CITY OF MOUNTAIN VIEW

MEMORANDUM

Public Works Department

DATE: June 24, 2020

TO: Bicycle/Pedestrian Advisory Committee

FROM: Ria Hutabarat Lo, Transportation Manager

SUBJECT: **Comprehensive Modal Plan Update**

RECOMMENDATION

Receive and review the draft reports on Pedestrian Quality of Service (Attachment 1) and Bicycle Level of Traffic Stress (Attachment 2), which have been undertaken as part of the Comprehensive Modal Plan.

BACKGROUND

On June 4, 2019, the City Council authorized the City Manager to execute a contract to undertake the Comprehensive Modal Plan. The Comprehensive Modal Plan ("the Plan") was one of the projects identified to fulfill the Council Major Goal to: "develop and implement comprehensive and coordinated transportation strategies to achieve mobility, connectivity, and safety for people of all ages." The Plan aims to identify the City's primary transportation network serving all modes with a focus on major corridors and first-/last-mile connections.

In order to identify the primary transportation network, the Plan is synthesizing existing conditions and planned improvements from more than 30 different City and regional plans affecting each mode of transportation in Mountain View. This approach is outlined in Figure 1.

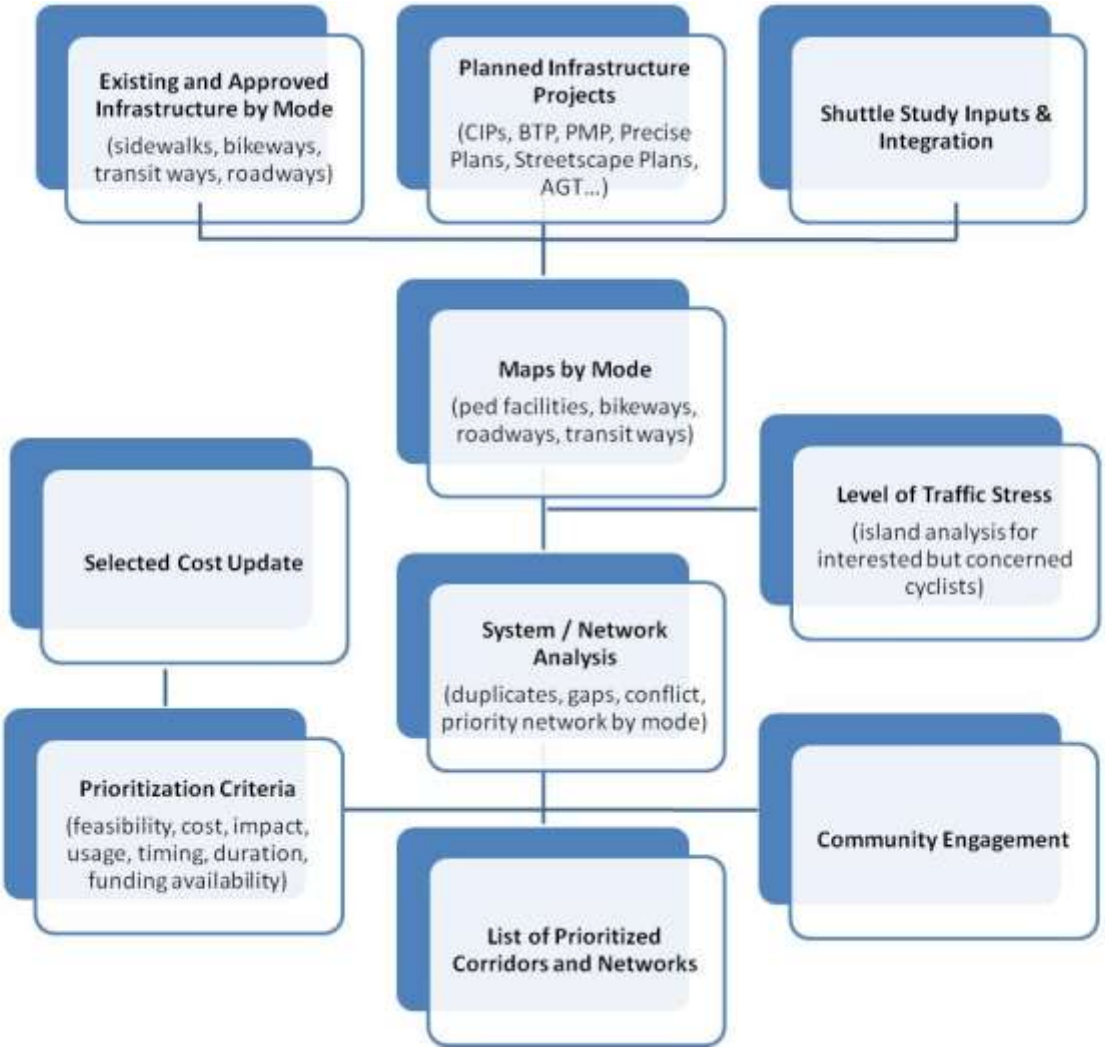

