Penngrove Traffic Study

Public Draft Report

County of Sonoma

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1. Background

The Penngrove Traffic Study (Study) was undertaken to address longstanding concerns of Penngrove area residents concerning traffic conditions, particularly related to regional cut-through traffic on Petaluma Hill Road, Main Street, Adobe Road and Old Redwood Highway and associated concerns regarding travel speeds, safety, and delays to emergency services. Specific concerns have also arisen related to school traffic as students are dropped-off/picked-up from Penngrove Elementary School.

1.1 Study Purpose

Sonoma Public Infrastructure (formerly the Sonoma County Department of Transportation and Public Works) initiated the Study as part of efforts to identify potential improvements that address traffic congestion, mobility, safety, and regional growth. Sonoma County is committed to finding solutions that respond to community concerns about traffic and safety on roadways within Penngrove.

An origin/destination (O/D) study conducted by Kimley-Horn in 2008 confirmed that over half of the traffic on key roadway segments within the study area were generated by vehicles registered in Petaluma, Rohnert Park and Santa Rosa. In addition, the bulk of the traffic passing through Penngrove on Adobe Road is traveling to/from Highway 12 to the east that provides the most direct route to origins and destinations near the cities of Sonoma, Napa, Fairfield and Vacaville.

While the study focuses on the community of Penngrove, as defined by the Penngrove Area Plan, it also evaluates traffic conditions relevant to Penngrove within a larger Study Area that extends north of Rohnert Park along the Petaluma Hill Road and Snyder Lane corridors, extends both north and south along Old Redwood Highway to interchanges with Highway 101 in Cotati and Petaluma, and extends southeast along Adobe Road to Frates Road. Figure 1.1 provides a vicinity map that shows the boundaries of the Penngrove Area Plan and also illustrates the boundaries of the Study Area.

1.2 Overview of Study Report

This study report is divided into the following sections:

- **Background (Section 1)** provides an overview of the study purpose, existing and planned transportation network, travel speeds, growth trends, and roadway network characteristics that are most relevant to the study goals. This section also describes planned upcoming transportation improvements relevant to the study.
- **Recommended Improvement Strategy (Section 2)** describes recommended improvements that respond to the goals of the study, particularly to reduce speeds and increase provisions for bicyclists and pedestrians, both to respond to community concerns and to provide traffic calming improvements consistent with the General Plan on specific segments. As stated in the County General Plan: traffic calming improvements are intended to accommodate local circulation,

reduce traffic volumes, and decrease speeds in order to promote the safety of pedestrians and bicyclists. The County General Plan further states that traffic calming measures include, but are not limited to, one-way streets, turn restrictions, traffic signals, stop signs, narrow lanes, roundabouts, road closures, pavement undulations, and measures that discourage truck traffic.

- **Technical Appendices**
    - **Appendix A Survey Results** summarizes the response to an online survey that asked respondents to indicate their key concerns and improvement preferences.
    - **Appendix B Traffic Operations Analysis** described the analysis of traffic level of service (LOS) that evaluated AM and PM Peak Hour congestion at 39 study intersections. The analysis was conducted for both Existing Conditions, and for Future Conditions based on the Sonoma County Transportation Authority (SCTA) travel demand forecast for year 2040.
    - **Appendix C Collision Analysis** described the analysis of collision data at intersections and on segments.
    - **Appendix D Level of Service Reports** shows the peak-hour turning movements and level of service calculations for each intersection.
    - **Appendix E Interactive Map Comments** provides the public comments submitted by members of the public for specific locations shown on the project website map.

The Study evaluates transportation conditions and recommends potential improvements to address community concerns, including:

- A strategy of relatively low-cost striping with narrower lanes to reduce speeds, buffered bicycle lanes, traffic calming, and pedestrian crossing treatments. Given their relatively low cost: the recommended improvements could be potentially installed within a decade or less if funding is secured.
- The proposed Phase 1 and Phase 2 improvements would complement current plans by the County to reconfigure the intersection of Adobe Road with Main Street/Petaluma Hill Road that will significantly reduce vehicle delay at that intersection. The Phase 1 and Phase 2 improvements would also complement the planned improvements of the intersections of Old Redwood Highway/Railroad Avenue and Old Redwood Highway/Ely Road that are anticipated to be implemented in the next few years.
- This study also recommends that school access be enhanced by providing a pathway along the north side of Adobe Road between Petaluma Hill Road and the planned SMART Trail, ideally concurrent with the SMART Trail construction if funding can be secured. The proposed path would allow for school access via the SMART Trail, as well as enhancing safety during the school drop-off/pick-up periods.
- Long-term improvement concepts are also described in this report, for further consideration over a longer-term horizon by 2045.

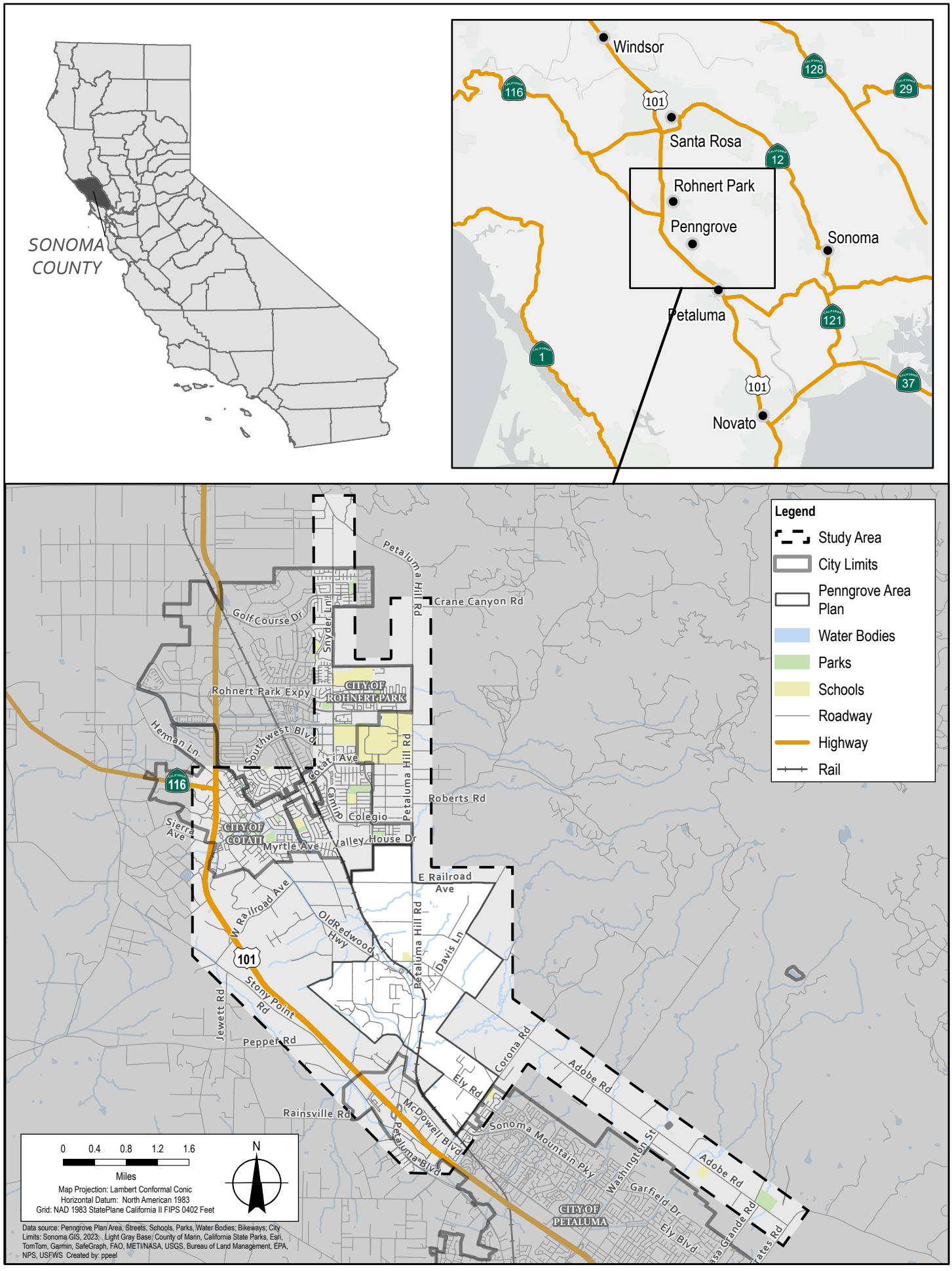


FIGURE 1.1 VICINITY MAP

PENNGROVE TRAFFIC STUDY

1.3 Setting

This section contains descriptions of the key transportation infrastructure relevant to transportation conditions in Penngrove.

1.3.1 Major Roads & Adopted Policies

The primary arterial and collector roadway network serving the study area is described below. Roadway classifications may vary between jurisdictions; classification descriptions described below are based on the Sonoma County General Plan 2020 (County GP) unless otherwise indicated. Figure 1.2 shows the adopted street classification maps from the County GP. The County GP includes adopted policies that specify:

- Commute and through traffic should be focused on Highway 101.
- Major arterials should primarily serve as connectors between urban areas, and arterial roads should be designed to carry large volumes of intercity traffic. *Within the study area, this applies to Old Redwood Highway, Railroad Avenue and segments of Petaluma Hill Road that are north of Railroad Avenue.*
- Collector roads are intended to carry the internal traffic of a local area from the local road system to arterial roads. Collector roads that are designated for traffic calming improvements are primarily intended to serve the local character. *Within the study area: Petaluma Hill Road (south of Formshlag Lane), Main Street and Adobe Road are collector roads that have been designated for traffic calming. In addition, Ely Road is a collector road (but not designated for traffic calming).*

Old Redwood Highway

Old Redwood Highway is a Rural Principal Arterial within unincorporated Sonoma County and extends approximately five miles within the study area, including portions within the cities of Cotati and Petaluma. From its northern terminus at Commerce Boulevard and US 101 in Cotati, Old Redwood Highway continues southward through downtown Cotati, Penngrove and into Petaluma where it becomes Petaluma Boulevard North at the US 101 interchange. Petaluma Boulevard North continues south of the study area through Petaluma. Old Redwood Highway maintains a 2-lane cross section with a shoulder through the majority of its length through unincorporated County areas but widens to four lanes within Cotati and Petaluma.

