

# memorandum



**Whitlock & Weinberger  
Transportation, Inc.**

475 14<sup>th</sup> Street  
Suite 290  
Oakland, CA 94612

voice (510) 444-2600

website [www.w-trans.com](http://www.w-trans.com)  
email [mspencer@w-trans.com](mailto:mspencer@w-trans.com)

Date: May 6, 2014

To: **Mr. Jesse Quirion**  
City of Menlo Park

From: Mark Spencer  
Tony Henderson

Project: MPA010

Subject: 500 El Camino Real – Traffic Operational Analysis

W-Trans has completed an access alternatives analysis for the the proposed project at 500 El Camino Real compared with the El Camino Real/Downtown Specific Plan. This memorandum summarizes the analysis the traffic associated with the proposed project and compares the project's impact on adjacent transportation facilities for six alterative access configurations. This analysis represents the second of three building block documents that will be prepared for this analysis. The first element was the *500 El Camino Real – El Camino Real/Downtown Specific Plan Vehicular Traffic Consistency* (March 7, 2014), in which the proposed project was compared to the El Camino Real/Downtown Specific Plan. The upcoming third element will be an analysis of potential cut-through traffic in the Allied Arts Neighborhood.

Attached to this memorandum are the following figures and tables:

- Table 1 – Alternative Access Comparison
- Table 2 – Alternative Access Comparison – Added Traffic Volumes
- Table 3 – Site Access Alternatives – Pros and Cons
- Figures 1A and 1B – Driveway Alternatives
- Intersection Level of Service Summary
- Intersection Queuing Summary

Development of the proposed project under the various access alternatives would result in differences in intersection level of service and queuing operations along El Camino Real between the access alternatives. The primary distinction between the access alternatives; however, would be the relative contribution of traffic on nearby arterial and collector streets, as summarized on Table 1. Additionally, there would be distinct effects in the form of redistribution of traffic and weaving on El Camino Real, as discussed in this memorandum.

## **Vehicular Access Alternatives**

The proposed project site would be accessed via four driveways on El Camino Real. In addition to the access configuration proposed by the applicant, five access alternatives were developed for the site. These alternatives were developed in coordination with City staff based on the characteristics of the site as well as access to nearby land uses and streets along El Camino Real. All access alternatives incorporated these four driveways, but there were variations in which movements would be allowed at which driveways. The alternatives are described below and are shown on the attached Figures 1A and 1B, along with the corresponding lane configurations. The driveways located at El Camino Real/Middle Avenue and El Camino Real/Cambridge Avenue would remain signalized, while the other two driveways would be unsignalized (uncontrolled on the El Camino Real approaches)

Current Proposal

The proposed site plan submitted by the applicant includes the following access configuration:

- Middle Avenue – all movements would be permitted entering and exiting the project site.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – the project driveway access would be restricted to right-turn in and out movements only.
- Cambridge Avenue – all movements would be permitted entering and exiting the project site.

Alternative A

- Middle Avenue – all movements would be permitted entering and exiting the project site.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – in addition to right-turn in and out movements at the driveway, a southbound (inbound) left-turn movement would be permitted. The intersection would remain uncontrolled on the El Camino Real approaches. The implications of this left-turn lane are discussed “Implementation of Alternatives” section.
- Cambridge Avenue – the project driveway access would be restricted to right-turn in and out movements only. All other movements not related to the project site at the intersection would be maintained with their current configuration (See Figure 1A).

Alternative B

- Middle Avenue – the project driveway access would be restricted to right-turn in and out movements only. All other movements at the intersection would be maintained with their current configuration.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – the project driveway access would be restricted to right-turn in and out movements only.
- Cambridge Avenue – all movements would be permitted entering and exiting the project site.

Alternative C

- Middle Avenue – the project driveway access would be restricted to right-turn in and out movements only. All other movements at the intersection would be maintained with their current configuration.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – in addition to right-turn in and out movements at the driveway, a southbound (inbound) left-turn movement would be permitted. The intersection would remain uncontrolled on the El Camino Real approaches. The implications of this left-turn lane are discussed “Implementation of Alternatives” section.
- Cambridge Avenue – the project driveway access would be restricted to right-turn in and out movements only. All other movements not related to the project site at the intersection would be maintained with their current configuration (See Figure 1A).

#### Alternative D

- Middle Avenue – eastbound and westbound through movements would be prohibited; however, all other movements at the intersection would be permitted.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – the project driveway access would be restricted to right-turn in and out movements only.
- Cambridge Avenue – eastbound and westbound through movements would be prohibited; however, all other movements at the intersection would be permitted.

#### Alternative E

- Middle Avenue – the westbound (outbound) left-turn movement would be prohibited with all other movements permitted entering and exiting the project site.
- College Avenue – the project driveway would be restricted to right-turn in and out movements only.
- Partridge Avenue – the project driveway access would be restricted to right-turn in and out movements only.
- Cambridge Avenue – the southbound (inbound) left-turn movement would be prohibited with all other movements permitted entering and exiting the project site.

#### **Access to Stanford Park Hotel**

Implementation of either Alternative A or Alternative C would result in the removal of the existing southbound left-turn movement at the El Camino Real/Cambridge Avenue driveway. Currently the Stanford Park Hotel shares inbound access with the project site at this driveway. This driveway serves as the hotel's only access for drivers traveling in the southbound direction. Therefore, removal of the existing southbound left-turn movement at El Camino Real/Cambridge Avenue would result in the removal of southbound left-turn access into the hotel and result in southbound drivers destined for the hotel to continue to the intersection of El Camino Real/Sand Hill Road, where they would complete a U-turn movement, then enter the hotel via a northbound right-turn movement. It is acknowledged that would result in change to the access for the Stanford Park Hotel; however, this turn restriction was included in the alternative analysis as it represents one of the possible physical options for site access.

#### **Redistribution of Traffic**

Any access alternative that would restrict access to the site also has the potential to redistribute traffic in the area. Some possible examples include:

- If access between the project site and Middle Avenue and/or Cambridge Avenue is restricted, drivers may choose to use other local and collector streets as an alternative route.
- Drivers may still choose to travel on Middle Avenue or Cambridge Avenue, but doing so would require an increase in both turning and weaving maneuvers on El Camino Real to travel between the project site and Middle Avenue/Cambridge Avenue.

Additionally, restricting access to the project site would likely result in a larger portion of project-generated traffic traveling on regional routes, such as El Camino Real, Sand Hill Road and Santa Cruz Avenue, thereby resulting in increased congestion on these routes. Or traveling on local routes such as Middle Avenue, Cambridge Avenue and Roble Avenue. Because of this increase in congestion on

regional routes, drivers unrelated to the project site may choose to use alternative routes such as Middle Avenue, Cambridge Avenue and other local and collector streets. It is noted that the added traffic volumes discussed in this memorandum are project-related traffic, and do not account for this redistribution of non-project traffic.

### **Implementation of Alternatives**

#### Partridge Avenue Southbound Left-Turn Lane (Alternatives A and C)

Installation of a southbound left-turn lane at El Camino Real/Partridge Avenue under Alternatives A and C would require reconfiguration of this intersection. To install the left-turn lane without widening El Camino Real, it would be necessary to remove on-street parking along El Camino Real near the intersection. Furthermore, there is currently a wide shoulder that operates as a southbound right-turn lane at this intersection. It is expected that modifications to the intersection would result in the loss of the southbound shoulder, thereby resulting in the southbound right-turn movement being shared with the outside through lane. For reference, this intersection currently serves approximately 21 southbound right turning vehicles during the a.m. peak hour and 34 such vehicles during the p.m. peak hour.

Based on the existing roadway width, it would be possible to install this southbound left-turn lane while maintaining the center median. Currently, independent studies are underway to determine if bicycle lanes should be installed on El Camino Real in this area. Installation of this southbound left-turn lane would preclude the installation of bicycle lanes on El Camino Real, unless the travel lanes are narrowed and the median is removed.

This intersection would remain unsignalized with the El Camino Real approaches being uncontrolled. Because of this, drivers wanting to complete the southbound left-turn movement would need to wait for an adequate gap in three lanes of oncoming traffic before completing the turn. The adjacent signalized intersection at El Camino Real/Cambridge Avenue would provide a metering affect for traffic which would help provide these gaps in northbound traffic.

