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Executive Summary

The purpose of the Page Mill Road Expressway Corridor Study is to identify improvements to improve traffic flow and support active transportation modes for the Page Mill Road segment of the Oregon-Page Mill Expressway. The Page Mill Road segment extends from the I-280 interchange to Birch Street just west of the Caltrain tracks (see **Figure ES-1**). This report combines the results of three separate, but coordinated, planning efforts:

1. I-280/Page Mill Road Interchange Study – Funded and managed by the County of Santa Clara to study various alternatives for reconfiguring Page Mill Road through the interchange to reduce freeway ramp backups, enhance bicycle and pedestrian travel through the interchange area, and address operational and community issues with the Park-and-Ride lot. An additional component of this Study was to evaluate improvements to the Page Mill Road/Coyote Hill Road intersection in terms of corridor operations.
2. Page Mill Conceptual Plan Line Study – Funded by the City of Palo Alto and managed by the County of Santa Clara to develop concept plans for widening Page Mill Road to six lanes and providing a continuous trail from I-280 to Foothill Expressway, for improving intersections between Foothill Expressway and El Camino Real, and for developing grade separation alternatives for the Page Mill/Foothill Expressway-Junipero Serra Boulevard intersection.
3. Expressway Plan 2040 – Funded and managed by the County of Santa Clara to develop a long-range plan for improving, operating, and maintaining the County expressway system. This Plan conducted the baseline traffic analysis and traffic forecasts for the Oregon-Page Mill Expressway.

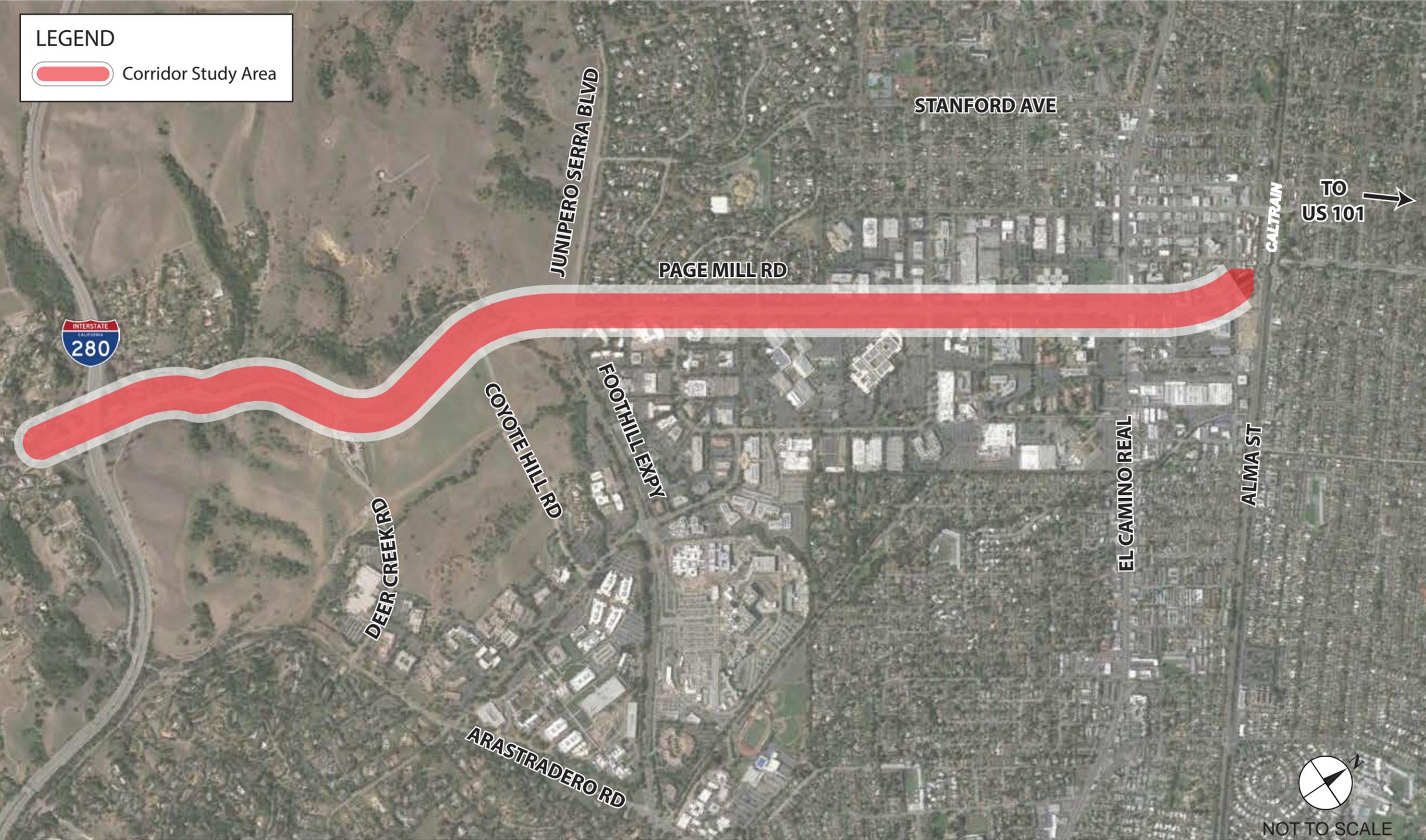
Oregon-Page Mill Expressway is approximately 4.7 miles long and extends between I-280 to the west and US-101 to the east. Oregon-Page Mill Expressway is the sixth highest volume expressway within the County, carrying over 134,000 vehicles per day within its two travel lanes in each direction. While Oregon-Page Mill Expressway does not appear to be heavily utilized as a connection roadway between I-280 and US-101, its access to both regional freeways makes it a vital connection for Los Altos Hills, Palo Alto, Stanford and the Stanford Research Park residents and employees. Oregon-Page Mill Expressway is also a heavily utilized bicycle corridor, providing connections to the numerous nearby open spaces, including Pearson-Arastradero Preserve, Foothills Park, Esther Clark Park, and the Baylands Nature Preserve.

NEED FOR TRAFFIC AND ACTIVE TRANSPORTATION IMPROVEMENTS

VEHICLE CIRCULATION

The intersection of Page Mill Road with Foothill Expressway has long been identified as a problem location within the County Expressway System. The 2003 Comprehensive County Expressway Planning Study (2003 Expressway Study) identified the intersection as deficient in both existing (Year 2001) and future (Year 2025) conditions. Since the 2003 Expressway Study, traffic volumes on Oregon-Page Mill Expressway have increased substantially.

FIGURE ES-1: CORRIDOR MAP



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In 2013, most of the corridor operated at or above capacity. The intersection of Page Mill Road with Foothill Expressway currently ranks as the third highest average delay throughout the entire countywide expressway system. The segment between Foothill Expressway and I-280 was found to have volumes exceeding the roadway capacity, associated with Level of Service (LOS) F.¹ The operating conditions are projected to worsen in the future with the proposed population and employment growth in the vicinity. Accounting for anticipated growth out to Year 2025 and without any improvements, the Expressway Plan 2040 is projecting the entire Oregon-Page Mill Expressway corridor to operate at LOS E or F. Such congestion will increase travel time along the corridor and reduce mobility.

