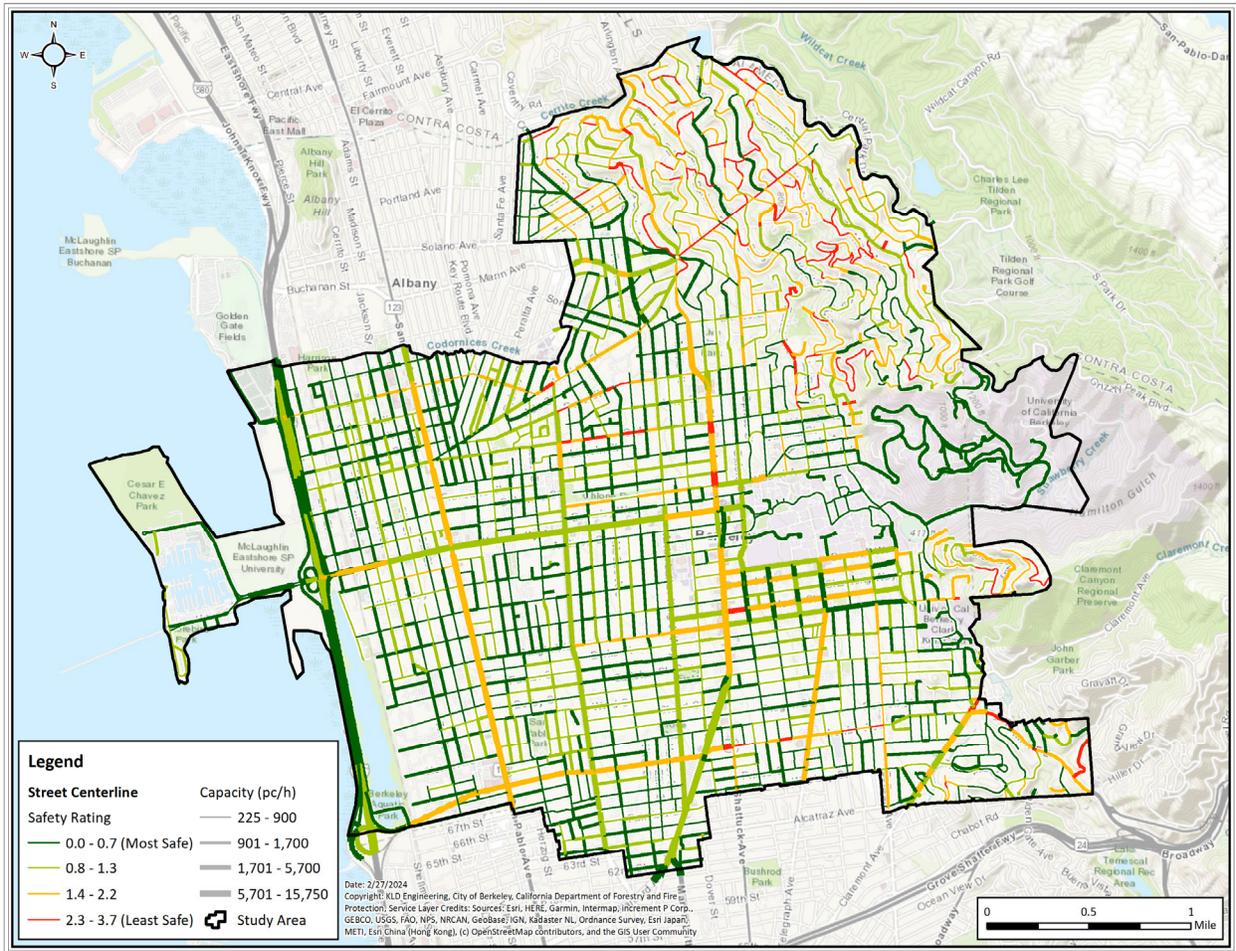*City of Berkeley, California*

Evacuation Route Safety, Capacity, and Viability Analysis

Assembly Bill 747 Requirement

Work performed for the City of Berkeley, by:

KLD Engineering, P.C.
1061 Veterans Memorial Highway, Ste 340
Islandia, NY 11749
email: rcohen@kldcompanies.com

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Introduction

Section 65302.15 of Assembly Bill (AB) 747, dated October 9, 2019, states that the safety element, as described in subdivision (g) of Section 65302, shall "identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios".

The City of Berkeley has contracted KLD Engineering, P.C. to analyze the capacity, safety, and viability of the evacuation routes within the city limits. The results of the analysis will help the City of Berkeley identify which evacuation routes are safest, have the largest capacity, and are the most viable under a variety of circumstances, as well as identify which evacuation routes may underserve the evacuating population. This report describes the data, assumptions, analysis, and results of the safety, capacity, and viability of the roadways within the City of Berkeley.

Data Sources

- The city street centerline dataset was provided by the city and is used as the basis for this analysis.
- The following datasets were utilized to analyze the safety of each evacuation route:
  - Crash data from the City of Berkeley Vision Zero high collision corridors within the city.
  - The street centerline data was provided by the city and was used to identify dead ends, narrow roads, and winding roads. In addition, the dead-end data provided by the city and those obtained from the road survey were also considered in this analysis.
  - The Pavement Conditions Index (PCI) was utilized to determine pavement quality on the roadways within the city. This data was provided by the city. Roadways with missing PCI data were supplemented with aerial imagery using data from neighboring roadways with similar characteristics/pavement conditions.
  - The International Roughness Index[1] (IRI) data from the Federal Highway Administration[2] (FHWA) was used to determine pavement quality on I-80.
  - National bridge and tunnel inventory from the Bureau of Transportation Statistics (BTS). The inventory includes information on bridge/ tunnel location, structure condition, year of construction, average daily traffic, etc.
  - Federal Emergency Management Agency's (FEMA) 100-year and 500-year flood zones[3]. The 100-year and 500-year flood zones identify areas that have a 1% and 0.2% chance of flooding, respectively, in any given year.

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[1] https://www.fhwa.dot.gov/policyinformation/pubs/hf/pl11028/chapter7.cfm#:~:text=The%20International%20Roughness%20Index%20(IRI,or%20very%20good%20ride%20quality
[2] https://geodata.bts.gov/datasets/highway-performance-monitoring-system-hpms-2020/about
[3] https://www.fema.gov/flood-maps

- o California Department of Conservation[4] earthquake zones and the United States Geological Survey (USGS) HayWired Scenario[5]. This dataset includes areas that are at risk for seismic hazards which include the following risks:
    - deep-seated landslide susceptibility based on estimates of rock strength and steepness of slopes,
    - liquefaction,
    - surface fault rupture,
    - and ground shaking.
  - o California Department of Conservation tsunami zones[4]. This dataset includes all populated areas that are at risk of tsunamis.
  - o Fire Hazard Severity Zones (FHSZ) data obtained from the City of Berkeley. FHSZ are scored based on factors that influence fire likelihood and fire behavior. Fire Zones 2 and 3 were considered at-risk in this study.
- The following datasets were utilized to analyze the viability of each evacuation route:
  - o Number and location of electric charging stations were obtained via PlugShare as referenced on the City's Electric Mobility website[6].
  - o Google Places was utilized to determine the number and location of gas stations throughout the city.
  - o Freeway ramps only exist within the city along I-80. The ramp locations are included in the street centerline data provided by the city.
- The following datasets were utilized to estimate the demand that would utilize each evacuation route:
  - o The latest census tract data from the U.S. Census Bureau.
  - o The permanent resident population is based on the 2020 U.S. Census population from the Census Bureau website extrapolated to April 2023 using annual growth rates that are computed from the 2022 Census population estimates.
  - o Data from the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) from the OnTheMap Census analysis tool is used to estimate the number of employees commuting into the city.
  - o Data for Almeda County from the Highway Performance Monitoring System[7] (HMPS) 2020 was utilized to estimate the volumes on I-80 within the city limits.
  - o Total enrollment at UC Berkeley from 2019 to 2020[8] was utilized to estimate the number of student vehicles that would evacuate from the campus.
- The following datasets were utilized to analyze the demographics[9] of the neighborhoods surrounding each evacuation route:

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[4] https://maps.conservation.ca.gov/cgs/#datalist
[5] https://earthquake.usgs.gov/education/shakingsimulations/hayward/M7.0.php#
[6] https://berkeleyca.gov/city-services/getting-around/electric-mobility
[7] https://geodata.bts.gov/datasets/highway-performance-monitoring-system-hpms-2020/about
[8] https://opa.berkeley.edu/campus-data/common-data-set
[9] The population demographics along each evacuation route can predict additional risks to people living along the route. For example, people living along evacuation routes in areas with higher rates of poverty may be at a higher risk than people living along evacuation routes in areas with lower rates of poverty due to the resources that are available to higher income people.

- o ESRI's ACS poverty status variables by census tract[10]. This dataset estimates the percentage of population with income lower than the federal poverty level at census tract level. The data is provided by the U.S. Census Bureau's ACS 2017-2021 5-year estimates.
- o ESRI's American Community Survey (ACS) vehicle availability variables by census tract[11]. This dataset shows the percentage of households without vehicles at census tract level. The data is provided by the U.S. Census Bureau's ACS 2017 – 2021 5-year estimates of household size by number of vehicles available.
- o California Department of Transportation housing and transportation affordability index[12]. This dataset measures the percentage of income devoted to housing and transportation for the regional typical household at the census tract level.
- o ESRI's ACS disability by type variables by census tract[13]. This dataset shows the percentage of the population with a disability at census tract level. The data is provided by the U.S. Census Bureau's ACS 2017-2021 5-year estimates of six different types of disability[14].

Assumptions

- Jenks Method of Natural Breaks[15] is used to develop the scaling factors, where applicable.

- Link centroids (midpoint) are used when applying factors of safety, demographics, and viability.

- For the analysis on pavement width (narrow roadways), the following assumptions were made:
  - o Parking stalls are 8 feet wide. Using the city's curb data for parking information, pavement width was reduced by 8 feet to account for roadways with street parking (or 16 feet if parking is permitted on both sides of the road).
  - o A minimum of 10 feet is necessary for large vehicles (delivery trucks, buses, etc.) to evacuate.

- For the viability analysis, the connectivity score is based on the following assumptions:

  - o The centroid (geometric center) of each Census block group was utilized as the representative trip origin.

  - o Shortest path chosen from each centroid to each exit leaving the city along a major evacuation route. (Some examples of exits leaving the city along a major

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[10] https://www.arcgis.com/home/item.html?id=0e468b75bca545ee8dc4b039cbb5aff6
[11] https://www.arcgis.com/home/item.html?id=9a9e43ec1603446880c50d4ed1df2207
[12] https://caltrans-gis.dot.ca.gov/arcgis/rest/services/CHhqcore/Economic_Opportunity/FeatureServer/0
[13] https://livingatlas-dcdev.opendata.arcgis.com/maps/esri::acs-disability-by-type-variables-boundaries/about
[14] The following disabilities are included: hearing, vision, cognitive, ambulatory, self-care, and independent living difficulties.
[15] The Natural Breaks (Jenks) identify class breaks as groups with similar values and maximize differences between classes. https://pro.arcgis.com/en/pro-app/latest/help/mapping/layer-properties/data-classification-methods.htm

evacuation route are I-80 eastbound at exit 13A/Buchanan Street and I-80 westbound at the junction with SR 13/Ashby Avenue.)

- For the viability analysis, the following assumptions were utilized to estimate the vehicular demand on a link:
  - The 2020 Census data, extrapolated to 2023, and 2020 employee estimates from OnTheMap, as well as 5-year ACS aggregate number of vehicles by block group, are used to determine the number of vehicles that are likely to use a given roadway segment.
  - Tourist vehicles are not included.
  - Employee and commuting student vehicle occupancies are assumed to be 1 employee per vehicle.
  - Public transit was not considered.
  - It was assumed that on campus students are included in the census data.
  - It was conservatively assumed that off campus students live within the City of Berkeley.
  - No reduction in commuters is considered for remote work and learning.

Analysis

Safety

There are several considerations when determining how safe a roadway is. For example, crash history can be a good indication of how well a roadway was designed. If an intersection is prone to side-impact collisions, it could be an indication of poor sight distance and, therefore, an unsafe roadway. Narrow and/or winding roadways were also considered a safety risk. These roadways can significantly impede evacuation since drivers often need to slow down to safely traverse these sections of roadway.

The safety factors were utilized to determine the overall safety of the evacuation routes within the city. Table 1 shows the safety factors, their associated scaling system (using Jenk's Law of Natural Breaks where appropriate), the weight applied (if any), and the description of each factor that was utilized in this study. Scales that ranged beyond 1 were normalized to fall between 0 and 1. **The higher the safety rating, the more unsafe a roadway segment is.** An overall safety rating was computed by summing each safety factor (multiplied by its weight, if applicable).

Figure 1 through Figure 6 show the various factors that were applied for the safety analysis and the results that were obtained.

Hazards

In addition to the roadway characteristics, roadways can be more or less unsafe than other roadways under different circumstances. For example, in rainy weather, a roadway that is in an area with a high landslide probability is likely to be more unsafe than a roadway in an area with low landslide probability. It should be noted that even if a route is exposed to one or more hazards, it may still need to be used to evacuate areas of the city. As such, the hazard factors are presented separately from the safety factors and were excluded in the overall safety rating.

Table 1 also presents the hazard factors, their associated scaling system (using Jenk's Law of Natural Breaks where appropriate), the weight applied (if any), and the description of each factor that was utilized in this study. Figure 7 through Figure 11 show the various factors that were applied for the hazard analysis and the results that were obtained.

Capacity

The ability of the road network to service vehicle demand is a major factor in determining how rapidly an evacuation can be completed. The capacity of a road is defined as the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane of roadway during a given time period under prevailing roadway, traffic and control conditions, as stated in the 2022 Highway Capacity Manual (HCM). This section discusses how the capacity of the roadway network was estimated.

For the purposes of this analysis, capacity is estimated along sections of roadway, rather than at intersections or ramp junctions. The capacity of roadway <u>sections</u>[16] is a function of roadway geometrics (e.g. number of lanes, grade, etc.), traffic composition (e.g., percent heavy trucks and buses in the traffic stream) and, of course, motorist behavior. The source material for the capacity estimates presented herein is contained in:

> 2022 Highway Capacity Manual (HCM)
> Transportation Research Board
> National Research Council
> Washington, D.C.

The evacuation route system in the city consists primarily of three categories of roads:

- Two-Lane roads: Local, State
- Multilane Highways/Roadways (at-grade)
- Freeways

Each of these classifications will be discussed. The roadway classifications, and resulting estimated capacities, are based on field observations, including number of lanes, collected during the road survey which was conducted in May 2023.

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[16] This analysis is based on computed capacity alone and does not consider the time-varying demand impact on actual capacity.

Two-Lane Roads

Ref: HCM Chapter 15

Two lane roads (one lane in each direction) comprise the majority of roadways within the city. The per-lane capacity of a two-lane roadway is based on its speed. The speeds[17] and corresponding estimated roadway capacities for two lane roads are provided in Table 2. These estimates are essentially independent of the directional distribution of traffic volume. The HCM procedures then estimate LOS and Average Travel Speed.

Based on the field survey, aerial imagery, and on expected traffic operations associated with evacuation scenarios:

- Most sections of two-lane roads within the study area are classified as "Class I", with "level terrain"; some are "rolling terrain".
- "Class II" highways/roadways are mostly those within urban and suburban centers.

Multilane Roadways

Ref: HCM Chapter 12

Exhibit 12-8 of the HCM presents a set of curves that indicate a per-lane capacity ranging from approximately 1,900 to 2,300 pc/h, for free-speeds of 45 to 70 mph, respectively. Based on observation and estimation, the multilane roadways within the city service traffic with free-speeds in this range. Once again, for purposes of this analysis on multilane roadways, the actual time-varying speeds, the demand and capacity relationship, and the impact of control at intersections are ignored due to their dynamic nature. A conservative estimate of per-lane capacity of 1,900 pc/h is adopted for this study for multilane roadways within the city.

Freeways

Ref: HCM Chapters 10, 12, 13, 14

Chapter 12 of the HCM presents procedures for estimating capacity and LOS for "Basic Freeway Segments". Exhibit 12-37 of the HCM presents capacity vs. free speed estimates, which are provided below.

Free Speed (mph):	55	60	65	70+
Per-Lane Capacity (pc/h):	2,250	2,300	2,350	2,400

The inputs to the estimation of capacity are roadway geometrics and free-speeds. A conservative estimate of per-lane capacity of 2,250 pc/h is adopted for this study for freeways.

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[17] Free flow speeds and number of lanes, as driven during the road survey in May 2023, were utilized to compute capacity. The impact of traffic control devices on free flow speeds is considered for two lane roadways within the City.

Chapter 13 of the HCM presents procedures for estimating capacity, speed, density and LOS for freeway weaving sections. Chapter 14 of the HCM presents procedures for estimating capacities of ramps and of "merge" areas. There are three significant factors to the determination of capacity of a ramp-freeway junction: The capacity of the freeway immediately downstream of an on-ramp or immediately upstream of an off-ramp; the capacity of the ramp roadway; and the maximum flow rate entering the ramp influence area. In most cases, the freeway capacity is the controlling factor. Values of this merge area capacity are presented in Exhibit 14-10 of the HCM and depend on the number of freeway lanes and on the freeway free speed. Ramp capacity is presented in Exhibit 14-12 and is a function of the ramp's free flow speed. Concepts in these chapters are utilized to estimate the capacity of freeway ramps within the city.

Viability

Viability is defined as the ability to function adequately. It is also defined as the ability to succeed or be sustained. As such, the viability of an evacuation route can be defined in several different ways. The following scores have been developed for this study to assess the viability of the roadways within the city. Table 3 presents each of the viability scores, their scales, and their descriptions.

Connectivity score: How well does a roadway connect you to an area of refuge or nearby city? Roadways that directly connect evacuees to places of safety are more *connected* and are considered more viable than roadways that do not. To determine how well connected each roadway is, ArcGIS's network analyst was utilized to find the shortest path from each trip origin (Census block centroid) to each trip destination (city exit along a major evacuation route). Once each route was computed from each origin (O) to each destination (D), the routes were spatially joined with each roadway link to determine the total number of origin-destination paths that traversed each segment. Roadway segments with more paths are more connected, and more viable, than roadway segments with less paths.

Accessibility score: How accessible is a roadway to evacuees? A freeway usually has a very high capacity and great connectivity, but if the ramps that give access to the freeway are 10 miles apart, it may not be the most viable evacuation route. For this reason, the number of connections, or intersections/ramp junctions, was considered in the accessibility score. To determine the number of connections or intersections for each route, the number of other links (roadway segments) that are connected to each link was computed. Nodes were created at the intersections of links. A spatial join was done to count the number of links that connect each node. Finally, a spatial join was conducted to assign the total number of connected links from connected nodes to their corresponding links. In addition, aerial imagery was used to verify the link and node connection. For ramps, if a roadway is a ramp or has a ramp connection, it was assigned a value of 5 for appropriate weight in the accessibility score. The accessibility score is the sum of the number of ramps and the number of connected links. The more intersections/connections/ramps a roadway has, the higher the accessibility score and the more viable the roadway is considered.

Service score: Does the roadway have the necessary commodities or services to sustain evacuees, like gas stations and/or electric charging stations? Roadways that have these types of commodities facilitate evacuation and, therefore, are more viable evacuation routes than roadways that do not have these types of commodities.

ArcGIS's network analyst was utilized to determine how far a roadway was from a service (gas or charging) station. For example, a roadway with a gas station score of 2 and a charging station score of 4 is a 2 minute drive from the nearest gas station and a 4 minute drive from the nearest charging station. The service rating is the sum of these two values.

Congestion score: A good way to measure the viability of an evacuation route is to determine if the population demand (residents, employees, students, and pass through traffic) that is expected to utilize the route will exceed the estimated capacity. For example, can the route service the demand in an evacuation, or will it operate below capacity and have bottlenecks and operational constraints?

The best way to answer these questions is with a traffic simulation model that uses algorithms to simulate real traffic behavior under a variety of circumstances. Currently, the City of Berkeley is conducting an evacuation time estimate (ETE) study to compute how long it would take to evacuate the city under different temporal and spatial conditions. This study utilizes a traffic simulation model. As part of this work effort, the congestion during evacuation conditions along each evacuation route can be assessed. This project is still ongoing, and as a result, the results of the project cannot be utilized to assess the congestion score, or viability, of the evacuation routes within the city at this time.

In the meantime, the evacuating vehicular demand can be estimated based on trip origins and this demand can be compared to the capacity[18] of the roadway segments within the vicinity of each origin.

The evacuating vehicular demand for each route was computed from Census data (population data extrapolated to 2023 and employment data from LEHD) in the proximity of the route. Resident and employee datapoints (converted to vehicles using assumed occupancies) within a quarter mile buffer of the roadway segment were assigned to each roadway segment as the vehicular demand to be serviced. In addition, pass through traffic along I-80 was estimated from annual average daily traffic counts collected by the US Department of Transportation along I-80.

This demand can fluctuate depending on the time of year, day of week, and time of day. For this reason, a minimum and maximum demand was estimated using scenario percentages for varying temporal conditions. For example, employees within the city peak between 9am and 5pm on weekdays and only about 10% of employees may be present on weekends and in the evening. It should be noted that the minimum demand represents when UC Berkeley is not in session; the maximum demand represents when UC Berkeley is in session.

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[18] As computed in the *Capacity* section of this report.

Since vehicles will load onto the roadway network over time, rather than all at once, the mobilization distribution[19] was computed from an online demographic survey of residents and employees/commuting students within the City of Berkeley. Figure 12 shows the mobilization curve that was utilized. The maximum demand (volume) was computed for each roadway segment based on the highest hourly mobilization percentage (57% for residents [between 45 minutes and 1 hour and 45 minutes after the order to evacuate] and 100% for employees and commuting students [in the first hour]).

The volume was then divided by the total roadway capacity to compute the volume-to-capacity (v/c) ratio for each roadway segment. The v/c ratio was utilized as the congestion score for the maximum and minimum demand, the higher the congestion score, the lower the viability.

Vulnerability

Although not specifically a roadway safety, capacity or viability consideration, the demographics of the neighborhoods that surround the roadway could be indicative of areas that are more vulnerable and may face challenges when evacuating. For example, areas with less vehicle availability are likely to require public transit and may face more challenges than those areas with enough vehicles to sufficiently evacuate the household in a personal vehicle. These factors were considered separately from the safety, capacity or viability factors but were included in this analysis for a complete picture. The vulnerability factors and their scaling system (using Jenk's Law of Natural Breaks where appropriate), the weight applied (if any), and their description are included in Table 4. **The higher the vulnerability rating, the greater vulnerability of the population living along a roadway segment.** An overall vulnerability rating was computed by summing each factor (multiplied by its weight, if applicable).

through show the various factors that were applied for the vulnerability analysis and the results that were obtained.

Results

Appendix A provides a summary (sorted by street name[20]) of the average[21] overall safety rating, capacity, viability score and vulnerability rating by roadway name. Each of the various components and factors that were utilized to compute the safety, capacity, and viability of each roadway segment, as well as the overall safety, capacity, and viability scores of each roadway segment, were provided to the City in electronic format.

While the safety, capacity, viability, and vulnerability varies somewhat within individual street segments on a particular roadway, the following evacuation routes have the highest capacity, are relatively safe, and are the most viable across the entire length of the roadway, see Figure 17:

- University Ave

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[19] The notification distribution was assumed over a 30-minute period due to the presence of wireless emergency alerts within the city and based on survey responses.
[20] The City's naming conventions within the centerline dataset were adopted with minimal changes.
[21] Each value shown is the average of all roadway segments that share that street name.