It is noted that El Camino Real is operated by Caltrans. Therefore, installation of the southbound left-turn lane at Partridge Avenue would require approval by Caltrans and therefore cannot be guaranteed by the City.

#### U-Turns at Middle Avenue (Alternative C)

If all westbound (outbound) left-turn movements from the project site were to be prohibited through implementation of Alternative C, drivers exiting the site and traveling to destinations to the south, would need to first travel to the north then complete a U-turn movement to travel to the south. The intersection of El Camino Real/Middle Avenue would be the closest, and therefore most likely, location that drivers would complete this U-turn movement.

#### Through Movement Restrictions (Alternative D)

If eastbound and westbound through movements were to be prohibited at Middle Avenue and Cambridge Avenue, it is assumed that all other movements (including existing turning movements not related to the project site) would continue to be permitted at these intersections. Therefore, the possible through-movement restrictions would be accomplished solely with the posting of regulatory signs. Generally, it is preferred to establish movement restrictions with physical barriers such as center

medians and channelizing islands. However, it is not feasible to install these barriers and retain all other turning movements at the intersection. Therefore, any reduction in traffic on Middle Avenue and Cambridge Avenue would be dependent on drivers' compliance with regulatory signs, and enforcement of these regulations as necessary.

#### El Camino Real/Middle Avenue Modification

The *El Camino Real/Downtown Specific Plan Draft Transportation Impact Analysis* (Fehr & Peers, April 2010) included a recommendation that a second northbound left-turn lane be added to El Camino Real at this intersection, along with a second receiving lane on Middle Avenue as a mitigation measure. However, it was stated in that report that this modification may not be feasible due to the need for additional right-of-way. Furthermore, the intersection is controlled by Caltrans and any modifications would require their approval. Due to these limitations, a second northbound left-turn lane was not included in this Operational Analysis.

However, for access alternatives that include southbound left-turn access into the site at El Camino Real/Middle Avenue, it was assumed that a single southbound left-turn lane would be provided. It appears that a short left-turn lane (approximately 75 feet of storage) could be installed at this location within the existing right of way. This length of the southbound left-turn lane, also the project's effect on queuing at this location, is discussed in more detail under the "Intersection Queuing" section below.

#### **Traffic Assignment**

Project generated-traffic was distributed to local and regional destinations based on trip distribution profiles presented in the City of Menlo Park's *Circulation System Assessment* (CSA) document. These trip distribution profiles only specify the origin/destination of the trips, not the route used to travel to these origin/destinations. Route specific assignment of traffic on the local transportation network was based the various alternative access configurations as well as knowledge of the local transportation network and travel patterns.

#### **Intersection Operations**

##### Level of Service

An operational analysis for intersections along El Camino Real was completed for the different access alternatives. The level of service results are summarized in the attached tables. In general, it was found that the impact to intersections along El Camino Real would be similar for the various access alternatives, with the largest change in operations occurring at the El Camino Real/Middle Avenue and El Camino Real/Cambridge Avenue intersections. The highest average delay at El Camino Real/Middle Avenue would occur under Alternative A (with Cambridge Avenue restricted to allow right-turn movements only at the driveway). Similarly, the lowest delay at this intersection would occur under Alternative B (with Middle Avenue restricted to allow right-turn movements only at the driveway).

##### Intersection Queuing

Under each scenario, the projected 95th percentile queues at the study intersections were determined based on the Highway Capacity Manual methodologies. Summarized below are intersection movements for which the project is expected to cause the approach queues to exceed the existing available storage capacity. The queuing conditions are summarized in the attached tables.

- El Camino Real/Cambridge Avenue – Alternative B would result in queuing that exceeds the available storage in this southbound left-turn lane under p.m. peak hour conditions with the addition of project-generated traffic.
- El Camino Real/Middle Avenue – Implementation of the Current Proposed Configuration, Alternative A, Alternative D or Alternative E would result in the need for installation of a southbound left-turn lane at El Camino Real/Middle Avenue. Based on the existing geometry, it is estimated that a southbound left-turn lane with approximately 75 feet of storage and a 25-foot taper could be installed within the existing right of way and without affecting the northbound left-turn lane into the Safeway driveway immediately to the north. It is projected that the maximum projected queue would be in the range of 76 to 140 feet, which would occasionally exceed the 75 feet of potential storage space.

Additionally, the following intersections are expected to experience queuing that exceeds the available storage capacity, with or without the implementation of the proposed project, under Cumulative conditions.

- El Camino Real/Menlo Avenue-Ravenswood Avenue: all eastbound, westbound left-turn, westbound through, northbound through, and southbound left-turn and through movements
- El Camino Real/Middle Avenue: eastbound left-turn and through, northbound left-turn, and southbound through movements
- El Camino Real/Sand Hill Road: eastbound left-turn, westbound right-turn, northbound left-turn, and southbound left-turn movements

### **Traffic on Middle Avenue**

Restricting the Middle Avenue driveway to allow only right-turn movements would result in a decrease in project-generated traffic that travels on Middle Avenue, between El Camino Real and University Drive, but would likely result in an increase in project-generated traffic traveling on other local streets.

### **Pedestrian and Bicycle Access**

All alternatives would offer a comparable level of access for pedestrians and bicyclists to the site. Based on the applicant's proposal, there would be a pedestrian undercrossing of the Caltrain tracks, providing access to Alma Street (the nearest crossings of the Caltrain tracks otherwise are located approximately 1,600 feet to the south and 2,400 feet to the north of the center of the site). In addition to providing pedestrians and bicyclists with direct access to destinations to the east of the Caltrain tracks, this undercrossing would also provide pedestrians and bicyclists two routes to access the Menlo Park Caltrain Station: via El Camino Real and via Alma Street. This undercrossing was assumed to be included in all access alternatives analyzed.

### **Comparison of Vehicular Access Alternatives**

A side-by-side summary comparison of the alternatives is provided on the attached Table 1 and the project-added traffic volumes are shown on Table 2. Additionally, a summary of access alternatives pros and cons is provided on the attached Table 3.

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Attachments: Table 1 – Alternative Access Comparison  
Table 2 – Alternative Access Comparison – Added Traffic Volumes  
Table 3 – Site Access Alternatives – Pros and Cons  
Figures 1A and 1B – Driveway Alternatives  
Intersection Level of Service Summary  
Intersection Queuing Summary

**Table I  
Alternative Access Comparison**

	<b>Current Proposal</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>
<b>Site Access Configuration</b>						
Middle Avenue	Full access (all movements allowed)	Full access (all movements allowed)	Right-turn in and out only	Right-turn in and out only	No eastbound-westbound through movements	No outbound (westbound) left-turn movement
College Avenue	Right-turn in and out only	Right-turn in and out only	Right-turn in and out only	Right-turn in and out only	Right-turn in and out only	Right-turn in and out only
Partridge Avenue	Right-turn in and out only	Right-turn in and out, plus inbound (southbound) left-turn	Right-turn in and out only	Right-turn in and out, plus inbound (southbound) left-turn	Right-turn in and out only	Right-turn in and out only
Cambridge Avenue	Full access (all movements allowed)	Right-turn in and out only	Full access (all movements allowed)	Right-turn in and out only	No eastbound-westbound through movements	No inbound (southbound) left-turn movement
<b>Partridge Ave Intersection</b>	No modification from the existing configuration	Add southbound left-turn lane, would likely require removal of some on-street parking to accommodate turn lane within the street width	No modification from the existing configuration	Add southbound left-turn lane, would likely require removal of some on-street parking to accommodate turn lane within the street width	No modification from the existing configuration	No modification from the existing configuration
<b>Access to Stanford Park Hotel</b>	No modification from the existing configuration	Remove existing southbound left-turn access. Southbound traveling drivers would need to complete a U-Turn at El Camino Real/Sand Creek Road and then enter the site with a northbound right-turn movement.	No modification from the existing configuration	Remove existing southbound left-turn access. Southbound traveling drivers would need to complete a U-Turn at El Camino Real/Sand Creek Road and then enter the site with a northbound right-turn movement.	No modification from the existing configuration	Remove existing southbound left-turn access. Southbound traveling drivers would need to complete a U-Turn at El Camino Real/Sand Creek Road and then enter the site with a northbound right-turn movement.
<b>U-Turn at Middle Avenue</b>	No change from existing conditions is expected	No change from existing conditions is expected	May result in some outbound drivers destined to the south choosing to exit at College Ave or Partridge Ave and complete a U-Turn movement at ECR/Middle Avenue	All outbound drivers destined to the south would need to exit the site and complete a U-Turn movement at ECR/Middle Avenue	No change from existing conditions is expected	May result in some outbound drivers destined to the south choosing to exit at College Ave or Partridge Ave and complete a U-Turn movement at ECR/Middle Avenue