The change in LOS between 2003 and 2013, and the projected LOS in 2025, is shown in **Figure ES-2**.

FIGURE ES-2: YEAR 2003, YEAR 2013, AND YEAR 2025 LEVEL OF SERVICE ALONG OREGON-PAGE MILL EXPRESSWAY



Source: *Expressway Plan 2040 (URS, 2015)*

Most corridor traffic on Oregon-Page Mill Expressway is heading to and from Stanford Research Park and not traveling the length of the corridor. Traffic volumes are much higher on Page Mill Road west of the Stanford Research Park than on Oregon Expressway. As a result of the lower volumes and recent intersection and traffic signal improvements on Oregon Expressway, adequate capacity exists along Oregon Expressway such that it is not a factor in the traffic congestion along Page Mill Road west of El Camino Real.

¹ Level of service is a traffic engineering term used to grade vehicle flows and operations on traffic facilities, and identify those in need of improvement. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating with significant congestion.

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The I-280 southbound and northbound ramps to/from Page Mill Road currently experience extremely heavy congestion and queuing during the peak periods. The current configuration of the I-280 interchange is shown as **Figure ES-3**. The all-way stop at the intersection of the I-280 southbound off-ramp with Page Mill Road results in queuing backups that extend the full length of the southbound off-ramp onto the I-280 freeway mainline throughout much of the morning peak period. Also in the morning peak period, Page Mill Road becomes heavily congested eastbound, backing up from the Foothill Expressway intersection. Queuing on eastbound Page Mill Road was observed to extend back from the Foothill Expressway intersection to the I-280 northbound off-ramp by the end of the weekday AM peak period, a distance of 1.2 miles. On some of the most congested days, this queuing was observed to extend back along the I-280 northbound off-ramp to the I-280 northbound freeway mainline.

Caltrans has long been interested in implementing improvements at the interchange to improve circulation and reduce safety concerns associated with ramp queues backing up onto the I-280 mainline and at the ramp intersections. Caltrans has completed an I-280 Transportation Concept Report (2013) and a Traffic Operational Analysis report that have identified the circulation and safety concerns at this intersection. This Page Mill Expressway Corridor Study integrates the interchange improvement needs with the overall corridor improvement needs to develop a comprehensive and coordinated set of improvement solutions.

CALTRANS PARK-AND-RIDE

A Caltrans-owned park-and-ride lot is currently located in the southwest corner of the I-280 southbound off-ramp/Arastradero Road intersection with Page Mill Road. The lot provides 40 parking spaces, including two disabled parking stalls. The park-and-ride lot is not used by any public transit service, but is used by some privately operated buses and shuttles in addition to personal autos. Park-and-ride users during the week include both local and regional residents that commute to employment locations, both north towards San Francisco and south towards San Jose and Silicon Valley.

The park-and-ride lot is currently plagued by demand that exceeds available capacity, poor bus and auto circulation, and the lack of dedicated loading/unloading areas. Excess demand for the park-and-ride lot results in on-street parking along Page Mill Road west of I-280. The parking lot generally is fully occupied prior to 9:00 AM on weekdays.

ACTIVE TRANSPORTATION

In addition to the vehicle circulation needs, Page Mill Road is heavily utilized, particularly on weekends, by bicyclists accessing the regional trail network and rural roadways from the western portion of the corridor. Bicycle volumes on weekends are substantially higher than weekdays with over 100 bicycles per hour along Page Mill Road between 8:00 AM and 12:00 PM. The existing bicycle infrastructure is limited and requires challenging interactions with vehicles through the I-280 interchange. Of particular concern are the vehicle/bicycle ramp conflicts which occur where there are two-lane, free-flowing on-ramps which forces a bicyclist to cross more than one conflicting vehicle lane at a time.

FIGURE ES-3: EXISTING I-280 INTERCHANGE CONFIGURATION



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The corridor has high pedestrian demand in some areas and only emergency/occasional use in others. Three intersections along the corridor have the highest pedestrian activity; over 100 pedestrians were observed at El Camino Real, Hanover Street and Foothill Expressway intersections. The I-280 interchange currently has very limited pedestrian facilities, discouraging pedestrian use. No pedestrians were observed at the interchange during either weekday peak traffic count period. However, on weekends, joggers have been observed to travel through the interchange area.

LOCAL ACCESS

A number of single-family dwelling units are located on the north side of Page Mill Road, east of the I-280 interchange. These residences, located in the Town of Los Altos Hills, rely exclusively on Page Mill Road for their access/egress. The approximately 19 dwellings along Christopher Lane have an unsignalized access point and a median opening on Page Mill Road immediately east of the I-280 northbound ramps. The unprotected turning movements into and out of Christopher Lane can be difficult at times, particularly during evening congestion associated with access to I-280. Gerth Lane and parallel private driveways have their only access to/from Old Page Mill Road, which has an unsignalized access point and a median opening on Page Mill Road approximately 600 feet to the east of Christopher Lane. Similar to Christopher Lane, left-turn movements to/from Old Page Mill Road can be difficult, particularly in the PM peak period. Additionally, the Old Page Mill Road access is located along a horizontal curve at the base of a vertical curve along Page Mill Road. Sight distance visibility is limited, further challenging movements from Old Page Mill Road.

DEVELOPMENT OF IMPROVEMENT CONCEPTS

Improvements are proposed as part of this Corridor Study to address the identified challenges along Page Mill Expressway. The improvements were developed as part of several individual, but coordinated, project efforts. The corridor was divided into the following segments:

- I-280 Interchange Configuration
- Page Mill Road from I-280 Interchange to El Camino Real

Improvements to the I-280 interchange configuration are focused on improving bicycle circulation, local access, traffic flow, and circulation around the park-and-ride lot through a reconfiguration of the ramps, changes to intersection control, and provision of active transportation facilities. Three distinct concepts were considered for reconfiguring the I-280 interchange in order to improve traffic, bicycle, and pedestrian circulation. The concepts included varying strategies of intersection control, ramp configuration, and bicycle facility configuration. Measures to address existing park-and-ride deficiencies were incorporated into the improvement concepts.

There are two primary traffic circulation challenges at the I-280 interchange. One is the limitation of capacity provided by the all-way stop control at the I-280 southbound off-ramp and the resulting queuing backup along the I-280 southbound off-ramp. The other is queues extending along Page Mill Road between Foothill Expressway and the interchange area. The latter challenge cannot be addressed by modifications to the interchange alone. Increasing the throughput of the interchange would merely increase the eastbound queues approaching Foothill Expressway. Therefore, any improvements to the interchange would need to be implemented in conjunction with or subsequent to improvements at the Page Mill Road/Foothill Expressway intersection and along Page Mill Road between the interchange and Foothill Expressway. All improvement concepts for the interchange thus assume widening of Page Mill Road to six lanes and accompanying improvements at the Foothill Expressway intersection.

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Improvements between the interchange and Foothill Expressway include roadway widening and active transportation facilities. Improvements at the intersection of Page Mill Road with Foothill Expressway are focused on grade separation configurations. Three different grade separation alternatives were analyzed to identify their cost, visual impact, and effect on circulation to/from nearby adjacent roadways. Finally, improvements between Foothill Expressway and El Camino Real include intersection improvements to improve intersection efficiency and reduce queuing impacts.

