# Menlo Park Linfield Middlefield Willow Area-Wide Transportation Impact Analysis

***Final Report***

Prepared for

City of Menlo Park

*By*

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# Executive Summary

This study provides an evaluation of traffic and transportation issues related to three separately proposed developments in the vicinity of the Linfield Oaks Neighborhood. The three redevelopment projects are located at 321 Middlefield Road, 8 Homewood Place, and 75 Willow Road. Particular attention is given to impacts on vehicular, transit, bicycle, and pedestrian transportation facilities located on-site and within the project vicinity.

The existing building at 321 Middlefield Road is currently occupied by Allstate Insurance Offices. A proposed project consists of replacing the existing 48,400 square feet (sf) office building with a similarly sized 48,400 sf medical office building. At the time of data collection, the building was partially occupied, and the analysis conducted was modified to incorporate the partial occupancy.

At 8 Homewood Place, 37 single family residential units would replace the vacant 21,500 square feet of general office space. 75 Willow Road is currently occupied with 39,000 sf of general office space, and would be redeveloped into 33 single family residential dwelling units. For this analysis, the building at 75 Willow Road was assumed to be approximately 25 percent occupied based on recent observations of activity.

Combined, the three proposed developments would generate a total of 112 net new AM peak hour trips, 192 net new PM peak hour trips, and 2,053 net new daily vehicle trips. Trip distribution patterns were consistent with the City of Menlo Park's Circulation System Assessment Document. In general, employment patterns were used for general office uses and residential patterns were used for single family homes. For medical offices, an assumption was made that a majority of the vehicle trips would be patients as opposed to medical staff, and therefore commercial distribution patterns from the CSA were used.

Due to the size of the proposed developments, analysis was conducted for local streets, intersections, and roadway segments in conformance with the City of Menlo Park Transportation Impact Analysis (TIA) Guidelines. Analysis performed in this study indicated that the three proposed developments would result in some potentially significant transportation impacts. In general, intersection operating conditions for the Near-Term plus Project conditions are estimated to remain approximately the same. However, potentially significant impacts would occur at two intersections. The City's General Plan includes "plan mitigations" that have yet to be implemented. This analysis includes an evaluation of several of the "plan mitigations" as well as other suggested improvement measures, and describes the relevance to the three proposed developments.

During the AM peak period, the northbound approach from Alma to Ravenswood (two-way stop controlled) currently operates at Level of Service (LOS) E due to vehicles attempting to turn left onto Ravenswood. The increase in east-west traffic for the project scenario would result in an increase in delay to the northbound approach that is greater than 0.8 seconds per vehicle. During the PM peak period, the northbound and southbound approaches from Alma to Ravenswood are limited to right turns, resulting in acceptable levels of service. A feasible

mitigation measure for the AM peak hour would involve restricting the northbound and southbound approaches to right-turn only during the AM peak period as well, similar to the current policy during the PM peak period. A possible improvement measure of constructing a median on Ravenswood Avenue was considered. Such median would also reduce the potential impact to a less than significant level; however it may result in added daily traffic to Burgess Drive and segments of Laurel Street.

The intersection at El Camino Real and Ravenswood would operate at LOS E during the PM peak period for the Near Term conditions and the Long Range conditions respectively. The addition of project related traffic would result in the average delay at the critical local approaches to increase by more than 0.8 seconds per vehicle; therefore a potentially significant impact would occur. Several mitigation and improvement measures were analyzed for this intersection including the potential widening of several approaches. These improvement measures would improve the operating conditions and reduce the potentially significant impacts to less than significant levels.

Willow Road, Middlefield Road, and Ravenswood Avenue currently operate above the estimated capacity for minor arterials. The ADT generated by the three proposed developments would create potentially significant and unavoidable impacts to these roadway segments by adding a number of vehicles that is greater than thresholds outlined in the CSA document. Linfield Drive and Waverley Street currently operate with greater than the estimated capacity for local streets. The addition of project related traffic would result in potentially significant and unavoidable impacts to these local streets. Without a reduction in the size of the projects, or a changing in land use, there is no feasible mitigation measure to lessen the number of daily vehicles to a less than significant amount; however the City has identified various improvement measures which would improve the operating conditions on minor arterials such as Willow Road, Middlefield Road, and Ravenswood Avenue. Various identified alternatives for streetscape improvements on Linfield Drive would potentially improve safety conditions such as reducing travel speeds, improving pedestrian crossings, and discouraging cut-through traffic, however they would not reduce the roadway impacts created by the three proposed developments to a less than significant level.

A project alternative would involve replacing the general office space at 321 Middlefield Road with approximately 55 residential units. For this scenario, the project sites at 75 Willow Road and 8 Homewood place would continue to be replaced with 33 and 37 residential units respectively. The all-residential scenario would result in the same potentially significant impacts as the proposed project, however average delays and increases in ADT would be slightly less.

A no project alternative that assumes full occupancy of the existing office buildings with comparable office uses was also analyzed. For this scenario, the re-occupancy of office uses is currently allowed and occupants would not be responsible for potentially significant impacts. The study intersections and roadway segments were analyzed for deficiencies and potential impacts that would be comparable to the project scenarios. In general, re-occupancy of the office spaces would result in very similar operating conditions to the Near-Term plus

Project Scenario. Similar deficiencies and increases in delay would occur at the potentially impacted intersections. The increases in delay would typically be slightly less than the increases due to the proposed project and slightly greater than the increases due to the project alternative (all residential). In general, all three scenarios would result in similar operating conditions at each of the study intersections and roadway segments.

Under the Long Range plus Project conditions, the two potentially significant impacts that occur at the study intersection during the Near-Term plus Project scenario would continue to occur. The proposed mitigation measures at these two intersections would reduce the potentially significant impacts to a less than significant level. In addition, the intersection of Middlefield Road and Linfield Drive would experience a potentially significant impact due to the addition of project related traffic during the PM peak hour. Signalization at the intersection would reduce delays to an acceptable and less than significant level and would provide a safe pedestrian crossing. The improvement due to signalization of this intersection may result in minor changes to the local traffic circulation in the area. An accurate estimate of changes in traffic patterns is not quantifiable. However significant shifts in traffic are not anticipated. The intersection of Willow Road and Middlefield Road would operate at an unacceptable LOS E during the PM peak period for the long range scenario. The addition of project related traffic would not result in a potentially significant impact during the AM peak hour, but a potentially significant impact would occur during the PM peak hour. Implementation of the City's mitigation plan (unfunded) outlined in the General Plan and in this report would reduce the potential impacts to a less than significant level, and improve the intersection operating conditions to LOS D for both the AM and PM peak hours.

The City of Menlo Park has identified several transportation related improvement measures. Several of these measures at the analysis intersections would reduce the potentially significant impacts to less than significant levels. Other improvement measures would provide additional operational improvement, but may not improve potentially deficient facilities to acceptable levels. The suggested improvement measures as well as other mitigating improvement measures are summarized, and a percent allocation of net new traffic from each of the proposed developments was determined.

# 1. Introduction

This study provides an evaluation of traffic and transportation issues related to the 48,400 square feet of proposed medical office use at 321 Middlefield Road, 37 proposed single family residential units at 8 Homewood Place, and 33 single family residential units at 75 Willow Road. Particular attention is given to impacts to vehicular, transit, bicycle, and pedestrian transportation facilities located on-site and within the project vicinity.

## Project Description

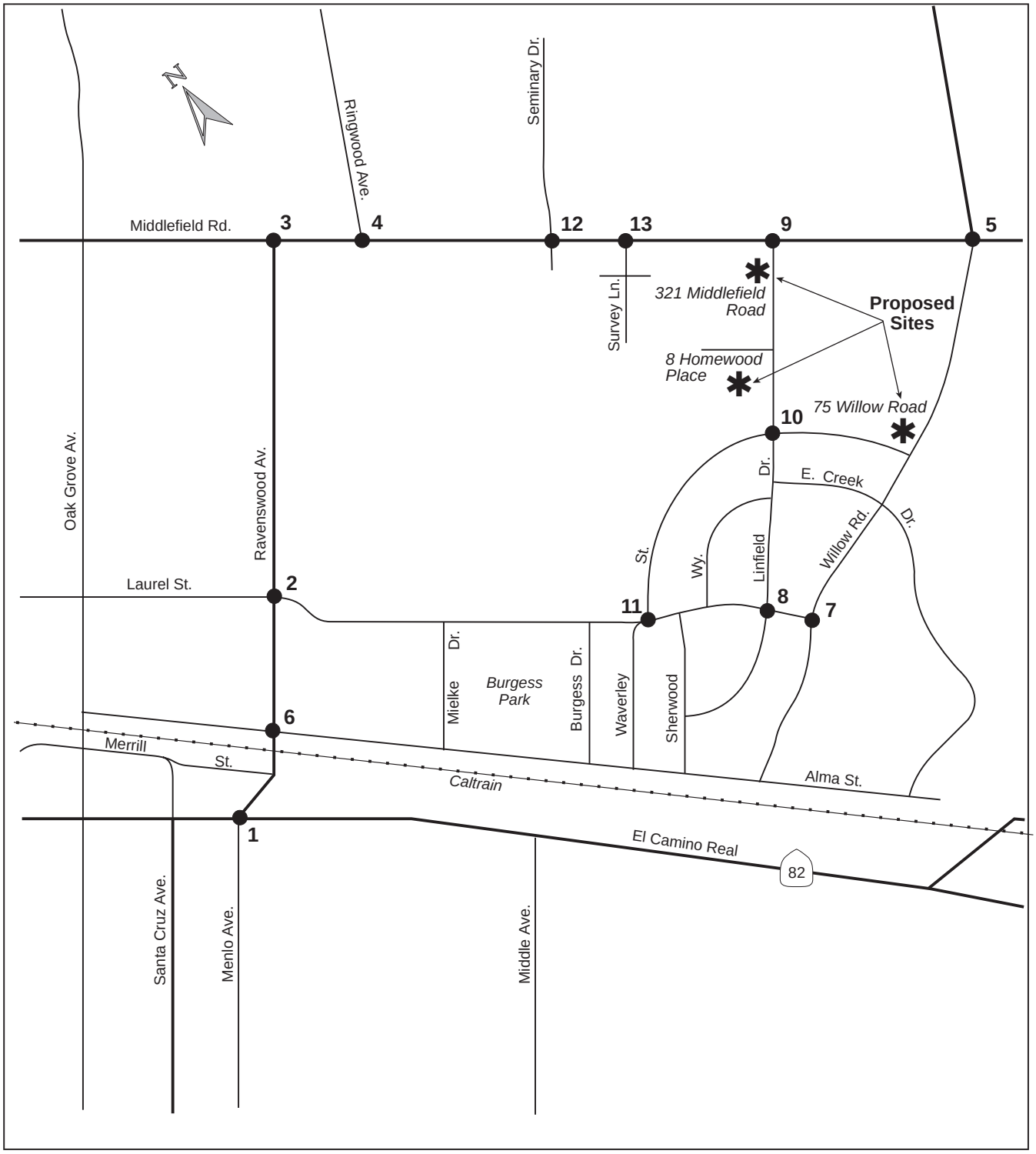
The proposed project involves replacing a partially occupied 48,400 of office space at 321 Middlefield Road with similarly sized medical office facilities and approximately 21,500 sf of office space at 8 Homewood Place with 37 single family residential units. At 75 Willow Road, the existing 39,000 sf of general office space would be replaced with 33 single family residential dwelling units. At the time of data collection, 8 Homewood place was vacant and the offices at 75 Willow Road and 321 Middlefield Road were partially occupied. The three proposed development sites are located in the City of Menlo Park in the Linfield Oaks Neighborhood (see Figure 1). Each property is currently zoned under the Professional and Administrative Offices classification. The properties at 8 Homewood Place and 75 Willow Road would need to be rezoned as residential.

The existing building at 321 Middlefield Road is partially occupied while the property at 8 Homewood place was assumed to be vacant at the time of data collection. For the purposes of this analysis, the property at 75 Willow Road was assumed to be 25 percent occupied.

## Study Methodology

This study was prepared according to the methodology recommended in the Transportation Impact Analysis (TIA) Guidelines (City of Menlo Park, August 14, 2002). City Staff selected 12 intersections for analysis (four signalized, eight unsignalized), as these are the intersections that would potentially be impacted by the three proposed developments. These include:

- El Camino Real/Ravenswood Avenue
- Ravenswood Avenue/Laurel Street
- Middlefield Road/Ravenswood Avenue
- Middlefield Road/Willow Road
- Alma Street/ Ravenswood Avenue (unsignalized)
- Laurel Street/Willow Road (unsignalized)
- Laurel Street/Linfield Drive (unsignalized)
- Middlefield Road /Linfield Drive (unsignalized)
- Linfield Drive/Waverley Street (unsignalized)

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● Study Intersection

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**Figure 1**
**Study Areas**

- Waverley Street/Laurel Street (unsignalized)
- Middlefield Road /Seminary Drive (unsignalized)
- Middlefield Road /Survey Road (unsignalized)

The analysis of intersections concentrated on the primary commute periods of the day (the weekday AM and PM peak hours). In addition, nine roadway segments were analyzed for potentially significant impacts related to average daily traffic (ADT). The following roadway segments were evaluated:

- Ravenswood Avenue: El Camino Real to Alma Street
- Ravenswood Avenue: Laurel Street to Alma Street
- Ravenswood Avenue: Middlefield Road to Laurel Street
- Middlefield Road: Ravenswood Avenue to Willow Road
- Willow Road: Laurel Street to Middlefield Road
- Willow Road: Middlefield Road to Bay Road
- Laurel Street: Willow Road to Ravenswood Avenue
- Linfield Dr: Waverley Street to Middlefield Road
- Waverley Street: Linfield Dr to Laurel Street

The San Mateo County Congestion Management Program Land Use Analysis Program guidelines require that Routes of Regional Significance be evaluated to determine the impact of added project-generated trips for projects that create more than 100 PM peak hour trips. Collectively, the three projects would generate approximately 112 net-new peak hour trips during the AM peak hour and 192 net-new trips during the PM peak hour. Individually, only the project at 321 Middlefield Road would warrant an analysis of the Routes of Regional Significance.

The Routes of Regional Significance that are in the study area are SR 82 (El Camino Real), SR 84, and US 101. An analysis of Routes of Regional Significance is included in this report. The following analysis scenarios were evaluated as part of this study:

- Existing Conditions. This scenario represents traffic conditions that exist today. Existing conditions at the study intersections were based on counts provided by City of Menlo Park, collected in April and May 2004 for the four signalized intersections, and counts that were collected in February 2005 at five unsignalized intersections and in November 2005 for three unsignalized intersections. The study intersections were based on the analysis reported in the Circulation System Assessment Document (CSA) (November, 2004).

- Near Term Conditions. This scenario assumes full occupancy of planned/approved developments near the project vicinity that would be completed in the near term future. Near Term conditions at the study intersections were based on projected volumes provided by City of Menlo Park staff in the CSA. The

average daily traffic (ADT) is based on the existing ADT volumes provided in the CSA and the most recent list of planned and approved projects provided by the City of Menlo Park (August, 2005). Data for this analysis was collected in 2004 and 2005. Traffic conditions for the Near Term scenario are based on the year 2007. Consistent with the CSA, an assumed ambient growth of one percent per year (two percent total) was used.

- Near-Term plus Project Conditions. This scenario represents traffic conditions that would exist in the near term future, plus the addition of project generated traffic from the three proposed developments. Project conditions were analyzed for a project scenario based on the proposed land use minus existing traffic generated from each the existing land uses at the project sites.

- Near-Term plus Project Alternative. This scenario replaces the proposed medical offices at 321 Middlefield Road with 55 single family residential units. The proposed developments at 75 Willow and 8 Homewood would continue to be the proposed residential units. Similar to the Project conditions, net-new trips were added to the Near-Term scenario volumes.

- Near-Term plus Occupied Offices. This scenario evaluates the traffic operating conditions for a scenario in which each of the existing three office buildings are assumed to be fully occupied. Because the office buildings are existing, this scenario would not result in potentially significant impacts, however this scenario was analyzed for deficiencies and compared to the Project and Project Alternative scenarios. Similar to the Project conditions, net-new trips were added to the Near-Term scenario volumes.

- Long Range Project Conditions. This scenario represents traffic conditions based on a 10-year horizon with an assumed ambient growth of one percent per year plus the addition of near term developments and project generated traffic from the three proposed sights.

## Approved/Planned Developments

A complete list of planned developments in Menlo Park is included in Appendix A. The current list (August 2005) was provided by City of Menlo Park staff and includes projects that are currently planned or approved but have not yet been occupied. It is anticipated that these projects would be fully implemented and occupied as part of the Near Term Scenario. These future near-term projects are anticipated to add traffic to the Menlo Park roadway network and, in some cases, would add traffic to the roadways and intersections studied in this analysis. The peak hour trips assigned to the roadway network for the intersection analysis for some of the projects were provided by the City of Menlo Park in the CSA as part of the near-term conditions analysis. The remaining (newly added) projects that were not included in the CSA analysis were added to the Near-Term and Long Range conditions.

## Programmed/Planned Transportation Facility Improvements

There are no programmed or planned physical improvements to transportation facilities within the study area. The City of Menlo Park has recently implemented an Adaptive Traffic Signal Program along El Camino Real to lessen congestion and delays for motorists along El Camino Real and along the approaching streets to El Camino Real. The traffic counts used in this analysis was collected after implementation of the adaptive signal timing program and as a result may reflect higher traffic volumes due to potentially increased capacity. However the analysis tools used for this analysis do not incorporate and adjust for an adaptive timing program. The analysis conducted for this report investigates the relative change in delay between a base scenario and added project traffic. It is estimated that the relative change in delay would continue to accurately portray any potentially significant impacts related to the proposed project.

The City's General Plan includes "plan mitigations" that were analyzed as potential mitigation or improvement measures. This analysis included an evaluation of several of the "plan mitigations" and describes the relevance of each to the three proposed developments.

## Level of Service Significance Criteria

Levels of service for this study were calculated based on the City of Menlo Park *TIA Guidelines* dated August 2002. Levels of service (LOS) were calculated using the 2000 Highway Capacity Methodology and definitions of Levels of Service for signalized intersections and for unsignalized Intersections are provided in Appendix B.

The City of Menlo Park's Circulation Element establishes a LOS standard for City-controlled intersections involving arterial streets, a LOS standard for City-controlled intersections involving only collector or smaller streets, and a LOS standard for State-controlled intersections.

Project impacts to study intersections, roadway segments, and regional routes of significance are considered potentially significant if:

**City Arterial Intersections/Local Approaches to State Controlled Intersections.** Project traffic increment causes an intersection operating at LOS D or better to reach LOS E or worse OR, to have an increase of 23 seconds or greater in average delay, whichever comes first. A project is also considered to have a potentially significant impact if the addition of project traffic causes an increase of more than 0.8 seconds of average delay to vehicles on all critical movements for intersections operating at a near term LOS E through F for major arterial streets or to the critical local approaches to state controlled intersections.

**Other City Intersections (Collector and Local streets).** Project traffic increment causes an intersection operating at LOS C or better to reach LOS D or worse OR, to have an increase of 23 seconds or greater in average delay, whichever comes first. A project is also considered to have a potentially significant traffic impact if the addition of project traffic causes an

increase of more than 0.8 seconds of average delay to vehicles on all critical movements for intersections operating at a near term LOS D through F for collector streets.

**Minor Arterials.** The existing Average Daily Traffic Volume (ADT) is: (1) greater than 18,000 (90 percent of capacity) and there is a net increase of 100 trips or more in ADT due to project-related traffic; (2) the ADT is greater than 10,000 (50 percent of capacity) but less than 18,000, and the project-related traffic increases the ADT by 12.5 percent or the ADT becomes 18,000 or more; or (3) the ADT is less than 10,000 and the project-related traffic increases the ADT by 25 percent.

**Collector Streets.** The existing ADT is: (1) greater than 9,000 (90 percent of capacity) and there is a net increase of 50 trips or more in ADT due to project-related traffic; (2) the ADT is greater than 5,000 (50 percent of capacity) but less than 9,000, and the project-related traffic increases the ADT by 12.5 percent or the ADT becomes 9,000 or more; or (3) the ADT is less than 5,000 and the project-related traffic increases the ADT by 25 percent.

