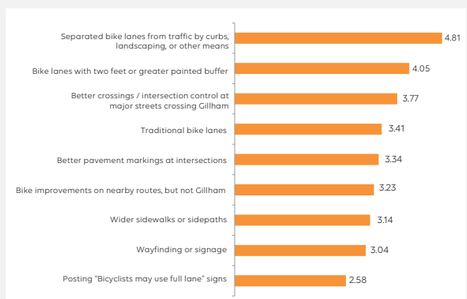
*How should the future of travel on Gillham Road be **PRIORITIZED?***



If you ride a BICYCLE, which of the following describes ***WHY?***

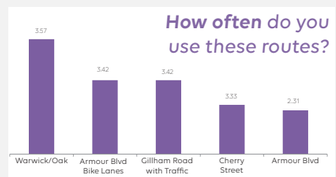


How effective do you feel each of the following improvements would be at ***INCREASING BICYCLING*** on the Gillham Corridor?



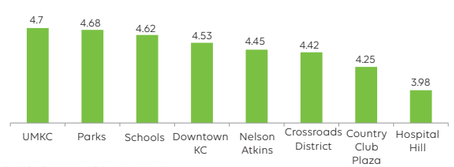
*Weighted average with 5 = Very Effective

***How often** do you use these routes?*



*Weighted average with 5 = Very Often

How important is good bike/ped access to **these destinations?**



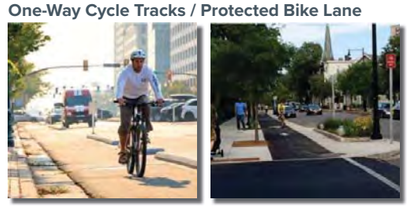
*Weighted average with 5 = Most Important

TYPICAL BICYCLE TREATMENTS

These are the potential bicycle facilities being examined for the Gillham Road Corridor.

Two-Way Cycle Track

One-Way Cycle Tracks / Protected Bike Lane

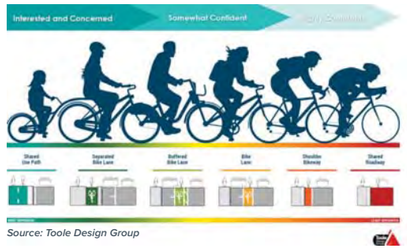


On-Street Buffered Bike Lanes

On-Street Bike Lanes

Shared Roadways (Sharrows)

Range of Potential Bicycle Users

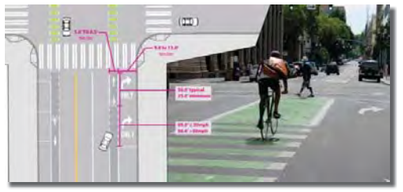


Source: Toole Design Group

Protected Intersections

Mixing Zone

Turn Lane With Crossover Before Intersection



Gillham Road Corridor Bike Connections Study
Online Survey #2 Summary
February 26, 2018

An online open-ended survey was distributed electronically via email to prospective respondents. It was also publicized through social media outlets. Respondents were asked to respond in essay form to the proposed improvement in each of the four sections of the Gillham Corridor. This survey was identical to the hard copy survey distributed to the public at the open house on January 30, 2018. This is a summary of the 46 online surveys only; hard copy surveys were summarized in the open house summary, a separate document dated January 30, 2018. The online Survey #2 was active from January 30, 2018 to February 26, 2018.

General

Two respondents consistently indicated throughout the survey that they were not in favor of added improvements for bicyclists and that vehicles should be the priority.

One respondent indicated that the survey was "poorly constructed" and they were not sure what was being asked.

Approximately 10 respondents indicated through the survey their support for bicycle/pedestrian improvements in the corridor but did not elaborate further.

Two respondents consistently expressed they supported improvements for bicyclists only if parking would not be reduced in the corridor.

For each segment of the corridor, the majority of respondents supported protected or physically separated bike lanes and cycle tracks.

Below are online survey questions and with responses in order of the frequency that they were mentioned.

Question 1: What are your thoughts on possible improvements on Grand Street to 29th Street?

Connect to Grand/McGee	10
Protected/physically separated Bike lane	9
Cycle tracks	7
Traffic calming/lower speed limits/road diet	6
Do not reduce parking	3
Shared bike lane	2
Attention given to how southbound cyclists turn to 27th Street	2
Extend to Cherry/Holmes to the east and across memorial drive to Wyandotte to west (one of best routes between Plaza and Liberty Memorial)	2
Concern about closing bike lanes during Crown Center events	2

Other responses included:

- Connect to Downtown
- Abrupt end at Grand is dangerous for cyclists
- Extend lanes to 27th
- Connect to Charlotte/Holmes
- Route to Union Station
- Go north to connect to lanes that end at 20th
- Section C – lots of parking lots means lots of traffic
- Construct sidewalk on east side of Grand near Crown Center
- Culture here does not respect bike travel
- Bicycle intersection treatments (two-stage turn queue box rather than bike boxes)
- Better signage needed
- Dangerous intersections

Question 2: What are your thoughts on possible bike improvements from 29th Street to Armour Blvd.?

