Appendix B. Existing Conditions

This Appendix includes the technical background documentation, including:

- Existing Conditions
- Plans and Policies Review
- Level of Traffic Stress Methodology
- Level of Traffic Stress Analysis

Existing Conditions

The following overview documents the regional context and baseline conditions for the GoShasta planning process. At the end of each section are key assumptions at the onset of the plan – including known challenges and opportunities that the GoShasta planning process might address.

Characteristics of the Region and the City of Redding

Natural Setting (as it Relates to Active Transportation)

Climate

The Shasta Region has a wide variety of climatic conditions that vary by season and elevation. The region's climate can be roughly divided into the Sacramento Valley, foothills, and surrounding mountainous areas.

Weather in the Sacramento Valley is well suited to walking and bicycling for much of the year. The greatest obstacles are periods of extreme heat in the summer months and periods of heavy rain from December to March. At higher elevations, cold temperatures and periods of snow and icy conditions can be prohibitive to walking and bicycling in the winter months.

Short winter days also impact the safety and the general appeal of walking and bicycling. On the shortest days, the sun rises as late as 7:43am and sets as early as 4:42pm. Reduced light combined with inclement weather affect work-related trips and other early morning/late afternoon travel.

Topography and Natural Features

The topography of the region is also diverse, ranging from just over 400 feet above sea level on the valley floor to Lassen Peak at 10,462 feet. The relatively flat Sacramento River floodplain quickly transitions to rolling foothills and then to mountain to the west, north, and east. The region's population and transportation infrastructure are largely located in the flatlands and surrounding foothills – what is commonly referred to as the South-Central Urbanized Region for planning purposes.

The region features many waterways, most of which feed into to the Sacramento River shed. Together, the region's topography and waterways serve to define and connect neighborhoods. For example, the Lake Redding and Kutras/Garden Tract neighborhoods are hemmed in by the Sacramento River and steep terrain, but are also linked to upstream and downstream neighborhoods by way of the Sacramento River Trail (see Figure B.1.).

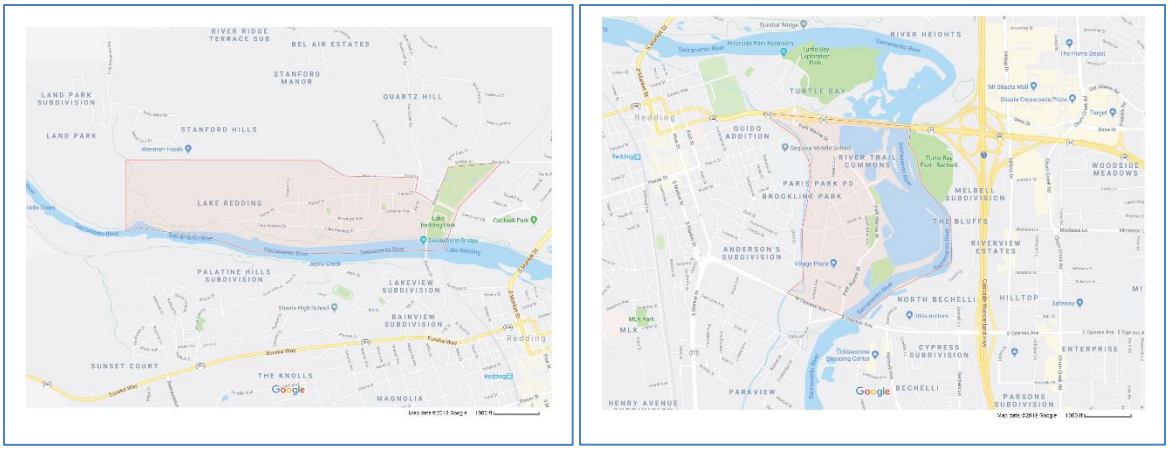


Figure B.1. Lake Redding and Kutras/Garden Tract Neighborhoods

River crossings are limited to a number of bridges designed to safely accommodate pedestrians and cyclists. The Diestelhorst, Sundial, SR 299, and Cypress Avenue bridges located in the City of Redding and the Airport Road Bridge located at the City of Anderson's northern border are examples of newer bridges that were purpose-built to enable safe and pleasant passage for pedestrians and cyclists. Many older bridges, particularly those on rural roads, have inadequate sidewalks and bike lanes.

Assumptions, Challenges, and Opportunities

Although the region's natural setting and environmental conditions are largely fixed, the GoShasta ATP should seek to take advantage of those factors that are well-suited to active transportation and mitigate for factors that represent barriers to active transportation. For example:

Climate related challenges

GoShasta should consider infrastructure, programs, and policies that enhance the safety and comfort of pedestrians and bicyclists exposed to extreme weather. Strategies may include urban tree shade cover, bicycle parking sheltered from the elements, snow removal from bike lanes, off-season programs (such as Boulder Colorado's Winter Walk and Bike Week), and strategies to increase the visibility of pedestrians and cyclists in inclement weather and low-light conditions.

Waterways

Natural corridors created by waterways can be capitalized upon to create active transportation corridors, as they allow for travel that is uninterrupted by vehicular, follows the topography of least resistance, and generally pointed toward population centers. The region should continue building upon existing corridors, such as the Sacramento River Trail, develop new corridors such as the Churn Creek corridor, and connect river trails to the roadway network.

The public's support and appetite for such projects is well-documented in the ShastaFORWARD>> Regional Blueprint and such projects have proven to be very popular in practice.

Figure B.2. Victor Avenue Bridge over Churn Creek

Where waterways need to be crossed, bridges should be designed to safely accommodate all modes of travel. Many bridges in the region were not originally designed to accommodate active transportation, such as the Victor Avenue Bridge over Churn Creek in Redding (see Figure B.2.). Fatal pedestrian versus vehicle collisions have occurred in close proximity to this bridge in 2011, 2012, and 2015. Safety improvements are in the works at this location; however, similar such locations should be identified and strategies developed to avoid walking- and bicycling-related injuries and deaths before they occur.

Bridges for the exclusive use of active transportation modes should also be considered, particularly where they give walking and bicycling a competitive advantage over vehicle trips. For example, the Churn Creek natural corridor physically separates neighborhoods from the local high school as well as neighborhood restaurants, shopping, and services (see Figure B.3.). If an active transportation corridor and active transportation bridge were provided in this example, it would provide an appealing and competitive advantage over the automobile.

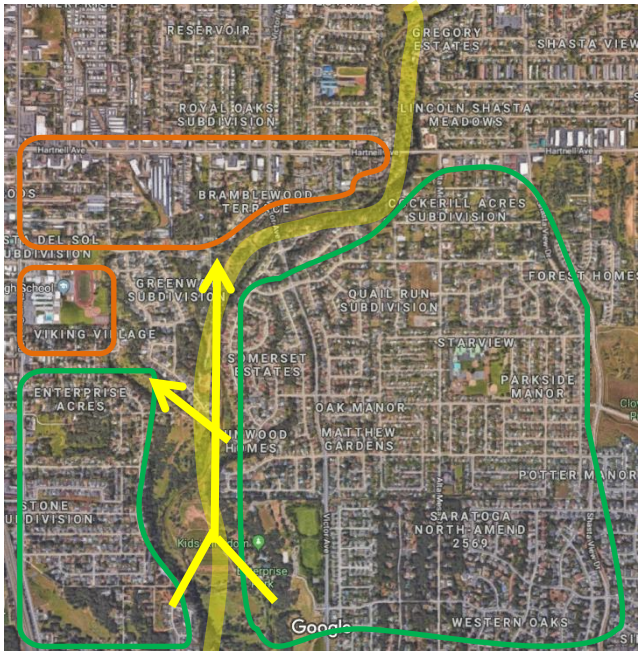


Figure B.3. Sample of missing bicycle and pedestrian connections between neighborhoods and trip destinations (Churn Creek Corridor in Redding)

Topography

Even within low-lying valley areas, there are small but significant elevation changes that discourage active transportation trips – particularly for those that are mobility limited. Walking- and bicycling-friendly communities should be evaluated to identify potential mitigation strategies, including engineering/design solutions, mapping/wayfinding guidance, and the use of 'bus-bridges' where major obstacles and trip length are prohibitive to all or some active transportation users.

A few examples of known locations with topography-related challenges include:

Approximately ¾ mile climb on Market Street, just north of Benton Drive (see Figure B.4.):

Figure B.4. Market Street at Benton Drive

Final phase of the Redding Downtown Trail loop from Downtown to Turtle Bay Exploration Park. More specifically: 1) the transition from the Redding Rodeo Grounds/Sundial Bridge Drive to Continental Street (see Figure B.5.); and 2) the transition from Continental Street to East Street (see Figure B.6.):

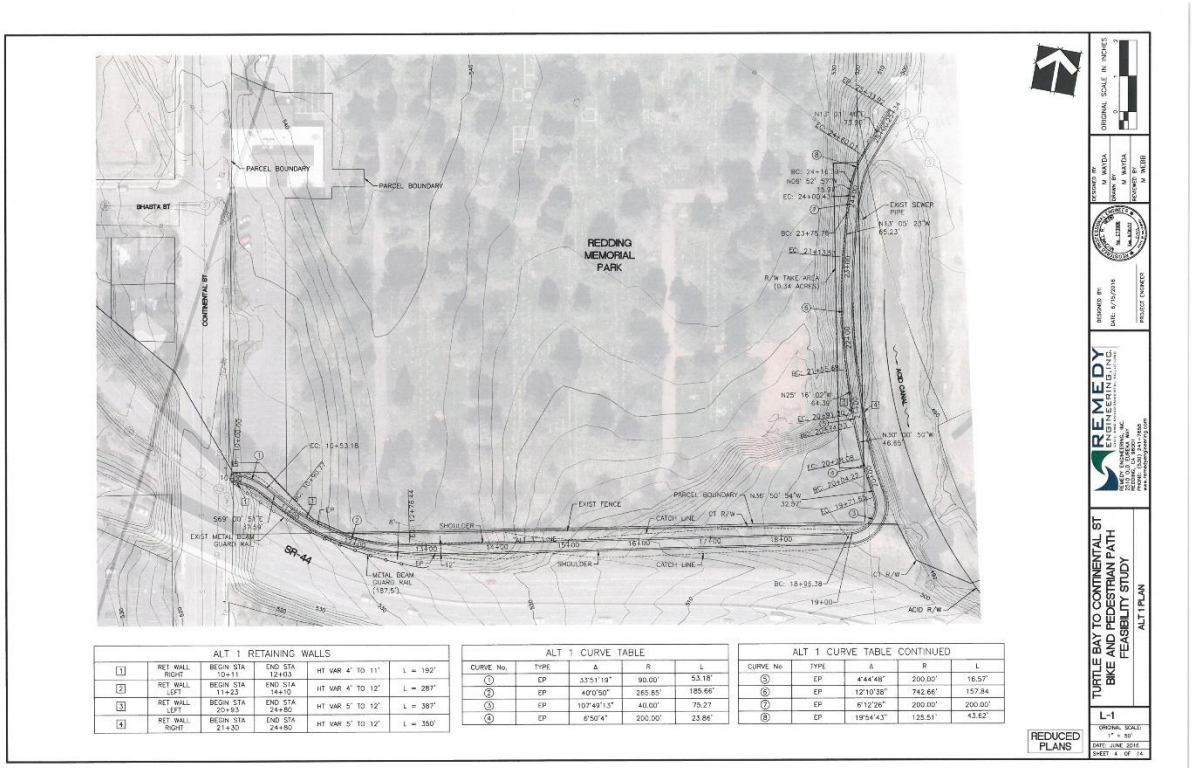


Figure B.5. Turtle Bay to Continental St Bike and Pedestrian Feasibility Study

Figure B.6. Yuba St at Continental St

Roadways with a sharp change in elevation often have reduced lane widths and may not include bicycle lanes or sidewalks. An example is the Quartz Hill Rd, north of Benton Drive (see Figure B.7.):

Figure B.7. Quartz Hill Rd North of Benton Drive

Population Characteristics

Demographic data can be used to better understand and respond to the varying ability levels that the transportation system must serve and the level of dependency on alternative travel modes. Such data viewed over time can then be used to measure the effectiveness of regional policies, programs, and projects.

At the project level, it is helpful to have a spatial understanding of these demographics, preferably at the Census Block Group or neighborhood level. A 'Disadvantaged Community Analysis' was recently performed by SRTA, with findings incorporated findings into the 2015 Regional Transportation Plan (see Figure B.8. for map). SRTA utilized Census data to identify areas that have a markedly higher share of individuals challenged by the cumulative impact of:

- Poverty and unemployment;
- Lack of mobility options, including access to automobile, active transportation, and public transportation;
- Housing and transportation cost burden;
- Single parent households;
- Young and elderly;
- Educational attainment;
- Linguistic isolation; and
- Minority status

Portions of each incorporated city and several rural communities are highlighted as disadvantaged in the map below. Due to the size larger size of census tracts in rural areas, it is difficult to pinpoint the exact location of such populations. Project specific outreach and household travel surveys are needed in rural communities and disadvantaged communities to assess community needs at a more granular level.