- Adeline St
- Ashby Ave (SR13)
- Cedar St
- Interstate 80 (I-80)
- San Pablo Ave (SR 123)
- Sacramento St
- Claremont Ave
- Marin Ave

Safety

Each of the safety risk scores were summed (with specified weights, if necessary) to obtain an overall safety rating for each roadway segment. Those roadway segments that have the highest overall score are the most unsafe roadway segments. Those with lower scores are safer. Figure 18 shows the overall evacuation safety ratings for each of the roadway segments within the city. Jenk's Law of Natural Breaks was used to develop the 4 thresholds of overall safety. Those roadways with the highest safety score (2.3 - 3.7) are shown in red and represent the roadways with the highest exposure to traffic fatalities, narrowest width, tightest turns, steepest slopes, poorest pavement condition and/or are located above or below a bridge or tunnel. The least safe roadways are within the hills and along Panoramic Way. These roadways are extremely narrow, winding, and steep. Many of the roadways within the flats, including San Pablo Ave, have poor or very poor pavement conditions, giving them a higher *unsafe* rating. The safest roadways are Frontage Rd, University Ave, and Adeline St.

Hazards

Each of the hazard risk scores were summed (with specified weights, if necessary) to obtain an overall hazard rating for each roadway segment. Those roadway segments that have the highest overall score have the highest exposure to flooding, landslides, earthquakes, tsunamis, wildfires. Those with lower scores are less exposed. Figure 19 shows the overall hazard ratings for each of the roadway segments within the city. The safest roadways are in central Berkeley between San Pablo Ave and the foothills of the mountains, including Hopkins St, Shattuck Ave, Adeline St, as well as parts of Cedar St, University Ave, and Ashby Ave. Roadways west of San Pablo Ave are exposed to water related hazards like flooding and tsunamis. Roadways in the mountains are exposed to fires, landslides, and more severe ground shaking.

Capacity

Figure 20 shows the capacity of each roadway segment within the City of Berkeley based on the field observations collected in May 2023, including the number of moving lanes on each roadway. I-80 has the highest capacity, followed by multilane major arterials like San Pablo Ave, University Ave, Shattuck Ave/Adeline St, Sacramento St, Telegraph Ave, and Claremont Ave. The vast majority of roadways within the city are single-lane collectors with a free flow speed of 45mph or less and a capacity of approximately 1,700 passenger cars per hour or less. In the hills, free flow speeds are 20 mph or less and capacities are 900 passenger cars per hour or less.

Viability

Figure 21 displays the connectivity score for the roadways within the city. In the figure, thicker roadways provide more origin-destination connections than thinner roadways and are, therefore, more connected. The most connected roadways are Sacramento St, Ashby Ave (SR 13), Martin Luther King Jr Way, Monterey Ave, Piedmont Ave (in Oakland), and Marin Ave. University Ave, Dwight Way and Cedar St are very connected as well.

Figure 22 displays the results of the accessibility score. Most of the roadways between I-80 and San Pablo Ave, South Berkeley, parts of central and north Berkeley, and I-80 are very accessible. Berkeley Hills and the eastern part of the city are not very accessible since they have limited connections to major roadways and very limited connections to the east of the city due to the mountainous terrain. Some of the most accessible roadways are I-80, Marin Ave, Shattuck Ave/Adeline St, and University Ave.

Figure 23 displays the results of the service score. Roadways west of San Pablo Ave, in the vicinity of University Ave, and in the vicinity of Shattuck Ave and Adeline St have the highest scores due to the density of gas and electric charging stations along these roadways.

Figure 24 and Figure 25 display the congestion scores[22] (v/c) for the maximum and minimum estimated effective demand during an evacuation event (respectively) converted to Level-of-Service (LOS), which is a term used to describe the operating conditions of a roadway. The LOS shown in these figures is based on the Highway Capacity Manual (HCM) rounded to the nearest tenth. As shown in these figures, during an evacuation, many of the roadways within the city will operate at LOS F and experience significant congestion. In both cases, the major arterials, like San Pablo Ave (SR 123), Sacramento St, University Ave, Adeline St, Ashby Ave (SR13), and Claremont Ave can better service the evacuating demand than the smaller, local streets within the heart of the city. As such, these roadways are more viable evacuation routes. During the case with minimal demand, and less pass-through traffic on I-80 (at night, for example), I-80 becomes one of the most viable evacuation routes as shown in Figure 25.

Vulnerability

Each of the vulnerability risk scores were summed (with specified weights, if necessary) to obtain an overall vulnerability rating for each roadway segment. Those roadway segments that have the highest overall score are the areas that could potentially have the most difficulty and/or challenges evacuating. Those with lower scores are less likely to have difficulty and/or challenges evacuating. Figure 26 shows the overall vulnerability ratings for each of the roadway segments within the city. Jenk's Law of Natural Breaks was used to develop the 4 thresholds of overall vulnerability. Those roadways with the highest vulnerability score (2.8 – 3.8) are shown in red and represent the roadways that are within areas with the most poverty, the least amount of income spent on transportation, the lowest vehicle availability and the highest population with disabilities.

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[22] It should be noted that this methodology treats the evacuation of the city in a vacuum ignoring possible, simultaneous evacuation in areas adjacent to the city.

Table 1. Safety and Hazard Factors

Factor	Scale	Description
	Safety Factors	
Collisions	0 - No	The City of Berkeley Vision Zero collisions data was utilized to determine corridors with high collision rates. This data was spatially joined with the roadway segments to identify which roadways had the most, or any, collisions. Roadways with more collisions may be indicative of poor roadway design. Those roadways with high collision rates were assigned a value of 1; those corridors that did not have high collision rates were assigned a value of 0. See Figure 1.
	1 - Yes	
Pavement Width	0 – Not Constrained	The city centerline dataset was utilized to determine which roadways were narrow/constrained (with a travel lane of less than 10 feet wide[23]). Roadways that were considered not constrained (less than 10 feet wide) were assigned a value of 0. Those roadways which are considered constrained (meet or exceed 10 feet wide[24]) were assigned a value of 1. See Figure 2.
	1 – Constrained	
Curvature	0 – greater than or equaled to 81 feet	The curvature of the roadway was calculated based on its geometry. The radius of the circumscribed circle of three sequential points was computed and assigned to the midpoint of those three points. The roadway segment between two points was assigned the average of the two radii of the points in which it connects. A threshold of 81 feet[25] was selected as the minimum radius. See Figure 3.
	1 – less than 81 feet	
Slope	0.0 – 2.3	The slope of the roadway was also considered. Slopes are represented as a percentage (rise/run x 100). Roadways with steep slopes can be more dangerous than roadways with shallow slopes. As such, larger slopes were assigned a higher value than smaller slopes. A weight of 0.33 is applied to this factor to normalize the results between 0 and 1. See Figure 4.
	2.4 – 7.0	
	7.1 – 15.2	
	15.3 – 37.1	

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[23] Based on discussions with staff from the City's Public Works and Fire Departments, a viable evacuation travel lane width of 10 feet was chosen to account for larger vehicles (8 feet wide) and sideview mirrors. It is assumed that even larger vehicles (10 feet wide) are operated by professional drivers with a higher degree of skill to reduce or eliminate driver error.

[24] Pavement width was utilized (with modifications made for side street parking). Eight feet of parking was removed from the pavement width for single side street parking and 16 feet was removed for street parking on both sides of the road. Eight feet was used since the typical width for a standard parking space is 8 feet. Although a width of 7.5 feet has been used to provide a balance among users, eight feet was used as vehicles are not always parked well, may not be parked in contact with the face of the curb or vegetation, and throughout the day, large vehicles may be parked on the side of the street. Overhanging vegetation was not accounted for.

[25] Table 3-7 of the 2018 AASHTO Policy on Geometric Design of Highways and Streets indicates the minimum radii for a curve with a design speed of 20mph is 81 feet. Based on the data collected during the road survey, the speed travelled on these curves was 20mph or less.

Factor	Scale	Description
Pavement Quality	0 – Very Good	Roadways with poor pavement quality can be more unsafe than roadways with good pavement quality. As such, the quality of the pavement was also considered in the safety analysis. Pavement quality was rated as unpaved, poor, fair/acceptable, and good. Unpaved and poorly rated roadways were rated higher than fair and good rated roadways. A weight of 0.33 is applied to this factor to normalize the results between 0 and 1. See Figure 5.
	1 - Good	
	2 - Poor	
	3 – Very Poor	
Bridges and Tunnels	0 - No	Bridges and tunnels are at risk of collapsing, making the roadways that traverse under or over them unsafe. The roadway segments that contained a bridge or tunnel were given a factor one 1. The remaining roadway segments were assigned a value of 0. Since all bridges (5) and tunnels (1) within the city are currently rated as 'fair', this factor was given a weight of 0.5. See Figure 6.
	1 - Yes	
Hazard Factors (excluded from overall safety rating)		
FEMA 100-Year and 500-Year Flood Hazard Areas	0 - not within a flood zone	The data depicts the FEMA 100-year and 500-year flood risk zones for Alameda County. The 100-year flood plain is the area with a 1% chance of flooding in any given year, while the 500-year flood plain is the area with a 0.2% chance of flooding in any given year. Roadways within a 100-year flood plain are at a higher risk, and are more unsafe, than roadways within a 500-year flood plain. It should be noted that none of the roadways within the city are within the 100-year flood zone. See Figure 7.
	0.2 - 500-year flood zone	
	1 - 100-year flood zone	
Landslide Hazard Areas	0 – 0.04 – Very low or none	The statewide landslide inventory shows many of the landslides mapped by CGS and others over the past 50 years. The database focuses on deep-seated landslides. Rock strength and slope are combined to create classes of landslide susceptibility. These classes express the generalization that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weaker rocks. Higher rates of landslide susceptibility include very steep slopes in hard rocks, and moderate to very steep slopes in weak rocks. Roadways with medium or high landslide susceptibility are less safe than roadways with low or very low (or no) landslide susceptibility. See Figure 8.
	0.05 – 0.12 - Low	
	0.13 – 0.22 - Medium	
	0.23 – 0.34 - High	

Factor	Scale	Description
Earthquake Hazard Risk	0.67 - Severe	HAZUS[26] results of an earthquake scenario on the Hayward Fault. These results include impacts due to ground shaking, landslide, and liquefaction. The results are measured in Modified Mercalli Intensity (MMI) which is composed of twelve levels that increase from imperceptible shaking to catastrophic destruction. The MMI rating is divided by 12 to scale the results from 0 to 1. The entire city falls either in severe (8) or violent (9) ground shaking. See Figure 9.
	0.75 - Violent	
Tsunami Hazard Areas	0 - No	The Tsunami hazard areas are developed for all populated areas at risk to tsunamis in California and represent a combination of the maximum considered tsunamis for each area. "No" indicates the roadway is not within a tsunami hazard area. "Yes" indicates the roadway is within a tsunami hazard area. See Figure 10.
	1 - Yes	
Fire Hazard Severity Zone	0 – Zone 1	FHSZ are scored based on factors that influence fire likelihood and fire behavior. Fire Zones 2 and 3 were considered at-risk in this study. Roadways that were not within Zones 2 or 3 are assigned a value of 0. Roadways within Zone 2 are assigned a value of 0.5 and those roadways within Zone 3 are assigned a value of 1. See Figure 11.
	0.5 – Zone 2	
	1 – Zone 3	

Table 2. Capacity for Two Lane Roads

Speed (mph)	Capacity (pc/h)
5	225
10	450
15	675
20	900
25	1,125
30	1,350
35	1,575
40+	1,700

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[26] Hazards US software developed by the Federal Emergency Management Agency (FEMA).

Table 3. Viability Scores

Score	Scale	Description
Connectivity	1 - 187	Roadways that directly connect evacuees to places of safety are more connected and are considered more viable than roadways that do not. The scale of this score is based on the number of origin-destination connections that are made.
	188 – 519	
	520 – 1,023	
	1,024+	
Accessibility	0 - 3	The more intersections/connections/ramps a roadway has, the higher the accessibility score and the more viable the roadway is considered. Ramps were assigned a value of 5 for weighting purposes.
	4 - 5	
	6 - 7	
	8 - 11	
Service	2 - 4	Roadways that have gas stations and/or charging stations readily accessible help evacuees maintain their evacuation and, therefore, are more viable evacuation routes than roadways that do not have these types of commodities. The scores represent the sum of the driving time to the nearest gas station and charging station. Roadways that are furthest from a gas or charging station have a higher score and are less viable.
	5 - 8	
	9 - 12	
	13 - 17	
Congestion	LOS A (0 – 0.1)	The congestion score compares the demand (volume) against the capacity to see how the roadways will operate under evacuation conditions. This metric is called the v/c ratio. The Highway Capacity Manual provides an equivalent Level-of-Service (LOS) that ranges from A (free flow conditions) to F (bumper to bumper traffic) based on the characteristics of the roadway. This concept was used to develop general thresholds for the congestion score, rather than Jenk's Law of Natural Breaks.
	LOS B (0.1 – 0.2)	
	LOS C (0.2 – 0.4)	
	LOS D (0.4 – 0.6)	
	LOS E (0.6 – 0.95)	
	LOS F (0.95+)	

Table 4. Vulnerability Factors

Factor	Scale	Description
Poverty	Low (0.6% - 7.9%)	The poverty data estimates the percentage of population with income lower than the federal poverty level at the census tract level. The data is provided by the U.S. Census Bureau's American Community Survey (ACS) 2017-2021 5-year estimates. Areas with high percentages of poverty are more likely to have evacuation challenges and, therefore, have a higher vulnerability rating. See Figure 13.
	Medium (8.0% - 15.3%)	
	High (15.4% - 26.9%)	
	Very High (27.0% - 64.3%)	
Housing and Transportation Income	Low (0.0%)	The H+T income indicator measures the percentage of income devoted to housing plus (+) transportation for the regional typical household at the census tract level. The latest data (as of 2017) for this indicator were collected directly from the Housing and Transportation Costs (H+T) Index webpage. Areas with higher H+T have dedicated a higher percent of their income to housing and transportation and are not likely to have evacuation difficulties. As such, areas with low H+T percentages have a higher vulnerability rating. See Figure 14.
	Medium (0.1% - 45.0%)	
	High (45.1% - 58.0%)	
	Very High (58.1% - 76.0%)	
Vehicle Availability	Low (0.0% - 5.1%)	The data shows the percentage of households with no vehicles at the census tract level. The data is provided by the U.S. Census Bureau's ACS 2017-2021 5-year estimates of household size by number of vehicles available. These individuals are more likely to depend on public transit or need transportation assistance in an evacuation. As such, areas with high percentages of households with no vehicles are assigned a higher vulnerability rating than those with lower percentages. See Figure 15.
	Medium (5.2% - 14.0%)	
	High (14.1% - 25.5%)	
	Very High (25.6% - 71.0%)	
Population with Disabilities	Low (3.8% - 7.8%)	The data shows the percentage of population with a disability at the census tract level. The data is provided by the U.S. Census Bureau's ACS 2017-2021 5-year estimates of six different types of disability (hearing, vision, cognitive, ambulatory, self-care, and independent living difficulties). Individuals with disabilities are more likely to have difficulty evacuating. Areas with higher populations with disabilities are given a higher vulnerability rating. Since this factor has such low scaling, a weight of 2 was applied to this factor. See Figure 16.
	Medium (7.9% - 9.6%)	
	High (9.7% - 14.6%)	
	Very High (14.7% - 18.7%)	