The project team worked closely with Town of Los Altos Hills, City of Palo Alto, Caltrans, and VTA staff in identifying potential improvements and in the evaluation of those improvements. The improvement concepts under consideration were presented for discussion and community feedback at three public meetings in November and December 2014. Improvement concept plans were presented for the Page Mill Road widening, Foothill Expressway grade separation and other proposed intersection improvements along Oregon-Page Mill Expressway. In addition, videos of the I-280 interchange micro-simulation models for each of the improvement concepts in future year conditions were presented and discussed with the public.

The I-280/Page Mill Road interchange area received the greatest amount of interest with overall support for widening Page Mill Road between I-280 and Foothill Expressway to relieve current congestion before any changes are made at the interchange itself. Residents on the west side of the interchange encouraged alternatives to signalizing the freeway ramps and were receptive to the roundabout concept. Residents near Foothill Expressway were open to grade separation concepts for the Page Mill Road/ Foothill Expressway intersection.

RECOMMENDED CORRIDOR CONCEPT

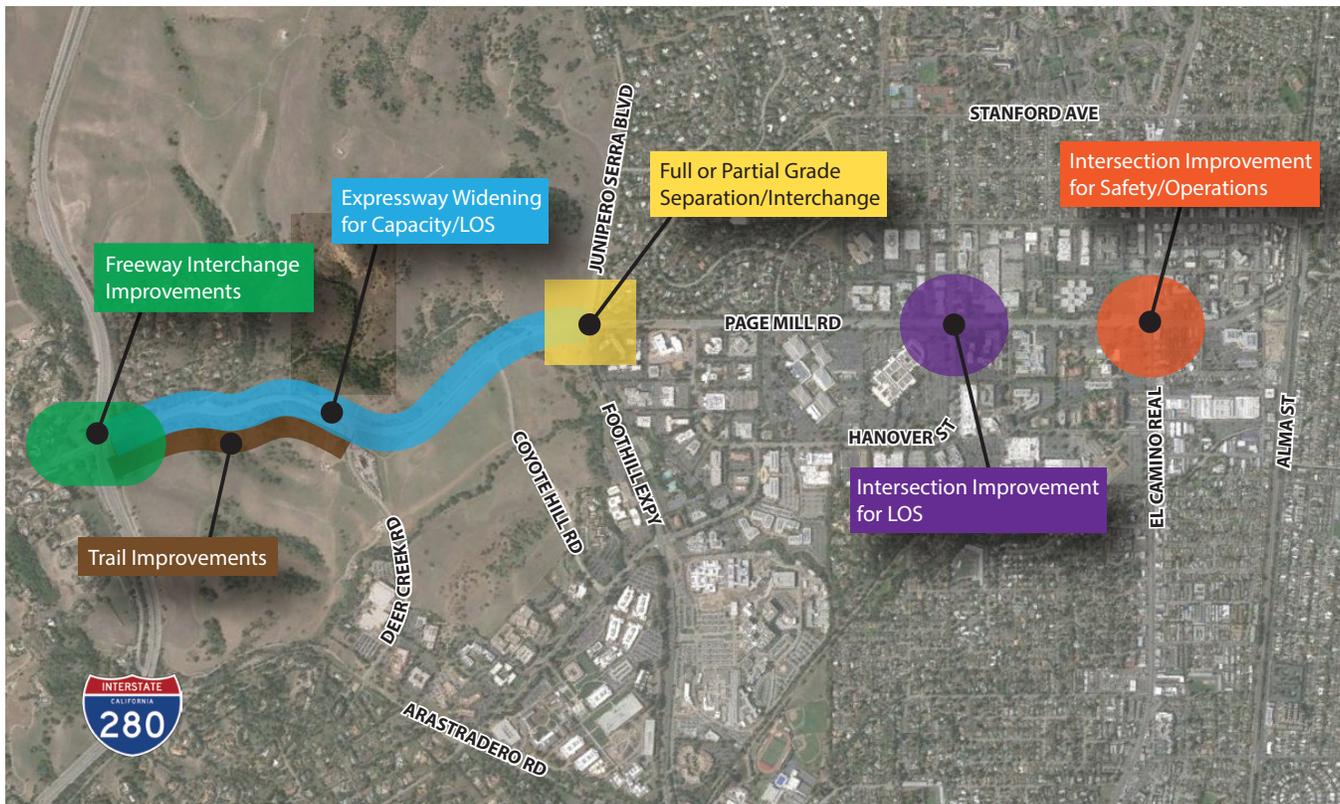
The improvements proposed for the Page Mill Road corridor are depicted in **Figure ES-4**. The description of the improvements are discussed by location: I-280 Interchange, Old Page Mill Road (west) to Foothill Expressway, and Foothill Expressway to El Camino Real.

I-280 INTERCHANGE

Figure ES-5 depicts the configuration of the recommended concept for the I-280 interchange. Key components of this concept include:

- Installation of a roundabout to serve the I-280 southbound off-ramp, Page Mill Road, Arastradero Road, and the eastbound Page Mill Road to I-280 southbound on-ramp;
- Signalization of the I-280 northbound ramps;
- Shift of the eastbound Page Mill Road to I-280 northbound on-ramp to the new northbound ramp intersection;
- Creation of a frontage road between Christopher Lane and Old Page Mill Road, shifting access between Page Mill Road and Christopher Lane, the private driveway, and Gerth Lane to Old Page Mill Road, and signalization of the Old Page Mill Road intersection;
- Provision of a dedicated westbound right-turn lane to the I-280 northbound on-ramp;
- New signalized pedestrian crossing at the I-280 northbound ramps intersection; and
- Provision of a bi-directional shared use path on the north side of Page Mill Road between the park-and-ride and frontage road connection to Old Page Mill Road. The shared use path would pass beneath the I-280 southbound on- and off-ramps.

FIGURE ES-4: PROPOSED IMPROVEMENTS ALONG OREGON-PAGE MILL EXPRESSWAY



Traffic circulation patterns would generally be consistent with current movements, except for local access to the neighborhood north of Page Mill Road, east of the interchange. Access for this neighborhood would be modified by the provision of the frontage road. This would serve to improve accessibility for the neighborhood by providing full movements at the proposed signal at Old Page Mill Road.

Bicycle circulation would be enhanced with a few geometric changes and the shared-use path. Continuous on-street striped bike lanes would be provided in both directions through the interchange area. The westbound Page Mill Road to I-280 southbound loop on-ramp would be reduced to one lane from the current two-lanes to simplify the conflict between bicycles and vehicles and allow the bike lane to shift to being adjacent to the curb. The shared-use path would provide for bicycle travel through the interchange area by less skilled cyclists. The shared use path would connect to the low-volume frontage road and provide direct access to the heavily used bike route on Old Page Mill Road, allowing eastbound cyclists to avoid having to make a left-turn across Page Mill Road. At a design speed of 25 MPH, the roundabout is also a viable option for those bicyclists choosing not to use the shared-use path.