Protected/physically separated bike lanes	14
Traffic calming/lower speed limits/road diet	9
Cycle tracks	7
Dangerous intersections • 31st & Linwood • Armour & Gillham • Intersections need to delineate lanes for turning	6
No sharrows	2
Downtown to Midtown (Armour) connection	2
Parked cars/angled parking restricts cyclists	2
This section is scary/intimidating	2
Do not reduce parking	2

Other responses included:

- Anti-sharrow, but sharrows may slow down traffic in this area
- Would like improvements, but would continue to use Holmes/Charlotte routes to Armour
- One-way bike lanes adequate
- Bike/traffic conflicts near Home Depot/Costco
- Bike/traffic conflicts turning in and out of 7-Eleven
- Most difficult section for bicycling infrastructure
- Avoid riding due to traffic volumes
- Spur to Martini Corner
- Spur downward on Armour
- Spur to allow convenient biking to MCC-Penn Valley
- Small bike area (benches, water fountains) needed near the summit of McGee Trafficway
- Two-stage turn queue boxes rather than bike boxes
- Drivers do not pay attention in this area
- Promote commuting Downtown
- Bike parking needed at Martini Corner and Home Depot/Costco
- Need additional protection due to steep grades and limited visibility
- Where lanes merge creates confusion for drivers
- Crosswalks need restriping

Question 3: What are your thoughts on possible bike improvements from Armour Blvd. to Gillham Road West?

Protected/physically separated Bike lanes	10
Cycle tracks	10
Traffic calming/lower speed limits/road diet • Traffic calming at 39th	9
Connect residential neighborhoods to park • Give neighborhoods back to people • Protected two-way on East for connecting residents to park	4
Pedestrian crossings needed • Striping • Crosswalks • Pedestrian crossing needed on all sides of park • Pedestrian crossing signals needed (especially at 36th and 38th Streets)	4
Drivers do not respect bicyclists	3
Keep traffic one-way (bike and vehicles)	3
Connect to Nelson-Atkins and Kauffman Gardens	2

Other responses included:

- Stop signs on Armour from Paseo to Gillham
- Rode bike on this section once to work and was flipped by car
- Prefer western part of Gillham around Hyde Park
- Crossing Gillham to go to Westport is problematic
- Easiest section due to less traffic
- Not enough space for bike lanes
- No sharrows
- Two uni-directioal protected lanes or single bi-directional bike lanes
- Bike path through the park
- Cycle track on south end with street trees in buffer zone
- Shared lanes

Question 4: What are your thoughts on possible bike improvements from Gillham Road West to Brush Creek?

Protected/physically separated bike lanes	8
Traffic calming/lower speed limits/road diet	6
Cycle tracks	5
Dangerous intersections (need improvement) • 45th & Gillham • 45th & Rockhill • Rockhill & Volker • Angled intersection of named and numbered streets dangerous	5
Connection to UMKC/Rockhurst Campus	4
Gillham to Harrison prioritized (due to steep hill on Rockhill)	3
No sharrows	2
Culture does not respect bicycling	2
Connect Hyde Park to Nelson-Atkins	2
Two-way protected	2
Connect to Brush Creek trail	2
Do not reduce parking	2
Prioritize residents/families	2

Other responses included:

- Connect Plaza to Hyde Park
- Improve crossings
- Make the city a place to be rather than a place to pass through.
- Gillham traffic mellow in this area as traffic splits off to Rockhill
- Parallel to streetcar improvements
- Shouldn't be an either or choice
- My favorite place to ride in the city but would not recommend to inexperienced riders
- Gillham park
- Respondent avoids bike lane on northbound Oak
- Design and signaling of Gillham West as it approaches Nelson from Northeast and of Rockhill along eastern edge of museum grounds dangerous
- Gillham road on northeast side of park is safer and easier parts of this route but does not connect with other routes
- Two uni-directional protected bike lanes
- Repaint crossings
- Sidewalk along this stretch needed
- Connecting Downtown to UMKC/Plaza via Gillham can create natural scenic and safe way to move people throughout city.

- Signage important
- Facilities on Gillham West (easiest grade)
- Provide a climbing lane to the museum
- Plant buffer as extension of parkland
- L2-Cycle tracks for commuters
- Prioritize Gillham road over Gillham Road West for work commute and Gillham Road West is steep dangerous
- M2/O2 good but should be lowest priority
- Troost and Emanuel Cleaver II are more important to access than art museum cycle paths on Gillham
- Parking on East side of Gillham causes issues
- Trail through Gorman parking lots
- Two stage turn queue boxes rather than bike boxes

Additional comments:

Vehicles should be priority.

Do not remove off-street parking for residents who live on Gillham. Residents suffer from closed roads during marathons/races and this is another burden of living on Gillham.

Please consider residents and our home values with this project.

Parkways and other routes are "traffic sewers" that make adjacent parks less pleasant and less accessible.

Drivers do not take city's attempts (to protect cyclists) seriously.

Plant trees in buffer areas

Speeds should be less than 30 mph.

Culture does not respect bicyclists.

Most accidents occur at intersections; designs do not address those conflicts.

"Please do not ever use mixing zones."

"Protection must extend all the way to the intersection."

"More bicycle/pedestrian access would make area much more vibrant to the people that live here and (would) help business out."

"Terrible decision to upgrade Penn Valley Parkway/Broadway through Penn Valley Park to a highway with no accommodations for cyclists whatsoever."

"Car/bike/pedestrian culture needs to shift/balance"

"People experience the city much different at bike-speeds than at 45 mph."

"Get people out of their cars, free up traffic."

"I am nervous that this will take years and years like the bike lanes on Grand did."

"No other route as good as this one to connect Downtown and Midtown."

"Above choices are limiting."

"Biggest improvement would be to reduce motor traffic speeds particularly on bike routes."

"I am not a fan of protected bike lanes or cycle tracks."

Gillham Road Corridor Bike Connections Study
Community Meeting #2 Summary
May 23, 2018

The Gillham Road Corridor Bike Connections Study team hosted the second Community Meeting for the Study on May 23, 2018 at El Torreon, 3101 Gillham Plaza, Kansas City, Missouri. The purpose of the meeting was to present final bike connections recommendations in the Gillham Corridor (between 18th Street and Brush Creek) to the community on behalf of the City of Kansas City, Missouri, the Mid-America Regional Council and BikeWalk KC. A **total of 48 meeting participants** signed in.