**Table 2  
Alternative Access Comparison – Added Traffic Volumes**

	<b>Current Proposal</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>
<b>Added Traffic on El Camino Real (north of Middle Ave)</b>						
AM Peak Hour	149	150	155	175	193	150
PM Peak Hour	146	147	146	165	179	154
Daily	1151	1161	1168	1339	1349	1188
<b>Added Traffic on El Camino Real (south of Cambridge Ave)</b>						
AM Peak Hour	164	176	172	173	161	167
PM Peak Hour	152	151	158	153	159	150
Daily	1219	1227	1227	1234	1233	1230
<b>Added Traffic on Middle Ave (west of El Camino Real)</b>						
AM Peak Hour	63	71	35	54	43	64
PM Peak Hour	67	83	37	71	51	69
Daily	528	640	300	514	494	543
<b>Added Traffic on Ravenswood Ave (east of El Camino Real)</b>						
AM Peak Hour	46	46	46	46	46	46
PM Peak Hour	44	44	44	44	44	44
Daily	327	327	327	327	327	327
<b>Added Traffic on Menlo Ave (west of El Camino Real)</b>						
AM Peak Hour	9	8	20	21	47	7
PM Peak Hour	7	7	12	29	39	8
Daily	37	41	107	208	262	38
<b>Added Traffic on Sand Hill Rd (west of El Camino Real)</b>						
AM Peak Hour	68	79	76	76	65	71
PM Peak Hour	58	58	64	59	65	56
Daily	475	483	482	489	489	486

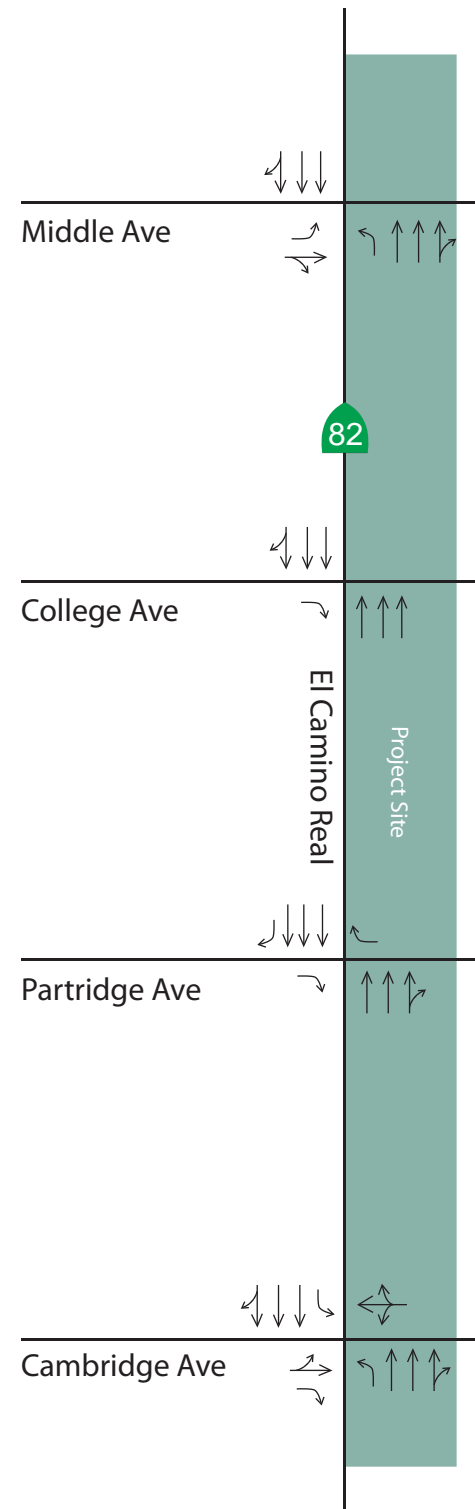
**Table 3  
Site Access Alternative Comparison – Pros and Cons**

Site Alternative	Pros	Cons
<p><b>Current Proposed Configuration</b> – Full access at both Middle Ave and Cambridge Ave</p> <p>Disperses project-related traffic among four entry points to the site and provides direct access to neighborhood via Middle Ave and Cambridge Ave</p>	<ul style="list-style-type: none"> <li>• Allows project generated traffic to enter and exit the site at multiple points</li> <li>• Reduces on-site circulation for drivers to reach entry/exit points</li> </ul>	<ul style="list-style-type: none"> <li>• Middle Ave experiences an increase in left-turning traffic which increases overall intersection delay</li> <li>• Results in a higher added traffic volumes on Middle Ave</li> </ul>
<p><b>Alternative A</b> – Full access at Middle Ave, Cambridge Ave restricted to right-turn in and out only; southbound (inbound) left-turn at Partridge Ave</p> <p>Reduces direct access to Cambridge Ave and provides direct access to Middle Ave from the project site</p> <p>Provides multiple inbound access routes to the project site</p>	<ul style="list-style-type: none"> <li>• Disperses inbound traffic by providing two locations (Middle Ave and Partridge Ave) where a driver could make an inbound (southbound) left-turn movement into the site from El Camino Real</li> </ul>	<ul style="list-style-type: none"> <li>• Concentrates outbound traffic by providing only one location where drivers can make an outbound (westbound) left-turn movement from the site at El Camino Real/Middle Ave</li> <li>• Would result in drivers making extra turning and weaving (traveling across multiple lanes between blocks) maneuvers on El Camino Real to travel between Cambridge Ave and the project site</li> <li>• Project related drivers would use alternative local and collector streets</li> <li>• Would restrict access to the Stanford Park Hotel</li> <li>• Results in the highest added traffic on Middle Ave</li> <li>• Would result in increased on-site circulation for drivers to reach entry/exit points</li> <li>• Partridge Ave southbound left-turn would be uncontrolled, requiring turning drivers to wait for a gap in oncoming traffic</li> <li>• Would result in loss of southbound shoulder at El Camino Real/Partridge Avenue</li> </ul>
<p><b>Alternative B</b> – Middle Ave restricted to right-turn in and out only, Full access at Cambridge Ave</p> <p>Reduces direct access to Middle Ave and provides direct access to Cambridge Ave from the project site</p>	<ul style="list-style-type: none"> <li>• Results in the lowest added traffic on Middle Ave</li> <li>• Lowest overall intersection delay at El Camino Real/Middle Ave</li> </ul>	<ul style="list-style-type: none"> <li>• Concentrates project-related traffic by allowing inbound and outbound left-turn access at only El Camino Real/Cambridge Ave</li> <li>• Project related drivers would use alternative local and collector streets</li> <li>• Would result in increased on-site circulation for drivers to reach entry/exit points</li> <li>• Would result in drivers making extra turning and weaving maneuvers on El Camino Real to travel between Middle Ave and the project site</li> <li>• Results in higher traffic on El Camino Real <ul style="list-style-type: none"> <li>○ Non-project related drivers would use alternative local and collector streets to avoid congestion on El Camino Real</li> </ul> </li> <li>• Results in a potentially significant increase in traffic on neighborhood streets</li> </ul>
<p><b>Alternative C</b> – Right turn in and out only at Middle Ave and Cambridge Ave; southbound (inbound) left-turn at Partridge Ave</p> <p>Reduces direct access to Middle Ave and Cambridge Ave from the project site</p> <p>Eliminates left-turn access exiting the project site</p> <p>Provides inbound left-turn site access at Partridge Avenue</p>	<ul style="list-style-type: none"> <li>• Results in a lower volume of added traffic on Middle Ave and Cambridge Ave</li> <li>• Reduces intersection delay that would be associated with left-turning vehicles at El Camino Real/Cambridge Ave</li> <li>• Provides direct inbound left-turn access from El Camino Real at Partridge Avenue to the project site</li> </ul>	<ul style="list-style-type: none"> <li>• Would result in increased on-site circulation for drivers to reach entry/exit points</li> <li>• Project related drivers may use alternative local and collector streets</li> <li>• Does not allow for outbound (westbound) left-turn access from the site onto El Camino Real</li> <li>• Would result in increased U-turn movements and increases overall intersection delay at El Camino Real/Middle Ave</li> <li>• Would result in drivers making extra turning and weaving maneuvers on El Camino Real to travel between Middle Ave or Cambridge Ave and the project site</li> <li>• Results in higher traffic on El Camino Real <ul style="list-style-type: none"> <li>○ Non-project related drivers would use alternative local and collector streets to avoid congestion on El Camino Real</li> </ul> </li> <li>• Results in a potentially significant increase in traffic on neighborhood streets</li> <li>• Concentrates inbound traffic by providing only one location where drivers can make a southbound left-turn movement into site at El Camino Real/Partridge Ave</li> <li>• Partridge Ave southbound left-turn would be uncontrolled, requiring turning drivers to wait for a gap in oncoming traffic</li> <li>• Would restrict access to the Sanford Park Hotel</li> </ul>

