

Review Guide

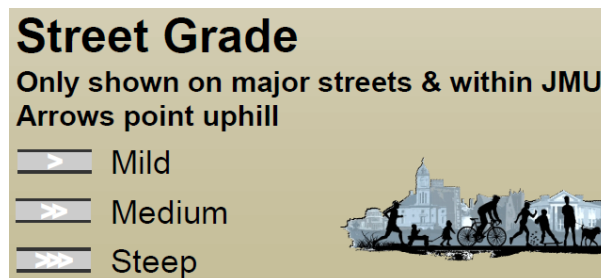
Harrisonburg Bike Map

The Harrisonburg Bike Map classifies streets by cycling comfort based on the amount of stress a bicyclist is likely to encounter given a set of characteristics, such as the number of travel lanes, vehicle speeds, presence of a right turn lane, presence of bike lanes, and the type intersection traffic control. This “cycling comfort level” designation, as seen in the excerpt of the map legend below, was determined using a methodology developed by the Mineta Transportation Institute in its paper, *Low Stress Bicycling and Network Connectivity* (<http://transweb.sjsu.edu/project/1005.html>).



The map project team chose this methodology because it takes into consideration many readily available attributes when classifying a street without requiring extensive data collection for every location, which would not be possible given personnel and time constraints. This review guide will provide you with a brief overview of the attributes used for the comfort level classification. **Please note that the project team would prefer not to deviate from the designations provided by this methodology except in rare cases when there is an element of cycling stress that was not considered.** An example of this would be in a parking lot through JMU, which adds considerable stress due to maneuvering vehicles through blind spots.

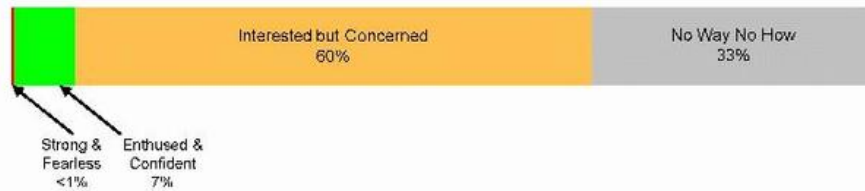
The steepness of the street grade is not a consideration in the comfort level designation. Instead, grade is indicated using map symbols as shown in the excerpt of the map legend below. Grade steepness was assigned using these approximate ranges: mild grade is 4-6%, medium grade is 6-8%, and steep grade is >8%. Note that these symbols are currently only shown within JMU and on major (arterial and collector) streets. Grade markings for local streets will be completed in the summer of 2015.



Details of the Mineta Transportation Institute classification methodology are provided on the following 3 pages. More detailed explanations can be found in the actual publication (<http://transweb.sjsu.edu/project/1005.html>).

The paper refers to “LTS”, which is the “Level of Traffic Stress” for cyclists. These designations are meant to roughly follow the scheme below developed by Roger Geller, Portland’s bicycle coordinator, which divides a population into 4 classes based on a survey of resident attitudes both in general and toward bicycle facilities available in the Portland area.

Four Types of Transportation Cyclists in Portland By Proportion of Population



The methodology used for our map adopts Geller’s classification scheme based on tolerance for traffic stress, but with the large “interested but concerned” class divided into two, one for younger riders, and one for adults. The more limited ability of children demands a greater degree of separation from traffic stress than that required by adults. Thus, ignoring the “No Way No How” segment of the population, our adopted scheme has four classes:

Cycling Comfort Level on Map	Color on Map	Level of Traffic Stress	User Category
High-Comfort Roads	Light Green	LTS 1	Least experienced, younger riders
Medium-Comfort Roads	Yellow	LTS 2	Interested but concerned adult
Low-Comfort Roads	Orange	LTS 3	Enthused and confident adult
Extremely Low-Comfort Roads	Red	LTS 4	Strong and fearless adult

Streets were segmented by block, with each block being assigned an LTS number, or comfort level. To select a comfort level, the street was first identified as having either a mixed traffic condition (no dedicated bike facility) or a dedicated bike lane condition.