At the community meeting, the Study team of Olsson & Associates and Parson + Associates were on hand to provide information and answer questions from the public. The team distributed a final project comment form consisting of two multiple choice questions and an opportunity to comment freely on final recommendations. A total of **40 meeting participants completed the form.** Results are as follows:

Types of Bicyclists
Participants were asked to choose the option below that most fits them:

- **10 - A committed bicyclist who rides in mixed traffic on <u>every</u> street**
- **13 - A committed bicyclist who rides in traffic on <u>most</u> streets**
- 6 - Interested in biking on low-traffic streets
- 4 - A recreational/occasional bicyclist who rides primarily on trails
- 5 - I do not ride a bike now, but may be interested if there were more bike routes or facilities
- 0 - I do not ride a bicycle
- 2 - Did not answer the question.

Participants were asked "Along Gillham Park, what would you prefer?":

- 9 preferred – A. The cycle track be placed in an existing travel lane as shown (removing weekend parking). Cost: $
- 2 preferred – B. Expand the roadway to accommodate both the cycle track and weeken parking. Cost: $$$
- **20 preferred – C. The cycle track be placed inside Gillham Park (preserving weekend parking). Cost: $$**
- 1 preferred - both B and C and
- 8 – Did not answer the question

General comments made on comment forms are as follows:

- I think Gillham is the wrong corridor. This process seems predetermined. It will displace traffic into midtown neighborhoods. Cyclists will not be safe.
- No analysis of topography. Topography is most important component to cycling in KC.

- Too major of an artery to reduce lanes for bikes; a major morning and end of workday to get home or south to take lanes away; Hallmark, two major law firms, Hospital Hill. Is the long term thought if you build it the bikes will come? Will be at the expense of the commuters.
- Continue to Cleaver II.
- My concern is two-way cycle tracks on the one side. Would prefer on each side. If has to be on one side, need to protect cyclists who would be moving from that street to another when going south.
- Support reduction of travel lanes to calm traffic, reduce crossing distances and reduce cost.
- Parking protected bike lanes/avoid conflict zones.

Open-ended Questions

Participants were asked, "What do you think about possible bike improvements on th4e following segments of Gillham Corridor?"

Grand to 29th Street

A total of 21 participants expressed general approval of the options for this segment with 5 specifically mentioning the need for protected bike lanes and 4 specifically mentioning cycle tracks.

There were some concerns about the transition to cycle tracks (3). Some participants would like to continue project to Grand (2).

Other comments on this section are as follows:

- Make two-way cycle tracks 10' wide or greater. (i.e. Grand north of 27th).
- Love it, no thanks to sharrows on McGee.
- Need more than wide sidewalks (current) on 27th.
- I'd like to see a bike lane continue north on Gillham and through to Oak. This would provide bike access to Hospital Hill for CHM and Truman Med employees.

29th Street to Armour Boulevard

A total of 10 participants generally approved the final recommendations on this segment.

Four participants indicated disapproval of sharrows. Some participants mentioned the need to protect on-street parking (3) and protect green space (3). A few mentioned their concern with transitioning from cycle to sharrow and the other way around (2).

Other comments on this section are as follows:

- Bike signal?
- Signage needed.
- I feel like a lot of highway traffic comes through this area and more visible bike improvements will help drivers stay aware and keep cyclists safe.
- Fine with Gillham. A lot of people also use Cherry (at least in the AM). In the next stage of planning/design – give focus to narrowing up and better defining some of the wide cross street ROW (Gillham Plaza, E. 33rd Street & Gillham Road). Enhance cycle infrastructure at Gillham and Armour would be cool with the intersection of two cycle corridors, bike signals, etc.

- Portions of Gillham are far to wide and fast. Plenty of room for protected bike lanes though.
- Would love to see clearly marked bike lanes or protected bike lanes to help make KC a more walkable and ridable place for all people regardless of location.
- Would the outside (parking) lanes be converted to bike lanes? Or would Gilham Road be widened at that point? (This refers to the area of south Gillham Road, south of Costco up to Armour Blvd.)
- Doubt neighbors would give up parking here (McGee Trafficway) but would like to see cycle tracks continue.
- Include traffic calming elements in section (G) to lower level of stress.
- This segment will encourage stops at the many businesses on the corridor.
- The plans show the two-way cycle track narrowing between Linwood and Armour. This is not well thought out as the southbound cyclist are on a steep grade that will easily produce 20 mph speeds.

Armour Blvd to Gillham Road West

A total of 8 participants generally approved of the final recommendations on this segment.

Four participants mentioned the need to preserve parking, while one participant desires that parking be removed.

Two participants questioned how cyclists get to west Gillham.

Other comments on this section are as follows:

- Keep concrete as small as possible.
- As a motorist, I like Gillham Road being a traffic slower – keeps fast cars out of neighborhoods.
- Plant trees in ROW and park-side of sidewalk; a wider ROW to meet minimum width for tree planting ordinance which is 5 feet.
- Keep crossings easy between styles of bike lanes.
- Protected bike lanes please. Only in favor of a two-way cycle track if conflicts are minimized (driveways, etc.). Otherwise, one-ways on each side.
- What will be the method of getting bikes going west on Gillham through the traffic light at 42nd Street? Will they proceed with car traffic? Would they have their own signal?

Gillham Road and Gillham Road West to Harrison St. and Emanuel Cleaver II Blvd.

A total of 11 participants generally approved of the final recommendations on this segment.

Two participants mentioned the desire to have the route go through the park.

Other comments on this section are as follows:

- This is a scenic, comfortable ride that connects housing to Brush Creek. Adding the bike improvements will encourage family use.
- A beautiful section of the City that could be enjoyed by more people with bike infrastructure.
- The odd angle of streets intersecting Gillham will increase conflicts.
- As long as we are able to park in front of our houses, we are okay with this plan.