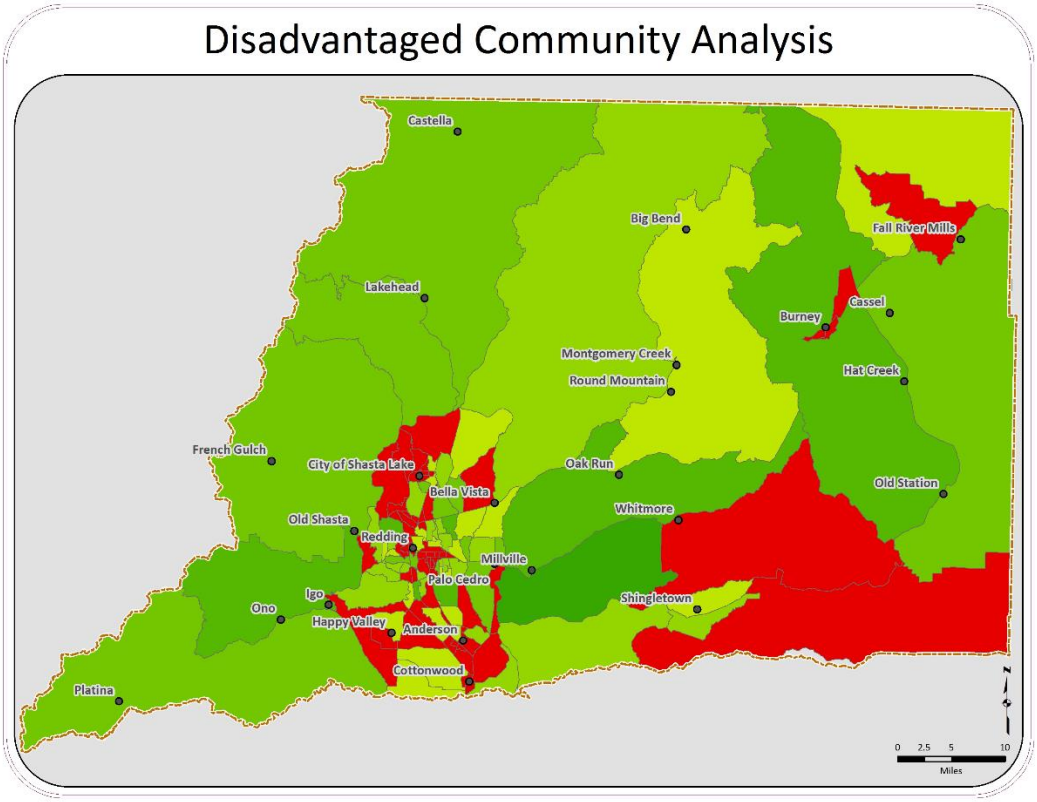


Figure B.8. Disadvantaged Community Analysis Map

Built Environment/Setting Affecting Active Transportation

The region's past is characterized by rural industry and rural development patterns. Population growth has historically been slow (<2%) with the exception of several 'boom' periods associated with construction of the Shasta Dam (1938-1945), the timber industry (1950s through the early 1970s) and retail and housing construction (late 1980s and early 1990s). The latter resulted in a greatly expanded urbanized area.

Population distribution among the four jurisdictions in the region are as follows:

Jurisdiction	Estimated Population (2016 Census)	Number of households (2011-15)
County of Shasta (unincorporated areas)	67,429	69,375
City of Redding	91,808	35,436
City of Shasta Lake	10,162	3,879
City of Anderson	10,232	4,007

Figure B.9. Total Population and Households by Jurisdiction

As of 2015, the Shasta Region is home to nearly 180,000 residents. Public lands constitute nearl 50% of the region's land area, including 34% federally-owned lands. An additional 14% is farm lands. Much of the remaining land area continues to be rural. The average of 47 persons per square mile in the Shasta Region compared to 239 persons per square mile statewide.

The Redding Urban Area – as defined by the U.S. Census and generally falling along the south county Interstate 5 corridor – is more densely populated. It represents only about 2% of the county's total land area, yet is home to over 66% of the county's population. Even this is area is largely rural and suburban in nature, having 1,625 persons per square mile (2.5 persons per acre). Compared to other Urban Areas in Northern California and surrounding regions, the Redding Urban Area has the most dispersed population (see Figure B.10.).

Figure B.10. Redding Urban Area Population Density Comparison to Similar-sized Urban

Urban Area	Pop (2010)	Pop/ Square Mi	Pop/ Acre
Redding, CA	**117,731**	**1,625**	**2.5**
Grants Pass, OR	50,520	1,838	2.9
Medford, OR	154,081	2,372	3.7
Reno, NV/CA	392,141	2,377	3.7
Carson City, NV	58,079	2,509	3.9
Chico, CA	98,176	2,849	4.5
Yuba City, CA	116,719	2,990	4.7
Santa Rosa, CA	308,231	3,138	4.9
Woodland, CA	55,513	4,551	7.1
Davis, CA	72,794	5,145	8

Land use in the Shasta Region is largely segregated and designed with vehicle access as the primary and priority mode of travel. SRTA performed extensive spatial analysis during the development of the Shasta*FORWARD*>> Regional Blueprint and Sustainable Communities Strategy. While these analyses were part of a greater planning process that included additional subjective factors, the underlying analysis remains relevant to planning active transportation facilities.

The Neighborhood Dynamic Scale (NeDS), for example, is GIS-based spatial analysis created to assess a neighborhood's receptivity to change by measuring and combining the following influences:

- Economic activity – as defined by number of new business licenses awarded;
- Land use homogeneity – meaning the diversity of land use types and a higher degree of self-containment – i.e. employment, shopping, commercial services, schools, and other common destinations are generally present within the boundaries each area. This can be combined with intersection density as a measure of connectivity and scale, both of which are critical to active transportation accessibility.
- Vacant and underutilized parcels – as defined by parcels that have not been developed or that have assessed improvements valued markedly lower than surrounding parcels. Areas with more vacant and underutilized land indicate the opportunity and market for infill and redevelopment.

The tool was used to screen the region's neighborhoods for consideration as strategic growth areas – locations where various policies, programs, and investments could be layered to influence travel behavior.

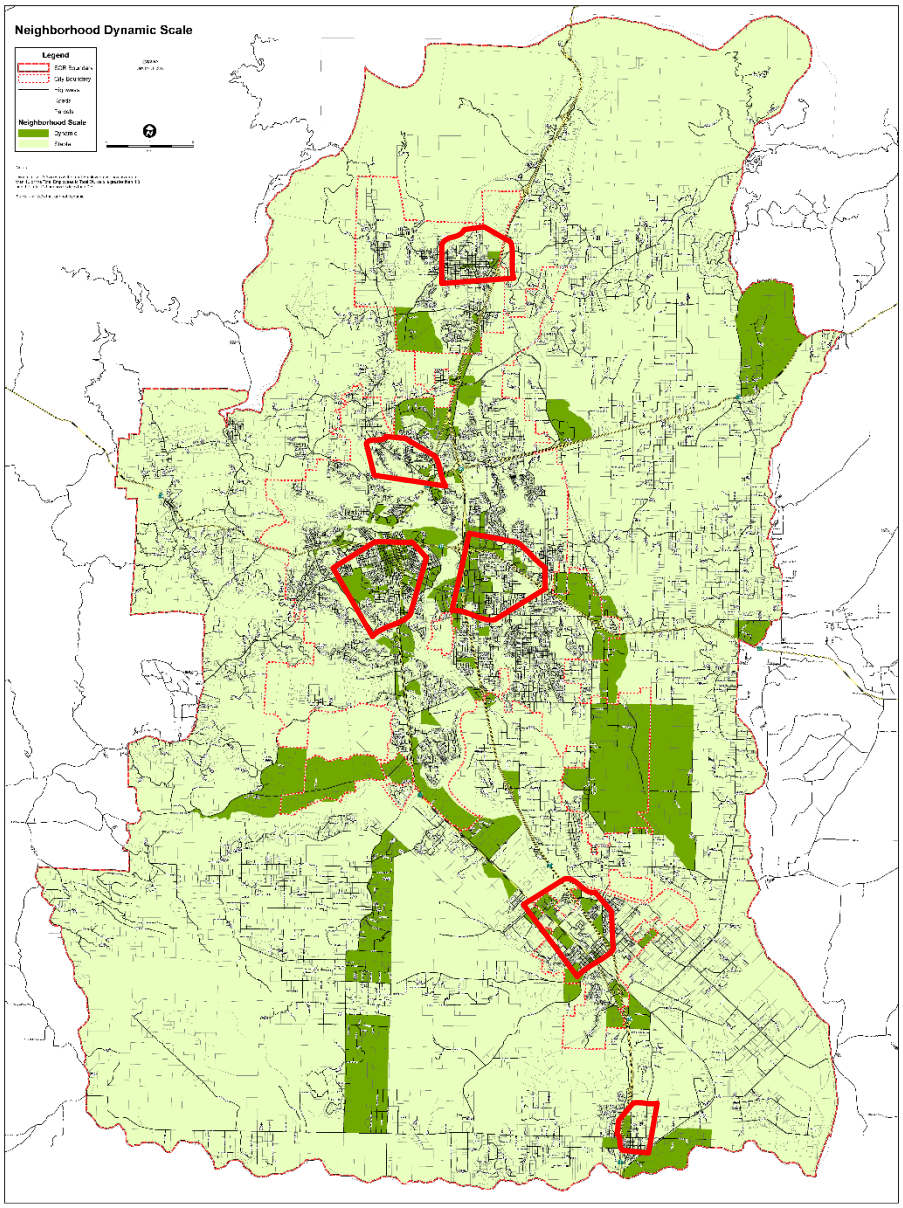


Figure B.11. Neighborhood Dynamic Scale Map

Discounting largely undeveloped Census Blocks skewed by limited data, areas indicated on Figure B.11. and described below stand out as locations that would most benefit from and be best served by active transportation improvements:

1. Central Shasta Lake, including Strategic Growth Area and surrounding neighborhoods.
2. North Redding, including Lake Boulevard area.
3. Central Redding, including Downtown Redding SGA and surrounding neighborhoods (Kutras, Garden Tract, Lake Redding, Parkview, and west of Downtown neighborhood?)
4. Redding Hilltop-Enterprise –
5. Central Cottonwood, including Strategic Growth Area and surrounding neighborhoods.
6. Central Anderson, including Strategic Growth Area and surrounding neighborhoods.

Such locations also have more of the ingredients that have been extensively researched and known correlate with lower vehicle miles travelled and higher mode share for transit and active transportation trips. These ingredients are known as the 'D' factors:

The 'D' Factors – The key variables known to effectively reduce vehicle miles traveled have been extensively researched and verified through observed data. These variables, summarized below, are commonly known as the five 'D' factors. In the Shasta Region, achieving the necessary combination and critical mass of 'D' factors are a challenge given the dispersed development patterns, segregation of land uses, limited access to practical travel alternatives, and slow growth rate. Furthermore, no single 'D' factor by itself will yield reduction in automobile dependency; rather, it is the combination of factors and the degree to which they are present in a given area.

- Density – the number of persons, jobs or dwellings in a given area;
- Diversity of land use – the number and variety of different land uses in a given area;
- Design of streets and development – the average block size, number of intersections, sidewalk coverage, building setbacks, street widths, pedestrian crossings, and other factors that result in a more human-scale environment;
- Destination accessibility – the number of common destinations (e.g. job sites, schools, shopping, etc) within a given travel time; and
- Distance to transit – the distance from home or work to the nearest transit stop by the shortest street route.

Transit Services

Whereas all transit trips begin and end as an active transportation trip, connections to public transportation is a high-priority focus of the GoShasta planning process. Transit is provided by RABA and a number of specialized services for the elderly and persons with disability.

Conventional transit services continue to evolve in response to the Unmet Transit Needs process carried out pursuant to the Transportation Development Act, which provides the bulk of the region's transit funding.

In addition to conventional transit services, SRTA seeks to develop and apply the concept of on-demand transit, which utilizes smart phone applications, GPS vehicle tracking, and advanced dispatching software to provide individualized mobility service. Upon deployment, an individual will be able to summon a point-to-point trip. Pilot projects are being considered for Sunday service and extended service in the city of Shasta Lake.

Objectives of the on-demand transit initiative include transit efficiency (only operating transit service when and where is needed) and transit effectiveness (transit service that better meets individual mobility needs). It is unknown at this time what impact this will have on transit usage and behavior (or any

potential secondary impacts on walking and bicycling activities); however, it is hoped that these improvements will specifically attract more choice riders (i.e. those that have access to an automobile, but choose alternative modes) – a market segment that has to date been largely uninterested in transit.

Policy Setting

As a policy, SRTA seeks to improve conditions for all residents and travelers; however, given limited resources and the potential for measurable improvements, it is SRTA's policy to strategically focus and layer the larger share of efforts and resources from state, regional, and local partners within small geographic areas.

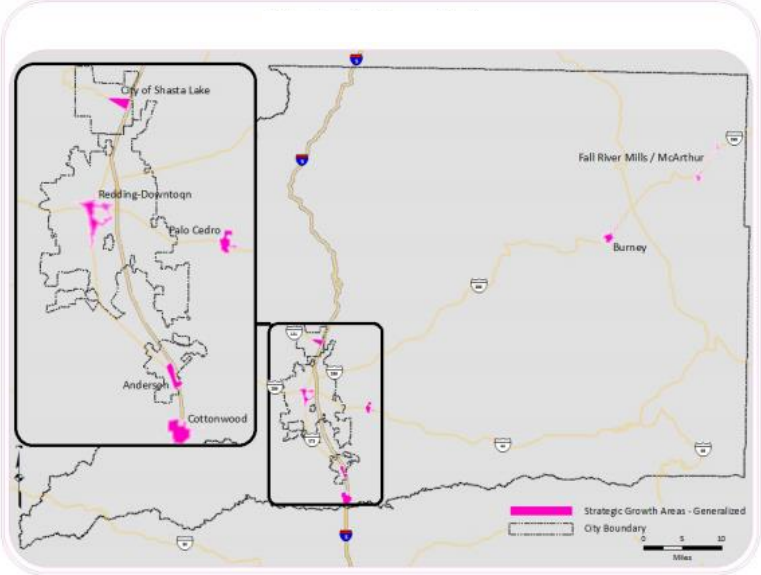


Figure B.12. Strategic Growth Areas (SGAs)

Applying the aforementioned 'D' factors a little here and a little there over a predominately rural region such as Shasta County would provide marginal return-on-investment. Layering many strategies within geographically small areas should yield measurable transportation efficiencies while at the same time reinforcing local planning and economic development objectives. In the context of Shasta County, it is recognized that some the 'D' factors will be more appropriate and effective than others depending on the community and neighborhood. Consultation and coordination with local agencies is essential in selecting the right mix and intensity of activities.

The most likely candidate locations for application of the five 'D' factors are existing urban centers and corridors – locations where some measure of the 'D' factors is already present; where the necessary infrastructure is largely in place; and where existing local plans permit an appropriate range and intensity of land uses. Such locations are also where the community is more receptive to change.