Adobe Road

Adobe Road is a 2-lane Rural Major Collector that extends approximately 9.5 miles southeast from Old Redwood Highway to Highway 116, which connects with Highway 12 to the east and the cities of Sonoma and Napa, as well as Interstate 80 near the cities of Fairfield and Vacaville. Within Penngrove, Adobe Road is fronted by residential and industrial land uses and Penngrove Elementary school. East of Penngrove: land uses adjacent to Adobe Road are primarily agricultural.

Petaluma Hill Road

Petaluma Hill Road is a 2-lane north-south road that is designated as a Rural Major Collector between Adobe Road and Railroad Avenue, and a Rural Minor Arterial north of Railroad Avenue. It extends north from Adobe Road in Penngrove, continuing for approximately 10 miles through unincorporated County areas where it borders the City Rohnert Park and Sonoma State University and continues to the city of Santa Rosa. South of Adobe Road, it becomes Penngrove's Main Street.

Main Street

Main Street is a 2-lane Rural Major Collector between Old Redwood Highway and Adobe Road, where it becomes Petaluma Hill Road north of Adobe Road. On-street parking is allowed on both sides of Main Street which provides access to adjacent commercial uses. A sidewalk is provided along the west side of Main Street, and some portions of the east side. The width of Main Street varies, with most segments providing a width of 40 feet including on-street parking.

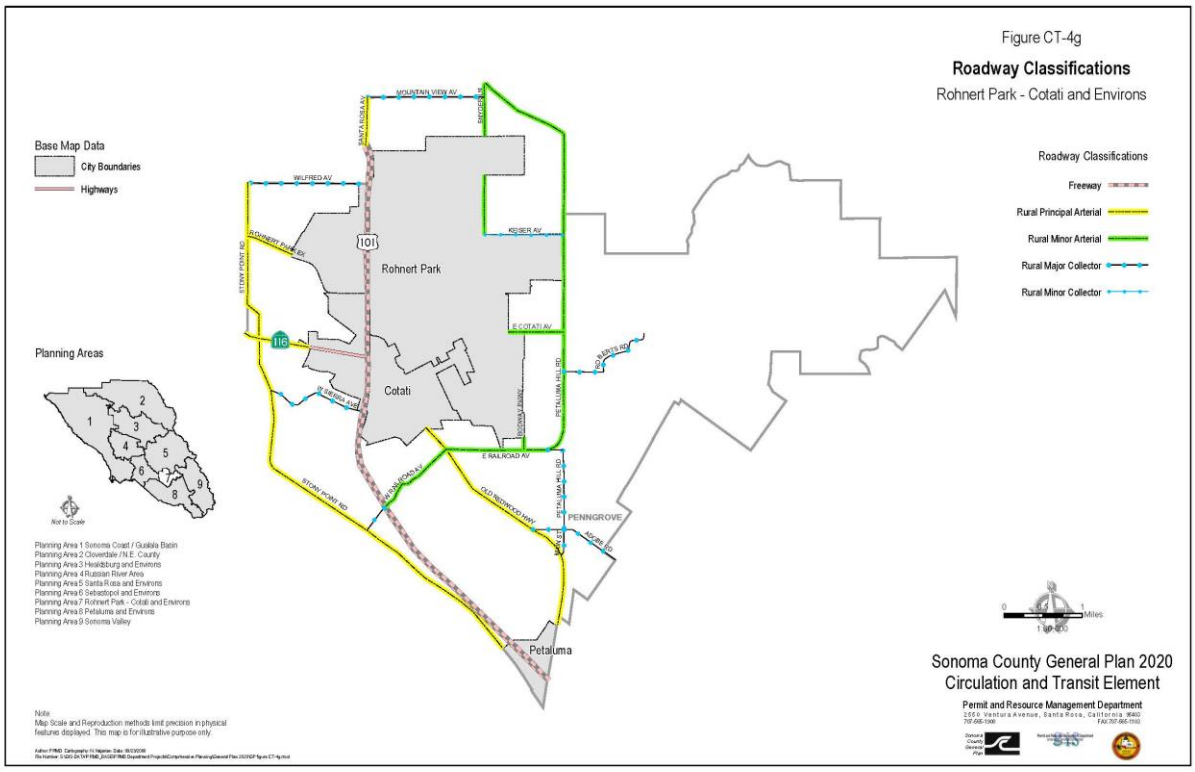
Railroad Avenue

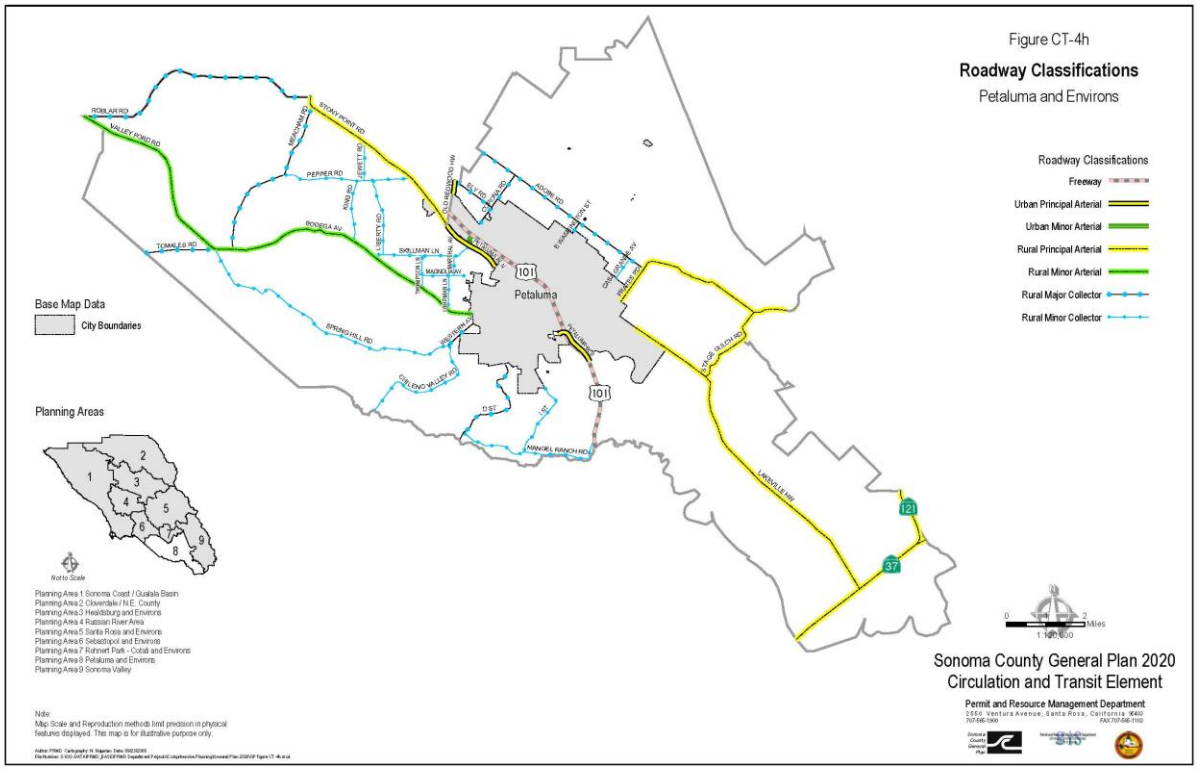
Railroad Avenue is a 2-lane east-west road that carries a low volume of traffic today, but it is designated as a Rural Minor Arterial, planned for expansion in the future to provide 3 lanes (one per direction plus a center turn lane) and shoulder/bike lane treatments, with a planned full interchange at US 101 that is intended to accommodate future traffic growth in Rohnert Park in a manner that avoid increasing traffic volumes through Penngrove. Railroad Avenue spans approximately four miles between its western terminus at Stony Point Road to its eastern terminus as Davis Lane. Land uses adjacent to Railroad Avenue are a mix of low-density residential and agricultural. The intersection with Old Redwood Highway is stop-sign controlled today but planned for intersection improvements within the next few years.

Ely Road

Ely Road North is a 2-lane Rural Major Collector that extends approximately 1.7 miles southeast from its western terminus at Old Redwood Highway into Petaluma where it connects with Sonoma Mountain Parkway . Ely Road North is fronted by a mix of agricultural and residential land uses between Old Redwood Highway and Corona Road. The intersection with Old Redwood Highway is stop-sign controlled today but planned for intersection improvements within the next few years.

Figure 1.2 Roadway Classification Maps (County General Plan)

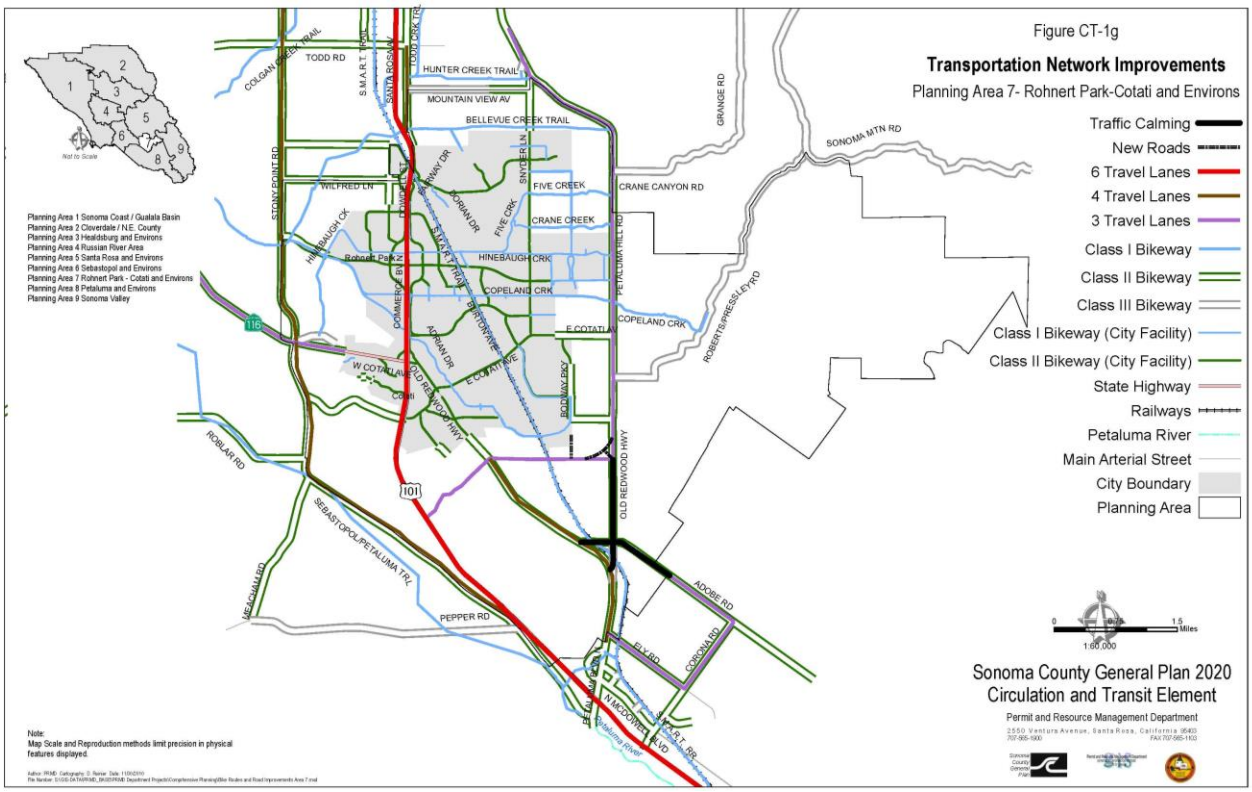




1.3.2 Planned Transportation Network Improvements

The County General Plan identifies planned long-term improvements to major roads in the study area as shown on Figure 1.3. The timeframe for such improvements is subject to funding, with some improvements likely to be funded by 2050, while others would not be implemented until after 2050.