- Connect cycle track to Anita B. Gorman Center.
- Harrison is great for bicycling.
- Crossing EC II at Harrison either to head east or south to the nature center can be difficult and dangerous! Extending the cycle track to this intersection will help boost visibility and awareness at this location.
- Get rid of parking at south end. Also, for the future, Brush Creek Blvd. needs improvement.
- Less concerned about sharrows at this zone.
- It would be nice to show interface with existing UMKC/Rockhurst cycling lanes.
- Education and signage (for cars and bikes) could help improve safety.

APPENDIX C: TRAFFIC ANALYSIS

HCM 6th Signalized Intersection Summary
11: Gillham Rd & Armour

06/29/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	87	10	44	217	50	37	518	19	18	159	54
Future Volume (veh/h)	32	87	10	44	217	50	37	518	19	18	159	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	55	116	15	51	278	69	46	609	29	22	189	126
Peak Hour Factor	0.58	0.75	0.67	0.86	0.78	0.72	0.81	0.85	0.65	0.80	0.84	0.43
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	148	394	51	339	351	87	687	969	46	373	1142	724
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.62	0.62	0.62	0.62	0.62	0.62
Sat Flow, veh/h	1034	1425	184	1259	1270	315	1065	1555	74	790	1832	1161
Grp Volume(v), veh/h	55	0	131	51	0	347	46	0	638	22	159	156
Grp Sat Flow(s),veh/h/ln	1034	0	1609	1259	0	1585	1065	0	1629	790	1560	1433
Q Serve(g_s), s	5.2	0.0	6.4	3.3	0.0	20.3	1.9	0.0	24.3	1.8	4.3	4.6
Cycle Q Clear(g_c), s	25.5	0.0	6.4	9.7	0.0	20.3	6.5	0.0	24.3	26.0	4.3	4.6
Prop In Lane	1.00		0.11	1.00		0.20	1.00		0.05	1.00		0.81
Lane Grp Cap(c), veh/h	148	0	445	339	0	438	687	0	1015	373	972	893
V/C Ratio(X)	0.37	0.00	0.29	0.15	0.00	0.79	0.07	0.00	0.63	0.06	0.16	0.17
Avail Cap(c_a), veh/h	214	0	547	419	0	539	687	0	1015	373	972	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.3	0.0	28.5	32.3	0.0	33.5	9.3	0.0	11.7	19.7	7.9	8.0
Incr Delay (d2), s/veh	0.6	0.0	0.1	0.1	0.0	5.1	0.2	0.0	2.9	0.3	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	2.5	1.0	0.0	8.3	0.5	0.0	8.8	0.4	1.4	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.9	0.0	28.6	32.4	0.0	38.6	9.5	0.0	14.6	20.0	8.3	8.4
LnGrp LOS	D	A	C	C	A	D	A	A	B	C	A	A
Approach Vol, veh/h		186			398			684			337	
Approach Delay, s/veh		33.7			37.8			14.3			9.1	
Approach LOS		C			D			B			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	32.7	67.3	32.7	67.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	34.0	56.0	34.0	56.0
Max Q Clear Time (g_c+I1), s	27.5	28.0	22.3	26.3
Green Ext Time (p_c), s	0.2	0.6	0.6	1.3

Intersection Summary	
HCM 6th Ctrl Delay	21.3
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary
206: Gillham Plaza & 31st St

06/29/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	270	42	27	416	15	105	875	32	17	153	34
Future Volume (veh/h)	79	270	42	27	416	15	105	875	32	17	153	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	116	342	51	46	547	45	122	951	41	33	170	39
Peak Hour Factor	0.68	0.79	0.82	0.59	0.76	0.33	0.86	0.92	0.79	0.51	0.90	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	613	103	95	1036	87	752	906	39	72	1469	329
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	322	1489	249	131	2515	212	1173	1562	67	568	2532	567
Grp Volume(v), veh/h	243	0	266	329	0	309	122	0	992	33	103	106
Grp Sat Flow(s),veh/h/ln	760	0	1300	1401	0	1456	1173	0	1630	568	1560	1540
Q Serve(g_s), s	16.8	0.0	15.2	4.4	0.0	15.9	0.0	0.0	58.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	33.1	0.0	15.2	20.0	0.0	15.9	0.0	0.0	58.0	58.0	0.0	0.0
Prop In Lane	0.48		0.19	0.14		0.15	1.00		0.04	1.00		0.37
Lane Grp Cap(c), veh/h	366	0	536	618	0	600	752	0	945	72	905	893
V/C Ratio(X)	0.66	0.00	0.50	0.53	0.00	0.52	0.16	0.00	1.05	0.46	0.11	0.12
Avail Cap(c_a), veh/h	366	0	536	618	0	600	752	0	945	72	905	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.44	0.00	0.44	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.0	0.0	21.7	22.3	0.0	22.0	0.0	0.0	0.0	29.0	0.0	0.0
Incr Delay (d2), s/veh	9.1	0.0	3.3	3.2	0.0	3.2	0.1	0.0	33.9	6.3	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.0	4.9	6.5	0.0	5.7	0.0	0.0	8.9	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.2	0.0	25.0	25.6	0.0	25.1	0.1	0.0	33.9	35.3	0.1	0.1
LnGrp LOS	D	A	C	C	A	C	A	A	F	D	A	A
Approach Vol, veh/h		509			638			1114			242	
Approach Delay, s/veh		32.2			25.3			30.2			4.9	
Approach LOS		C			C			C			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	47.2	63.3	47.2	63.3
Change Period (Y+Rc), s	* 5.7	* 5.3	* 5.7	* 5.3
Max Green Setting (Gmax), s	* 31	* 58	* 31	* 58
Max Q Clear Time (g_c+I1), s	35.1	60.0	22.0	60.0
Green Ext Time (p_c), s	0.0	0.0	2.4	0.0