To this end, SRTA worked alongside local agencies to identify small geographic areas known as 'Strategic Growth Areas' (SGAs) (see Figure B.12.). Within SGAs, it is intended that regional and local policies, programs, and investments be jointly focused and private sector investments be leveraged to achieve measurable sort-term progress – if not cumulatively across the region, at least within designated focus areas.

In addition to SGAs, other target areas include: 1) contiguous corridors, 2) connections to/from SGAs, and 3) locations that have the ingredients for increased active transportation (i.e. the have a measure of the 'D' factors and places that have showed up in previous spatial analyses such as NeDS, land use homogeneity, and vacant and underutilized parcels).

Areas not included in these focus areas may call for different active transportation priorities and alternative strategies for meeting local needs. For example, the focus may be more on safe routes to schools and connections to local commercial areas rather than an expansive network of connected

facilities. In addition, land use strategies might be employed as a first step toward a more walkable and bikable neighborhood or community.

The 2015 RTP for the Shasta Region provides the following overview of active transportation from a policy perspective:

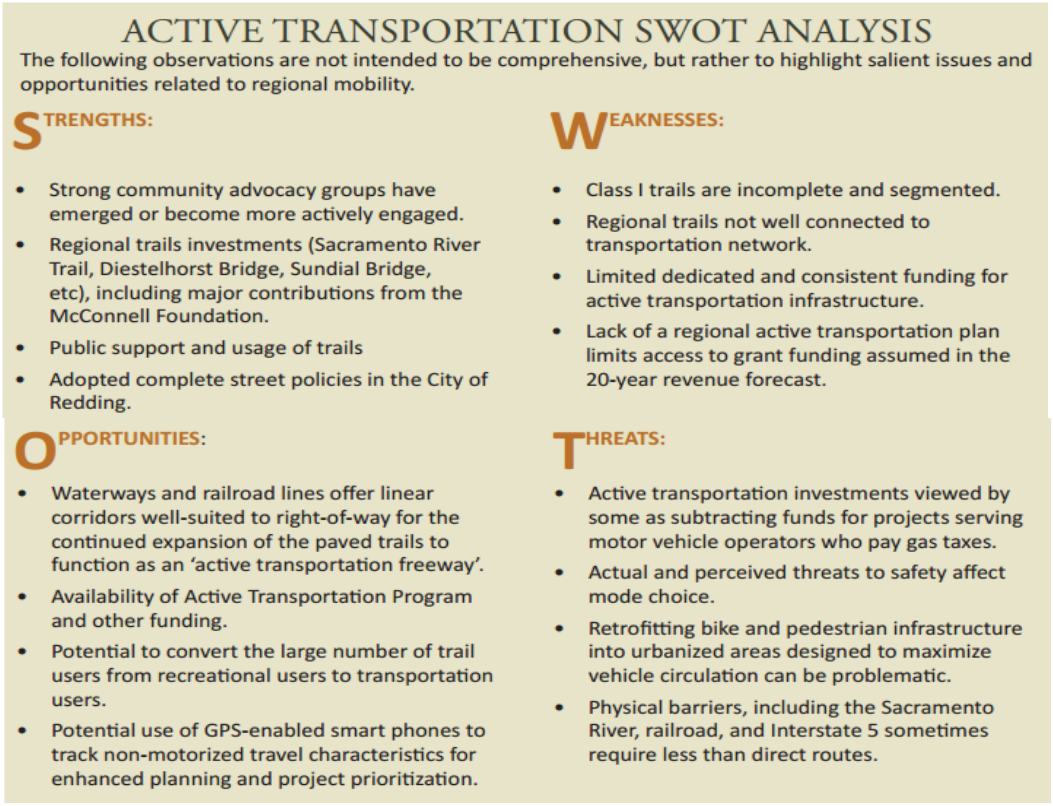


Figure B.13. Active Transportation SWOT Analysis from the 2015 RTP

One of the major pillars to the region's Sustainable Communities Strategy is the accelerated delivery of active transportation investments in Strategic Growth Areas. These improvements include incremental improvements to existing facilities and a new generation of non-motorized transportation expressways that connect communities and SGAs with commerical and employment trips destinations.

Additional information on biking and walking throughout Shasta County can be found online by a variety of resources, including:

- SRTA's Bike and Pedestrian Planning web page;
- Healthy Shasta's 'Be Active' web page;
- City of Redding's Community Services website;
- City of Anderson's Community Services website;
- City of Shasta Lake's Parks & Recreation website Accomplishments since last RTP; and
- 2010 Shasta County Bicycle Transportation Plan (adopted June 2010).

The League of American Bicyclists has recognized the city of Redding as a 'bronze' level bicycle friendly community, meaning that the community is addressing the Five E's consistently found in great bicycling

communities: Engineering, Education, Encouragement, Enforcement, and Evaluation & Planning. By strengthening or expanding efforts in these areas, the City of Redding may become increasingly friendly to bicyclists and earn the status of a silver, gold, platinum, or diamond level community. The City of Anderson, City of Shasta Lake, and rural unincorporated communities have not been similarly recognized; however, each community has the opportunity to be distinguished as walkable, bikable, and vibrant. Friendly competition between communities is encouraged and supported.

SRTA's greatest ability to influence bicycle and pedestrian mode share and safety is through planning and capital funding of infrastructure. In addition, SRTA provides administrative support and technical assistance when pursuing and managing grant funds utilized for capital improvements, education and promotional activities.

A good portion of active transportation facilities in the region have been realized in an opportunistic manner – meaning that active transportation was not the driving objective of the improvements, but rather piggy-backed onto a larger roadway maintenance, capacity increasing, or safety projects. Active transportation improvements may also be 'spot fixes', such as site access as a condition of development permitting or in response to a fatal collision involving a pedestrian. As a result, the active transportation 'system' is more a collection of bits and pieces than a connected and contiguous network tied to an overarching vision. In addition, facility design standards may vary within and between communities.

Predictability is paramount to a pleasant and safe experience – from the perspective of both active transportation and motor vehicle users. Consistent and predictable active transportation facility design standards serve to validate the presence of active transportation users. Without predictability, users are forced to make up their own rules. Often this means bicycling against the flow of traffic or other dangerous behavior. This is not to say that active transportation facility standards should be standardized to the point of being inflexible to the local context or inseparably attached to a roadway's functionality as a motor vehicle corridor.

An existing priority going into the GoShasta process is enhanced connectivity between the region's trails and the urban network. The region's dedicated, Class I active transportation facilities are largely recreational in nature, and will continue to be so until such time as the segments can be connected and linked to trip origins and destinations located on the roadway network. Once connected, various programs may be employed to convert the large community of recreational walkers and bicyclists to utilitarian/transportation trips. This objective was most recently explored in partnership with the Shasta County HHSA, resulting in the 'Redding Area Analysis of Gaps Between Trails and On-Street Bikeways' report, completed May 2016.

Types of Users

The following types of users have been identified, but are not exclusive of one another – meaning that individuals may fall into multiple user groups at any given time.

- Choice users – i.e. those that have access to an automobile but that choose walking and bicycling for a variety of reasons. These users are generally more confident and resourceful when navigating and overcoming obstacles and challenges.

- Dependent and disadvantaged users – i.e. those that rely upon walking and bicycling because it is the only available option. These users may not have a driver's license, access to an automobile, or be able to afford other options.

- Transportation user – i.e. those that walk and bike to accomplish a task such as work, shopping, school, etc. These users often benefit from destinations that support active transportation (e.g. provide secure parking, showers, etc) and are likely to have a back-up plan for unscheduled travel needs should an emergency or other need arise.

- Recreational users – i.e. those that walk or bicycle for pleasure, including for exercise and social interaction. Depending on where such individuals live and the immediate surroundings, they may choose to walk or bike from their home. Often, they must first drive to a trailhead or other similar destination. These users are viewed as one of the most likely groups in the region to target for converting vehicle trips to active transportation trips.

- Latent/potential users – i.e. those that would walk or bike if not for a specific obstacle or obstacles, such as the lack of safe facilities, long distances, lack of confidence, etc. These users may require one-on-one contact and a personal guide/instructor able to safely introduce the user to active transportation modes without fear or anxiety.

Data on Current Usage, Behavior, and Trends

Data is critical to effective to all types of planning and the development of meaningful policies, programs, and projects. The reality is that data is never complete, up to date, accurate, and accessible. The GoShasta effort, like any other planning effort, is based on the best available data. That said, even the best data on active transportation usage, behavior, and collisions for the Shasta Region is skimpy. A dedicated data collection program exists at the regional and local level to measure vehicular travel on streets and roads in order to satisfy federal requirements for data reporting and travel demand modeling capabilities; however, no such mandate or data collection program exist for active transportation data in the region.

The best available local active transportation usage data for the Shasta Region is generated by the Shasta County Health and Human Services Agency in collaboration with Healthy Shasta. Each year, public health professionals and community partners carry out bicycle and pedestrian counts at a number of set locations. Most of the data is collected on a volunteer basis. The data collected is not comprehensive, but has been collected routinely and consistently over a period of time. It allows planners to assess trends and draw reasonable conclusions when combined with other data sets, including but not limited to spatial data on trip destinations; disadvantaged communities; land use; and collision data. This data may then be augmented with anecdotal information and field observations.

The ShastaSIM regional travel demand model is often cited as the 'source' when reporting current and future active transportation mode share. The modeling script is based on technical studies and field research performed outside the region, adjusted as needed to reflect local data and conditions. A travel model is only as precise as the data input into the model, and even the most advanced model is not sensitive to all factors influencing active transportation mode choice. Manual adjustments need to be made to replicate observed data and local knowledge. ShastaSIM is an invaluable tool that could be even more useful if supported by a robust active transportation data collection program. If collected, the data would serve as both an input and a post-modeling tool for fine-tuning and validating modeling accuracy over time.

Forecast Daily VMT (region and per capita) According to the ShastaSIM regional travel model, total daily vehicle miles traveled in Shasta County will increase by approximately 32% between 2005 and 2035. Daily

per capita vehicle miles traveled in Shasta County will, however, remain relatively steady, increasing by only 6% over the same period.

Residents living in the unincorporated regions of Shasta County have the highest VMT per capita (25.4), followed by Shasta Lake (18.1), Anderson (17.2), and then Redding (15.0) (see Figure B.14.). When comparing overall household VMT, Shasta Lake accounts for the smallest percentage (5%), followed by Anderson (6%), Redding (41%) and the unincorporated region of Shasta County (48).

B.14. Total Daily VMT and VMT/Capita

Year	Total Daily VMT[1]	VMT/Capita[1]
2005	5,606,121	26.81
2020	6,171,441	26.88
2035	7,390,629	28.51

[1]Results from ShastaSIM travel model reflect the current growth trend of the region without changes resulting from the 2015 RTP. Includes all trips types (inter-regional, intra-regional & through-trips).

Daily trips per household and trip lengths Using only those trip categories that are subject to SB 375, average daily VMT per household in 2005 was 47.5. It is projected that this will decrease approximately 1% to 47.2 miles by 2035. In the year 2035, it is forecast that residents in Anderson will make the most trips per household (6.6), followed by Redding and unincorporated Shasta County household (6.4). City of Shasta Lake household will make the fewest trip on average (6.0). Although the number of trips per household is fairly consistent across the region, the average trip length is substantially different. Region wide in 2005 the average trip length is 7.4 miles. Due to the relative proximity to everyday destinations, City of Redding residents traveled the least per trip at 5.3 miles. On the other hand, residents in the rural unincorporated area of the County travel farthest, averaging 10.6 miles per trip.

Safety and Collision Analysis

The primary source of collision data is obtained via SWITRS. SWITRS is not comprehensive and has considerable lag time, but it is the best available data. One thing it does not document is near-misses. For this reason, residents of City of Boulder Colorado can fill out an online 'near-miss' form to bring dangerous areas and conditions to light before a collision and related property loss, injury, or death.

Collisions with significant injury or death are typically covered by local news media. For the last few years, SRTA has monitored and documented newspaper coverage of such incidents. These have not been logged in any way, but are reviewed and referenced when considering the location and design of active transportation improvements with a regional funding component. Pedestrian and bicycle crash maps using 2011-2015 SWIRTS data can be viewed at the end of this section (Figures B.15. through B.19).

Care should be taken not to base project priority too heavily on the collision data without data necessary to determine collision rate per unit volume of walking and bicycling trips.

Perceived safety is a significant factor (possibly even more so than actual statistical data) in influencing the active transportation behavior.

- There is a high community interest is safety due to a string of violent assaults on pedestrians and bicyclists on regional trails.

When considering future data collection, the following information would be most useful:

- In addition to active transportation data from more locations, information is needed regarding trip origins, destinations, and route selection. Factors that influence active transportation usage patterns is much different than those factors affecting individuals operating motor vehicles. For example, a vehicle trip may prioritize speed/trip time, whereas a cyclist may favor routes based on comfort, a feeling of safety, and trip distance.

- Trip purpose – regional trails are popular for recreational trips. The opportunity exists to convert recreational walkers and cyclists to transportation. To do this is to better connect trail corridors such as the Sacramento River Trail to the transportation network.