Figure 1.3-A Long-Term Improvement Plan (County General Plan)

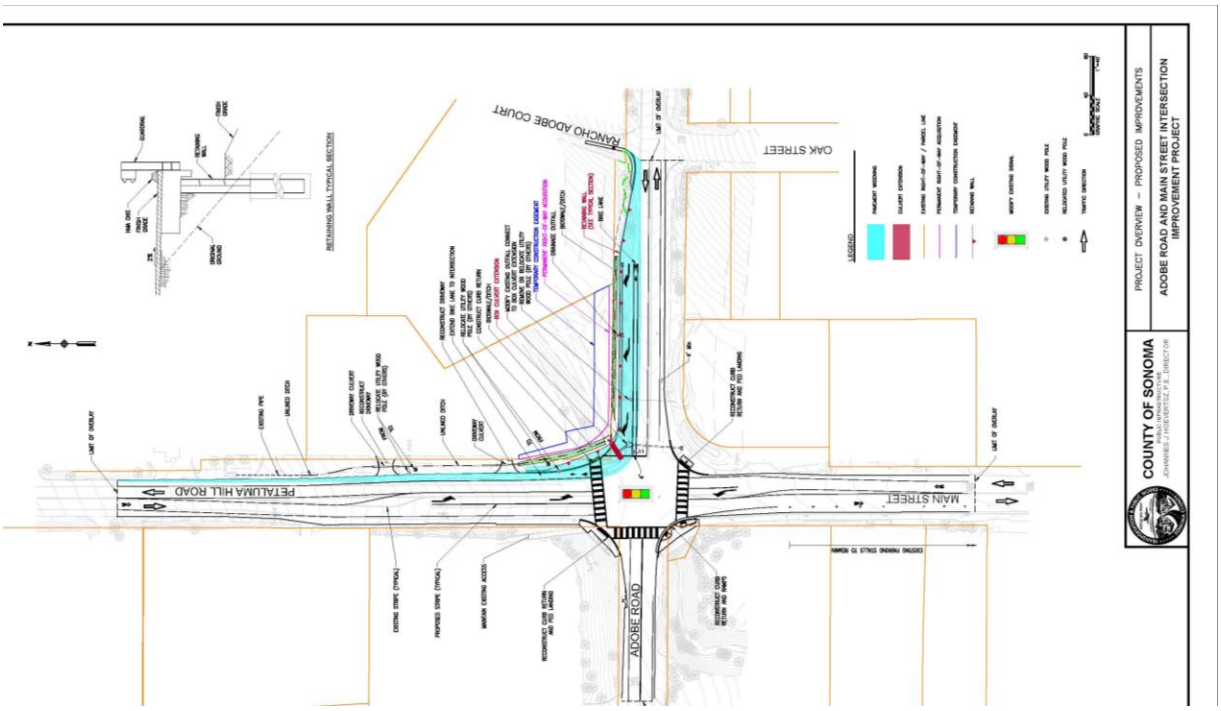


Funded Improvements

The key planned improvements relevant to the Study Area that have secured funding are:

- **SMART Pathway (Penngrove segment, Phase 1 of 2).** The segment of the planned bicycling and walking path through Penngrove received $10 million in grant funding and $1 million from regional impact fee for construction of the first phase of the SMART Pathway construction in the Penngrove area. Phase 1 of the Penngrove segment will extend southeast from Main Street to Southpoint Boulevard in Petaluma and is currently under construction with completion expected by the end of 2024.
- **Improvements at Adobe Road intersection with Petaluma Hill Road and Main Street:** as currently planned, a right-turn lane would be installed on westbound Adobe Road, and the northbound approach on Main Street would be reconfigured with a short left-turn pocket. Provision of the northbound left-turn pocket will allow for the current split-phase signal pattern to be replaced with a more efficient signal plan that will significantly reduce traffic queueing in combination with the westbound right-turn pocket. Figure 1.3-B illustrates the planned improvements at this intersection.

Figure 1.3-B Short-term Funded Improvement: Adobe Road intersection with Petaluma Hill Road and Main Street



- **Intersection improvements of two intersections on Old Redwood Highway, at (1) Railroad Avenue; and (2) Ely Road.** Sonoma County has secured funding for improvements at two intersections on Old Redwood Highway. A Intersection Control Evaluation (ICE) completed by engineering consultant BKF January 2024. Environmental permitting may be a challenge due to being located in the San Francisco Regional Water Quality Control Board (SFRWQCB) jurisdictional area.

    - **Old Redwood Highway at Railroad Avenue:** The two main alternatives under review are a traffic signal and a roundabout. $5.5 million has been secured for the environmental clearance, design, and construction of this project.
    - **Old Redwood Highway & Ely Road:** Of the five alternatives presented in the ICE, two stood out: a signalized intersection with added lanes on Ely Rd. and a roundabout with added slip lanes with the recommendation to convert the existing intersection to a roundabout with slip lanes, as it would provide the greatest overall benefit. While the alternative that provides the greatest LOS is a signalized intersection with added lanes on Old Redwood Hwy, that option is not economically feasible, providing the lowest Benefit Cost Ratio (BCR), and is also not the safest option. Rather, the safest and most economically feasible option is a simple roundabout; however, this option has shown to present operational failure under future traffic volumes. As such, the next safest option would be a roundabout with slip lanes, which is also the second lowest cost, providing 16% more savings than a traffic signal, even with additional R/W acquisition. $2.8 million has been secured for the environmental clearance, design, and construction of this project.

Unfunded Improvements

Long-term planned improvements identified in the General Plan that have not yet secured funding include the following:

- **Traffic calming improvements on Petaluma Hill Road (south of Formshlag Lane), Main Street and Adobe Lane.** This project is not included in the 2050 Comprehensive Transportation Plan project list, funding has not been secured, and no work has been completed to date.

- **Railroad Avenue widening to 3 lanes (with center turn lane):** This project is included in the 2050 Comprehensive Transportation Plan but funding has not been secured and no work has been completed to date.

- **Railroad Avenue interchange with Highway 101.** This project is included in the 2050 Comprehensive Transportation Plan project list, but funding and Caltrans approval has not been secured and no work has been completed to date.

- **Old Redwood Highway widening to 4 lanes south of Railroad Avenue:** Based on future traffic growth forecasts from the SCTA model, future traffic volumes on Old Redwood Highway between Railroad Avenue and Main Street will remain low in the future, therefore the planned long-term widening to 4 lanes is not recommended north of Main Street. This project is not included in the 2050 Comprehensive Transportation Plan project list, funding has not been secured and no work has been completed to date.

- **Petaluma Hill Road widening to 3 lanes (1 per direction with center turn-lane):** This project is not included in the 2050 Comprehensive Transportation Plan project list, funding has not been secured and no work has been completed to date.

- **Adobe Road widening to 3 lanes (1 per direction with center turn-lane):** This project is not included in the 2050 Comprehensive Transportation Plan project list, funding has not been secured and no work has been completed to date.

- **Adobe Road bicycle lanes & signalization of intersection with Corona Road:** Provision of bicycle lanes on Adobe Road, and signalization of the intersection with Corona Road, are included in the 2050 Comprehensive Transportation Plan project list but funding has not been secured and no work has been completed to date.

- **SMART Pathway (Penngrove segment, Phase 2 of 2):** Phase 2 will extend the pathway north of Main Street to Railroad Avenue where it will connect with an existing pathway segment that extends north through Cotati and Rohnert Park, with a planned future connection to Santa Rosa. Phase 2 will include crosswalks at Main Street and Adobe Road. Phase 2 is currently in the design phase but funding for construction has not been secured.