**Local Streets.** The existing ADT is: (1) greater than 1,350 (90 percent of capacity) and there is a net increase of 25 trips or more in ADT due to project-related traffic; (2) the ADT is greater than 750 (50 percent of capacity) but less than 1,350, and the project-related traffic increases the ADT by 12.5 percent or the ADT becomes 1,350; or (3) the ADT is less than 750 and the project related-traffic increases the ADT by 25 percent.

## Directional Convention

For the purpose of this study, it is assumed that El Camino Real, Laurel Street, and Middlefield Road provide travel in the north-south direction, and Ravenswood Avenue, Linfield Drive, and Willow Road provide travel in the east-west direction.

# 2. Existing Setting

This section summarizes existing conditions in the project vicinity including a description of the existing project sites, the roadway network, vehicular traffic conditions, and bicycle, pedestrian, and transit facilities within the project vicinity.

## Project Sites

The three project sites are located within the Linfield Oaks Neighborhood. The proposed project at 321 Middlefield Road currently consists of a single 48,400 sf office building. The existing building is currently occupied by Allstate Insurance Company. At the time data were collected, the building was not at full occupancy. The project site at 321 Middlefield Road consists of a one-way passenger loading zone with an entrance and exit driveway fronting Middlefield Road, and a parking lot with loading zones to the west of the building with one-way entrance and exit driveways fronting Linfield Drive. The second project site is a vacant 21,500 sf office building 8 Homewood Place, with primary access via Homewood Place and Linfield Drive. The third project site is a 39,000 sf general office building located at 75 Willow Road with two driveway access points from Willow Road and one access connecting to the property at 85 Willow Road.

## Roadway Network

The existing roadway network within the project vicinity is illustrated in Figure 1. Arterial streets within the project area include Middlefield Road, El Camino Real, and Ravenswood Avenue. A number of collector streets serve the project vicinity, which includes Laurel Street and Willow Road. Linfield Drive is considered a local street. With some exceptions, sidewalks are provided in all areas of the study vicinity, along with crosswalks and pedestrian signals and push buttons at the signalized intersections. There are no sidewalks on the project frontage facing Linfield Drive.

**Middlefield Road.** Middlefield Road is a four-lane, north-south minor arterial that stretches across Menlo Park. Middlefield Road is two lanes wide north of Ravenswood Avenue and four lanes wide south of Ravenswood. Middlefield Road provides access mainly to residential and school areas along with some office use in the project vicinity. In the vicinity of the project, there are left turn lanes on Middlefield Road at Ravenswood Avenue, Seminary Road, and Willow Road. There are bike lanes along Middlefield Road.

**El Camino Real.** El Camino Real is a north-south state-controlled facility (State Route 82), which extends through San Mateo County and Santa Clara County. In the project vicinity it is four lanes wide with numerous signalized intersections and left-turn bays. South of the project vicinity El Camino Real widens to six lanes wide. The land uses abutting El Camino Real are mostly commercial. El Camino Real is classified as a primary arterial.

**Ravenswood Avenue.** Ravenswood Avenue is a two-lane east-west road between El Camino Real and Middlefield Road. On the north side of Ravenswood are residential areas and on the

south side are the Menlo Park Civic Center area and the SRI campus. Near El Camino Real, Ravenswood widens to four lanes. There are bike lanes along Ravenswood Avenue. Ravenswood Avenue is classified as a minor arterial.

**Linfield Drive.** Linfield Drive is a two-lane, east-west residential street between Sherwood Way and Middlefield Road. There are no bike lanes along Linfield. Linfield Drive is classified as a local street in the project vicinity. In the vicinity of the project site, there are sidewalks on the south-side of Linfield Drive, and there are no sidewalks on the north-side.

**Laurel Street.** Laurel Street is a two-lane, north-south, mainly residential, street between Willow Road and Encinal Avenue. The Civic Center area can be accessed from Laurel Street. There is some on-street parking near the public facilities of the Civic Center on Laurel Street. There are bike lanes along Laurel Street. Laurel Street is classified as a collector street in the project vicinity.

**Willow Road.** Willow Road is a two-lane, east-west street running along the south side of the project area. Between Alma Street and Middlefield Road, there are no signalized intersections on Willow. Willow Road serves mainly residential with some commercial areas. There are bike lanes along Willow Road, both east and west of Middlefield Road. Willow Road is classified as a minor arterial east of Middlefield Road and as a collector street west of Middlefield Road.

**Waverley Street.** Waverley Street is a two-lane, residential, street between Willow Road and Laurel Street. Although Waverley Street is in a residential area, it has been identified as serving non-resident cut-through traffic in the Linfield Oaks Neighborhood Traffic Study (Kimley-Horn and Associates, 2001). There is some on-street parking on both sides of the street. Waverley Street is classified as a local street.

## Level of Service Significance Threshold

Referring to the City of Menlo Park LOS significance criteria and the designations of the project roadways, the LOS significance threshold for each study intersection is presented below in Table 1. Refer to the previous section on LOS significance criteria for a more detailed description of the City of Menlo Park guidelines.

## Transit

Bus service in the project vicinity is provided by the San Mateo County Transit District (SamTrans), Caltrain, Santa Clara Valley Transportation Authority (VTA), and the Dumbarton Express Bus. (See Figure 2). Several routes serve the study area, with SamTrans lines 295, 296, and 83 almost directly adjacent to the proposed project sites. These routes serve Willow Road, Middlefield Road, Ravenswood Avenue, Laurel Street, and El Camino Real.

**Table 1**
**Level of Service Significance Threshold**

| Study Intersection | Jurisdiction | Acceptable LOS Criteria | Significance Threshold for Unacceptable LOS |
|---|---|---|---|
| El Camino Real/Ravenswood Avenue | State | D | 0.8 second increase to critical local approaches |
| Ravenswood Avenue/Laurel Street | City | D | 0.8 second increase to all critical movements |
| Ravenswood Avenue/Middlefield Road | City | D | 0.8 second increase to all critical movements |
| Middlefield Road/Ringwood Avenue | City | D | 0.8 second increase to all critical movements |
| Middlefield Road/Willow Road | City | D | 0.8 second increase to all critical movements |
| Alma Street/ Ravenswood Avenue (unsignalized) | City | D | 0.8 second increase to all critical movements |
| Laurel Street/Willow Road (unsignalized) | City | D | 0.8 second increase to all critical movements |
| Laurel Street/Linfield Drive (unsignalized) | City | C | 0.8 second increase to all critical movements |
| Middlefield Road /Linfield Drive (unsignalized) | City | D | 0.8 second increase to all critical movements |
| Linfield Drive/Waverley Street (unsignalized) | City | C | 0.8 second increase to all critical movements |
| Laurel Street/Waverley Street (unsignalized) | City | C | 0.8 second increase to all critical movements |
| Middlefield Road /Seminary Drive (unsignalized) | City | D | 0.8 second increase to all critical movements |
| Linfield Drive/Survey Lane (unsignalized) | City | D | 0.8 second increase to all critical movements |

The city of Menlo Park and Caltrain operate an employer shuttle service (Willow Road Area Shuttle) that connects the Linfield Oaks neighborhood the Menlo Park Caltrain Station, and has stops on Linfield Drive and Willow Road. Other shuttles that serve Marsh Road and the Sun Microsystems campus do not have stops in the vicinity of the project. Several other bus routes (including SamTrans lines 295 and 296) also make connections at the Menlo Park Caltrain station.

## Bicycle and Pedestrian Facilities

On-street bike lanes for both directions are provided on Middlefield Road, Willow Road, Laurel Street, and Ravenswood Avenue as shown in Figure 3. Pedestrian crosswalks and

signals are provided at all of the signalized study intersections. In the vicinity of the project sites, there are sidewalks on the south-side of Linfield Drive along the 175 Linfield Drive frontage. There are no sidewalks on the north-side along the 110 Linfield Drive frontage.

In the vicinity of the proposed project, there are Class II bicycle facilities on Willow Road, Ravenswood Avenue, and Middlefield Road. On Laurel Street, there is a Class III facility between Linfield Drive and Burgess Drive, which becomes a Class II facility north of Burgess Drive. A Class II bikeway provides a striped lane for one-way bicycle travel on a street, and a Class III bikeway is a signed route which provides shared lane for bicycle use with pedestrian or motor vehicle traffic.

## Traffic Demand and Levels of Service

Existing conditions at the study intersections were based on a combination of traffic counts provided by City of Menlo Park staff collected in April and May 2004 for the four signalized intersections, traffic counts that were collected in March 2005 at five unsignalized intersections, and additional counts collected in November 2005 at the three remaining unsignalized intersections. Analyses of the signalized intersections were based on the analysis methodologies and assumptions used in the Circulation System Assessment Document (February, 2005) (CSA).

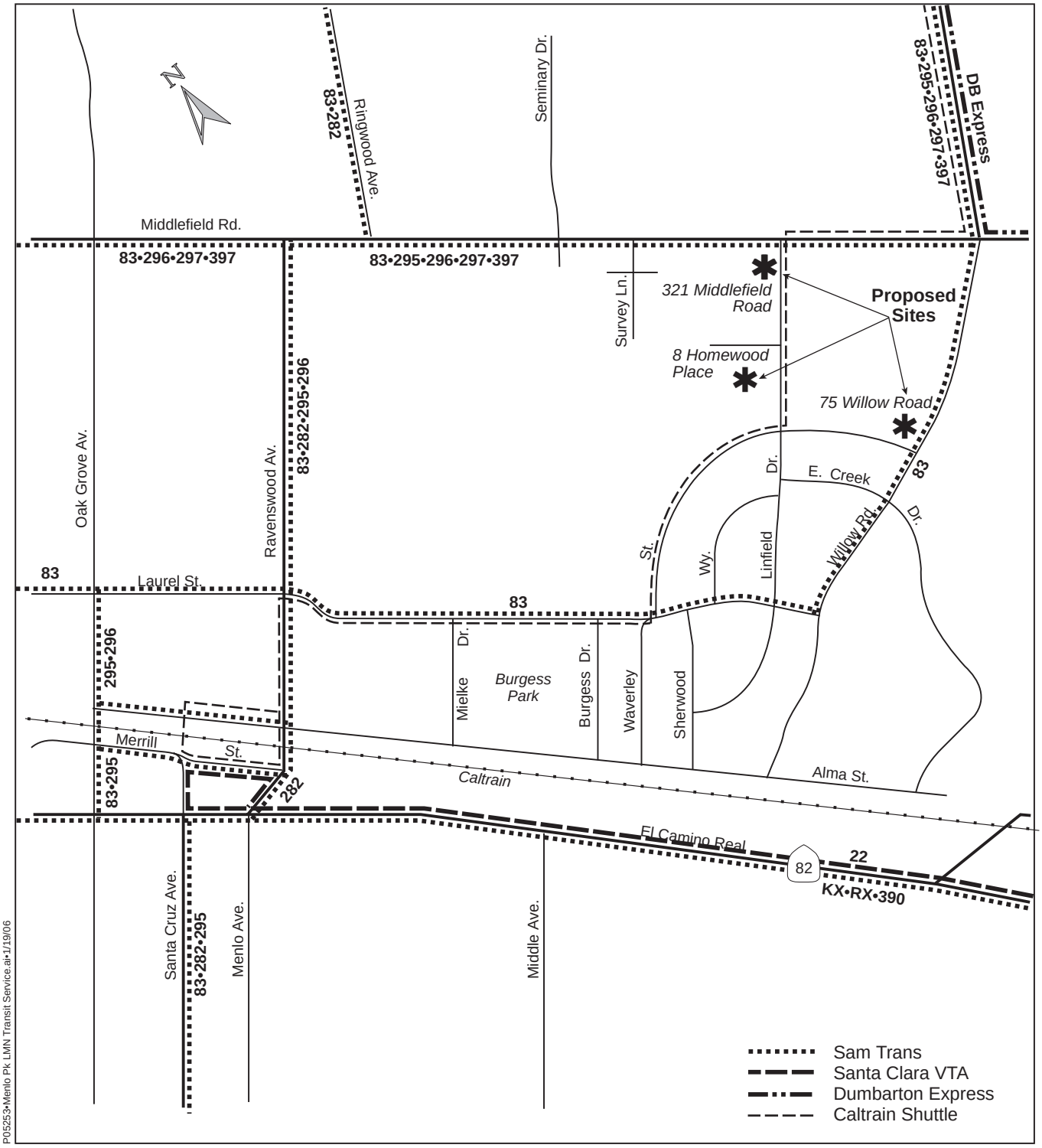


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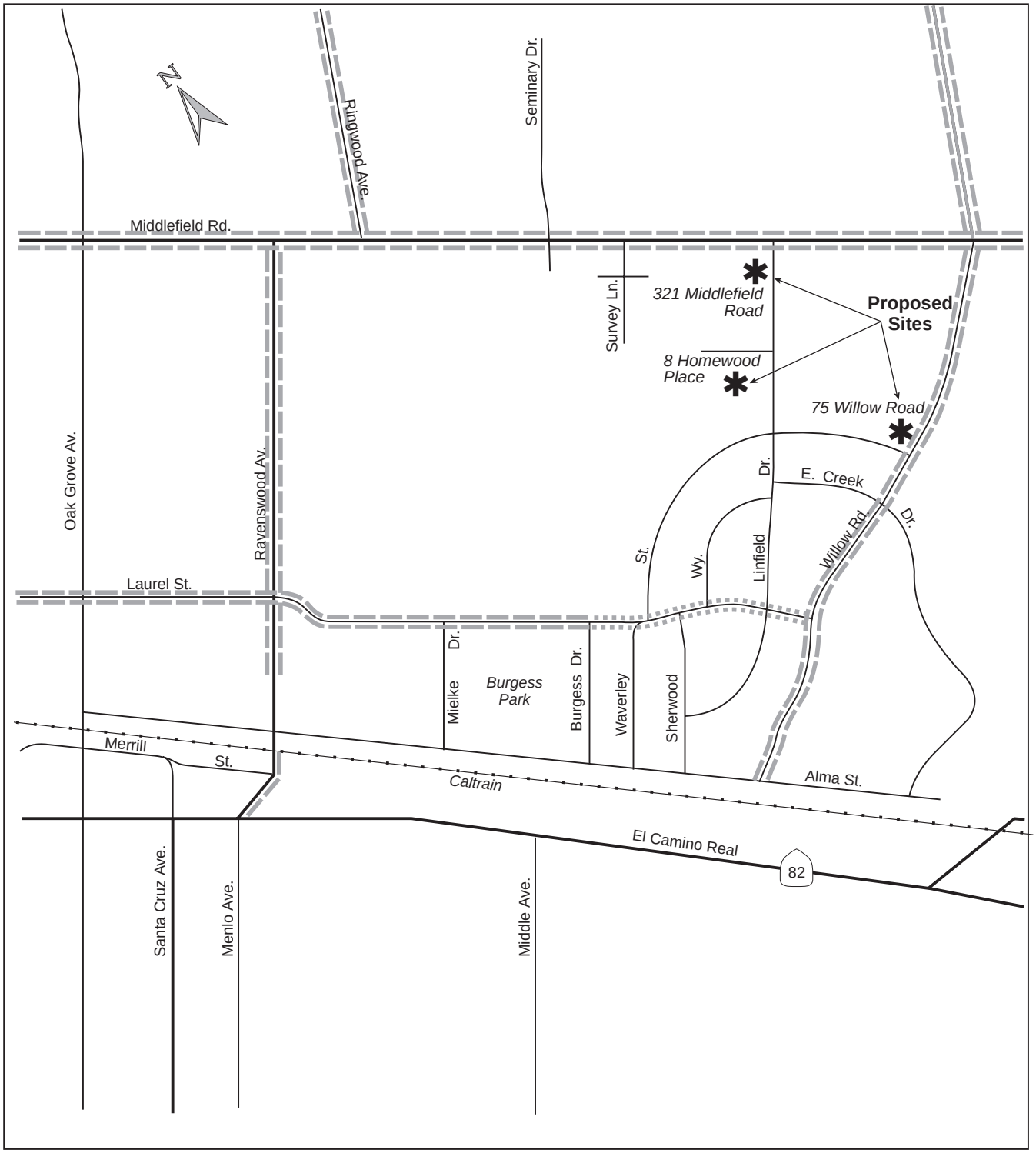
**Figure 2**
**Transit Service**

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Class II Bike Facility

Class III Bike Facility

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**Figure 3**
**Bicycle Facilities**

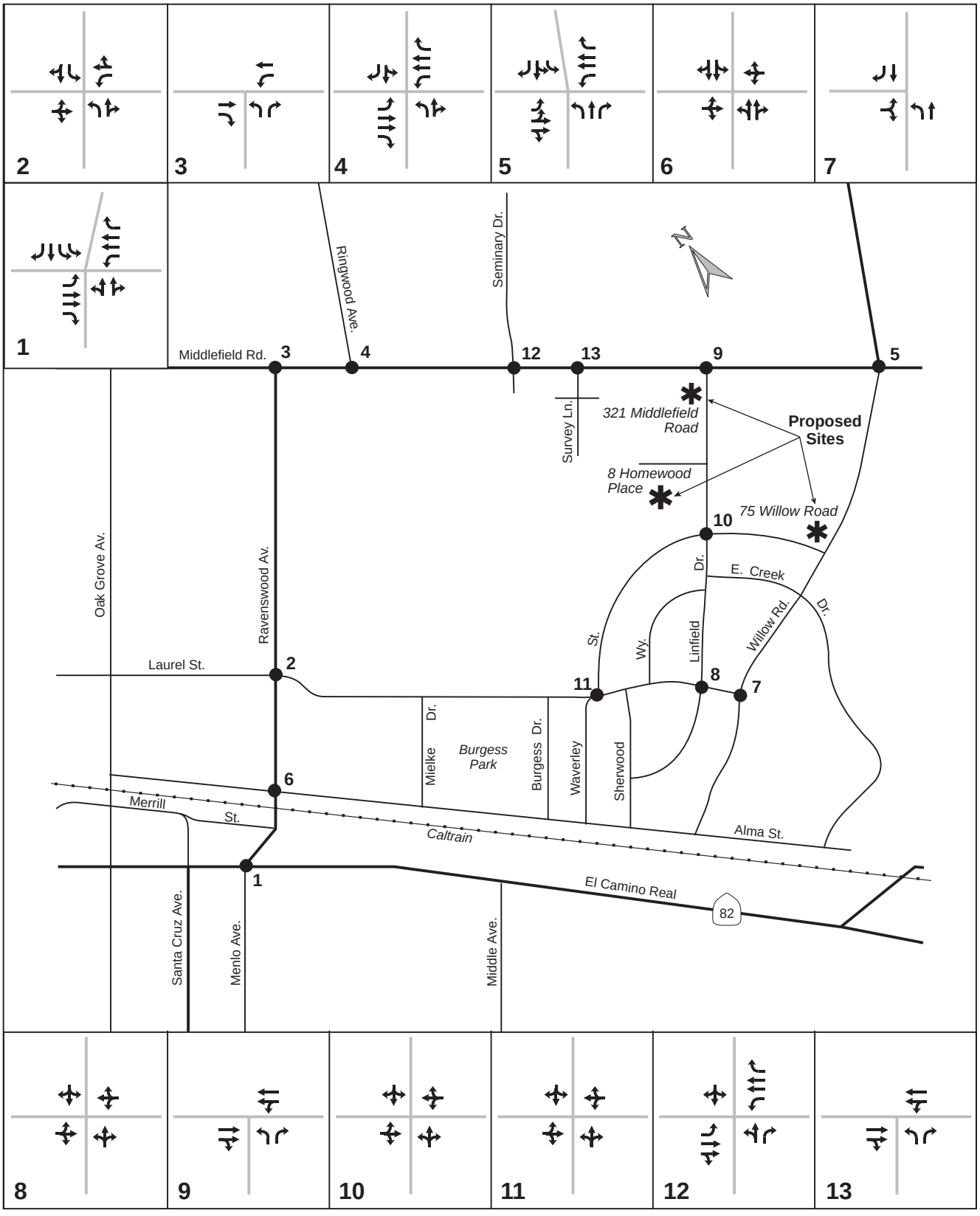
Existing intersection geometrics and existing peak hour traffic volumes are provided in Figures 4 and 5, respectively. Signal timing parameters were set to be consistent with the CSA analyses.

