

Guide for Using the Bicycle Network Assessment Data

A product of the Greater Kansas City Regional Bikeway Plan Update

Introduction

As part of the Greater Kansas City Regional Bikeway Plan Update, the consultant team led by Toole Design Group produced a series of analyses on the regional street network that give different perspectives on the street network in terms of cycling. These analyses are a product of the Greater Kansas City Bikeway Plan Update that is intended for viewing and use by cities that wish to do their own bicycle planning, and they are housed in a publicly available web map. This guide will explain the contents of the web map and the purpose of each analysis therein.

Contents of the Web Map

The contents will be explained by layer.

Planning Layers

Trails and Bikeways

This layer shows the existing trails and on-street cycling facilities in the region using data from MARC's [Greater Kansas City Regional Trails & Bikeways Map](#). To keep the layer focused on the transportation aspect of cycling, walking trails, mountain bike trails, and equestrian trails are omitted.

Regional Bikeway Network – Priority Network

This layer shows the core transportation-focused alignments of the envisioned Regional Bikeway Network that was developed through the planning process. Exact facility types for this network are not specified, but ideally, they will have a relatively high degree of separation from vehicular traffic. The Regional Bikeway Network is intended to provide a framework that will not replace local bicycle planning but supplement it by identifying connections to the rest of the region.

Regional Bikeway Network – Connectivity Corridor

Connectivity Corridors highlight future opportunities. The project team identified additional areas where less opportunity exists to shift daily trips to bicycle because of longer trip

distances and a lower concentration of uses supporting bicycling. However, as this is a plan with a regional focus, it is appropriate to envision connections across the entire region. Connectivity Corridors are drawn with wide alignments because future planning work will likely be needed to identify exact alignments.

MetroGreen Corridors

These are trail corridors identified for the [MetroGreen greenway plan](#). Some of the Regional Bikeway Network overlaps with the proposed MetroGreen system.

Bicycle Network Assessment Layers

Please note: As you explore the layers of the Bicycle Network Assessment, it is important to remember that no one analysis offers a complete picture of cycling conditions in the Kansas City region. They all give a particular perspective of the region in terms of cycling, and they all have their strengths and limitations. Users are encouraged to view the analyses with this in mind.

Short Vehicle Trip Density

This layer shows the density of where short vehicle trips occur in the region, according to data platform Replica. Short vehicle trips are defined as trips between 0 and 3 miles.

What this means for local bicycle planning: If a block group shows a significant amount of short vehicle trips, it could represent an opportunity to improve bicycle access, as bicycles can thrive in short-distance conditions.

Trip Potential

The Trip Potential analysis depicts a heatmap of the Kansas City region's Census blocks showing where land uses and existing short vehicle trips indicate the most potential for trips by bicycle. Inputs to the calculation include residential and employment densities, proximity to schools, transit/streetcar stops, grocery stores, and density of existing short vehicle trips (under 3 miles). The Trip Potential analysis does not consider the existing stress level of a given street. Many areas of high potential likely see few bicycle trips today due to existing levels of traffic stress and lack of end of trip facilities. When level of traffic stress is reduced in areas of high trip potential, more bicycle trips are likely to occur.

What this means for local bicycle planning: When planning local bicycle networks, connecting areas of higher trip potential with low-stress connectivity is likely to produce the greatest amount of new trips by bicycle.

Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (BLTS) is the stress that bicyclists experience resulting from facility design and user perceptions of safety. Some people are comfortable riding with more and/or faster-moving motor vehicle traffic and with less separation. However, research shows that people generally fall into a range of stress-tolerant categories based on differing levels of bicycling confidence. These categories are labeled:

- Not Interested or Able
- Interested but Concerned (The majority of the adult population)
- Somewhat Confident (Risk averse but comfortable cyclists)
- Highly Confident (Most risk tolerant cyclists)

BLTS scores street segments on a scale from 1 to 4, with BLTS 1 and 2 indicating low-stress segments and BLTS 3 and 4 indicating higher levels of stress. Generally, Interested but Concerned bicyclists prefer BLTS 1 and 2 facilities. Where stress levels are higher, bicyclists may choose to detour on a longer alternative route or forego a trip by bicycle entirely.

What this means for local bicycle planning: BLTS helps local planners understand and visualize the existing stress of local roadways. This information can be used to plot bicycle routes along low-stress streets, or to identify higher-stress segments of proposed or existing routes where projects can be implemented to reduce the stress level of the roadway segment.