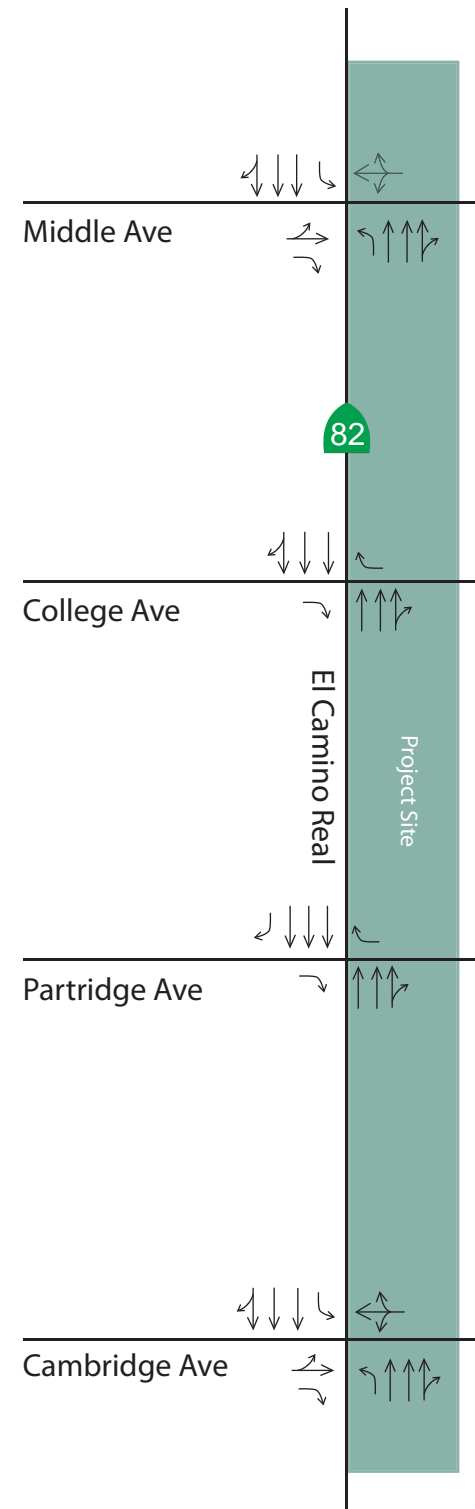
**Table 3  
Site Access Alternative Comparison – Pros and Cons**

Site Alternative	Pros	Cons
<p><b>Alternative D</b> – No eastbound or westbound through movements at Middle Ave and Cambridge Ave</p> <p>Reduces direct access to Middle Ave and Cambridge Ave from the project site</p>	<ul style="list-style-type: none"> <li>• Reduces through access, but maintains left-turn access at Middle Ave and Cambridge Ave</li> <li>• Results in lower added traffic on Middle Ave</li> <li>• Disperses traffic by allowing inbound and outbound left-turn access at Middle Ave and Cambridge Ave</li> </ul>	<ul style="list-style-type: none"> <li>• No physical barriers preventing through movements at Middle Ave and Cambridge Ave</li> <li>• Project related drivers would use alternative local and collector streets</li> <li>• Dependent on drivers' compliance with regulatory signs, and enforcement of restrictions               <ul style="list-style-type: none"> <li>○ Some drivers would choose to ignore the restriction and complete through movements across El Camino Real, posing a safety hazard</li> </ul> </li> <li>• Would result in increased on-site circulation for drivers to reach entry/exit points</li> <li>• Would result in drivers making extra turning and weaving maneuvers on El Camino Real to travel between Middle Ave or Cambridge Ave and the project site,</li> <li>• Results in higher traffic on El Camino Real               <ul style="list-style-type: none"> <li>○ Non-project related drivers would use alternative local and collector streets to avoid congestion on El Camino Real</li> </ul> </li> </ul>
<p><b>Alternative E</b> – No outbound (westbound) left-turn movement at Middle Ave; No southbound (inbound) left-turn movement at Cambridge Ave</p> <p>Does not restrict access to Middle Ave or Cambridge Ave from the project site</p> <p>Restricts locations for left-turn access to/from the site</p>	<ul style="list-style-type: none"> <li>• Provides multiple routes drivers could use to access the project site</li> <li>• By allowing inbound (southbound) left-turns only at Middle Ave, it would reduce the number of drivers traveling further south on El Camino Real to enter the site</li> <li>• By allowing outbound (westbound) left-turns only at Cambridge Ave, it would eliminate drivers exiting the site and traveling southbound on El Camino Real between Middle Ave and Cambridge Ave</li> </ul>	<ul style="list-style-type: none"> <li>• Results in a higher volume of added traffic on Middle Ave</li> <li>• Does not restrict direct access to Middle Ave and Cambridge Ave from the project site</li> <li>• Would restrict access to the Stanford Park Hotel</li> <li>• Would result in increased on-site circulation for drivers to reach entry/exit points</li> <li>• Concentrates project-related traffic:               <ul style="list-style-type: none"> <li>○ Provides only one location where drivers can make an inbound (southbound) left-turn movement into site at El Camino Real/Middle Ave</li> <li>○ Provides only one location where a driver could make an outbound (westbound) left-turn movement from the site at El Camino Real/Cambridge Ave</li> </ul> </li> </ul>