Figure 1: Project Approach

Metrics and Methodologies

The project consultants have worked with City staff to refine metrics for Citywide analysis of bicycle and pedestrian conditions.

Previous pedestrian and bicycle planning efforts in Mountain View focused on providing information on the types of network facilities that existed, but did not translate this data into information on the walkability or bikeability of different corridor segments or intersections. The resulting information is useful for understanding the City's inventory of infrastructure but does not clarify its usability by accounting for contextual factors such as traffic speed or user characteristics, such as age and ability.

For bicycle transportation, research has identified four user types: "Strong and Fearless," "Enthused and Confident," "Interested but Concerned," and "No Way No How." After replicating the initial Portland study across the 50 largest metropolitan regions in the U.S., this research suggests that the majority of the people (51 percent) are classified as "Interested but Concerned" cyclists as shown in the darkest shade on Figure 2. Effective bike network facilities, therefore, need to be usable by this key user type.

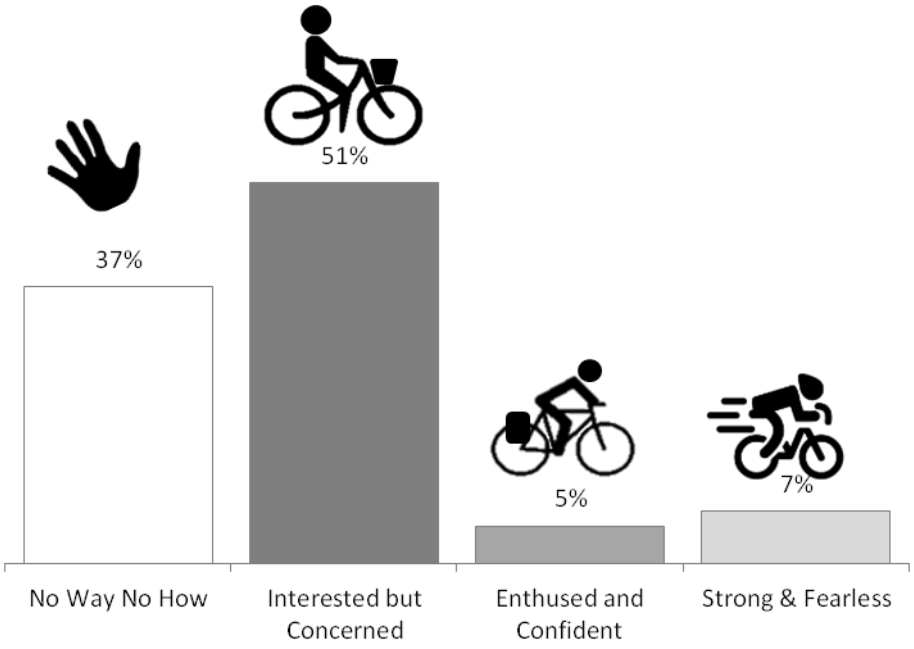

Figure 2: Types of Cyclists in 50 U.S. Metropolitan Regions[1]

