

### REPORT TO BICYCLE AND PEDESTRIAN ADVISORY COMMISSION

#### **SUBJECT**

Recommend to the City Council Capacity and Safety Improvements to the Wolfe Road Corridor from El Camino Real to Homestead Road (Study Issue)

#### **REPORT IN BRIEF**

In 2014, Council ranked and combined Study Issue DPW 14-14 *Optimization of Wolfe Road for Neighborhood and Commuter Reconfiguration and Signalization*; and, DPW 14-17 *Analysis of Reconfiguration or Other Capacity Improvement Alternatives for the Wolfe Road/El Camino Real/Fremont Avenue Intersection Complex*. The Wolfe Road Study Area consists of two sections, named the “Corridor” and the “Triangle.” The Corridor (Wolfe Road south of Fremont Avenue to Homestead Road) currently experiences congestion during peak hours due to heavy commute traffic. That congestion is in part caused by intersection delays at the Triangle (the El Camino / Fremont Avenue / Wolfe intersection area). The Corridor and Triangle are shown on Attachment 1. Improvements are needed along Wolfe Road to address existing conditions and future regional and local growth. In addition, area residents have also raised concerns regarding the existing alignment of Wolfe Road. The current alignment accommodates alternating on-street parking on either side of the street, which creates lane shifts throughout the corridor.

The City hired Kimley-Horn and Associates to analyze Wolfe Road and develop feasible alternatives that could reduce congestion. Both community input and the technical analysis identified the Triangle as the most constrained, congested, and least multimodal-friendly portion of the study area. Backups at the Triangle can affect operations for the Corridor and present challenges for bicycle commuting.

Three different alternatives were developed for consideration for both the Triangle and Corridor. For analysis purposes, the most promising Triangle and Corridor alternatives were paired up. Triangle Alternative 1 was modeled with Corridor Alternative 1, and so forth. This allowed for analysis of the combined effect of the implementation of the proposed alternatives. The analysis considered existing, near-term and long-term conditions along with traffic (including bike and pedestrian) volumes, parking usage, collision history, emissions, and traffic congestion. Through the community outreach process and the technical analysis, the alternatives were ranked based on their effectiveness and desirability.

Staff reviewed the analysis, community feedback, and existing General Plan and Council policy and recommends proceeding with Triangle Alternative 3 and Corridor Alternative 3. Alternatives 3 provide the best options for all users of the roadway. Parking would need to be removed on all of Wolfe Road, and cars currently parked on-street would have to be parked off-street (such as driveways) or on side streets. This would allow for the implementation of wider bike lanes and a Center Two-Way Left-Turn Lane (TWLTL). These improvements would create a safer multimodal corridor and increase capacity.

To facilitate the implementation of the desired alternatives, it is anticipated that the project would be implemented in two phases. Corridor improvements are comparatively of low cost and do not require right-of-way acquisition or California Department of Transportation (Caltrans) approval; therefore they are relatively easy to implement as a first phase of the project. Triangle improvements would be implemented in the second phase because they are higher cost, require further analysis, some right-of-way acquisition, and Caltrans coordination and approval.

## **BACKGROUND**

In an effort to improve operations, the City previously studied Wolfe Road both in 1991 and 2000 and found that to improve operations road widening would be required. The City decided not to pursue road widening as it required significant amounts of right-of-way acquisition on many properties, including part of the front yards of single family homes, and the community opposed the project.

As part of the Study Issue process the City proposed to once again review options on Wolfe Road. Study Issues DPW 14-14 (Attachment 2) and DPW 14-17(Attachment 3) were combined such that they would result in a more effective and coordinated analysis of traffic operations. Wolfe Road is a critical north-south arterial roadway that provides access to North Fair Oaks Avenue to the north and I-280 to the south. Wolfe Road includes two travel lanes in each direction, left-turn pockets at major intersections, alternating on-street parking, and meandering bike lanes that provide a connection to bike lanes on Fremont Avenue to the north and Wolfe Road within the City of Cupertino to the south. Traffic volumes are approximately 24,000 vehicles per day and result in periods of congestion with higher than average delays and queuing for vehicles.

