# Appendix A
## Bikeway Quality Index

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The goal of BQI analysis is to capture a snapshot of the current condition of biking infrastructure using both qualitative and quantitative measures. Studying well-performing bikeways and pinpointing deficient facilities will allow improvements to be carefully targeted to areas that need improvement or areas where minimal improvement will significantly improve the cycling experience.

## Bikeway Segment Definition

Using existing GIS data, project staff surveyed existing bicycle facilities, including trails. The segments range in length from 250 feet to over 6,000 feet. The following graphic shows a typical division of segments.

## Data Collection and Synthesis

The team collected data for all the existing trails within the City. Each route was followed on a bicycle and rated for a number of criteria including pavement quality and width. The data for street routes were taken primarily from the provided GIS data and most of the evaluation factors like speed, and pavement quality were estimated based on facility type.

## Bikeway Quality Analysis

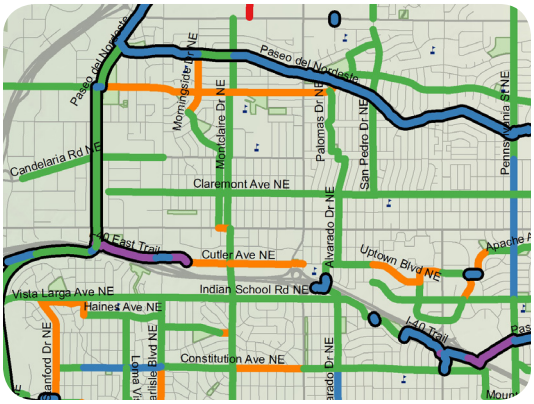
The BQI factors included are:

### Auto Speed

**Definition**
The posted speed of the segment.

**Reasoning**
Auto travel speed plays a large part in how comfortable cyclists feel while traveling on the road. Generally, increasing auto speeds are associated with decreasing cyclist comfort and quality of the cycling experience.

**Basic Methodology**
Speed was combined with volume data to create a composite measurement. (See Speed and Volume Integration)




*Color changes represent segment changes*

### Auto Volume

**Definition**
The average number of cars that pass along a street is called Average Daily Traffic (ADT). The City provided ADT data for most segments, and this number was used when available. When this information was not available or counts were taken before the year 2000, an estimated volume was assigned. This estimate was based on the street's functional classification (local highway, arterial, or local street), and number of auto lanes.

**Reasoning**
As a general rule, increasing auto volumes equate to decreasing cyclist comfort and ride quality.

**Basic Methodology**
See speed volume integration factor (below) for calculation detail

### Speed and Volume Integration

**Definition**
The relationship between auto speed and volume plays a significant role in defining the feel of comfort on a road segment. Four extreme relationships are recognized: low speed-low volume, low speed-high volume, high speed-low volume, and high speed- high volume.

The relationship between these variables is not linear: for example, a high speed-low volume street may be worse than a low speed-high volume street. Most cyclists prefer more slow moving vehicles to few fast moving vehicles. By assigning categorical rankings of speed and volume, we can more closely define how cyclists respond to varying combinations of these factors.

**Reasoning**
Speed and volume each impact cyclist comfort and ride quality, and these factors interact in a non-linear manner. It is appropriate to create a composite measure that captures this interrelationship.

**Basic Methodology**
Each segment is assigned to a category based on the speed and volumes in Table 1 below. The color key (best – worst) results in a quantitative ranking of 1 (worst) – 5 (best).

**Table 1. Speed and Volume Relationship Methodology**

| Motor Vehicle Daily Volume | | | | | |
|---|---|---|---|---|---|
| 10,000+ | 2 | 2 | 2 | 1 | 1 |
| 8,000 | 2 | 2 | 2 | 1 | 1 |
| 6,000 | 3 | 3 | 3 | 2 | 1 |
| 4,000 | 4 | 3 | 3 | 2 | 1 |
| 2,000 | 8 | 4 | 3 | 3 | 2 |
| 1,000 | 5 | 8 | 4 | 3 | 2 |
| 500 | 5 | 5 | 4 | 3 | 2 |
| Posted Speed (MPH) | 18 | 25 | 30 | 35 | 40+ |

## Facility Width

**Definition**
**The width of the bike lane:** This is measured from the center of the lane striping on each side. If the bike lane is against a curb, the width is measured from the center of the lane stripe to the edge of the curb. Bike lanes received 1 – 3 points based on the following criteria:

- 1 point if the facility was less than 5 feet wide
- 2 points if the facility was exactly 5 feet wide
- 3 points if the facility was more than 5 feet wide

**The width of a trail/path:** This is measured from the edge of pavement on one side to the edge of pavement on the other side. Multi-use trails received 1 – 3 points based on the following criteria:

- 1 point if the facility was less than 8 feet wide
- 2 points if the facility was exactly 8 feet wide
- 3 points if the facility was more than 8 feet wide

**The width of Bike Boulevards/Shared roads:** This is not measured, due to the nature of the facility it is assigned the highest width score.