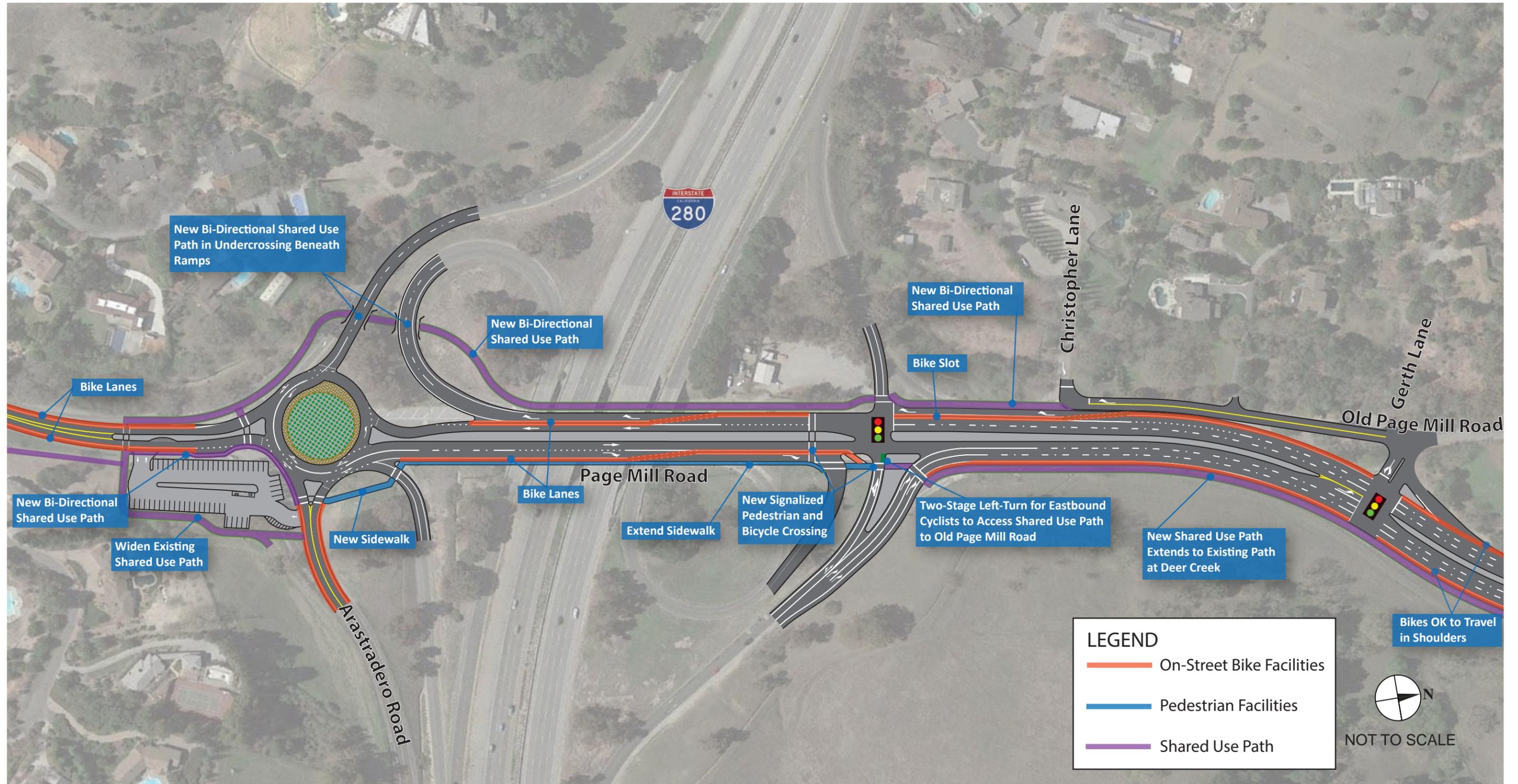
Pedestrian circulation would be similarly enhanced with the shared-use path. In addition, sidewalk gaps on the south side of Page Mill Road would be closed to allow for pedestrian travel on both sides of the roadway.

Bicycle and pedestrian circulation features are shown in **Figure ES-6**.

FIGURE ES-5: INTERCHANGE CONCEPT



FIGURE ES-6: INTERCHANGE CONCEPT – BICYCLE AND PEDESTRIAN FEATURES



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This concept received the most popular support from stakeholders and the community. The following comment themes were received regarding this concept:

- It appeared to be the most effective at addressing the existing and future traffic flows through the interchange;
- It maintained the community's desire for a rural environment;
- The shared-use path combined with the bike lanes provided bicycle facilities to serve the full spectrum of bicycle riders;
- Some members of the community expressed concern about the park-and-ride lot reconfiguration included in this concept to provide for on-site bus circulation; and
- Some members of the community expressed interest in considering a roundabout for the northbound ramps as well.

The concept will undergo further review and refinement as part of a detailed environmental review process and further design development. The concept will also require further vetting and analysis by Caltrans prior to design approval.

ROUNDBOUT VERSUS SIGNAL FOR I-280 NORTHBOUND RAMPS (EAST SIDE OF INTERCHANGE)

Caltrans has adopted a policy whereby both roundabouts and signalization will be considered for all locations where intersections meet the required warrants and an improvement is being implemented. A detailed evaluation process, known as an Intersection Control Evaluation (ICE), will be performed by Caltrans to identify the appropriate solution for each location. As the I-280 interchange is under Caltrans jurisdiction, an ICE will be required prior to detailed design and construction of improvements at this location. At that time, a roundabout will be further considered for the I-280 northbound ramps intersection. It should be noted, however, that a roundabout on this side of the interchange faces significantly more challenges than are present for the installation of a roundabout on the west side of the interchange.

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PARK-AND-RIDE LOT

The concept identified opportunities to improve the Caltrans park-and-ride lot located at the southwest corner of the Page Mill Road and Arastradero Road intersection. By shifting the alignment of Arastradero Road to feed into the roundabout, the park-and-ride lot can be reconfigured to provide an internal circulation pattern that does not require illegal maneuvers, driveway blockages, or extensive out-of-direction travel for buses. The reconfigured lot would have roughly the same number of spaces as the existing lot.

The community has expressed concerns regarding the existing location and heavy utilization of the Caltrans park-and-ride lot. Caltrans and VTA are encouraged to identify other park-and-ride lot locations in the I-280 corridor to relieve the overcrowding at the Page Mill Road park-and-ride lot. The community has also requested that the project team consider alternative locations for the park-and-ride lot. As it is a Caltrans-owned lot, alternative areas within Caltrans jurisdiction at the interchange were reviewed. One potential location would be the Caltrans Corporation Yard, located in the triangular area between the I-280 northbound on-ramp, I-280, and Page Mill Road. This area currently houses a Caltrans maintenance facility and a number of cellular towers. The provision of a park-and-ride lot in this area would require relocation of both facilities to alternate sites. A preliminary concept was developed for the relocation of the lot to this area that would provide a greater number of parking spaces than the existing lot and would provide an efficient circulation pattern. Relocation of the park-and-ride lot to this location has not been reviewed by Caltrans staff. It can be studied further by Caltrans when funding is available to proceed into the Project Report/Environmental Document phase for the interchange improvements.