With mixed traffic, the chart below was used to select the appropriate starting LTS:

Table 4. Criteria for Level of Traffic Stress in Mixed Traffic

Speed Limit	Street Width		
	2-3 lanes	4-5 lanes	6+ lanes
Up to 25 mph	LTS 1 ^a or 2 ^a	LTS 3	LTS 4
30 mph	LTS 2 ^a or 3 ^a	LTS 4	LTS 4
35+ mph	LTS 4	LTS 4	LTS 4

Note: ^a Use lower value for streets without marked centerlines or classified as residential and with fewer than 3 lanes; use higher value otherwise.

The segment LTS was then modified if there was an intersection with a right turn lane:

Table 6. Level of Traffic Stress Criteria for Mixed Traffic in the Presence of a Right-turn Lane

Configuration	Level of Traffic Stress
Single right-turn lane with length \leq 75 ft. and intersection angle and curb radius limit turning speed to 15 mph.	(no effect on LTS)
Single right-turn lane with length between 75 and 150 ft., and intersection angle and curb radius limit turning speed to 15 mph.	LTS \geq 3
Otherwise.	LTS = 4

Where there was a bike lane present, the charts below were used to select the LTS. **If a bike lane is dropped before an intersection, the segment (not the full street) was considered as being mixed traffic.** At certain low speed T-intersections, the LTS may not be affected when the bike lane is dropped because the cyclist is unable to proceed straight and must choose a turning lane.

Table 2. Criteria for Bike Lanes Alongside a Parking Lane

	LTS \geq 1	LTS \geq 2	LTS \geq 3	LTS \geq 4
Street width (through lanes per direction)	1	(no effect)	2 or more	(no effect)
Sum of bike lane and parking lane width (includes marked buffer and paved gutter)	15 ft. or more	14 or 14.5 ft. ^a	13.5 ft. or less	(no effect)
Speed limit or prevailing speed	25 mph or less	30 mph	35 mph	40 mph or more
Bike lane blockage (typically applies in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress.

^a If speed limit < 25 mph or Class = residential, then any width is acceptable for LTS 2.

Table 3. Criteria for Bike Lanes Not Alongside a Parking Lane

	LTS \geq 1	LTS \geq 2	LTS \geq 3	LTS \geq 4
Street width (through lanes per direction)	1	2, if directions are separated by a raised median	more than 2, or 2 without a separating median	(no effect)
Bike lane width (includes marked buffer and paved gutter)	6 ft. or more	5.5 ft. or less	(no effect)	(no effect)
Speed limit or prevailing speed	30 mph or less	(no effect)	35 mph	40 mph or more
Bike lane blockage (may apply in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress.

The segment LTS was then be modified if there was an intersection with a continuation of the bike lane alongside a right turn lane:

Table 5. Level of Traffic Stress Criteria for Pocket Bike Lanes

Configuration	Level of Traffic Stress
Single right-turn lane up to 150 ft. long, starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 15 mph.	LTS ≥ 2
Single right-turn lane longer than 150 ft. starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 20 mph.	LTS ≥ 3
Single right-turn lane in which the bike lane shifts to the left but the intersection angle and curb radius are such that turning speed is ≤ 15 mph.	LTS ≥ 3
Single right-turn lane with any other configuration; dual right-turn lanes; or right-turn lane along with an option (through-right) lane.	LTS = 4

Finally, the type of intersection can change the segment LTS. Intersections with traffic signals were not considered as having any negative impact on comfort level because they provide a protected crossing. Unsignalized intersections/crossings modify the LTS for the street segment based on the chart below:

Table 7. Level of Traffic Stress Criteria for Unsignalized Crossings Without a Median Refuge

Speed Limit of Street Being Crossed	Width of Street Being Crossed		
	Up to 3 lanes	4 - 5 lanes	6+ lanes
Up to 25 mph	LTS 1	LTS 2	LTS 4
30 mph	LTS 1	LTS 2	LTS 4
35 mph	LTS 2	LTS 3	LTS 4
40+	LTS 3	LTS 4	LTS 4

If you have questions about the development of the Community Bike Map, please contact Brad Reed, Harrisonburg Public Works Department at brad.reed@harrisonburgva.gov or 540.434.5928.