In addition, local residents and the City's Bicycle and Pedestrian Advisory Commission (BPAC) have expressed concerns with the existing alignment of Wolfe Road. On-street parking is provided on only one side of the street and alternates throughout the corridor, which results in continuous travel lane shifts.

The City Council is scheduled to consider this item on June 21, 2016.

## **EXISTING POLICY**

General Plan, Chapter 3, *Land Use and Transportation Element Policies*:

- LT -5.5: Support a variety of transportation modes.
- LT-5.5d: Maximize the provision of bicycle and pedestrian facilities.
- LT-5.8: Provide a safe and comfortable system of pedestrian and bicycle pathways.
- LT-5.9: Appropriate accommodations for motor vehicles, bicycles, and pedestrians shall be determined for city streets to increase the use of bicycles for transportation and to enhance the safety and efficiency of the overall street network for bicyclists, pedestrians, and motor vehicles.
- LT-5.12: City streets are public space dedicated to the movement of vehicles, bicycles and pedestrians. Providing safe accommodation for all transportation modes takes priority over non-transport uses. Facilities that meet minimum appropriate safety standards for transport uses shall be considered before non-transport uses are considered.
- LT-5.13: Parking is the storage of transportation vehicles and shall not be considered a transport use.
- LT-5.14: Historical precedence for street space dedicated for parking shall be a lesser consideration than providing street space for transportation uses when determining the

appropriate future use of street space.

## **ENVIRONMENTAL REVIEW**

Corridor Alternative 1 and 3 are exempt under the California Environmental Quality Act (CEQA) Section 15301(c), minor alteration of existing highways and streets, bicycle and pedestrian trails, and similar facilities involving negligible expansion of use beyond that existing at the time of determination.

Corridor Alternative 2 proposes removal of one travel lane in each direction. Additional traffic and environmental analysis would be required for Council consideration. Any modifications to the Triangle would require CEQA analysis as part of a future project.

## **DISCUSSION**

The City hired Kimley-Horn and Associates to analyze feasible alternatives for Wolfe Road between El Camino Real and Homestead Road. Kimley-Horn identified existing and future traffic concerns within the study area and evaluated the effectiveness of the alternatives to improve the safety and functionality of the roadway for all users including autos, pedestrians, bicycles, and transit. A full report prepared by Kimley-Horn and Associates entitled "*Wolfe Road Corridor Traffic Improvement Study*" (Attachment 4) provides the methodology and findings of the analysis.

The analysis was completed using VISSIM, a state of the art microscopic simulation model. VISSIM was used to analyze corridor flow, vehicle delay, emissions, and queuing. This software was used instead of other commonly used traffic engineering software (such as TRAFFIX which is typically used for development projects) because it is unique in that it allows for the evaluation of complex traffic flow situations in a network-wide setting and reports on measures of effectiveness (MOEs) such as overall vehicle hours of delay, fuel consumption, travel times, greenhouse gas emissions, and effects of the improvements on all modes of transportations including pedestrians and bikes. It is also user friendly and displays the results in a 3D video format.

## ***Analysis***

### **Existing Conditions**

The study corridor is 1.1 miles long and has five signalized and five un-signalized intersections. Wolfe Road is generally two lanes in each direction with a posted speed limit of 35 MPH and bicycle lanes. An additional southbound lane is provided for the short segment between El Camino Real and just south of Fremont Avenue. On-street parking is provided on only one side of the street, and alternates sides throughout the corridor.

Much of the study area has bike lanes. The bike lanes meet minimum requirements, but feel narrow due to heavy traffic volumes, lane shifts, and the alternating on-street parking. There are also two critical gaps in those lanes at either end of the corridor. The El Camino Real, Fremont Avenue, and Homestead Avenue intersections are the most challenging to navigate for cyclists, and bike lanes are currently not provided on the approaches to these streets. As currently designed it is not a desirable route for recreational and casual cyclists.

### **Data Collection**

The City conducted auto, bicycle, and pedestrian counts along Wolfe Road in May 2015. Additional

traffic data was collected in September 2015 to allow for adjustment of the May counts to account for construction activity related to the Apple Campus 2 that had reduced the capacity of Wolfe Road in the City of Cupertino at that time. The average weekday traffic volumes along the study corridor are 1,980 and 2,285 vehicles in the AM and PM peak hours respectively. The corridor was moderately utilized by cyclists with an average of 5-10 cyclists per hour traveling in either direction during the weekday peak hours. The maximum hourly number of pedestrian crossings was 64 which occurred at the intersection of El Camino Real and Wolfe Road during the mid-day peak hour (12:30 PM to 1:30 PM).