All types of bike facilities are comfortable and bikeable for some users in some contexts. Traffic speed is an important contextual factor that affects bikeability. According to the National Association of City Transportation Officials (NACTO) publication on *Designing for All Ages and Abilities*, Class III Bike Boulevards are bikeable for people of all ages and abilities in contexts where the target motor vehicle speeds are less than or equal to 20 miles per hour. Above 20 miles per hour, Class II bike lanes provide more bikeable conditions for Interested but Concerned cyclists. At speeds of more than 30 miles per hour, the Mountain View Bicycle Transportation Plan recommends prioritizing Class IV protected bikeways. These approximate thresholds are displayed in Figure 3 below.

[1] Jennifer Dill and Nathan McNeil, "Revisiting the Four Types of Cyclists: Findings from a National Survey," *Transportation Research Record: Journal of the Transportation Research Board*, 2587: 90-99, 2016.

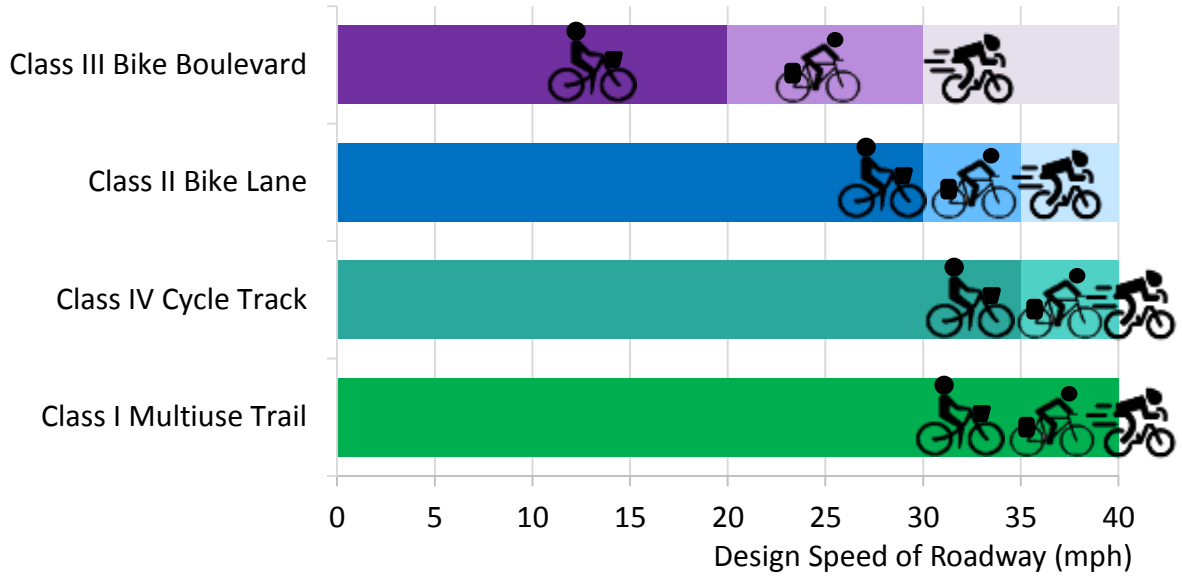

Figure 3: Approximate Thresholds of Bikeable Facilities by Speed Context and User Type (Dark=Interested but Concerned, Medium=Enthused and Confident, Light=Strong and Fearless)

In order to prioritize corridors and projects, the Comprehensive Modal Plan aims to employ multi-variable metrics to understand the effectiveness of Mountain View's transportation infrastructure for each mode of transportation, including walking and biking.

Unlike Automobile Level of Service (LOS), which has been refined, applied, and institutionalized in the United States since the 1950s, metrics for measuring walkability and bikeability are still evolving, and there is a lack of widespread agreement on the most appropriate metrics for assessing pedestrian and bicycle conditions.