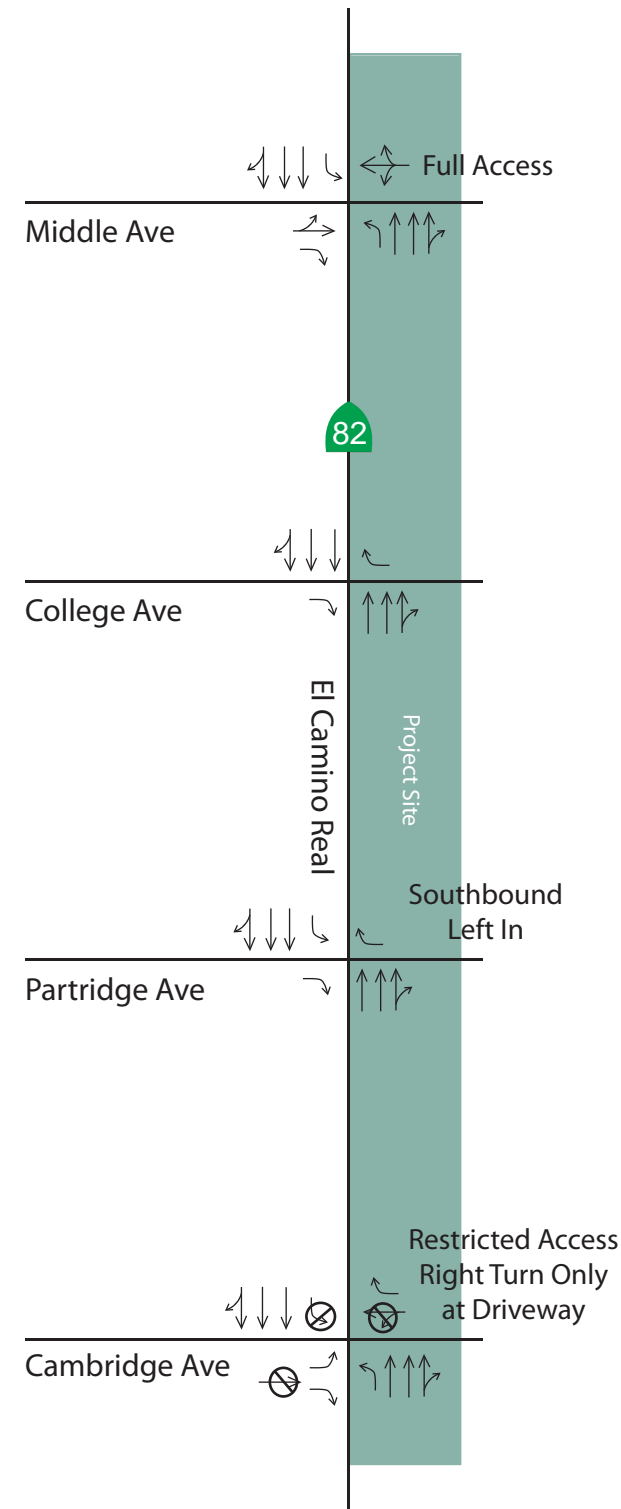
**Existing Conditions**



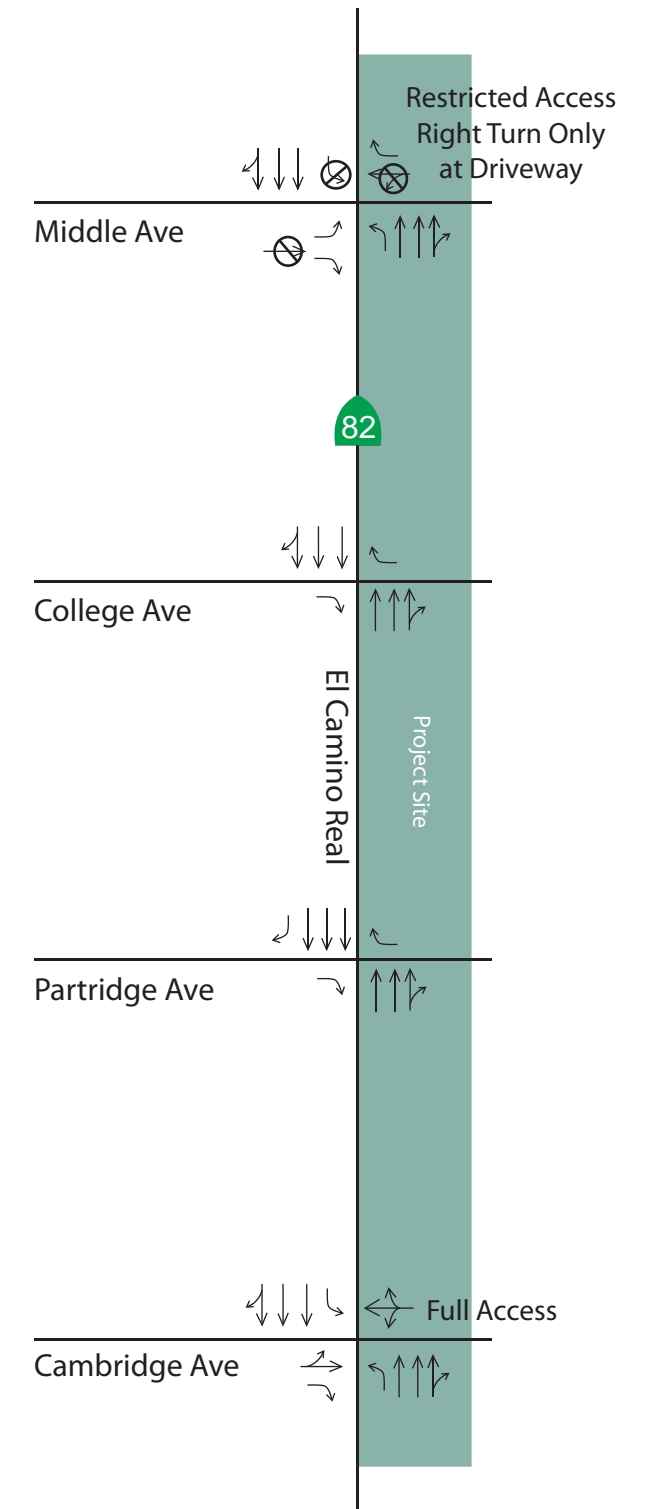
**Current Proposal**



**Alternative A**



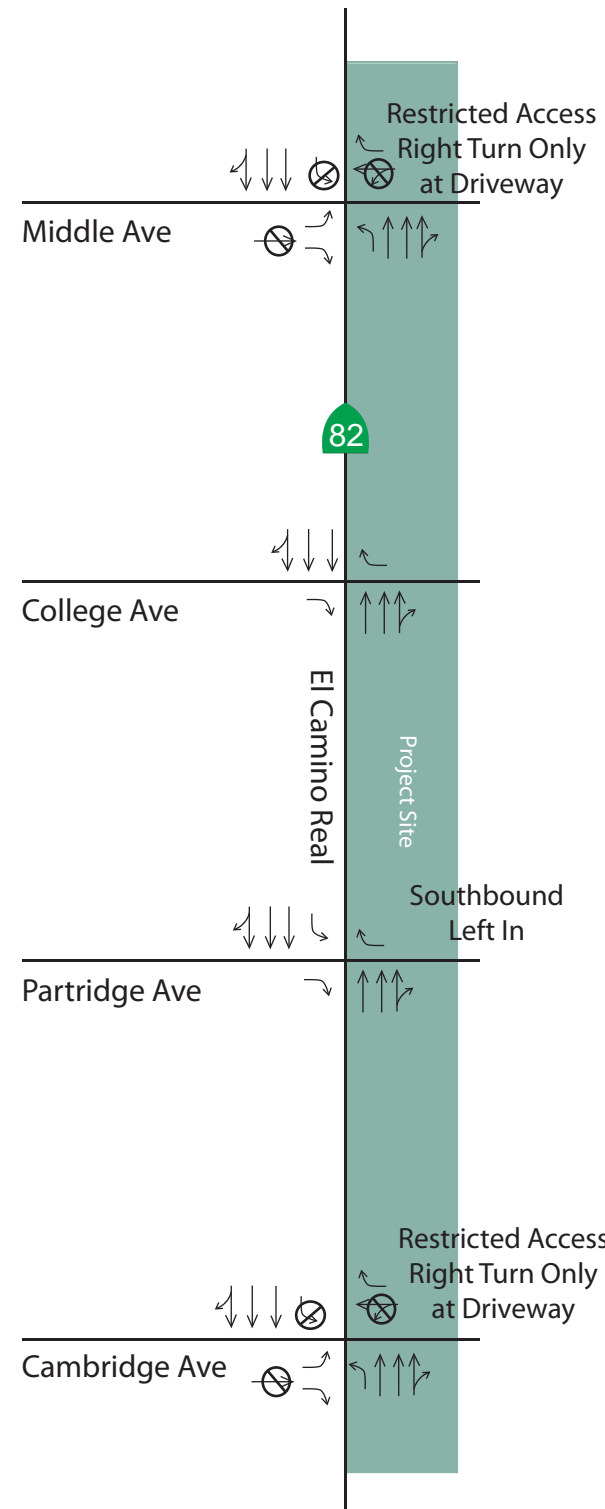
**Alternative B**



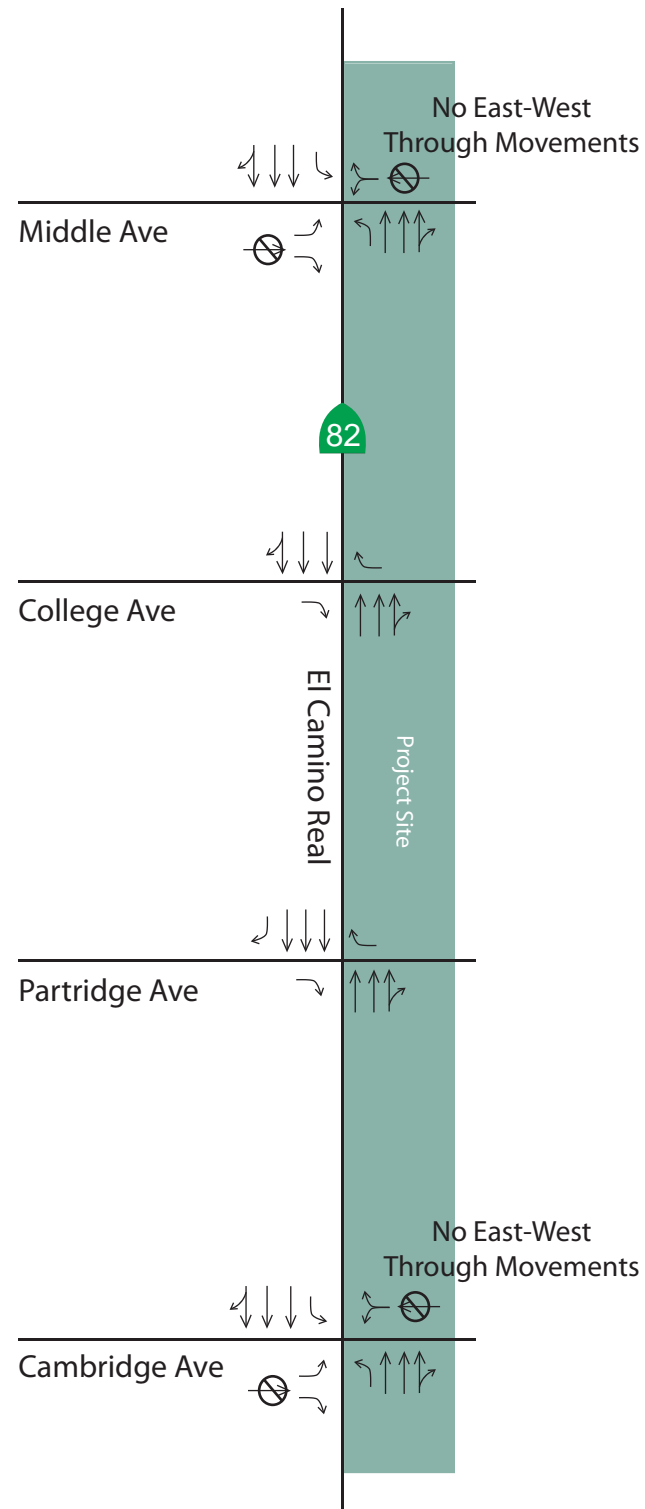
Traffic Engineering Analysis for the 500 El Camino Real Project  
**Figure 1A – Driveway Alternatives**



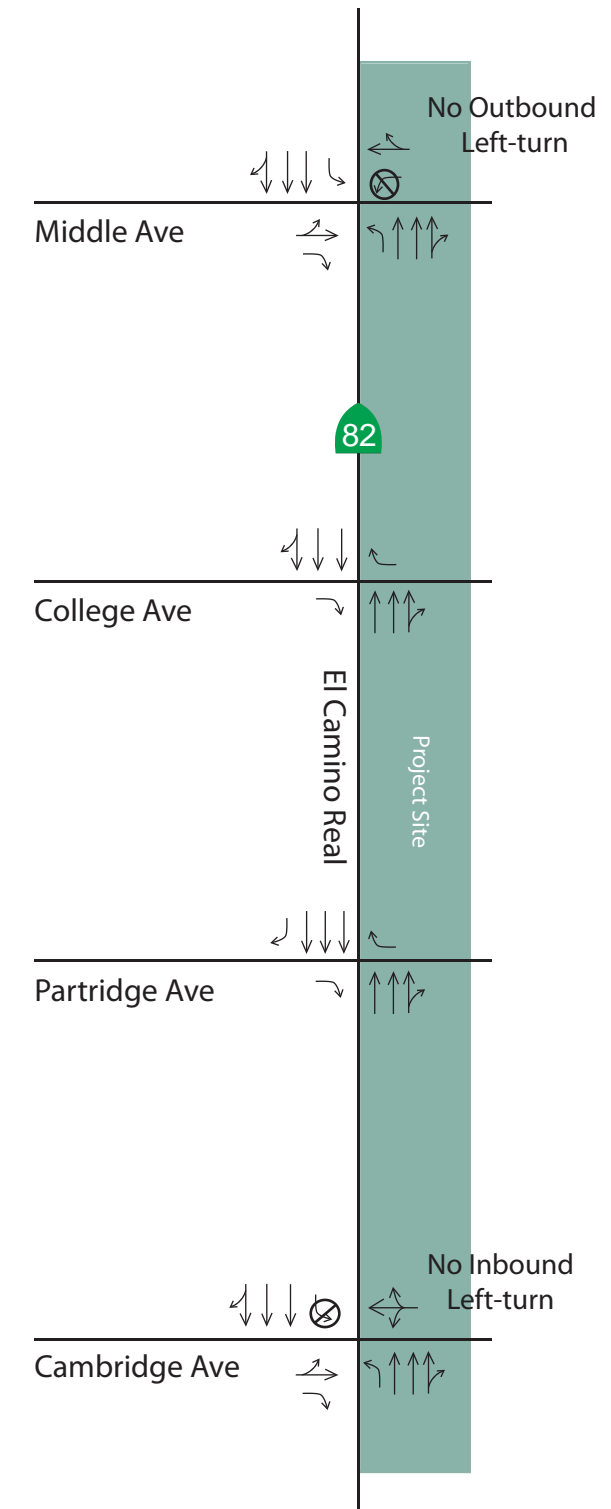
**Alternative C**



**Alternative D**



**Alternative E**



Traffic Engineering Analysis for the 500 El Camino Real Project  
**Figure 1B – Driveway Alternatives**



**Level of Service Summary**  
**Cumulative and Cumulative plus Project - AM Peak Hour**

Intersection	Cumulative - No Project		Cumulative plus Project											
			Current Proposed Configuration		Access Alternative A		Access Alternative B		Access Alternative C		Access Alternative D		Access Alternative E	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
El Camino Real & Menlo Avenue/Ravenswood Avenue	73.0	E	78.6	E	78.2	E	77.5	E	80.1	F	79.4	E	75.6	E
El Camino Real & Live Oak Avenue	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A
<i>Eastbound Live Oak</i>	<i>12.0</i>	<i>B</i>	<i>12.0</i>	<i>B</i>	<i>12.0</i>	<i>B</i>	<i>11.9</i>	<i>B</i>	<i>11.9</i>	<i>B</i>	<i>12.0</i>	<i>B</i>	<i>11.9</i>	<i>B</i>
El Camino Real & Roble Avenue	6.8	A	6.0	A	6.0	A	6.7	A	4.7	A	5.7	A	4.9	A
El Camino Real & Middle Avenue	15.6	B	25.1	C	35.3	D	17.5	B	20.9	C	28.5	C	22.6	C
El Camino Real & College Avenue	0.1	A	0.1	A	0.2	A	0.1	A	0.3	A	0.1	A	0.2	A
