DATE:	February 29, 2024
TO:	City of Spokane
FROM:	Erin David, Sierra Ohlsen
SUBJECT:	Spokane Bicycle Network: Network Development Principles
PROJECT NAME:	Spokane Priority Bicycle Network

Introduction

The purpose of this memo is to identify proposed Network Development Principles for Spokane's priority bicycle network. The proposed principles build on established goals for the bicycle network as well as prioritization criteria used to guide the selection of priority network segments and routes. The following sections describe the importance of Network Development Principles, how they can be used to facilitate network selection, and describe each of the proposed principles, including how it's measured. Finally, additional resources are provided for further guidance on establishing principles and applying them to the network.

Guiding Network Development

Network Development Principles translate project goals into practical considerations for selecting priority routes. They not only reflect specific targets or priorities, but they also capture logistical considerations for route selection that were revealed through the selection of the City's priority network.

Network Development Principles are an important consideration as the City advances priority network implementation. The selected priority network represents current and anticipated future conditions in the city. However, over time, the built environment, travel patterns, and other projects change. Routes once identified as a priority may no longer be feasible, or other projects open opportunities for better routes. Network Development Principles will help the City navigate these changes while remaining consistent with the overall vision established through this project and other planning efforts.

How to Use Network Development Principles

The Network Development Principles outlined in this memo provide a framework for selecting priority network segments and routes. When used in conjunction with prioritization criteria, these principles can help streamline decision-making and lend to a more consistent application of network goals and priorities. While each of the principles outlined here are important aspects of network selection, it is important to consider the role each has in the selection process and how they correspond with City priorities.

Certain principles, such as Route Directness and Access to Destinations, correspond with factors that are less flexible and less likely to change—the location of destinations and configuration of the roadway network. However, factors such as low-stress routes and route legibility are more flexible. Facility selection, design choices, and the addition of amenities can significantly improve user experience related to these factors. Finally, principles including network spacing, equitable network coverage, and feasibility serve as additional checks to the process to confirm that the right routes—both in terms of location and quantity—are included. This relationship is depicted in Figure 1.

IDENTIFY POTENTIAL ROUTES

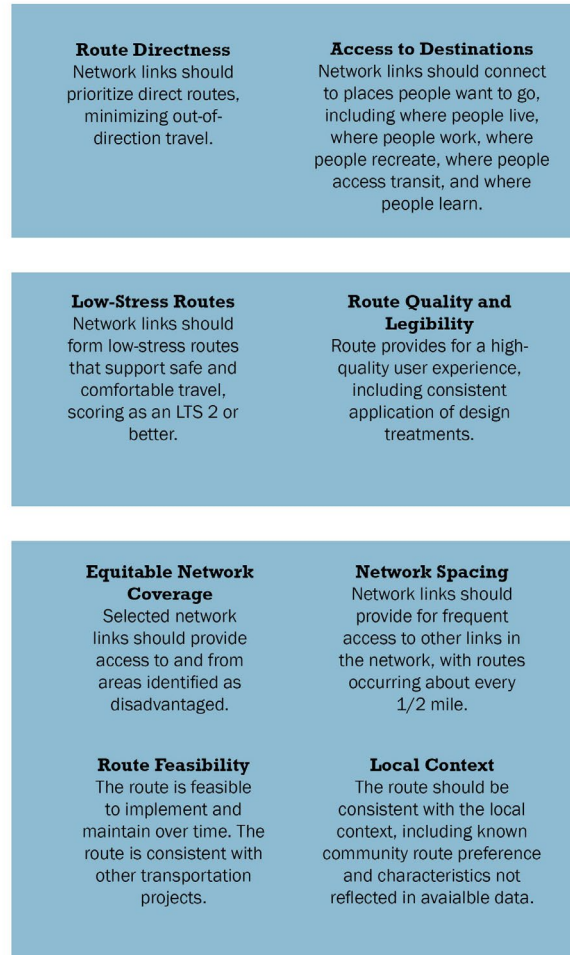**REFINE ROUTE SELECTION**

ASSESS NETWORK

Route Directness
Network links should prioritize direct routes, minimizing out-of-direction travel.

Access to Destinations
Network links should connect to places people want to go, including where people live, where people work, where people recreate, where people access transit, and where people learn.