Figure 1. Collision Factor
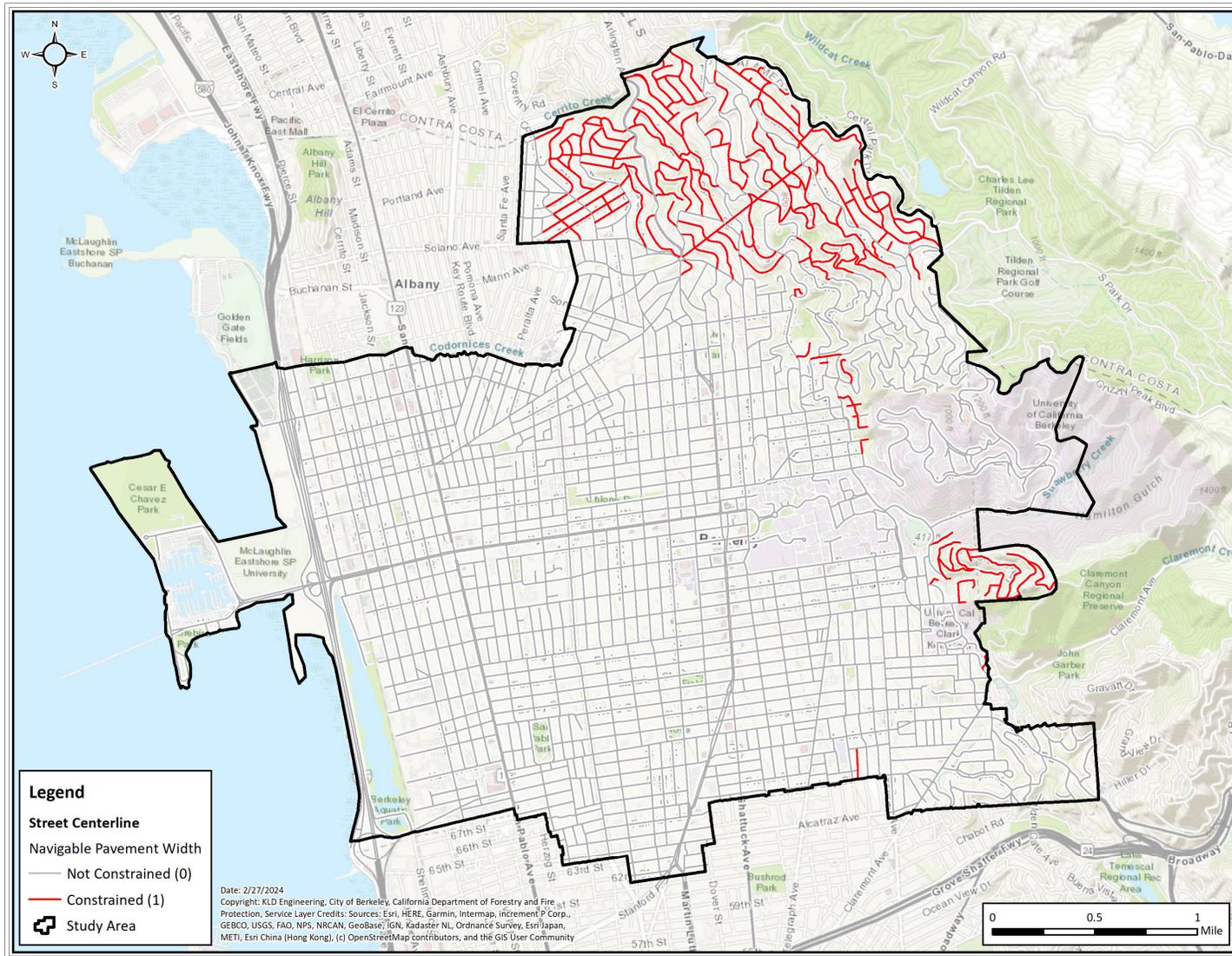
Figure 2. Navigable Pavement Width
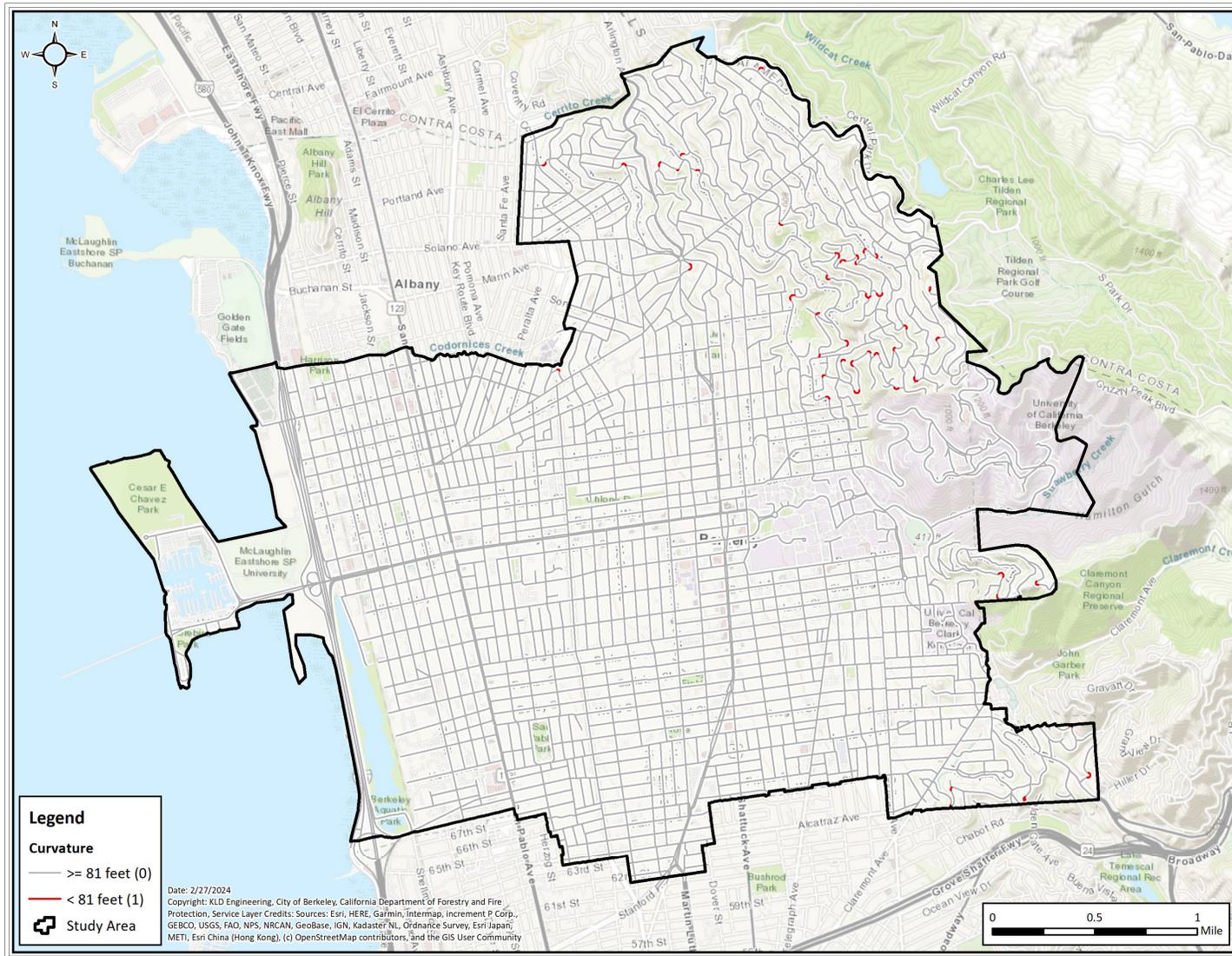
Figure 3. Roadway Curvature
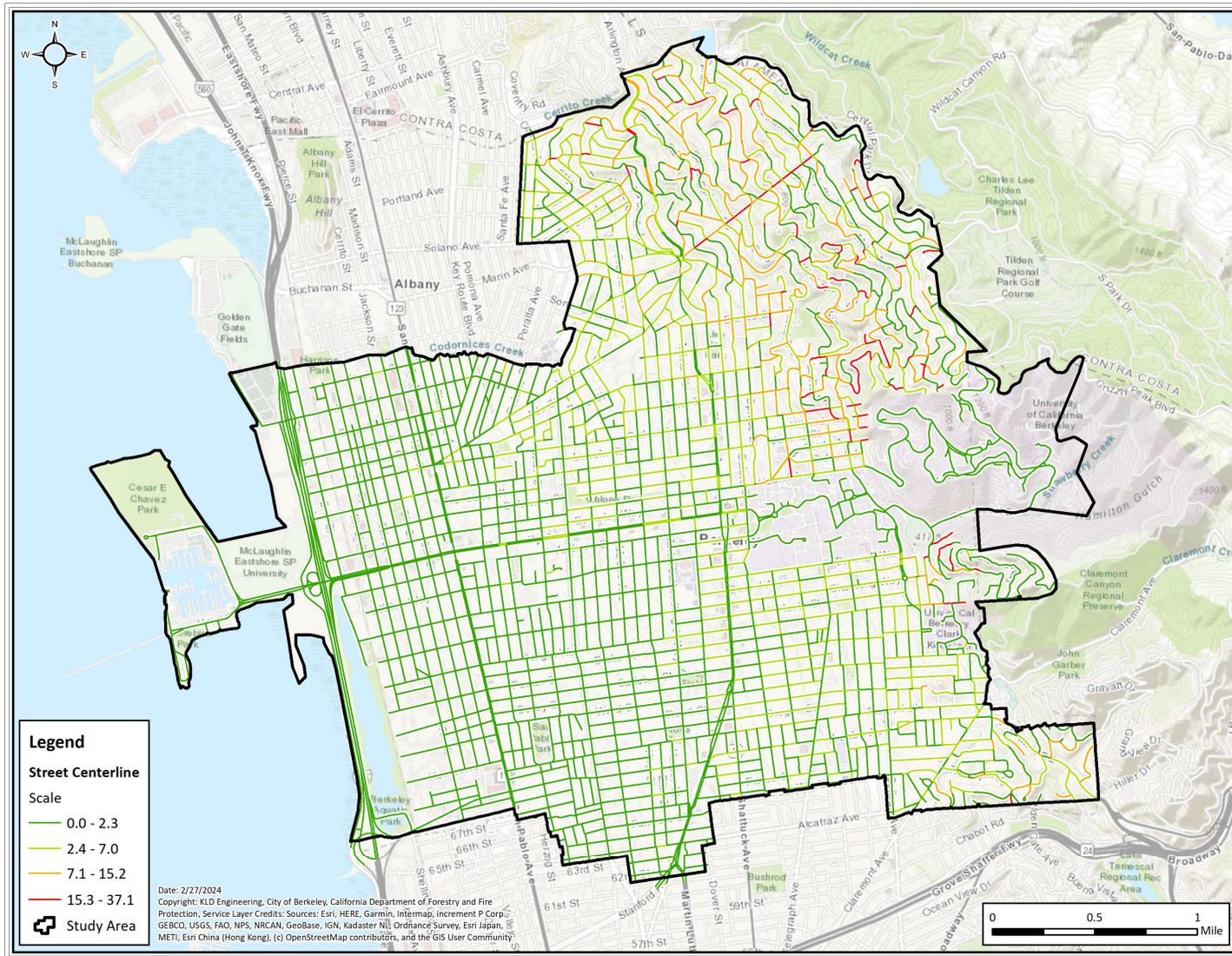
Figure 4. Roadway Slope
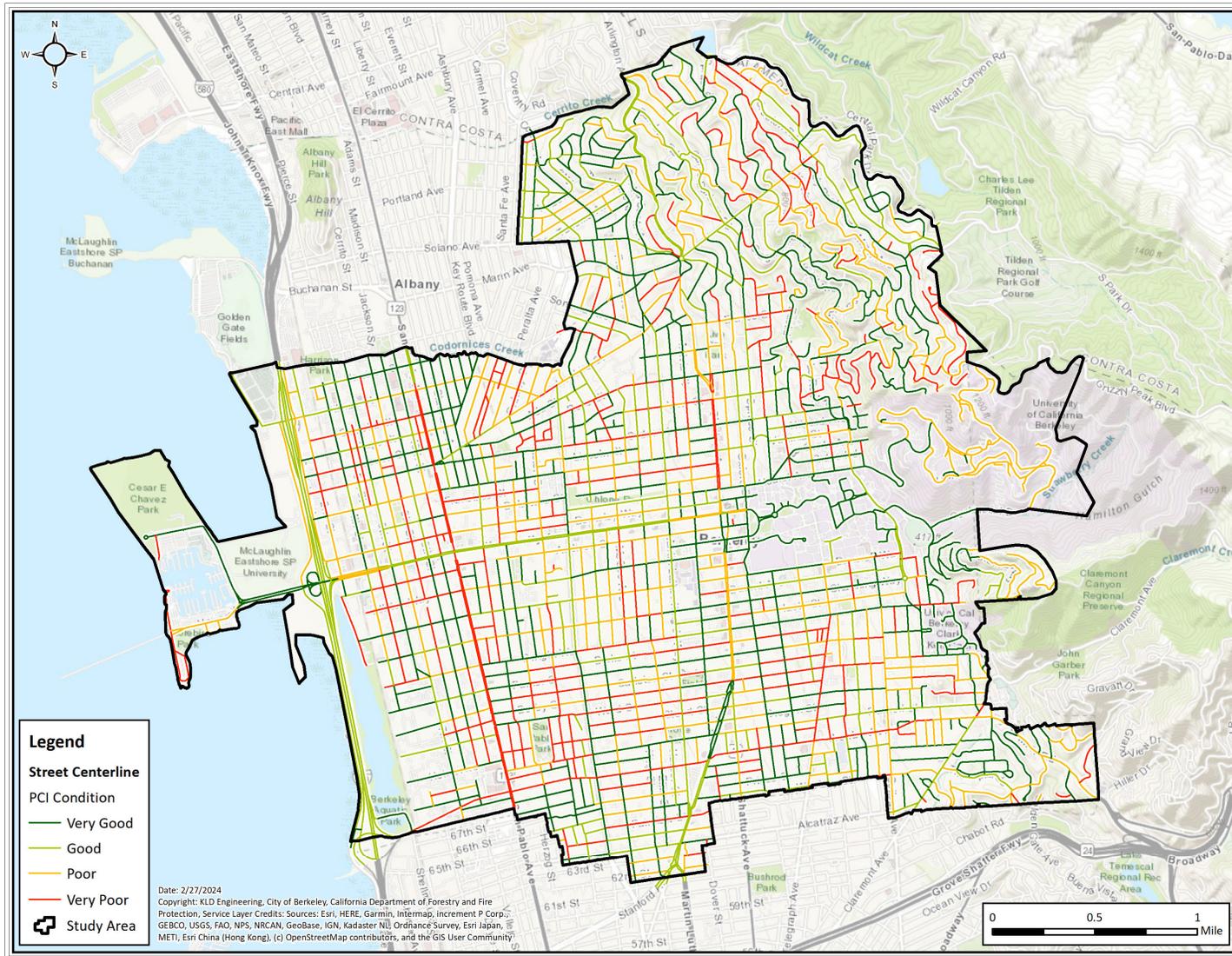
Figure 5. Pavement Condition Index
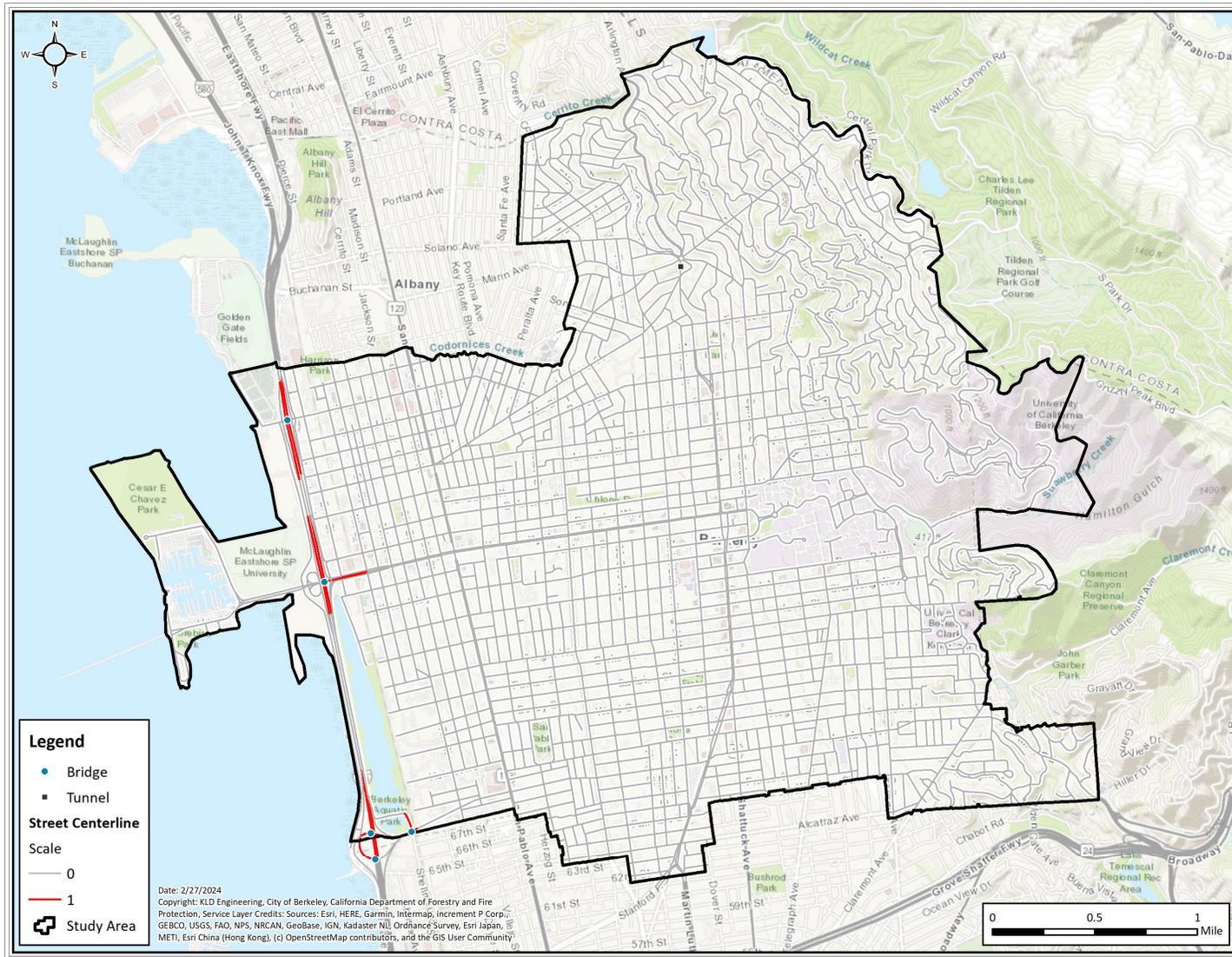
Figure 6. Bridges and Tunnels
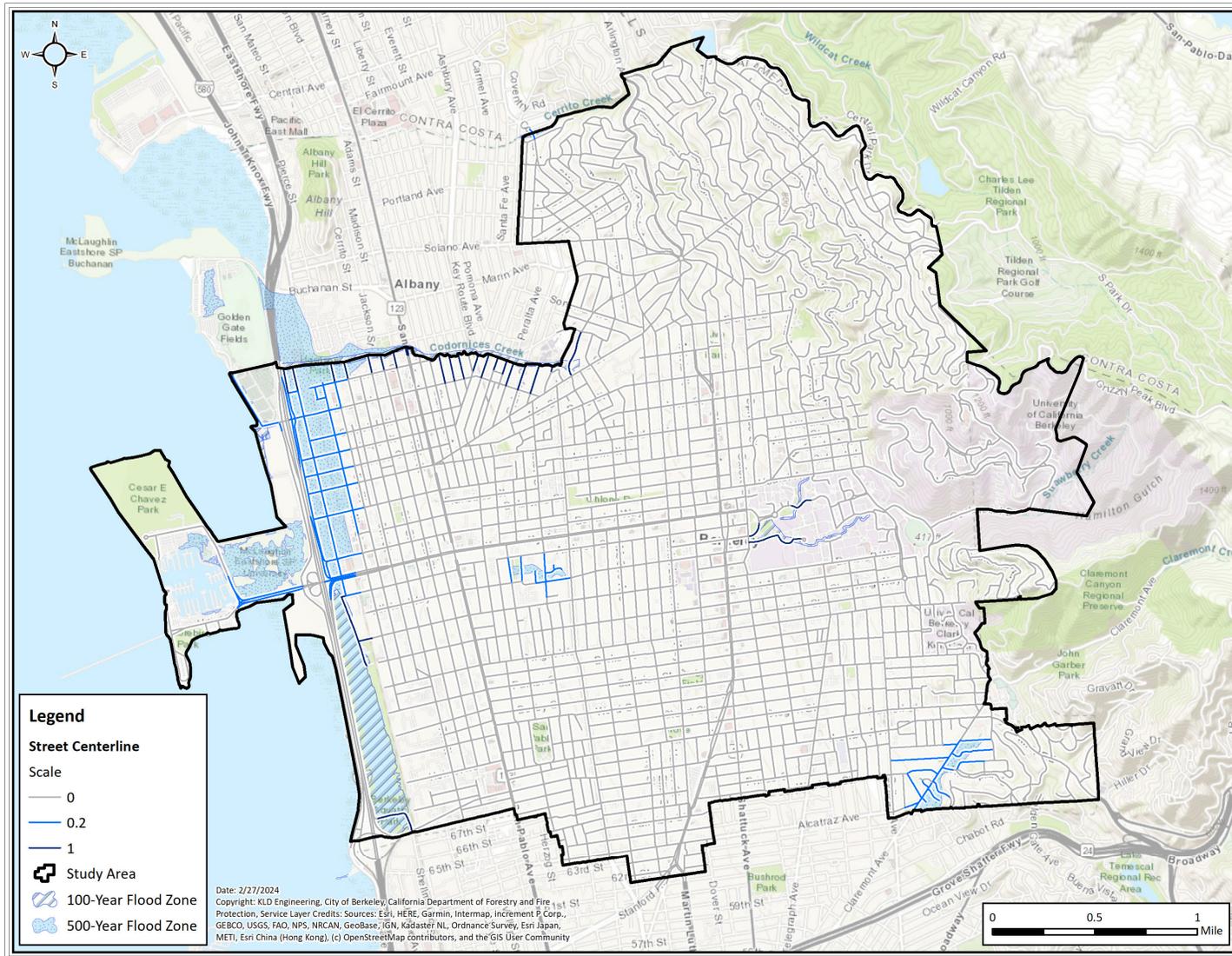
Figure 7. Flood Hazard Areas
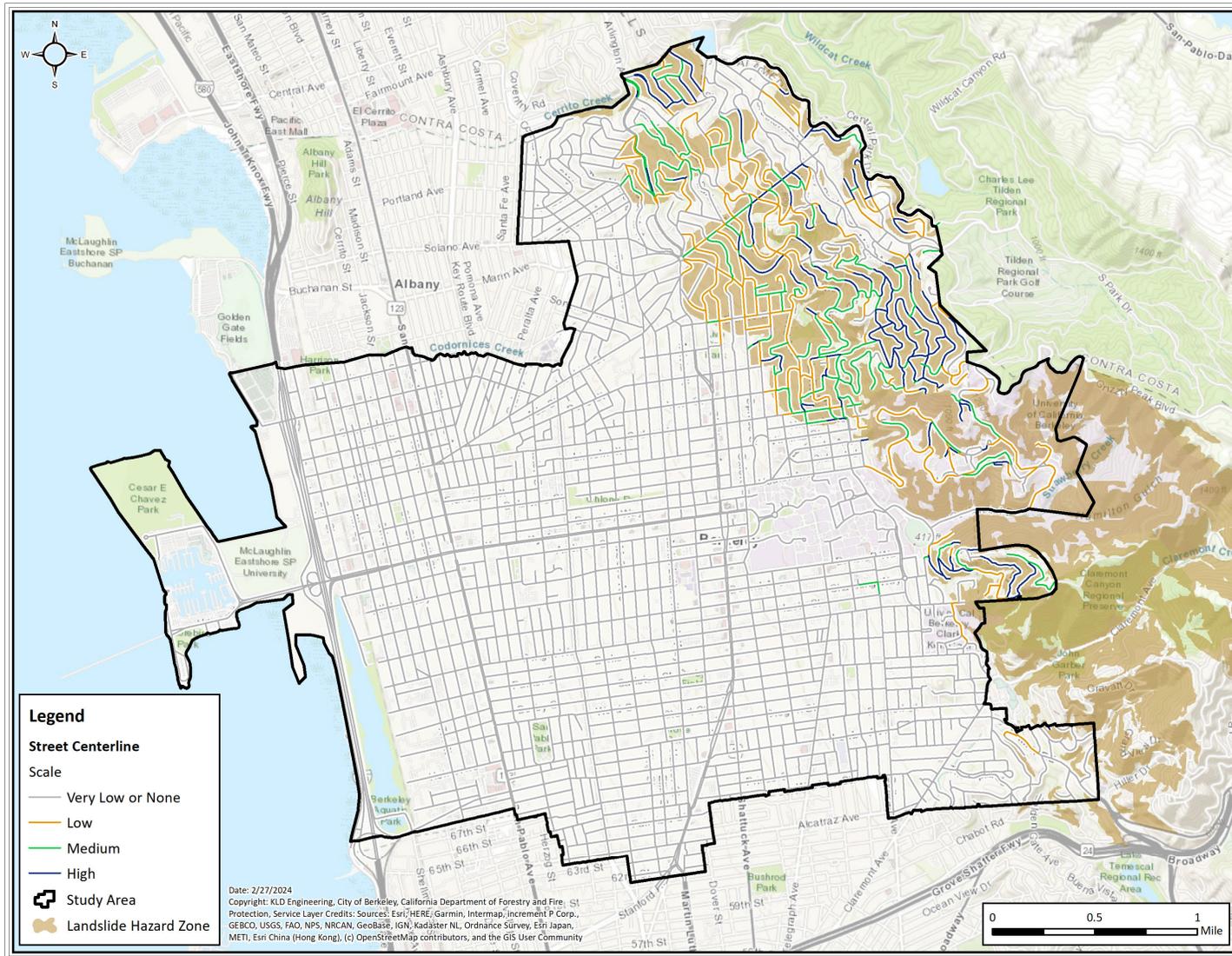
Figure 8. Landslide Hazard Areas
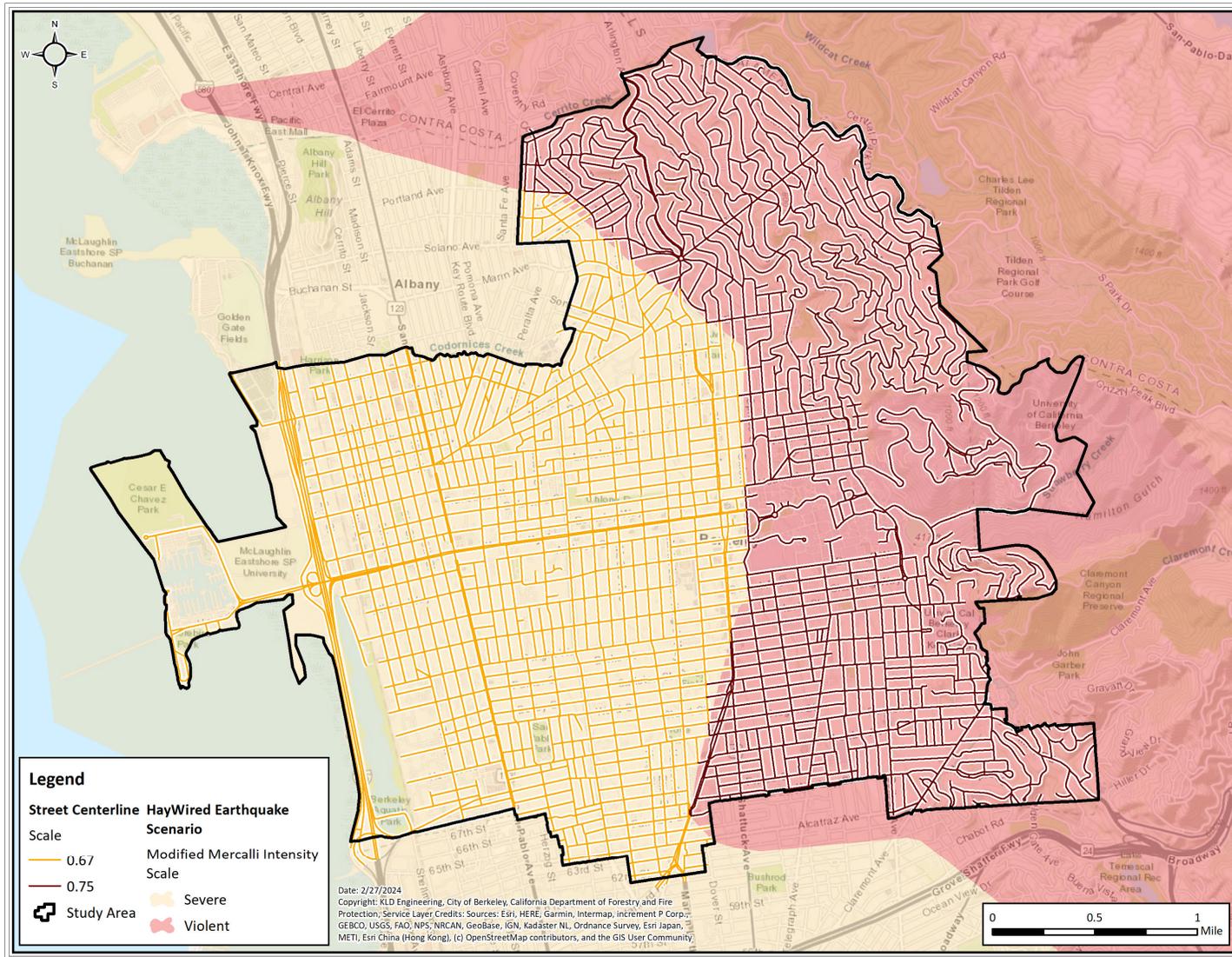
Figure 9. Earthquake ShakeMap
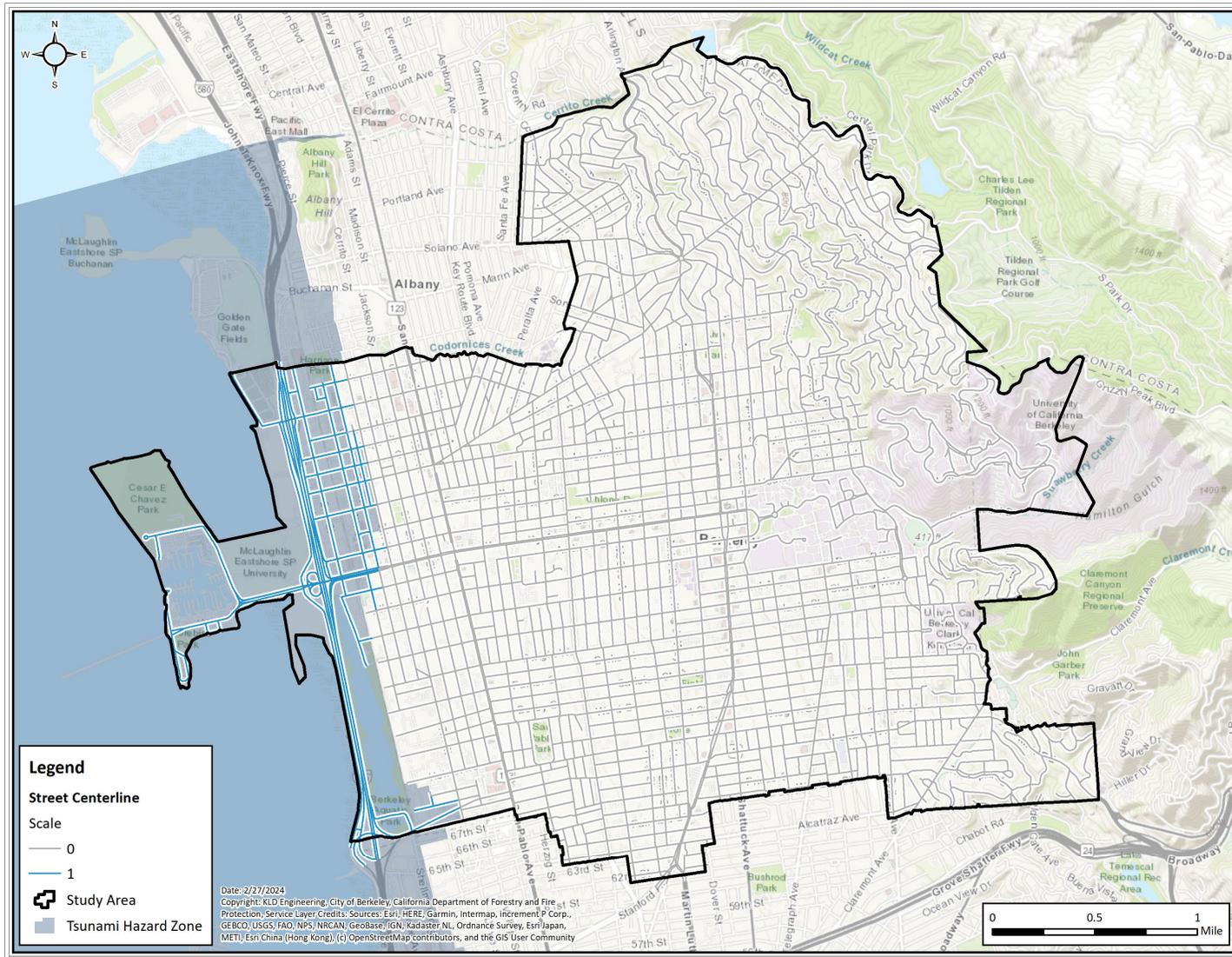