Intersection Summary	
HCM 6th Ctrl Delay	26.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
207: Gilham Plaza/Gillham Plaza & E Linwood Blvd

06/29/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	152	295	44	92	682	53	0	985	59	0	217	47
Future Volume (veh/h)	152	295	44	92	682	53	0	985	59	0	217	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	0	1642	1642	0	1642	1642
Adj Flow Rate, veh/h	208	355	0	103	766	0	0	1094	100	0	258	59
Peak Hour Factor	0.73	0.83	0.76	0.89	0.89	0.75	0.25	0.90	0.59	0.38	0.84	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	2	0	2	2
Cap, veh/h	268	985		405	831		0	1376	126	0	1485	662
Arrive On Green	0.11	0.32	0.00	0.06	0.27	0.00	0.00	0.48	0.48	0.00	0.95	0.95
Sat Flow, veh/h	1564	3120	1392	1564	3120	1392	0	2972	264	0	3202	1392
Grp Volume(v), veh/h	208	355	0	103	766	0	0	590	604	0	258	59
Grp Sat Flow(s),veh/h/ln	1564	1560	1392	1564	1560	1392	0	1560	1594	0	1560	1392
Q Serve(g_s), s	9.2	8.8	0.0	4.7	23.9	0.0	0.0	31.9	32.0	0.0	0.5	0.2
Cycle Q Clear(g_c), s	9.2	8.8	0.0	4.7	23.9	0.0	0.0	31.9	32.0	0.0	0.5	0.2
Prop In Lane	1.00		1.00	1.00		1.00	0.00		0.17	0.00		1.00
Lane Grp Cap(c), veh/h	268	985		405	831		0	742	759	0	1485	662
V/C Ratio(X)	0.78	0.36		0.25	0.92		0.00	0.79	0.80	0.00	0.17	0.09
Avail Cap(c_a), veh/h	287	1048		414	874		0	742	759	0	1485	662
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	26.4	0.0	24.1	35.7	0.0	0.0	22.1	22.1	0.0	1.3	1.3
Incr Delay (d2), s/veh	11.9	0.2	0.0	0.3	14.6	0.0	0.0	8.6	8.5	0.0	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	3.2	0.0	1.7	10.4	0.0	0.0	12.7	12.9	0.0	0.2	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.7	26.7	0.0	24.5	50.2	0.0	0.0	30.7	30.6	0.0	1.5	1.5
LnGrp LOS	D	C		C	D		A	C	C	A	A	A
Approach Vol, veh/h		563	A		869	A		1194			317	
Approach Delay, s/veh		30.4			47.2			30.6			1.5	
Approach LOS		C			D			C			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.8	36.6		52.6	15.8	31.6		52.6				
Change Period (Y+Rc), s	4.5	5.0		5.0	4.5	5.0		5.0				
Max Green Setting (Gmax), s	6.9	33.6		45.0	12.5	28.0		45.0				
Max Q Clear Time (g_c+I1), s	6.7	10.8		2.5	11.2	25.9		34.0				
Green Ext Time (p_c), s	0.0	1.3		1.2	0.1	0.8		3.6				

Intersection Summary	
HCM 6th Ctrl Delay	32.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
210: 39th St

06/29/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2
Lane Configurations												
Traffic Volume (veh/h)	0	278	21	0	548	54	1	820	0	0	261	10
Future Volume (veh/h)	0	278	21	0	548	54	1	820	0	0	261	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No		No		
Adj Sat Flow, veh/h/ln	0	1642	1642	0	1642	1642	1642	1642	0	1642	1642	1642
Adj Flow Rate, veh/h	0	299	26	0	677	57	1	1	0	0	13	13
Peak Hour Factor	1.00	0.93	0.80	1.00	0.81	0.95	1.00	0.84	1.00	1.00	0.85	0.79
Percent Heavy Veh, %	0	2	2	0	2	2	2	2	0	2	2	2
Cap, veh/h	0	869	75	0	871	73	36	36	0	0	71	71
Arrive On Green	0.00	0.30	0.30	0.00	0.30	0.30	0.57	0.57	0.00	0.00	0.57	0.57
Sat Flow, veh/h	0	2988	251	0	2995	245	0	0	0	0	124	124
Grp Volume(v), veh/h	0	160	165	0	362	372	977	977	0	0	170	170
Grp Sat Flow(s),veh/h/ln	0	1560	1597	0	1560	1598	1642	1642	0	0	1620	1620
Q Serve(g_s), s	0.0	8.0	8.1	0.0	21.2	21.3	6.9	6.9	0.0	0.0	5.0	5.0
Cycle Q Clear(g_c), s	0.0	8.0	8.1	0.0	21.2	21.3	56.9	56.9	0.0	0.0	5.0	5.0
Prop In Lane	0.00		0.16	0.00		0.15	0.00	0.00	0.00	0.00	0.08	0.08
Lane Grp Cap(c), veh/h	0	466	477	0	466	478	970	970	0	0	922	922
V/C Ratio(X)	0.00	0.34	0.35	0.00	0.78	0.78	1.01	1.01	0.00	0.00	0.18	0.18
Avail Cap(c_a), veh/h	0	466	477	0	466	478	970	970	0	0	922	922
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	27.4	27.4	0.0	32.0	32.0	22.6	22.6	0.0	0.0	10.4	10.4
Incr Delay (d2), s/veh	0.0	2.0	2.0	0.0	12.0	11.8	30.6	30.6	0.0	0.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	3.3	0.0	9.4	9.6	29.8	29.8	0.0	0.0	1.8	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	29.4	29.4	0.0	44.0	43.8	53.2	53.2	0.0	0.0	10.6	10.6
LnGrp LOS	A	C	C	A	D	D	F	F	A	A	B	B
Approach Vol, veh/h		325			734		977	977		320		
Approach Delay, s/veh		29.4			43.9		53.2	53.2		10.6		
Approach LOS		C			D		D	D		B		