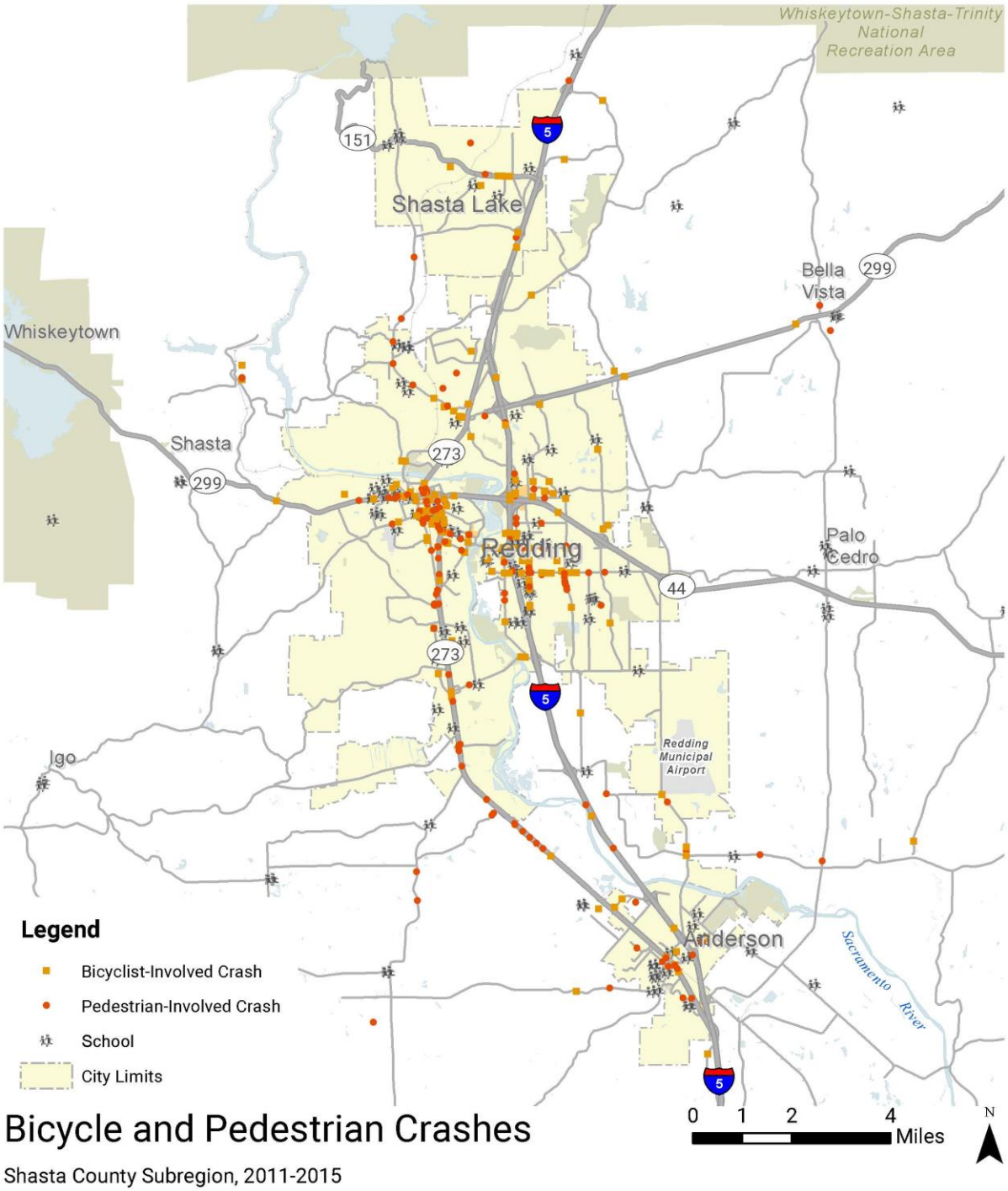
Assumptions, Challenges, and Opportunities

- A new model of active transportation projects and programs must be developed, prioritized, adopted, prepared for construction, and backed by a strong commitment of regional resources – Regional greenhouse gas emission reduction targets have been set for the Shasta Region by the California Air Resources Board. The SRTA Board of Directors subsequently adopted aggressive assumptions for active transportation mode share as part of the 2015 Regional Transportation Plan and Sustainable Communities Strategy. Neither status quo progress nor incremental improvements to the active transportation network are adequate to meet targets and assumptions. Only dramatically improved active transportation infrastructure combined with programmatic support will enable the region to meet externally and internally established goals. In addition to being safe and comfortable, active transportation must be compelling and competitive in comparison to the automobile for a large share of trip types and purposes.

  Inspiration for the next generation of facilities will not be found through an examination of existing local facilities and deficiencies. Part of the GoShasta scope, therefore, includes a best practices field trip to Davis, CA – the first city to achieve Platinum level bicycle friendly status by the League of American Bicyclists. Davis is similar in size to Redding with many transferrable lessons. Local cycling advocates and local agency transportation planners and engineers will be invited to learn from their peers in Davis, and then share this information with stakeholders in the Shasta Region.

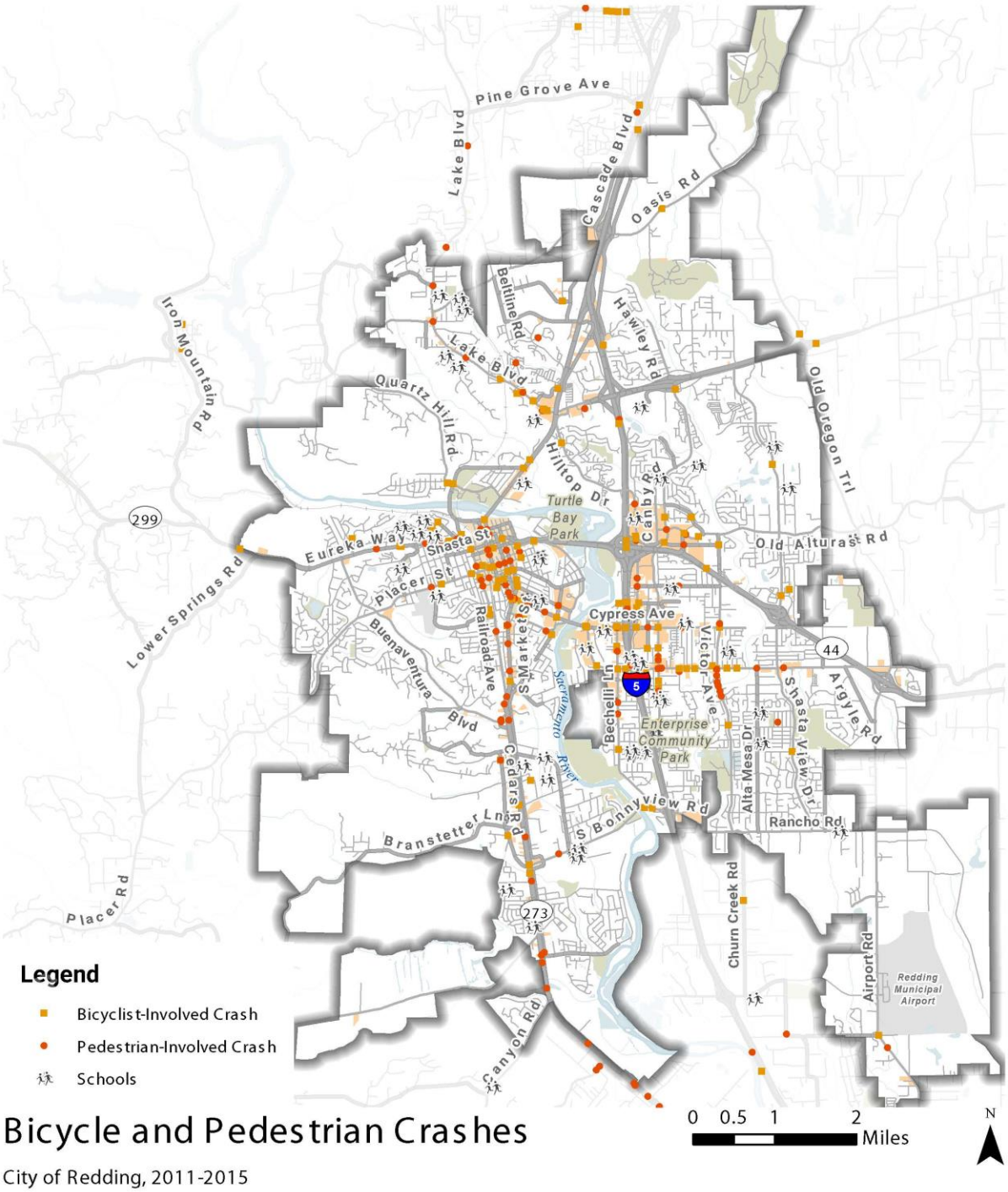
Figure B.14. Bicyclists and Pedestrians in Davis, California

- Transit coordination – Planning for active transportation and on-demand transit planning should be coordinated to reflect complete trips from origin to destination, including trip chaining.
- Social equity – Demographics vary considerably between neighborhoods in the Shasta Region. GoShasta should consider strategies and initiatives that would effectively mitigate disparities that have a nexus to transportation such as economic status and public health. GoShasta should also seek to engage individuals representing a broad demographic range and different user types.
- Public Health partnership – The region has a long history of coordination with and support from the public health community, including Healthy Shasta partners. GoShasta should tap into this community and incorporate public health related considerations into the plan wherever appropriate.



Data Source: Transportation Injury Mapping System, 2011-2015

Figure B.15. Bicycle and Pedestrian Crashes, Shasta County Subregion, 2011-2015



Bicycle and Pedestrian Crashes

City of Redding, 2011-2015

Data Source: Transportation Injury Mapping System

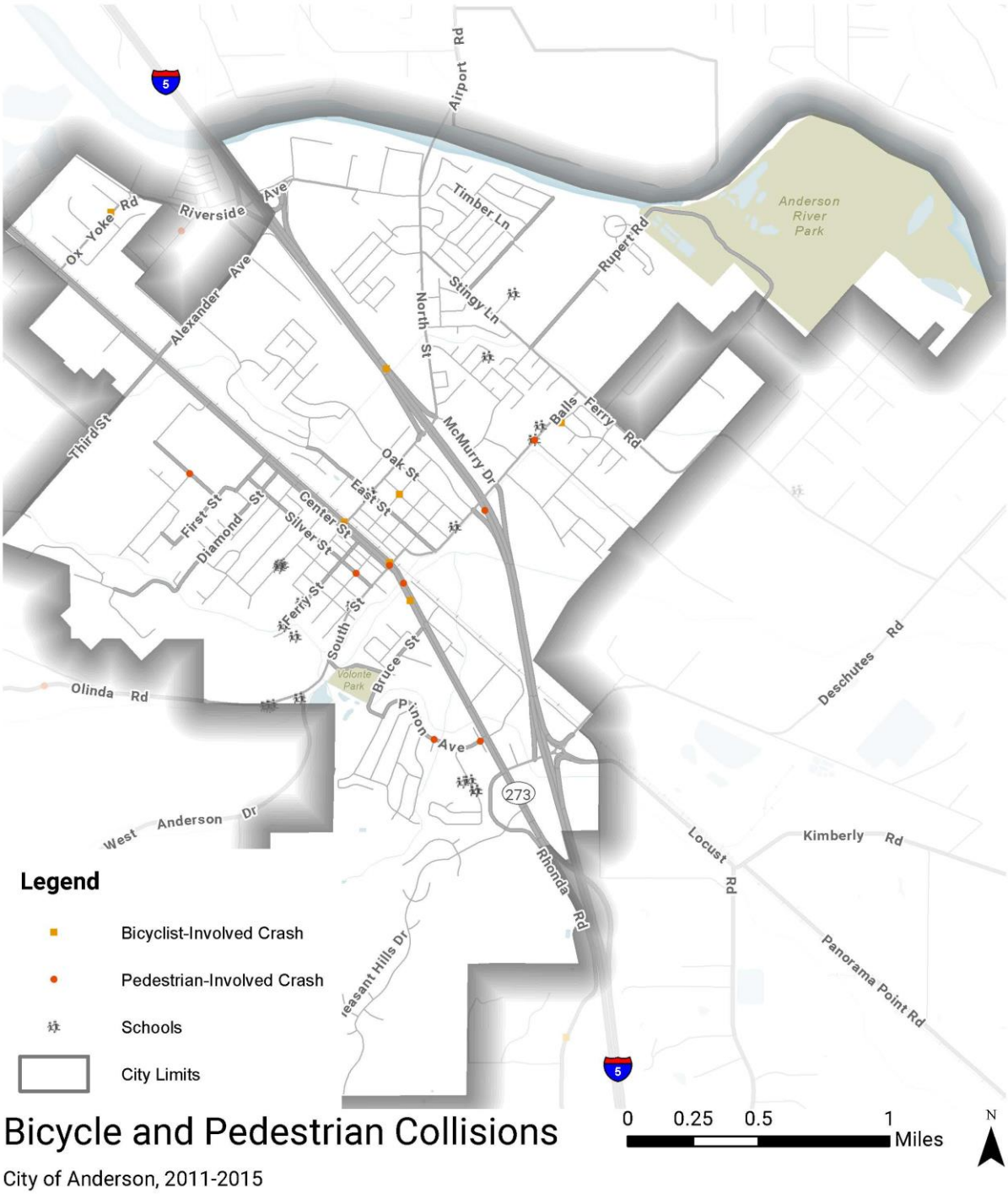
Figure B.16. Bicycle and Pedestrian Crashes, City of Redding, 2011-2015