Existing peak hour intersection levels of service are summarized in Table 2. Detailed calculations are provided in the Appendix E. All study intersections currently operate under acceptable service conditions with the exception of Alma Street at Ravenswood Avenue during the AM peak period. The northbound approach from Alma Street currently operates at LOS F due to vehicles turning left onto Ravenswood, or continuing straight through on Alma. This movement is often difficult due to the high demand for both the eastbound and westbound approaches on Ravenswood Avenue. Because this is a two way stop controlled intersection, there are limited gaps available to the vehicles coming from Alma. Approximately 39 vehicles currently use the northbound approach during the AM peak hour. During the PM peak period, approaches from Alma are limited to right turns only, resulting in acceptable levels of service. It was observed that some vehicles make illegal left-turn or through movements during the PM peak period, potentially reducing the service levels to LOS E or worse. For this analysis, observed volumes were adjusted such that no vehicles would make illegal movements following an assumption that enforcement of the current traffic regulations would be enforced.

The existing average daily traffic (ADT) for the study roadways segments in the vicinity of the project site were provided by the City of Menlo Park. The existing ADT is illustrated in Figure 6. As shown in Figure 6, the ADT of Ravenswood Avenue increases with proximity to El Camino Real while the ADT of Laurel Street increases with distance from Willow Road toward Ravenswood Avenue and then decreases north of Ravenswood Avenue.

## Regional Access Routes

The project sites are located in the Linfield Oaks neighborhood and are accessible to regional origins and destinations by various routes including US Route 101, Interstate 280, and State Route 82 (El Camino Real). Access from US Route 101 is via Willow Road to the east of the project site. Trips coming from or going toward Interstate 280 would travel on Ravenswood Avenue west of Laurel Street. Vehicles accessing the site from State Route 82 (El Camino Real) would turn east onto Ravenswood Avenue.

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● Study Intersection

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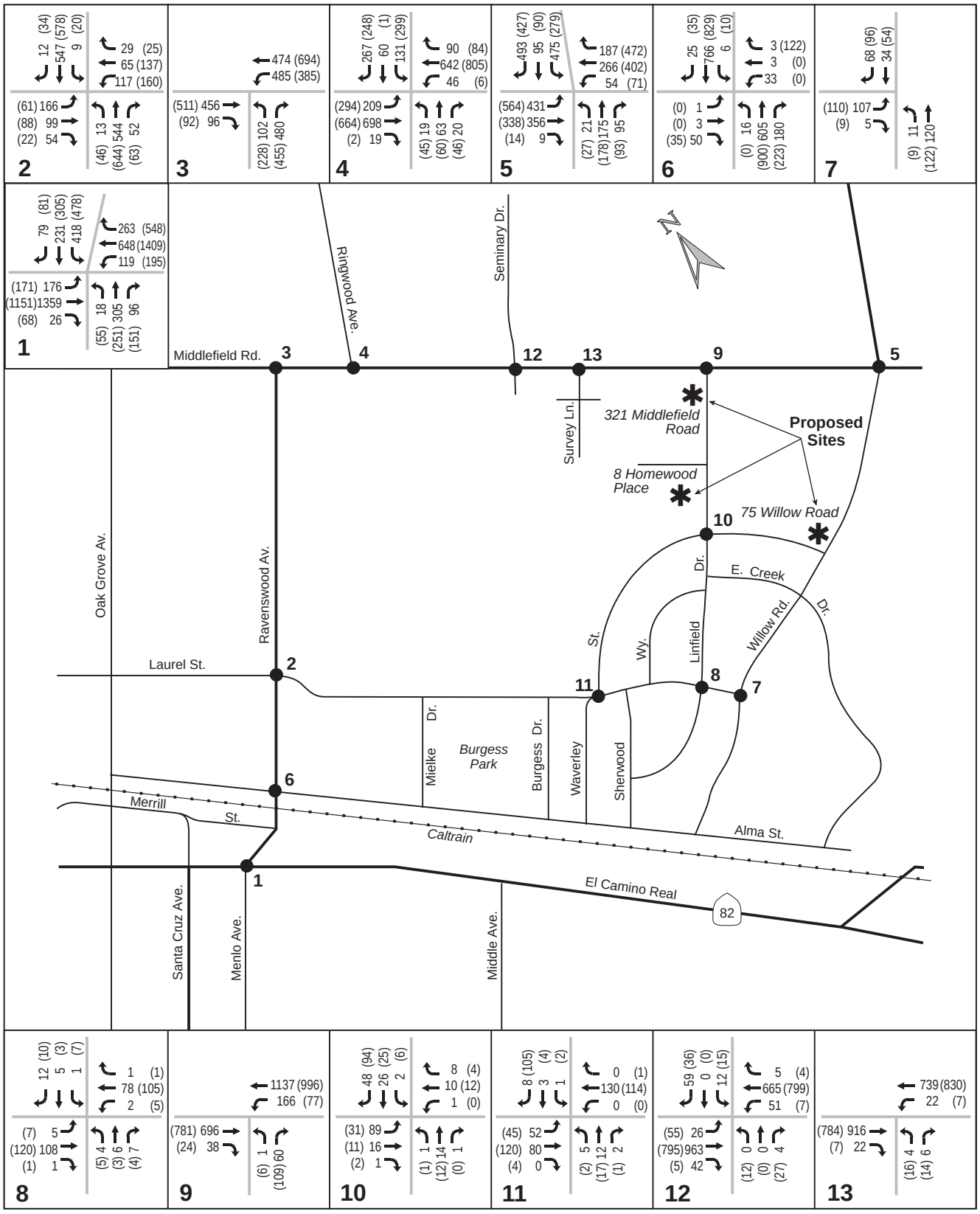
**Figure 4**
**Existing Lane Designations**




00 AM Peak Hour
(00) PM Peak Hour

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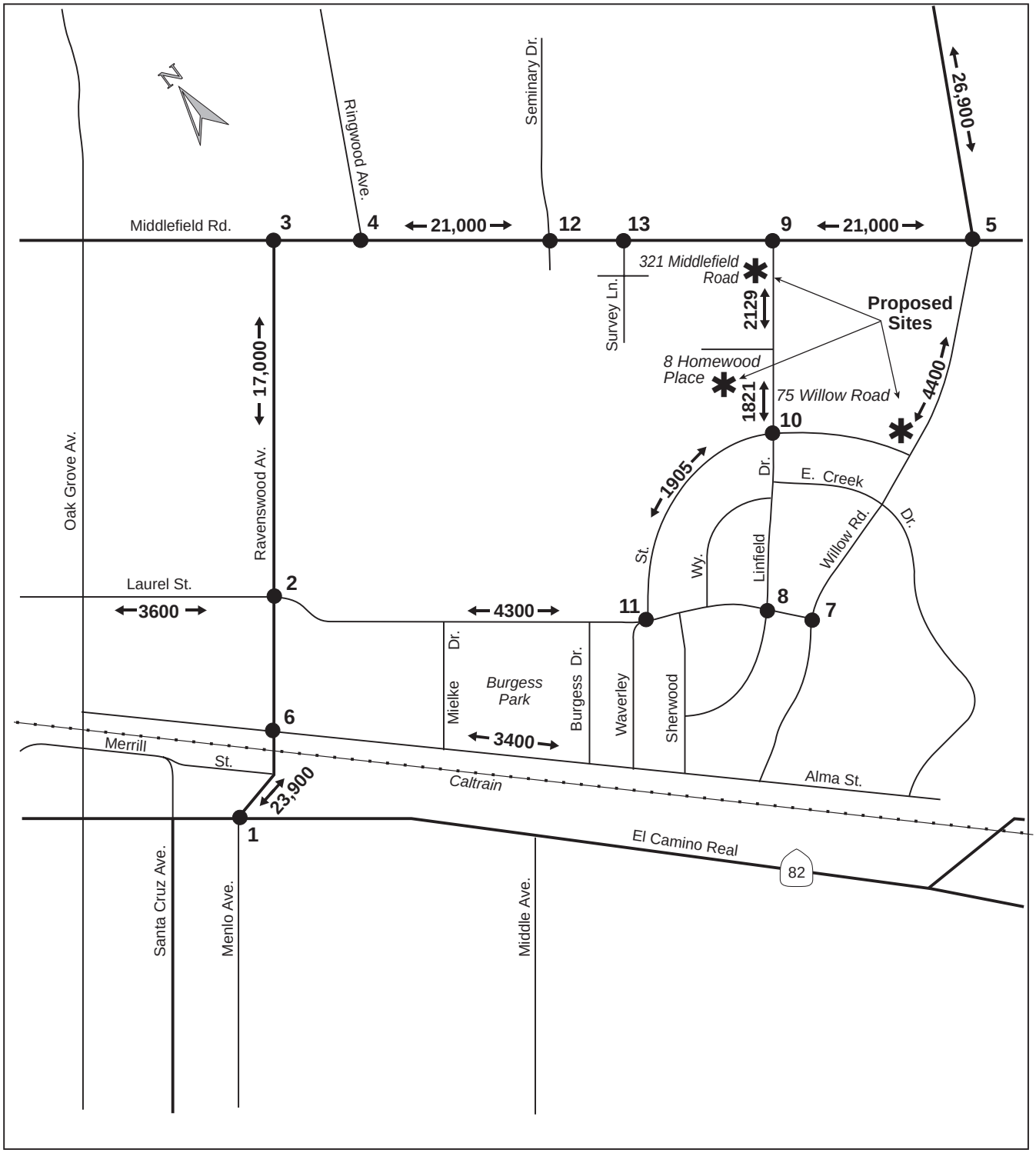
**Figure 5**
**Existing Peak Hour Volumes**

**Table 2**
**Existing Levels of Service**

| | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| Study Intersection | Delay[a] | LOS[b] | Delay | LOS |
| El Camino Real/Ravenswood Avenue | 50.2 | D | 54.1 | D |
| Critical Local Approaches[c] | 45.0/46.7 | | 53.7/72.1 | |
| Ravenswood Avenue/Laurel Street | 16.1 | B | 12.2 | B |
| Middlefield Road/Ravenswood Avenue | 22.6 | C | 29.9 | C |
| Middlefield Road/Ravenswood Avenue | 25.1 | C | 31.9 | C |
| Middlefield Road/Willow Road | 36.3 | D | 49.6 | D |
| Alma Street/ Ravenswood Avenue | 38.6 | E | 15.6 | C |
| Laurel Street/Willow Road | 8.3 | A | 8.2 | A |
| Laurel Street/Linfield Drive | 9.8 | A | 10.2 | B |
| Middlefield Road /Linfield Drive | 12.4 | B | 14.4 | B |
| Linfield Drive/Waverley Street | 7.6 | A | 7.5 | A |
| Waverley Street/Laurel Street | 11.3 | B | 11.4 | B |
| Middlefield Road /Seminary Drive | 17.4 | C | 22.8 | C |
| Middlefield Road /Survey Lane | 19.4 | C | 15.7 | C |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
c. Average delay for Eastbound/Westbound critical movements (local approaches).




● Study Intersection

P05040•Menlo Pk LMN Existing ADT.ai•2/24/06

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**Figure 6**
**Existing ADT**

# 3. Near-Term Conditions

A list of near-term developments was provided by City of Menlo Park staff and includes developments that are currently planned (i.e., applied for a development permit) or approved in Menlo Park and adjacent cities. A complete list of approved or planned projects is included in Appendix A. Trips related to each of the approved or planned developments are included in the Near-Term Scenario. Table 3 summarizes the list of approved projects that are within the immediate study area as well as projects that would generate trips traveling through the study area. Figure 7 illustrates the locations of the two near term developments within the immediate study area. The remainder of the planned or approved projects are not within the immediate study area, however are included in this analysis.

**Table 3**
**Near-Term Developments in Study Area**

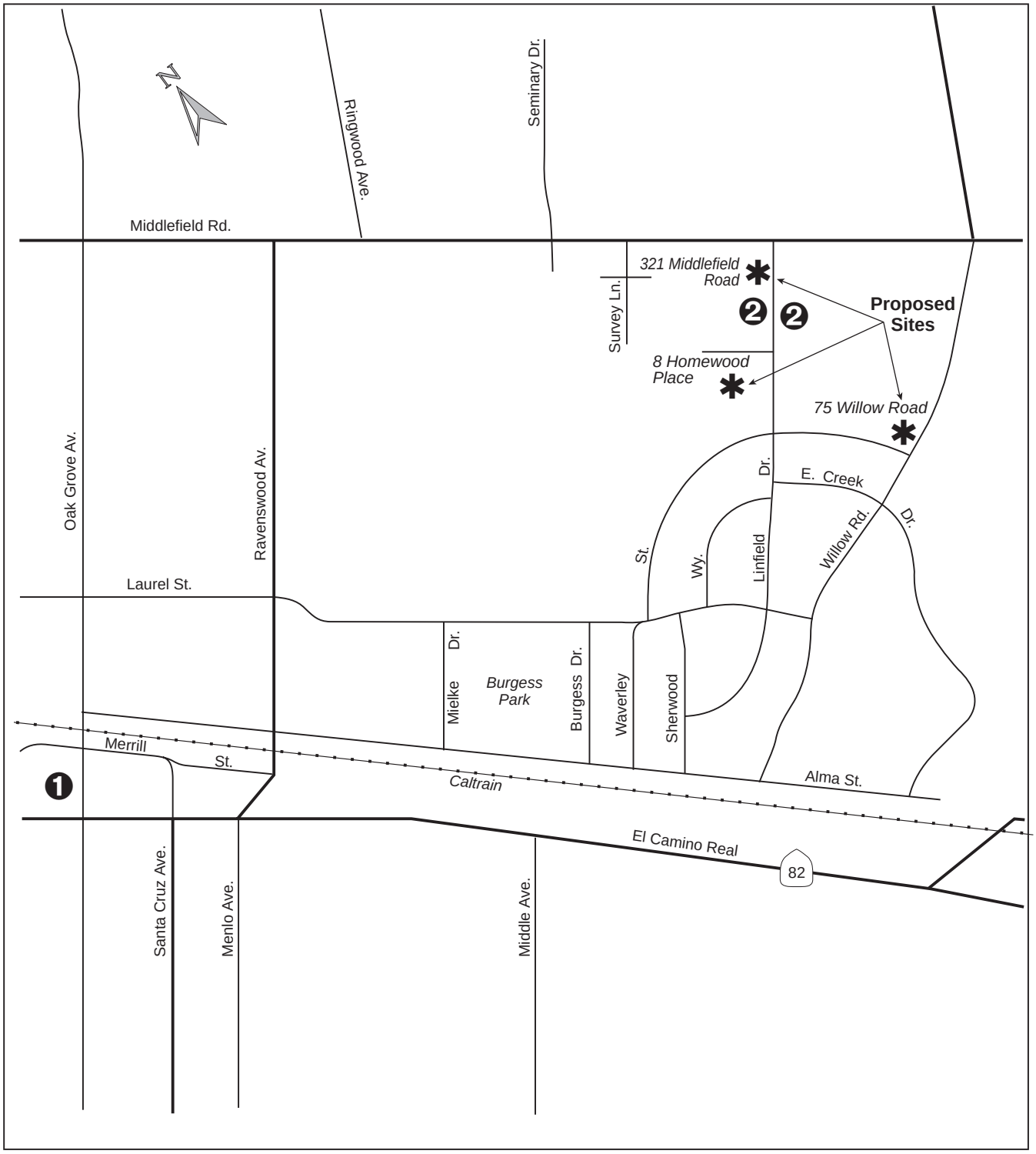
| Proposed Development | Land Use | Size | Units[a] |
|---|---|---|---|
| 1. 580 Oak Grove | Commercial | -3,790 | SF |
| 1. 580 Oak Grove | Residential | 137 | DU |
| 2. 110 and 175 Linfield Dr | Residential | 56 | DU |
| 1702-1706 El Camino Real | Residential | 36 | DU |
| 1702-1706 El Camino Real | Commercial | -7,000 | SF |
| 1702-1706 El Camino Real | Hotel | 13 | RM |
| 1460 El Camino Real | Residential | 16 | DU |
| 1460 El Camino Real | Commercial | -12,016 | SF |
| 1460 El Camino Real | Office | 26,800 | SF |
| 996-1002 Willow Road | Residential | 11 | DU |

Source: City of Menlo Park
Note: Developments 1 and 2 correspond to locations shown on Figure 7.
a. Units are given as per square foot (SF), single family dwelling units (DU), and rooms (RM).

## Traffic Volumes and Levels of Service

Peak Hour traffic volumes for the Near-Term Conditions were provided by City of Menlo Park staff for the four signalized study intersections based on the Near Term Scenario in the CSA Traffix Model. For the eight unsignalized intersections and ADT volumes, base volumes were increased by one percent annually (two percent total) to be consistent with the growth factor used in the CSA Traffix Model, and also included projected traffic from approved developments in the Linfield Oaks Neighborhood (development #2) based on the CSA Traffix Model. In addition, trips related to projects on the provided list in Appendix A that were not included in the CSA analysis were manually added to the Near-Term scenario for each of the analysis intersections and roadway segments. For this analysis, the Near-Term Scenario represents the 2007 analysis year.

The Near-Term Conditions peak hour intersection turning movement volumes are illustrated in Figure 8. No planned/programmed mitigation measures would be implemented by the time the near term developments are built and occupied. Intersection geometrics would remain the same as with existing conditions; however signal timing parameters at several intersections change slightly (cycle lengths). The analysis was set to be consistent with the CSA analyses. Intersection levels of service for the Near-Term scenario are summarized in Table 4.