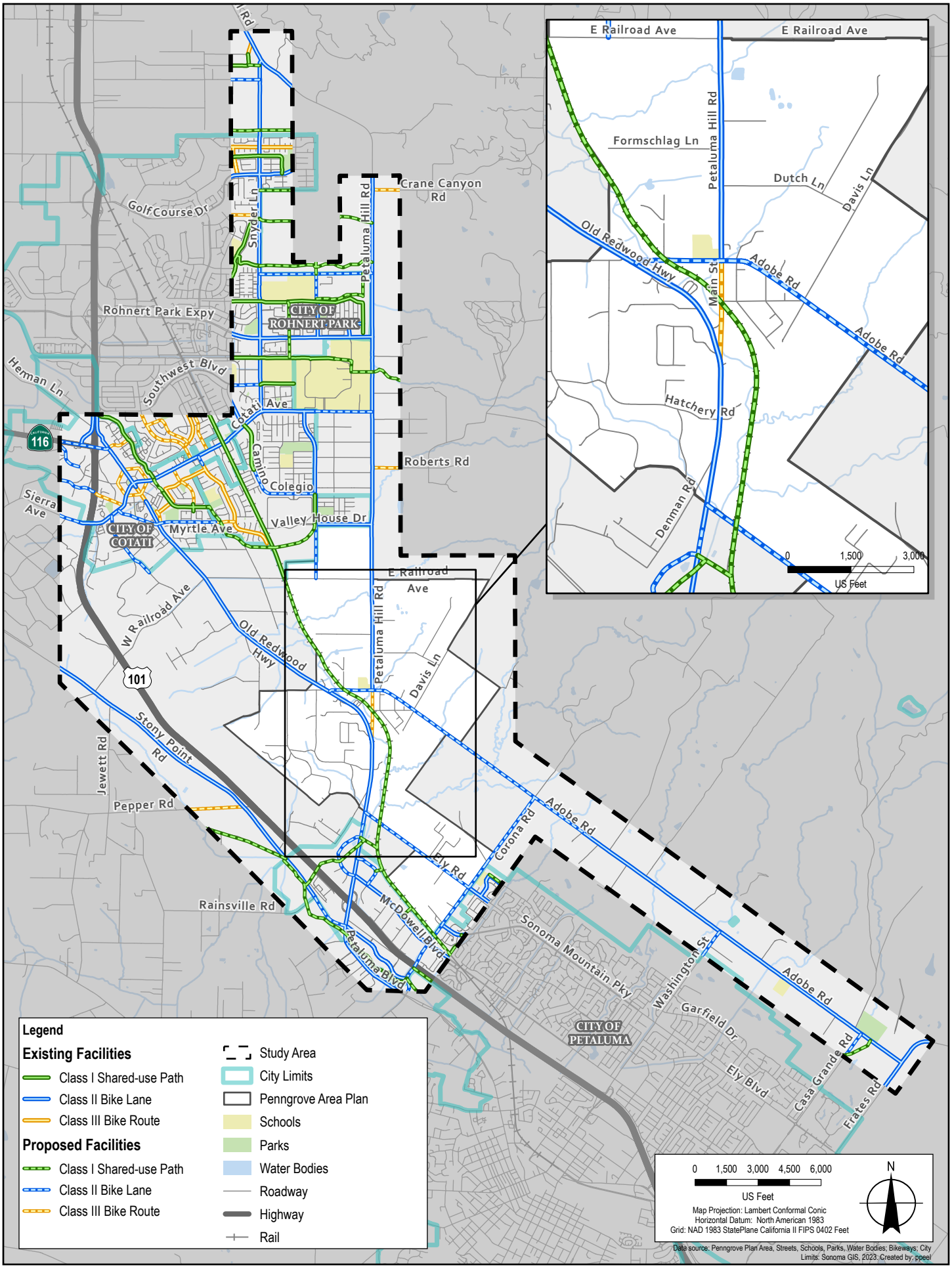


FIGURE 1.4 BIKEWAY NETWORK

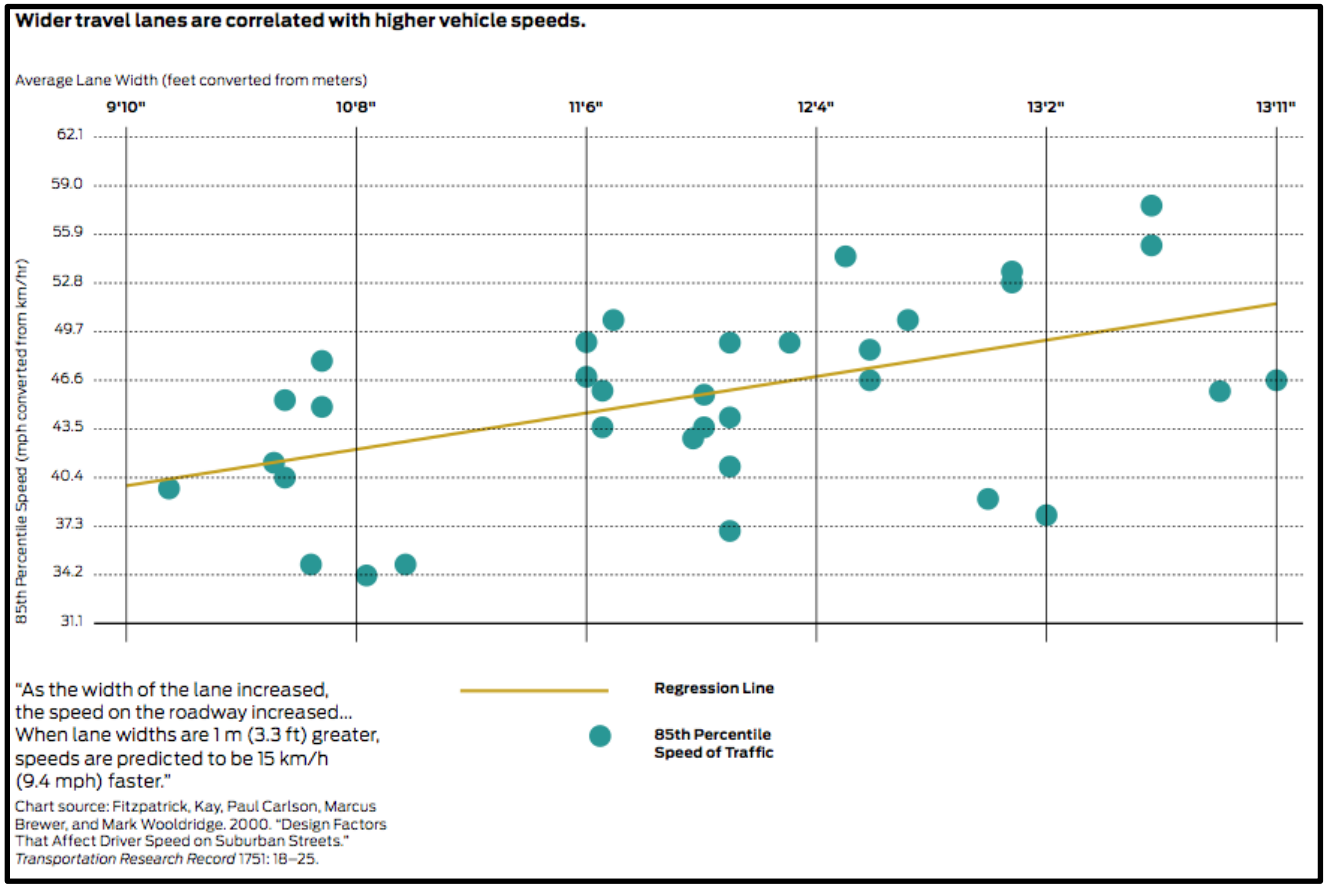
PENNGROVE TRAFFIC STUDY

1.3.3 Speeds

The current speed limits on major roads serving the study area are illustrated on Figure 1.5. As shown, posted speed limits on segments of Old Redwood Highway are 50 mph through central Penngrove, while posted speed limits on Adobe Road are 40 mph (an increase from 30 mph in 2019). Community members have expressed safety concerns due to the speeds on those roadways. In addition, Sonoma County's Local Roadway Safety Plan recommended measures to reduce speed on roadways throughout the County.

Posted speed limits are largely defined by State law, based on prevailing speeds (defined as the 85th percentile speed). The biggest factor affecting the prevailing speed is the design speed of each roadway segment. Roads with wide travel lanes (greater than 11 feet), wide shoulders, and large curb radii tend to result in higher prevailing speeds as illustrated on Figure 1.4-B. Streets with wide travel lane widths therefore provide opportunities to reallocate space in a manner that better serves all modes of travel, as recommended in Section 2 of this report.

Figure 1.4-B Lane Width Correlation with Higher Speeds



Traffic Conditions

The traffic operations analysis is summarized in Appendix A, and evaluated peak-hour traffic delay at the 39 study intersections shown on Figure 1.6. The analysis was conducted under both Existing Conditions, and Future Conditions based on Year 2040 traffic forecasts from the SCTA model. The key finding of the traffic analysis were that:

- The planned improvements at the Adobe Road intersection with Petaluma Hill Road and Main Street will significantly reduce delay at that intersection. LOS will improve from D (AM) and E (PM) to C during both peak hours. Even under Future Conditions: LOS will be D or better during both peak hours, an improvement from existing conditions. A key factor in the improved LOS is that the reconfigured intersection can use a more efficient signal-timing plan that can replace the current split-phase for north/south travel.
- Traffic volumes on Old Redwood Highway south of Main Street will increase under Future Conditions, and two through lanes would be recommended in each direction, consistent with the General Plan. (North of Main Street: traffic volumes will remain low on Old Redwood Highway under Future Conditions, and not require additional through lanes).
- Use of Railroad Avenue for travel to and from the planned full interchange with Highway 101 is predicted by the SCTA model to attract relatively few trips from the Petaluma Hill Road, due to the added travel distance. The bulk of the traffic passing through Penngrove today via Petaluma Hill Road and Adobe Road is traveling to/from Highway 12 to the east (connecting via Highway 116 east of Petaluma).