Bicycle and Pedestrian Crashes

Downtown Redding, 2011-2015

Data Source: Transportation Injury Mapping System, 2011-2015

Figure B.17. Bicycle and Pedestrian Crashes, Downtown Redding, 2011-2015

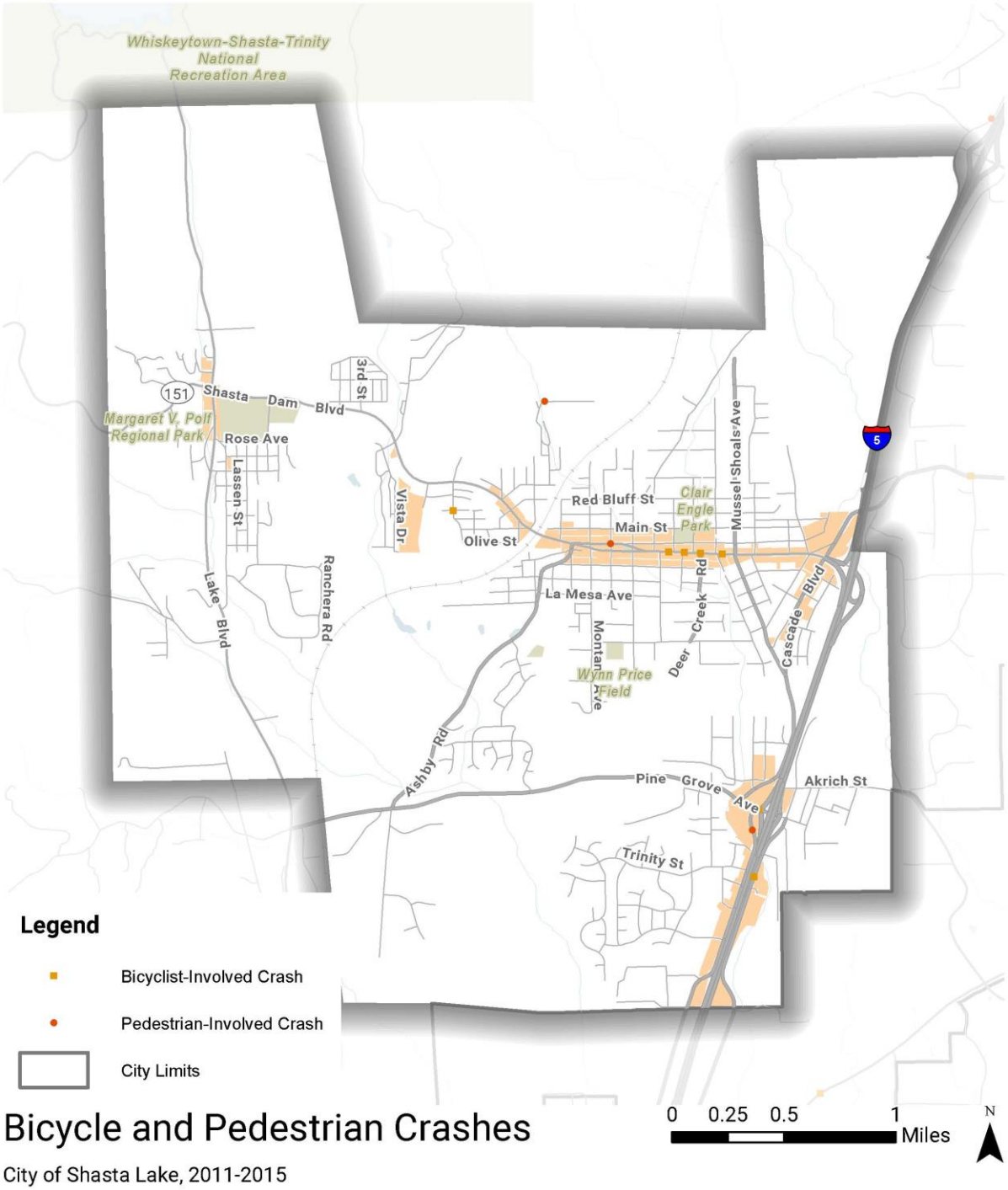


Bicycle and Pedestrian Collisions

City of Anderson, 2011-2015

Data Source: Transportation Injury Mapping System, 2011-2015

Figure B.18. Bicycle and Pedestrian Crashes, City of Anderson, 2011-2015



Bicycle and Pedestrian Crashes

City of Shasta Lake, 2011-2015

Data Source: Transportation Injury Mapping System, 2011-2015

Figure B.19. Bicycle and Pedestrian Crashes, City of Shasta Lake, 2011-2015

Regional Momentum and Recent Accomplishments

Caltrans recognition and efforts (see Mile Marker cover story on California Street road diet) and City of Redding (complete streets policy and the Downtown Transportation Plan) as prime examples.

Figure B.20. Examples of Caltrans and City of Redding Recognition

The region is growing and showing clear signs of evolving from an exclusively rural community to a mix of rural and urban – in terms of physical attributes, local agency policies, grassroots community action, media coverage, and increased general public interest and usage. What arguably can be traced back to catalyst projects made possible by the McConnell Foundation and initiatives led by Healthy Shasta have been parlayed by organizations such as Shasta Living Streets, RideRedding, Shasta Wheelmen, Redding Mountain Bike Club, and other organizations into a successful movement. This cultural shift has manifested itself in a number of ways, including 1) community organization engagement and 2) local agency activities.

Examples of recent and recently funded projects

- SRTA Board of Directors adopted a 2% Transportation Development Act (TDA) set aside for bike and pedestrian infrastructure;
- Creation of GIS-based network of active transportation facilities suitable for use by within the ShastaSIM regional travel model;
- Creation of bicycle parking data and crowdsourcing map viewer available through the FarNorCalGIS website;
- Pit River Tribe/Burney Bicycle and Walkway Plan and provides a plan for building more bicycle and walking infrastructure in and around the town of Burney;
- Shasta View improvements around the Redding School of the Arts;
- Old 99 Class I trail and signage program in the City of Anderson;
- Beginning of the Great Shasta Rail Trail - An 80-mile scenic multi-use Class I trail located in eastern Shasta County between the communities of Burney and Mt Shasta.

Early success in achieving the 2015 RTP SCS is evident in the Downtown Redding SGA, including the following developments:

- ATP Riverside trail project grant
- Downtown Redding Affordable Housing and Downtown Trail project AHSC grant
- California Street bike lane/lane reduction

Viewed collectively, this package-set of factors and accompanying assumptions and inputs represent one potential future for the region. Actual observed data and performance outcomes will vary from this scenario; however, all assumptions and inputs used in the SCS are considered realistic and achievable if supported by coordinated local and regional polices, programs, and targeted public investments.

Many such activities are already occurring. The city of Redding, for example, has no limitations on residential density, commercial density, and building height in the downtown core. Transportation impact fees in downtown core have also been reduced in recognition of the mobility benefits associated with density, proximity to employment, and access to alternative modes. At the regional level, SRTA is making pre-development technical assistance grants available to developers and local agencies toward infill and redevelopment projects located in SGAs. Funding for a bicycle and pedestrian trail linking the Downtown Redding SGA to the nearby Sacramento River Trail corridor has also been committed. Caltrans, in partnership with the city of Redding, recently re-striped several streets in Downtown Redding from three vehicle lanes to two in order to add a new buffered bicycle lane.

As a result of these type of geographically focused and coordinated efforts applied over time, the region's Strategic Growth Areas will increase in population and the previously described 'D' factors will be more fully realized. The average number and distance of daily vehicle trips will decrease within SGAs and region-wide per capita greenhouse gas emissions will be able to meet the region's given targets.

Plans and Policies Review

The Shasta Region has many plans and policies that lay the groundwork and support the implementation of a regional Active Transportation Plan. Locally, the Cities of Anderson, Redding, Shasta Lake, and Burney, as well as other areas of unincorporated Shasta County, have taken strides towards making their communities a better place to walk and bike. Additionally, California has continued to produce supportive policies, including multiple Senate and Assembly Bills, the California Statewide Bike and Pedestrian Plan, and the California Transportation Plan 2025. The GoShasta ATP will build on these efforts on the policy, programmatic and project level. This section documents relevant plans and policies as they relate to the ATP planning effort.

Relevant Plans and Policies

Plan	*Date Adopted*
Federal Policies	
US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations	2001
FHWA Bicycle and Pedestrian Facility Design Flexibility Memo	2013
USDOT Ladders of Opportunity	2014
FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts	2016
State Plans and Policies	
California Statewide Bike and Pedestrian Plan	2017
California Strategic Management Plan	2015
Design Information Bulletin 89 Class IV Bikeway Guidance (Separated Bikeways/Cycle Tracks)	2015
California Transportation Plan 2025	2006
Smart Mobility 2010: A call to Action for the New Decade	2010
Caltrans Complete Streets Policy & Implementation Plan 2.0	2001
Assembly Bill 32: Global Warming Solutions	2006
Assembly Bill 1358: Complete Streets	2008
Assembly Bill 2245: Environmental Quality: CEQA: Exemption: Bicycle Lanes	2015
Assembly Bill 1193: Bikeways	2014
Assembly Bill 1371: Vehicles: Bicycles: Passing Distance	2013
Caltrans Complete Streets Policy and Deputy Directive 64	2008
Senate Bill 375: Sustainable Communities	2009
Senate Bill 743: Environmental Quality: Transit Oriented Infill Projects, Judicial Review Streamlining for Environmental Leadership Development Projects, and Entertainment and Sports Center in the City of Sacramento	2013
Senate Bill 99: Active Transportation Program Act	2013
Regional Plans	
Shasta County Regional Transportation Plan	2015
2010 Shasta County Bicycle Transportation Plan	2010
Local Plans (http://srta.ca.gov/281/Active-Transportation-Plans-Documents)	
City of Anderson General Plan	2007
City of Anderson Bicycle Transportation Plan	2007
City of Anderson Pedestrian Accessibility & Safety Master Plan	2011
City of Redding Bikeway Action Plan	2010
City of Shasta Lake Bicycle Transportation Plan	2009
Pit River Tribe/Burney Bicycle Walkway Plan	2012

Federal Policies

US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations (2001)

On March 15, 2010, the United States Department of Transportation announced a policy statement, included below, with a list of recommended actions.

"The DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes."

Recommended actions to support the policy statement include considering walking and biking equal to other modes, ensuring that there are transportation choices for people of all ages and abilities, going beyond minimum design standards, collecting data on walking and biking trips, and several other actions that make it easier for people to walk and bike.

FHWA Bicycle and Pedestrian Facility Design Flexibility Memo (2013)

The Federal Highway Administration supports a flexible approach to bicycle and pedestrian facility design. The FHWA Design Flexibility Memo supports the use of the following resources to further develop nonmotorized transportation networks and support the USDOT's Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations.

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities.
- AASHTO Guide for the Development of Bicycle Facilities.
- NACTO Urban Bikeway Design Guide.
- ITE Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.

USDOT Ladders of Opportunity (2014)

"The Opportunities Agenda empowers transportation leaders, grantees and communities to revitalize, connect, and create workforce opportunities that lift more Americans into the middle class through initiatives, program guidance, tools, and standards." The Ladders of Opportunity Agenda realizes that transportation infrastructure can connect people with opportunities and strengthen communities. Transportation facilities should be built by, for, and with the communities impacted by them. The Policy Solutions that provide support for the Opportunities Agenda include the following:

- Funding Projects that Promote Ladders of Opportunity.
- Closing Safety Disparities.
- Prioritizing Vital Projects that Yield Local and Regional Benefit.
- Promoting an Inclusive Transportation Workforce.
- Holding Decision-makers Accountable.
- Empowering the Public.
- Raising the Standards for Connectivity.

FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts (2016)

This publication builds on the design flexibility memo mentioned above and highlights ways that designers can apply design flexibility found in current national design guidance to reduce multimodal conflicts and achieve "connected networks so that walking and bicycling are safe, comfortable, and attractive options for people of all ages and abilities."

State Plans and Policies

Toward an Active California – State Bicycle and Pedestrian Plan (2017)

In May 2017, Caltrans adopted *Toward an Active California,* a statewide bicycle and pedestrian plan which will guide the development of non-motorized transportation facilities throughout the state. This Plan provides a vision, goals, and objectives for Caltrans' efforts for active transportation; strategies to meet these goals and objectives; performance measures to evaluate the success of Caltrans' policies and investments; and the first stages in the development of a statewide bicycle map. The Plan will improve connections between pedestrian and bicycle facilities, transit systems, and regional roads.

California Strategic Management Plan (2015)

This plan provides strategic direction for Caltrans, including targets of doubling walking trips and tripling bicycling trips by 2020. Additionally, the plan calls for reducing user fatalities and injuries, promoting community health through active transportation, and improving the quality of life for all Californians by increasing accessibility to all modes of transportation.

California Transportation Plan 2025 (2006)

The California Transportation Plan's Vision Statement calls for California to have a "safe, sustainable, world-class transportation system that provides for the mobility and accessibility of people, goods, services, and information through an integrated, multimodal network that is developed through collaboration and achieves a Prosperous Economy, a Quality Environment, and Social Equity.". The first goal of the plan includes enhancing modal choice and connectivity.

Figure B.21. California Transportation Plan's Vision

Smart Mobility 2010

The California Smart Mobility Call to Action provides new approaches to implementation and lays the groundwork for an expanded State Transportation Planning Program. It enhances the scope of the existing California Transportation Plan by analyzing the benefits of multi-modal, interregional transportation projects. The Smart Mobility framework emphasizes travel choices and safety for all users, supporting the goals of social equity, climate change intervention, energy security, and a sustainable economy.

Caltrans Complete Streets Policy (2010) and Deputy Directive 64 (2008)

The California Complete Streets Policy states that the California Department of Transportation "views all transportation improvements as opportunities to improve safety, access, and mobility for all travelers and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation

To support Deputy Directive 64, Caltrans adopted the Complete Streets Implementation Action Plan in 2010. Various people across Caltrans contributed ideas and projects to include in the Complete Streets Implementation Action Plan to make Complete Streets a reality in California.

Assembly Bills (AB)

Assembly Bill 32: Global Warming Solutions (2006)
The Global Warming Solutions Act (AB 32) has a goal of California reaching 1990 greenhouse gas emission levels by 2020 by reducing emissions, including those caused by motor vehicles.

Assembly Bill 1358: Complete Streets (2008)
All California Cities and Counties must include accommodations for all street users (pedestrians, bicyclists, transit riders, motorists, children, persons with disabilities, and elderly persons) in the Circulation Element of their General Plans.

Assembly Bill 2245: Environmental quality: CEQA: Exemption: Bicycle Lanes (2012)
This bill exempts the restriping of roadways for bicycle lanes, provided the roadways are within an urbanized area and the restriping is consistent with a prepared bicycle transportation plan. The 2010 Caltrans adjusted urban areas include Shasta Lake, Redding, and Anderson, as well as the Highway 151-Lake Boulevard loop from the City of Shasta Lake to the Shasta Dam. A lead agency would be required to conduct a traffic assessment and safety impact, as well as conduct hearings, before determining if a project is exempt.

Assembly Bill 1193: Bikeways (2014)
Assembly Bill 1193 adds a fourth classification of bikeway to the Caltrans bikeway classifications. The new designation, Class IV bikeways, applies to cycle tracks or separated bike lanes.