P05253•Menlo Pk LMN Near-Term Des.ai•2/7/06

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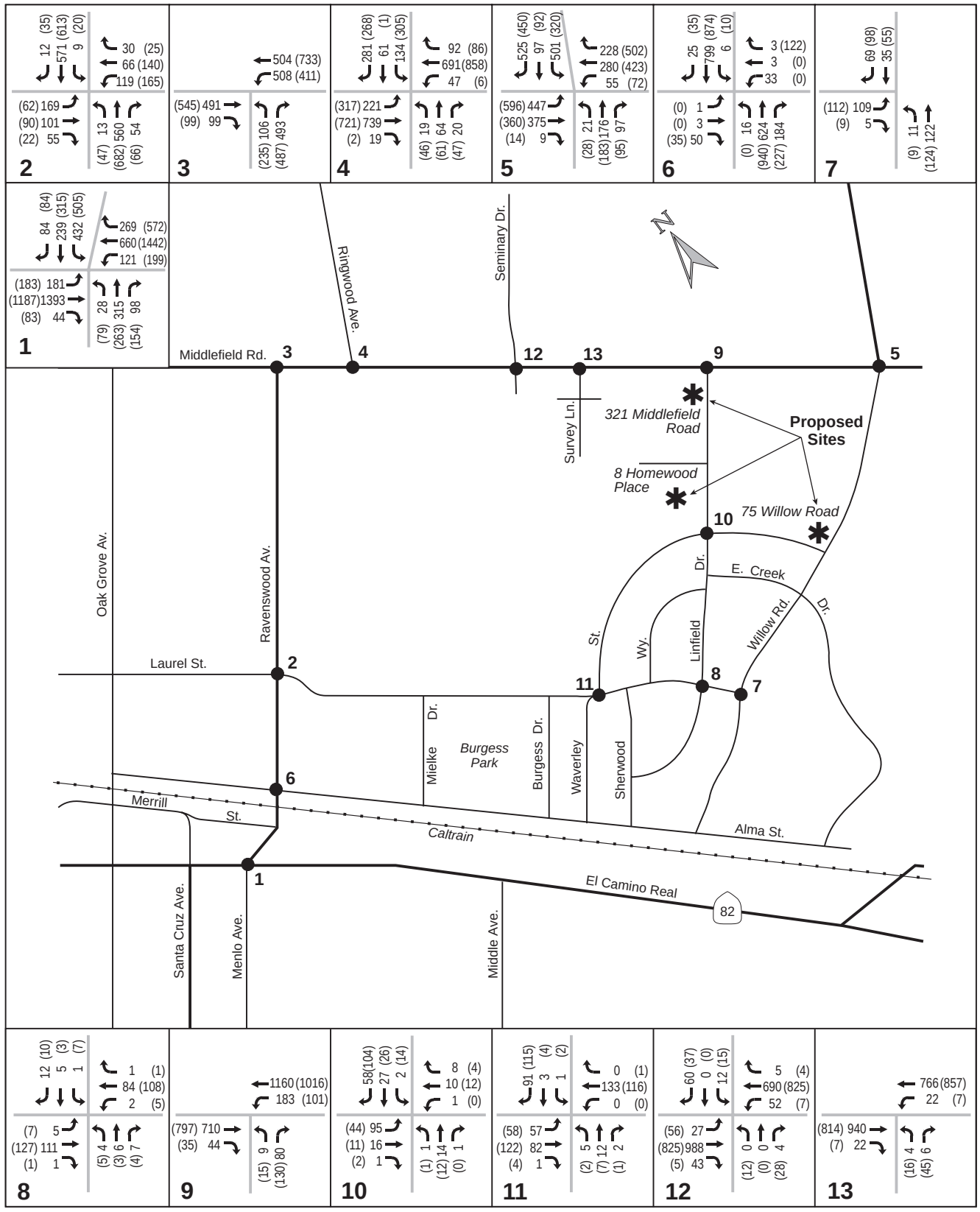
**Figure 7**
**Location of Near-Term Developments**




00 AM Peak Hour
(00) PM Peak Hour

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**Figure 8**
**Near-Term Conditions Peak Hour Volumes**

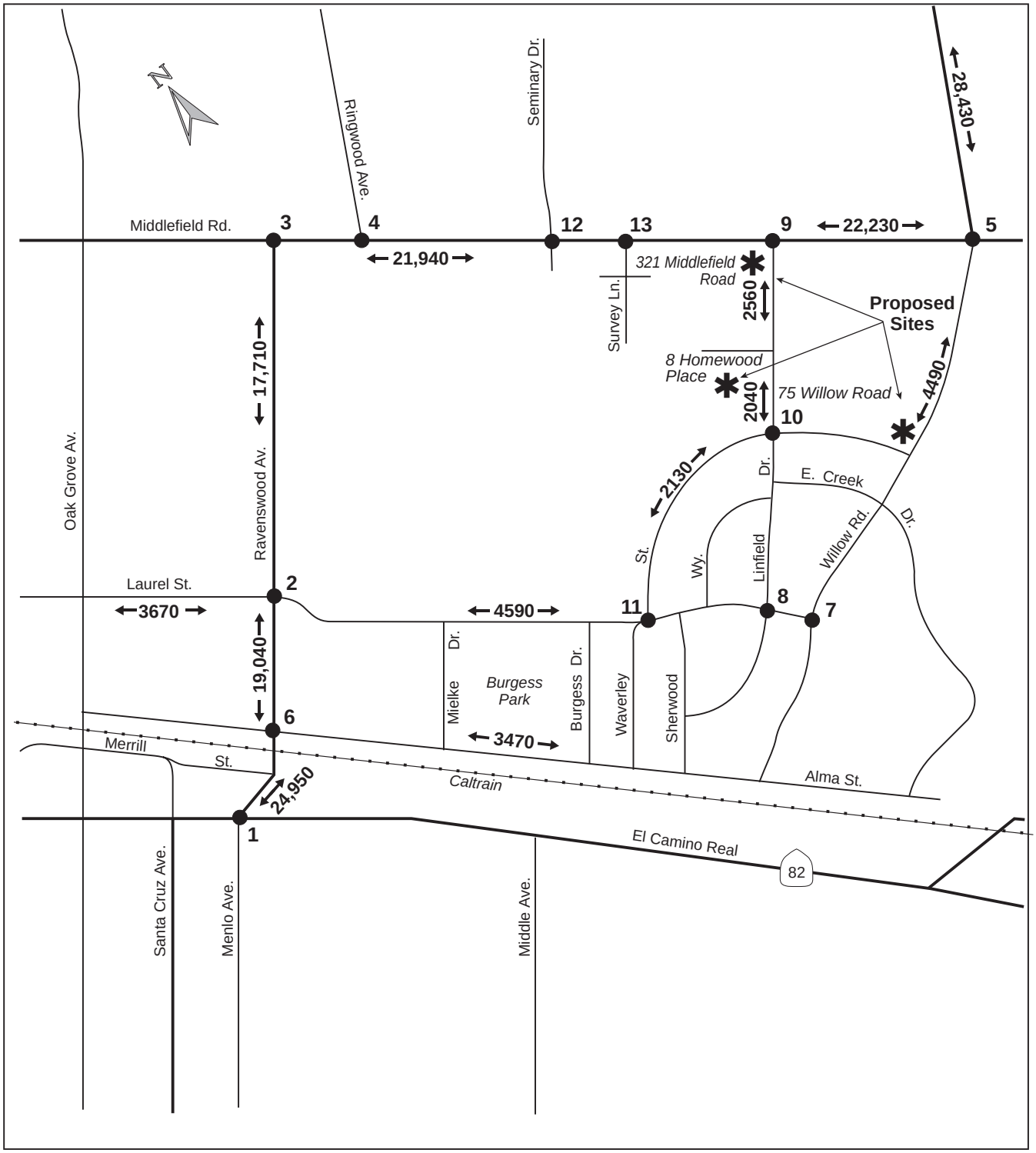
**Table 4**
Near Term Conditions Levels of Service

| | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| Study Intersection | Delay[a] | LOS[b] | Delay | LOS |
| El Camino Real/Ravenswood Avenue | 47.8 | D | **58.8** | **E** |
| Critical Local Approaches[c] | 52.9/55.6 | | **56.8/76.6** | |
| Ravenswood Avenue/Laurel Street | 16.5 | B | 12.6 | B |
| Middlefield Road/Ravenswood Avenue | 31.0 | C | 31.7 | C |
| Middlefield Road/Ringwood Avenue | 25.6 | C | 31.6 | C |
| Middlefield Road/Willow Road | 47.9 | D | 52.9 | D |
| Alma Street/ Ravenswood Avenue | **41.1** | **E** | 16.6 | C |
| Laurel Street/Willow Road | 8.1 | A | 8.3 | A |
| Laurel Street/Linfield Drive | 9.7 | A | 10.1 | B |
| Middlefield Road /Linfield Drive | 16.7 | C | 16.4 | C |
| Linfield Drive/Waverley Street | 7.5 | A | 7.4 | A |
| Waverley Street/Laurel Street | 11.5 | B | 11.6 | B |
| Middlefield Road /Seminary Drive | 18.1 | C | 24.1 | C |
| Middlefield Road /Survey Lane | 20.1 | C | 16.2 | C |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
c. Average delay for Eastbound/Westbound critical movements (local approaches).

All but two study intersections are expected to operate under acceptable service conditions under the Near-Term Conditions. During the AM Peak hour, the northbound approach from Alma to Ravenswood would continue to operate at LOS E due to vehicles trying to make a left turn onto Ravenswood Avenue. During the PM peak period, the intersection of Ravenswood and El Camino Real would deteriorate from LOS D today to LOS E. The average delay at El Camino Real and Ravenswood Avenue would increase to approximately 59 seconds during the PM peak period.

The Near-Term Conditions ADT volumes are illustrated in Figure 9. The near-term ADT was estimated using the existing ADT and the projected daily traffic due to the planned and approved projects shown previously in Table 3. The segments of Willow Road east of Middlefield Road, Middlefield Road between Willow Road and Ravenswood Avenue, and Ravenswood Avenue between El Camino Real and Alma Street are minor arterials that would serve a demand that is greater than the estimated capacity of 20,000 vehicles a day. Linfield Drive and Waverley Street are local streets that currently serve a demand greater than the estimated capacity of 1,500 vehicles per day.




P05253•Menlo Pk LMN Near-Term ADT.ai•2/24/06

● Study Intersection

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**Figure 9**
**Near Term Conditions ADT**

# 4. Near Term plus Project Conditions

The proposed project involves replacing a partially occupied 48,400 of office space at 321 Middlefield Road with similarly sized medical office facilities and approximately 21,500 sf of office space at 8 Homewood Place with 37 single family residential units. At 75 Willow Road, the existing 39,000 sf of general office space would be replaced with 33 single family residential dwelling units. The three proposed development sites are located in the City of Menlo Park in the Linfield Oaks Neighborhood (see Figure 1). Each property is currently zoned under the Professional and Administrative Offices classification. The property at 8 Homewood Place and 75 Willow Road would need to be rezoned as residential.

At the time of data collection, the 321 Middlefield site was partially occupied, and on-site surveys were conducted to estimate the amount traffic currently entering and exiting the site. At 8 Homewood Place, the existing building was assumed to be vacant, and at 75 Willow Road, the building was assumed to be 25 percent occupied at the time of data collection.

The proposed project at 321 Middlefield Road includes several transportation demand management (TDM) measures to encourage alternative methods of transportation to and from the project site. Based on input from City Staff, a peak hour trip credit was applied to the estimated trip generation.

## Transportation Demand Management

The City of Menlo Park TIA Guidelines has adopted TDM guidelines. The intent of the TDM guidelines is to provide options for, and encourage the use of, creative ways to mitigate the traffic impacts of new development projects. Because two of the proposed project sites are commercial/office developments, standard TDM measures would typically be applicable to these developments. Some measures that the City's Transportation Division may recommend include, but are not limited to:

- Bicycle Lockers/Racks
- Shower/changing room facilities
- Shuttles to Rail Station or urban residential area
- Preferential parking for carpool/vanpool, and implementation of a vanpool program.
- Transportation allowance for bicyclists, walkers, and carpoolers
- Provision of Child Care Services as part of the development
- Improvement in pedestrian/bicycle access.

The proposed project site at 321 Middlefield Road includes several TDM measures that qualify for peak hour trip credits. Fifteen bicycle lockers and/or racks are proposed; which qualify for one peak hour trip per three lockers or racks. In addition, the proposed building would provide two shower facilities which qualify for two peak hour trip credits each, or four total trips. Finally, the proposed project includes the addition of a paved sidewalk along the project frontages as well as reducing the number of access driveways by one. Per discussions with City staff, the proposed sidewalks and driveway reductions combine for five peak hour

trip credits. The proposed project qualifies for a total of 14 peak hour trip credits due to various TDM measures.

## Trip Generation and Distribution

Trip generation for the proposed medical office facility and the residential uses is based upon the *ITE Trip Generation Manual* (7th Edition, 2003). For the existing land uses, driveway counts were collected at 321 Middlefield Road, and ITE Trip rates were used at 75 Willow Road.

Combined, the three proposed developments would generate 112 net-new AM peak hour trips and 192 net-new PM peak hour trips. During the AM peak hour, there would be 62 inbound trips and 50 outbound trips. During the PM peak hour, there would be 78 inbound trips and 114 outbound trips. Traffic currently generated by the project sites was subtracted from the estimation of gross project trips. Table 5 further illustrates the trip generation by land use at the project site.

**Table 5**
**Project Trip Generation**

| | AM Peak Hour | | | PM Peak Hour | | | Daily |
|---|---|---|---|---|---|---|---|
| Project Site | In | Out | Total | In | Out | Total | Total |
| ITE Trip Generation Rates: | | | | | | | |
| Medical Offices – SF (ITE Code 720) | 79% | 21% | 2.48 | 27% | 73% | 3.72 | 36.13 |
| General Offices – SF (ITE Code 710) | 88% | 12% | 1.55 | 17% | 83% | 1.49 | 11.01 |
| Single Family Residential - Units (ITE Code 210) | 25% | 75% | 0.75 | 63% | 37% | 1.01 | 9.57 |
| Existing 48,400 sf Office at 321 Middlefield Road (based on survey count data) | -22 | -10 | -32 | -10 | -21 | -31 | -259 |
| Proposed 48,400 sf Medical Office at 321 Middlefield Road | 95 | 25 | 120 | 49 | 131 | 180 | 1,749 |
| TDM Trip Credits | -11 | -3 | -14 | -4 | -10 | -14 | N/A |
| Proposed 37 Single Family Dwelling Units at 8 Homewood Place | 7 | 21 | 28 | 24 | 14 | 38 | 354 |
| Existing 39,000 sf Office at 75 Willow Road (25 percent occupancy assumed) | -13 | -2 | -15 | -2 | -12 | -14 | -107 |
| Proposed 33 Single Family Dwelling Units at 75 Willow Road | 6 | 19 | 25 | 21 | 12 | 33 | 316 |
| Total Net New Trips | 62 | 50 | 112 | 78 | 114 | 192 | 2,053 |

The trip credits for the project site at 321 Middlefield Road includes the TDM measures described above. The 14 peak hour trips credited due to the TDM measures were assumed to have the same inbound/outbound ratios as the proposed medical office trips.

Existing and new trips generated by the proposed project sites distributed to the local street network based on information provided by the City of Menlo Park in Table 6 of the

Circulation System Assessment Document (See Appendix A). Distribution patterns for office/employment facilities were utilized for both the existing offices at 321 Middlefield Road and 75 Willow Road, and the proposed residential units used residential distribution patterns. It is anticipated that the majority of trips related to the medical office uses would be made by patients. For patient trips, a distribution pattern similar to commercial uses was presumed, and therefore proposed medical office land uses were assumed to use commercial distribution patterns. Figure 10 illustrates the trip distribution patterns that were used in this analysis and Figure 11 illustrates the combined net new project related trips at each of the analysis intersections. The Near-Term plus Project Conditions peak hour intersection turning movement volumes are illustrated in Figure 12. The Near-Term plus Project Conditions ADT volumes are illustrated in Figure 13.

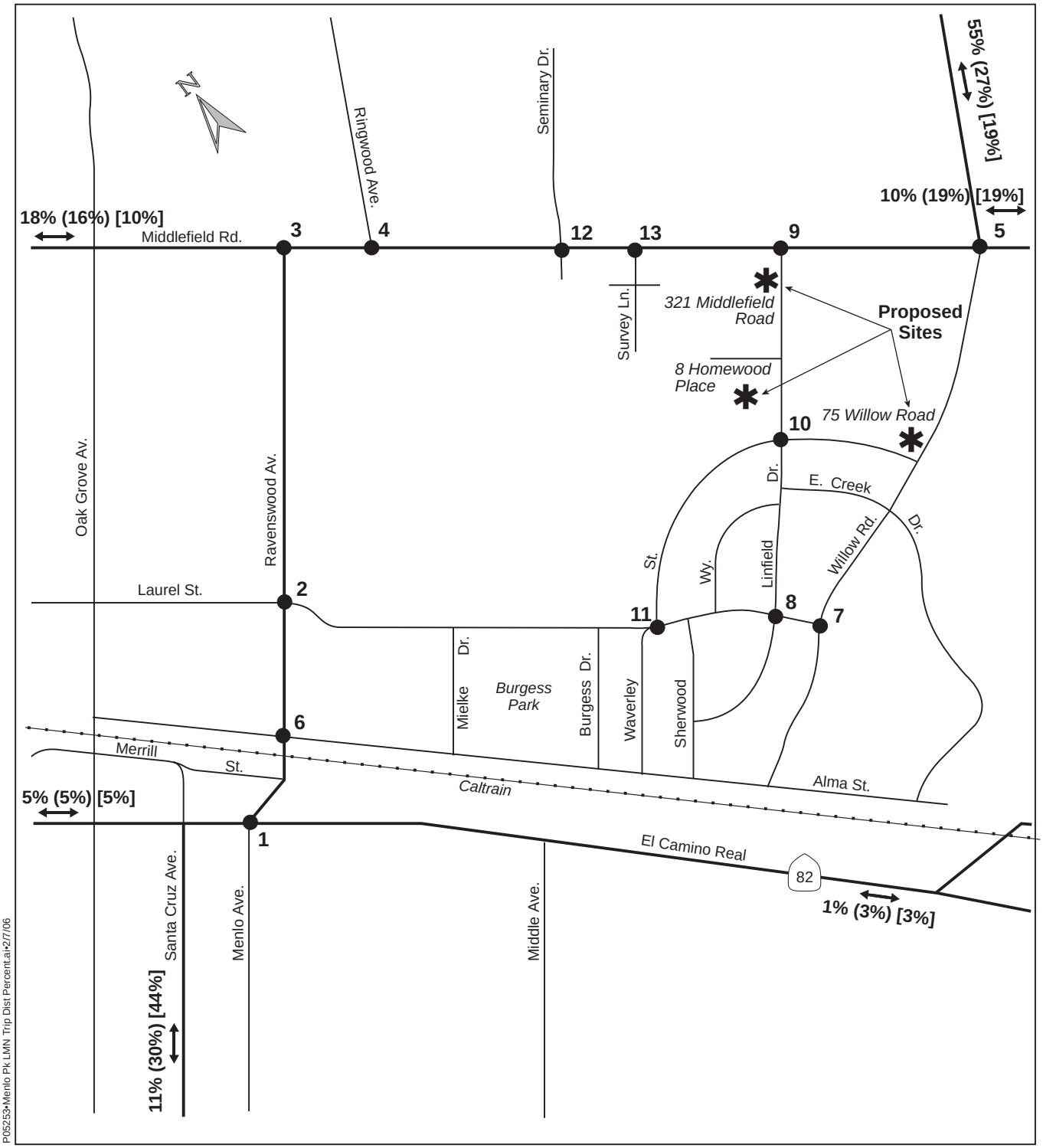
## Traffic Volumes and Levels of Service

Intersection levels of service for Project Conditions are provided in Table 6. An intersection level of service comparison summary between Existing Conditions, Near-Term Conditions, and Project Conditions is shown in Tables 7 (AM peak) and 8 (PM peak).

**Table 6**
**Near Term plus Project Conditions Levels of Service**

| | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| Study Intersection | Delay[a] | LOS[b] | Delay | LOS |
| El Camino Real/Ravenswood Avenue | 48.6 | D | **64.2** | **E** |
| Critical Local Approaches[c] | 55.5/59.5 | | **60.4/106** | |
| Ravenswood Avenue/Laurel Street | 16.8 | B | 13.6 | B |
| Middlefield Road/Ravenswood Avenue | 31.5 | C | 32.8 | C |
| Middlefield Road/Ringwood Avenue | 25.5 | C | 30.3 | C |
| Middlefield Road/Willow Road | 48.6 | D | 53.3 | D |
| Alma Street/ Ravenswood Avenue | **46.3** | **E** | 17.1 | C |
| Laurel Street/Willow Road | 8.1 | A | 8.3 | A |
| Laurel Street/Linfield Drive | 9.7 | A | 10.2 | B |
| Middlefield Road /Linfield Drive | 23.7 | C | 34.2 | D |
| Linfield Drive/Waverley Street | 7.7 | A | 7.6 | A |
| Waverley Street/Laurel Street | 12.1 | B | 12.3 | B |
| Middlefield Road /Seminary Drive | 18.6 | C | 26.0 | D |
| Middlefield Road /Survey Lane | 20.7 | C | 16.7 | C |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections. c. Average delay for Eastbound/Westbound critical movements (local approaches).