**Reasoning**
Wider facilities are more comfortable than narrow facilities.

**Basic Methodology**
The data was added to the GIS from several sources including, field checks, and City GIS data. There were no calculations performed to get these numbers, they were simply added to the GIS data as width in feet per segment and scored in the overall segment analysis.

## Pavement Quality

**Definition**

Pavement quality was assigned as an overall measure of quality throughout the entire segment. Facilities were assigned 1 – 5 points based on the basic pavement quality.

- 5- Only new or nearly new pavements are likely to be smooth enough and free of cracks and patches to qualify for this category.
- 4 - Pavement, although not as smooth as described above, provides a smooth ride while exhibiting some signs of surface deterioration.
- 3 - Riding qualities are noticeably inferior to those rated at a four or five. Defects may include rutting, cracking - longitudinal or transversemap cracking, raveling and extensive patching. 3 is the maximum rating for any pavement that has a ridge height greater than ¼" at gutter lip.
- 2- Flexible pavement having distress over 50 percent or more of the surface, washboard surface, potholes and pavement shoving. Rigid pavement distress includes joint spalling, patching, etc.. Bike lanes that have valve boxes or manholes that have not been adjusted to grade.
- 1 - Pavements that are in an extremely deteriorated condition. Distress occurs over 75 percent or more of the surface.

*Good pavement quality*

**Reasoning**

Cyclists are more affected by pavement quality than automobiles. Poor pavement quality can be distracting to a cyclist, potentially dangerous due to potholes and cracks and can decrease the quality of the ride experience.

**Basic Methodology**

These were qualitative measures gathered in the field or assumed based on facility type. There were no calculations performed to get these numbers, they were simply added to the GIS data as value per segment and scored in the overall segment analysis.

*Poor pavement quality*

## Signing and Marking

**Definition**

The segment is assigned a score of 1 if it is signed and marked as a trail or bike route.

**Reasoning**

Signed and marked bikeways improve wayfinding and can increase use.

**Basic Methodology**

These were qualitative measures gathered in the field or assumed based on facility type. There were no calculations performed to get these numbers, they were simply added to the GIS data as value per segment and scored in the overall segment analysis.

*Poor pavement quality*

## Facility Evaluation and Model Outcomes

The data gathered for each bikeway segment is then used to score each segment using a 0-20 scale, shown in Table 2.