Assembly Bill 1371: Vehicles: Bicycles: Passing Distance (2013)
AB 1371 requires that motor vehicles leave three feet of space between a bicycle and motor vehicle, when the driver of the motor vehicle is overtaking a bicyclist traveling in the same direction.

Senate Bills

Senate Bill 375: Sustainable Communities (2009)
SB 375 directs the Air Resources Board to set regional targets for the reduction of greenhouse gases. Metropolitan planning organizations must develop land use plans to meet these emission reduction goals by tying together regional housing needs and regional transportation planning to reduce greenhouse gas emissions from motor vehicle trips.

Senate Bill 743: Environmental Quality: Transit Oriented Infill Projects, Judicial Review Streamlining for Environmental Leadership Development Projects, and Entertainment and Sports Center in the City of Sacramento (2013)
SB 743 eliminates auto LOS and other measures of vehicle capacity or traffic congestion as a basis for determining significant impacts. This bill promotes infill development, active transportation, and reduction of greenhouse gas emissions.

Senate Bill 99: Active Transportation Program Act (2013)
The Active Transportation Program distributes federal funds for local and regional efforts to increase walking and bicycling. The funding is intended to increase the number of walking and bicycling trips,

increase safety for those modes, and provide support for disadvantage communities to achieve transportation equity.

Regional Plans

Regional Transportation Plan for Shasta County (2015)

The Regional Transportation Plan (RTP) includes a vision of meeting the regions mobility needs through the integration of travel options into a seamless network. Specifically, Goal #3 states that the region should "Provide an integrated, context-appropriate range of practical transportation choices". Strategies that will help achieve this goal are:

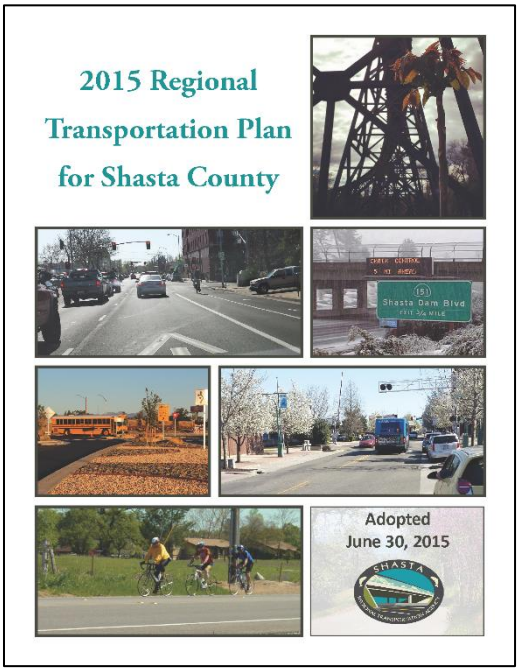


Figure B.22. 2015 Regional Plan for Shasta County

- Prepare a regional plan of active transportation projects for funding.
- Incorporate accommodations for all applicable travel modes into the design of SRTA-funded projects.
- Improve connectivity between public transportation and bicycling and walking to reflect the complete door-to-door trip from origin to destination.
- Prioritize public transportation, bicycle, and pedestrian infrastructure and amenities within designated Strategic Growth Areas (SGAs), or those that provide connections to/from SGAs.
- Fill gaps between recreational trail corridors and integrate into the greater network of transportation facilities.
- Establish multi-modal level of service criteria for evaluating and prioritizing projects and services for funding.

Goal #4 "Create vibrant, people-centered communities" includes a focus on bicycle and pedestrian mobility by listing the following supporting strategies:

- Support the development and use of active transportation choices (i.e. bicycling and walking, including connections to public (transportation).
- Develop transportation safety data and analysis for all modes, incorporate findings into regional planning processes, and seek funding to resolve identified safety issues.

Additionally, the plan addresses the sustainable Communities Strategy by recommending expansion of the bicycle and pedestrian network, "including the completion of network gaps, enhanced integration with public transportation, and connections between regional trail corridors and the roadway network."

Shasta County Bicycle Transportation Plan (2010)

The overall goal of the Shasta County Bicycle Transportation Plan (BTP) is to provide a safe, effective, efficient, balanced, and coordinated bicycling system that serves the needs of the people within the unincorporated region of Shasta County. The goals, policies and actions in the BTP also promote decreased automobile dependency, reduced traffic congestion, reduced air and noise pollution and reduced greenhouse gas emissions.

The BTP is supported by strategies to enhance safety and education, increase the number of bicycle commuters, provide a continuous countywide bicycle network, encourage recreational bicycling facilities, and encourage the use of all available funding sources for bicycle facilities. The plan proposes 86.22 miles of bikeways throughout the unincorporated area of the county. The GoShasta Active Transportation Plan will build on the goals, policies, of the BTP, and proposed projects will be reviewed in the Existing Conditions Report.

Local Plans

City of Anderson Bicycle Transportation Plan (2007)

The City of Anderson Bicycle Transportation Plan (BTS) has two main goals that will be supported by the GoShasta Active Transportation Plan: Encourage bicycling for reasons of traffic congestion, reduction, energy conservation, air quality, health, economy and enjoyment; and make conditions safer for bicycle use. The BTS has several proposed projects that will be reviewed in the Existing Conditions Report.

City of Anderson Pedestrian Accessibility and Safety Master Plan (2011)

The goals of the City of Anderson's Pedestrian Accessibility and Safety Master Plan are:

- To ensure the development of a multimodal circulation system which will be both safe and efficient.
- Provide pedestrian trails and facilities within and between residential areas.
- Provide pedestrian facilities on all arterial and collector streets.
- Pedestrian routes shall connect to schools, shopping centers, and recreational areas.
- Provide maximum opportunities for pedestrian circulation on existing and new roadway facilities.
- Create a pedestrian system that provides connections throughout Anderson and with neighboring areas, and serves both recreational and commuter users.
- Design new roadway facilities to accommodate pedestrians. Through the Design Review process, provide sidewalks to all roads, except in cases where very low pedestrian volumes and/or safety considerations preclude sidewalks.

The Plan also identifies several issues and opportunities to improve walking in Anderson, including:

- The need for more complete, connected pedestrian facilities in the downtown core (less than 50% of streets have sidewalks), near the City's 430-acre River Park, adjacent to schools, and between regional shopping centers and residential areas.
- The need for a comprehensive inventory of Americans with Disabilities Act (ADA) deficiencies to guide future grant applications and project priorities.
- Pedestrian barriers caused by the 100-foot railroad right-of-way and State Highway 273 that both run through the center of the City of Anderson.

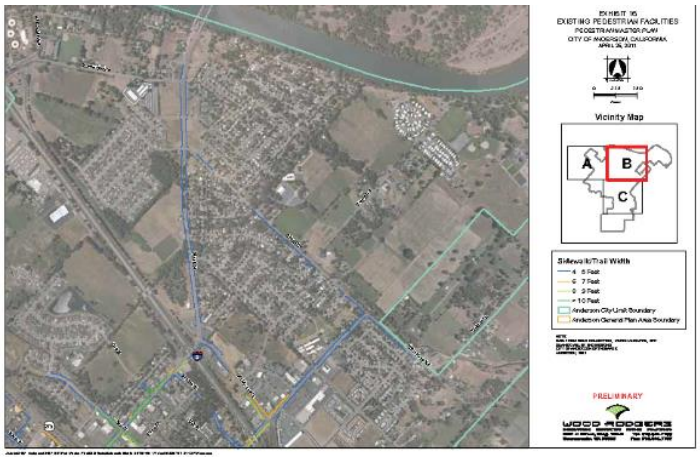


Figure B.23. Map of Existing Pedestrian Facilities in the City of Anderson

City of Redding Bikeway Action Plan (2010)

The Redding Bikeway Action Plan expands on the 1998 Redding Bicycle Plan, and expands the scope of the original plan. The Action Plan includes a detailed inventory and analysis of the existing bikeway system. The Plan was developed in partnership with multiple agencies and community input.

The goals of the Redding Bikeway Action Plan, supported by recommendations that rely on the five "E's" of bikeway planning (Evaluation and Planning, Engineering, Education, Enforcement, and Encouragement) are as follows:

1. Improve and add bikeways, connections and facilities by:

- Recommendation 1.1 – Improve and expand the bike route system and provide functional and distinctive signs and markings for the system.
- Recommendation 1.2 – Upgrade significant Class 3 Bike Routes to Class 2 Bike Lanes when possible.
- Recommendation 1.3 – Provide bicycle parking in public spaces.
- Recommendation 1.4 – Encourage bicycle parking in existing uses private spaces and require bicycle parking in new uses private spaces.
- Recommendation 1.5 – Improve bicycle access through complex intersections.

2. Develop bicycle-friendly policies by:

- Recommendation 2.1 – Adopt a Complete Streets ordinance and review and recommend necessary changes to Redding ordinances, regulations, policy documents and design standards to address bicycle accommodation.
- Recommendation 2.2 – Provide training to City of Redding staff and policymakers.
- Recommendation 2.3 – Review City of Redding projects to ensure they provide bicycle accommodation.

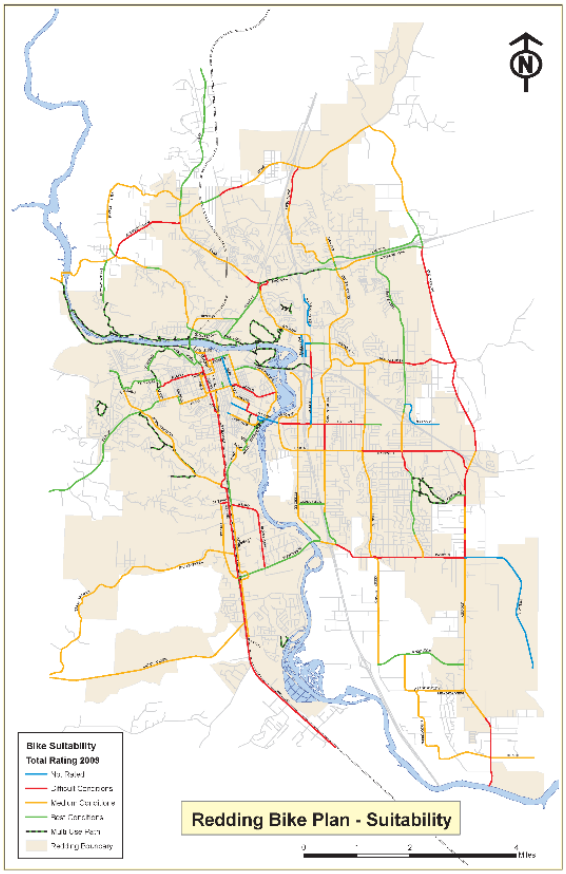


Figure B.24. City of Redding's Bikeway Action Plan

3. Develop bicycle-related education, promotion and enforcement initiatives by:

- Recommendation 3.1 – Educate motorists about safe operating behavior around bicyclists.
- Recommendation 3.2 – Educate bicyclists about safe bicycling.
- Recommendation 3.3 – Enforce traffic laws related to bicycling.
- Recommendation 3.4 – Establish a Bikeway Advisory Committee.
- Recommendation 3.5 – Seek recognition from the League of American Bicyclists as a bicycle friendly community.
- Recommendation 3.6 – Promote increased bicycle usage.
- Recommendation 3.7 – Regularly update the Redding Bikeway Map.

The Bikeway Action Plan includes a detailed project list with the following milestones to be completed by 2015:

- The Redding bikeway system will expand by 38.7 on-street miles to a total City of Redding bikeway network of 162.8 miles.
- The portion of the bikeway system graded as Class 2 Bike Lanes will almost double from the current 24.61 miles to a total of 46.18 miles at this level of service.

The GoShasta Active Transportation Plan will build upon the policies, recommendations, and proposed projects in this plan.

City of Shasta Lake Bicycle Transportation Plan (2009)

The City of Shasta Lake's Bicycle Transportation plan goal is to create a safe, efficient, coordinated transportation environment that encourages bicycling. The BTP achieves these goals by identifying proposed infrastructure, prioritizing desired bicycle facilities, and maximizing funding for implementation.

Pit River Tribe/Burney Bicycle Walkway Plan (2012)

The Pit River Tribe and the City of Burney developed the Bicycle and Walkway Plan to establish a long-term vision for bicycling and walking infrastructure and to identify next steps for implementation. The ultimate goal of this plan is to improve safe routes to schools and increase the number of people in Burney who bike and walk.

Level of Traffic Stress Proposed Methodology

This section summarizes Kittelson & Associates, Inc.'s (KAI) proposed approach to implementing a bicyclist Level of Traffic Stress (LTS) analysis for the GoShasta Regional and City of Redding Active Transportation Plans (ATP). This methodology classifies road segments and intersections by one of four levels of traffic stress with Level of traffic stress 1 (LTS 1) meant to be a level that most children can tolerate and LTS 4 a level tolerated by "strong and fearless" bicyclists. KAI's approach, described below, adapts the methodology from national documented Level of Traffic Stress methodologies to fit the existing data and context for the Shasta Region.

Proposed Methodology

KAI proposes to use a simplified version of the LTS segment and intersection crossing methodology documented in the Mineta Transportation Institute (MTI) *Low-Stress Bicycling and Network Connectivity* report for the incorporated areas of the Shasta Region. For the unincorporated areas of the region, KAI proposes to use a simplified version of the rural bicycle LTS segment methodology developed by the Oregon Department of Transportation in their *Analysis Procedures Manual*. The detailed methodologies for each of the proposed approaches are provided in the following subsections.

Urban Segment LTS Methodology

The full version of the MTI LTS methodology for urban and suburban street segments divides the analysis into the following three bicycle facility types:

- Bike lanes alongside a parking lane;
- Bike lanes not alongside a parking lane; and,
- Mixed traffic.

The methodology evaluation criteria for each of the three facility types are shown in the tables below. These criteria operate following the "weakest link" principle, where the criterion with the worst LTS determines the stress level of the segment. Thus, if the number of lanes criteria matches the metric for LTS 1 but the speed limit matches for LTS 3, the segment would be coded for LTS 3.