**xx%** Employment Trip Distribution
**(xx%)** Residential Trip Distribution
**[xx%]** Commercial Trip Distribution

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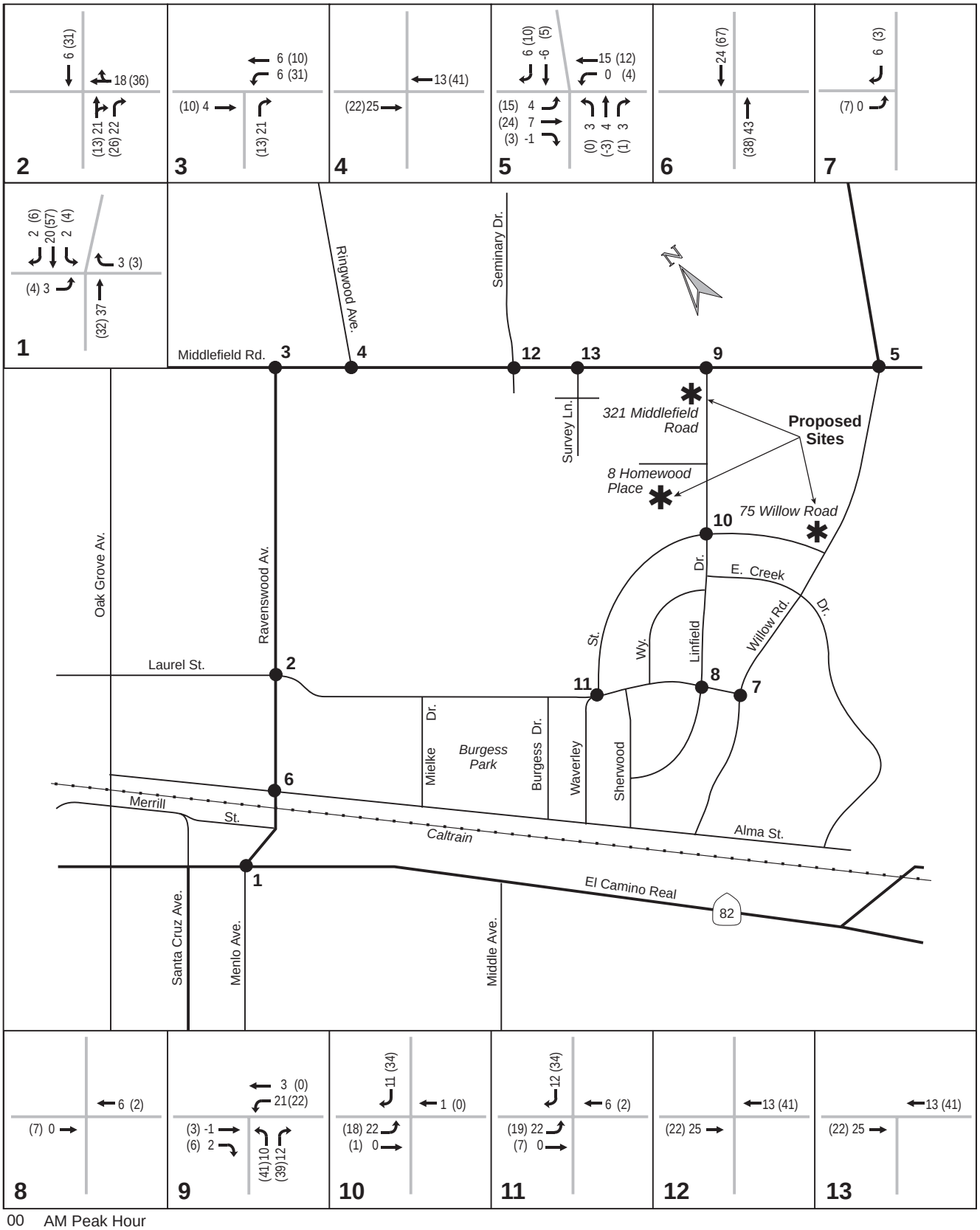
**Figure 10**
**Trip Distribution Percentages**




P05253•Menlo Pk LMN Net New Proj Vols.ai•2/24/06

00 AM Peak Hour
(00) PM Peak Hour

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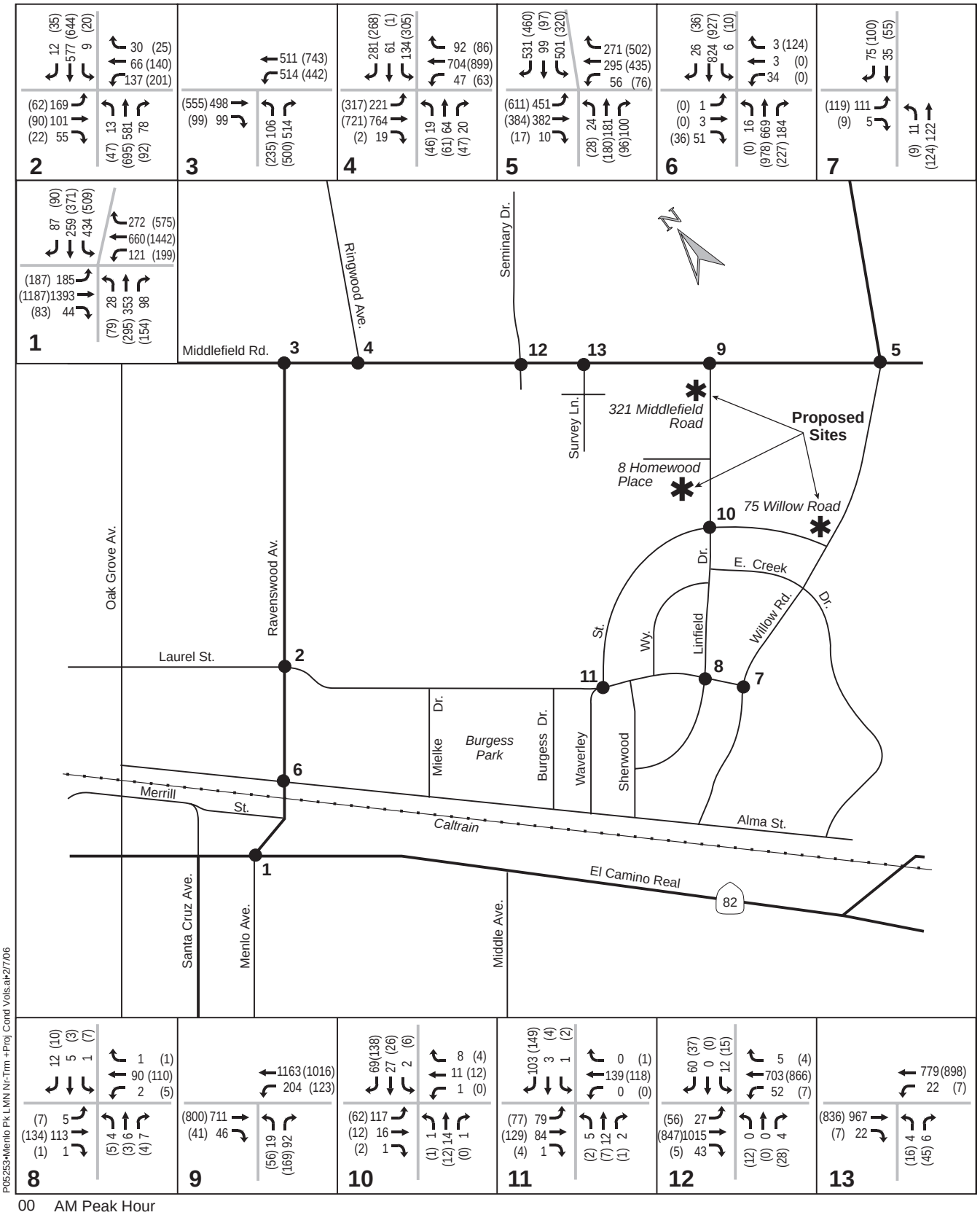
**Figure 11**
**Net-New Project Peak Hour Volumes**




00 AM Peak Hour
(00) PM Peak Hour

P05253•Menlo Pk LMN Nr-Trm +Proj Cond Vols.ai•2/7/06

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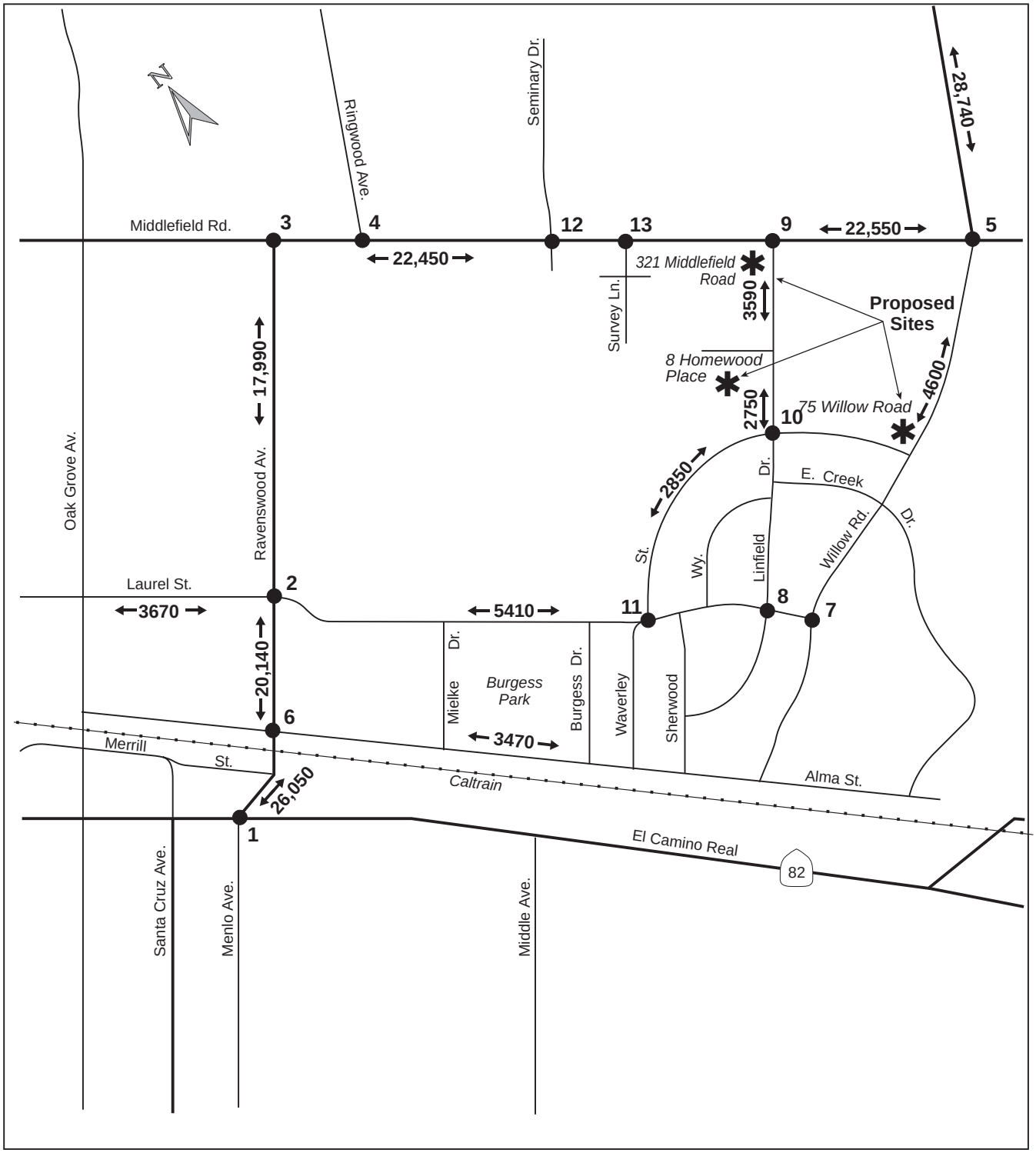
**Figure 12**
**Near-Term Plus Project Conditions Peak Hour Volumes**




P05253•Menlo Pk LMN Near-Term +Proj ADT.ai•2/24/06

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**Figure 13**
**Near Term Plus Project Conditions ADT**

As shown in Tables 7 and 8, the addition of 112 net-new trips would have little effect on the average delay at the study intersections when compared to the Near-Term Conditions. The Near-Term Conditions also would have little effect on the average delay of the study intersections when compared to the existing conditions. Under the near term scenario, two intersections would operate at unacceptable levels; the intersection of Alma Street/Ravenswood Avenue during the AM peak hour (LOS E), and the intersection of El Camino Real/Ravenswood Avenue in the PM peak hour (LOS E).

During the AM peak hour, there would be a net increase of 67 vehicle trips in the east and westbound directions of Ravenswood Avenue at Alma Street due to the three proposed developments. The increase in traffic results in an increase in delay to the northbound approach from Alma to Ravenswood of approximately 4.5 seconds. Because the approach is already an unacceptable level, this would be a potentially significant traffic impact. The intersection of Middlefield Road and Linfield Drive would operate at an acceptable service level. However, the eastbound (Linfield Drive) approach delay increases by approximately seven seconds. The eastbound left turn movement would operate with approximately 82 seconds of delay which would constitute an operational deficiency; however the intersection would not experience a potentially significant impact because the critical approach would continue to operate at LOS D. The increases in average delay at each of the other study intersections would be less one second during the AM peak hour.

During the PM Peak hour, there would be an increase of 192 net new trips due to the three proposed developments. All study intersections are expected to operate under acceptable service conditions during the PM peak period of the project conditions scenario with the exception of El Camino Real and Ravenswood Avenue. This intersection would operate at LOS E with an average of 58.8 seconds of delay during the PM peak hour under the Near-Term Scenario. The addition of project generated trips would result in the average delay for this intersection increasing to 64.2 seconds; an increase of four seconds. The increase in average delay for the critical movements on the east and westbound (local approaches to state intersection) approaches would be approximately 3.6 and 30 seconds respectively. Therefore this intersection would experience a potentially significant impact.

The intersection of Middlefield Road and Linfield Drive would operate at LOS D during the PM peak hour with an increase of approximately 18 seconds to the critical approach (Linfield Drive), however this is not considered a potentially significant impact. The eastbound left turn movement would experience approximately 97 seconds of delay, which would be considered an operational deficiency. Similarly, the intersection of Middlefield Road and Seminary Drive would deteriorate to LOS D, which remains an acceptable level of service. However, the eastbound left turn movement would experience approximately 52 seconds of delay, which would be considered an operational deficiency

The three projects combined would generate approximately 2,053 net new daily trips. Many of the roadway segments in the surrounding area serve an ADT greater than 90% of the capacity stated for their respective classifications. A comparison Near Term and Near Term plus Project ADT is summarized in Table 9. The addition of project traffic would be greater

**Table 7**
**AM Peak Hour Intersection Levels of Service Comparison Summary**

| Study Intersection | Existing | | Near Term | | | | Near Term plus Project | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Increase in Delay from Existing | % Increase in Delay from Existing | Delay[a] | LOS[b] | Increase in Delay from Near-Term | % Increase in Delay from Near-Term | Potentially Significant Impact? |
| El Camino Real/Ravenswood Avenue | 50.2 | D | 47.8 | D | -2.4 | -4.8% | 48.6 | D | 0.8 | -1.7% | No |
| Critical Local Approaches[c] | 45.0/46.7 | | 52.9/55.6 | | >7.9 | | 55.5/59.5 | | >2.6 | | No |
| Ravenswood Avenue/Laurel Street | 16.1 | B | 16.5 | B | 0.4 | 2.5% | 16.8 | B | 0.3 | -1.8% | No |
| Middlefield Road/Ravenswood Avenue | 22.6 | C | 31.0 | C | 8.4 | 37.2% | 31.5 | C | 0.5 | -1.6% | No |
| Middlefield Road/Ringwood Avenue | 25.1 | C | 25.6 | C | 0.5 | 2.0% | 25.5 | C | -0.1 | 0.4% | No |
| Middlefield Road/Willow Road | 36.3 | D | 47.9 | D | 11.6 | 32.0% | 48.6 | D | 0.7 | -1.5% | No |
| Alma Street/ Ravenswood Avenue | 38.6 | E | **41.1** | **E** | 2.5 | 6.5% | **46.3** | **E** | **5.2** | -12.7% | **Yes** |
| Laurel Street/Willow Road | 8.3 | A | 8.1 | A | -0.2 | -2.4% | 8.1 | A | 0.0 | 0.0% | No |
| Laurel Street/Linfield Drive | 9.8 | A | 9.7 | A | -0.1 | -1.0% | 9.7 | A | 0.0 | 0.0% | No |
| Middlefield Road /Linfield Drive | 12.4 | B | 16.7 | C | 4.3 | 34.7% | 23.7 | C | 7.0 | -41.9% | No |
| Linfield Drive/Waverley Street | 7.6 | A | 7.5 | A | -0.1 | -1.3% | 7.7 | A | 0.2 | -2.7% | No |
| Waverley Street/Laurel Street | 11.3 | B | 11.5 | B | 0.2 | 1.8% | 12.1 | B | 0.6 | -5.2% | No |
| Middlefield Road /Seminary Drive | 17.4 | C | 18.1 | C | 0.7 | 4.0% | 18.6 | C | 0.5 | -2.8% | No |
| Middlefield Road /Survey Lane | 19.4 | C | 20.1 | C | 0.7 | 3.6% | 20.7 | C | 0.6 | -3.0% | No |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
c. Average delay for Eastbound/Westbound critical movements (local approaches).

**Table 8**
**PM Peak Hour Intersection Levels of Service Comparison Summary**

| Study Intersection | Existing | | Near Term | | | | Near Term plus Project | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Increase in Delay from Existing | % Increase in Delay from Existing | Delay[a] | LOS[b] | Increase in Delay from Near-Term | % Increase in Delay from Near-Term | Potentially Significant Impact? |
| El Camino Real/Ravenswood Avenue | 54.1 | D | **58.8** | **E** | 4.7 | 8.7% | **64.2** | **E** | 5.4 | -9.2% | No |
| Critical Local Approaches[c] | 53.7/72.1 | | **56.8/76.6** | | >3.1 | | **60.4/106** | | >3.2 | | **Yes** |
| Ravenswood Avenue/Laurel Street | 12.2 | B | 12.6 | B | 0.4 | 3.3% | 13.6 | B | 1.0 | -7.9% | No |
| Middlefield Road/Ravenswood Avenue | 29.9 | C | 31.7 | C | 1.8 | 6.0% | 32.8 | C | 1.1 | -3.5% | No |
| Middlefield Road/Ringwood Avenue | 30.3 | C | 31.6 | C | 1.3 | 4.2% | 31.9 | C | 0.3 | 1.0% | No |
| Middlefield Road/Willow Road | 49.6 | D | 52.9 | D | 3.3 | 6.7% | 53.3 | D | 0.4 | -0.8% | No |
| Alma Street/ Ravenswood Avenue | 15.6 | C | 16.6 | C | 1.0 | 6.4% | 17.1 | C | 0.5 | -3.0% | No |
| Laurel Street/Willow Road | 8.2 | A | 8.3 | A | 0.1 | 1.2% | 8.3 | A | 0.0 | 0.0% | No |
| Laurel Street/Linfield Drive | 10.2 | B | 10.1 | B | -0.1 | -1.0% | 10.2 | B | 0.1 | -1.0% | No |
| Middlefield Road /Linfield Drive | 14.4 | B | 16.4 | C | 2.0 | 13.9% | 34.2 | D | 17.8 | -108.5% | No |
| Linfield Drive/Waverley Street | 7.5 | A | 7.4 | A | -0.1 | -1.3% | 7.6 | A | 0.2 | -2.7% | No |
| Waverley Street/Laurel Street | 11.4 | B | 11.6 | B | 0.2 | 1.8% | 12.3 | B | 0.7 | -6.0% | No |
| Middlefield Road /Seminary Drive | 22.8 | C | 24.1 | C | 1.3 | 5.7% | 26.0 | D | 1.9 | -7.9% | No |
| Middlefield Road /Survey Lane | 15.7 | C | 16.2 | C | 0.5 | 3.2% | 16.7 | C | 0.5 | -3.1% | No |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
c. Average delay for Eastbound/Westbound critical movements (local approaches).