Figure 10. Tsunami Hazard Zone
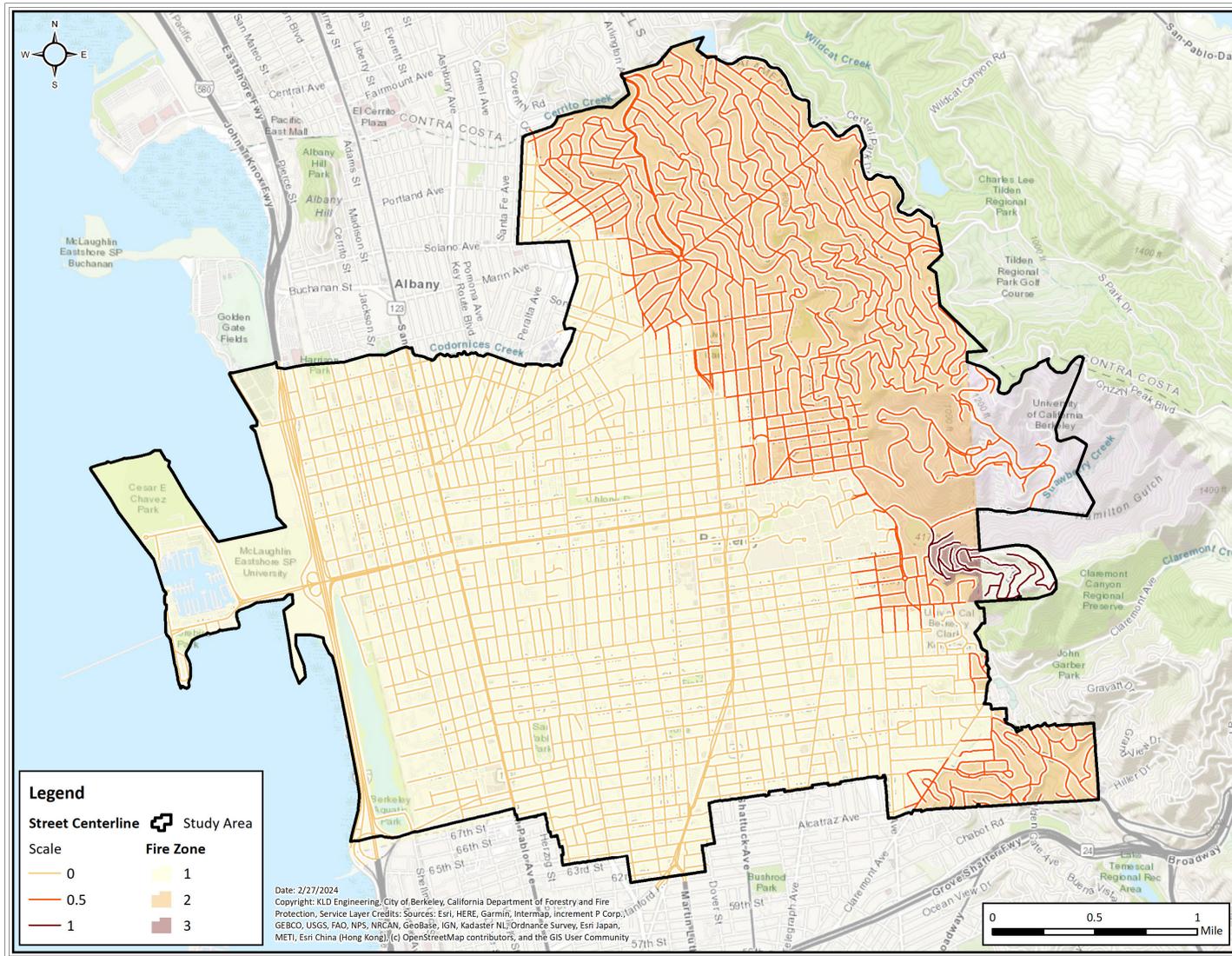
Figure 11. Fire Hazard Severity Zones
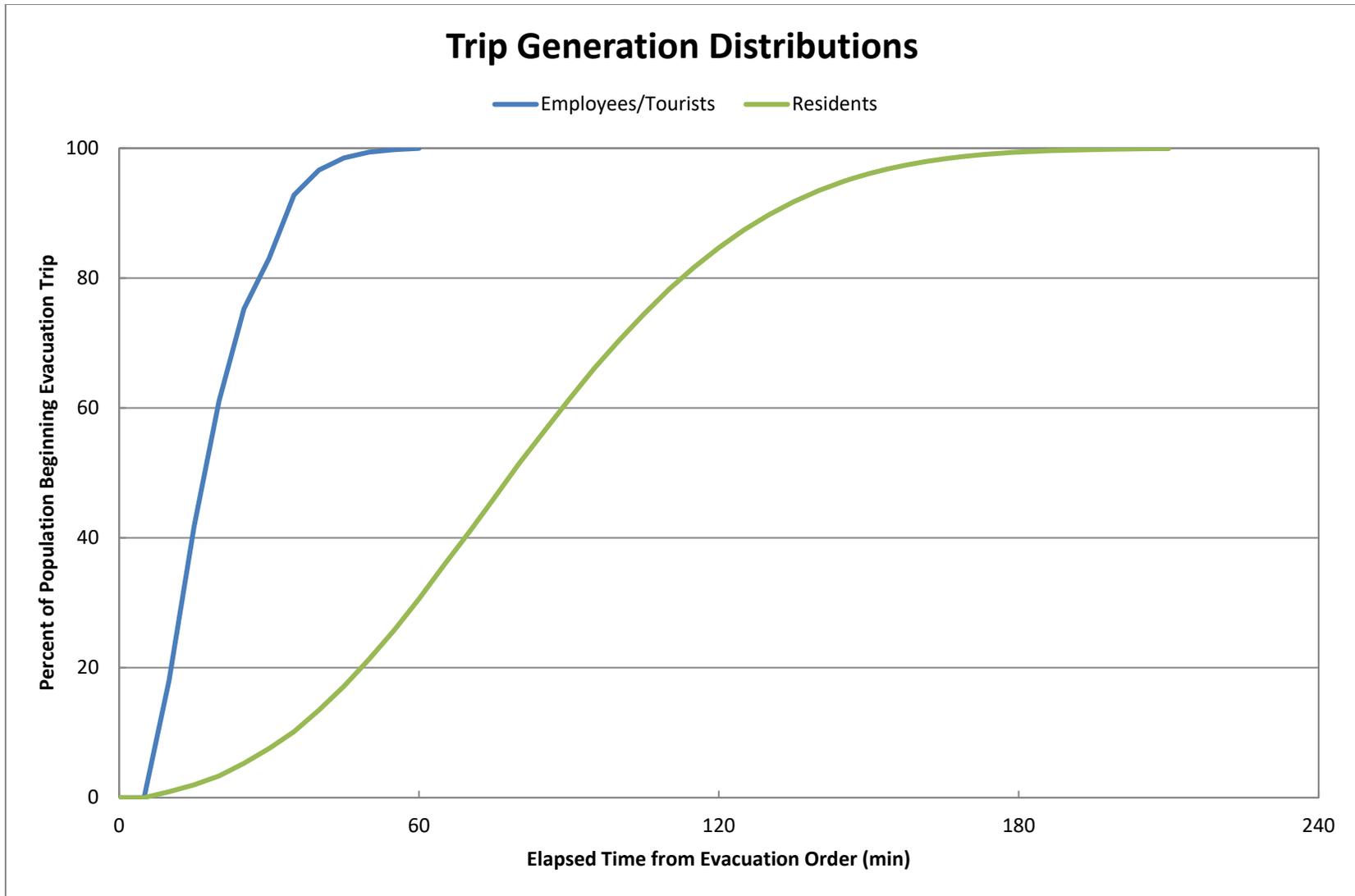
Figure 12. Mobilization Times
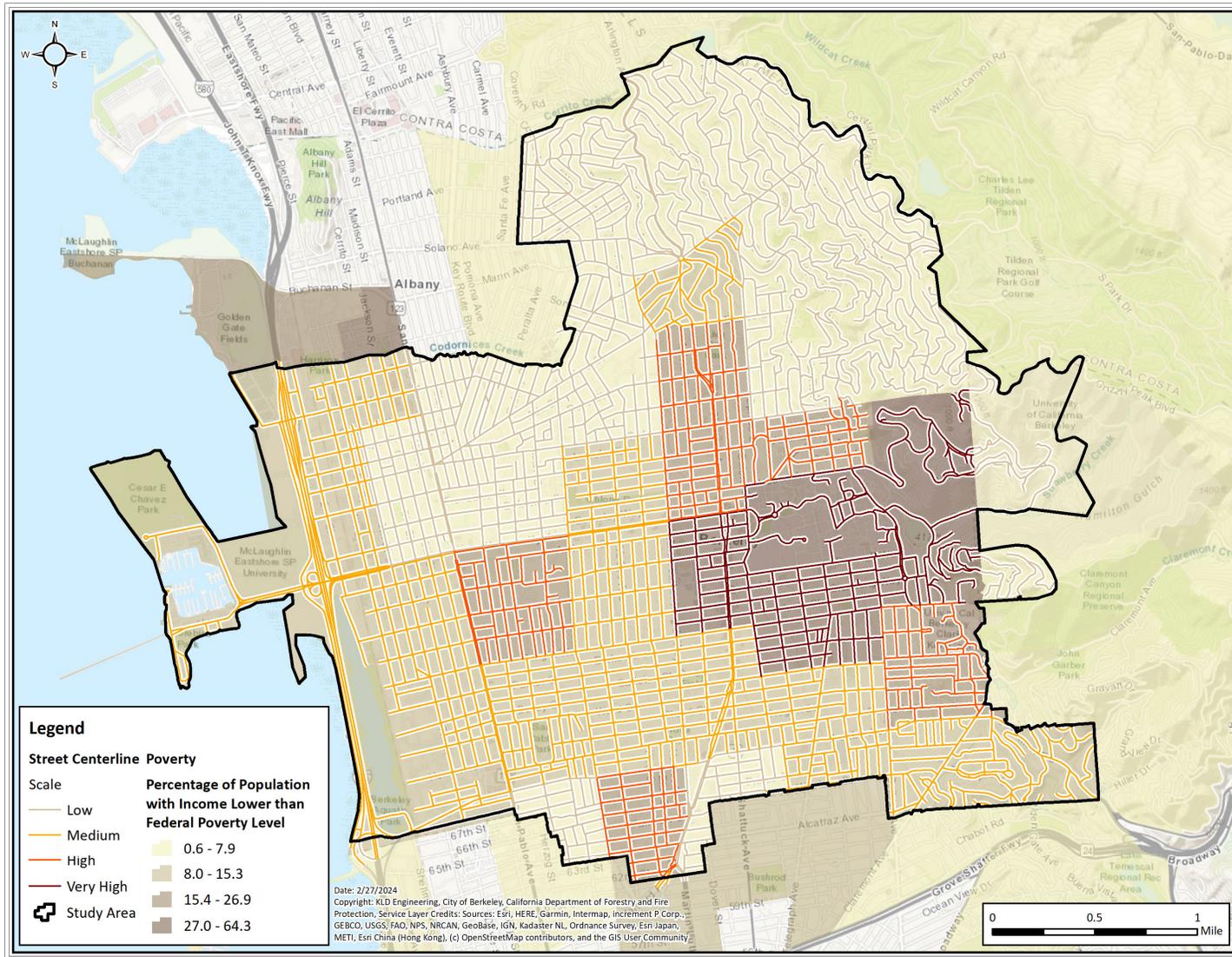
Figure 13. Poverty
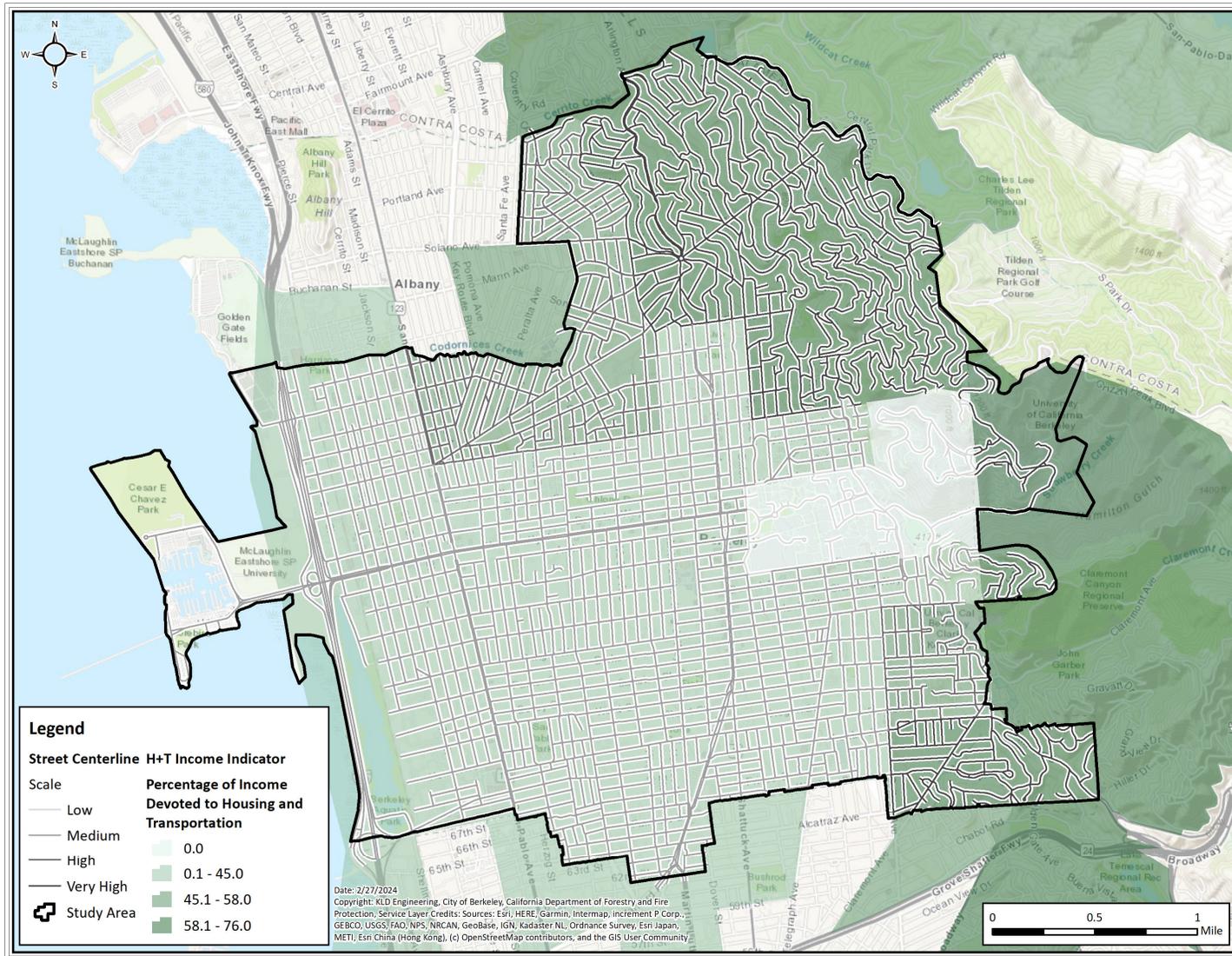
Figure 14. H+T Household Indicator
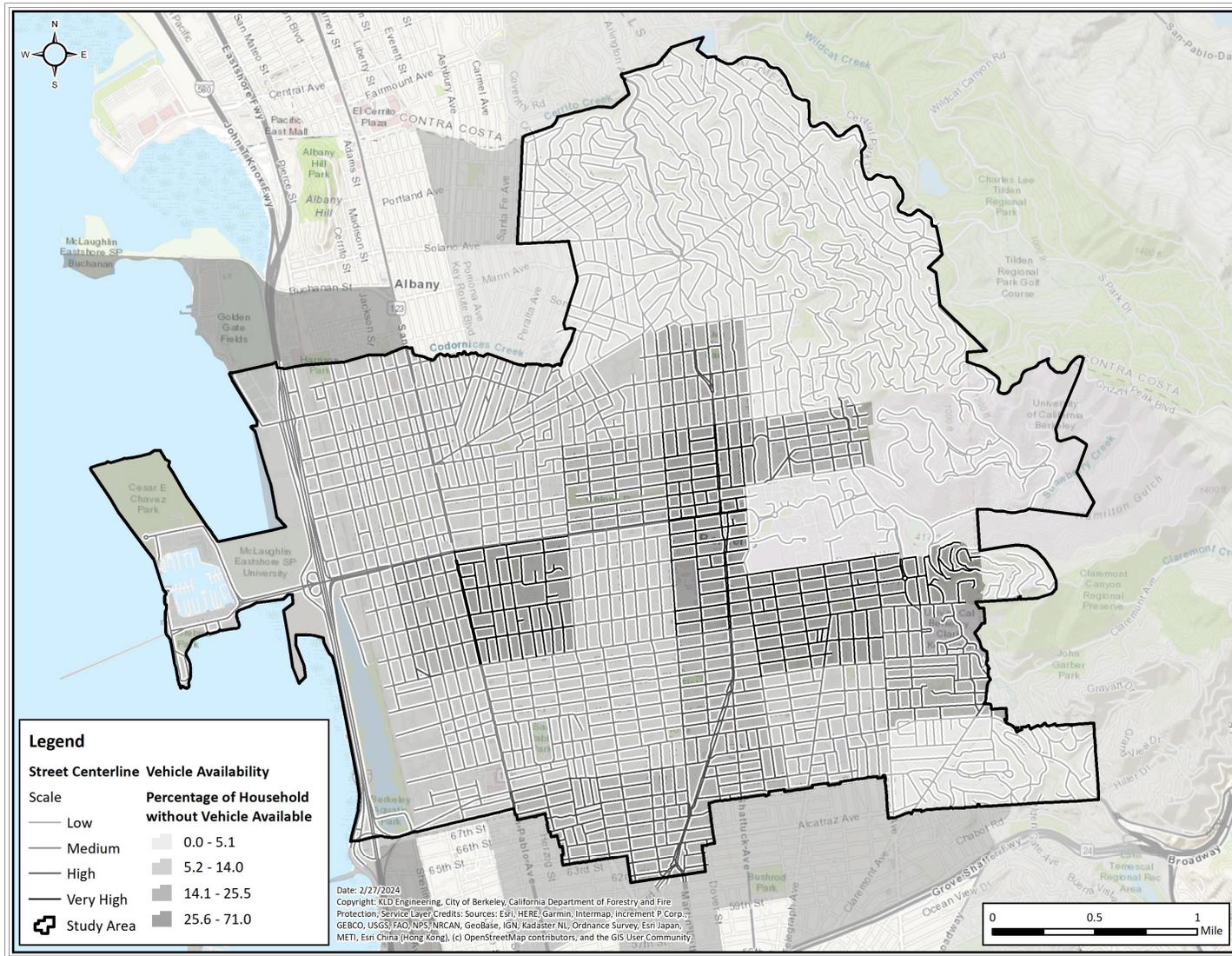
Figure 15. Vehicle Availability
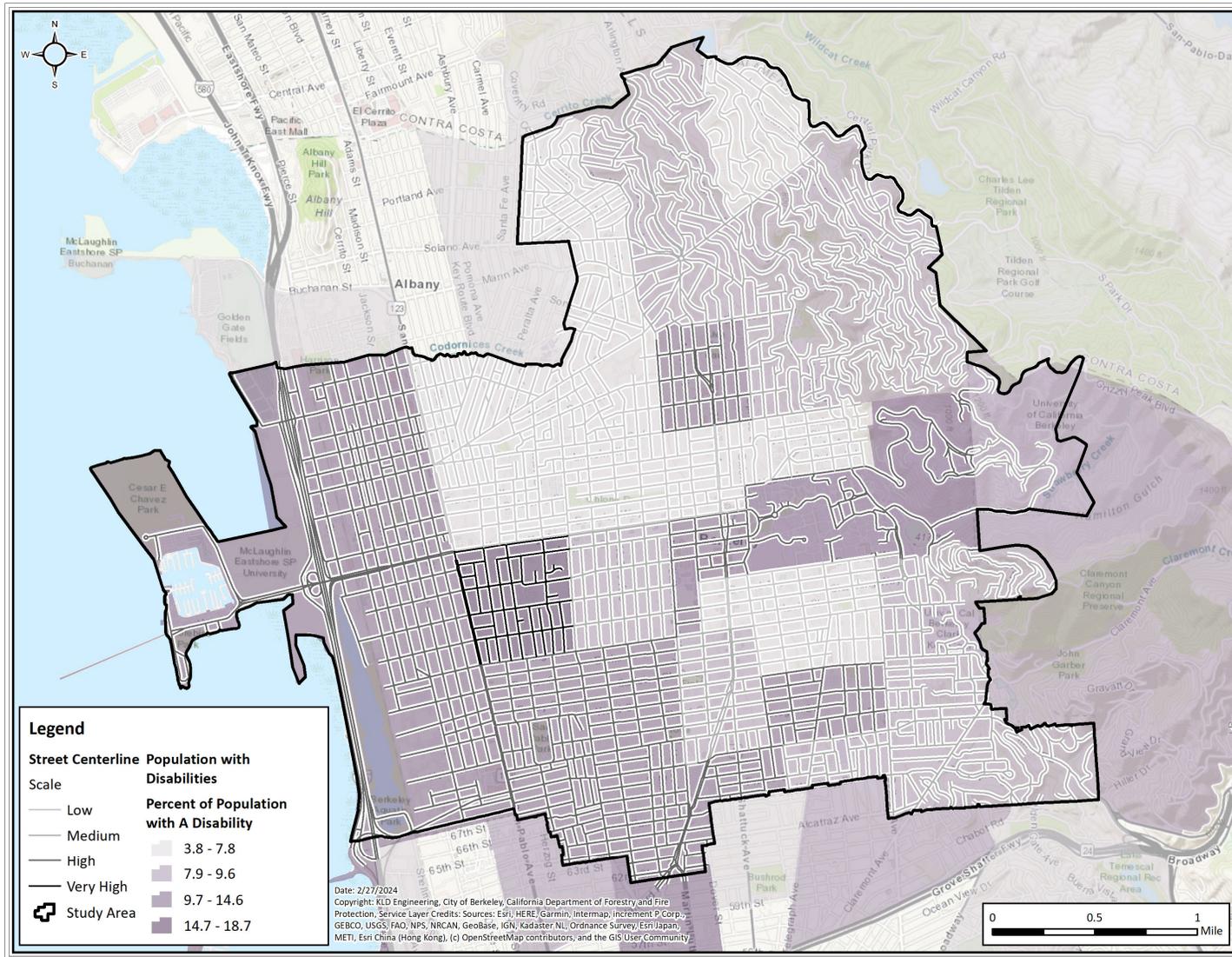
Figure 16. Population with Disabilities
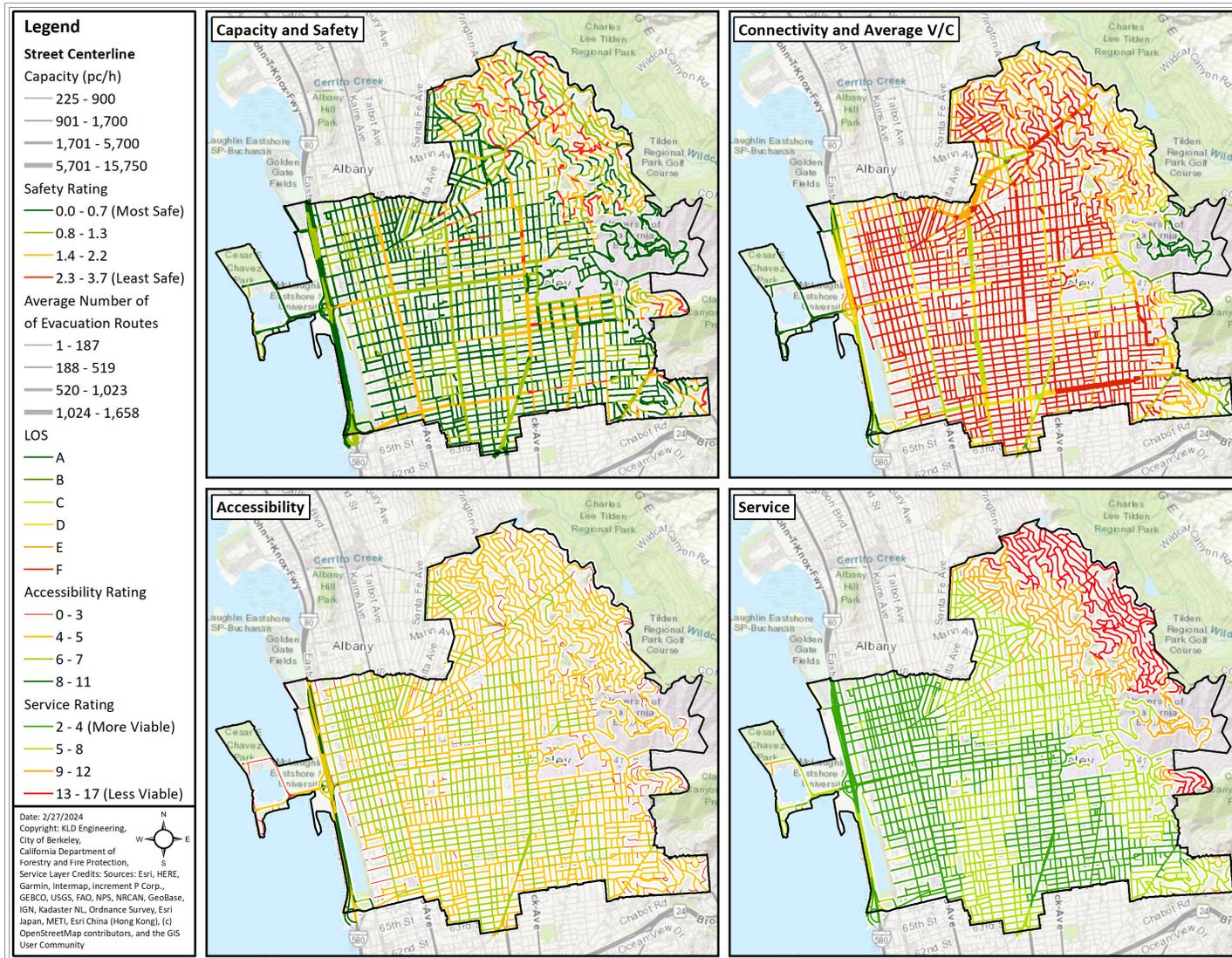
Figure 17. Overview of Capacity, Safety, and Viability
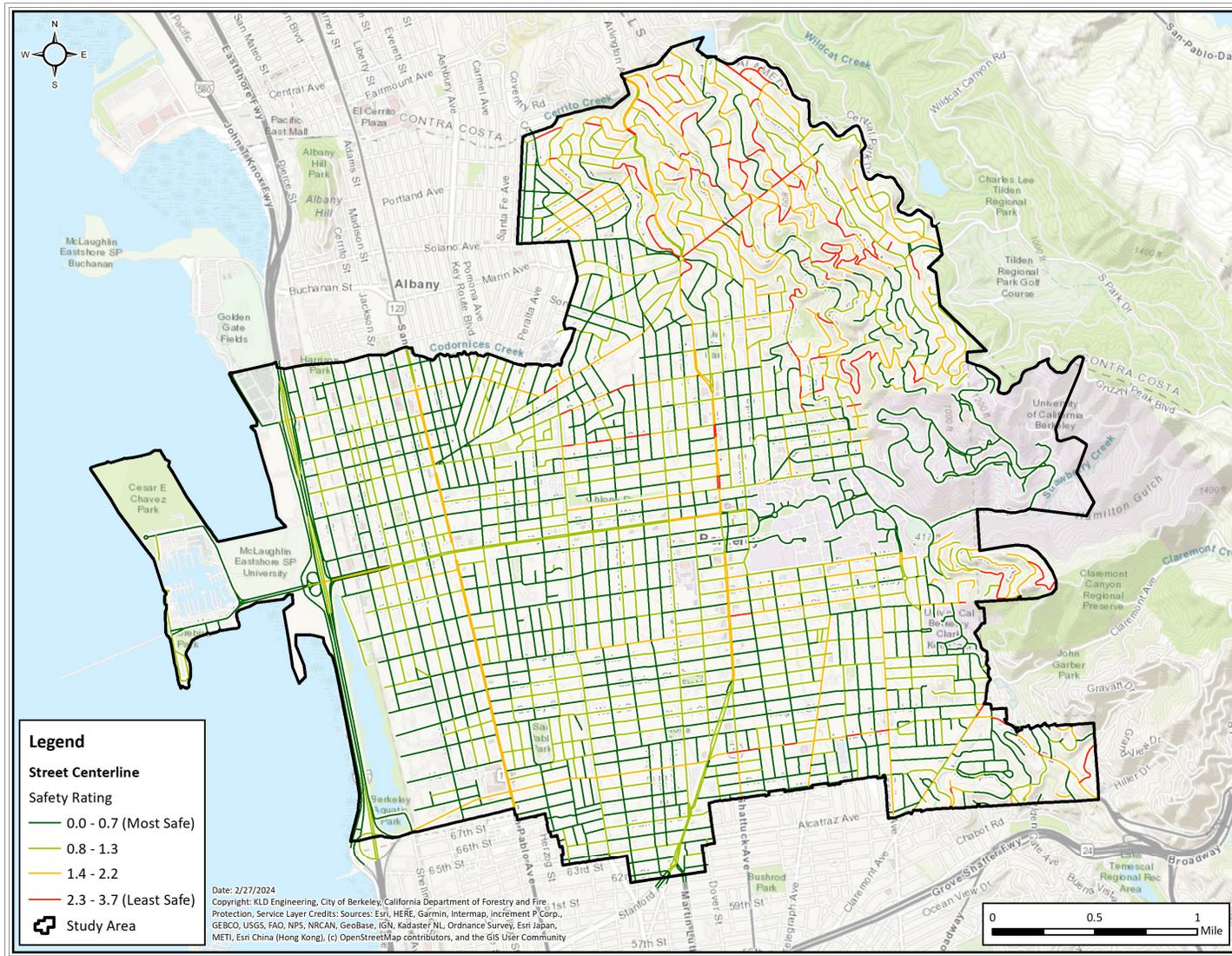