Table B.1. Urban Segment Criteria for Bike Lanes Alongside a Parking Lane

Criteria	Level of Traffic Stress			
	LTS 1	LTS 2	LTS 3	LTS 4
Lanes per Direction	1 lane	[No Effect]	2 or more lanes	[No Effect]
Bike Lane plus Parking Lane Width	15+ feet	14-14.5 feet	13.5 feet or less	[No Effect]
Speed Limit	25 mph or less	30 mph	35 mph	40+ mph
Bike Lane Blockage	Rare	[No Effect]	Frequent	[No Effect]

Source: Mekuria, Maaza. *Low-Stress Bicycling and Network Connectivity*, Mineta Transportation Institute, 2012.

Table B.2. Urban Segment Criteria for Bike Lanes Not Alongside a Parking Lane

Criteria	Level of Traffic Stress			
	LTS 1	LTS 2	LTS 3	LTS 4
Lanes per Direction	1 lane	2 lanes (with median)	2 (no median) or > 2 lanes	[No Effect]
Bike Lane Width	6+ feet	5.5 feet or less	[No Effect]	[No Effect]
Speed Limit	30 mph or less	[No Effect]	35 mph	40+ mph
Bike Lane Blockage	Rare	[No Effect]	Frequent	[No Effect]

Source: Mekuria, Maaza. *Low-Stress Bicycling and Network Connectivity*, Mineta Transportation Institute, 2012.

Table B.3. Urban Segment Criteria for Level of Traffic Stress in Mixed Traffic

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

Source: Mekuria, Maaza. *Low-Stress Bicycling and Network Connectivity*, Mineta Transportation Institute, 2012.

The data requirements and current data availability for fully implementing each of these facility types is shown below:

Table B.4. Data for Bike Lanes Alongside a Parking Lane

Data Requirement	Data Availability
Parking lane presence	Not currently available
Number of lanes	Available
Parking lane width	Not currently available
Bicycle lane width	Not currently available
Speed limit	Available
Frequency of bicycle lane blockage	Not currently available

Table B.5. Data for Bikes Lane Not Alongside a Parking Lane

Data Requirement	Data Availability
Parking lane presence	Not currently available
Number of lanes	Available
Bicycle lane width	Not currently available
Speed limit	Available
Frequency of bicycle lane blockage	Not currently available

Table B.6. Data for Mixed Traffic

Data Requirement	Data Availability
Number of Lanes	Available
Speed Limit	Available

Based on data needs and data availability for the three facility types, KAI proposes using the following assumptions:

- **Parking Lane Presence:** Assume a parking lane is present for all roadways with bike lanes. This assumption is recommended given that most streets in urban areas typically allow on-street parking and updating the exceptions can be handled through the method presented below.
    - KAI will provide a map of bike lanes to SRTA and the City of Redding to comment on those locations where parking is not present.
- **Parking Lane Width:** Assume a 7-foot parking lane for all locations with parking present. This assumption is recommended as the minimum parking lane width recommended by the National Association of City Transportation Officials (NACTO). Assuming a minimum parking lane width adopts a conservative approach for the parking lane width criteria. If the cities of Redding, Shasta Lake, or Anderson have different design standards, the standard applied to each city can be adjusted to reflect the individual city's standards.

    - SRTA and the City of Redding can provide revised assumptions by jurisdiction, area, or individual locations. KAI will provide maps for commenting on specific locations, as desired.
- **Bicycle Lane Width**: Assume a 5-foot bike lane for all locations. Five-foot bike lanes are assumed given this is the minimum width for a bike lane next to a parking lane and is the most common width many jurisdictions use when striping a bike lane.
    - SRTA and the City of Redding can provide revised assumptions by jurisdiction, area, or individual locations. KAI will provide maps for commenting on specific locations.
- **Bicycle Lane Blockage:** Assume that the bike lane is not blocked. Bike lane blockage refers to locations where the bike lane is frequently blocked by illegal parking, double parking, or delivery vehicles. This tends to occur in commercial areas and is not broadly applicable to all bike lanes.
    - SRTA and the City of Redding can provide a map of bike lane locations that are frequently blocked.

Using the adjustments to the assumptions provided by SRTA and the City of Redding, KAI will evaluate the LTS of the regional roadway network consistent with the evaluation criteria established in the MTI report.

Rural Segment LTS Methodology

KAI proposes using a separate LTS methodology for rural areas because of the different context for bicycle and vehicle interactions on rural roads versus urban and suburban roadways. Rural roadways are typically low volume and provide little or no paved shoulder width. Additionally, because of more frequent vertical and horizontal curves, sight distances vary frequently as road users travel along the roadway. The Oregon DOT methodology recommended below was developed with this context in mind and aims to evaluate bicyclist stress on rural roads based on the frequency of vehicle interactions (based on volume) and the presence and width of paved shoulders.

The full version of the ODOT LTS methodology for rural street segments divides the analysis into the following analysis types:

- Roadways with bike lanes or mixed traffic roadways with posted speeds below 45 miles per hour (mph); and,
- Mixed traffic with posted speeds above 45 mph.

The methodology for the first analysis type is the same as the MTI methodology for bicycle lanes not alongside a parking lane and mixed traffic calculations for urban areas. As a result, the same assumptions that apply to those roadways will be adopted for rural roadways in this analysis type.

The evaluation criteria for mixed traffic roadways with posted speeds above 45 mph are shown in Table 4. Because the cyclist is always in a high vehicle speed environment in this methodology, the frequency with which the bicyclist is forced to interact with vehicles and the available shoulder width for use during these interactions are the determining factors for rural segments with posted speeds above 45 mph.

Table B.7. Rural Segment Criteria for Mixed Traffic with Posted Speeds above 45 mph

Daily Volume	Paved Shoulder Width			
	<2 feet	2 - <4 feet	4 – <6 feet	≥ 6 feet
<400	LTS 2	LTS 2	LTS 2	LTS 2
400 - 1,500	LTS 3	LTS 2	LTS 2	LTS 2
1,500 - 7,000	LTS 4	LTS 3	LTS 2	LTS 2
> 7,000	LTS 4	LTS 4	LTS 3	LTS 3

Source: Oregon Department of Transportation, *Analysis Procedures Manual Version 2*, Oregon, 2016.

The data requirements and current data available for fully implementing the mixed traffic with posted speeds above 45 mph analysis type are shown below.

Table B.8. Data for Rural Mixed Traffic with Posted Speeds Above 45 mph

Data Requirement	Data Availability
Speed limit	Available
Paved Shoulder Width	Not currently available
Daily Volume	Limited availability for Caltrans roadways.

Based on these data needs and the data that is available, KAI proposes using the following assumptions:

- **Paved Shoulder Width:** Assume paved shoulder width of less than two feet given the mountainous character of most regional rural roads.
    - KAI will provide a map of rural roadways to SRTA to identify locations where shoulder widths are wider.
- **Daily Volume:** KAI apply the Caltrans volumes to all state highway segments. Using nearby state highway roadway volumes and functional classification, KAI will estimate which volume category roadways without roadway volume data fall into based on the thresholds shown in Table 4.
    - KAI will provide a map of the rural roadway volume estimation to SRTA to identify locations where volume estimates should be adjusted.

Crossing LTS Methodology

The full version of the MTI LTS methodology for urban and suburban streets analyzes intersections and crossing for the following situations:

- Intersection approaches for pocket bike lanes;
- Intersection approaches for mixed traffic in the presence of right-turn lanes;
- Intersection crossings for unsignalized crossings without a median refuge; and,
- Intersection crossings for unsignalized crossings with a median refuge.

These categories also apply to rural intersections where posted speeds are lower than 45 mph. The ODOT *Analysis Procedures Manual* recommends a separate methodology for unsignalized rural intersections with posted speeds above 45 mph based on the volume and number of lanes to be crossed.

For the incorporated cities within the Shasta Region, data regarding pocket bike lanes, vehicle turn lanes, and presence of medians are not available for each intersection. Posted speed data and number of vehicle lanes data are available broadly across the region. Therefore, KAI proposes to implement LTS at crossings using posted speed and number of lanes data. The analysis will assume a median refuge is not present. We believe this will represent an accurate LTS evaluation for the majority of locations within the incorporated cities. For locations where median refuges are present, it will result in a more conservative evaluation. This same methodology will also be applied to rural roadways with posted speeds less than 45 mph. Where posted speeds are greater than 45 mph in the rural areas, the ODOT *Analysis Procedures Manual* methodology will be followed using volume and number of vehicle lanes data.

The methodology evaluation criteria for the urban and rural crossing types are shown in Table B.9. and Table B.10., respectively.

Table B.9. Urban Crossing Criteria for Unsignalized Crossings without a Median Refuge

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

Source: Mekuria, Maaza. *Low-Stress Bicycling and Network Connectivity*, Mineta Transportation Institute, 2012.

Table B.10. Rural Crossing Criteria for Unsignalized Crossings with Posted Speeds 45 mph or Greater

Daily Volume	Width of Street Being Crossed		
	Up to 3 lanes	4 -5 lanes	6+ lanes
< 400	LTS 2	--	--
400 – 1,500	LTS 2	--	--
1,500 – 7,000	LTS 2	LTS 3	--
> 7000	LTS 3	LTS 4	LTS 4

Source: Oregon Department of Transportation, Analysis Procedures Manual Version 2, Oregon, 2016.

Following the assumptions outlined in the urban and rural segment methodologies, KAI will have all required inputs to carry out the crossing analysis described above.

Next Steps

Based on the process outlined above, KAI proposes the following five-step process to complete the LTS Analysis:

1. KAI will provide preliminary maps of the assumptions and current data to SRTA and City of Redding for review consistent with the approach outlined above.
2. SRTA and the City of Redding will provide comments to modify the assumptions or data based on their local knowledge of the street network.
3. KAI will provide draft LTS maps of the City and Region to SRTA and City of Redding for review using the updated data and assumptions.
4. SRTA, the City, the GoShasta Citizen Advisory Committee, and the City of Redding Active Transportation Advisory Group will have an opportunity to provide comments on the draft maps noting any inconsistencies or results that do not make sense given the character of the roadway.
5. KAI will produce the final LTS analysis maps.

Level of Traffic Street Analysis

This section includes the draft Level of Traffic Stress (LTS) analysis results for each of the incorporated cities and the region as a whole. Below is a summary of how the roadway network performs with the LTS classification as well as context for the methodology and how the results will be used.

- The LTS methodology focuses on identifying routes based on the type of cyclist that would be comfortable on a facility with LTS 1 representing a road comfortable for all ages and abilities and LTS 4 representing a facility that only strong and fearless bicyclists would be comfortable using.
- The LTS mapping will be used to help identify key connections and crossings that would will connect "low-stress islands" of the street network. This will tie into the network development process to provide recommended facility types (such as a standard bike lane, protected bike lane, or bike boulevard) to allow low-stress travel across the network.
- As a part of the recommended network, a key item will be addressing arterial and major collectors across the region and helping to develop low-stress crossings for existing barriers (e.g., state highways/interstates and the Sacramento River).

Level of Traffic Stress Analysis

City of Anderson

- LTS 1: 69%
- LTS 2: 17%
- LTS 3: 4%
- LTS 4: 10%
- Arterials account for 69% of all LTS 3 facilities and 80% of all LTS 4 facilities

See Figure B.5 for a bicyclist level of traffic stress map of the City of Anderson.

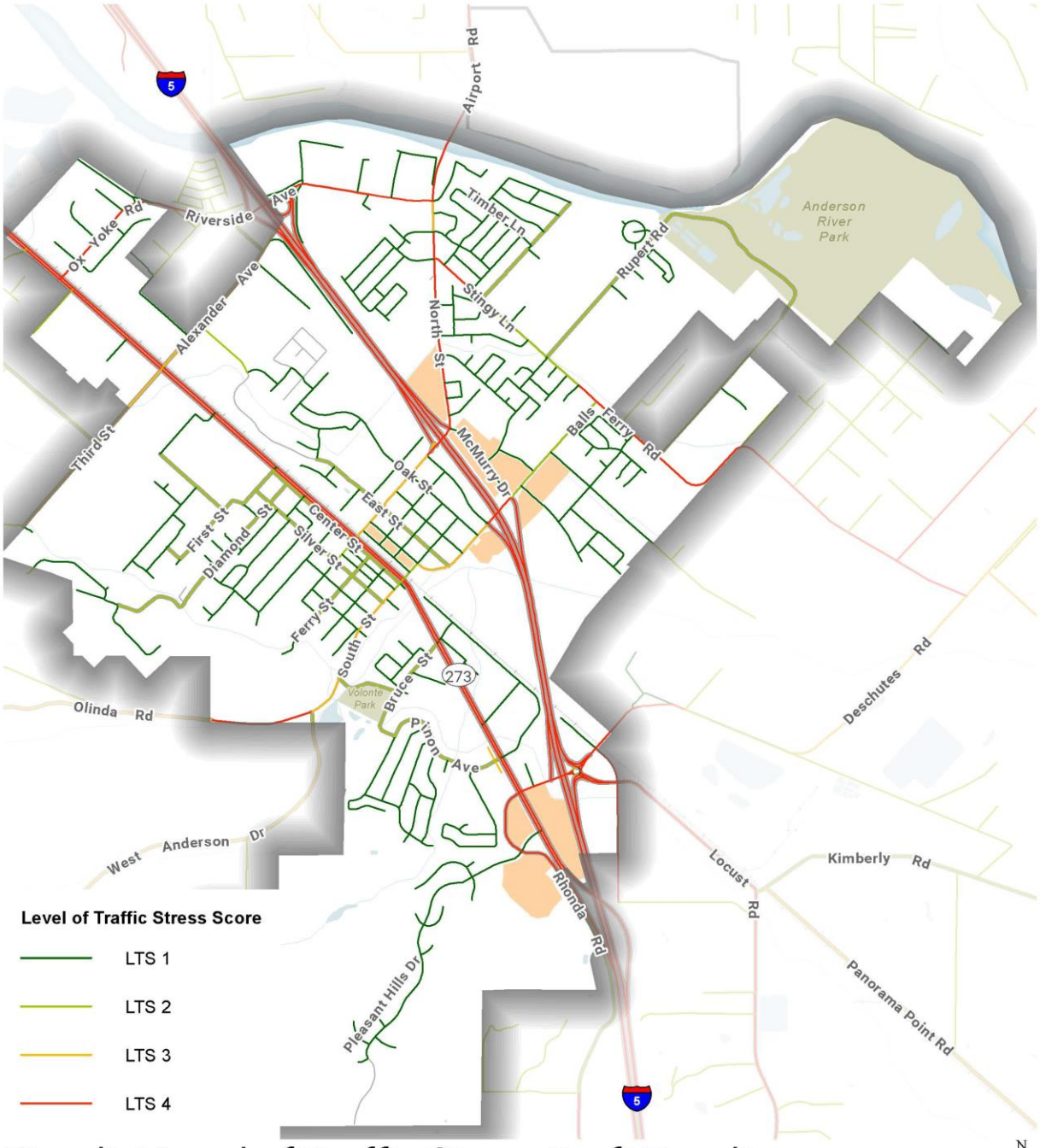


Figure B.25. Bicyclist Level of Traffic Stress Draft Results for the City of Anderson

City of Redding

- LTS 1: 69%
- LTS 2: 4%
- LTS 3: 4%
- LTS 4: 23%
- Arterials account for 52% of all LTS 3 facilities and 54% of all LTS facilities
- Major Collectors account for an additional 39% of LTS 3 facilities and 29% of LTS facilities

See Figure C.6 for a bicyclist level of traffic stress map of the City of Redding and Figure C.7 for a bicyclist level of traffic stress map of Downtown Redding.