#### Collision History

Data collected from a five-year period from August 2010 to August 2015 shows a total of 190 collisions in the Wolfe Road study area. The average collision rate for an urban facility of four or more undivided lanes in Santa Clara County is 1.44 collisions per Million Vehicle Miles (MVM) traveled and for California as a whole is 1.85 collisions per MVM. Wolfe Road has a five-year average of 2.52 collisions per MVM traveled, exceeding the countywide average and even greater than the statewide average for similar facilities. As a point of comparison, the collision rate on Homestead Road (four lane roadway with 24,000 average daily vehicles), a similar type of facility to Wolfe Road, was only 0.9 collisions per MVM, barely one-third that of Wolfe Road.

#### Parking Study

On-street parking is provided on only one side of the roadway at any given point, alternating between sides. The northbound side has 26 on-street spaces and the southbound side has 49 spaces, for a total of 75 on-street parking spaces provided along the corridor. A parking utilization study identified that, at peak utilization in the early morning, a maximum of 47 of the 75 spaces were occupied (62%). There are 104 residential driveways along this section of Wolfe Road. Those residential driveways were estimated to provide 252 off-street parking spaces. Field observations noted that approximately half (126 spaces) of those off-street driveway spaces were not being utilized.

#### Congestion

Congestion along Wolfe Road primarily originates at at-capacity intersections at either end of the study corridor (El Camino Real, Fremont Avenue, and Homestead Road). The intersection of Fremont Avenue and Wolfe Road is forecasted to operate with unacceptable level of service with previously approved projects and pending projects, resulting in increased congestion, queues that extend along the corridor, and lengthy delays. Queues from El Camino Real and Fremont Avenue were observed to currently extend past Elizabeth Way in the morning peak hour, and queues from Homestead Road were observed to currently extend past Marion Way in the evening peak hour. With the addition of previously approved projects the travel time on the 1.1 mile corridor is projected to be over ten minutes for each vehicle during the peak hour, and in the long term this travel time is forecasted to increase over 14 minutes. That is compared to a travel time of approximately six minutes during the peak hours, currently.

Due to existing congestion and queues, it can be difficult to access the Wolfe Road corridor from the adjacent neighborhoods. Access points at Eleanor Way and Elizabeth Way currently have a high level of delay in one or more peak hours due to the heavy volumes on Wolfe Road. When considering future traffic volume growth on the corridor, it will also become more difficult to turn onto the corridor from Dartshire Way.

## **Alternatives**

As a result of the analysis, three alternatives with differing roadway cross-sections were developed and evaluated. As previously mentioned, the project study area was split into the Triangle and the Corridor. The Triangle includes the intersections formed by El Camino Real, Wolfe Road, and Fremont Avenue and the Corridor consists of Wolfe Road south of Fremont Avenue to Homestead Road. Staff anticipates implementing the project in two phases: 1) Corridor improvements and 2) Triangle improvements. Corridor improvements are comparatively of low cost and do not require right of way acquisition or California Department of Transportation (Caltrans) approval; therefore they are relatively easy and quick to implement as the first phase of the project. Triangle improvements would be implemented in the second phase because they are high cost would require some right-of-way acquisition, and Caltrans coordination and approval. In addition the Triangle improvements would require additional analysis and a more extensive environmental review process.

### Triangle Alternatives

The descriptions below focus on some of the key modifications, but the full proposal as part of the triangle improvements are described within Attachment 5. Caltrans review and approval would be required to implement any of the triangle alternatives. Triangle Alternatives 2 and 3 represent the greatest modification to El Camino Real by introducing a new traffic signal, and would require more extensive review by Caltrans.

#### *Triangle Alternative 1*

Triangle Alternative 1 is the least intensive in terms of geometric changes at the intersections. Two key modifications for this alternative include restricting Eleanor Way at Fremont Avenue to right-in-right-out access only, and converting one southbound through lane into an exclusive right-turn lane at the Wolfe Road and Fremont Avenue intersection. This alternative would marginally improve the efficiency of the Fremont Avenue & Wolfe Road intersection.