Figure 18. Overall Evacuation Safety Rating
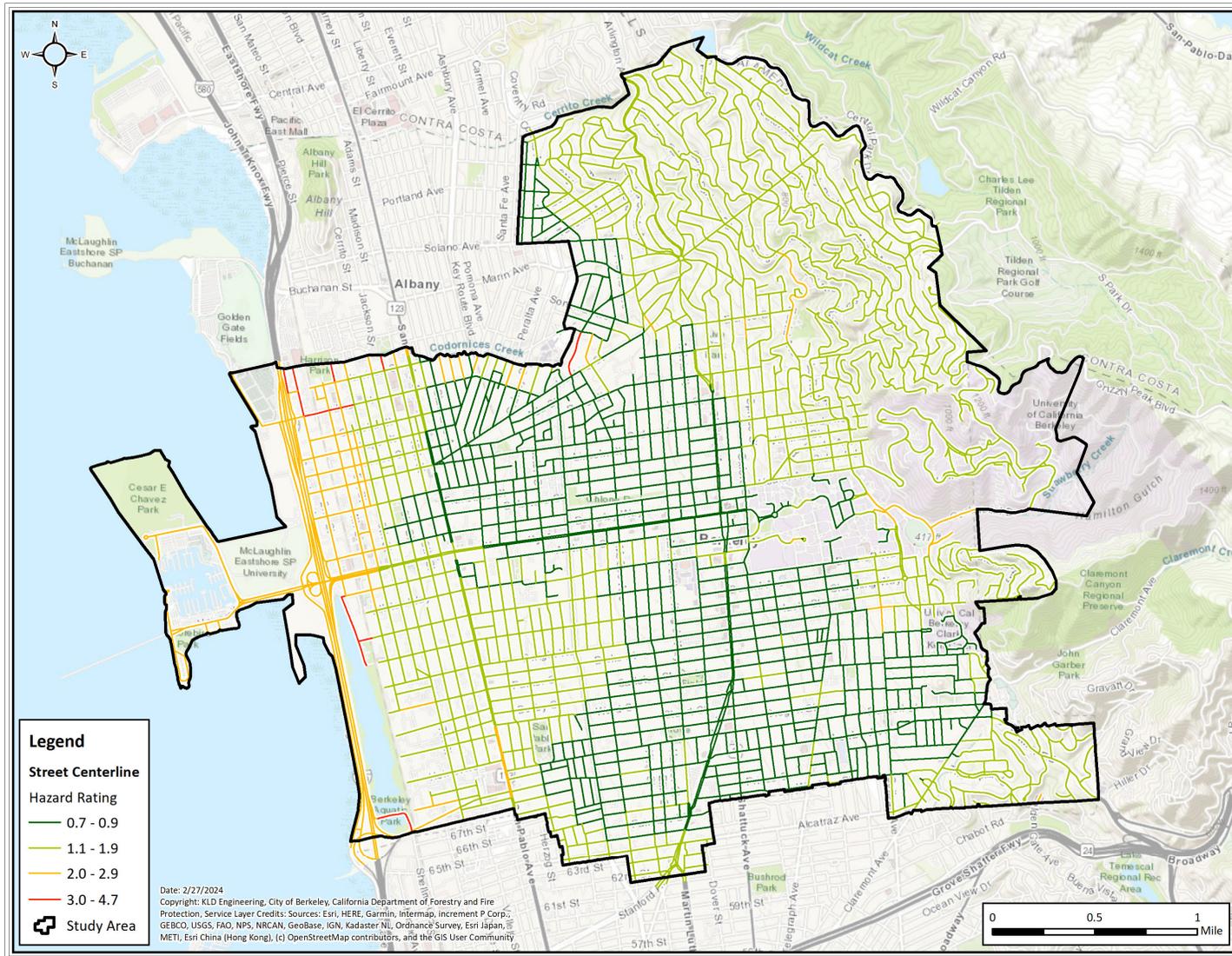
Figure 19. Hazard Rating
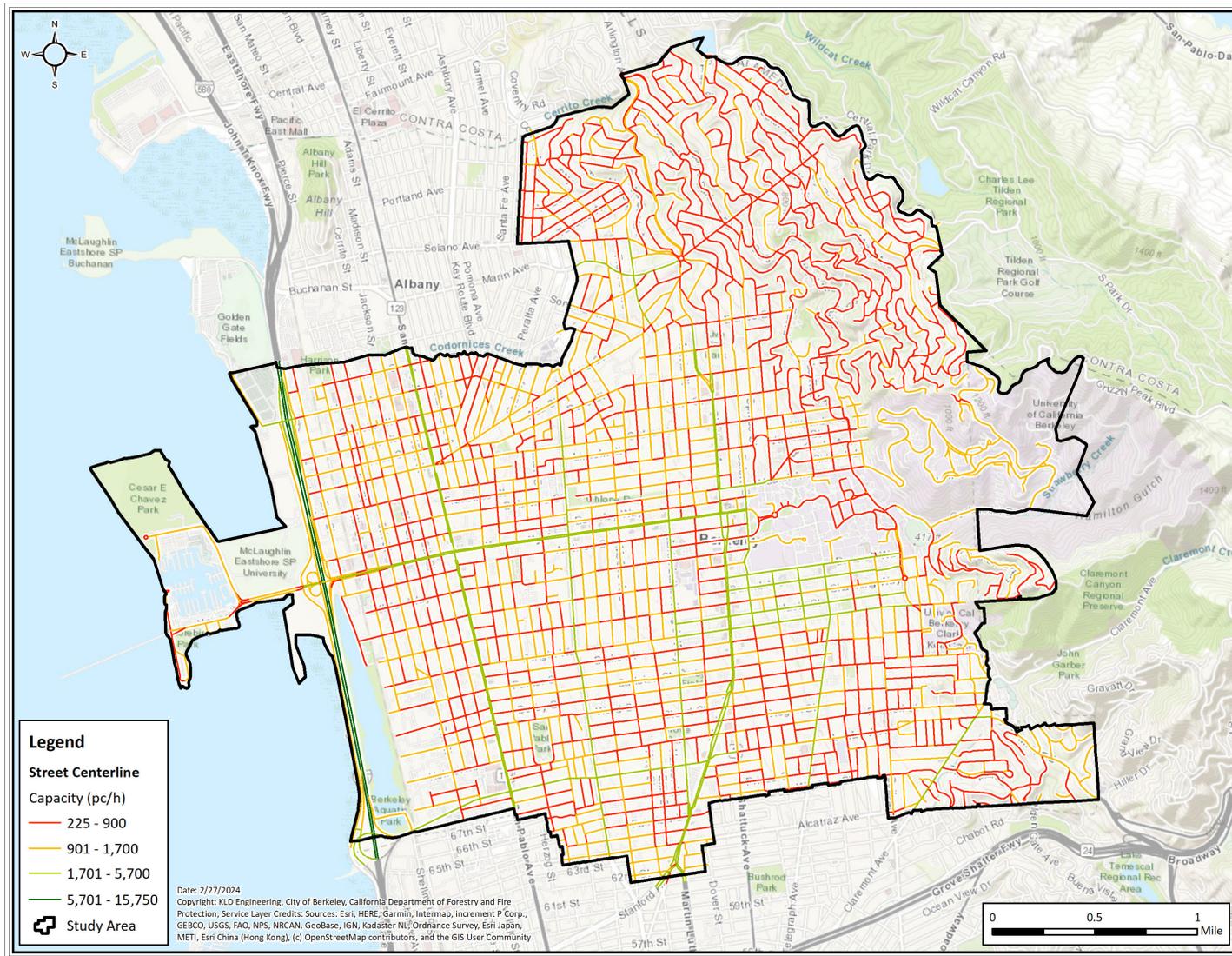
Figure 20. Capacity
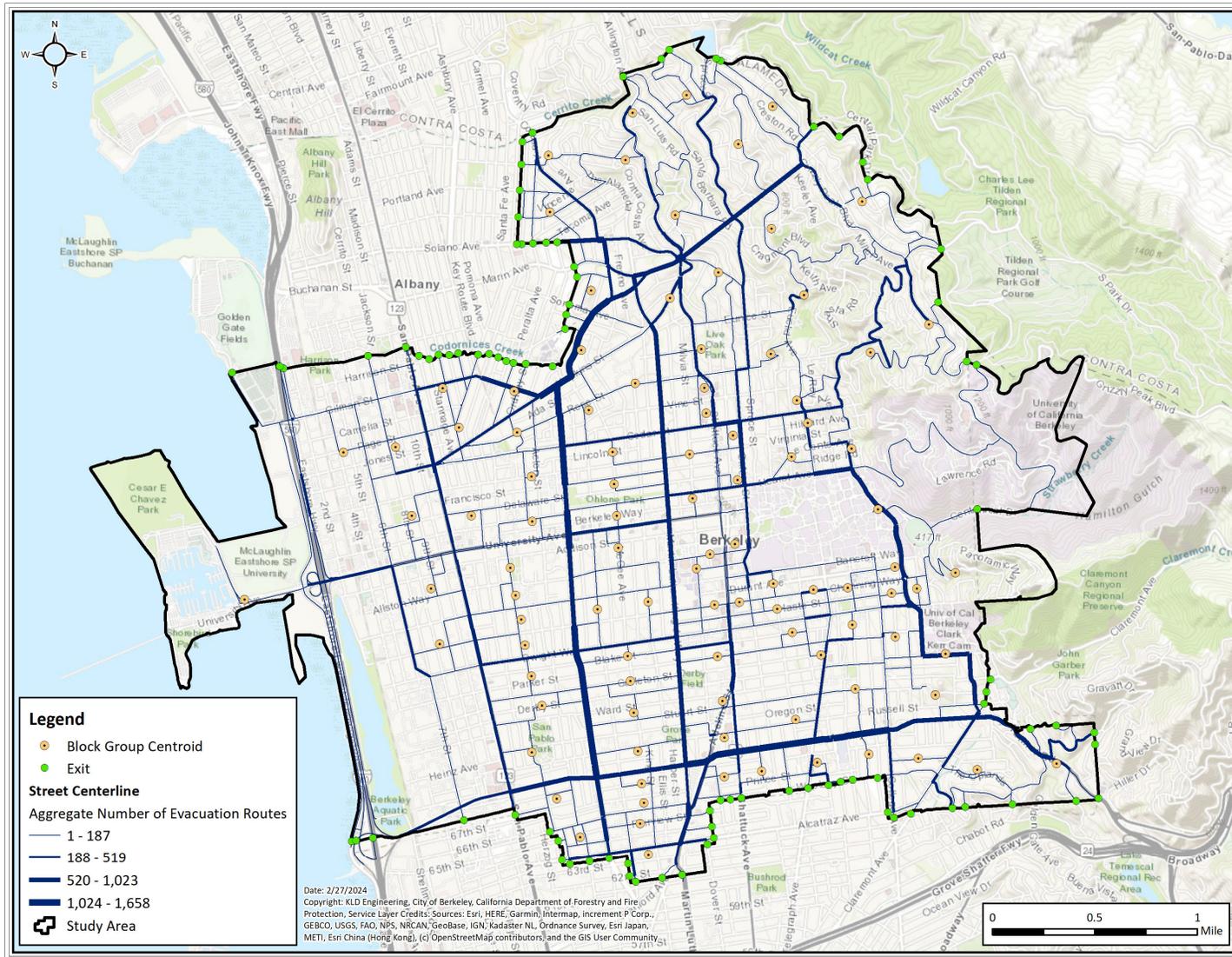
Figure 21. Connectivity
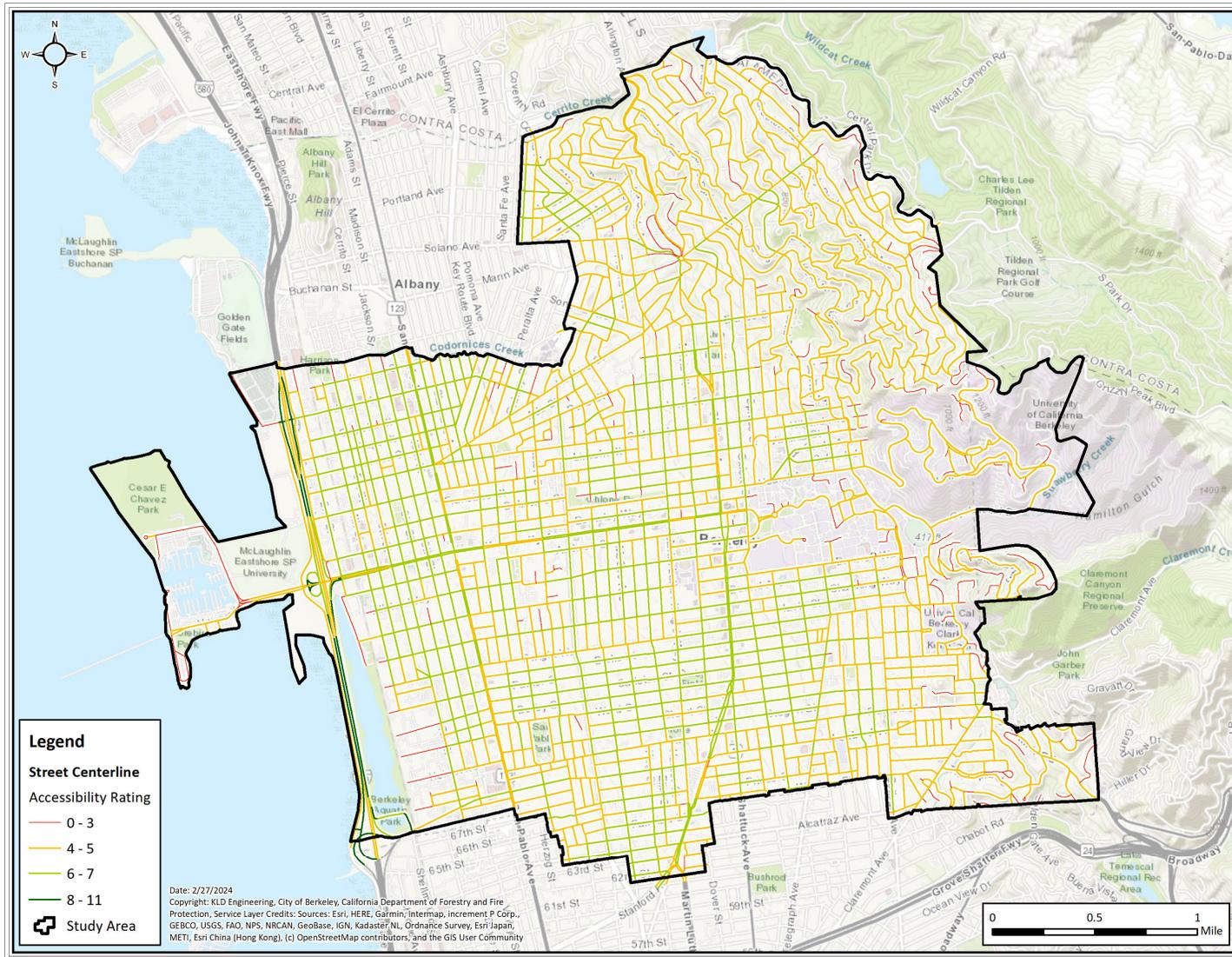
Figure 22. Accessibility Score
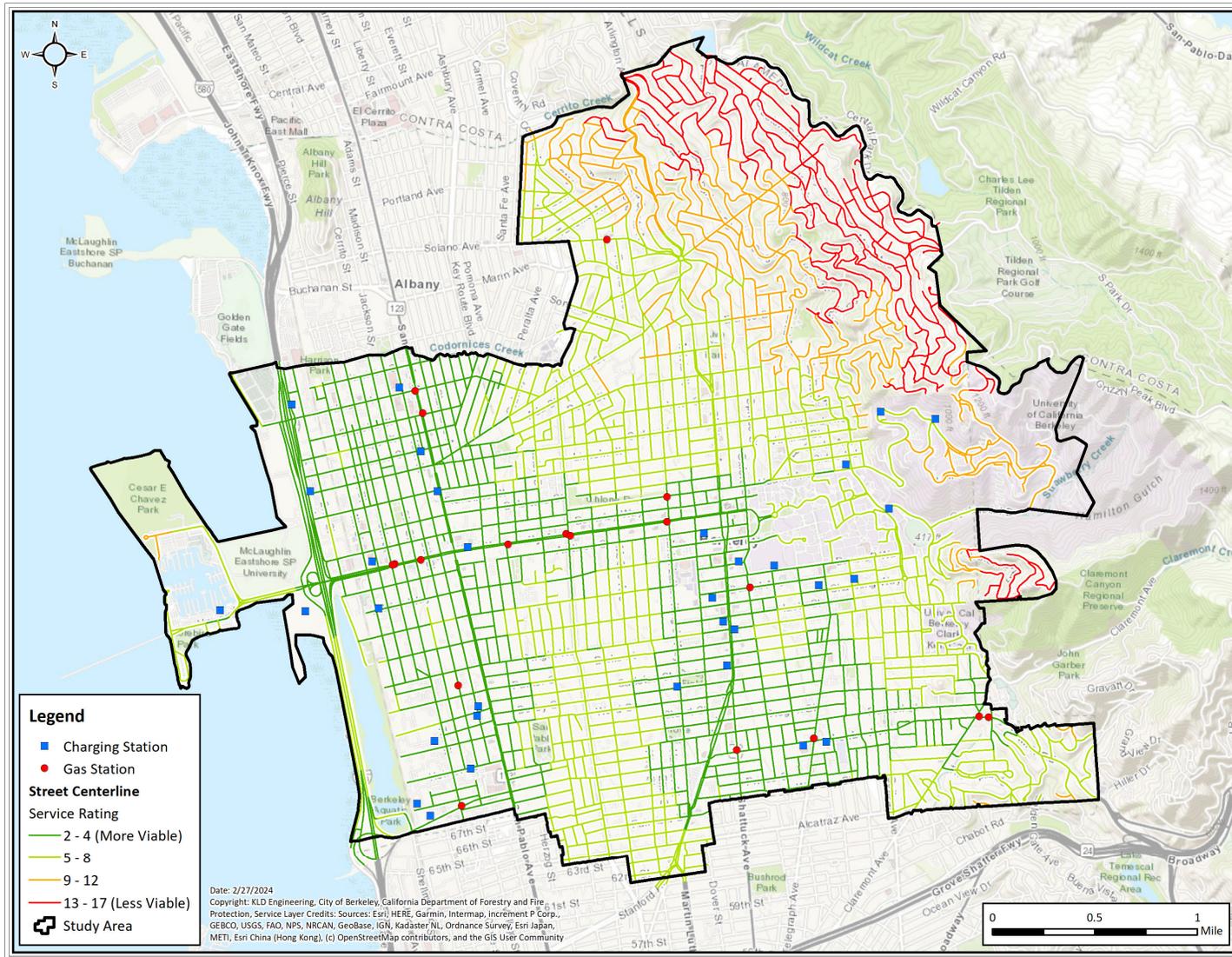
Figure 23. Service Score
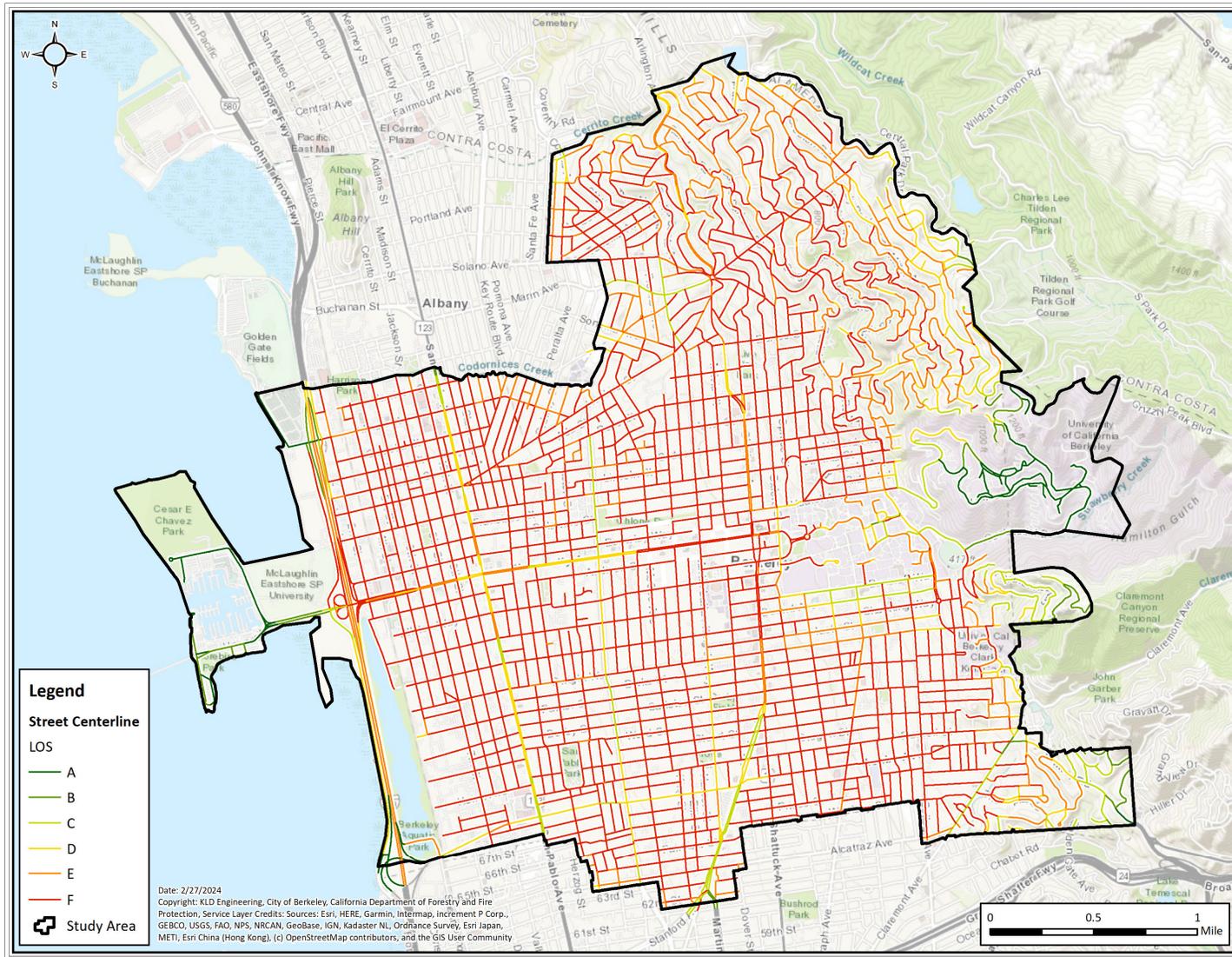
Figure 24. Maximum Demand During an Evacuation Event
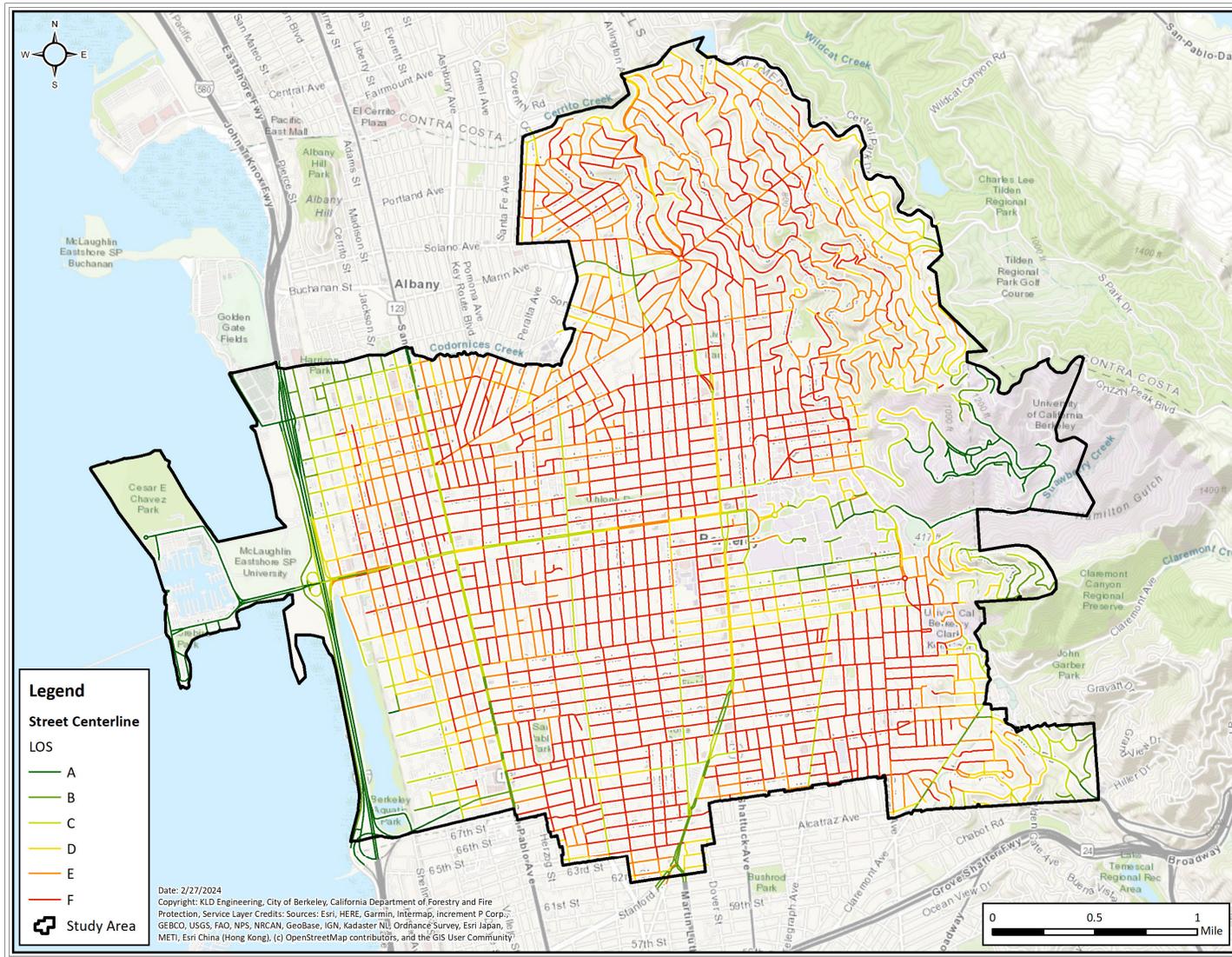
Figure 25. Minimum Demand During an Evacuation Event
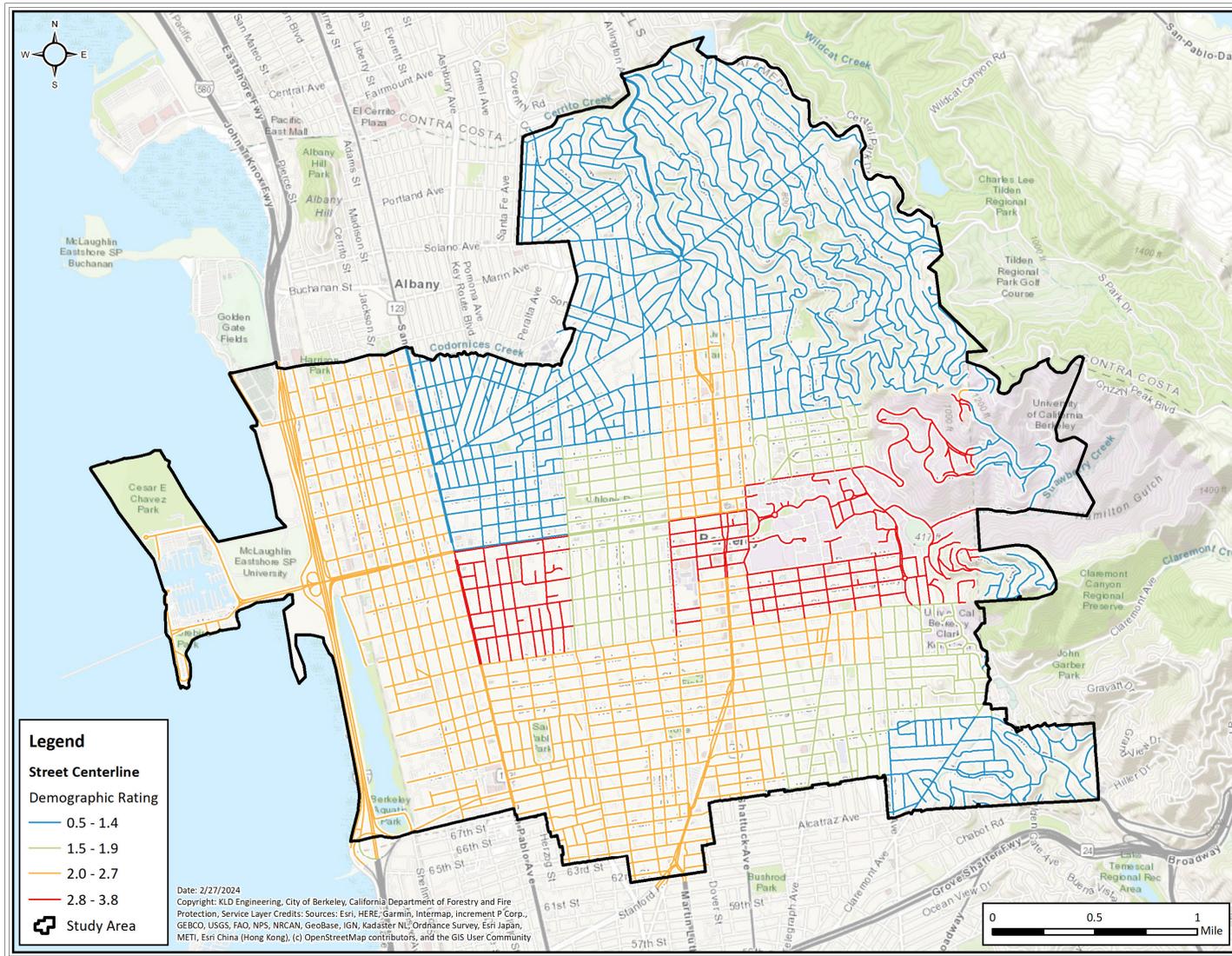
Figure 26. Demographic Vulnerability Rating