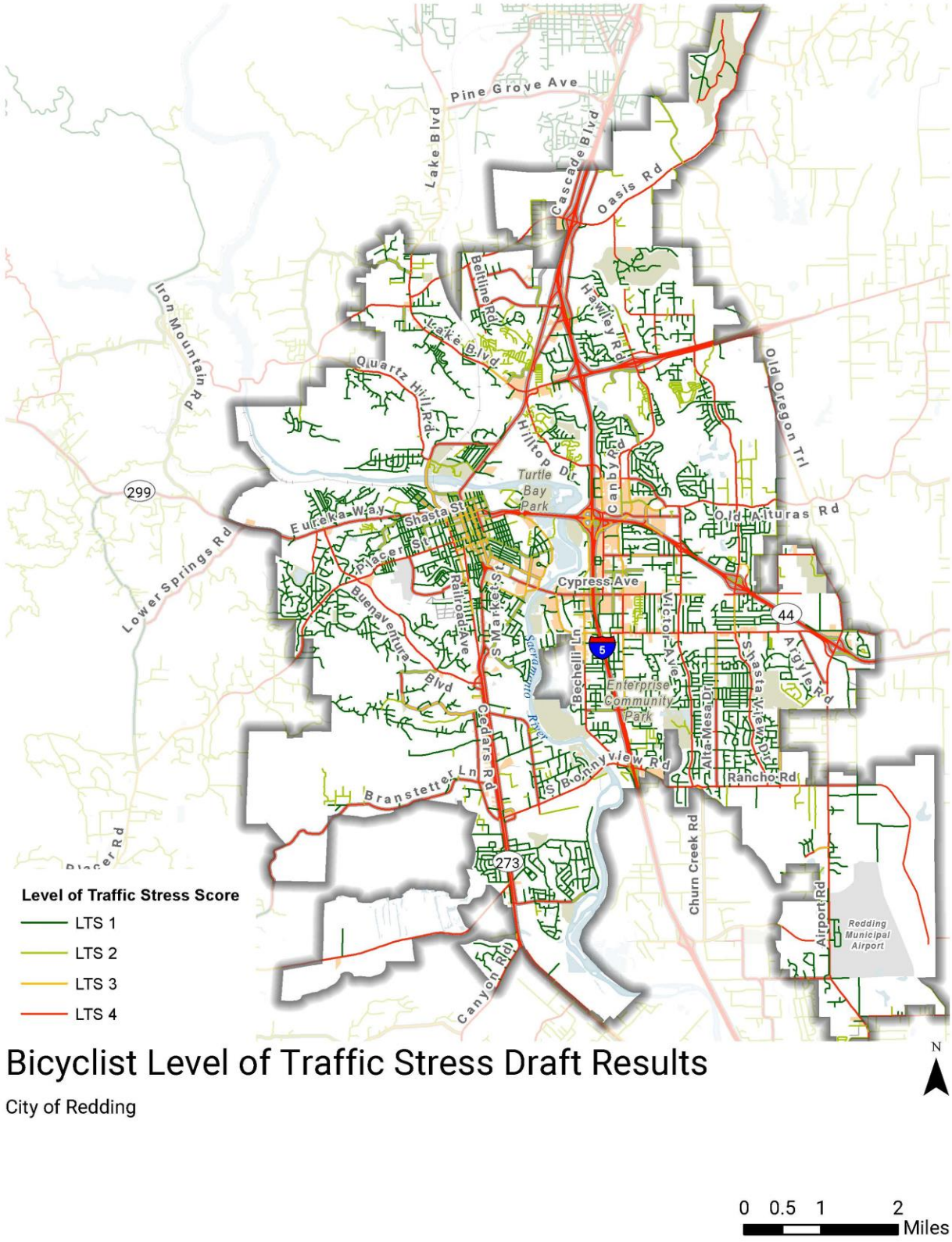


Figure B.26. Bicyclist Level of Traffic Stress Draft Results for the City of Redding

Bicyclist Level of Traffic Stress Draft Results

Downtown Redding

Figure B.27. Bicyclist Level of Traffic Stress Draft Results for Downtown Redding

City of Shasta Lake

- LTS 1: 79%
- LTS 2: 2%
- LTS 3: 2%
- LTS 4: 17%
- Arterials account for 58% of all LTS 3 facilities and 47% of all LTS facilities
- Major Collectors account for an additional 42% of LTS 3 facilities and 53% of LTS facilities

See the following for a bicyclist level of traffic stress map of the City of Shasta Lake.

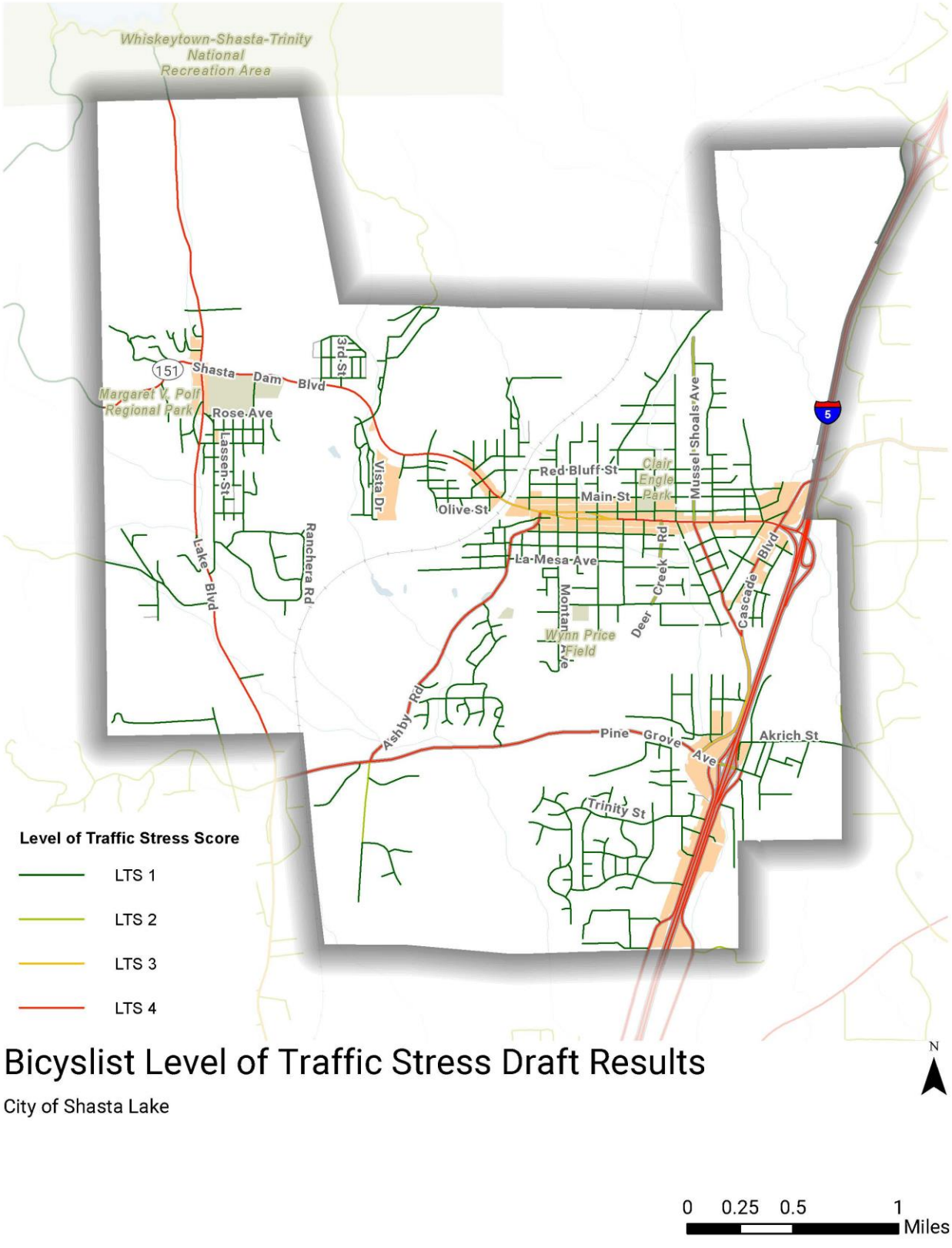


Figure B.28. Bicyclist Level of Traffic Stress Draft Results for the City of Shasta Lake

Shasta Region

- LTS 1: 20%
- LTS 2: 61%
- LTS 3: 6%
- LTS 4: 13%

See the following for a bicyclist level of traffic stress map for the Shasta Region.

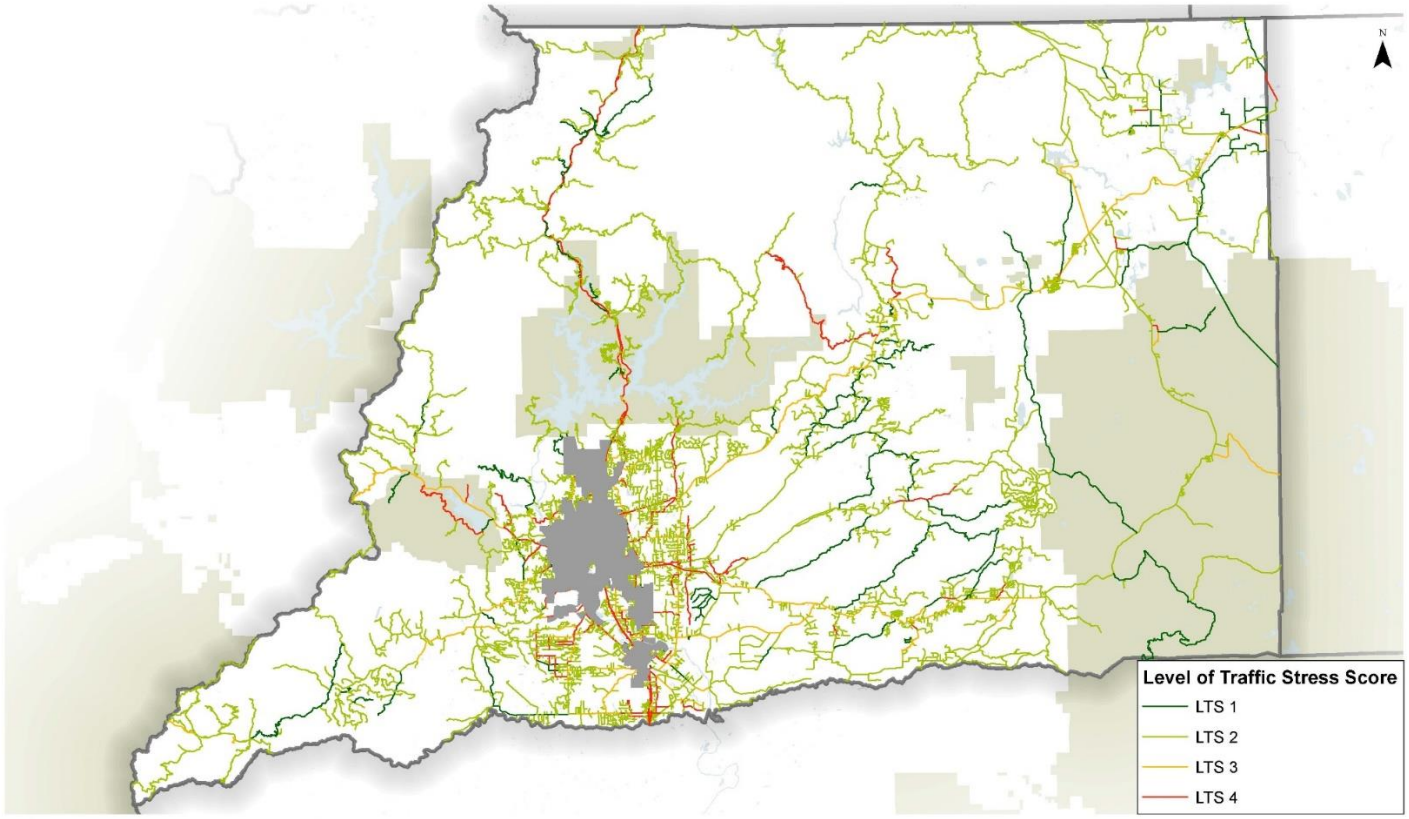


Figure B.29. Bicyclist Level of Traffic Stress Draft Results for the Shasta Region