Low-Stress Routes
Network links should form low-stress routes that support safe and comfortable travel, scoring as an LTS 2 or better.

Route Quality and Legibility
Route provides for a high-quality user experience, including consistent application of design treatments.

Equitable Network Coverage
Selected network links should provide access to and from areas identified as disadvantaged.

Network Spacing
Network links should provide for frequent access to other links in the network, with routes occurring about every 1/2 mile.

Route Feasibility
The route is feasible to implement and maintain over time. The route is consistent with other transportation projects.

Local Context
The route should be consistent with the local context, including known community route preference and characteristics not reflected in avaialble data.

Figure 1: How to Use Network Development Principles

Network Development Principles

Route Directness

Route directness refers to the variation between the total trip distance of a particular route compared to the shortest route available. More direct routes help people get to where they're going faster and with fewer turns to navigate. Route directness is a key component of route utility; when balanced with safety and comfort, route directness can also improve user experience. As an example, neighborhood streets that have lower speed limits and lower volumes of motor vehicles may provide a more comfortable path of travel. However, limited connectivity due to cul-de-sacs or limited safe crossing opportunities may require significant out-of-direction travel, adding significant time/distance to a route.

How is this measured? Route directness can be measured by comparing distance (in miles) or anticipated trip time (in minutes). Comparison among route choices may also include qualitative measures, like ease of navigation.

Recommended Principle: Routes should prioritize direct routes between key destinations, neighborhoods, or districts. Direct routes will minimize out-of-direction travel to the extent feasible. Selection of less direct routes may be required if the creation of safe, comfortable connections is not feasible along the selected route (see LTS below).

Associated Goals: Connectivity

Access to Destinations

Access to destinations is a key factor in building out a quality route and network. Providing adequate access to destinations via the bicycle network removes barriers for people bicycling, whether for commuting, running errands, recreation, or something else.

How is this measured? Access to destinations can be measured through quantitative means, such as describing the number or percent of jobs accessible by bicycle, the percentage of households with access to a low-stress bicycle route, or the development of travel sheds for specific destination types. Access to destinations can also be evaluated through a visual assessment that compares bicycle routes, key destinations, and areas where people work or live. This principle currently uses a visual assessment.

Recommended Principle: Priority network routes should provide access to the greatest number of destinations possible. Routes should connect within a block of destination clusters and should provide direct access to schools, transit centers, activity centers, employment areas, and parks.

Associated Goals: Comfort, Connectivity, Equity, Sustainability, Safety

Low-Stress Routes

Level of Traffic Stress (LTS) is a framework that estimates route safety and comfort based on factors such as posted speed limit, traffic volumes/number of lanes, presence of bicycle facilities, and bicycle facility characteristics (width, separation from motor vehicles, and similar). LTS provides a framework for understanding overall route safety and comfort while also corresponding with who might be expected to use the route. For example, LTS 1 routes are typically known to accommodate all ages and abilities, while LTS 2 routes are suitable for most adults.

How is this measured? LTS scores routes and intersections using a four-point scale. LTS results estimate the expected comfort and safety of a particular route, with lower scores (LTS 1 and 2) corresponding with low-stress routes, and higher scores (LTS 3 and 4) corresponding with high-stress routes. LTS scores apply to both road segments (travel along) and intersections (travel across). LTS score assignment should be consistent with evaluation methods used in the region.

Recommended Principle: Priority network routes should accommodate low-stress travel, with a target of LTS 2 or better along the entire route. This evaluation should account for intersections as well as segments.

Associated Goals: Safety, Comfort

Network Spacing

Network spacing defines the density of routes on the priority network. Network spacing provides a sense of network coverage and has direct impacts on access to destinations, route directness, and more. Targets for network spacing will vary across the network based on factors such as roadway network density as well as the density of trip generators and attractors. Areas with denser road networks and a greater density of people and places may necessitate closer spacing, while areas with a less dense road network and fewer people and places may require less frequent spacing. The target identified below is based on observations from the selected priority network.

How is this measured? Network spacing refers to the straight-line distance between two parallel routes. It is recommended to measure at various points along the routes for both east-west and north-south travel.

Recommended Principle: The priority network should have frequent and direct network connections. Spacing between parallel segments should be about a ½ mile for most of the city and no more than one mile apart in less dense areas. Areas with a greater density of roadways and destinations, or that have one-way routes, may be spaced at less than ½ mile.