INTERIM BICYCLE IMPROVEMENTS THROUGH THE INTERCHANGE

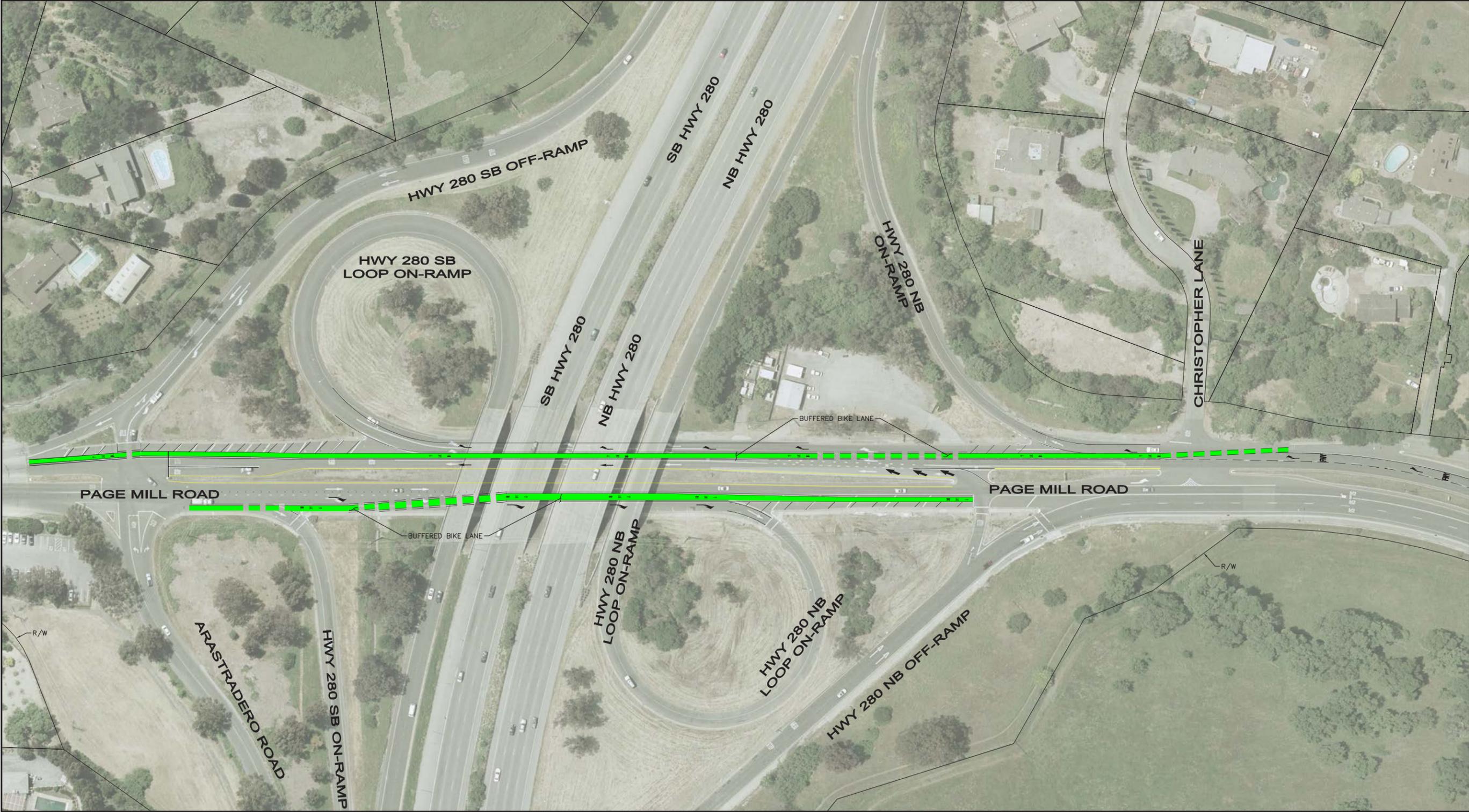
The potential interchange improvements identified in this report will likely take years to secure funding and proceed through all the necessary Caltrans studies and approval processes. Some members of the bicycling community have requested that interim improvements similar to the bicycle treatments through the I-280/Alpine Road interchange be considered. Page Mill Road experiences much higher traffic volumes than Alpine Road, making the exact bicycle treatments used on Alpine Road not feasible. However, as indicated in **Figure ES-7**, a number of enhanced bicycle treatments are feasible for implementation, including:

- Provision of eastbound bike lanes;
- Striping of buffered bike lanes in both directions;
- Demarcation of bike lanes with green paint, including dashed green paint in conflict areas;
- Modifications to vehicle lane alignments to clearly define areas where vehicles would yield to bicyclists; and
- Reduction in the westbound Page Mill Road to I-280 southbound on-ramp from two lanes to one lane, reducing the number of lanes that will need to be crossed by westbound bicyclists.

While these interim improvements would not fully address many of the existing challenges faced by bicyclists traveling through the intersection, collectively they serve to increase the visibility of bicycle facilities and reduce the complexity of existing conflict points.

These improvements have not yet proceeded into the Caltrans review and approval process. Modifications to the concept may be required subsequent to Caltrans review and further design development.

FIGURE ES-7: INTERIM BICYCLE CIRCULATION IMPROVEMENT CONCEPT



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OLD PAGE MILL ROAD (WEST) TO Foothill EXPRESSWAY

Traffic demand on Page Mill Road between the I-280 interchange and El Camino Real was found to exceed capacity by Year 2025, with the segment between the interchange and Foothill Expressway experiencing the highest level of congestion. As a result, improvements have been identified for this section of the roadway. The improvements can be grouped into three categories with different characteristics and implementation strategies:

- Widening of Page Mill Road from four to six lanes between Old Page Mill Road and Foothill Expressway;
- Grade separation of Foothill Expressway with Page Mill Road; and
- Intersection improvements along Page Mill Road between Foothill Expressway and El Camino Real.

PAGE MILL ROAD BETWEEN OLD PAGE MILL ROAD (WEST) AND Foothill EXPRESSWAY

This segment needs additional travel lanes to handle existing and future demand on the corridor. The recommended improvements along Page Mill Road in this segment were developed based on numerous design constraints and criteria including:

1. Minimize grading impacts to hillsides;
2. Limit additional right of way needs; and
3. Maintain a continuous Class I multi-use trail from I-280 to Foothill Expressway.

The eastbound direction of Page Mill Road would be widened from the current lane drop just east of Old Page Mill Road through the Foothill Expressway intersection. The westbound direction of Page Mill Road would be widened from immediately west of Foothill Expressway to the I-280 northbound on-ramp. The additional lanes would primarily be provided within the existing roadway width by replacing the existing median and reducing lane widths to 11 feet. Minimal widening would be required on the south side of the roadway.

In conjunction with the roadway widening project, a Class I multi-use trail would be provided along the south side of the roadway between the I-280 interchange and Deer Creek Road. At Deer Creek Road, it would connect to the existing Class I trail that extends to the Foothill Expressway intersection. The new trail would require grading on the south side of the roadway, but would not require any right-of-way, except for a small sliver near Deer Creek Road.