In Santa Clara County, the Santa Clara Valley Transportation Authority (VTA) Transportation Impact Assessment (TIA) Guidelines[2] encourage agencies to use a Pedestrian and Bicycle Quality of Service (QOS) methodology, such as the one in the Highway Capacity Manual (HCM) 2010 (Chapter 16-18) or a similar methodology, such as those discussed in Appendix G. However, no thresholds have been established for these metrics, and they have almost never been used anywhere in the County. The VTA's own Countywide Bicycle Plan does not employ the HCM Bicycle QOS methodology, but instead uses a modified version of Bicycle Level of Traffic Stress (LTS). Also, VTA's Pedestrian Access to Transit Plan does not use the HCM Pedestrian QOS methodology, but provides information on collisions and walking rates because

[2] VTA Transportation Impact Analysis Guidelines, 2014, Page 21.
https://www.vta.org/sites/default/files/documents/VTA_TIA_Guidelines_2014_MainDocumentOnly_FINAL.pdf

they lacked sufficient information to inventory sidewalks or assess any potential quality of service measure.

There are several key concerns related to the HCM QOS methodologies suggested in the VTA TIA Guidelines:

- The HCM methodologies are prohibitively data-intensive for agencies that lack accurate, up-to-date data on the condition of every segment within their network of public rights-of-way.

- The HCM Bike QOS methodology was developed using 1990s (or earlier) studies of mostly Floridian cyclists who volunteered to ride an on-street route with various conditions. The data, therefore, reflects the average perception of "Strong and Fearless" or "Confident and Enthused" cyclists, rather than the majority of the population—i.e., "Interested but Concerned" cyclists—who may be less willing to volunteer for a bike ride involving high-stress on-street conditions.

- Given the age and location of the source data, the HCM Bike QOS methodology does not recognize the difference in quality of service associated with Class IV protected bikeways relative to Class II bike lanes, since the former infrastructure did not exist in the sample study sites.

- The HCM Pedestrian and Bicycle QOS methodologies calculate corridor QOS based on the average QOS of the constituent parts, which does not reflect the assessment of many pedestrians, bicyclists, or their caregivers (in case of children or those requiring assistance). Instead, those who make decisions about walking and biking tend to weigh challenging segments or crossings more heavily than the rest of the journey, to the point that they may reroute or even avoid the trip entirely based on the most challenging conditions.

- The HCM Pedestrian QOS does not account for land use context or regional transit connections, which research has identified as the most significant variables affecting people's propensity to walk or ability to reach destinations without a motor vehicle.

Given the above flaws, City staff and consultants agreed that different metrics would be more appropriate than those outlined in the HCM and the VTA's TIA Guidelines.

The Bicycle LTS and Pedestrian QOS metrics selected for this work are based upon research by the Mineta Transportation Institute (MTI), the Walk Score Advisory Board, and numerous other authors. They involve reasonable data inputs and reflect the

corridor geometry of walking and biking trips. They also incorporate information on land use density, land use diversity, network connectivity, sidewalk continuity, posted speed limit, and crossing distance.

The Bicycle LTS methodology used for this work represents a modified version of the Mineta methodology presented in Appendix G of the VTA TIA Guidelines. Modifications were made due to a lack of Citywide data for each street segment on parameters such as prevailing speeds. The resulting Bicycle LTS information was used to analyze connected "islands" of low-stress bicycle network facilities across the City and to visualize the network of "All Ages and Abilities" facilities. The island analysis provides insight on the bikeable range for "Interested but Concerned" cyclists starting their trip in different parts of the City.

The Pedestrian QOS methodology used for this work represents an in-house methodology that incorporates information on land use density and mix, street connectivity, sidewalk continuity, traffic speed, and street width. Contextual factors, such as land use density, diversity, street connectivity, and the presence of motor vehicles, have a significant effect on walkability and the propensity to walk, yet are missing from the HCM Pedestrian QOS and methodologies listed in the VTA TIA Guidelines.

More information on the specific methodologies for both Pedestrian QOS and Bicycle LTS is provided in attached reports (Attachments 1 and 2).