Centrality

Centrality assesses the relative importance of street segments for efficient travel by calculating millions of trip-routes that are the shortest paths between origin and destination locations using the entire roadway and off-street network, regardless of stress level.

The Centrality analysis uses a 3-mile radius to look at trips between all intersection pairs within typical bicycling distance of one another.

Centrality quantifies the idea that streets with more trip-routes passing through them are more important. However, this analysis does not tell us whether there is a similar alternate route available that runs parallel to the shortest route, which may be slightly longer but less stressful and therefore more acceptable to most bicyclists.

This map includes three Centrality analyses:

- **Full Network Centrality:** this is Centrality applied to the whole regional street network as described above.
- **Centrality of Road Network Segments Adjusted for Intersection Density:** This analysis recognizes that areas with higher densities of intersections will see more activity; because those areas are located in the urban core, a base Centrality analysis fails to recognize streets which are important in other areas of the region. This layer normalizes the base Centrality analysis by intersection density, helping to identify streets that are important for longer trips.
- **Centrality of Road Network Segments Adjusted for Intersection Density and Weighted by Total Population and Employment:** This analysis takes the previous intersection-adjusted results and weights them by population and employment. Reviewing this analysis could help users identify the streets that are most important as commuting corridors or streets that support travel from denser population centers to non-commute destinations.

What this means for local bicycle planning: High-centrality network links indicate streets that are important for connectivity and should be considered for bike routes when the level of stress is low or can be reduced with changes to the roadway configuration. Centrality tends to be more relevant in areas without a traditional street grid (e.g., many suburban areas) because there is less redundancy in the street network. Higher centrality streets should be considered for how they accommodate bicycle traffic because of their importance in connecting the network for shorter trips.

Directness – Connectivity and Detour Ratios

Directness considers the same routes calculated for the Centrality analysis but adds level of traffic stress as an additional factor. This means routes are between origins and destinations are only considered if they follow low stress street segments. For each trip this results in one of three outcomes:

- The route is the same because the most efficient route between the origin and destination is low stress;
- The route is longer because a bicyclist must make a detour to avoid a high-stress street that someone driving a car would use to travel more directly; or
- The route is impossible because there is no viable low stress way to travel between the origin and destination. Areas with more trips that are impossible and larger average detours are less connected for bicycling than areas with fewer impossible trips and smaller average detours.

This map has two layers for directness, one for measuring connectivity and one for detour ratios. Darker colors indicate areas that are more connected or areas that require more detours, respectively.

What this means for local bicycle planning: Areas of higher detours and disconnectedness indicate potential opportunities for lowering the level of stress on the adjacent street network to reduce the length of and encourage more trips by bicycle.

Low Stress Bike Sheds

The Low Stress Bike Sheds analysis looks at areas from which a given amenity can be reached within a reasonable trip distance using the low-stress network. Amenities evaluated included grocery stores, schools, and transit stops. The analysis considers a collection of factors including the location of amenities (a person can't reasonably access a grocery store by bicycle if the nearest grocery store is 20 miles away), barriers to access (if the only route to an amenity includes high stress roads, that amenity is not reachable for most people by bike), and required detours. The analysis limits trips to a maximum of 3 miles, therefore large detours may limit the low-stress access area and may help identify locations for improvements to provide more direct low stress routes.

There are several Low Stress Bike Sheds analyses covering several destination types. Each type has three layers within it:

- A "points" layer which shows the location of the analyzed amenities
- A layer of the low stress bike shed
- A "potential" layer, which shows how far geographically the trip could extend (up to 3 miles) if the stress of surrounding streets were lowered.

Please note: the Low Stress Bike Shed analysis around the KC Streetcar does not include the most recent Riverfront Extension. Similarly, the analysis for bus stops may not reflect current services from transit agencies.

What this means for local bicycle planning: At the local level, the 3-mile radius around studied amenities can be examined to understand whether access to the amenity is reaching its full potential. Where the potential and existing access do not align, there may be an opportunity to lower the stress level of the street by upgrading bicycling infrastructure to increase low-stress access.

Low Stress Islands Including Crossing Stress

This is an illustrative look at how fragmented the regional street network is for low-stress cycling if a cyclist was not willing to cross a high-stress street. If this were the case, the network of many potential cyclists would be limited to a single neighborhood, sometimes

even a single street. The reality for many cyclists is not this confining; a variety of crossing conditions exist in the region for busy, stressful streets, some more daunting than others. But this analysis helps illustrate the degree of disconnection that can occur, especially for beginning cyclists, when streets are designed as vehicle thoroughfares.