This alternative would require approximately six feet of width and a total of approximately 1,070 square feet of right-of-way acquisition along the west side of Wolfe Road between El Camino Real and Fremont Avenue.

#### *Triangle Alternative 2*

Triangle Alternative 2 contains more extensive improvements to the triangle intersections. Two key improvements for this alternative include signalizing the Fremont Avenue and El Camino Real intersection, and elimination of the westbound and eastbound left-turn lanes at the El Camino Real at Wolfe Road intersection by shifting these movements to the new proposed signalized intersection at Fremont Avenue and El Camino Real. This would require vehicles heading from eastbound El Camino Real to northbound Wolfe Road first make a U turn at the new traffic signal at Fremont Avenue and El Camino Real and then turn right onto northbound Wolfe Road (this is commonly known as “indirect lefts” or “Michigan lefts”). This alternative would significantly improve the efficiency of the El Camino Real & Wolfe Road intersection.

This alternative would also require approximately six feet of width and a total of approximately 1,070

square feet of right-of-way acquisition along the west side of Wolfe Road between El Camino Real and Fremont Avenue.

### *Triangle Alternative 3*

Triangle Alternative 3 contains the improvements recommended for Triangle Alternative 2, as well as additional modifications, including the conversion of one southbound through lane on Wolfe Road at El Camino Real to a second left-turn lane and a new dedicated southbound left turn movement at the Fremont Avenue and Wolfe Road intersection. Triangle Alternative 3 is most effective at reducing congestion.

This alternative would require approximately 13 feet of width and a total of approximately 1,565 square feet of right-of-way acquisition along the west side of Wolfe Road between El Camino Real and Fremont Avenue. The required right-of-way may impact the existing medical office building on the northwest corner of the Fremont Avenue and Wolfe Road intersection. Additional right-of-way of approximately 6 feet of width and a total of approximately 550 square feet would be required on the west side of Wolfe Road south of Fremont Avenue. The additional right-of-way south of Fremont Avenue would not affect any existing structures or access. The total right-of-way acquisition for this alternative is approximately 2,115 square feet.

### Corridor Alternatives

All of the alternatives discussed below include improved signal timing and coordination along Wolfe Road and no additional right-of-way is required. A graphic of the existing cross-section and the three Corridor alternatives are included in Attachment 6.

### *Corridor Alternative 1*

Corridor Alternative 1 does not modify the capacity of the roadway. It removes existing on-street parking in order to provide buffered bicycle lanes. Buffered bicycle lanes improve bicycle comfort and safety and may also increase bicycle ridership. Based on the parking survey only 50 percent of the 104 residential driveways were occupied, indicating that there may be adequate off-street capacity to support the removal of the 75 on-street parking spaces. In addition, as part of the community input process, parking was not identified as a major concern or top priority.

### *Corridor Alternative 2*

Corridor Alternative 2 is a road diet which reduces the travel lanes from two in each direction to one in each direction with a center TWLTL. It also provides buffered bicycle lanes and on-street parking on both sides of the roadway. Buffered bicycle lanes improve bicycle comfort and safety. The number of on-street parking spaces would significantly increase with this alternative, while roadway capacity would be significantly decreased. Analysis of this alternative indicates that vehicle congestion, travel times, greenhouse gas emissions, and fuel consumption would substantially increase with this alternative.

### *Corridor Alternative 3*

Corridor Alternative 3 increases the capacity of the roadway by providing a center TWLTL. It converts existing on-street parking to create space both the center TWLTL and wider bicycle lanes. The removal of on-street parking and wider bicycle lanes improve bicycle comfort and safety. As in Corridor Alternative 1, all of the on-street parking would be removed, but the parking survey showed only 50 percent of the 104 residential driveways occupied, indicating that there may be adequate off-street capacity to support the removal of the 75 on-street parking spaces. Lastly, the provision of the center TWLTL would improve vehicular safety and access by providing a refuge for turning movements between Wolfe Road and the approximately 100 residential driveways along the corridor. This alternative is most effective at reducing congestion and reducing collisions along Wolfe Road.