**Table 9**
**Average Daily Traffic Comparison Summary – Project Scenario**

| | | Existing | Near Term | | | Near Term plus Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Study Roadway Segment | Roadway Class | ADT | ADT | Volume Added for Near Term | % Change in ADT from Existing | ADT | Net Volume Added for Project | % Change in ADT from Near Term | Potentially Significant Impact? |
| Linfield Drive (Homewood to Waverley) | L | 1,821 | 2,040 | 219 | 12.0% | 2,754 | 713 | 35.0% | **Yes** |
| Linfield Drive (Homewood to Middlefield) | | 2,129 | 2,455 | 326 | 15.3% | 3,585 | 1,130 | 46.1% | |
| Waverley Street (Linfield to Laurel) | L | 1,905 | 2,126 | 221 | 11.6% | 2,850 | 724 | 34.0% | **Yes** |
| Ravenswood Ave. (El Camino Real to Alma) | MA | 23,900 | 24,951 | 1,051 | 4.4% | 26,053 | 1,102 | 4.4% | **Yes** |
| Ravenswood Ave. (Alma to Laurel) | MA | 18,100 | 19,035 | 935 | 5.2% | 20,137 | 1,102 | 5.8% | **Yes** |
| Ravenswood Avenue (Middlefield to Laurel) | MA | 17,000 | 17,709 | 709 | 4.2% | 17,995 | 286 | 1.6% | No |
| Middlefield Road (Ringwood to Linfield) | MA | 21,100 | 21,941 | 841 | 4.0% | 22,452 | 511 | 2.3% | **Yes** |
| Middlefield Road (Willow to Linfield) | | 21,100 | 22,229 | 1,129 | 5.4% | 22,554 | 325 | 1.5% | |
| Laurel Street (Ravenswood to Waverley) | C | 4,300 | 4,591 | 291 | 6.8% | 5,406 | 815 | 17.8% | No |
| Willow Road (Middlefield to Bay) | MA | 26,900 | 28,432 | 1,532 | 5.7% | 28,744 | 312 | 1.1% | **Yes** |
| Willow Road (Middlefield to Laurel) | C | 4,400 | 4,488 | 88 | 2.0% | 4,595 | 107 | 2.4% | No |
| Alma Street (Willow to Ravenswood) | C | 3,400 | 3,468 | 68 | 2.0% | 3,468 | 0 | 0.0% | No |

Key:
L = Local Street. Impact if ADT is >1,350 vehicles and project adds 25 or more trips, or if 1,350 > ADT > 750 and project increases ADT by 12.5% or ADT reaches 1,350, or if ADT is <750 and project increases ADT by 25%.
C = Collector Street. Impact if ADT is >9,000 vehicles and project adds 50 or more trips, or if 9,000 > ADT > 5,000 and project increases ADT by 12.5% or ADT reaches 9,000, or ADT is <5,000 and project increases ADT by 25%.
MA = Minor Arterial. Impact if ADT is >18,000 vehicles and project adds 100 or more trips, or if 18,000 > ADT > 10,000 and project increases ADT by 12.5% or ADT reaches 18,000, or ADT is <10,000 and project increases ADT by 25%.

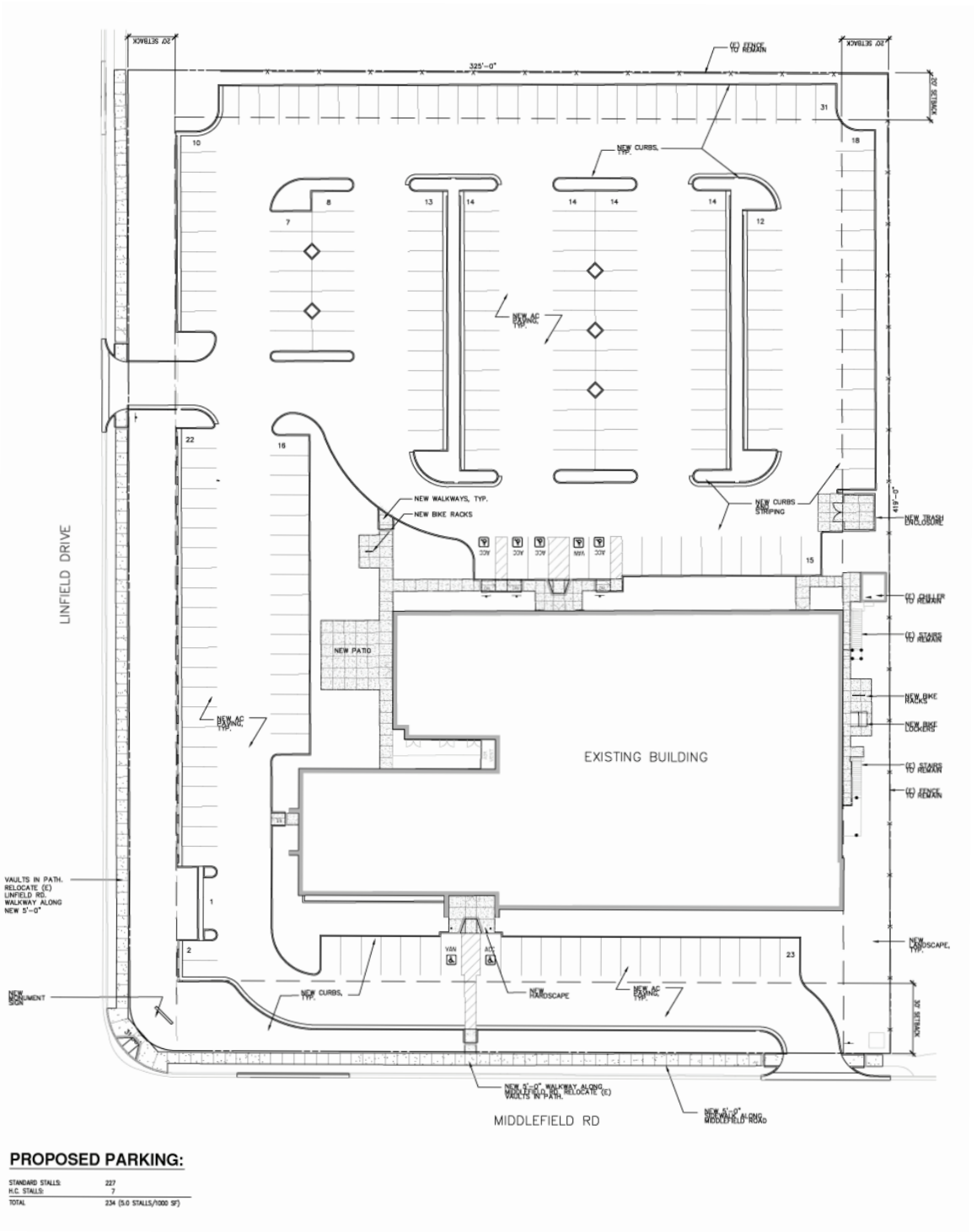
than the significance criteria specified in the TIA Guidelines on six of the ten study roadway segments. Linfield Drive and Waverley Street (local streets) currently serve approximately 1,800 to 2,000 vehicles daily. The proposed developments would add approximately 1,130 daily vehicles to Linfield Drive, west of Middlefield Road. This is greater than the threshold of 25 daily trips for a potentially significant impact. Ravenswood Drive (El Camino Real to Alma), Middlefield Road (Ringwood to Willow), and Willow Road (Middlefield to US 101) are classified as Minor Arterials, with a capacity of 20,000 vehicles per day. Each segment currently serves approximately 21,000-29,000 vehicles per day. Approximately 310 to 1100 vehicles per day would be added to these segments. In total, there would be six roadway segments that would experience potentially significant impact due to the addition of daily traffic from the three proposed developments to the Near-Term scenario.

## Routes of Regional Significance

Three roadway segments within the project vicinity are considered Routes of Regional Significance by the San Mateo County Final Congestion Management Program. Project generated traffic would not change the levels of service on Routes of Regional Significance in the study area. General employment distribution patterns tend to attract a higher percentage of trips from regional routes. Due to the conversion of general office space to medical office and residential uses, the net new change in vehicle trips added to US 101 and SR 84 would be relatively small. Less than 10 vehicles during each of the AM and PM peak hours would be added to SR 82 (El Camino Real). The moderate increase in traffic would not change the operating conditions of these facilities. However the projects would add approximately one second of average delay during the AM peak hour and five seconds of average delay during the PM peak hour to the intersection of El Camino Real and Ravenswood Avenue. Although the intersection of El Camino Real and Ravenswood is not considered a CMP intersection, the CMP designates the general LOS standard for roadway segments and intersections on El Camino is LOS E. Therefore this intersection would continue to operate at an acceptable LOS E during the Near Term plus Project scenario. The addition of project related trips would not cause the intersection of El Camino Real and Ravenswood to deteriorate below LOS E under the Near-Term plus Project conditions scenario.

## Site Access and Circulation

The access points for the project sites at 321 Middlefield Road are on Linfield Drive and the southbound direction of Middlefield Road. The proposed site plan includes one two-way driveway on Middlefield Road and one two way driveway on Linfield Drive. Figure 14A illustrates the proposed site plans for the proposed project at 321 Middlefield Road. The proposed driveways for the project site are anticipated to provide adequate width for office developments in the Linfield Oaks area. For the purpose of this analysis, vehicles exiting the project site are anticipated to primarily use the Linfield Drive exit. A majority of the provided parking is to the west of the proposed building, and Linfield Drive would be the most accessible exit and provide the easiest access to Middlefield Road.




P05253-321 Middlefield Site Plan.ai-3/2/06

**Figure 14A**
**Project Site Plan**
**321 Middlefield Road**

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The proposed residential development at 75 Willow Road would have a single access driveway to and from Willow Road. The proposed plan would incorporate a curvilinear street that would meander through the existing trees on site. The proposed site plan for 75 Willow Road is shown in Figure 14B.

The proposed project at 8 Homewood Place would have two access driveways to and from Homewood Place. The proposed site plan for 8 Homewood Place is shown in Figure 13C. Although the illustrated site plan only shows 25 units, the proposed project (and analysis) is for 37 units.

## Parking

321 Middlefield Road

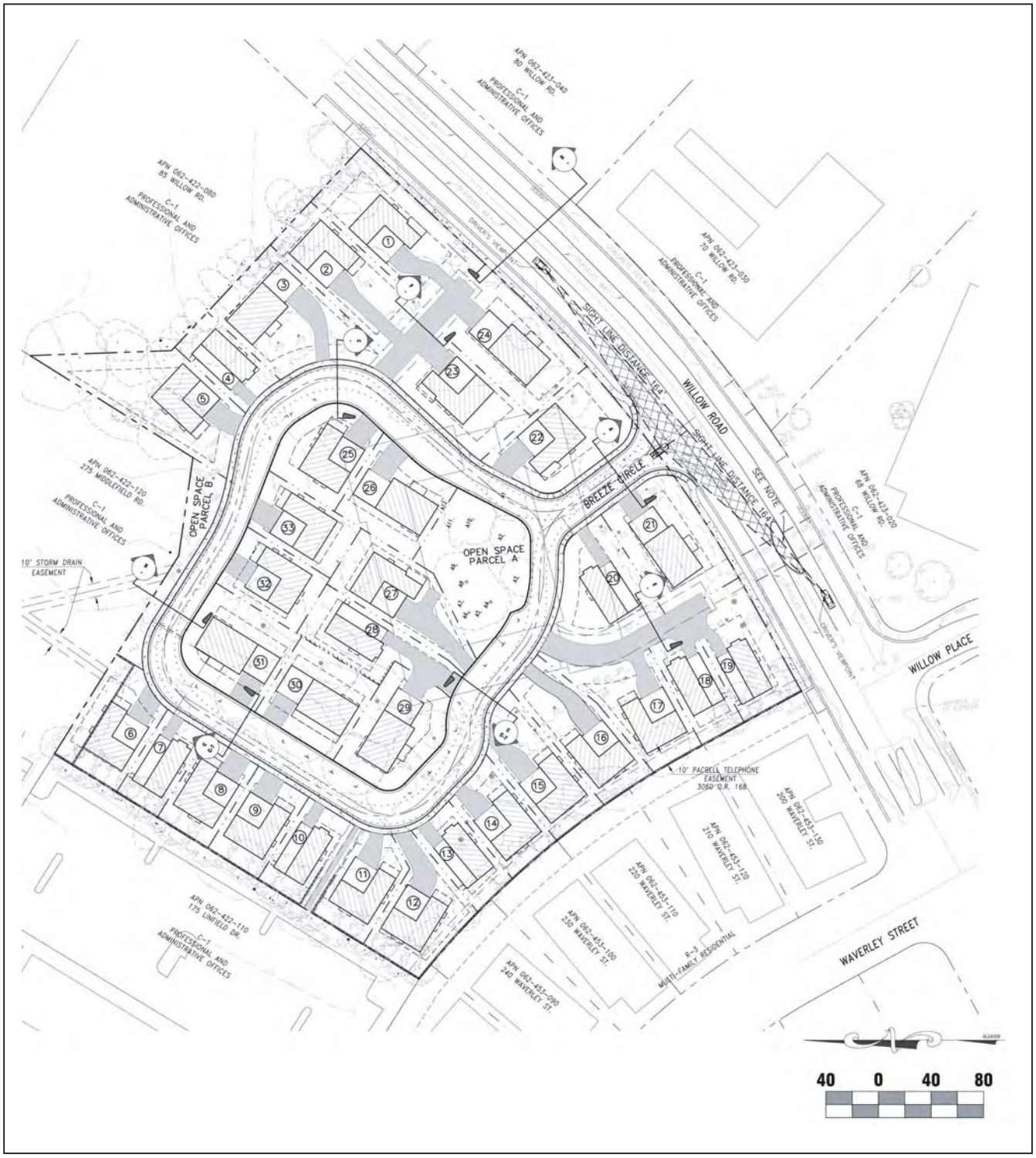
The parking requirements for the proposed project at 321 Middlefield Road were evaluated based on the City of Menlo Park Municipal Code requirements and the expected parking demand. In accordance with the City's parking requirements, the proposed project is required to provide a total of one parking space per 200 square feet of gross floor area. The proposed project includes 46,700 square feet of gross floor area distributed throughout the basement, first and second floors. The existing building also includes 1,700 square feet within the basement used for mechanical, electrical, and elevator equipment, but this is excluded from the total gross floor area. Given the total gross floor area of 46,700 square feet, 234 parking spaces (46,700/200 = 234 parking spaces) are required. The proposed site plan would include 227 standard parking stalls and seven handicapped parking stalls.

The design of the proposed project includes 234 parking stalls on-site. Based on the ITE Parking General Manual (3rd Edition, 2004), the proposed project at 321 Middlefield Road (ITE code 630- medical clinic) would have a demand of approximately 207 spaces during the peak period. The proposed parking supply is anticipated to meet the anticipated demand. Additional parking demand could be accommodated on Linfield Drive. This on-street parking is not dedicated parking to the site and does not count towards meeting the City's parking requirement.

75 Willow Road

The proposed residential project at 75 Willow Road would consist of 33 dwelling units. Each unit would have a two-car garage, with cars located either side by side or in tandem. The City's parking requirement for single-family residential units is two spaces, one of which must be covered. All spaces must be independently accessible. Tandem garages do not explicitly meet the requirement without an exception.

In addition to the covered parking spaces, each unit would have a driveway apron. Most of the aprons would be able to accommodate an additional two cars. Where tandem garages are proposed, the driveway apron would accommodate one car.




P05253•75 Willow Rd Site Plan.ai•1/31/06

**Figure 14B**
**Project Site Plan**
**75 Willow Road**

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P05040•321 Middlefield Proj Site.ai•1/31/06

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**Figure 14C**
**Project Site Plan**
**8 Homewood Place**

Guest parking spaces would be located on site along the circular street within the project. The applicant proposes 11 guest parking spaces that would be distributed throughout the road. Additional street parking will be available along Willow Road. This on-street parking is not dedicated parking to the site and does not count towards meeting the City's parking requirement.

8 Homewood Place

The proposed residential units at 8 Homewood Place were not evaluated for parking conditions, however adequate parking consisting of two spaces per unit, of which one must be covered, would be provided. Guest parking spaces would also be accommodated on-site. On-street parking is available on the west side of Homewood Place with a two-hour time limit from 8:30 AM to 5:30 PM on weekdays. This on-street parking is not dedicated parking to the site and does not count towards meeting the City's parking requirement.

## Transit

With a transit mode share of less than ten percent, the number of net-new transit riders would be minimal (seven to 15 peak hour riders). The relatively low number of potential transit trips is not expected to have an adverse impact on transit service or load factors.

## Pedestrians and Bicyclists

The site plans for the project at 321 Middlefield Road were reviewed in terms of pedestrian and bicyclist safety. In general, the proposed site plans would not create potentially significant bicycle and pedestrian impacts. A new pedestrian sidewalk would be created along the project frontages on Linfield Drive and Middlefield Road. Outside of the project site, pedestrians and bicyclists would be accommodated via the existing network of bike paths, sidewalks, crosswalks, and the local roadway network. The proposed project site is located within easy access to the existing sidewalks and bike lanes on Laurel Street as well as Middlefield Road.

At 75 Willow Road, the internal looping street would have a sidewalk provided on one side. An emergency vehicle access would serve as a pedestrian path between the residential community and Willow Road. Units facing Willow Road would have walkways that connect to the sidewalk along Willow Road. Final plans for the development at 8 Homewood Place would include appropriate pedestrian circulation and access facilities.

## Adjacent Neighborhoods

The three proposed developments are located in the Linfield Oaks Neighborhood, and all trips created by the proposed project would have origins or destinations within the project site. The project is not expected to contribute to cut-through traffic in adjacent neighborhoods due to the existing Linfield Oaks Neighborhood Traffic Management Plan. Per previous studies, the primary concerns with cut-through traffic are related to non-local, non-resident truck

activity that is inconsistent with nearby land uses (Kimley-Horn and Associates, Inc., May 2001). The three proposed developments would not generate unwanted cut-through traffic due the project sites being located within the Linfield Oaks Neighborhood.

Traffic calming measures are in place in the Linfield Oaks Neighborhood to deter cut-through traffic in general. These measures include:

- Two speed humps on Linfield Drive;
- "Welcome to Linfield Oaks Neighborhood Please Drive Carefully" signs on Alma Street, Laurel Street, Linfield Drive, and Willow Road;
- Three raised crosswalks on Laurel Street between Ravenswood Avenue and Burgess Drive;
- Two raised crosswalks and one speed table on Willow Road between Middlefield Road and Alma Street;
- Directional signs to Downtown Menlo Park, Stanford, Palo Alto, and US 101 on Ravenswood Avenue and Willow Road to direct motorists away from the Linfield Oaks Neighborhood roadways.

Based on the existing traffic calming measures, level of enforcement, and the number of net new trips that would be generated by the proposed project, the potential for additional cut-through traffic is minimal.

# 5. Near Term plus Alternative Project Conditions

The project alternative involves replacing a partially occupied 48,400 of office space at 321 Middlefield Road with approximately 55 residential units. Similar to the proposed project conditions, 8 Homewood Place and 75 Willow Road would be redeveloped with 37 and 33 residential units respectively.

## Trip Generation and Distribution

Trip generation for the current office units is consistent with methodologies presented previously. For 321 Middlefield, survey data was credited for the occupied office space. Based on the existing occupancy of general office space described in Section 4, there would be a net increase of nine trips during the AM peak hour and 25 trips during the PM peak hour. A net increase of approximately 267 total daily trips would be generated by the residential project alternative at 321 Middlefield Road.

For the project alternative, trip generation for the residential units at 75 Willow Road and 8 Homewood Place would be the same as described previously in Section 4 and in Table 5.