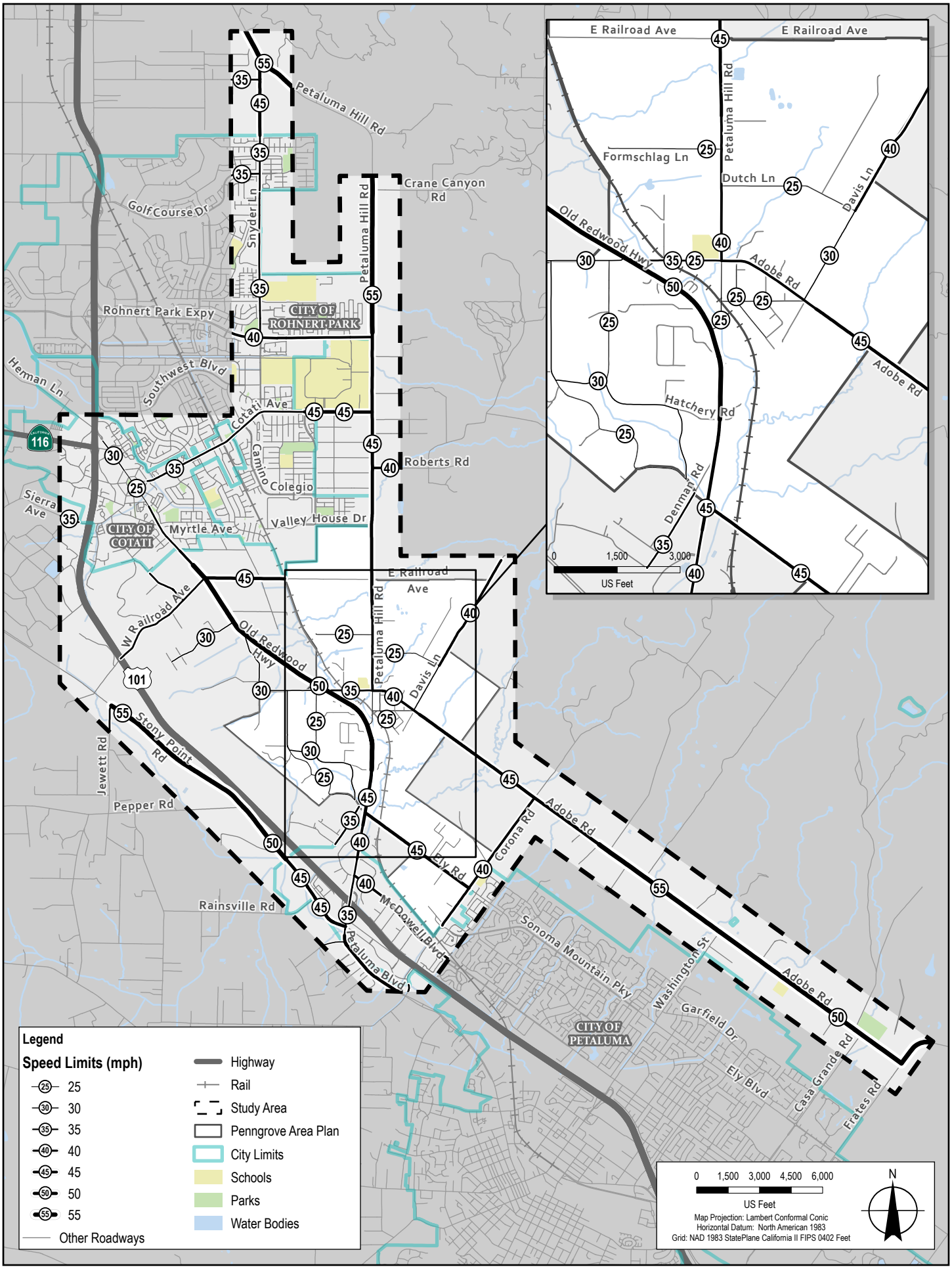


FIGURE 1.5 SPEED LIMITS

PENNGROVE TRAFFIC STUDY

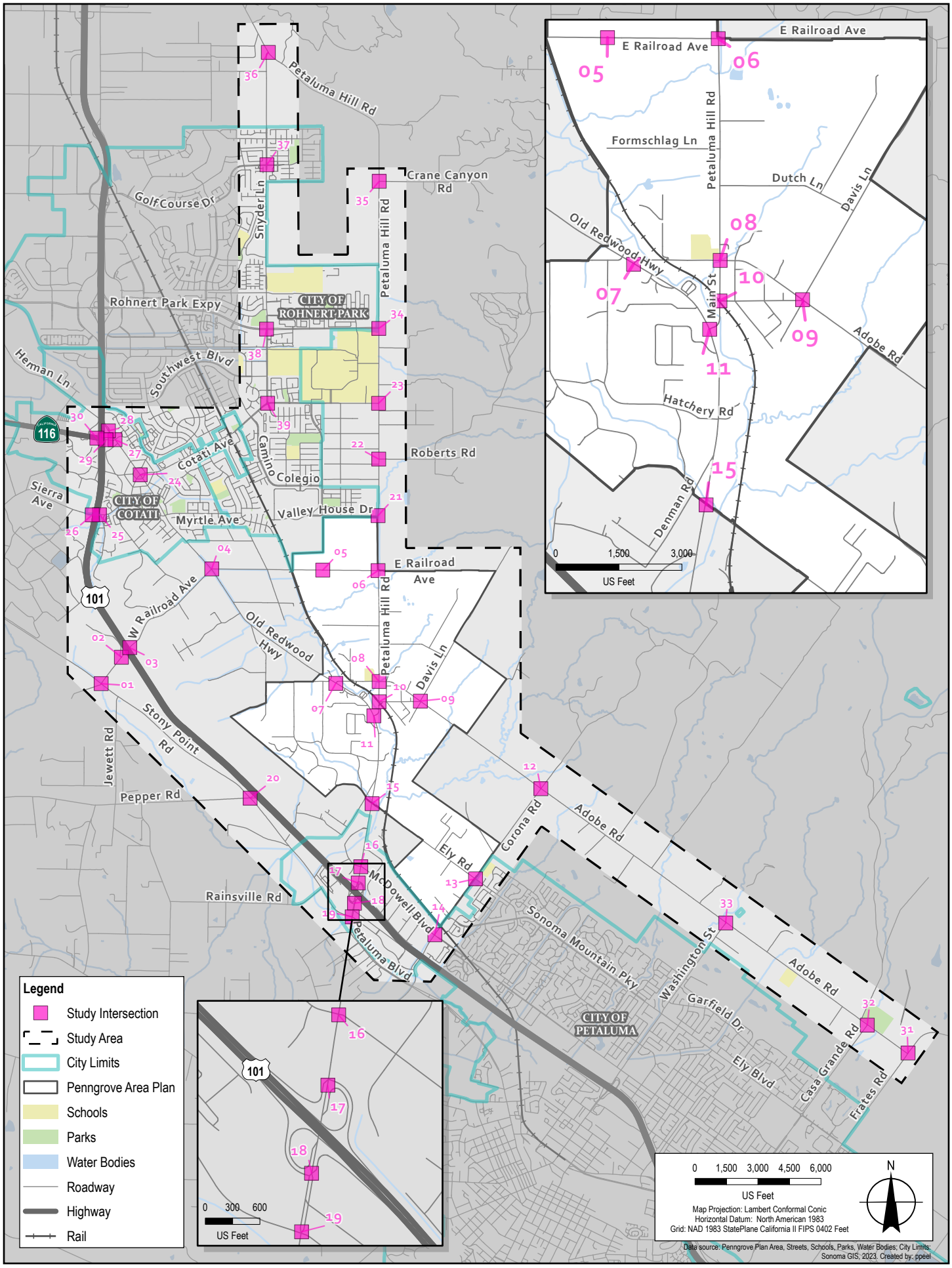


FIGURE 1.6 STUDY INTERSECTIONS

PENNGROVE TRAFFIC STUDY

1.4 Community Input

The study included a project website to facilitate public input that provided an interactive map and survey, and a Town Hall meeting on May 4, 2023 hosted by the Sonoma County Second District Supervisor, David Rabbitt, that represents Penngrove.

1.4.1 Key Concerns

Key concerns expressed by residents at the Town Hall meeting included:

- Safety concerns, particularly since two pedestrians were fatally struck at different locations on Old Redwood Highway in 2022.
- Traffic speeds (and posted speeds) are higher than desired, particularly on Old Redwood Highway, Adobe Road and Petaluma Hill Road. Residents noted that posted speeds had been raised on several street segments since 2019.
- Concerns about safety for students traveling to and from Penngrove Elementary School.
- Cut-through traffic on Dutch Lane (and a desire to install a barrier to prevent through traffic on Dutch Lane).
- Participants stated that there had been no changes to the key roads in the area for at least 40 years. The following improvements have been made in recent years: signal on Old Red Hwy at Main St, signal and continual signal adjustments on Petaluma Hill Road at Adobe, sidewalks on west side of Main St in downtown Penngrove which include bulb-outs lighted safety enhancements at crosswalk at Post Office and pedestrian lighting, safety enhancements at SMART rail crossing, queue-cutter signal on Main St at SMART rail crossing, crosswalk safety enhancements on Old Redwood Highway at Adobe, and safety enhancements on Adobe at SMART rail crossing
- Concerns about traffic growth resulting from approved housing developments in Rohnert Park, including support for implementation of traffic calming improvements on segments of Adobe Road and Petaluma Hill Road as called for by the County General Plan (shown on Figure 1.3-A of this report). The Rohnert Park Regional Traffic Mitigation Fund was created by agreement in 2007 with funds to be collected as the University District was built to mitigate traffic impacts beyond the Rohnert Park City limits, with funds collected by the City to be transferred to the SCTA. Through the end of Fiscal Year 2022/23, the City of Rohnert Park has paid $3,643,500 to the SCTA from fees collected. This program is anticipated to ultimately generate up to $7 million in funding for traffic mitigation, of which $5.8 million has already been committed to studies and projects.

1.4.2 Online Survey

The online survey for the Penngrove Traffic Study Survey opened for responses in May 2023 following the Town Hall meeting and closed on June 12, 2023. The survey received 80 responses. Survey responses are summarized in Appendix A. Key findings from the online survey are that:

- Most survey respondents (nearly 65 percent) indicated that a key concern for traveling in the study area is that motorists' speeds are too high. Roughly 60 percent identified traffic congestion/delays to motorists as a key concern. Over 40 percent indicated uncomfortable pedestrian crossings and lack of sidewalks are a key concern. Over 20 percent indicated that limited bike lanes/high level of stress for cyclists are a key concern.
- Over three-quarters (76%) of respondents agreed that "Traffic calming measures should be installed on the major roads through Penngrove to reduce motorists' speeds and discourage cut-

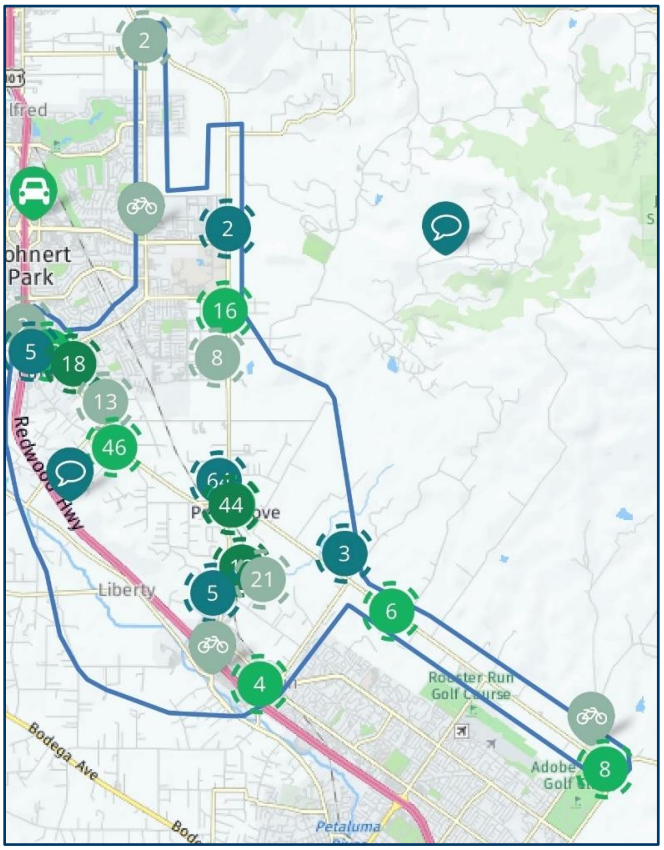
through traffic." A much smaller share (just 13%) indicated a preference for widening major roads to reduce delay to motorists.