<i>Eastbound College Avenue</i>	<i>10.8</i>	<i>B</i>	<i>11.3</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>11.3</i>	<i>B</i>	<i>11.6</i>	<i>B</i>	<i>11.1</i>	<i>B</i>	<i>11.2</i>	<i>B</i>
<i>Westbound Driveway</i>	--	--	<i>9.3</i>	<i>A</i>	<i>10.7</i>	<i>B</i>	<i>9.1</i>	<i>A</i>	<i>11.5</i>	<i>B</i>	<i>8.9</i>	<i>A</i>	<i>10.9</i>	<i>B</i>
El Camino Real & Partridge Avenue	0.1	A	0.1	A	0.2	A	0.1	A	0.8	A	0.1	A	0.1	A
<i>Eastbound Partridge Avenue</i>	<i>10.9</i>	<i>B</i>	<i>11.4</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>11.3</i>	<i>B</i>	<i>11.6</i>	<i>B</i>	<i>11.2</i>	<i>B</i>	<i>11.2</i>	<i>B</i>
<i>Westbound Driveway</i>	--	--	<i>8.9</i>	<i>A</i>	<i>10.1</i>	<i>B</i>	<i>9.1</i>	<i>A</i>	<i>10.0</i>	<i>A</i>	<i>8.9</i>	<i>A</i>	<i>10.1</i>	<i>B</i>
El Camino Real & Cambridge Avenue	3.9	A	4.8	A	3.8	A	6.0	A	3.3	A	5.0	A	4.0	A
El Camino Real & Harvard Avenue	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A
<i>Eastbound Harvard Avenue</i>	<i>10.2</i>	<i>B</i>	<i>10.2</i>	<i>B</i>	<i>10.4</i>	<i>B</i>	<i>10.5</i>	<i>B</i>	<i>11.1</i>	<i>B</i>	<i>10.2</i>	<i>B</i>	<i>10.4</i>	<i>B</i>
El Camino Real & Creek Drive	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
<i>Eastbound Creek Drive</i>	<i>9.5</i>	<i>A</i>	<i>9.4</i>	<i>A</i>	<i>9.6</i>	<i>A</i>	<i>9.6</i>	<i>A</i>	<i>9.7</i>	<i>A</i>	<i>9.5</i>	<i>A</i>	<i>9.5</i>	<i>A</i>
El Camino Real & Sand Hill Road	29.3	C	31.8	C	32.7	C	30.0	C	30.2	C	32.6	C	33.8	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Level of Service Summary**  
**Cumulative and Cumulative plus Project - PM Peak Hour**