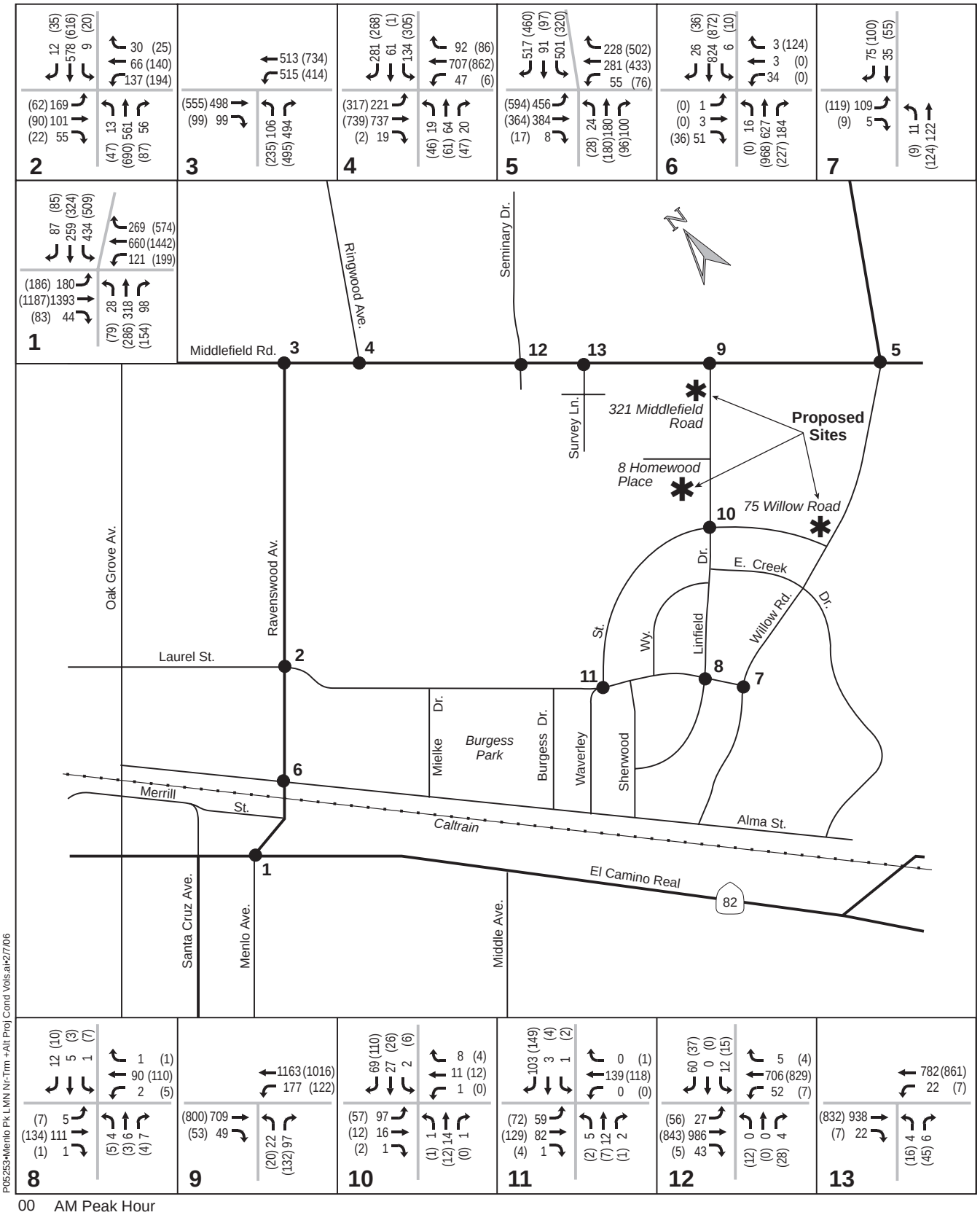
The distribution patterns for each of the project sites are consistent with the employment trip distribution patterns used in the CSA and previously illustrated in Figure 10.

## Traffic Volumes and Levels of Service

The net new trips related to the residential uses were added to the Near Term Conditions scenario. Figure 15 illustrates the Near Term plus Project Alternative Scenario peak hour traffic volumes, and Figure 16 illustrates the daily traffic volumes on the study roadway segments.

The operating conditions of the study intersections are similar to the Near Term plus Project scenario. Table 10 summarizes the intersection operating conditions for the Near Term, Near Term plus Project, and Near Term plus Project Alternative. Table 11 compares the ADT for the the Near Term, Near Term plus Project, and Near Term plus Project Alternative scenarios.

During the AM peak hour, operating conditions would operate with the same LOS and average intersection delays would typically be less than when compared to the Near Term plus Project scenario. The critical northbound approach to the intersection of Alma and Ravenswood would operate with approximately 43 seconds of delay. This is approximately 3.5 seconds less delay than compared to the Near-Term plus Project scenario. However the increase from the Near-Term scenario would also trigger a potentially significant impact.




00 AM Peak Hour
(00) PM Peak Hour

P05253•Menlo Pk LMN Nr-Trm +Alt Proj Cond Vols.ai•2/7/06

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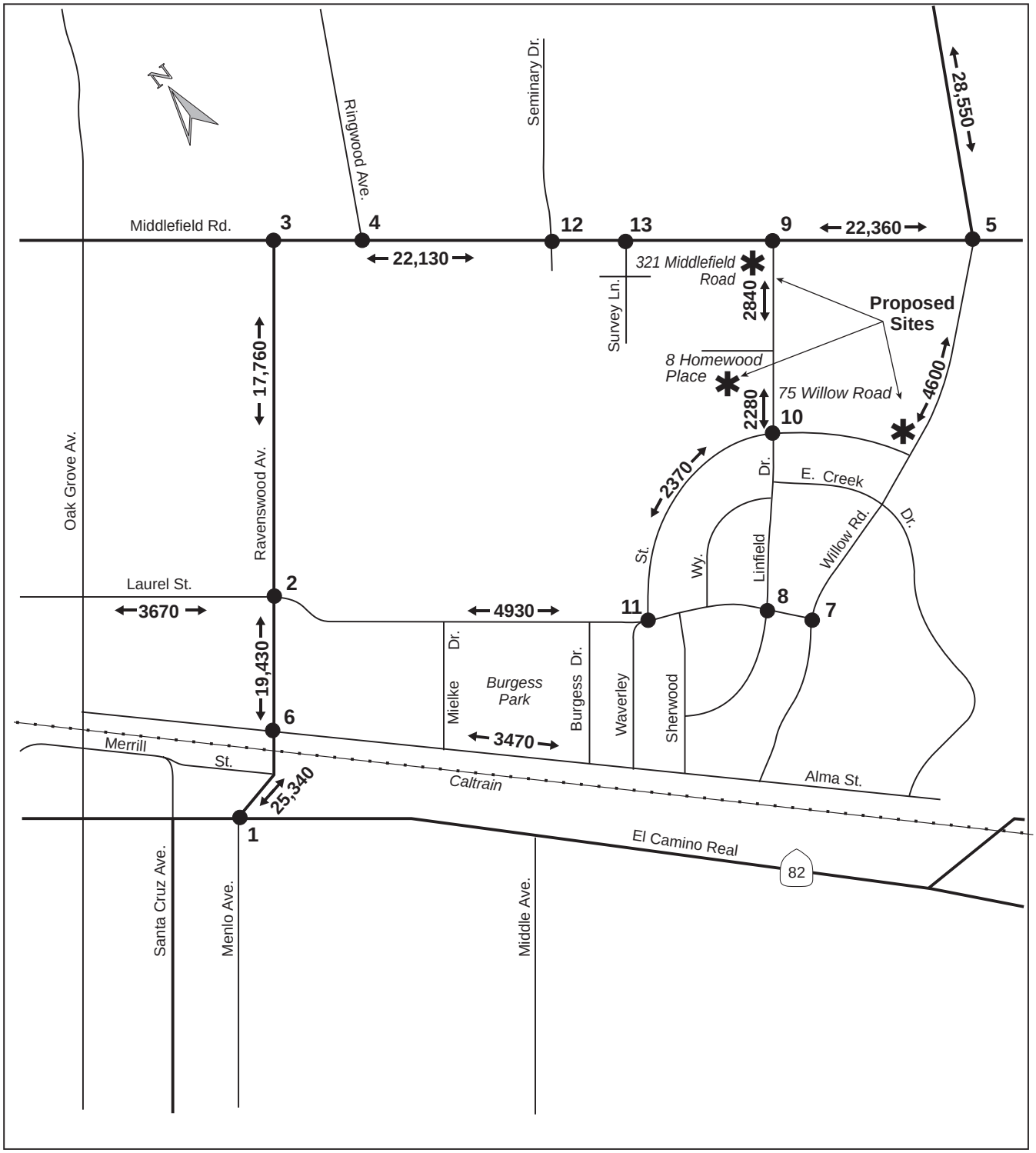
**Figure 15**
**Near-Term Plus Alternative Project Conditions**
**Peak Hour Volumes**

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● Study Intersection

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**Figure 16**
**Near Term Plus Alternative Project Conditions ADT**

**Table 10**
**Near Term plus Project Alternative Peak Hour Intersection Levels of Service Comparison Summary**

| Study Intersection | Near Term | | | | Near Term plus Project | | | | Near Term plus Project Alternative | | | | Potentially Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | |
| | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | |
| El Camino Real/Ravenswood | 47.8 | D | **58.8** | **E** | 48.6 | D | **64.2** | **E** | 48.2 | D | **60.1** | **E** | No |
| Critical Local Approaches[C] | 52.9/55.6 | | **56.8/76.6** | | 55.5/59.5 | | **60.4/106** | | 53.1/ 59.5 | | **59.4/82.5** | | **Yes** |
| Ravenswood Avenue/Laurel | 16.5 | B | 12.6 | B | 16.8 | B | 13.6 | B | 16.6 | B | 13.0 | B | No |
| Middlefield Road/Ravenswood | 31.0 | C | 31.7 | C | 31.5 | C | 32.8 | C | 31.0 | C | 32.2 | C | No |
| Middlefield Road/Ringwood | 25.6 | C | 31.6 | C | 25.5 | C | 31.9 | C | 25.6 | C | 31.5 | C | No |
| Middlefield Road/Willow Road | 47.9 | D | 52.9 | D | 48.6 | D | 53.3 | D | 44.6 | D | 53.4 | D | No |
| Alma Street/ Ravenswood | **41.1** | **E** | 16.6 | C | **46.3** | **E** | 17.1 | C | **42.8** | **E** | 17.0 | C | **Yes** |
| Laurel Street/Willow Road | 8.1 | A | 8.3 | A | 8.1 | A | 8.3 | A | 8.1 | A | 8.3 | A | No |
| Laurel Street/Linfield Drive | 9.7 | A | 10.1 | B | 9.7 | A | 10.2 | B | 9.7 | A | 10.2 | B | No |
| Middlefield Road /Linfield | 16.7 | C | 16.4 | C | 23.7 | C | 34.2 | D | 23.4 | C | 18.8 | C | No |
| Linfield Drive/Waverley Street | 7.5 | A | 7.4 | A | 7.7 | A | 7.6 | A | 7.6 | A | 7.5 | A | No |
| Waverley Street/Laurel Street | 11.5 | B | 11.6 | B | 12.1 | B | 12.3 | B | 11.6 | B | 12.1 | B | No |
| Middlefield Road /Seminary | 18.1 | C | 24.1 | C | 18.6 | C | 26.0 | D | 18.5 | C | 24.6 | D | No |
| Middlefield Road /Survey Lane | 20.1 | C | 16.2 | C | 20.7 | C | 16.7 | C | 20.2 | C | 16.5 | C | No |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
c. Average delay for Eastbound/Westbound critical movements (local approaches).

**Table 11**
**Average Daily Traffic Comparison Summary – Project Alternative**

| | | Near Term | Near Term plus Project | | | Near Term plus Project Alternative | | | |
|---|---|---|---|---|---|---|---|---|---|
| Study Roadway Segment | Roadway Class | ADT | ADT | Net Volume Added for Project | % Change in ADT from Near Term | ADT | Net Volume Added for Project | % Change in ADT from Near Term | Potentially Significant Impact? |
| Linfield Drive (Homewood to Waverley) | L | 1,821 | 2,040 | 219 | 12.0% | 2,277 | 237 | 11.6% | **Yes** |
| Linfield Drive (Homewood to Middlefield) | | 2,129 | 2,455 | 326 | 15.3% | 2,839 | 385 | 15.7% | |
| Waverley Street (Linfield to Laurel) | L | 1,905 | 2,126 | 221 | 11.6% | 2,373 | 247 | 11.6% | **Yes** |
| Ravenswood Ave. (El Camino Real to Alma) | MA | 23,900 | 24,951 | 1,051 | 4.4% | 25,343 | 392 | 1.6% | **Yes** |
| Ravenswood Ave. (Alma to Laurel) | MA | 18,100 | 19,035 | 935 | 5.2% | 19,427 | 392 | 2.1% | **Yes** |
| Ravenswood Avenue (Middlefield to Laurel) | MA | 17,000 | 17,709 | 709 | 4.2% | 17,763 | 54 | 0.3% | No |
| Middlefield Road (Ringwood to Linfield) | MA | 21,100 | 21,941 | 841 | 4.0% | 22,129 | 188 | 0.9% | **Yes** |
| Middlefield Road (Willow to Linfield) | | 21,100 | 22,229 | 1,129 | 5.4% | 22,364 | 135 | 0.6% | |
| Laurel Street (Ravenswood to Waverley) | C | 4,300 | 4,591 | 291 | 6.8% | 4,930 | 339 | 7.4% | No |
| Willow Road (Middlefield to Bay) | MA | 26,900 | 28,432 | 1,532 | 5.7% | 28,553 | 121 | 0.4% | **Yes** |
| Willow Road (Middlefield to Laurel) | C | 4,400 | 4,488 | 88 | 2.0% | 4,595 | 107 | 2.4% | No |
| Alma Street (Willow to Ravenswood) | C | 3,400 | 3,468 | 68 | 2.0% | 3,468 | 0 | 0.0% | No |

Key:
L = Local Street. Impact if ADT is >1,350 vehicles and project adds 25 or more trips, or if 1,350 > ADT > 750 and project increases ADT by 12.5% or ADT reaches 1,350, or if ADT is <750 and project increases ADT by 25%.
C = Collector Street. Impact if ADT is >9,000 vehicles and project adds 50 or more trips, or if 9,000 > ADT > 5,000 and project increases ADT by 12.5% or ADT reaches 9,000, or ADT is <5,000 and project increases ADT by 25%.
MA = Minor Arterial. Impact if ADT is >18,000 vehicles and project adds 100 or more trips, or if 18,000 > ADT > 10,000 and project increases ADT by 12.5% or ADT reaches 18,000, or ADT is <10,000 and project increases ADT by 25%.

During the PM peak hour, each of the analysis intersections would operate at the same LOS with slightly less delays with the exception of the intersection of Middlefield and Willow Road, which would operate with approximately 0.1 seconds of more delay.

The intersection of Middlefield Road and Linfield Drive would operate at LOS C instead of LOS D with approximately 19 seconds of delay to the eastbound approach, which is approximately 15 seconds less delay than during the Near Term plus Project scenario, due to a reduced number of outbound trips during the PM peak period. It should be noted that the eastbound left turn movement would continue to operate with an existing deficiency, however.

Two potentially significant impacts would occur due to proposed residential units at the three project sites. The intersection of Alma Street and Ravenswood Avenue would experience impacts similar to the Near Term plus Project scenario during the AM peak hour. The northbound approach would increase by more than 0.8 seconds of delay. During the PM peak hour, the critical eastbound and westbound (local) approaches to El Camino Real and Ravenswood would experience an increase of delay by more than 0.8 seconds.

Average daily traffic would also experience a decrease as compared to the Near Term plus Project scenario on each of the study roadway segments. However potentially significant impacts would still occur at six of the ten analysis segments.

## Site Access and Circulation

A formal application and proposed layout for residential units at 321 Middlefield Road has not been submitted. Recently proposed residential developments in the Linfield Oaks neighborhood, including those at 8 Homewood Place and 75 Willow Road typically follow a cluster pattern with a single driveway entrance to a circulatory roadway within the development site. For the purposes of this analysis, vehicle trips were assumed to use a single access point on Linfield Drive. Driveways on Middlefield Road were not assumed to be available for a residential development.

## Routes of Regional Significance

Project generated traffic related to residential units would generate less than 100 total trips from each of the sites respectively. At most, each of the project sites would add less than 10 vehicles to any segment along a Route of Regional Significance during the AM or PM peak hour. This would be significantly less than one percent of the segment's capacity.

# 6. Near Term plus Full Occupancy Conditions

The analysis scenario represents a no project alternative in which each of the existing project sites are re-occupied with general office uses. Existing office buildings at the three project sites consist of 21,500 sf at 8 Homewood Place, 48,400 of office space at 321 Middlefield, and 39,000 sf at 75 Willow Road. These existing buildings are currently zoned and approved for potential occupants; therefore this scenario would not result in potentially significant impacts. However, the additional traffic may contribute to degradation of intersection operating at unacceptable levels. Due to evolving traffic conditions in the area, potential deficiencies in the study intersections are analyzed, and a comparison of full occupancy versus the proposed developments is presented. In general, the three proposed developments would result in slightly more traffic than fully occupied office buildings.

## Trip Generation and Distribution

Trip generation for occupied general offices at 321 Middlefield Road is based on the ITE Trip Generation Manual. The difference between the total trips generated and the trips surveyed was added to the Near Term scenario. The ITE Trip generation rates were also used for 100 percent occupied office spaces at 8 Homewood Place and 75 Willow Road. As described previously, 8 Homewood Place was assumed to be vacant, and 75 Willow Road was assumed to be 25 percent occupied for the Near Term scenario. Combined, fully occupied offices at the three project sites would generate 121 net new AM peak hour trips (113 in, 8 out) and 116 net new PM peak hour trips (15 in, 101 out). Approximately 829 net new daily vehicle trips would be generated by the occupied offices. Table 12 compares the trip generation estimates between the three proposed developments and fully occupied offices at the three project sites. As shown in Table 12, fully occupied offices would generate approximate nine more AM peak hour trips and 77 less PM peak hour trips when compared to the net new trip generation from the three proposed developments. The occupied office would generate approximately 1,220 less daily trips than the three proposed developments combined.

For 321 Middlefield, credit for the partially occupied office space is based on survey data collected in 2005. Based on the existing occupancy of general office space, a fully occupied office space would result in a net increase of 43 trips during the AM peak hour and 41 trips during the PM peak hour. A net increase of approximately 274 daily trips would be generated by a fully occupied office at 321 Middlefield Road.

At 8 Homewood Place, a 21,500 sf office building would generate approximately 33 AM peak hour trips (29 in, 4 out) and 31 PM peak hour trips (5 in, 26 out). Approximately 233 daily trips would be generated.

At 75 Willow Road, a fully occupied office building (39,000 sf) would generate a total of approximately 60 AM peak hour trips (53 in, 7 out), 58 PM peak hour trips (10 in, 48 out), and approximately 429 daily trips. Based on an existing occupancy rate of 25 percent, this represents an increase of 45 AM peak hour trips, 43 PM peak hour trips, and 322 daily trips.