- Over three-quarters (76%) of survey respondents indicated they regularly walk or run within the study area. However, just 22% indicate they feel comfortable walking in the study area.
- Over one-fourth of survey respondents (26%) indicated regularly travel by bicycle within the study area, but no survey respondents indicated they feel comfortable bicycling in the study area.
- Respondents were asked to prioritize or rank their preferred possible roadway enhancements for the study area. "Measures to reduce motorists' speeds" came out ahead with the most first choice votes (44) followed by "Additional traffic signals or controls" (29), "Enhanced pedestrian crossings" (27), and "Additional sidewalks and paths" (25). "Measures to reduce motorists' speeds" was also the most frequently selected second choice (10).

1.4.3 Online Map Comments

The online interactive map was opened for responses in December 2022 and closed for responses on June 13, 2023, and received 691 comments. Comments received on the interactive map are summarized in Appendix E. Commenters provided site-specific comments and safety recommendations, particularly on the three key streets serving Penngrove, Old Redwood Highway, Adobe Road and Petaluma Hill Road. Similar to the Town Hall meeting and survey: many comments recommended reducing traffic speeds.

Figure 1.7 Interactive Map (Initial View)



2. Recommended Improvement Strategy

Example of a street with narrow lanes and buffer treatments to reduce speeds.

Streets with travel lane widths exceeding 10 to 11 feet provide opportunities to reallocate space in a manner that better serves all modes of travel, while narrowing the width of motor vehicle lanes helps to reduce motor vehicle speeds. Based on that approach: this Study recommends an improvement strategy of relatively low-cost improvements that would restripe portions of Old Redwood Highway, Adobe Road and Petaluma Hill Road with narrower lanes and buffered bike lanes. Recommended improvements also include provision of a pedestrian pathway along the north side of Adobe Road between Petaluma Hill Road and the planned SMART Trail to enhance access to the Penngrove School, and measures to restrict through traffic on Dutch Lane. Recommended improvements are divided into two phases, with the goal of securing funding for implementation for Phase 1 (highest priority improvements) by 2030, and Phase 2 by 2035. In addition, this section also describes several improvement concepts for long-term consideration by 2045.

2.1.1 Phase 1 Improvement Recommendations

Phase 1 improvements would consist of the following measures to reduce speeds on Old Redwood Highway and restrict through traffic on Dutch Lane:

- **Old Redwood Highway:** Restriping of Redwood Highway from Ely Road to Adobe Road to narrow the travel lane widths and provide buffered bicycle lanes (with bollards on some segments), and accommodate a two-way center turn lane within the existing paved width. Restriping to create low-cost bulbouts treatments to further reduce speeds by narrowing specific intersections. Provision of a Pedestrian Hybrid signal is also recommended for the intersection of Old Redwood Highway Highway/Hatchery Road to enhance bus stop access. Figures 2.1 to 2.5 illustrate the improvement concept for key locations on Old Redwood Highway.
- **Dutch Lane:** Installation of measures to restrict through traffic on Dutch Lane, if desired based on neighborhood consensus. This could include removable bollards to allow emergency vehicles to pass.

Subject to funding: Phase 1 improvements could be potentially installed by 2030. The Phase 1 improvements would also complement the planned improvements of the intersections of Old Redwood Highway/Railroad Avenue and Old Redwood Highway/Ely Road that are anticipated to be implemented in the next few years.

Figure 2.1 Phase 1 Proposed Restriping on Old Redwood Hwy at Hatchery Rd (with Pedestrian Signal)

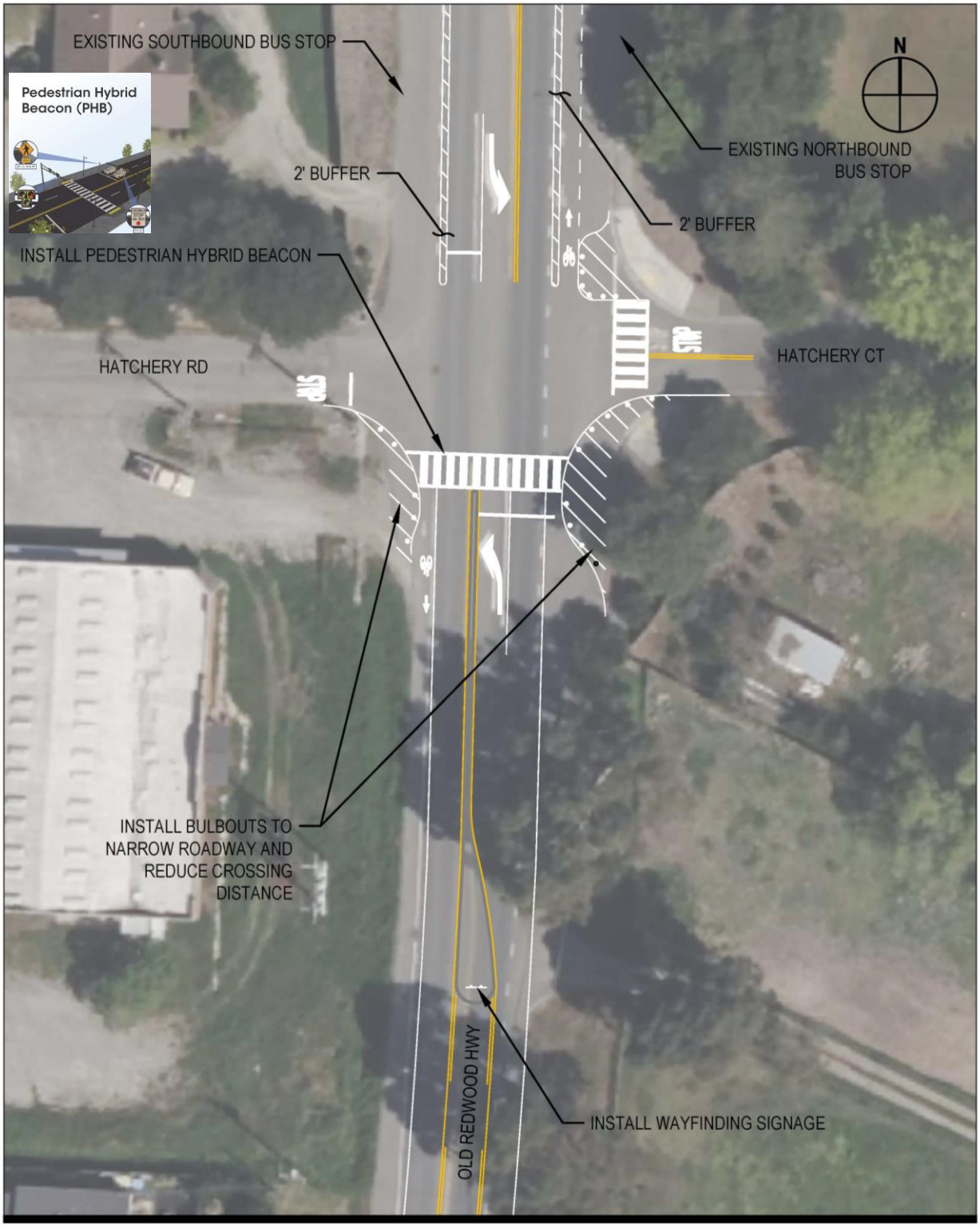


Figure 2.2 Phase 1 Proposed Restriping on Old Redwood Hwy (north of Hatchery Road)