Associated Goals: Comfort, Connectivity

Route Quality and Legibility

Route quality and legibility directly influence user experience. Route quality refers to various physical characteristics of the route that improve user experience; examples include tree/shade coverage, lighting, and pavement quality. Consistency refers to the use of consistent design treatments and features that help people understand the route. Not only can this increase comfort, but it helps the route be more intuitive for navigation purposes.

While this measure accounts for some existing conditions, such as lighting and tree coverage, it may also include consideration for design potential. Questions may include:

- If a route does not currently have significant tree coverage or lighting, can this be added as part of the route design?

- Do the physical constraints along the route prevent consistent application of facility treatments?

- What are the maintenance considerations that will guide long-term route quality?

How is this measured? Existing data regarding tree coverage and lighting can guide the selection of routes; additional data collection and/or collaboration with relevant departments may be required for other elements.

Recommended Principle: Priority network routes should provide for a consistent experience along the corridor, whether based on existing characteristics or the ability to improve quality and consistency through route implementation.

Associated Goals: Safety, Comfort, Connectivity

Equitable Coverage

Priority routes should be accessible to disadvantaged areas. As network links and routes are selected, City staff should confirm that areas identified as disadvantaged are not precluded from priority network coverage. Providing priority network access in these areas helps expand mobility choice for the community.

How is this measured? The Climate and Economic Justice Screening Tool is a federal resource that identifies areas with higher concentrations of disadvantaged populations based on environmental and socioeconomic factors. Other sources of data include USDOT, FTA, FHWA, and WSDOT. These sources should be utilized depending on the needs of available funding opportunities.

Recommended Principle: Priority network routes should connect through areas identified as disadvantaged, providing high-quality routes connecting to destinations.

Associated Goals: Equity, Connectivity

Local Context

Routes should also consider local context, including both additional factors not represented in available data as well as community preference, a based on local knowledge and experience These considerations may mean that a route with more out-of-direction travel may be preferred as it's more intuitive to people biking,provides access to destinations not reflected in the data, or exhibits unique ride quality in terms of pavement condition, topography or aesthetic factors. This principle also provides consideration for known projects or other agency actions that may influence route feasibility over time.

How is this measured? Understanding of local context can reflect City staff knowledge, public input, and engagement through the City's Bicycle Advisory Board. As an example, the City is asking for feedback on the draft priority network as part of this project, as seen here.

Recommended Principle: Priority network routes should account for community preference and local context when it is logical to do so.

Associated Goals: Comfort, Connectivity

Route Feasibility

Selected routes and required treatments to align with identified principles (such as low-stress routes and route quality) should be feasible for both implementation and long-term maintenance. Feasibility includes consideration for factors such as cost to implement, available right-of-way, consistency with maintenance practices and procedures, and cost of ongoing maintenance. Additionally, the route should be consistent with other planned transportation projects. For example, will other planned projects substantially impact the ability of this corridor to provide a complete, connected, and low-stress route for people bicycling?

How is this measured? Feasibility should reflect internal City buy-in with consideration for capital project funding, operations funding, and relevant department procedures. Coordination with other departments and agencies may be required to assess compatibility with future projects.

Recommended Principle: Selected routes should be feasible, both to implement and maintain in the long-term. Planned transportation projects should not negatively impact bicycle routes.

Associated Goals: Sustainability

Additional Resources

The following list of resources available through the Federal Highway Administration (FHWA) can provide additional guidance to City staff for the implementation of a priority bicycle network that aligns with the local vision for a complete, connected, safe, and comfortable bicycle system.

- **Bikeway Selection Guide**
  Guidance for identifying the most appropriate bicycle facility for a corridor to provide safe and comfortable routes of travel.

  Website: https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

- **FHWA Guidebook for Measuring Multimodal Connectivity Guidebook**
  Guidebook and toolbox for evaluating network connectivity for bicycle and pedestrian networks.

  Website: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_connectivity/fhwahep18032.pdf

- **Guidebook for Developing Pedestrian & Bicycle Performance Measures**
  Guidance for identifying relevant performance measures and track system progress over time.

  Website: *https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/performance_measures_guidebook/pm_guidebook.pdf*