Intersection	Cumulative - No Project		Cumulative plus Project											
			Current Proposed Configuration		Access Alternative A		Access Alternative B		Access Alternative C		Access Alternative D		Access Alternative E	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
El Camino Real & Menlo Avenue/Ravenswood Avenue	113.3	F	118.3	F	124.4	F	119.1	F	122.9	F	119.7	F	121.8	F
El Camino Real & Live Oak Avenue	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A
<i>Eastbound Live Oak</i>	<i>11.3</i>	<i>B</i>	<i>11.4</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>11.4</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>11.5</i>	<i>B</i>	<i>11.5</i>	<i>B</i>
El Camino Real & Roble Avenue	11.7	B	12.0	B	11.1	B	16.3	B	15.0	B	12.9	B	11.0	B
El Camino Real & Middle Avenue	17.6	B	29.0	C	42.9	D	17.2	B	22.5	C	26.3	C	26.2	C
El Camino Real & College Avenue	0.1	A	0.2	A	0.2	A	0.2	A	0.4	A	0.2	A	0.2	A
<i>Eastbound College Avenue</i>	<i>10.6</i>	<i>B</i>	<i>10.6</i>	<i>B</i>	<i>10.8</i>	<i>B</i>	<i>10.5</i>	<i>B</i>	<i>10.9</i>	<i>B</i>	<i>10.6</i>	<i>B</i>	<i>10.6</i>	<i>B</i>
<i>Westbound Driveway</i>	--	--	<i>13.8</i>	<i>B</i>	<i>9.8</i>	<i>A</i>	<i>12.7</i>	<i>B</i>	<i>10.6</i>	<i>B</i>	<i>10.4</i>	<i>B</i>	<i>10.7</i>	<i>B</i>
El Camino Real & Partridge Avenue	0.1	A	0.1	A	0.2	A	0.1	A	0.9	A	0.1	A	0.1	A
<i>Eastbound Partridge Avenue</i>	<i>10.4</i>	<i>B</i>	<i>10.4</i>	<i>B</i>	<i>10.6</i>	<i>B</i>	<i>10.3</i>	<i>B</i>	<i>10.7</i>	<i>B</i>	<i>10.4</i>	<i>B</i>	<i>10.4</i>	<i>B</i>
<i>Westbound Driveway</i>	--	--	<i>12.3</i>	<i>B</i>	<i>9.5</i>	<i>A</i>	<i>11.9</i>	<i>B</i>	<i>9.8</i>	<i>A</i>	<i>10.0</i>	<i>B</i>	<i>10.3</i>	<i>B</i>
El Camino Real & Cambridge Avenue	6.9	A	12.0	B	5.0	A	11.3	B	5.6	A	7.7	A	7.6	A
El Camino Real & Harvard Avenue	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A	0.1	A
<i>Eastbound Harvard Avenue</i>	<i>10.6</i>	<i>B</i>	<i>10.6</i>	<i>B</i>	<i>9.9</i>	<i>A</i>	<i>10.2</i>	<i>B</i>	<i>9.8</i>	<i>A</i>	<i>9.7</i>	<i>A</i>	<i>10.1</i>	<i>B</i>
El Camino Real & Creek Drive	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
<i>Eastbound Creek Drive</i>	<i>9.6</i>	<i>A</i>	<i>9.6</i>	<i>A</i>	<i>9.3</i>	<i>A</i>	<i>9.6</i>	<i>A</i>	<i>9.2</i>	<i>A</i>	<i>9.2</i>	<i>A</i>	<i>9.5</i>	<i>A</i>
El Camino Real & Sand Hill Road	135.8	F	137.3	F	140.6	F	134.9	F	138.4	F	136.1	F	139.5	F

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

**Intersection Queuing  
AM Peak Hour**

	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
El Camino Real/Menlo Avenue-Ravenswood Avenue												
<i>Available Storage</i>	225			175	175	--	325	600	600	250	335	70
Existing	<b>238*</b>			<b>326*</b>	<b>305*</b>	--	124	138	29	<b>320*</b>	<b>654</b>	0
Cumulative - No Project	<b>398*</b>			<b>398*</b>	<b>401*</b>	--	200*	315	136	<b>377*</b>	<b>912*</b>	4
Cumulative plus Project Conditions												
Current Proposed Configuration	<b>419*</b>			<b>440*</b>	<b>403*</b>	--	220*	537	164	<b>391*</b>	<b>1011*</b>	17
Alternative A	<b>416*</b>			<b>440*</b>	<b>403*</b>	--	220*	433	205	<b>391*</b>	<b>1014*</b>	17
Alternative B	<b>377*</b>			<b>397*</b>	<b>370*</b>	--	213*	313*	22	<b>350*</b>	<b>888*</b>	0
Alternative C	<b>390*</b>			<b>416*</b>	<b>387*</b>	--	224*	490	402	<b>364*</b>	<b>935*</b>	14
Alternative D	<b>422*</b>			<b>434*</b>	<b>401*</b>	--	226*	513	117	<b>380*</b>	<b>967*</b>	15
Alternative E	<b>385*</b>			<b>416*</b>	<b>387*</b>	--	206*	268*	50	<b>364*</b>	<b>933*</b>	2
El Camino Real/Roble Avenue												
<i>Available Storage</i>	500			150		--	200	850	--	140	220	--
Existing	129			21		--	77m	131	--	29m	217	--
Cumulative - No Project	139			20		--	71m	258	--	25m	184m	--
Cumulative plus Project Conditions												
Current Proposed Configuration	146			21		--	81m	159	--	26m	110m	--
Alternative A	146			21		--	85m	213m	--	29m	43m	--
Alternative B	128			20		--	69m	331	--	26m	32m	--
Alternative C	142			20		--	82m	191	--	27m	28m	--
Alternative D	153			20		--	76m	105m	--	25m	54m	--
Alternative E	135			20		--	78m	334	--	27m	28m	--
El Camino Real/Middle Avenue												
<i>Available Storage</i>	185	185		TBD			280	1000	--	TBD	375	--
Existing	<b>278</b>	82					198	17	--		160	--
Cumulative - No Project	<b>322</b>	<b>253</b>					262*	48	--		<b>466</b>	--
Cumulative plus Project Conditions												
Current Proposed Configuration	<b>389*</b>	<b>408*</b>		84			<b>294*</b>	96	--	95m	<b>635</b>	--
Alternative A	<b>416*</b>	<b>391*</b>		121			<b>331*</b>	164	--	122m	<b>826*</b>	--
Alternative B	<b>319*</b>	<b>305*</b>							--	-	<b>523</b>	--
Alternative C	<b>336*</b>	<b>386*</b>							--	--	<b>630*</b>	--
Alternative D	<b>434*</b>	<b>223*</b>		20			<b>353*</b>	175	--	140m	<b>565</b>	--
Alternative E	<b>362*</b>	<b>284</b>		40			257*	105	--	133m	<b>558</b>	--