Figure 2.3 Phase 1 Proposed Restriping: Old Redwood Highway at Main Street

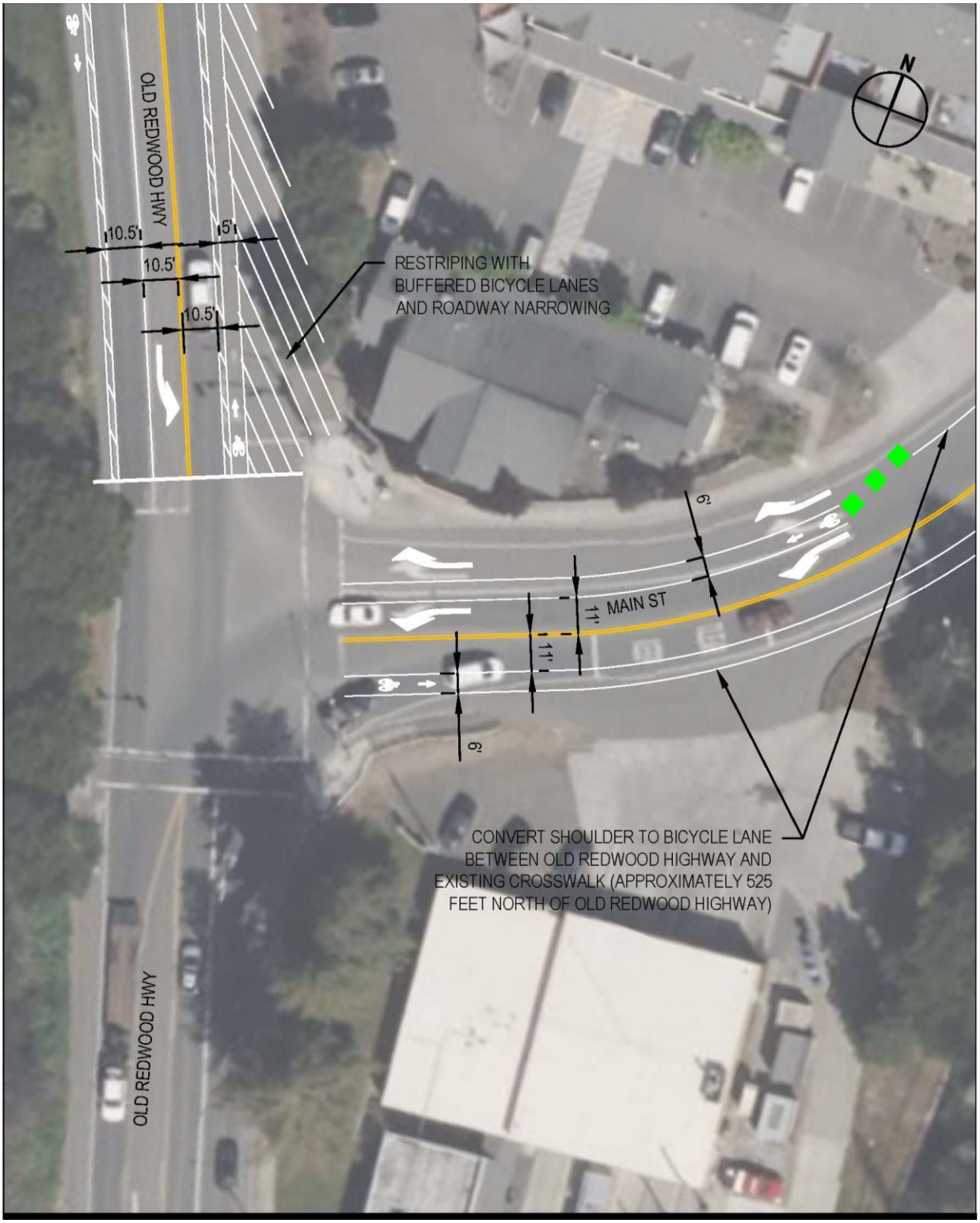


Figure 2.4 Phase 1 Proposed Restriping: Old Redwood Hwy at Denman Rd and Minnesota Ave

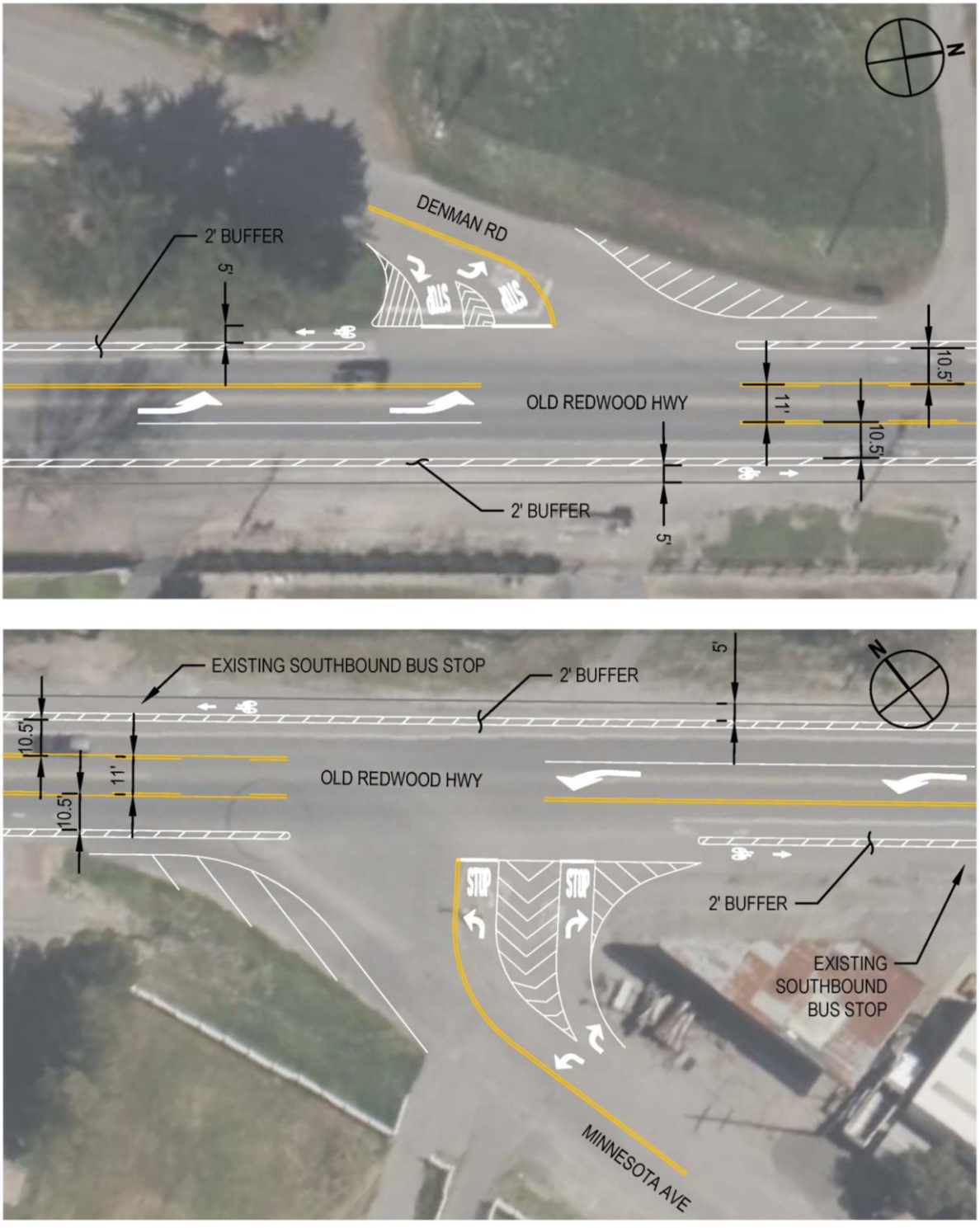
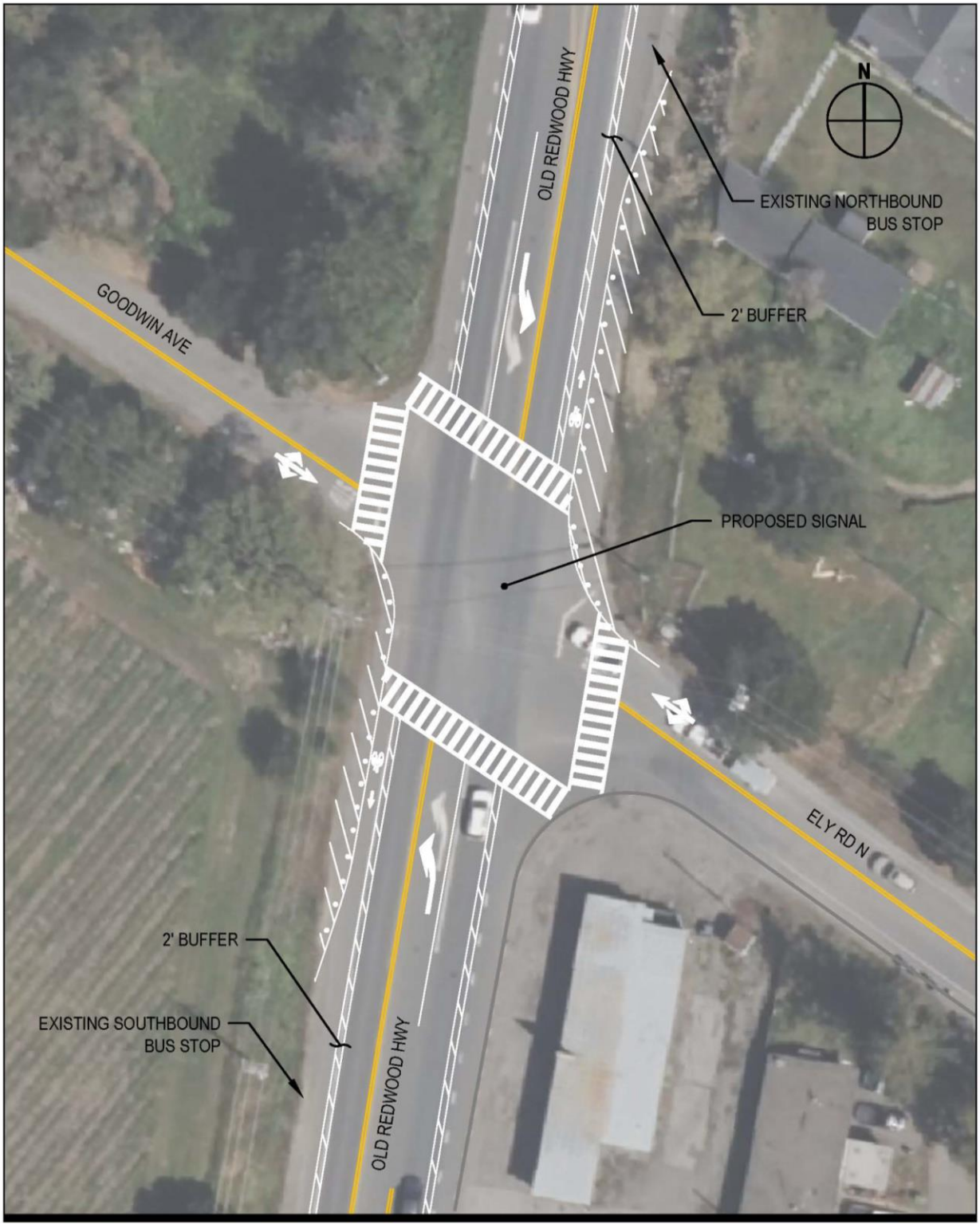


Figure 2.5 Phase 1 Proposed Restriping: Old Redwood Highway at Ely Road (with Intersection Improvements)