Appendix A

Table A-1. Summary of Safety, Capacity, Viability, and Vulnerability Scores

Street Name	Average[21] of								
	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	▲ ▼	▲ ▽	▲ ▽	▲ ▼	▲ ▼	▲ ▽	▲ ▽	▲ ▽	▲ ▽
10TH ST	986	0.46	1.57	5.95	5.95	2.24	1.07	2.62	2.11
2ND ST	994	0.64	3.10	5.33	5.33	1.91	0.38	3.75	2.11
4TH ST	1,024	0.18	2.51	5.50	5.50	1.95	0.55	3.40	2.11
5TH ST	936	0.67	2.31	5.37	5.37	2.39	0.72	3.05	2.11
62ND ST	1,163	0.89	1.67	5.17	5.17	0.96	0.56	6.83	2.23
63RD ST	1,215	0.80	1.67	5.00	5.00	1.11	0.69	5.80	2.18
65TH ST	1,125	0.67	1.67	4.00	4.00	0.71	0.56	7.00	2.12
66TH ST	1,050	0.33	1.33	4.17	4.17	1.19	0.99	6.67	2.12
67TH ST	750	0.00	1.33	5.33	5.33	2.11	1.79	6.00	2.12
6TH ST	1,167	0.90	1.73	5.63	5.63	1.84	0.69	3.31	2.13
7TH ST	1,058	0.52	1.63	5.67	5.67	2.25	0.73	2.85	2.11
8TH ST	879	0.68	1.62	5.62	5.62	2.85	1.08	3.00	2.11
9TH ST	881	0.14	1.67	5.50	5.50	2.68	1.09	2.58	2.11
ACACIA AVE	900	2.00	1.25	4.00	4.00	0.92	0.84	15.00	0.89
ACROFT CT	1,125	0.33	0.67	2.00	2.00	1.33	0.92	5.00	3.26
ACTON CIR	1,125	0.78	0.87	2.67	2.67	1.53	1.05	5.00	3.26
ACTON ST	955	0.67	0.98	5.00	5.00	1.61	1.28	5.11	2.08
ADA ST	990	0.40	0.67	5.20	5.20	1.32	0.95	6.20	1.34
ADDISON ST	892	0.86	1.23	5.52	5.52	4.78	1.62	3.03	2.48
ADELINE ST	5,454	1.17	1.14	5.51	5.51	0.32	0.18	3.94	2.10
ALAMO AVE	675	2.00	1.25	4.00	4.00	1.35	1.25	13.00	0.89
ALCATRAZ AVE	1,073	0.51	1.66	5.23	5.23	1.16	0.78	5.92	1.95
ALLSTON WAY	852	0.51	1.25	5.57	5.57	4.04	1.67	3.86	2.53
ALTA RD	675	1.67	1.25	4.00	4.00	0.82	0.77	14.00	0.89
ALVARADO RD	1,125	0.81	1.25	3.86	3.86	0.27	0.24	6.71	1.20
AMADOR AVE	788	0.67	1.25	4.00	4.00	1.41	1.13	8.00	1.27
ANTHONY ST	563	0.83	1.67	5.00	5.00	4.14	0.78	2.00	2.11
ARCADE AVE	900	1.00	1.25	4.00	4.00	0.60	0.56	13.00	1.24
ARCH ST	859	0.97	1.25	4.27	4.27	1.95	1.59	8.00	1.40

Street Name	Average[21] of								
	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	🔺🔻	🔺🔻	🔺🔻	🔺🔻	🔺🔻	🔺🔻	🔺🔻	🔺🔻	🔺🔻
ARDEN RD	788	1.50	1.75	2.00	2.00	0.55	0.52	11.00	2.82
ARLINGTON AVE	1,133	1.65	1.25	4.36	4.36	0.70	0.63	11.25	1.02
ASHBY AVE	2,477	1.78	0.99	5.11	5.21	1.48	0.67	3.15	1.82
ASHBY PL	1,125	0.33	0.75	4.00	4.00	1.59	1.10	4.00	1.20
ATHERTON ST	1,125	1.00	0.75	4.00	4.00	2.56	1.43	4.00	3.39
ATLAS PL	450	1.00	1.25	4.00	4.00	0.98	0.93	14.00	1.24
AVALON AVE	990	1.20	0.75	3.00	3.00	1.07	0.77	4.60	1.74
AVENIDA DR	750	0.89	1.25	4.67	4.67	0.67	0.65	13.83	1.24
AVIS RD	900	1.33	1.25	4.00	4.00	0.86	0.77	12.00	1.06
BAKER ST	1,013	0.33	1.67	5.25	5.25	1.06	0.87	7.25	2.12
BANCROFT PL	450	1.67	1.75	2.00	2.00	0.25	0.22	17.00	1.14
BANCROFT STEPS WAY	675	1.00	1.25	4.00	4.00	1.30	0.86	7.00	2.82
BANCROFT WAY	1,872	0.78	1.30	5.02	5.02	1.66	0.87	4.44	2.70
BARROWS LN	1,125	0.33	0.75	4.00	4.00	0.95	0.27	5.00	3.30
BATAAN AVE	1,125	1.00	1.67	4.00	4.00	1.60	0.79	3.00	1.98
BATEMAN ST	675	1.00	0.75	4.00	4.00	5.34	1.63	4.00	1.68
BAY ST	1,125	0.50	3.67	3.00	8.00	0.84	0.10	2.00	2.11
BAYTREE LN	450	2.00	1.25	1.00	1.00	0.68	0.63	13.00	1.24
BAYVIEW PL	675	0.67	1.25	4.00	4.00	1.68	1.41	10.00	1.24
BELROSE AVE	1,125	0.00	1.25	5.00	5.00	0.64	0.46	4.00	1.74
BELVEDERE AVE	1,013	0.50	0.67	5.00	5.00	1.60	1.14	4.00	1.37
BENVENUE AVE	956	0.67	0.75	5.50	5.50	3.50	1.66	4.38	2.02
BERKELEY SQ	3,800	0.67	0.67	6.00	6.00	1.58	0.38	3.00	3.31
BERKELEY WAY	916	0.60	0.67	5.36	5.36	6.89	2.09	3.50	1.82
BERRYMAN PATH	900	0.67	1.17	5.00	5.00	1.90	1.29	8.00	2.14
BERRYMAN ST	996	0.48	0.81	5.57	5.57	1.57	1.07	8.43	1.91
BEVERLY PL	1,200	0.56	1.00	5.33	5.33	0.75	0.61	6.67	1.20
BLAKE ST	970	0.85	1.07	5.63	5.63	2.29	1.56	4.25	2.38
BOISE ST	1,125	0.33	1.67	4.00	4.00	1.10	0.92	7.00	2.12
BOLIVAR DR	788	1.00	3.67	2.50	2.50	1.98	0.46	5.50	2.11
BONAR ST	1,050	0.00	1.53	5.67	5.67	1.41	0.99	4.00	3.26