FINDINGS

Updated Interactive Bikeway Map

Data inputs to the analysis include updated GIS layers on various topics, including sidewalks and current and planned bikeways in the City. As a result of this effort, an updated interactive bikeway map has been generated and was brought to B/PAC for consideration at their February 26, 2020 meeting. The updated map is now available for use at the City's GIS portal. The interactive bikeway map is regularly used for a variety of planning efforts, and will be used as the basis for an updated printed bike map.

Pedestrian QOS

Results from the Pedestrian QOS analysis are presented in Figure 4. This figure displays the City's street network by Pedestrian QOS in addition to freeway facilities, which are shown as "inaccessible to pedestrians."

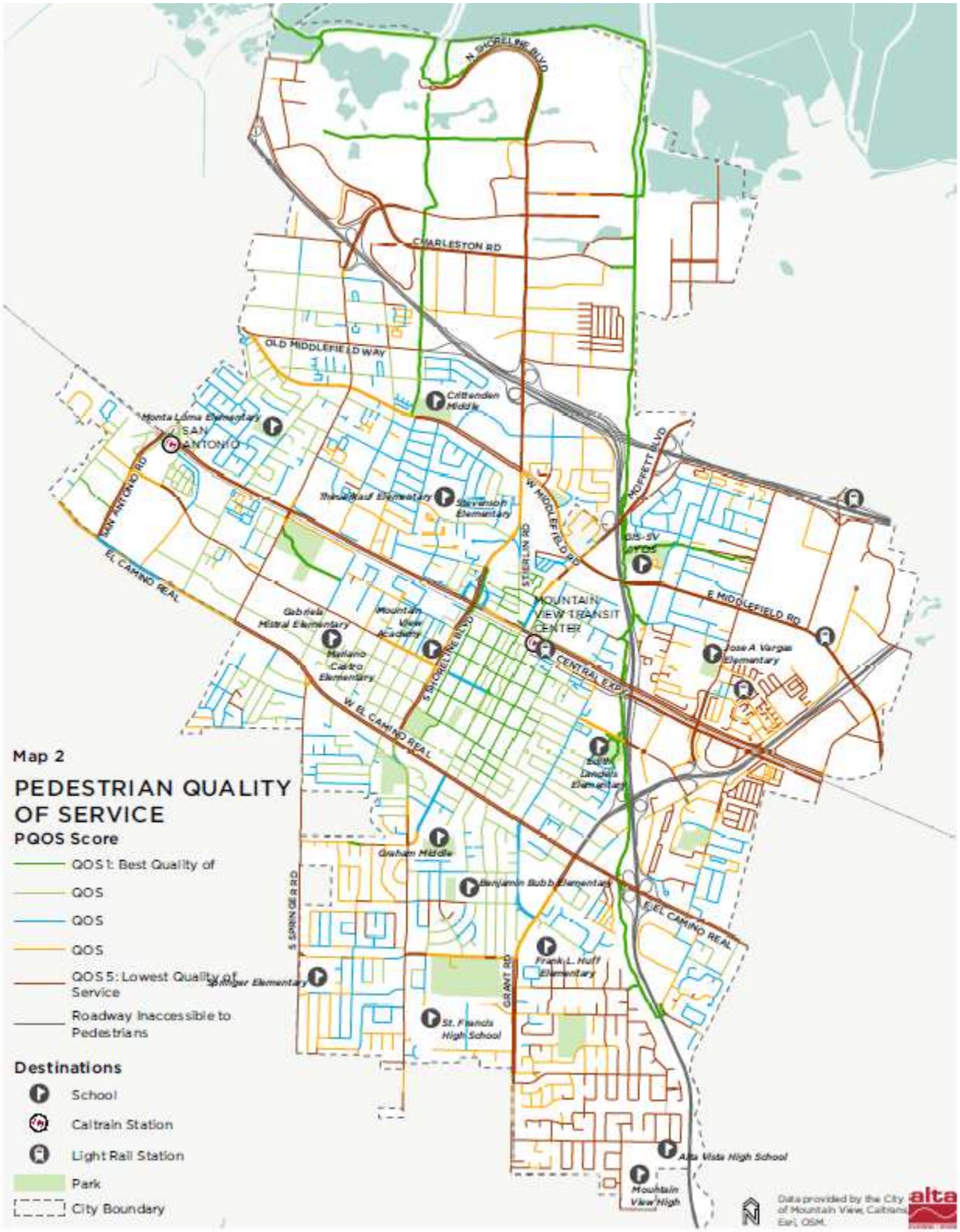

Figure 4: Citywide Pedestrian Quality of Service

Key findings that emerged from the Citywide analysis of Pedestrian QOS include the following:

- Mountain View's most walkable conditions, as measured by Pedestrian QOS, exist in the Downtown and Old Mountain View neighborhood where there are mixed land uses, higher densities, and a fine-grained grid of relatively narrow, low-speed streets;

- While the Downtown had the highest walkability, it also had the highest number of pedestrian collisions, which likely reflects a higher rate of pedestrian activity and exposure rather than safety-related conditions;

- Areas along higher-speed auto-oriented corridors, such as Central Expressway, Shoreline Boulevard, and Middlefield Road, were found to be less walkable;

- Of all the higher-speed auto-oriented corridors, El Camino Real has the highest walkability based on contextual factors such as density, land use diversity, surrounding street network connectivity before accounting for conditions of the street itself;

- Formerly industrial areas with large block sizes and/or disconnected street networks, such as North Bayshore and East Whisman, are less walkable;

- The Waverly Park residential neighborhood also had lower walkability, due to limited street connectivity and a lack of nonresidential land uses which make it difficult to reach everyday activities on foot; and

- The City's largest park, Shoreline at Mountain View, is located in an area of very low walkability, which means that the park is unlikely to be reached on foot.

Bicycle LTS

Results from the Bicycle LTS analysis in relation to the existing network are presented in Figures 5 through 7. Figure 5 provides information on Bicycle LTS for each street in the City, while Figure 6 translates these conditions into the resulting "islands" of low-stress facilities throughout the City. In Figure 6, freeways are labeled as "inaccessible to bicycles", while a lighter shade of grey is used for segments that either have higher stress conditions (LTS 3 or 4) or are within 100 feet of a higher stress intersection. Figure 7 focuses on streets with bicycle facilities and classifies those facilities into whether or not they meet the standard of "All Ages and Abilities" facilities. Attachment 2 provides similar information for planned bicycle facilities in the City.