In addition, a Class I multi-use trail would be provided between the eastern terminus of Old Page Mill Road and Foothill Expressway to provide an improved connection for cyclists using Old Page Mill Road to travel between the interchange and Foothill Expressway. The multi-use trail would provide a connection to the Stanford Perimeter Trail, which runs to the north along Junipero Serra Boulevard. The existing eastern one-way vehicular connection from Page Mill Road to Old Page Mill Road would be closed to traffic except emergency vehicles.

Along with the roadway widening would be minor improvements to the approaches of the Page Mill Road and Foothill Expressway intersection. These improvements include lengthening of turn pockets on southbound Junipero Serra Boulevard and re-alignment of Page Mill Road east of the intersection to align with the widened roadway west of the intersection.

A related project along this section of Page Mill Road are improvements to the Page Mill Road and Coyote Hill Road intersection. This intersection is currently an unsignalized location with full access from Coyote Hill Road onto Page Mill Road. This is one of only a few locations along the countywide expressway system that has an unsignalized median opening. For all such locations, the County is considering either closing the median

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or controlling the location by signalization. The near-term increase of traffic volumes on Coyote Hill Road, in addition to the future widening of Page Mill Road, would result in a safety and level of service issue with the current unsignalized, side-street stop-controlled configuration. Based on a circulation evaluation, the County has identified signalization as the preferred solution at Coyote Hill Road.

PAGE MILL ROAD/FOOTHILL EXPRESSWAY GRADE SEPARATION

The Page Mill Road/Foothill Expressway intersection currently experiences the third highest amount of delay of any intersection in the countywide expressway system. In the AM peak period, it causes backups along Page Mill Road that extend more than a mile to the west to I-280. Therefore, the County evaluated a grade separation at this intersection. In each of the grade separation concepts, the heavy through traffic on Page Mill Road would be separated from movements along and to/from Foothill Expressway-Junipero Serra Boulevard.

The recommended improvements at Page Mill/Foothill Expressway-Junipero Serra Boulevard intersection were developed based on numerous design constraints and criteria including:

- Separate and eliminate signal for Page Mill Road through traffic;
- Minimize utility conflicts with proposed improvements;
- Limit additional right of way needs;
- Maintain aesthetic value; and
- Accommodate bicycles and pedestrians approaching and through the intersection.

Three concepts were evaluated for the grade separation using different configurations in which the expressway goes over and under Foothill Expressway-Junipero Serra Boulevard. It was decided not to select a preferred grade separation concept for the Page Mill Road/ Foothill Expressway-Junipero Serra Boulevard intersection. The three grade separation concepts will be available for further study in the future when the project is ready to proceed. Given the significant cost of grade separation, this improvement is considered a long-term solution. At-grade improvements, including a third eastbound through lane, will be pursued at this intersection to improve traffic flow in the interim.

FOOTHILL EXPRESSWAY TO EL CAMINO REAL

While the segment of Page Mill Road between Foothill Expressway and Ramos Way is projected to operate at LOS E by Year 2025, it does not have the level of congestion experienced west of Foothill Expressway. Furthermore, this segment of Page Mill Road is highly constrained due to fronting businesses and numerous driveways. Therefore, improvements for this segment include intersection-specific improvements, developed to increase intersection capacity and throughput.

Improvements were developed at each of the signalized intersections along this segment. The primary improvements are:

- **Page Mill Road & Hanover Street Intersection** — Add a northbound and southbound left turn lane and convert the signal to an 8-phase operation. Convert Hanover Street to one-through lane in each direction and add bike lanes;
- **Page Mill Road & El Camino Real Intersection** — Modify alignment of westbound left-turn lane to provide additional left-turn storage capacity, provide a dedicated westbound right-turn lane, extend bike lanes, and possibly eliminate the eastbound right-turn pork-chop island (will require further study).

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IMPROVEMENT COST

Table ES-1 below lists the Page Mill Corridor improvements with the opinion of probable costs for each improvement

TABLE ES-1: IMPROVEMENT COST ESTIMATE SUMMARY

Improvement	Opinion of Probable Cost
Interim Bicycle Improvements at the I-280 Interchange	\$0.2 Million
I-280 Interchange Improvements	\$19.7 Million
Widening of Page Mill Road to 6-lanes from Old Page Mill Road to Foothill Expressway	\$17.0 Million
Provision of a Trail on the South Side of Page Mill Road between Deer Creek Road and the I-280 Interchange	\$6.0 Million
Grade Separation of Foothill Expressway intersection	\$44.2 Million to \$49.3 Million ¹
At-Grade Intersection Improvements between Foothill Expressway and Ramos Way	\$2.7 Million
Intersection Improvements at El Camino Real	\$2.4 Million
Total	\$92.2 Million to \$97.3 Million

Sources: Kimley-Horn (2015) and Page Mill Road Expressway Conceptual Plan - Technical Memorandum, HMM (2015)

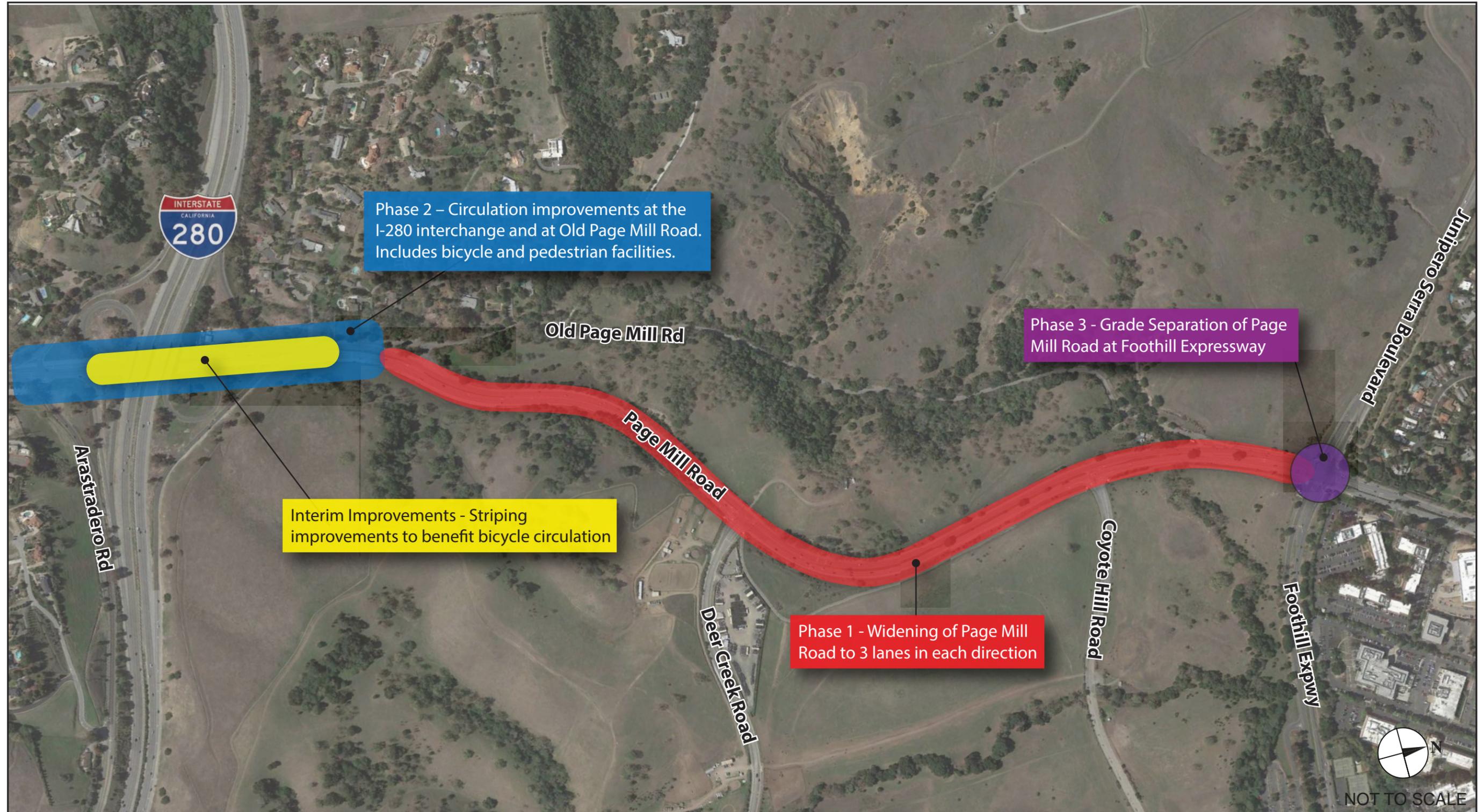
¹ Range in costs reflects the three grade separation options under consideration