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		37.0		63.0		37.0		63.0				
Change Period (Y+Rc), s		7.1		* 6.1		7.1		* 6.1				
Max Green Setting (Gmax), s		29.9		* 57		29.9		* 57				
Max Q Clear Time (g_c+I1), s		10.1		7.0		23.3		58.9				
Green Ext Time (p_c), s		2.2		2.7		2.9		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	41.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
212: Gillham Plaza/Gillham Rd & McGee St

06/29/2018

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	204	786	29	16	268	3	2	3	14	6	20	60
Future Volume (veh/h)	204	786	29	16	268	3	2	3	14	6	20	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	272	959	62	19	305	5	6	4	19	9	23	83
Peak Hour Factor	0.75	0.82	0.47	0.83	0.88	0.58	0.33	0.69	0.73	0.70	0.88	0.72
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	889	1200	78	507	2471	40	80	37	123	108	31	111
Arrive On Green	1.00	1.00	1.00	0.79	0.79	0.79	0.10	0.10	0.10	0.10	0.10	0.10
Sat Flow, veh/h	1069	1526	99	552	3141	51	229	373	1252	1388	312	1127
Grp Volume(v), veh/h	272	0	1021	19	151	159	10	0	19	9	0	106
Grp Sat Flow(s),veh/h/ln	1069	0	1624	552	1560	1633	601	0	1252	1388	0	1439
Q Serve(g_s), s	1.1	0.0	0.0	0.8	2.3	2.3	0.0	0.0	1.4	0.6	0.0	7.2
Cycle Q Clear(g_c), s	3.4	0.0	0.0	0.8	2.3	2.3	7.2	0.0	1.4	7.8	0.0	7.2
Prop In Lane	1.00		0.06	1.00		0.03	0.60		1.00	1.00		0.78
Lane Grp Cap(c), veh/h	889	0	1278	507	1227	1285	117	0	123	108	0	141
V/C Ratio(X)	0.31	0.00	0.80	0.04	0.12	0.12	0.09	0.00	0.15	0.08	0.00	0.75
Avail Cap(c_a), veh/h	889	0	1278	507	1227	1285	211	0	207	201	0	237
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.00	0.09	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	2.4	2.5	2.5	41.1	0.0	41.3	47.7	0.0	43.9
Incr Delay (d2), s/veh	0.1	0.0	0.5	0.1	0.2	0.2	0.3	0.0	0.6	0.3	0.0	7.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.2	0.1	0.6	0.6	0.2	0.0	0.5	0.2	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.1	0.0	0.5	2.5	2.7	2.7	41.4	0.0	41.9	48.1	0.0	51.6
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	D
Approach Vol, veh/h		1293			329			29			115	
Approach Delay, s/veh		0.4			2.7			41.7			51.3	
Approach LOS		A			A			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	15.3	84.7	15.3	84.7
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0
Max Green Setting (Gmax), s	16.5	72.0	16.5	72.0
Max Q Clear Time (g_c+I1), s	9.2	4.3	9.8	5.4
Green Ext Time (p_c), s	0.0	1.2	0.2	8.0

Intersection Summary	
HCM 6th Ctrl Delay	4.8
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
11: Gillham Rd & Armour

05/15/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	344	40	38	177	46	13	190	26	64	899	86
Future Volume (veh/h)	79	344	40	38	177	46	13	190	26	64	899	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	136	459	60	44	227	64	16	224	40	80	1070	200
Peak Hour Factor	0.58	0.75	0.67	0.86	0.78	0.72	0.81	0.85	0.65	0.80	0.84	0.43
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	342	531	69	156	460	130	158	680	121	540	1317	245
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	1088	1423	186	882	1232	347	436	1356	242	1115	2625	489
Grp Volume(v), veh/h	136	0	519	44	0	291	16	0	264	80	635	635
Grp Sat Flow(s),veh/h/ln	1088	0	1609	882	0	1579	436	0	1598	1115	1560	1554
Q Serve(g_s), s	8.8	0.0	23.9	3.9	0.0	11.3	2.6	0.0	7.9	3.7	27.3	27.6
Cycle Q Clear(g_c), s	20.1	0.0	23.9	27.8	0.0	11.3	30.1	0.0	7.9	11.6	27.3	27.6
Prop In Lane	1.00		0.12	1.00		0.22	1.00		0.15	1.00		0.31
Lane Grp Cap(c), veh/h	342	0	601	156	0	590	158	0	802	540	782	779
V/C Ratio(X)	0.40	0.00	0.86	0.28	0.00	0.49	0.10	0.00	0.33	0.15	0.81	0.82
Avail Cap(c_a), veh/h	358	0	623	169	0	612	158	0	802	540	782	779
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	0.0	23.2	36.0	0.0	19.3	29.5	0.0	11.9	15.4	16.7	16.8
Incr Delay (d2), s/veh	0.3	0.0	11.2	0.4	0.0	0.2	1.3	0.0	1.1	0.6	8.9	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	10.3	0.8	0.0	4.0	0.3	0.0	2.8	1.0	10.7	10.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.3	0.0	34.3	36.4	0.0	19.5	30.8	0.0	13.0	15.9	25.7	26.0
LnGrp LOS	C	A	C	D	A	B	C	A	B	B	C	C
Approach Vol, veh/h		655			335			280			1350	
Approach Delay, s/veh		32.9			21.7			14.0			25.2	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	34.9	45.1	34.9	45.1
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	31.0	39.0	31.0	39.0
Max Q Clear Time (g_c+I1), s	25.9	29.6	29.8	32.1
Green Ext Time (p_c), s	0.8	2.3	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	25.5
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary
206: Gillham Plaza & 31st St