Table 2. Bicycle Quality Index Factor Weights

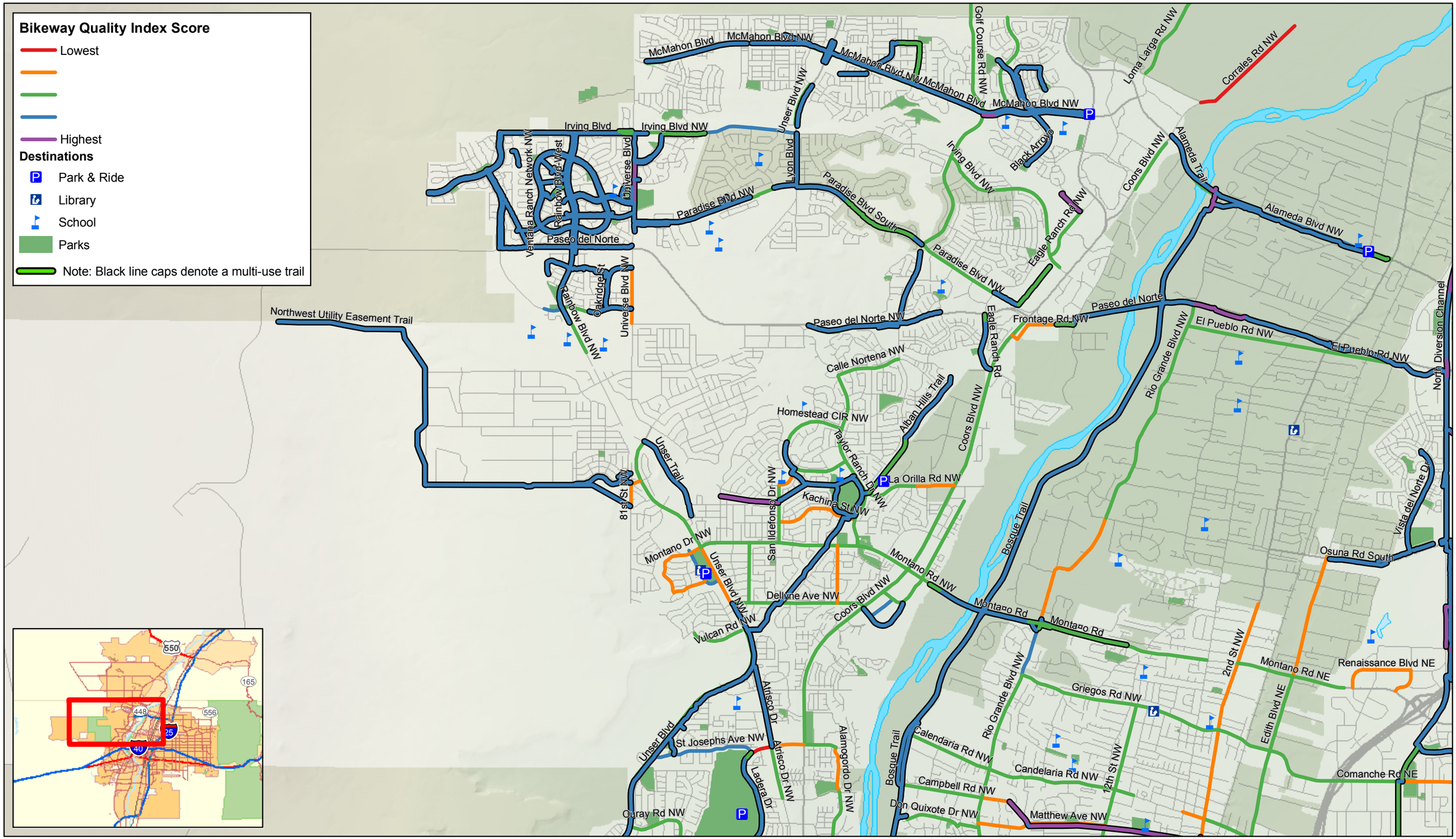
Facilities scored a potential of 20 points, with score ranging from 6 – 19. No facility scored a perfect 20 points. Both multi-use trails and on-street facilities were scored on the same scale to facilitate comparison of the cycling experience, though in some cases different criteria were used. Multi-use trails generally scored higher than on-street facilities; while the lowest trail segment scored a 13, the lowest scoring on-street facility scored a 6. The average score for multi-use trail segments was a 16.1 while the average score for an on-street facility was 12.4 this is consistent with the most people's perception of relative level of comfort in on-street vs. off-street facilities. Within the on-street facilities, it is useful to sample the variation in average facility quality. Table XX shows the on-street facility types and associated average segment scores:

Figure XX. Average Scores for On-street Bikeways by Type

These average scores are consistent with the expected variation in the level of quality and comfort most cyclists experience with riding on these types of facility. Of course, there are some cyclists that prefer on-street riding to cycling on multi-use trails and experience the same quality of ride on all facility types.

This tool has many potential uses beyond the development of project recommendations, one of which is to highlight high performing facilities and quantify the reasons for excellent performance. Once measured, this information can be extracted and applied to other facilities throughout the city. For example, the quality of cycling facilities in the NW quadrant of the city is high based on the presence of many multi-use trails that provide many opportunities to bicycle on a network of trails that are separated from motor vehicles. However, looking at the cycle zone factors for land use indicates that many people may not bicycle in this area due to a relatively low population and employment density, and a relatively low quality of roadway connections, which decreases the opportunity for cyclists to choose their route. However, the NW quadrant performs well in terms of exiting bikeway density and connectivity, indicating that cyclists may find it easier to traverse this part of the city on designated bikeway facilities than the SW quadrant or portions of the SE quadrant. Examination of the BQI map indicates that the NW quadrant can be significantly improved through increased connection of bikeways and roadways.