Street Name	Total Capacity (vph)	Average[21] of							
		Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	△ ▼	△ ▼	△ ▽	△ ▼	△ ▼	△ ▽	△ ▽	△ ▽	△ ▽
BONITA AVE	950	0.33	0.72	5.00	5.00	6.00	1.99	5.89	2.16
BONNIE LN	675	1.67	1.25	4.00	4.00	1.57	1.41	12.00	0.89
BOWDITCH ST	844	1.00	0.75	5.50	5.50	2.92	1.64	5.00	3.39
BOYNTON AVE	863	1.83	1.25	4.00	4.00	0.61	0.57	14.50	1.06
BREAKWATER DR	1,125	1.00	2.67	2.00	2.00	0.00	0.00	9.00	2.11
BRET HARTE PATH	1,125	3.00	1.25	4.00	4.00	0.67	0.59	14.00	1.10
BRET HARTE RD	788	2.50	1.25	4.00	4.00	1.12	1.01	13.00	1.10
BRIDGE RD	1,125	0.67	1.25	4.00	4.00	0.34	0.29	6.00	1.20
BROOKSIDE AVE	675	0.00	1.45	2.00	2.00	1.41	1.02	6.00	1.20
BROOKSIDE CT	1,125	0.00	0.75	2.00	2.00	1.03	0.77	6.00	1.20
BROOKSIDE DR	1,013	0.00	1.35	4.00	4.00	1.08	0.81	6.00	1.20
BROWNING ST	1,125	0.00	1.67	5.75	5.75	1.46	0.93	4.00	3.26
BUCHANAN ST	1,350	0.33	2.87	2.00	2.00	0.02	0.00	6.00	2.11
BUENA AVE	731	0.33	0.67	4.75	4.75	1.84	1.35	6.75	1.33
BUENA VISTA WAY	731	2.00	1.25	4.50	4.50	1.07	1.00	9.13	1.24
BURNETT ST	900	0.50	1.17	4.75	4.75	1.96	1.41	3.75	2.32
BYRON ST	1,069	0.25	1.17	4.50	4.50	1.99	1.08	3.50	3.26
CAL SAILING LOOP	1,125	0.67	2.67	4.00	4.00	0.11	0.04	5.00	2.11
CALIFORNIA ST	956	0.38	1.00	5.72	5.72	1.79	1.49	5.61	1.94
CAMELIA ST	953	0.65	1.64	5.76	5.76	1.97	0.76	3.00	1.89
CAMPUS DR	900	0.70	1.25	4.18	4.18	0.70	0.66	12.00	1.24
CANYON RD	1,125	2.00	2.75	2.00	2.00	0.61	0.37	8.00	3.30
CAPISTRANO AVE	900	1.72	1.04	5.00	5.00	1.24	0.88	8.17	1.18
CARLETON ST	956	0.75	1.19	5.60	5.60	2.15	1.22	3.85	2.30
CARLOTTA AVE	1,125	0.50	2.17	4.00	4.00	1.16	0.87	8.00	1.27
CARRISON ST	900	0.00	1.00	5.00	5.00	1.88	1.53	4.67	2.12
CATALINA AVE	1,125	0.17	1.25	4.00	4.00	1.04	0.69	8.00	1.20
CATHERINE DR	1,125	1.33	0.67	4.00	4.00	0.94	0.69	6.00	1.35
CEDAR ST	1,082	1.20	1.14	5.23	5.23	1.51	1.05	4.98	1.59
CEDARWOOD LN	1,125	0.67	2.87	4.00	4.00	0.88	0.11	4.00	2.11
CENTENNIAL DR	1,200	0.59	1.36	3.78	3.78	0.08	0.06	11.11	1.86

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
					Average[21] of				
CENTER ST	844	0.08	0.67	5.75	5.75	9.26	1.99	3.25	3.31
CHABOLYN TER	675	0.00	1.25	3.00	3.00	0.55	0.48	9.00	1.20
CHANNING WAY	940	0.72	1.29	5.54	5.54	2.35	1.43	4.67	2.68
CHAUCER ST	900	1.00	1.67	4.00	4.00	1.41	1.10	4.00	3.26
CHERRY ST	675	0.33	0.75	4.00	4.00	2.63	1.98	4.00	1.74
CHESTNUT ST	928	0.96	0.67	5.50	5.50	1.74	1.23	3.50	1.39
CHILTON WAY	900	1.00	0.75	4.00	4.00	2.43	1.62	4.00	2.68
CLAREMONT AVE	3,429	1.59	1.15	4.33	4.33	0.25	0.18	4.89	1.28
CLAREMONT BLVD	964	0.71	0.82	4.86	4.86	0.76	0.55	4.86	1.74
CLAREMONT CRES	675	0.00	0.75	4.00	4.00	1.18	0.92	3.00	1.20
CODORNICES RD	1,125	1.67	1.25	2.00	2.00	0.84	0.78	9.00	1.10
COLBY ST	731	0.08	0.75	4.50	4.50	5.88	1.65	2.75	1.68
COLLEGE AVE	1,057	1.49	1.10	4.78	4.78	2.16	1.36	5.22	1.93
COLORADO AVE	675	2.17	1.25	4.00	4.00	1.14	1.06	15.00	1.06
COLUMBIA CIR	1,125	0.00	1.25	2.00	2.00	0.50	0.47	14.00	1.24
COLUSA AVE	1,054	0.54	1.01	5.00	5.00	0.95	0.70	7.32	1.19
COMSTOCK CT	1,350	0.00	0.67	4.00	4.00	0.91	0.76	7.00	1.33
CONTRA COSTA AVE	700	1.04	1.25	4.56	4.56	1.26	1.05	8.67	1.06
CORNELL AVE	1,029	0.00	0.95	5.86	5.86	1.51	1.02	2.57	1.35
CORONA CT	675	1.33	1.25	2.00	2.00	1.36	1.19	10.00	1.10
COURT ST	1,125	0.00	0.75	2.00	2.00	0.82	0.70	7.00	1.74
COWPER ST	900	0.00	0.67	4.00	4.00	2.50	1.25	4.00	3.26
CRAGMONT AVE	783	1.30	1.25	4.07	4.07	1.05	0.95	12.59	1.00
CRESCENT DR	900	0.00	0.75	4.50	4.50	2.43	0.79	3.50	3.30
CRESCENT RD	788	0.00	0.75	4.00	4.00	1.86	0.49	4.00	3.30
CRESTON RD	900	1.52	1.25	4.44	4.44	0.80	0.75	13.67	1.01
CROSS CAMPUS RD	1,125	0.00	1.75	4.00	4.00	1.70	0.47	4.00	3.30
CRYSTAL WAY	1,125	2.33	1.25	2.00	2.00	0.61	0.54	10.00	1.10
CURTIS ST	830	0.56	1.10	5.56	5.56	2.42	1.49	3.19	2.08
CUTTER WAY	1,125	0.00	1.67	4.00	4.00	1.90	0.52	4.00	2.11
CYCLOTRON RD	1,125	0.48	1.25	4.00	4.00	0.15	0.14	9.29	3.30

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	Average[21] of								
	▲ ▼	▲ ▽	▲ ▽	▲ ▼	▲ ▼	▲ ▽	▲ ▽	▲ ▽	▲ ▽
CYPRESS ST	900	0.00	0.67	3.00	3.00	1.47	1.13	7.00	1.33
DANA ST	1,648	0.48	0.89	5.29	5.29	3.32	1.26	3.71	2.47
DEAKIN ST	990	0.00	0.75	5.20	5.20	2.22	1.01	2.80	1.73
DEL MAR AVE	675	2.00	1.25	4.00	4.00	0.90	0.85	11.00	1.24
DEL NORTE ST	975	0.78	1.25	4.00	4.00	0.96	0.84	8.00	1.27
DELAWARE ST	1,017	0.46	0.75	5.13	5.13	3.31	1.50	3.91	1.73
DELMAR AVE	900	2.11	1.25	4.00	4.00	0.67	0.64	11.67	1.24
DERBY ST	870	0.82	0.93	5.10	5.10	2.32	1.63	4.73	1.99
DOHR ST	1,013	0.75	0.92	4.50	4.50	1.77	1.51	6.00	2.27
DOMINGO AVE	900	0.19	1.18	4.29	4.29	0.72	0.57	4.29	1.27
DOVER ST	1,125	1.00	1.67	4.00	4.00	0.89	0.42	5.00	2.05
DOWLING PL	900	0.33	0.75	4.00	4.00	4.87	1.34	2.00	1.68
DURANT AVE	4,573	1.43	0.88	5.50	5.50	1.08	0.45	3.70	3.12
DWIGHT CIR	1,125	1.00	1.67	6.00	6.00	1.90	0.58	3.00	2.31
DWIGHT PL	450	1.33	1.75	2.00	2.00	0.50	0.47	15.00	1.14
DWIGHT WAY	1,724	1.04	1.36	4.55	4.55	1.24	0.84	5.13	2.19
EAST GATE DR	563	0.00	1.25	4.00	4.00	0.62	0.46	6.00	3.30
EASTSHORE HWY	1,254	0.62	2.98	4.14	4.14	0.89	0.14	3.86	2.11
EASTWAY DR	1,125	0.17	0.75	4.00	4.00	0.46	0.37	6.00	1.74
EDITH ST	1,125	0.60	0.67	4.80	4.80	2.13	1.18	6.60	1.46
EDWARDS ST	1,013	0.33	1.67	5.00	5.00	1.58	1.25	5.00	3.26
EL DORADO AVE	900	1.17	1.21	5.00	5.00	1.13	1.00	8.00	1.27
EL PORTAL CT	1,125	2.00	1.25	2.00	2.00	0.52	0.48	10.00	1.24
ELLIS ST	825	0.11	0.83	5.67	5.67	2.56	1.66	5.17	2.27
ELLSWORTH ST	1,664	0.02	0.82	5.71	5.71	2.70	1.39	3.86	2.56
ELMWOOD AVE	1,125	1.00	0.75	4.00	4.00	1.46	1.02	4.00	1.20
ELMWOOD CT	450	0.33	0.75	2.00	2.00	2.23	1.61	3.00	1.20
EMERSON ST	1,050	0.44	0.75	4.67	4.67	2.15	1.11	3.00	2.05
ENCINA PL	675	0.33	1.45	4.00	4.00	1.33	1.04	5.00	1.20
ENSENADA AVE	868	1.05	0.68	5.71	5.71	1.43	0.98	7.57	1.20
EOLA ST	675	1.00	0.67	4.00	4.00	1.53	1.40	6.00	1.65

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ESHLEMAN DR	1,125	0.33	0.75	2.50	2.50	0.63	0.15	6.00	3.30
ESPLANADE DR	900	0.00	0.75	4.00	4.00	0.41	0.15	7.00	3.30
ESSEX ST	975	0.44	0.75	5.33	5.33	2.13	1.10	3.00	2.05
ETNA ST	1,125	1.00	1.00	5.00	5.00	1.96	1.61	7.50	1.74
ETON AVE	1,125	0.00	1.45	5.00	5.00	1.13	0.82	5.00	1.20
ETON CT	1,125	1.00	1.45	3.00	3.00	0.78	0.55	6.00	1.20
EUCALYPTUS RD	1,013	1.17	1.25	4.00	4.00	0.35	0.31	8.00	1.25
EUCLID AVE	961	1.46	1.44	4.68	4.68	1.05	0.94	10.03	1.17
EUCLID ST	900	1.33	2.25	4.00	4.00	1.09	0.95	9.00	1.10
EUNICE ST	825	1.30	1.18	5.33	5.33	1.41	1.11	8.56	1.19
EVELYN AVE	900	0.00	1.67	5.50	5.50	1.08	0.91	3.00	1.35
FAIRLAWN DR	716	0.36	1.25	4.00	4.00	0.86	0.81	13.45	1.24
FAIRVIEW ST	868	0.90	0.82	5.71	5.71	2.37	1.54	5.86	2.22
FERNWALD RD	1,125	2.00	1.25	2.00	2.00	0.62	0.54	8.00	2.82
FLORENCE ST	900	1.00	0.75	4.00	4.00	5.11	1.53	2.00	1.93
FLORIDA AVE	900	1.83	1.25	3.00	3.00	0.90	0.82	15.00	1.06
FOLGER AVE	1,125	0.11	2.00	2.67	2.67	1.40	0.31	2.33	2.11
FOREST AVE	900	1.00	0.75	5.00	5.00	2.13	1.73	6.00	1.74
FOREST LN	675	2.33	1.25	4.00	4.00	0.97	0.92	13.00	1.10
FOUNTAIN WALK	1,125	1.67	1.25	7.00	7.00	0.82	0.71	8.00	1.27
FRANCISCO ST	1,050	1.17	0.67	5.50	5.50	2.75	1.34	4.83	1.63
FRANKLIN ST	1,181	0.00	0.67	5.50	5.50	1.02	0.83	4.25	1.39
FRESNO AVE	1,275	0.89	0.67	4.67	4.67	0.98	0.75	6.33	1.20
FRONTAGE RD	1,350	0.33	2.67	1.50	1.50	0.51	0.05	4.00	2.11
FULTON ST	1,918	0.07	0.88	5.60	5.60	2.40	1.46	3.33	2.62
GARBER ST	900	1.11	0.92	4.67	4.67	1.54	1.15	5.00	1.74
GAYLEY RD	900	0.33	1.75	4.50	4.50	0.46	0.22	5.83	3.30
GILMAN AVE	1,013	1.67	1.67	6.00	6.00	1.39	0.51	2.00	2.11
GILMAN ST	1,823	1.59	1.85	5.39	6.19	0.86	0.43	3.19	1.77
GLASER RD	1,125	0.00	1.25	3.00	3.00	0.05	0.05	11.00	3.30
GLEN AVE	788	1.33	1.25	4.33	4.33	1.32	1.08	9.00	1.22

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
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GLENDALE AVE	975	1.33	1.25	4.00	4.00	0.70	0.66	10.67	1.24
GOLDEN GATE AVE	1,125	0.67	2.25	0.00	0.00	0.26	0.23	8.00	1.20
GRANT ST	832	0.48	0.71	5.57	5.57	4.96	2.14	4.96	1.83
GRAYSON ST	945	0.33	1.67	5.20	5.20	2.57	0.62	2.80	2.11
GREENWOOD TER	600	1.33	1.25	4.00	4.00	1.13	1.04	9.33	1.24
GRIZZLY PEAK BLVD	1,085	1.29	1.25	4.00	4.00	0.57	0.53	13.56	1.11
HALCYON CT	900	0.00	0.75	4.00	4.00	4.73	1.39	2.00	1.68
HALKIN LN	675	2.33	1.25	4.00	4.00	1.25	1.17	12.50	0.89
HARDING CIR	450	2.33	1.25	2.00	2.00	0.81	0.78	14.00	1.24
HARMON ST	900	0.63	1.04	5.50	5.50	1.98	1.36	6.38	2.18
HAROLD WAY	1,125	0.67	1.67	4.00	4.00	6.90	1.64	3.00	3.31
HARPER ST	788	0.25	0.67	5.00	5.00	2.64	1.64	4.25	2.27
HARRISON ST	917	0.15	2.05	5.23	5.23	1.32	0.27	3.15	2.00
HARVARD CIR	675	1.67	1.25	3.00	3.00	0.76	0.73	14.00	1.24
HASKELL ST	900	0.00	1.33	4.67	4.67	1.55	1.28	5.33	2.12
HASTE ST	3,800	1.77	0.83	5.40	5.40	0.81	0.48	4.20	3.17
HAVILAND RD	900	0.00	0.75	3.00	3.00	0.92	0.67	5.00	3.30
HAWTHORNE TER	900	0.53	1.25	3.80	3.80	1.41	1.28	8.20	1.24
HAZEL RD	900	0.00	1.45	4.00	4.00	1.13	0.85	5.00	1.20
HEARST AVE	1,398	1.02	1.17	5.05	5.05	2.92	1.20	3.54	2.17
HEARST MINING CIR	675	0.00	0.75	4.00	4.00	0.57	0.41	7.00	3.30
HEINZ AVE	945	0.27	1.67	4.00	4.00	2.62	0.65	2.60	2.11
HENRY ST	2,463	1.00	0.83	5.33	5.33	1.73	0.92	6.83	2.15
HIGH CT	563	1.33	1.25	4.00	4.00	1.54	1.40	10.50	1.10
HIGHLAND PL	1,125	1.17	1.25	4.00	4.00	0.44	0.42	6.00	1.79
HILGARD AVE	1,093	0.71	1.25	4.57	4.57	1.13	0.99	7.43	1.79
HILGARD WAY	1,125	0.00	0.75	1.00	1.00	1.18	0.54	5.00	3.30
HILL CT	900	0.00	1.25	2.00	2.00	1.47	1.36	7.00	1.24
HILL RD	720	1.60	1.25	3.00	3.00	0.75	0.71	13.80	1.24
HILLCREST CT	450	2.00	1.25	2.00	2.00	1.72	1.40	6.00	1.20
HILLCREST RD	850	1.41	1.27	3.56	3.56	0.68	0.55	7.56	1.20

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HILLDALE AVE	816	2.25	1.25	4.25	4.25	1.07	0.99	12.88	1.00
HILLEGASS AVE	872	0.21	0.75	5.38	5.38	4.27	1.75	3.63	2.03
HILLSIDE AVE	1,125	0.00	1.25	3.33	3.33	0.86	0.73	7.00	2.82
HILLSIDE CT	1,125	1.67	1.25	2.00	2.00	0.90	0.74	6.00	2.82
HILLVIEW RD	900	1.00	1.25	4.00	4.00	0.40	0.38	14.50	1.10
HOLLY ST	675	0.17	0.67	5.00	5.00	2.08	1.58	5.50	1.33
HOPKINS ST	1,001	1.25	0.86	4.52	4.52	1.28	0.91	5.66	1.29
HOWE ST	900	1.00	0.75	4.00	4.00	5.28	1.63	2.00	1.93
I80 EAST (OFF RAMP) GILMAN HWY	3,400	0.33	2.87	4.00	9.00	0.25	0.04	4.00	2.11
I80 EAST (ON RAMP) ASHBY HWY	1,700	0.33	2.67	2.33	7.33	0.01	0.00	4.67	2.11
I80 EAST (ON RAMP) GILMAN HWY	3,400	0.33	2.87	4.00	9.00	0.15	0.02	4.00	2.11
I80 EAST HWY	11,250	0.65	2.67	4.00	5.25	0.74	0.08	4.13	2.11
I80 W FRONTAGE RD	1,294	0.42	2.69	5.00	5.00	0.58	0.12	4.00	2.11
I80 WEST (OFF RAMP) ASHBY HWY	3,000	0.38	2.67	3.25	8.25	0.00	0.00	4.00	2.07
I80 WEST (OFF RAMP) GILMAN HWY	3,400	0.33	2.67	4.00	9.00	0.12	0.02	4.00	2.11
I80 WEST (ON RAMP) ASHBY HWY	2,700	0.71	2.67	3.00	8.00	0.01	0.00	4.50	2.11
I80 WEST (ON RAMP) GILMAN HWY	3,400	0.33	2.67	4.00	9.00	0.19	0.03	4.00	2.11
I80 WEST HWY	11,925	0.63	2.67	4.00	5.00	0.68	0.07	4.10	2.11
IDAHO ST	900	0.75	1.67	4.50	4.50	0.94	0.75	6.25	2.12
INDIAN ROCK AVE	825	1.33	1.25	4.00	4.00	1.07	0.96	9.83	1.06
JAYNES ST	1,125	0.17	0.67	4.50	4.50	1.03	0.90	6.50	1.33
JEFFERSON AVE	1,170	0.53	1.27	5.60	5.60	1.76	1.49	4.80	1.70
JONES ST	1,029	0.19	2.01	5.71	5.71	1.54	0.70	3.14	1.95
JOSEPHINE ST	1,061	0.33	0.74	5.14	5.14	1.95	1.21	7.14	1.34
JUANITA WAY	675	1.17	0.67	4.00	4.00	1.68	1.34	5.00	1.35
JULIA ST	1,125	0.00	0.67	5.00	5.00	1.80	1.43	5.50	2.26
KAINS AVE	932	0.05	0.81	5.71	5.71	1.70	0.95	2.14	1.35
KEELER AVE	816	1.54	1.25	4.31	4.31	0.90	0.82	13.81	1.09
KEITH AVE	720	0.57	1.25	4.20	4.20	1.08	0.97	12.20	1.10
KELSEY ST	1,125	0.33	0.75	4.00	4.00	1.25	0.94	5.00	1.74
KENTUCKY AVE	750	1.89	1.25	3.33	3.33	0.88	0.81	15.67	1.06

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KEONCREST DR	900	1.25	0.67	3.50	3.50	1.18	0.91	5.00	1.35
KING ST	859	0.00	1.03	5.45	5.45	2.32	1.59	5.45	2.27
KITTREDGE ST	900	0.89	0.67	4.67	4.67	7.43	2.08	2.33	3.31
LA LOMA AVE	881	0.94	1.25	4.58	4.58	0.92	0.86	7.50	1.61
LA VEREDA RD	1,125	1.67	1.25	4.00	4.00	0.64	0.60	8.50	1.65
LASSEN ST	900	0.67	1.25	4.00	4.00	0.95	0.78	8.00	1.27
LATHAM LN	675	2.00	1.25	4.00	4.00	0.92	0.85	13.00	1.10
LAUREL LN	788	1.83	1.25	5.00	5.00	1.52	1.12	9.00	1.20
LAUREL ST	1,125	1.33	1.25	4.00	4.00	0.72	0.66	10.00	1.10
LE CONTE AVE	900	0.48	1.25	4.89	4.89	1.16	1.00	5.89	1.79
LE ROY AVE	1,125	0.67	1.25	3.00	3.00	0.78	0.71	8.00	1.24
LEROY AVE	750	0.85	1.25	4.56	4.56	1.37	1.24	7.11	1.55
LEWISTON AVE	1,125	0.00	0.75	4.00	4.00	1.06	0.74	6.00	1.20
LINCOLN ST	1,069	0.50	0.67	4.75	4.75	1.35	1.09	5.50	1.62
LINDEN AVE	900	0.67	0.75	4.00	4.00	1.65	1.19	3.00	1.20
LORINA ST	450	0.33	0.75	4.00	4.00	5.14	2.76	3.00	2.10
LOS ANGELES AVE	1,097	0.63	1.25	3.88	3.88	0.95	0.82	8.00	1.19
MABEL ST	813	0.51	1.44	5.38	5.38	1.66	1.32	4.54	2.26
MADERA ST	1,050	0.89	0.67	4.00	4.00	0.77	0.52	6.33	1.20
MAGNOLIA ST	675	0.67	0.75	4.00	4.00	1.91	1.40	3.00	1.20
MARIN AVE	2,033	2.01	1.10	4.88	4.88	0.74	0.66	9.04	1.09
MARINA BLVD	1,238	0.00	2.77	2.25	2.25	0.03	0.02	5.75	2.11
MARIPOSA AVE	1,125	0.17	1.25	4.00	4.00	0.98	0.84	9.00	1.27
MARTIN LUTHER KING JR WAY	3,059	1.17	0.91	5.32	5.32	1.94	0.70	4.43	2.33
MARYLAND AVE	675	2.50	1.25	4.00	4.00	0.85	0.78	16.50	1.06
MATHEWS ST	996	0.57	1.67	5.71	5.71	1.68	0.96	4.00	2.32
MAYBECK TWIN DR	450	3.00	1.25	2.00	2.00	1.55	1.44	8.00	1.24
MC GEE AVE	1,021	0.72	0.71	5.46	5.46	2.90	1.56	5.62	1.77
MC KINLEY AVE	1,069	0.67	0.92	5.50	5.50	5.46	1.82	4.25	1.70
MCMILLIAN RD	1,141	0.67	1.25	4.00	4.00	0.05	0.04	10.07	2.69
MENDOCINO AVE	788	2.50	1.25	3.00	3.00	1.35	1.09	9.00	1.06