05/15/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	526	102	57	260	8	76	246	54	47	893	67
Future Volume (veh/h)	41	526	102	57	260	8	76	246	54	47	893	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	60	666	124	97	342	24	88	267	68	92	992	76
Peak Hour Factor	0.68	0.79	0.82	0.59	0.76	0.33	0.86	0.92	0.79	0.51	0.90	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	992	181	173	732	57	202	538	137	448	1250	96
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.85	0.85	0.85	0.85	0.85	0.85
Sat Flow, veh/h	140	2272	414	241	1675	131	528	1263	322	1045	2936	225
Grp Volume(v), veh/h	470	0	380	194	0	269	88	0	335	92	527	541
Grp Sat Flow(s),veh/h/ln	1556	0	1270	577	0	1471	528	0	1584	1045	1560	1601
Q Serve(g_s), s	9.2	0.0	19.2	11.4	0.0	10.1	11.5	0.0	4.4	2.7	12.4	12.4
Cycle Q Clear(g_c), s	19.0	0.0	19.2	29.0	0.0	10.1	28.7	0.0	4.4	9.3	12.4	12.4
Prop In Lane	0.13		0.33	0.50		0.09	1.00		0.20	1.00		0.14
Lane Grp Cap(c), veh/h	730	0	555	319	0	642	202	0	674	448	664	682
V/C Ratio(X)	0.64	0.00	0.69	0.61	0.00	0.42	0.44	0.00	0.50	0.21	0.79	0.79
Avail Cap(c_a), veh/h	730	0	555	319	0	642	219	0	727	487	721	741
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.89	0.00	0.89	0.63	0.63	0.63
Uniform Delay (d), s/veh	17.9	0.0	18.1	24.2	0.0	15.5	13.0	0.0	3.7	5.4	4.3	4.3
Incr Delay (d2), s/veh	4.3	0.0	6.7	8.3	0.0	2.0	1.9	0.0	0.7	0.2	3.9	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	0.0	6.1	4.0	0.0	3.4	1.0	0.0	1.0	0.3	2.2	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	0.0	24.8	32.6	0.0	17.5	14.8	0.0	4.5	5.6	8.3	8.2
LnGrp LOS	C	A	C	C	A	B	B	A	A	A	A	A
Approach Vol, veh/h		850			463			423			1160	
Approach Delay, s/veh		23.4			23.8			6.6			8.0	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	41.6	38.4	41.6	38.4
Change Period (Y+Rc), s	* 5.7	* 5.3	* 5.7	* 5.3
Max Green Setting (Gmax), s	* 32	* 37	* 32	* 37
Max Q Clear Time (g_c+I1), s	21.2	14.4	31.0	30.7
Green Ext Time (p_c), s	3.8	7.3	0.4	1.5

Intersection Summary	
HCM 6th Ctrl Delay	14.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
207: Gilham Plaza/Gillham Plaza & E Linwood Blvd

05/15/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	689	122	150	557	18	0	310	38	0	1149	125
Future Volume (veh/h)	88	689	122	150	557	18	0	310	38	0	1149	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	0	1642	1642	0	1642	1642
Adj Flow Rate, veh/h	121	830	0	169	626	0	0	344	64	0	1368	156
Peak Hour Factor	0.73	0.83	0.76	0.89	0.89	0.75	0.25	0.90	0.59	0.38	0.84	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	2	0	2	2
Cap, veh/h	285	858		221	872		0	764	647	0	1451	647
Arrive On Green	0.07	0.28	0.00	0.08	0.28	0.00	0.00	0.47	0.47	0.00	0.93	0.93
Sat Flow, veh/h	1564	3120	1392	1564	3120	1392	0	1642	1392	0	3202	1392
Grp Volume(v), veh/h	121	830	0	169	626	0	0	344	64	0	1368	156
Grp Sat Flow(s),veh/h/ln	1564	1560	1392	1564	1560	1392	0	1642	1392	0	1560	1392
Q Serve(g_s), s	4.4	21.0	0.0	6.3	14.5	0.0	0.0	11.3	2.1	0.0	20.0	0.8
Cycle Q Clear(g_c), s	4.4	21.0	0.0	6.3	14.5	0.0	0.0	11.3	2.1	0.0	20.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	285	858		221	872		0	764	647	0	1451	647
V/C Ratio(X)	0.42	0.97		0.76	0.72		0.00	0.45	0.10	0.00	0.94	0.24
Avail Cap(c_a), veh/h	286	858		221	872		0	764	647	0	1451	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.46	0.46
Uniform Delay (d), s/veh	19.8	28.6	0.0	21.7	26.0	0.0	0.0	14.5	12.0	0.0	2.2	1.5
Incr Delay (d2), s/veh	1.0	23.0	0.0	14.6	2.9	0.0	0.0	1.9	0.3	0.0	7.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	10.1	0.0	3.0	5.4	0.0	0.0	4.2	2.2	0.0	2.3	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.8	51.7	0.0	36.3	28.8	0.0	0.0	16.4	12.3	0.0	9.5	1.9
LnGrp LOS	C	D		D	C		A	B	B	A	A	A
Approach Vol, veh/h		951	A		795	A		408			1524	
Approach Delay, s/veh		47.7			30.4			15.8			8.8	
Approach LOS		D			C			B			A	

Timer - Assigned Phs	1	2	4	5	6	8
Phs Duration (G+Y+Rc), s	10.8	27.0	42.2	10.4	27.4	42.2
Change Period (Y+Rc), s	4.5	5.0	5.0	4.5	5.0	5.0
Max Green Setting (Gmax), s	6.3	22.0	37.2	6.0	22.3	37.2
Max Q Clear Time (g_c+I1), s	8.3	23.0	22.0	6.4	16.5	13.3
Green Ext Time (p_c), s	0.0	0.0	6.2	0.0	1.3	1.3