Another use of the BQI tool is the examination of conditions within the facility types to identify priorities for spot improvements. For example, an analysis of surface quality conditions on the multi-use trail system can be used to generate a list of repaving priorities. For example, existing multi-use trail facilities that scored a one or two for surface quality should be considered priorities for repaving projects. Similarly bicycle lanes that scored a one for facility width should be widened to five-feet, especially along bicycle lanes with high roadway speeds and volumes.



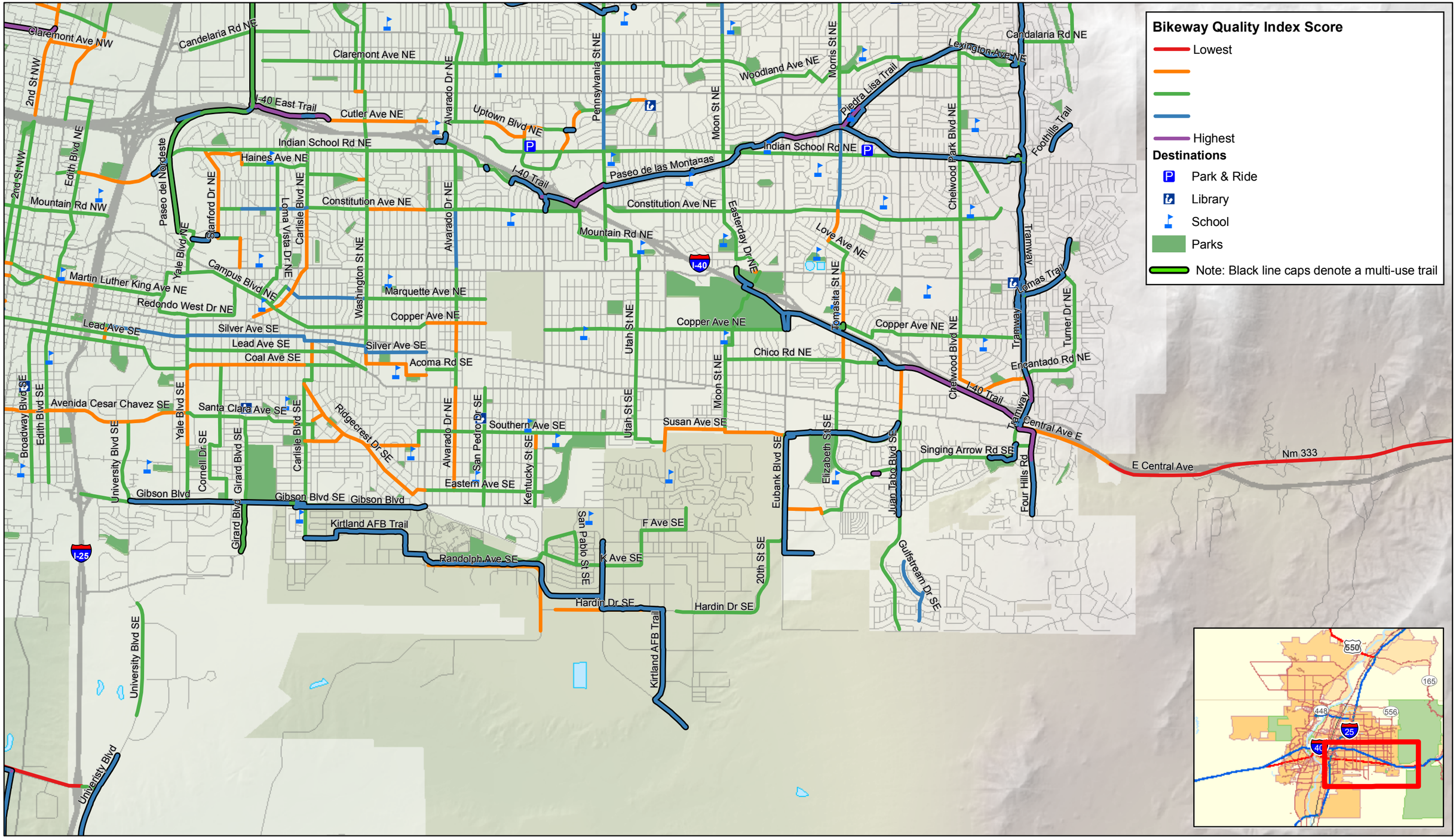

## Appendix A - Map 1. Bicycle Quality Index - Southwest Quadrant

Albuquerque Bikeways and Trails Master Plan Update

Source: City of Albuquerque, MRCOG, Gannett Fleming

Author:

Date: January 2011

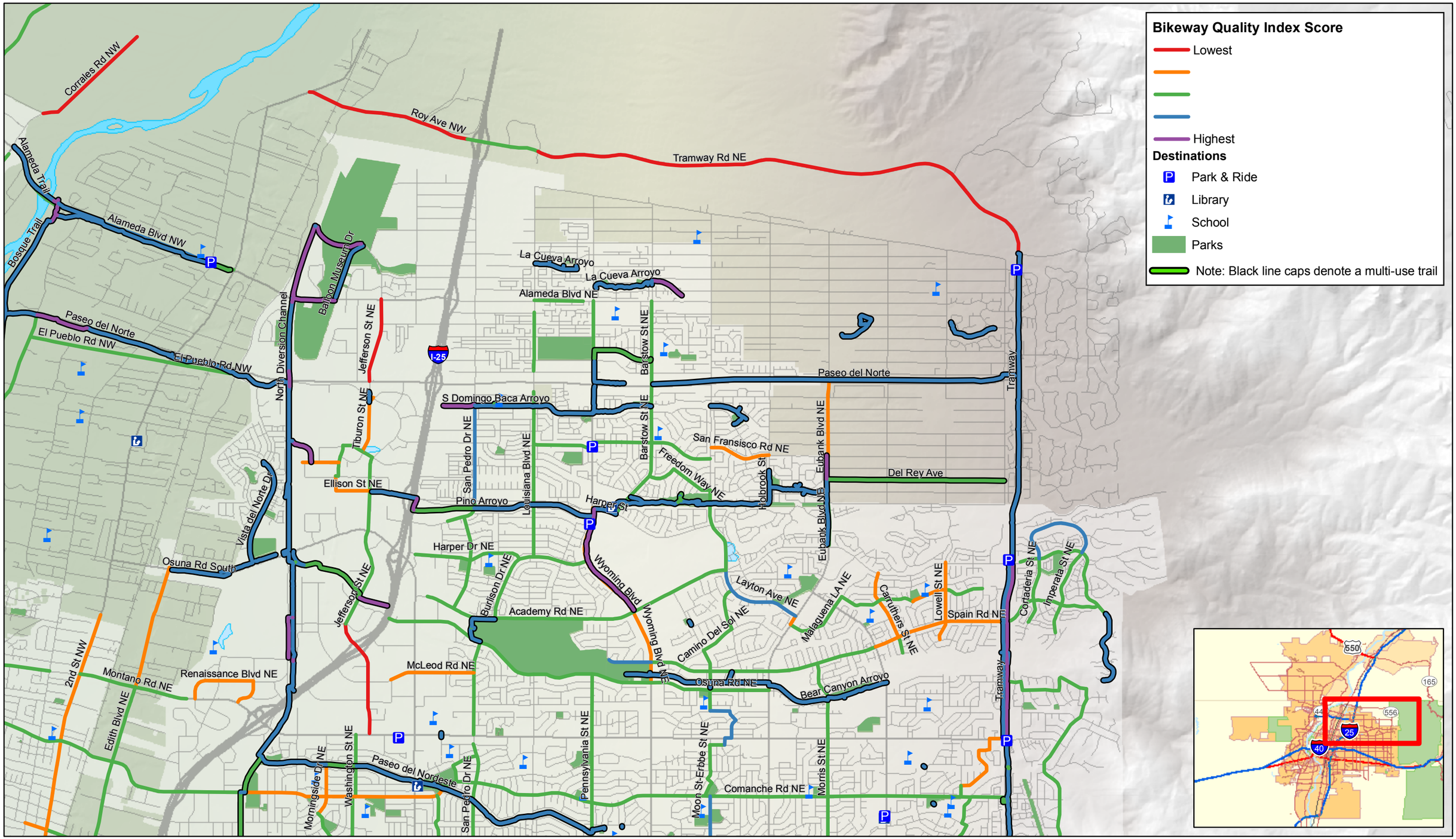



# Appendix A - Map 2. Bicycle Quality Index - Southeast Quadrant

Albuquerque Bikeways and Trails Master Plan Update

Source: City of Albuquerque, MRCOG, Gannett Fleming
Author:
Date: January 2011

0 0.5 1 Miles

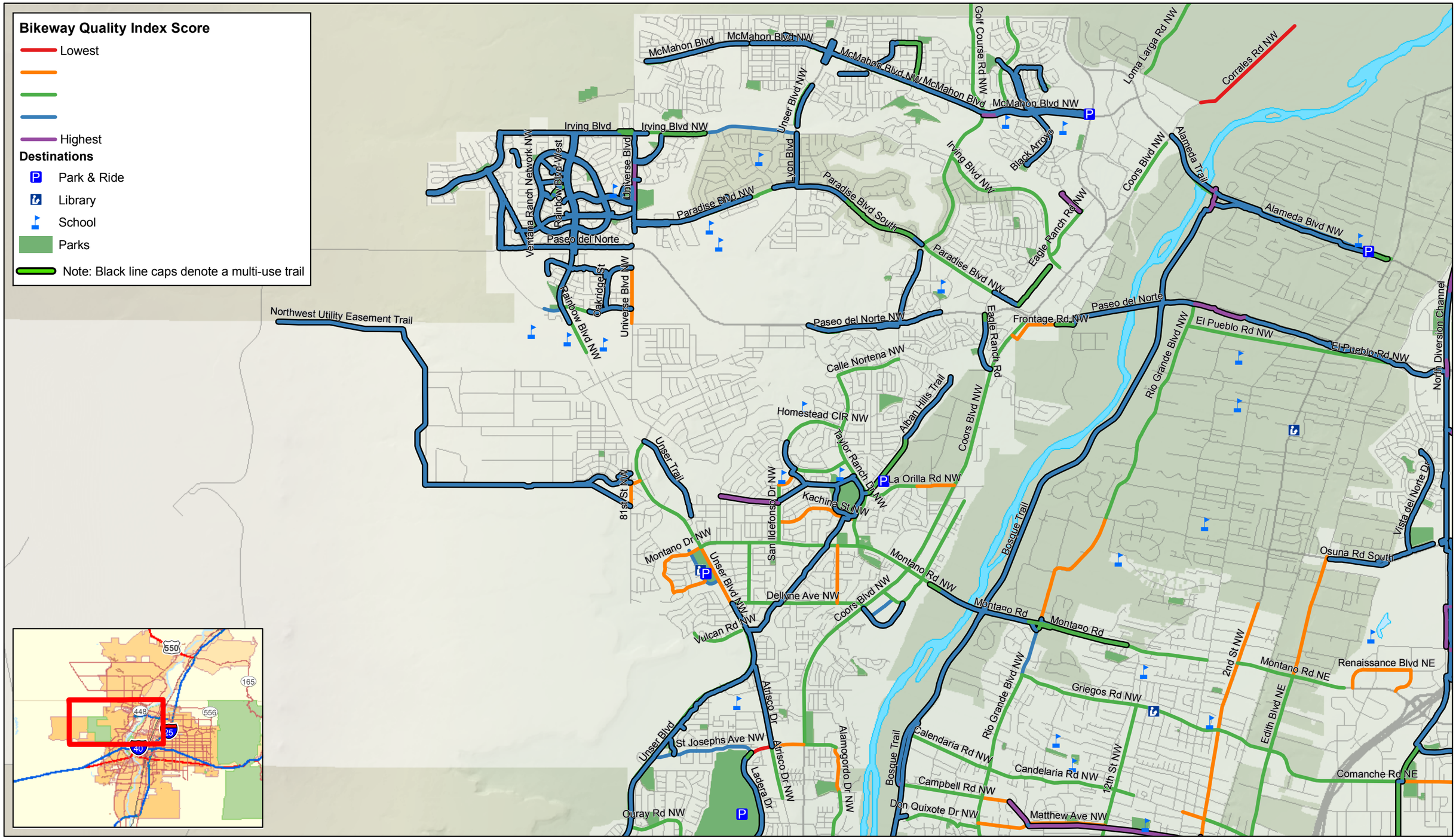



## Appendix A - Map 3. Bicycle Quality Index - Northeast Quadrant

Albuquerque Bikeways and Trails Master Plan Update

Source: City of Albuquerque, MRCOG, Gannett Fleming
Author:
Date: January 2011

0 0.5 1 Miles




## Appendix A - Map 4. Bicycle Quality Index - Northwest Quadrant

Albuquerque Bikeways and Trails Master Plan Update

Source: City of Albuquerque, MRCOG, Gannett Fleming
Author:
Date: January 2011