### **Alternatives Evaluation and Results**

For the purpose of the simulation analysis, the Triangle and Corridor alternatives were paired up in the order of their effectiveness. Triangle Alternative 1 was modeled with Corridor Alternative 1, and so forth. This allowed for analysis of the cumulative effect of the implementation of the proposed alternatives.

The daily system wide delay results of the near-term (includes approved projects) and long-term (includes approved and pending projects) analysis can be seen in the table below. The column to the right shows the change from maintaining the existing roadway geometry (striping) and signal timing:

<b>Alternative</b>	<b>Delay (veh-hr)</b>	<b>Change</b>
<b><i>Near-Term (Existing + Approved Projects)</i></b>		
Existing Roadway	5,100	
Triangle Alternative 1 and Corridor Alternative 1	4,600	-500
Triangle Alternative 2 and Corridor Alternative 2	5,900	800
Triangle Alternative 3 and Corridor Alternative 3	4,500	-600
<b><i>Long-Term (Existing + Approved Projects + Pending Projects)</i></b>		
No Improvements	7,800	
Triangle Alternative 1 and Corridor Alternative 1	7,700	-100
Triangle Alternative 2 and Corridor Alternative 2	11,400	3,600
Triangle Alternative 3 and Corridor Alternative 3	6,500	-1,300

Notes:

Includes summation of AM and PM peak periods (6 hours) for a typical week

A comparison of travel times between El Camino and Homestead Road was also completed. The analysis compares the existing roadway geometry (striping) and signal timing against the three different Alternatives. The table below summarizes those findings:

Direction	Metric	Existing		Alternative 1		Alternative 2		Alternative 3	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Near-Term									
Northbound	Travel Time	10.2 min	6.2 min	5.8 m	4.2 m	7.0 m	6.0 m	5.6 min	4.4 min
	Change from Existing	-	-	-43%	-32%	-32%	-3%	-46%	-29%
Southbound	Travel Time	3.7 min	8.1 min	4.0 m	5.3 m	5.2 m	14.9 r	3.6 min	6.5 min
	Change from Existing	-	-	11%	-34%	41%	84%	-1%	-20%
Long-Term									
Northbound	Travel Time	14.3 r	8.6 min	11.7 r	4.6 m	12.1 r	9.3 m	8.8 min	4.9 min
	Change from Existing	-	-	-18%	-46%	-15%	8%	-38%	-44%
Southbound	Travel Time	3.8 m	9.2 min	5.1 m	7.2 m	7.8 m	15.8 r	4.0 min	7.1 min
	Change from Existing	-	-	32%	-22%	104%	71%	3%	-24%

## Notes:

- Travel times represent the average travel time per vehicle driving between Homestead and El Camino Real, inclusive, in the indicated peak hour.
- No Improvements scenarios utilize existing geometrics and existing signal timing;
- All alternatives include signal coordination and modifications to signal timing parameters

Lastly, Attachment 7 provides an Alternatives Evaluation Matrix that compares the alternatives relative to existing conditions pertaining to vehicular traffic, multimodal circulation, and parking and impacts to adjacent properties.

Based on the results of the analysis conducted for various combinations of alternatives, Triangle and Corridor Alternative 3 provides the maximum benefit in terms of greatest traffic congestion relief, reduced corridor travel times, reduced emissions, reduced number of collisions, and increased bicycle and pedestrian safety.

### **FISCAL IMPACT**

As part of the feasibility assessment, the consultant developed preliminary permitting, design, and construction cost estimates summarized below. Cost estimates include project development, permitting, administration, construction management, and construction costs. It is important to note that these are preliminary costs based on a high level conceptual design. It does not include detailed analysis on items such as utility conflicts, which can increase the costs significantly.



	Triangle (Millions)	Corridor (Millions)	Total (Millions)
Alternative 1	\$2.00	\$0.34	\$2.34
Alternative 2	\$3.60	\$0.60	\$4.20
Alternative 3	\$3.89	\$0.45	\$4.34

The project is anticipated to be implemented in two phases. The lower-cost Corridor improvements would be implemented in an initial phase through acquisition of grant funding or proposed as a Capital project. The higher-cost Triangle improvements would require a detailed environment review process, acquisition of right-of-way, and approval from Caltrans, necessitating a much longer implementation timeframe. Therefore these would be implemented as a second phase of the project, and the additional analysis and design work would be proposed as a Capital Project.