PHASED IMPROVEMENT STRATEGY

A phasing order has been established based on the immediacy of improvement needs while ensuring the effectiveness of the transportation network at the conclusion of each phase. The phasing is shown in **Figure ES-8** and the timing for each phase is listed below.

- **Interim Improvement** — Bicycle Improvements through Interchange: Implement when funding is available. Still requires further engineering design development and Caltrans review.
- **Phase 1** — Widen Page Mill Expressway: When funding becomes available. Includes at-grade improvements at Foothill Expressway–Junipero Serra Boulevard intersection. Includes trail extension from Deer Creek Road to I-280 interchange. Requires minor right-of-way acquisition.
- **Phase 2** — I-280 Interchange Improvements: Could be implemented at same time as Page Mill Road widening if enough funding is available. Otherwise, would follow Page Mill Road widening. Includes bicycle and pedestrian enhancements, including shared-used paths, sidewalks, and crosswalks. Includes park-and-ride improvements at the existing or an alternate location. The preferred intersection control strategy for the I-280 northbound ramps intersection will be determined through a Caltrans ICE.
- **Phase 3** — Grade Separation for Page Mill Road/Foothill Expressway-Junipero Serra Boulevard Intersection: Long-term project to follow other improvements. Phase 1 (widening eastbound Page Mill Road to three lanes through the intersection) will provide short term congestion relief; however, grade separation will be required in the long term as traffic demand grows.
- **Foothill Expressway to El Camino Real Intersection Improvements** — These relatively simple, low cost improvements can be implemented at any time and need not be connected to the phasing strategy for improvements west of Foothill Expressway.

FIGURE ES-8: PROPOSED PAGE MILL ROAD IMPROVEMENT PHASING



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BENEFITS OF IMPROVEMENTS

The proposed improvements were evaluated for their effectiveness in improving traffic circulation, bicycle connectivity, and pedestrian connectivity.

I-280 INTERCHANGE TO FOOTHILL EXPRESSWAY

The improvement concepts between the I-280 interchange and Foothill Expressway were evaluated using a micro-simulation tool in order to assess the overall network-wide effect of the improvements. All interchange improvements were analyzed assuming that Page Mill Road would be widened to six lanes between the I-280 interchange and Foothill Expressway. This widening includes an additional eastbound through lane on Page Mill Road through the Foothill Expressway intersection.

EXISTING VOLUMES

Table ES-2 identifies the delay and level of service for intersections between the I-280 interchange and Foothill Expressway with the roundabout improvement concept using existing traffic volumes.

TABLE ES-2: INTERSECTION LEVEL OF SERVICE WITH PAGE MILL ROAD IMPROVEMENTS – EXISTING VOLUMES

Intersection	Existing					Roundabout Concept and Page Mill Road Widening				
	Control	AM Peak		PM Peak		Control	AM Peak		PM Peak	
		Delay (s)	LOS	Delay (s)	LOS		Delay (s)	LOS	Delay (s)	LOS
Arastradero Road/ I-280 SB Ramps	AWSC ¹	171.9	F	15.7	B	RAB ³	25.3	C	9.7	A
I-280 NB Ramps	SSSC ²	127.2	F	8.3	A	Signal	4.5	A	8.2	A
Old Page Mill Road	SSSC ²	5.6	A	9.1	A	Signal	1.3	A	4	A
Deer Creek Road	Signal	59.0	E	11.8	B	Signal	7.2	A	9.2	A
Foothill Expressway ⁴	Signal	84.4	F	108.5	F	Signal	31.1	C	43.4	D

Notes:

Delay is based on average vehicle delay for all entering vehicles at signalized, roundabout and all-way stop intersections. Delay is based on average vehicle delay for the side-street movements at side-street stop-controlled intersections.

¹ AWSC = All-way Stop Control

² SSSC = Side-street Stop Control

³ RAB = Roundabout

⁴ Assumed improvements at the Foothill Expressway intersection include a third eastbound through lane. Does not include grade separation in this scenario.

As shown in **Table ES-2**, the improvement concept would result in acceptable operations for all study intersections with existing volumes. The intersection of Page Mill Road and Foothill Expressway would operate at an acceptable level of service with the widening of Page Mill Road to six lanes and the third eastbound lane extending through the Foothill Expressway intersection.

The travel time during the peak periods between the interchange and Foothill Expressway was measured with the improvement concept using the micro-simulation model. **Table ES-3** identifies the travel times between I-280 and Foothill Expressway.

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TABLE ES-3: TRAVEL TIMES WITH PAGE MILL ROAD IMPROVEMENTS – EXISTING VOLUMES

Segment Limits	Period	Existing	Roundabout Concept with Page Mill Road Widening		
		Travel Time (min)	Travel Time (min)	Δ	% Change
Between I-280 NB and Foothill Expressway	AM	7.8	3.1	- 4.7 min	- 60%
	PM	6.9	3.0	- 3.9 min	- 57%
Between I-280 SB and Foothill Expressway	AM	9.1	3.6	- 5.5 min	- 60%
	PM	6.5	3.6	- 2.9 min	- 45%

Notes:

Travel times are for the peak direction. AM peak direction is eastbound and PM peak direction is westbound.

As shown in the table, the concept would provide substantial travel time benefits compared to the baseline scenario.

YEAR 2025 VOLUMES

The improvement concepts were evaluated under Year 2025 conditions to ensure that they will adequately support projected future growth in the area. Future year forecasts were developed based on the regional travel demand model, which accounts for employment and population growth contained in city and County General Plans. **Table ES-4** identifies the delay and level of service for intersections between the I-280 interchange and Foothill Expressway with Year 2025 volumes.