Figure 5: Citywide Bicycle Level of Traffic Stress

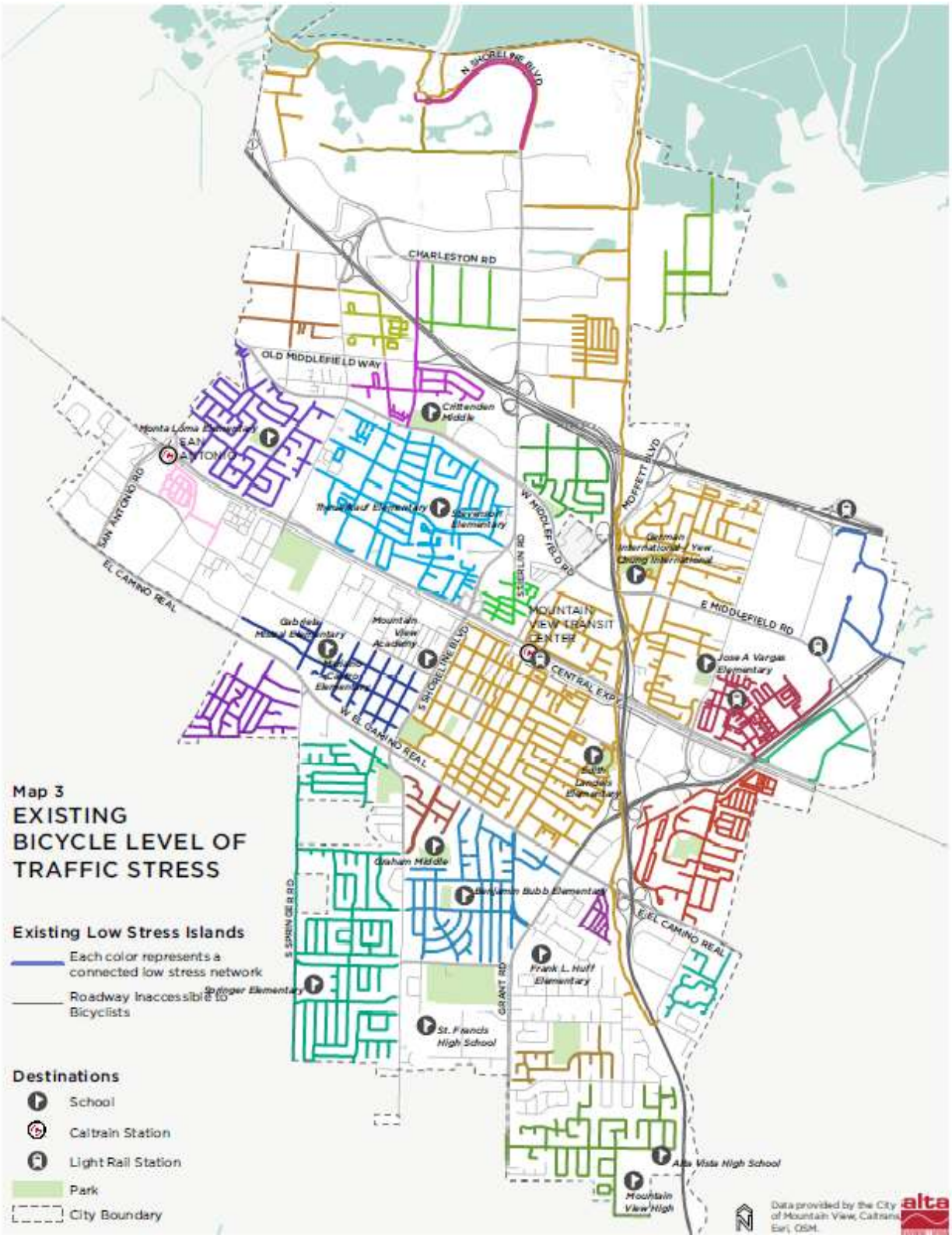

Figure 6: Citywide Low-Street Bikeable Islands

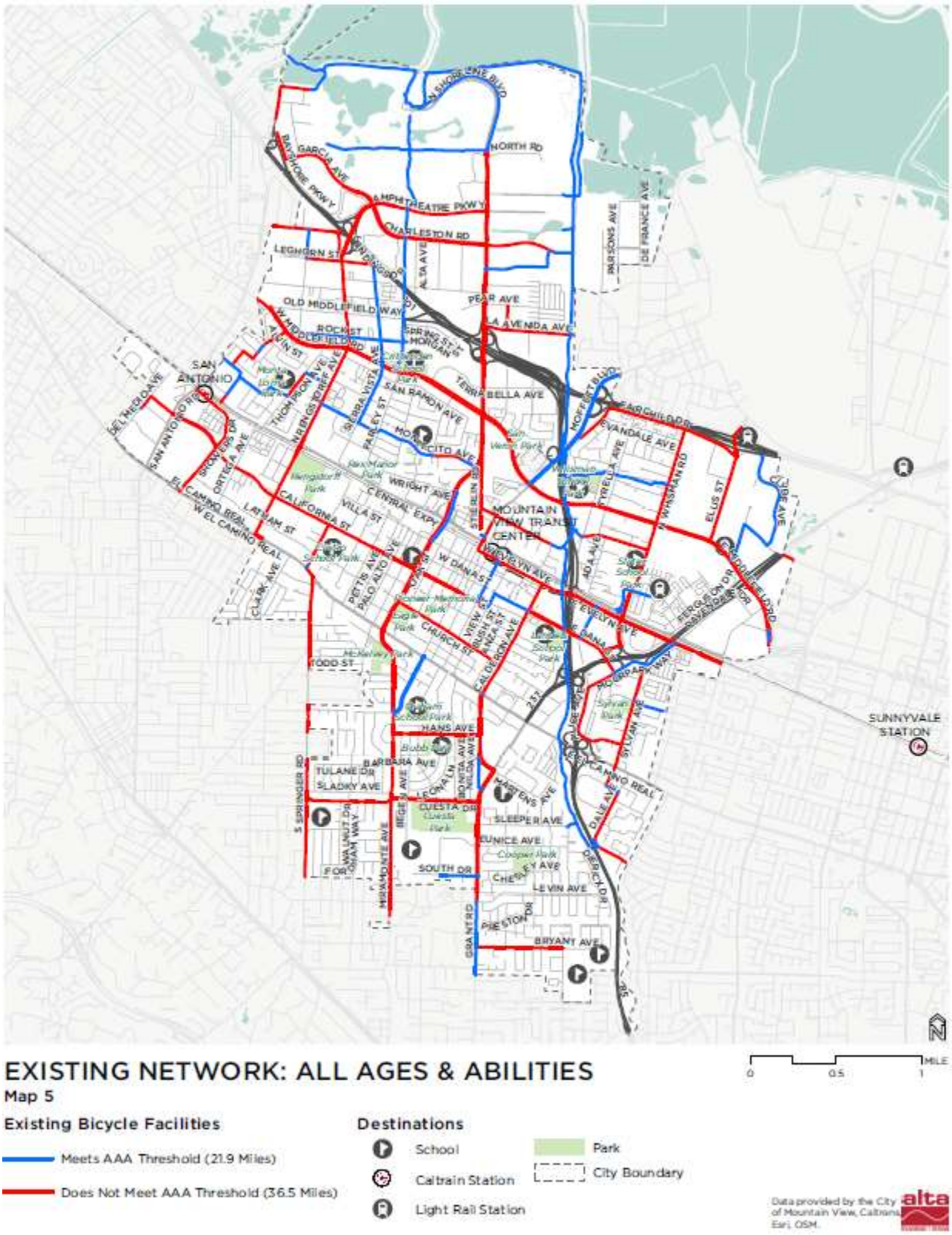

Figure 7: Citywide All Ages and Abilities Bike Facilities

Key findings from the Citywide analysis include the following:

- While the City has a network of bicycle facilities, many of these facilities do not meet the standard of an "All Ages and Abilities" network;

- For "Interested but Concerned" cyclists, Mountain View's streets and bicycle facilities currently function like an archipelago of 26 different bikeable islands that are completely separated by physical barriers or high-stress straits of auto-oriented roads;

- The City is planning for substantial bike infrastructure improvements which would reduce the number of bikeable islands from 26 small (4.9-mile) islands to 14 larger (11.3-mile) islands of low-stress bikeable range;

- Key corridors with planned improvements that benefit the creation of a connected low-stress network of bike facilities include: El Camino Real, Shoreline Boulevard, and Moffett Boulevard; and

- Key streets that hinder a connected low-stress network of bike facilities include: Miramonte Avenue/Shoreline Boulevard, Rengstorff Avenue, and Middlefield Road.

NEXT STEPS

The Pedestrian QOS and Bicycle LTS analyses will be updated using new edits to the Citywide interactive bike map. The information on both Pedestrian QOS and Bicycle LTS will then be used as part of the corridor prioritization process under the Comprehensive Modal Plan. This Plan will be used to prioritize projects listed in dozens of City plans for inclusion in future Capital Improvement Program (CIP) processed.

DISCUSSION

Staff seeks B/PAC input on the preliminary findings of this research.

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Attachments: 1. Draft Pedestrian Quality of Service Memo
2. Draft Bike Level of Traffic Stress Memo