### **PUBLIC CONTACT**

Public contact was made through posting of the Bicycle and Pedestrian Advisory Commission agenda on the City's official-notice bulletin board, on the City's website, and the availability of the agenda and report in the Office of the City Clerk and Sunnyvale Public Library.

Two public community outreach meetings were also held on September 1st and December 10th of 2015 to elicit feedback from the community on the improvement alternatives developed as part of the project. Notices were sent to residents within a 1,000 feet radius of the project boundary. Approximately 35 residents attended each community meeting. In addition, one BPAC meetings were held in advance of each community meeting to gather similar input from the bicycle and pedestrian community. Meeting summaries are provided in Chapter 8 of Attachment 4.

Notices were also sent in advance of the BPAC and Council meetings to all properties that front on Wolfe Road to advise them of the improvements and changes under consideration, including possible parking removal.

### **ALTERNATIVES**

#### **Triangle:**

Triangle Alternative 1 - Recommend to the City Council to select Triangle Alternative 1 and pursue funding for a future project, to complete a more detailed traffic study, and to coordinate with Caltrans on this alternative.

Triangle Alternative 2 - Recommend to the City Council to select Triangle Alternative 2, and pursue funding for a future project to complete a more detailed traffic study and to coordinate with Caltrans on this alternative.

Triangle Alternative 3 - Recommend to the City Council to select Triangle Alternative 3 as fully described in Attachment 5 - *Triangle Alternative 3*, and pursue funding for a future project to complete a more detailed traffic study and coordinate with Caltrans on this alternative.

Triangle Alternative 4 -Do not make any modifications to the Triangle.

**Corridor:**

Corridor Alternative 1 - Recommend to the City Council to select Corridor Alternative 1, which includes removal of on-street parking and buffered bicycle lanes along Wolfe Road between Fremont Avenue and Homestead Road.

Corridor Alternative 2 - Recommend to the City Council to select Corridor Alternative 2, which includes a road diet from four total lanes to two total lanes with a center TWLTL and buffered bicycle lanes on Wolfe Road between Fremont Avenue and Homestead Road. Direct Staff to proceed with additional environmental analysis.

Corridor Alternative 3 - Recommend to the City Council to select Corridor Alternative 3, which includes removal of on-street parking to provide both a center TWLTL and wider bicycle lanes along Wolfe Road between Fremont Avenue and Homestead Road.

Corridor Alternative 4 - Do not make any modifications to the Corridor.

**RECOMMENDATION**

Recommend to the City Council to select Triangle Alternative 3 as fully described in Attachment 5 - *Triangle Alternative 3*, and pursue funding for a future project to complete a more detailed traffic study and coordinate with Caltrans; and, Corridor Alternative 3 which includes removal of on-street parking to provide both a center Two-Way Left-Turn Lane (TWLTL) and wider bicycle lanes along Wolfe Road between Fremont Avenue and Homestead Road.

Triangle Alternative 3 is most effective at reducing congestion and delay along Wolfe Road, Fremont Avenue, and El Camino Real, while also providing enhanced bicycle facilities. Corridor Alternative 3 is most effective at reducing congestion and delay, improving travel time, and bicycle and vehicular safety. In addition, the proposed TWLTL would improve emergency response time as emergency vehicles can bypass congestion using TWLTL. Both sets of improvements would address many of the existing challenges that have resulted in a significantly higher than regional and statewide average collision rate along the Wolfe Road corridor. Research shows that TWLTLs reduce traffic collisions by up to 50 percent (*Caltrans Local Roadway Safety Manual*).

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Reviewed by: Kent Steffens, Assistant City Manager

Approved by: Deanna J. Santana, City Manager

**ATTACHMENTS**

1. Project Study Area
2. DPW Study Issue 14-14
3. DPW Study Issue 14-17
4. Full Report from Kimley-Horn and Associates
5. Triangle Alternatives
6. Corridor Alternatives
7. Triangle and Corridor Evaluation Matrix