Intersection Summary	
HCM 6th Ctrl Delay	24.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
210: 39th St

05/15/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER	SER2
Lane Configurations											
Traffic Volume (veh/h)	0	542	64	0	614	19	282	0	0	1004	22
Future Volume (veh/h)	0	542	64	0	614	19	282	0	0	1004	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No		No		No		
Adj Sat Flow, veh/h/ln	0	1642	1642	0	1642	1642	1642	0	1642	1642	1642
Adj Flow Rate, veh/h	0	583	80	0	758	20	336	0	0	28	28
Peak Hour Factor	1.00	0.93	0.80	1.00	0.81	0.95	0.84	1.00	1.00	0.85	0.79
Percent Heavy Veh, %	0	2	2	0	2	2	2	0	2	2	2
Cap, veh/h	0	9999	3151	0	9999	684	396	0	0	33	33
Arrive On Green	0.00	1.00	1.00	0.00	1.00	1.00	0.25	0.00	0.00	0.47	0.47
Sat Flow, veh/h	0	2839	377	0	3187	82	1564		0	71	71
Grp Volume(v), veh/h	0	329	334	0	381	397	336		0	641	641
Grp Sat Flow(s),veh/h/ln	0	1560	1574	0	1560	1627	1564		0	1629	1629
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	20.4		0.0	34.6	34.6
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	20.4		0.0	34.6	34.6
Prop In Lane	0.00		0.24	0.00		0.05	1.00		0.00	0.04	0.04
Lane Grp Cap(c), veh/h	0	13027	13145	0	13027	13589	396		0	760	760
V/C Ratio(X)	0.00	0.03	0.03	0.00	0.03	0.03	0.85		0.00	0.84	0.84
Avail Cap(c_a), veh/h	0	13027	13145	0	13027	13589	871		0	907	907
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00	1.00		0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	35.5		0.0	23.5	23.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	10.2		0.0	7.9	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	8.8		0.0	14.3	14.3
Unsig. Movement Delay, s/veh											
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	45.6		0.0	31.3	31.3
LnGrp LOS	A	A	A	A	A	A	D		A	C	C
Approach Vol, veh/h		663			778		336		1209		
Approach Delay, s/veh		0.0			0.0		45.6		31.8		
Approach LOS		A			A		D		C		

Timer - Assigned Phs	2	3	4	6
Phs Duration (G+Y+Rc), s	864.6	31.5	52.7	864.6
Change Period (Y+Rc), s	7.1	* 6.1	* 6.1	7.1
Max Green Setting (Gmax), s	31.1	* 56	* 56	31.1
Max Q Clear Time (g_c+I1), s	2.0	22.4	36.6	2.0
Green Ext Time (p_c), s	5.8	2.9	10.0	7.0

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
212: Gillham Plaza/Gillham Rd & McGee St

05/15/2018

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	27	350	15	43	983	7	4	44	255	14	7	23
Future Volume (veh/h)	27	350	15	43	983	7	4	44	255	14	7	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
Adj Flow Rate, veh/h	36	427	32	52	1117	12	12	64	349	20	8	32
Peak Hour Factor	0.75	0.82	0.47	0.83	0.88	0.58	0.33	0.69	0.73	0.70	0.88	0.72
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	243	832	62	439	1743	19	99	444	382	354	88	350
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	499	1509	113	933	3162	34	155	1456	1252	973	287	1148
Grp Volume(v), veh/h	36	0	459	52	551	578	76	0	349	20	0	40
Grp Sat Flow(s),veh/h/ln	499	0	1622	933	1560	1636	1611	0	1252	973	0	1435
Q Serve(g_s), s	4.3	0.0	14.2	3.0	19.6	19.6	0.0	0.0	21.5	1.2	0.0	1.6
Cycle Q Clear(g_c), s	23.9	0.0	14.2	17.1	19.6	19.6	2.7	0.0	21.5	3.9	0.0	1.6
Prop In Lane	1.00		0.07	1.00		0.02	0.16		1.00	1.00		0.80
Lane Grp Cap(c), veh/h	243	0	894	439	860	902	543	0	382	354	0	438
V/C Ratio(X)	0.15	0.00	0.51	0.12	0.64	0.64	0.14	0.00	0.91	0.06	0.00	0.09
Avail Cap(c_a), veh/h	243	0	894	439	860	902	645	0	462	416	0	529
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.00	0.86	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.8	0.0	11.2	16.6	12.5	12.5	20.3	0.0	26.8	21.7	0.0	19.9
Incr Delay (d2), s/veh	1.1	0.0	1.8	0.6	3.7	3.5	0.1	0.0	20.3	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	5.1	0.7	7.1	7.4	1.0	0.0	8.3	0.3	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.9	0.0	13.0	17.1	16.1	15.9	20.4	0.0	47.1	21.8	0.0	20.0
LnGrp LOS	C	A	B	B	B	B	C	A	D	C	A	B
Approach Vol, veh/h		495			1181			425			60	
Approach Delay, s/veh		13.7			16.1			42.3			20.6	
Approach LOS		B			B			D			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	29.9	50.1	29.9	50.1
Change Period (Y+Rc), s	5.5	6.0	5.5	6.0
Max Green Setting (Gmax), s	29.5	39.0	29.5	39.0
Max Q Clear Time (g_c+I1), s	23.5	21.6	5.9	25.9
Green Ext Time (p_c), s	0.9	4.5	0.2	1.8

Intersection Summary	
HCM 6th Ctrl Delay	20.8
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.