**Intersection Queuing  
AM Peak Hour**

	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
El Camino Real/Cambridge Avenue												
<i>Available Storage</i>	100	100	100	<i>TBD</i>			375	1000	--	100	300	--
Existing	52		24	--			74m	23	--	30m	35	--
Cumulative - No Project	55		31	--			72m	35	--	28m	72	--
Cumulative plus Project Conditions												
Current Proposed Configuration	77		34	52			74m	55	--	67m	65	--
Alternative A	54		46			--	48m	22	--	--	78	--
Alternative B	71		23	86			62m	99	--	123m	73	--
Alternative C	50		42			--	61m	19	--	--	108	--
Alternative D	52		31	0			71m	63	--	82m	84	--
Alternative E	71		41	78			60m	24m	--	--	67	--
El Camino Real/Sand Hill Road												
<i>Available Storage</i>	300	--	230	--		400	190	1300	1300	475	725	180
Existing	154	--	54	--		166	<b>268*</b>	178	19	<b>601*</b>	309	7
Cumulative - No Project	277*	--	88	--		85	<b>296*</b>	231	29	<b>586*</b>	410	12
Cumulative plus Project Conditions												
Current Proposed Configuration	266*	--	78	--		124	<b>304*</b>	271	29	<b>635*</b>	507	14
Alternative A	267*	--	73	--		163	<b>304*</b>	276	29	<b>664*</b>	532	46
Alternative B	243*	--	85	--		120	<b>289*</b>	236	26	<b>569*</b>	426	14
Alternative C	247*	--	83	--		159	<b>297*</b>	525	27	<b>620*</b>	464	131
Alternative D	225*	--	80	--		121	<b>296*</b>	258	28	<b>610*</b>	473	13
Alternative E	252*	--	83	--		240*	<b>297*</b>	243	25	<b>658*</b>	495	20

Notes:

**Bold** indicates queuing that exceeds the storage capacity

TBD indicates that the storage length would be determined as part of the site design process

\* indicates that the 95th percentile demand exceeds the capacity, therefore the actual queue may be higher

m' indicates that the queue is metered by the upstream traffic signal

**Intersection Queuing  
PM Peak Hour**

	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
El Camino Real/Menlo Avenue-Ravenswood Avenue												
<i>Available Storage</i>		225		175	175	--	325	600	600	250	335	70
Existing		<b>221*</b>		<b>260*</b>	<b>364*</b>	--	145	<b>707*</b>	62	<b>292*</b>	<b>440</b>	
Cumulative - No Project		<b>514*</b>		<b>426*</b>	<b>661*</b>	38	271*m	<b>1316*</b>	459*	<b>517*</b>	<b>782</b>	113
Cumulative plus Project Conditions												
Current Proposed Configuration		<b>526*</b>		<b>448*</b>	<b>672*</b>	41	263*m	<b>1386*</b>	329*	<b>525*</b>	<b>822*</b>	133
Alternative A		<b>457*</b>		<b>388*</b>	<b>583*</b>	50	216*m	<b>1203*</b>	355*	<b>470*</b>	<b>765*</b>	90
Alternative B		<b>525*</b>		<b>456*</b>	<b>648*</b>	75	270*m	<b>1402*</b>	797*	<b>533*</b>	<b>858*</b>	120
Alternative C		<b>486*</b>		<b>421*</b>	<b>629*</b>	60	272*m	<b>1272*</b>	359*	<b>491*</b>	<b>805*</b>	102
Alternative D		<b>521*</b>		<b>439*</b>	<b>661*</b>	38	309*m	<b>1365*</b>	341*	<b>529*</b>	<b>886*</b>	136
Alternative E		<b>457*</b>		<b>394*</b>	<b>595*</b>	21	232*m	<b>1217*</b>	345*	<b>479*</b>	<b>761*</b>	107
El Camino Real/Roble Avenue												
<i>Available Storage</i>		500		150	--	--	200	850	--	140	220	--
Existing		115		87	--	--	112m	70	--	45m	35	--
Cumulative - No Project		178		126	11	--	131m	801	--	57m	199m	--
Cumulative plus Project Conditions												
Current Proposed Configuration		183		127	12	--	144m	535	--	59m	290m	--
Alternative A		166*		113	7	--	123m	317m	--	51m	287m	--
Alternative B		184		129	38	--	158m	816	--	62m	49m	--
Alternative C		170		118	11	--	150m	636	--	54m	293m	--
Alternative D		181		126	11	--	154m	530m	--	56m	281m	--
Alternative E		159		113	4	--	132m	447	--	50m	301m	--
El Camino Real/Middle Avenue												
<i>Available Storage</i>	185	185		TBD			280	1000	--	TBD	375	--
Existing	<b>248</b>	60					264	461	--		327	--
Cumulative - No Project	<b>247*</b>	56					<b>324*</b>	4	--		<b>404</b>	--
Cumulative plus Project Conditions												
Current Proposed Configuration	<b>478*</b>	95		139			<b>465*m</b>	647	--	81*m	<b>658</b>	--
Alternative A	<b>454*</b>	109		348*			<b>495*</b>	548	--	85*m	<b>669*</b>	--
Alternative B	<b>435*</b>	82				27	<b>393m</b>	142	--		<b>613</b>	--
Alternative C	<b>443*</b>	104				24	<b>651*</b>	60	--		<b>741*</b>	--
Alternative D	<b>498*</b>	87		91			<b>566*</b>	519	--	76*m	<b>778*</b>	--
Alternative E	<b>423*</b>	91		81			<b>441*</b>	245	--	85*m	<b>238</b>	--

**Intersection Queuing  
PM Peak Hour**

	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
El Camino Real/Cambridge Avenue												
<i>Available Storage</i>	100	100	100	TBD			375	1000	--	100	300	--
Existing	49		18	27			143	310	--	22m	36	--
Cumulative - No Project	39		5	21			76m	553m	--	12m	45	--
Cumulative plus Project Conditions												
Current Proposed Configuration	40		4	98			78m	169m	--	16m	424	--
Alternative A	61		46			15	74m	14m	--	--	105m	--
Alternative B	82		44	308*			132m	134m	--	<b>109m</b>	167	--
Alternative C	70		47			22	81m	15m	--	--	111m	--
Alternative D	71		49	103			92m	34m	--	59m	89	--
Alternative E	61		40	195			80m	32m	--	--	86	--
El Camino Real/Sand Hill Road												
<i>Available Storage</i>	300	--	230	--		400	190	1300	1300	475	725	180
Existing	<b>381*</b>	--	42	--		~	<b>184</b>	413*	47	<b>538*</b>	324	70
Cumulative - No Project	<b>615*</b>	--	48	--		<b>1102*</b>	<b>363*</b>	705*	63	<b>841*</b>	417	43
Cumulative plus Project Conditions												
Current Proposed Configuration	<b>635*</b>	--	50	--		<b>1119*</b>	<b>359*</b>	728*	66	<b>827*</b>	446	23
Alternative A	<b>542*</b>	--	45	--		<b>1005*</b>	<b>327*</b>	633*	55	<b>751*</b>	408	62
Alternative B	<b>629*</b>	--	49	--		<b>1153*</b>	<b>365*</b>	731*	64	<b>855*</b>	491	233
Alternative C	<b>576*</b>	--	47	--		<b>1070*</b>	<b>337*</b>	672*	60	<b>792*</b>	427	40
Alternative D	<b>626*</b>	--	49	--		<b>1127*</b>	<b>363*</b>	713*	63	<b>383*</b>	501	31
Alternative E	<b>557*</b>	--	46	--		<b>1016*</b>	<b>332*</b>	635*	57	<b>758*</b>	426	28

Notes:

**Bold** indicates queuing that exceeds the storage capacity

TBD indicates that the storage length would be determined as part of the site design process

\* indicates that the 95th percentile demand exceeds the capacity, therefore the actual queue may be higher

m' indicates that the queue is metered by the upstream traffic signal

~ Volume exceeds capacity, queue is theoretically infinite