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
MENLO PL	788	1.42	1.25	4.00	4.00	0.99	0.90	11.25	1.20
MERCED ST	1,125	1.00	0.67	5.00	5.00	0.88	0.66	7.00	1.20
MICHIGAN AVE	900	1.58	1.25	4.00	4.00	0.96	0.89	15.25	1.06
MIDDLEFIELD RD	844	1.42	1.25	3.25	3.25	0.56	0.52	15.25	1.10
MILLER AVE	798	2.09	1.25	4.36	4.36	0.98	0.89	13.64	1.10
MILLER RD	675	1.67	1.25	4.00	4.00	0.91	0.84	13.00	1.10
MILVIA ST	885	0.80	0.75	5.48	5.48	5.94	2.03	4.77	2.30
MINING CIR	600	0.00	0.75	4.00	4.00	0.56	0.41	6.33	3.30
MIRAMAR AVE	675	0.67	0.67	4.00	4.00	1.40	0.92	7.00	1.20
MIRAMONTE CT	1,125	0.67	0.67	2.00	2.00	0.98	0.71	6.00	1.33
MODOC ST	1,125	0.00	0.67	4.00	4.00	1.07	0.66	6.00	1.20
MONTEREY AVE	1,041	0.29	1.17	5.50	5.50	0.85	0.72	6.88	1.21
MONTROSE RD	788	3.00	1.25	5.00	5.00	1.20	1.06	12.00	1.06
MOSSWOOD RD	990	1.60	1.75	2.00	2.00	0.57	0.37	7.80	2.92
MUIR WAY	900	1.67	1.25	4.00	4.00	0.56	0.51	13.00	1.10
MURRAY ST	900	0.00	1.67	4.00	4.00	2.04	0.65	2.50	2.11
MY WAY	450	1.67	1.25	2.00	2.00	0.92	0.84	17.00	0.89
MYSTIC ST	1,125	0.00	1.45	2.00	2.00	0.63	0.44	6.00	1.20
NAPA AVE	1,125	1.00	1.17	4.00	4.00	1.04	0.88	9.00	1.27
NEILSON ST	844	0.75	0.81	5.13	5.13	1.06	0.90	6.38	1.27
NEWBURY ST	675	0.33	0.75	4.00	4.00	3.28	1.71	3.00	2.10
NOGALES ST	1,125	0.00	1.25	4.00	4.00	0.56	0.45	6.00	1.20
NOGALES ST PATH	1,125	1.00	1.25	4.00	4.00	0.48	0.38	6.00	1.20
NORTH ST	1,125	0.00	0.96	2.00	2.00	0.94	0.86	7.00	1.54
NORTH VALLEY ST	1,125	0.00	1.87	2.00	2.00	1.31	0.85	5.00	3.26
NORTHAMPTON AVE	900	2.67	1.25	4.00	4.00	1.15	1.06	13.00	1.06
NORTHGATE AVE	788	1.00	1.25	3.00	3.00	0.85	0.77	12.00	1.24
NORTHSIDE AVE	1,125	0.78	0.67	3.33	3.33	1.05	0.92	4.67	1.35
OAK KNOLL TER	1,013	1.00	0.75	3.50	3.50	0.75	0.54	6.00	1.74
OAK ST	525	1.78	1.25	4.00	4.00	1.54	1.36	10.33	1.10
OAKRIDGE RD	675	0.33	1.25	2.00	2.00	0.81	0.62	4.67	1.20

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
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OAKVALE AVE	788	0.00	1.20	4.00	4.00	1.71	1.34	5.00	1.20
OLYMPUS AVE	675	2.00	1.25	3.60	3.60	0.64	0.62	14.40	1.41
ORDWAY ST	1,013	0.67	1.17	5.25	5.25	1.26	0.98	5.00	1.35
OREGON ST	853	0.74	0.90	5.53	5.53	2.66	1.57	4.16	2.20
OTIS ST	675	0.67	0.67	4.00	4.00	3.28	1.74	3.00	2.10
OVERLOOK RD	975	1.56	1.25	3.33	3.33	0.57	0.53	13.67	1.10
OXFORD ST	2,957	0.91	1.01	5.42	5.42	1.33	0.90	5.58	2.44
PAGE ST	1,035	0.38	1.92	5.93	5.93	1.68	0.67	3.20	1.91
PALM CT	1,125	0.67	0.75	2.00	2.00	1.03	0.82	5.00	1.74
PANORAMIC PL	1,125	1.67	1.75	2.00	2.00	0.20	0.19	15.00	2.80
PANORAMIC WAY	888	1.16	1.80	3.68	3.68	0.55	0.39	10.58	2.47
PARDEE ST	788	1.00	1.67	5.50	5.50	2.69	0.69	2.50	2.11
PARK HILLS RD	855	1.30	1.25	4.20	4.20	0.63	0.60	14.20	1.10
PARK ST	750	1.00	1.00	4.00	4.00	2.03	1.70	5.33	2.32
PARK WAY	1,125	0.67	2.87	3.00	3.00	0.97	0.12	3.00	2.11
PARKER ST	931	0.44	1.12	5.59	5.59	2.34	1.50	4.34	2.30
PARKSIDE DR	996	0.05	1.25	3.57	3.57	0.65	0.55	6.71	1.20
PARNASSUS CT	900	0.17	1.25	2.00	2.00	0.50	0.48	12.50	1.24
PARNASSUS RD	750	1.11	1.25	4.00	4.00	0.68	0.66	13.00	1.24
PERALTA AVE	765	0.27	0.89	5.00	5.00	1.35	1.00	7.20	1.23
PIEDMONT AVE	900	0.96	1.09	4.16	4.16	1.47	1.05	5.60	2.50
PIEDMONT CIR	1,013	1.00	1.25	4.00	4.00	1.61	1.34	5.50	2.28
PINE AVE	1,013	0.83	0.75	5.00	5.00	1.17	0.89	3.00	1.47
POE ST	1,125	0.00	1.67	2.00	2.00	0.94	0.62	5.00	3.26
POPLAR ST	750	2.67	1.25	4.00	4.00	1.26	1.11	12.67	0.89
POPPY LN	675	1.78	1.25	4.67	4.67	1.08	0.99	12.67	1.10
PORTLAND AVE	1,013	0.58	0.85	6.25	6.25	0.95	0.73	8.00	1.20
POSEN AVE	1,013	1.08	0.67	4.75	4.75	0.80	0.61	6.25	1.16
POTTER ST	1,181	0.00	2.67	3.50	4.75	1.40	0.22	3.25	2.11
PRINCE ST	817	0.44	0.73	4.95	4.95	3.08	1.51	4.47	1.95
PROSPECT ST	1,050	0.44	1.25	4.00	4.00	1.15	0.88	7.00	2.82

Street Name	Total Capacity (vph)	Average[21] of							
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QUAIL AVE	788	1.00	1.25	5.00	5.00	0.91	0.83	12.00	1.24
QUEENS RD	638	1.00	1.25	3.83	3.83	1.05	1.00	12.67	1.24
REGAL RD	900	2.00	1.25	5.00	5.00	1.07	0.97	11.25	1.00
REGENT ST	923	0.70	0.75	5.00	5.00	4.15	1.51	3.60	1.99
RIDGE RD	1,013	0.42	1.25	6.00	6.00	1.11	0.93	5.00	1.79
RIMWAY RD	825	0.00	2.42	4.67	4.67	0.52	0.25	6.33	3.30
ROANOKE RD	900	1.17	1.25	5.00	5.00	0.46	0.42	8.00	1.20
ROBLE CT	1,125	1.67	1.25	2.00	2.00	0.22	0.19	10.00	1.20
ROBLE RD	788	0.33	1.25	3.00	3.00	0.25	0.20	7.50	1.20
ROCHDALE WAY	900	3.00	1.25	2.00	2.00	0.33	0.32	17.00	0.89
ROCK LN	600	2.33	1.25	4.00	4.00	1.54	1.38	12.33	0.89
ROOSEVELT AVE	956	0.75	0.92	5.50	5.50	6.58	2.56	5.50	1.70
ROSE ST	999	1.48	0.85	4.74	4.74	1.55	1.12	6.88	1.48
ROSEMONT AVE	675	2.00	1.25	5.00	5.00	0.76	0.69	16.50	0.89
ROSLYN CT	675	0.00	1.25	2.00	2.00	0.56	0.49	9.00	1.20
RUGBY AVE	900	1.00	1.25	4.00	4.00	0.44	0.39	17.00	1.06
RUSSELL ST	846	0.58	0.78	4.59	4.59	2.85	1.55	3.96	2.08
SACRAMENTO ST	3,595	1.09	0.94	5.32	5.32	0.44	0.36	5.16	1.94
SAN ANTONIO AVE	1,050	2.00	1.25	4.67	4.67	0.78	0.70	13.00	1.06
SAN BENITO RD	675	1.67	1.25	4.00	4.00	1.84	1.63	10.00	1.27
SAN DIEGO RD	855	1.80	1.25	3.60	3.60	0.97	0.87	12.40	1.06
SAN FERNANDO AVE	675	1.50	1.25	4.50	4.50	1.35	1.23	11.50	1.06
SAN JUAN AVE	1,125	1.33	1.25	4.00	4.00	0.85	0.79	12.00	1.06
SAN LORENZO AVE	771	1.29	0.90	5.29	5.29	1.35	0.97	8.29	1.20
SAN LUIS RD	825	1.63	1.25	4.00	4.00	0.91	0.83	13.11	1.06
SAN MATEO RD	750	2.00	1.25	2.00	2.00	1.18	1.02	10.00	1.06
SAN MIGUEL AVE	675	1.33	1.25	4.00	4.00	1.21	1.12	10.00	1.20
SAN PABLO AVE	3,800	1.95	1.60	5.02	5.02	0.44	0.23	2.70	2.15
SAN PEDRO AVE	788	1.33	1.25	4.00	4.00	1.47	1.00	8.00	1.20
SAN RAMON AVE	750	1.56	1.25	4.00	4.00	1.00	0.91	13.67	1.06
SAN ROSA AVE	1,125	1.00	1.25	2.00	2.00	0.76	0.70	10.00	1.20

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SANTA BARBARA RD	802	1.50	1.25	4.69	4.69	1.07	0.96	12.38	1.08
SANTA CLARA AVE	900	1.33	1.25	4.00	4.00	0.85	0.77	11.00	1.06
SANTA FE AVE	900	0.33	1.00	5.50	5.50	1.27	1.05	3.17	1.35
SANTA ROSA AVE	900	1.25	1.25	4.50	4.50	1.04	0.95	9.50	1.20
SCENIC AVE	788	1.04	1.25	5.25	5.25	1.98	1.70	7.50	1.51
SEAWALL DR	844	1.00	2.67	2.63	2.63	0.08	0.03	6.63	2.11
SENIOR AVE	900	1.67	1.25	5.00	5.00	0.57	0.55	14.00	1.24
SHASTA RD	844	0.83	1.25	4.06	4.06	0.74	0.68	13.00	1.17
SHATTUCK AVE	3,060	1.47	0.82	5.71	5.71	1.17	0.63	4.12	2.26
SHATTUCK PL	3,800	1.47	0.97	5.40	5.40	0.55	0.36	7.00	2.14
SHATTUCK SQ	3,800	0.00	0.67	5.00	5.00	1.22	0.34	3.00	3.31
SHORT ST	788	0.50	0.67	4.00	4.00	1.42	1.17	4.00	1.39
SIERRA ST	900	0.67	0.67	4.00	4.00	1.15	0.82	7.00	1.20
SMYTH RD	1,125	2.00	1.25	2.00	2.00	0.39	0.35	9.00	2.82
SOJOURNER TRUTH WAY	1,125	0.33	0.67	2.00	2.00	1.25	1.07	6.00	2.32
SOLANO AVE	935	0.28	0.81	5.08	5.08	1.16	0.73	6.54	1.18
SOMERSET PL	1,013	1.00	1.25	2.75	2.75	0.75	0.69	11.25	1.06
SONOMA AVE	868	0.10	0.81	4.71	4.71	1.05	0.93	7.00	1.20
SOULE RD	1,125	0.00	0.75	2.50	2.50	0.75	0.49	5.50	3.30
SOUTH DR	675	0.00	1.25	4.00	4.00	0.90	0.33	6.50	3.30
SOUTH HALL RD	675	0.00	0.75	3.50	3.50	0.70	0.23	6.50	3.30
SOUTH ST	450	0.00	0.75	4.00	4.00	1.72	1.44	6.00	1.74
SOUTHAMPTON AVE	868	1.95	1.25	3.86	3.86	0.81	0.74	12.29	1.06
SOUTHWEST ST	675	0.00	0.75	4.00	4.00	1.68	1.38	6.00	1.74
SPAULDING AVE	1,181	0.67	1.67	5.50	5.50	1.51	1.26	4.50	1.70
SPINNAKER WAY	1,125	0.00	2.67	3.25	3.25	0.00	0.00	8.25	2.11
SPORTS LN	675	0.00	1.00	4.00	4.00	1.09	0.94	7.50	1.74
SPRING WAY	675	0.33	1.25	2.00	2.00	1.74	1.55	10.00	1.24
SPRUCE ST	1,118	0.83	1.31	4.19	4.19	1.01	0.83	10.63	1.09
STANFORD AVE	3,800	0.33	1.67	4.67	4.67	0.23	0.12	7.00	2.23
STANNAGE AVE	1,125	0.05	0.67	5.43	5.43	1.46	0.89	2.43	1.35

Street Name	Average[21] of								
	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
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STANTON ST	1,050	0.33	0.67	4.00	4.00	1.90	1.65	6.00	2.25
STATION PL	1,125	0.67	1.25	2.00	2.00	0.91	0.61	7.00	1.20
STERLING AVE	725	2.30	1.25	4.00	4.00	1.05	0.94	13.67	1.10
STEVENSON AVE	788	2.83	1.25	4.00	4.00	0.75	0.67	13.00	1.10
STODDARD WAY	1,125	2.67	1.25	2.00	2.00	0.56	0.51	14.00	1.10
STUART ST	875	0.69	0.84	5.33	5.33	2.34	1.49	4.00	2.00
SUMMER ST	675	1.33	1.25	4.00	4.00	1.71	1.41	9.00	1.24
SUMMIT RD	816	1.33	1.25	3.13	3.13	0.48	0.45	13.50	1.19
SUNSET LN	731	1.67	1.25	4.00	4.00	0.71	0.66	13.50	0.97
SUNSET TRAIL	1,125	0.67	1.25	2.00	2.00	0.19	0.16	7.00	1.01
SUTTER ST	1,200	1.78	1.19	5.00	5.00	1.00	0.79	8.00	1.27
SW PL	900	0.00	0.75	4.00	4.00	0.91	0.76	6.00	1.74
TACOMA AVE	900	1.67	1.08	5.50	5.50	1.35	0.92	7.50	1.20
TALBOT AVE	900	0.00	1.33	6.00	6.00	1.61	1.26	3.00	1.35
TAMALPAIS PATH	1,125	2.00	1.25	2.00	2.00	0.52	0.47	15.00	1.10
TAMALPAIS RD	619	2.00	1.25	4.00	4.00	1.10	1.01	12.00	1.14
TANGLEWOOD RD	1,125	0.75	1.25	3.50	3.50	0.48	0.35	5.25	1.74
TELEGRAPH AVE	3,800	1.65	1.10	5.35	5.35	0.83	0.32	2.85	2.30
TERMINAL PL	1,125	1.00	0.67	2.00	2.00	3.39	0.79	3.00	3.31
TEVLIN ST	1,125	1.11	1.00	3.00	3.00	0.79	0.71	4.33	1.35
THE PLAZA DR	731	0.08	1.30	4.00	4.00	0.97	0.82	6.50	1.20
THE UPLANDS PATH	1,125	1.00	1.25	4.00	4.00	0.44	0.40	6.00	1.20
THOUSAND OAKS BLVD	839	1.55	1.11	5.27	5.27	0.88	0.83	9.55	1.16
TOMLEE DR	675	1.33	0.67	4.00	4.00	1.72	1.39	6.00	1.35
TREMONT ST	956	1.00	0.75	5.00	5.00	1.72	0.93	4.25	2.05
TULARE AVE	1,125	0.33	0.67	4.00	4.00	0.80	0.50	6.75	1.20
TUNNEL RD	1,414	2.05	1.25	4.29	4.29	0.29	0.24	5.43	1.20
TWAIN AVE	675	3.67	1.25	4.00	4.00	1.21	1.09	14.00	1.10
TYLER ST	1,125	1.00	0.67	5.00	5.00	2.01	1.61	5.50	2.27
UNIVERSITY AVE	2,814	0.98	1.61	5.08	5.15	1.14	0.39	3.27	2.19
UNIVERSITY DR	844	0.00	0.75	4.00	4.00	0.28	0.15	6.50	3.30

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
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UNNAMED UC BERKELEY PATH	844	0.00	0.75	2.75	2.75	1.19	0.56	5.25	3.30
VALLEJO ST	900	2.67	1.25	4.00	4.00	0.71	0.64	12.00	1.06
VALLEY ST	1,013	0.67	1.67	4.00	4.00	1.31	1.02	5.00	3.26
VASSAR AVE	750	1.44	1.25	3.33	3.33	0.78	0.72	15.67	1.06
VERMONT AVE	765	1.60	1.25	3.20	3.20	0.66	0.60	16.40	1.06
VICENTE RD	1,125	1.67	1.25	2.00	2.00	0.15	0.13	7.00	1.20
VINCENTE AVE	750	1.22	1.14	4.67	4.67	1.26	1.02	9.17	1.17
VINE ST	948	0.93	0.87	5.86	5.86	2.10	1.51	7.21	1.72
VIRGINIA GDNS	675	0.00	0.67	2.00	2.00	1.55	1.39	5.00	1.39
VIRGINIA ST	905	0.46	1.10	5.09	5.09	2.35	1.29	4.76	1.77
VISALIA AVE	900	1.67	1.08	4.00	4.00	0.51	0.49	10.00	1.15
VISTAMONT AVE	619	1.83	1.25	3.00	3.00	0.80	0.74	16.50	0.89
WALKER ST	1,125	0.67	0.75	4.00	4.00	1.69	0.92	3.00	2.10
WALLACE ST	1,125	1.00	1.67	4.00	4.00	1.53	0.89	4.00	2.32
WALNUT ST	968	0.83	0.93	5.10	5.10	2.37	1.53	6.70	1.98
WARD ST	979	0.70	1.09	5.05	5.05	1.79	1.19	4.00	2.21
WARRING ST	1,029	1.00	1.04	4.14	4.14	1.58	1.31	6.00	2.05
WEBSTER ST	840	0.42	0.76	4.20	4.20	4.46	1.58	3.07	1.52
WEST CIR	720	0.00	0.75	4.00	4.00	1.31	0.35	5.00	3.30
WEST CRESCENT DR	900	0.00	1.75	5.00	5.00	2.41	0.64	3.00	3.30
WEST ST	950	0.37	1.16	4.89	4.89	1.58	1.18	3.78	2.22
WHEELER ST	765	0.20	0.75	4.80	4.80	2.74	1.46	3.00	2.06
WHITAKER AVE	563	3.50	1.25	4.00	4.00	1.14	1.03	14.00	1.10
WHITNEY ST	675	0.00	0.75	4.00	4.00	1.70	1.00	3.00	2.05
WICKSON RD	750	0.00	1.08	4.00	4.00	0.77	0.27	6.00	3.30
WILDCAT CANYON RD	1,125	0.30	1.25	4.00	4.00	0.31	0.30	15.67	1.01
WILLOW WALK	1,125	0.67	1.25	2.00	2.00	0.22	0.20	7.00	1.20
WILSON CIR	225	1.67	1.25	2.00	2.00	1.29	1.25	15.00	1.24
WOODHAVEN RD	675	1.33	1.25	4.00	4.00	0.54	0.52	15.00	1.10
WOODHAVEN ST	450	1.33	1.25	2.00	2.00	0.51	0.50	16.00	1.10
WOODMONT AVE	872	1.46	1.31	3.75	3.75	0.60	0.55	15.38	0.87

Street Name	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	△ ▼	▲ ▽	▲ ▽	△ ▼	△ ▼	▲ ▽	▲ ▽	▲ ▽	▲ ▽
WOODMONT CT	1,125	2.00	1.25	2.00	2.00	0.46	0.41	17.00	0.89
WOODSIDE RD	825	1.78	1.25	4.67	4.67	0.52	0.49	14.00	1.10
WOOLSEY ST	779	0.41	1.06	4.88	4.88	3.12	1.38	4.58	1.83
YOLO AVE	1,050	0.33	1.17	4.00	4.00	1.12	0.90	8.00	1.27
YOSEMITE RD	844	2.08	1.25	4.00	4.00	1.12	1.03	10.25	1.06
I80 EAST (OFF RAMP) UNIV	1,433	0.33	2.80	3.00	7.44	1.34	0.34	3.89	2.11
UNIVERSITY AVE OVERPASS	3,393	1.56	2.65	4.48	4.91	0.66	0.18	3.26	2.11
I80 WEST (OFF RAMP) UNIV	1,438	0.08	2.67	2.50	7.50	1.05	0.20	3.50	2.11
RAMP	1,700	0.33	2.67	2.50	7.50	0.55	0.15	4.00	2.11
NORTHBRAE TUNNEL	750	0.33	1.25	7.00	7.00	1.27	1.13	8.00	1.13
I80 EAST (ON RAMP) UNIV	1,700	0.33	2.87	2.00	7.00	1.33	0.33	4.00	2.11
UNNAMED ALLEY	825	1.00	2.00	4.44	4.44	2.78	0.97	3.11	2.07
THE UPLANDS	875	0.85	1.27	4.33	4.33	0.76	0.64	6.11	1.20
EL CAMINO REAL	675	0.67	1.25	3.83	3.83	0.66	0.56	6.50	1.20
SPINNAKER CIRCLE	563	0.00	2.67	3.00	3.00	0.00	0.00	10.00	2.11
I80 WEST (ON RAMP) UNIV	1,350	0.00	2.67	3.33	8.33	1.01	0.19	4.00	2.11
UNNAMED LBL ROAD	1,125	0.33	1.25	4.00	4.00	0.31	0.29	8.00	3.30
EASTSHORE	1,125	0.67	2.87	4.00	4.00	2.08	0.44	3.00	2.11
THE CIRCLE	611	1.48	1.25	4.00	4.00	1.28	1.18	8.00	1.17
THE ALAMEDA	1,712	0.52	1.30	4.56	4.56	0.77	0.65	8.56	1.12
UNNAMED	1,044	0.28	1.21	2.72	2.72	0.57	0.29	8.20	2.92
REGAL	675	1.67	1.25	4.00	4.00	1.18	1.06	12.50	1.10
ROANE	450	1.67	1.25	4.00	4.00	1.57	1.36	12.00	1.10
UNNAMED UC BERKELEY	788	0.06	1.08	3.17	3.17	0.60	0.23	6.50	3.30
I80 EAST	12,375	0.58	2.67	4.00	4.00	0.63	0.06	4.00	2.11
PARK GATE	788	0.67	1.25	4.50	4.50	0.59	0.54	14.00	1.10
GREENWOOD COMMONS	675	1.00	1.25	2.00	2.00	1.06	0.97	9.00	1.24
THE CRESCENT	788	1.17	1.25	4.50	4.50	0.51	0.49	15.50	1.10
THE SHORT CUT	675	2.00	1.25	4.00	4.00	0.69	0.64	15.00	1.10
THE CROSSWAYS	675	2.33	1.25	4.00	4.00	0.68	0.63	14.00	1.10
THE SPIRAL	1,125	2.00	1.25	2.00	2.00	0.27	0.26	16.00	1.10

Street Name	Average[21] of								
	Total Capacity (vph)	Safety Score	Hazard Score	Connectivity	Accessibility	Congestion Score (Max)	Congestion Score (Min)	Service Score	Vulnerability Score
	▲ ▼	▲ ▽	▲ ▽	▲ ▼	▲ ▼	▲ ▽	▲ ▽	▲ ▽	▲ ▽
EASTWAY	1,125	0.00	0.75	4.00	4.00	0.44	0.35	6.00	1.74
CHILTON ALLEY	675	1.00	0.75	4.00	4.00	2.96	1.87	4.00	2.68
EASTSHORE OFF I80	1,125	0.33	2.87	3.00	3.00	1.75	0.40	4.00	2.11
MASONIC AVE	900	0.00	0.67	6.00	6.00	0.90	0.80	4.00	1.35
ALBINA AVE	1,125	0.67	1.17	4.00	4.00	0.93	0.65	6.00	1.35
WATKINS ST	1,125	1.00	0.67	4.00	4.00	0.79	0.71	4.00	1.35
HOPKINS CT	1,125	1.67	0.67	4.00	4.00	0.92	0.64	6.00	1.35