2.1.2 Phase 2 Improvement Recommendations

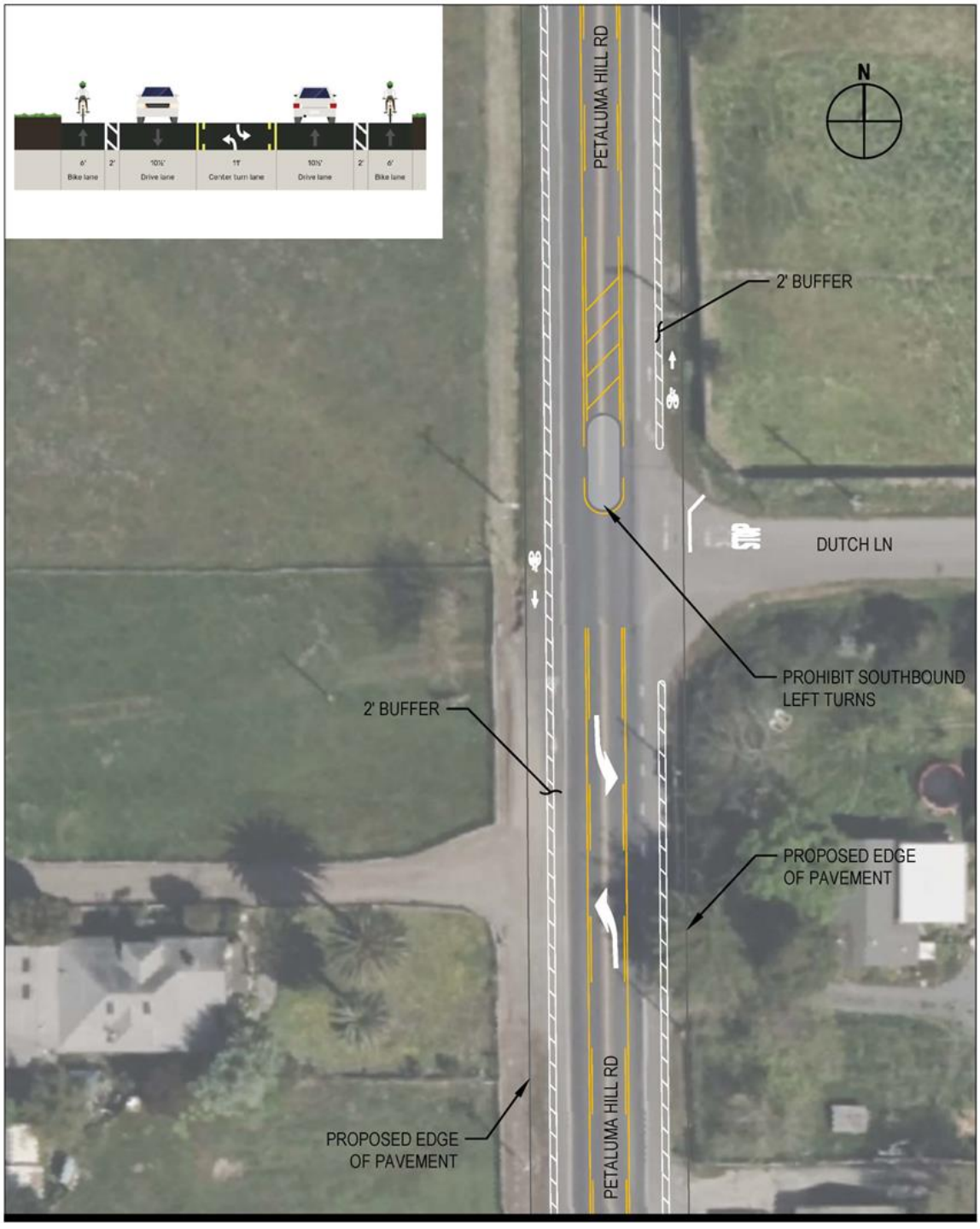
Phase 2 improvements would consist of the following measures to reduce speeds on Adobe Road and Petaluma Hill Road, and enhance access to Penngrove School:

- **Adobe Road:** Restriping of Adobe Road between Davis Lane and Main Street (east of Main Street) to narrow the travel lane widths and provide buffered bicycle lanes (with bollards on some segments) in conjunction with the planned (but currently unfunded) widening of the paved area to accommodate bicycle lanes. Figure 2.6 illustrates this improvement plan for a segment of Adobe Road.
- **Penngrove School Access:** Provision of a walking path by modifying the shoulder and applying an asphalt berm treatment along the north side of Adobe Road between Petaluma Hill Road and the planned SMART Pathway, ideally concurrent with Phase 2 of the SMART Trail construction if funding can be secured in time. The proposed walking path would allow for school access via the SMART Pathway, as well as enhancing safety during the school drop-off/pick-up periods.
- **Petaluma Hill Road:** Restriping of Petaluma Hill Road south of Formschlag Lane to narrow the travel lane widths and provide buffered bicycle lanes (with bollards on some segments), and accommodate a two-way center turn lane within the existing paved width. Figures 2.7 illustrates this improvement plan for the segment of Petaluma Hill Road near Dutch Lane.

Subject to funding, the proposed Phase 2 improvements could be installed by 2035. The proposed Phase 2 improvements would complement current plans by the County to reconfigure the intersection of Adobe Road with Main Street/Petaluma Hill Road that will significantly reduce vehicle delay at that intersection by allowing for a more efficient signal-timing plan.

Figure 2.6 Phase 2 Proposed Lane Narrowing & Buffered Bicycle Lanes on Adobe Road (East of Main Street)

Figure 2.7 Phase 2 Proposed Lane Narrowing with Center-turn Lane & Buffered Bike Lanes on Petaluma Hill Road



2.1.3 Long-term Improvement Concepts (Year 2045 & Beyond)

The following improvement concepts are recommended for consideration as long-term improvement options for implantation by 2045 or later, subject to further study and funding:

- Speed tables on Adobe Road and Petaluma Hill Road (south of Formshlag Lane).
- Restriping of Main Street with narrower lanes (reducing the current travel lane widths from 13 feet to 10-11 feet) to create space to provide a sidewalk on the east side of Main Street (while maintaining the on-street parking on both sides) without requiring expensive grading.

What are Speed Tables?

Example of a Speed Table on a 2-lane rural road near Aspen, Colorado

This study recommended long-term consideration of installing Speed Tables (not Speed Humps) on the segments of Adobe Road and Petaluma Hill Road recommended for traffic calming by the County General Plan. This study does not recommend Speed Humps. Key differences between Speed Tables and Speed Humps are that:

1. **Speed Tables are longer than Speed Humps. The longer depth of Speed Tables enables comfortable and safe operating speeds that are higher than Speed Humps**

2. **Speed Tables have a flat top, while Speed Humps are curved on top (sloping up and then quickly sloping down).**

3. **While Speed Humps limit speeds to just 15-20 mph, Speed Tables can comfortably accommodate speeds of 25-45 mph (depending on spacing)**

4. **While Speed Humps are typically limited to low-volume local streets, Speed Tables are generally installed on higher-volume major streets including collectors (thus applicable to the segments of Adobe Road and Petaluma Hill Road in Penngrove).**

5. **Speed Tables are appropriate for use on emergency response routes and transit routes (while Speeds Humps are typically discouraged on such routes)**

Definitions of Speed Humps (not recommended) and Speed Tables (recommended) are shown below:

NACTO: the National Association of City Transportation Officials (NACTO) provides the following definitions of Speed Humps and Speed Tables:

- **Speed Humps:** "*Speed humps are parabolic vertical traffic calming devices intended to slow traffic speeds on low volume, low speed roads. Speed humps are 3–4 inches high and 12–14 feet wide, with a ramp length of 3–6 feet, depending on target speed. Speed humps reduce speeds to 15–20 mph and are often referred to as "bumps" on signage and by the general public."*

- **Speed Tables:** *"Speed tables are longer than speed humps and flat-topped, with a height of 3–3.5 inches and a length of 22 feet. Vehicle operating speeds for streets with speed tables range from 25–45 mph, depending on the spacing. Speed tables may be used on collector streets and/or transit and emergency response routes. Where applied, speed tables may be designed as raised midblock crossings often in conjunction with curb extensions."*

U.S. DOT Federal Highway administration (FHWA):

- **Speed Humps:** "A speed hump is an elongated mound in the roadway pavement surface extending across the travel way at a right angle to the traffic flow. A speed hump is typically 3 inches in height (with applications as high as 4 inches) and 12 feet in length along the vehicle travel path axis."

- **Speed Tables:** *"A speed table is a raised area placed across the roadway designed to physically limit the speed at which a vehicle can traverse it. Like a speed hump, it extends across the travelway. Unlike a speed hump, a speed table has a long enough flat top (typically, 10 feet) to accommodate the entire wheelbase of most passenger cars. The longer longitudinal depth in the direction of travel enables comfortable and safe vehicle operating speeds that are faster than for a speed hump."*

Sonoma County:

- **Speed Humps:** The County's adopted Speed Hump Policy provides the following definition of Speed Humps (which matches the NACTO definition of "Speed Humps" above): *"Speed humps are generally 12 feet long and 3 inches to 4 inches high. Their parabolic shape is designed to permit vehicles to traverse them at reasonable speeds without significant discomfort to the passengers. A speed hump creates a gentle rocking sensation in a car passing over it at the posted speed limit. If a car is driving at speed above the posted limit, the hump will jar the vehicle and its contents, causing discomfort to the occupants and disruption to cargo. Speed*

humps are not a good choice for arterial roads, emergency routes, or on any road where it is easy for a car to evade the hump by driving on a shoulder. Because of this, they're usually installed in one or two lane local residential settings."

- **Speed Tables:** there is no mention of "Speed Tables" in Sonoma County's Speed Hump Policy. (The County's Speed Hump Policy document does include a discussion of how Speed Humps differ from Speed Bumps, but that pertains to the type of Speed Bumps typically found in parking lots).

2.1.4 Improvement Cost Estimates

Phase 1 Improvements

Preliminary planning-level cost estimates estimate the following costs for the recommended Phase I improvements that were described in Section 2.1.1 (pages 17 to 22 of this report):

- Old Redwood Highway (improvements : $3.5 million (not including the cost of improving the intersections with Railroad Avenue ($5.5M) and Ely Road ($2.8M) that are already funded)
- Dutch Lane – measures to prevent drive through: <$100,000

Phase 2 Improvements

Preliminary planning-level cost estimates estimate the following costs by corridor for Phase 2 improvements that were described in Section 2.1.2 (pages 24 to 26 of this report):

- Adobe Road: $3.2 million (including the $2 million cost of widening Adobe Road to provide bicycle lanes that is already identified in the 2050 Comprehensive Transportation Plan, and including the proposed walkway on the north side of Adobe Road between the SMART Pathway and Petaluma Hill Road)
- Penngrove School Access (provision of a walking path by modifying the shoulder and applying an asphalt berm treatment along the north side of Adobe Road between Petaluma Hill Road and the planned SMART Pathway): $1 million
- Petaluma Hill Road: $1.8 million

Long-term Concepts

Preliminary planning-level cost estimates estimate the following costs for long-term concepts (described in Section 2.3, page 27 of this report) for future consideration by 2045 or later:

- Speed Tables on Adobe Road and Petaluma Hill Road: $400,000 (total for 15 speed tables)
- Walkway on east side of Main Street: $600,000