TABLE ES-4: INTERSECTION LEVEL OF SERVICE WITH PAGE MILL ROAD IMPROVEMENTS – YEAR 2025 VOLUMES

Intersection	Page Mill Road Widening Only					Roundabout Concept with Page Mill Road Widening ¹				
	Control	AM Peak		PM Peak		Control	AM Peak		PM Peak	
		Delay (s)	LOS	Delay (s)	LOS		Delay (s)	LOS	Delay (s)	LOS
Arastradero Road/I-280 SB Ramps	AWSC ²	231.6	F	23.8	C	RAB ⁴	21.5	C	21.9	C
I-280 NB Ramps	SSSC ³	66.9	F	10.1	B	Signal	6.6	A	8.5	A
Old Page Mill Road	SSSC ³	5.4	A	6.9	A	Signal	2.1	A	6.6	A
Deer Creek Road	Signal	47	D	6.3	A	Signal	12.8	B	6.0	A
Foothill Expressway	Signal	131.0	F	102.6	F	Signal	103.9	F	98.7	F

Notes:

Delay is based on average vehicle delay for all entering vehicles at signalized, roundabout and all-way stop intersections.

Delay is based on average vehicle delay for the side-street movements at side-street stop-controlled intersections.

¹ Includes at-grade improvements at Foothill Expressway intersection but no grade separation

² AWSC = All-way Stop Control

³ SSSC = Side-street Stop Control

⁴ RAB = Roundabout

As shown in **Table ES-4**, the interchange movements operate acceptably with the roundabout concept. The roundabout reduces the morning peak period delay at the I-280 southbound ramps intersection by over 90 percent. However, without grade separation of Page Mill Road through movements at Foothill Expressway, the intersection of Foothill Expressway would operate at a deficient level of service.

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The grade separation of Page Mill Road through movements at this location is sufficient to improve the operations of the intersection to an acceptable LOS C. The grade separation significantly reduces delay at the Foothill Expressway intersection but increases delay at Deer Creek Road and the I-280 interchange intersections in the PM peak period by eliminating an existing bottleneck that meters westbound Page Mill Road traffic.

The travel time during the peak periods between the interchange and Foothill Expressway with implementation of the recommended improvements was measured using the micro-simulation model. **Table ES-5** identifies the travel times between I-280 and Foothill Expressway with the interchange improvement concept and Page Mill Road widening.

TABLE ES-5: TRAVEL TIMES WITH PAGE MILL ROAD IMPROVEMENTS – YEAR 2025 VOLUMES

Segment Limits	Period	Page Mill Road Widening Only	Roundabout Concept with Page Mill Road Widening ¹		
		Travel Time (min)	Travel Time (min)	Δ	% Change
Between I-280 NB and Foothill Expressway	AM	6.7	4.2	- 2.5 min	- 37%
	PM	2.8	3.2	+ 0.4 min	+ 14%
Between I-280 SB and Foothill Expressway	AM	10.3	4.6	- 5.7 min	- 55%
	PM	3.2	3.4	+ 0.2 min	+ 6%

Notes:

Travel times are for the peak direction. AM peak direction is eastbound and PM peak direction is westbound.

¹ Includes at-grade improvements at Foothill Expressway intersection but no grade separation

The improvements would result in a substantial travel time savings in the eastbound direction in the morning compared to the baseline scenario. Eastbound travel time from the I-280 southbound ramps would be reduced from 10.3 minutes in the baseline scenario to 4.6 minutes with the improvements, a reduction of 55 percent. Westbound travel times along Page Mill Expressway west of Foothill Expressway would slightly increase in the evening peak period. The increased capacity with at-grade improvements at Foothill Expressway increases the throughput of that intersection, thereby increasing the number of vehicles approaching the I-280 interchange in the PM peak period.

The grade separation of Foothill Expressway would further benefit eastbound travel time in the morning peak period and reduce intersection delay at the Foothill Expressway intersection for Page Mill Road movements. It would also increase the number of vehicles approaching the I-280 interchange by reducing vehicle queuing on Page Mill Road approaching Foothill Expressway.

BICYCLE AND PEDESTRIAN CIRCULATION

The improvement concept would substantially improve bicycle and pedestrian circulation from existing conditions by providing dedicated facilities and reducing conflict points.

FOOTHILL EXPRESSWAY TO EL CAMINO REAL

Traffic circulation with implementation of the proposed improvements along Page Mill Expressway east of Foothill Expressway were analyzed as part of the Expressway Plan 2040 effort. The roadway segment level of service with and without the improvements is shown in **Table ES-6**.

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TABLE ES-6: ROADWAY SEGMENT LEVEL OF SERVICE – 2025 BUILD CONDITIONS

Segment	Peak Hour	No Build 2025				Build 2025			
		Segment Capacity	Link Volume	V/C ¹	LOS	Segment Capacity	Link Volume	V/C ¹	LOS
I-280 to Foothill Expressway	AM	3,760	3,788	1.01	F	5,660	4,029	0.71	C
	PM		3,820	1.02	F		4,445	0.79	C
Foothill Expressway to Ramos Way	AM	3,400	3,387	1.00	E	3,910	3,438	0.88	D
	PM		3,300	0.94	E		3,411	0.87	D
Ramos Way to Birch Street	AM	3,400	3,647	1.07	F	3,910	3,699	0.95	E
	PM		3,434	1.01	F		3,719	0.95	E

Source: Expressway Plan 2040, Comprehensive County Expressway Planning Study Traffic Forecasting Methodology, Existing, 2025 and 2040 Traffic Conditions (URS, 2015)

¹ V/C = Volume-to-Capacity Ratio

As shown in the table, the deficient LOS F segments along Page Mill Road would be improved to operate at LOS E or better with the identified improvements.

NEXT STEPS

The Page Mill Road Expressway Corridor improvements identified in this report will be incorporated into the Expressway Plan 2040 report. It is likely that all of the Page Mill Road corridor projects will be incorporated into the Tier 1 (highest priority) list of projects, with the exception of the grade separation at Foothill Expressway-Junipero Serra Boulevard, which is likely to be a Tier 3 project.

PROJECT DEVELOPMENT

The next step in project development varies by project. Projects located within Caltrans right-of-way (I-280 interchange and El Camino Real) require additional Caltrans studies and approvals prior to proceeding into design and environmental review. For a project as complex as the I-280 interchange modifications, Caltrans will require additional alternatives analysis building on the work conducted as part of this study.

Projects outside of Caltrans right-of-way (Page Mill Expressway widening and the various intersection improvements) can proceed into design and environmental review when funding is available. Community outreach will be an integral part of the design and environmental process.

FUNDING

The Expressway Plan 2040 does not provide funding for projects. It identifies and prioritizes improvement projects, setting the stage for acquiring grants and for cities to collect traffic impact fees and/or condition developers to provide improvements. Most of the Tier 1 projects have potential funding sources already identified for at least a portion of the project costs. These funding sources include city traffic impact fees and development mitigations, bicycle-improvement related grants, and Caltrans safety improvement grants. The County, working in partnership with the cities, VTA, and Caltrans, will pursue all potential funding sources to move these projects forward with implementation based on the phasing strategy.