**Table 12**
**Occupied Office Trip Generation Comparison**

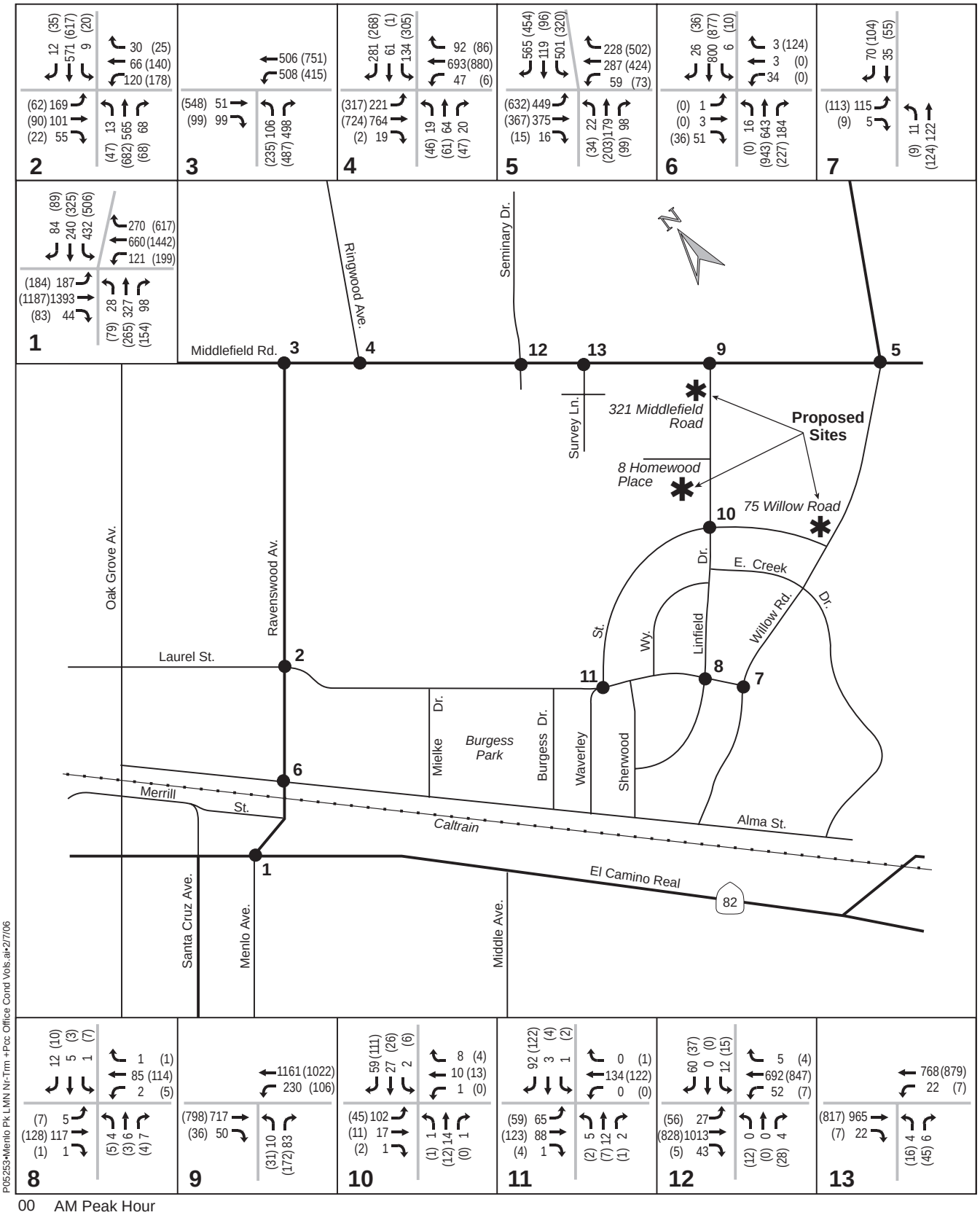
| | AM Peak Hour | | | PM Peak Hour | | | Daily |
|---|---|---|---|---|---|---|---|
| Project Site | In | Out | Total | In | Out | Total | Total |
| ITE Trip Generation Rates: | | | | | | | |
| Medical Offices – SF (ITE Code 720) | 79% | 21% | 2.48 | 27% | 73% | 3.72 | 36.13 |
| General Offices – SF (ITE Code 710) | 88% | 12% | 1.55 | 17% | 83% | 1.49 | 11.01 |
| Single Family Residential - Units (ITE Code 210) | 25% | 75% | 0.75 | 63% | 37% | 1.01 | 9.57 |
| Existing 48,400 sf Office at 321 Middlefield Road (based on survey count data) | 22 | 10 | 32 | 10 | 21 | 31 | 259 |
| Existing trips from 8 Homewood Place | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Existing 39,000 sf Office at 75 Willow Road (25 percent occupancy assumed) | 13 | 2 | 15 | 2 | 12 | 14 | 107 |
| New Trips for Fully Occupied Office at 321 Middlefield Road | 43 | 0 | 43 | 2 | 39 | 41 | 274 |
| New Trips for Fully Occupied Office at 8 Homewood Place | 29 | 4 | 33 | 5 | 26 | 31 | 233 |
| New Trips for Fully Occupied Office at 75 Willow Road | 40 | 5 | 45 | 7 | 36 | 43 | 322 |
| Total Net New Trips – Occupied Office | 112 | 9 | 121 | 14 | 101 | 115 | 829 |
| Total Net New Trips – Proposed Project (See Table 5) | 62 | 50 | 112 | 78 | 114 | 192 | 2,053 |
| **Net Difference** | **50** | **-41** | **9** | **-64** | **-13** | **-77** | **-1,224** |

The distribution pattern for the general office re-occupancy at each of the sites is consistent with the employment uses previously illustrated in Figure 10.

## Traffic Volumes and Levels of Service

The net new trips related to the occupied offices were added to the Near Term Conditions scenario. Figure 17 illustrates the Near Term plus Occupied Office Scenario peak hour traffic volumes, and Figure 18 illustrates the daily traffic volumes on the study roadway segments.

The operating conditions of the study intersections are similar to the Near Term plus Project scenario. Two intersections would meet the criteria for potentially significant impacts with fully occupying the vacant office. The intersection of Alma Street and Ravenswood Avenue would experience impacts similar to the Near Term plus Project scenario during the AM peak hour. The northbound approach would increase by more than 0.8 seconds of delay. During the PM peak hour, the critical local approaches to El Camino Real and Ravenswood would experience an increase of delay by more than 0.8 seconds. Although these intersections would meet the criteria for potentially significant impacts, they are currently zoned and approved for office uses, and therefore would not be required to provide mitigating measures.




00 AM Peak Hour
(00) PM Peak Hour

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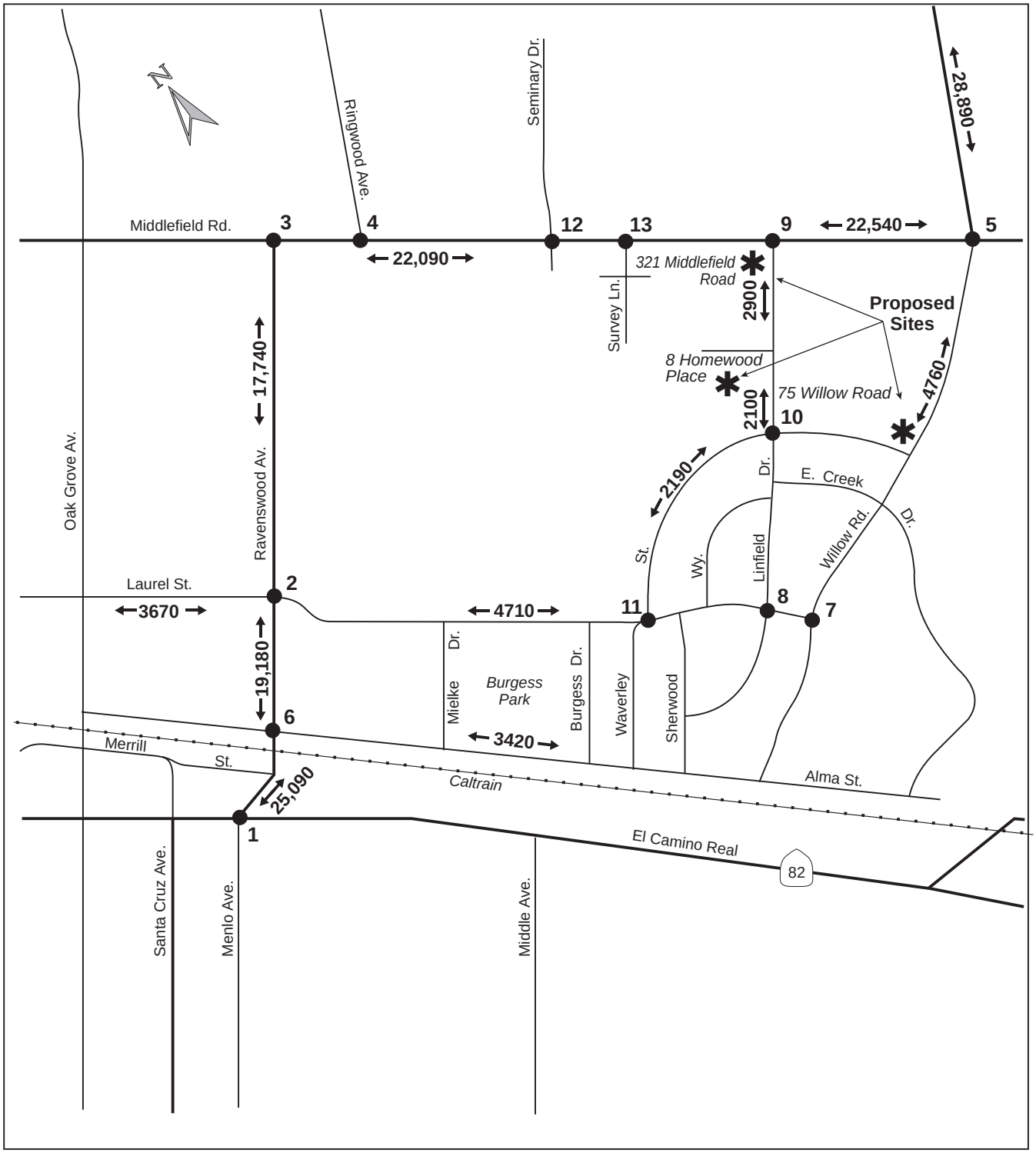
**Figure 17**
**Near-Term Plus Occupied Office Conditions**
**Peak Hour Volumes**




Study Intersection

P05253•Menlo Pk LMN Near-Term +Occ Office ADT.ai•2/24/06

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**Figure 18**
**Near Term Plus Occupied Office Conditions ADT**

Table 13 summarizes the intersection operating conditions for the Near Term, Near Term plus Project, and Near Term plus Occupied Offices operating conditions. Table 14 summarizes a comparison of the ADT volumes. As shown, the relative difference in delays between the addition of occupied office trips and proposed project trips is minimal.

## Site Access and Circulation

Re-occupancy of the existing buildings would not change the existing circulation patterns at each of the project sites. As described previously, the project site at 321 Middlefield Road consists of a one-way passenger loading zone with an entrance and exit driveway fronting Middlefield Road, and a parking lot with loading zones to the west of the building with one-way entrance and exit driveways fronting Linfield Drive. The second project site is a vacant 21,500 sf office building at 8 Homewood Place, with primary access via Homewood Place and Linfield Drive. The third project site is a 39,000 sf general office building located at 75 Willow Road with a single driveway access point from Willow Road..

## Routes of Regional Significance

Vehicle trips generated due to re-occupying the existing office buildings would total less than 100 peak hour trips from each of the sites respectively. At most, each of the project sites would add less than 20 vehicles to any segment along a Route of Regional Significance during either the AM or PM peak hour. This would be less than one percent of the segment's capacity.

**Table 13**
**Near Term plus Occupied Office Spaces Peak Hour Intersection Levels of Service Comparison Summary**

| Study Intersection | Near Term | | | | Near Term plus Project | | | | Near Term plus Occupied Offices | | | | Potentially Significant Impact? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | | |
| | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay[a] | LOS[b] | |
| El Camino Real/Ravenswood | 47.8 | D | **58.8** | **E** | 48.6 | D | **64.2** | **E** | 48.1 | D | **59.5** | **E** | No |
| Critical Local Approaches[C] | 52.9/55.6 | | **56.8/76.6** | | 55.5/59.5 | | **60.4/106** | | 53.7/55.8 | | **57.0/83.2** | | **Yes** |
| Ravenswood Avenue/Laurel | 16.5 | B | 12.6 | B | 16.8 | B | 13.6 | B | 16.6 | B | 12.9 | B | No |
| Middlefield Road/Ravenswood | 31.0 | C | 31.7 | C | 31.5 | C | 32.8 | C | 31.9 | C | 31.8 | C | No |
| Middlefield Road/Ringwood | 25.6 | C | 31.6 | C | 25.5 | C | 31.9 | C | 25.5 | C | 31.8 | C | No |
| Middlefield Road/Willow Road | 47.9 | D | 52.9 | D | 48.6 | D | 53.3 | D | 49.6 | D | 55.5 | E | No |
| Alma Street/ Ravenswood | **41.1** | **E** | 16.6 | C | **46.3** | **E** | 17.1 | C | **43.1** | **E** | 16.6 | C | **Yes** |
| Laurel Street/Willow Road | 8.1 | A | 8.3 | A | 8.1 | A | 8.3 | A | 8.2 | A | 8.3 | A | No |
| Laurel Street/Linfield Drive | 9.7 | A | 10.1 | B | 9.7 | A | 10.2 | B | 9.7 | A | 10.1 | B | No |
| Middlefield Road /Linfield | 16.7 | C | 16.4 | C | 23.7 | C | 34.2 | D | 19.3 | C | 20.5 | C | No |
| Linfield Drive/Waverley Street | 7.5 | A | 7.4 | A | 7.7 | A | 7.6 | A | 7.6 | A | 7.4 | A | No |
| Waverley Street/Laurel Street | 11.5 | B | 11.6 | B | 12.1 | B | 12.3 | B | 11.7 | B | 11.8 | B | No |
| Middlefield Road /Seminary | 18.1 | C | 24.1 | C | 18.6 | C | 26.0 | D | 18.4 | C | 25.0 | D | No |
| Middlefield Road /Survey Lane | 20.1 | C | 16.2 | C | 20.7 | C | 16.7 | C | 20.6 | C | 16.4 | C | No |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.

**Table 14**
**Average Daily Traffic Comparison Summary**

| | | Near Term | Near Term plus Project | | | Near Term plus Occupied Offices | | | |
|---|---|---|---|---|---|---|---|---|---|
| Study Roadway Segment | Roadway Class | ADT | ADT | Net Volume Added for Project | % Change in ADT from Near Term | ADT | Net Volume Added for Project | % Change in ADT from Near Term | Potentially Significant Impact? |
| Linfield Drive (Homewood to Waverley) | L | 1,821 | 2,040 | 219 | 12.0% | 2,101 | 60 | 3.0% | **Yes** |
| Linfield Drive (Homewood to Middlefield) | | 2,129 | 2,455 | 326 | 15.3% | 2,901 | 446 | 18.2% | |
| Waverley Street (Linfield to Laurel) | L | 1,905 | 2,126 | 221 | 11.6% | 2,192 | 66 | 3.1% | **Yes** |
| Ravenswood Ave. (El Camino Real to Alma) | MA | 23,900 | 24,951 | 1,051 | 4.4% | 25,092 | 141 | 0.6% | **Yes** |
| Ravenswood Ave. (Alma to Laurel) | MA | 18,100 | 19,035 | 935 | 5.2% | 19,176 | 141 | 0.7% | **Yes** |
| Ravenswood Avenue (Middlefield to Laurel) | MA | 17,000 | 17,709 | 709 | 4.2% | 17,735 | 26 | 0.1% | No |
| Middlefield Road (Ringwood to Linfield) | MA | 21,100 | 21,941 | 841 | 4.0% | 22,090 | 149 | 0.7% | **Yes** |
| Middlefield Road (Willow to Linfield) | | 21,100 | 22,229 | 1,129 | 5.4% | 22,540 | 311 | 1.4% | |
| Laurel Street (Ravenswood to Waverley) | C | 4,300 | 4,591 | 291 | 6.8% | 4,706 | 115 | 2.5% | No |
| Willow Road (Middlefield to Bay) | MA | 26,900 | 28,432 | 1,532 | 5.7% | 28,888 | 456 | 1.6% | **Yes** |
| Willow Road (Middlefield to Laurel) | C | 4,400 | 4,488 | 88 | 2.0% | 4,755 | 267 | 6.0% | No |
| Alma Street (Willow to Ravenswood) | C | 3,400 | 3,468 | 68 | 2.0% | 3,468 | 0 | 0.0% | No |

Key:
L = Local Street. Impact if ADT is >1,350 vehicles and project adds 25 or more trips, or if 1,350 > ADT > 750 and project increases ADT by 12.5% or ADT reaches 1,350, or if ADT is <750 and project increases ADT by 25%.
C = Collector Street. Impact if ADT is >9,000 vehicles and project adds 50 or more trips, or if 9,000 > ADT > 5,000 and project increases ADT by 12.5% or ADT reaches 9,000, or ADT is <5,000 and project increases ADT by 25%.
MA = Minor Arterial. Impact if ADT is >18,000 vehicles and project adds 100 or more trips, or if 18,000 > ADT > 10,000 and project increases ADT by 12.5% or ADT reaches 18,000, or ADT is <10,000 and project increases ADT by 25%.

# 7. Long Range Conditions

The long range no project scenario is based on future peak hour traffic at the study intersections as well as average daily traffic on the study roadway segments. The projected traffic volumes presented in this section are based on a 10-year horizon with an assumed ambient growth of one percent per year. Analysis for potentially significant transportation related impacts was conducted for a long range plus project scenario. Similar to the near term plus project scenario, the long range plus project scenario adds the net-new traffic projected for all three of the proposed developments.

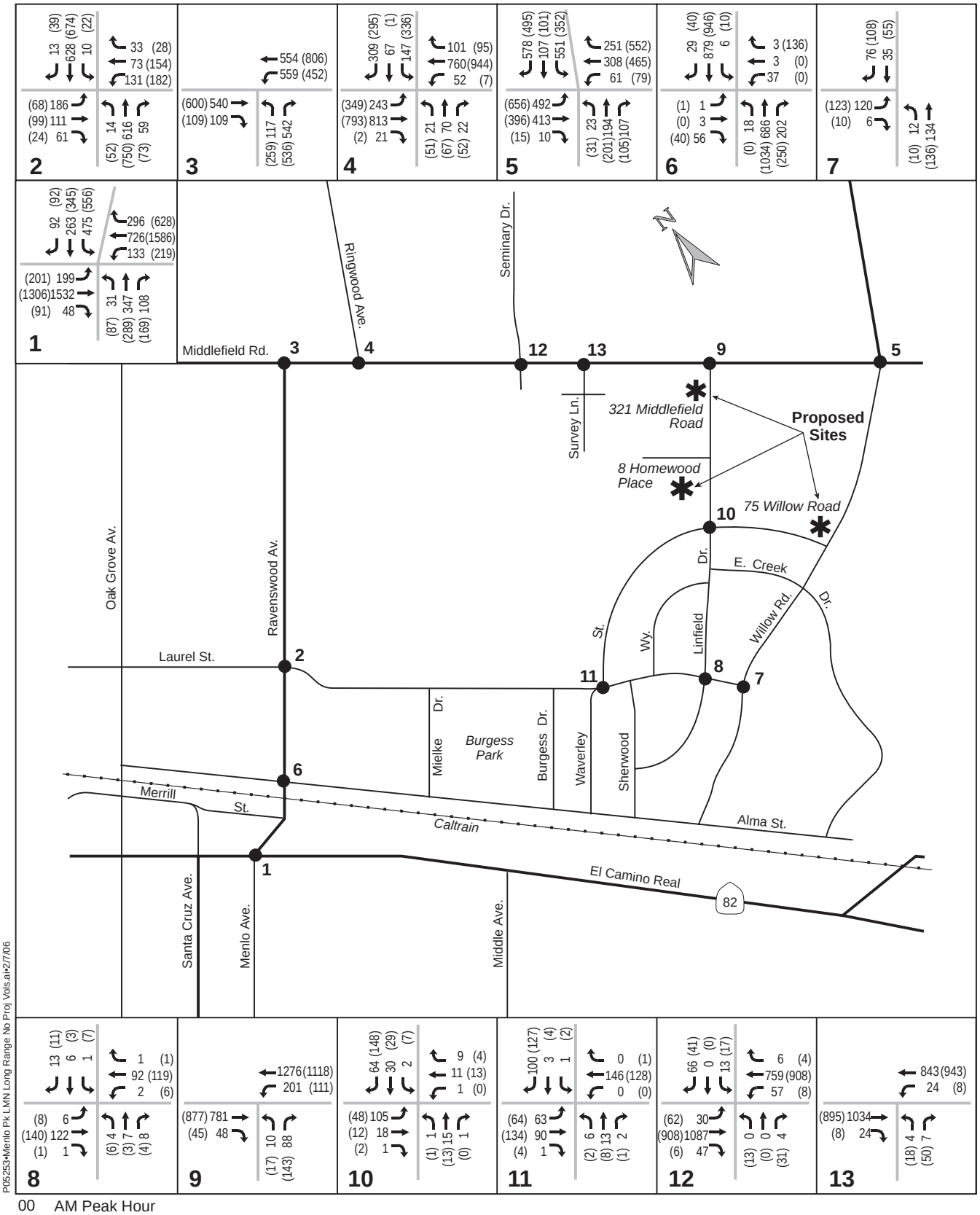
## Traffic Volumes and Levels of Service

To obtain long range traffic volumes, the baseline volumes used in the previous scenarios were assumed to increase with an ambient growth of one percent per year over ten years (approximately 10.5% total growth) to estimate long range base traffic conditions. The planned and approved projects that were discussed previously in Section 3 were also included in the Long Range scenarios. Figure 19 illustrates the Long Range (no project) peak hour traffic volumes at the study intersections. Figure 20 illustrates the Long Range no project ADT volumes for the study roadway segments.

Table 15 summarizes the intersection operating conditions for the Long Range No Project and Long Range plus Project intersection operating conditions. As shown in Table 15, three of the study intersections would operate at unacceptable service levels during the AM peak hour of the Long Range No Project scenario; the intersection of El Camino Real and Ravenswood, the intersection of Willow Road and Middlefield Road, and the intersection of Ravenswood Avenue and Alma Street. During the PM peak hour, two intersections would operate at unacceptable service levels; the intersection of El Camino Real and Ravenswood and the intersection of Middlefield Road and Willow Road.

For the Long Range plus Project scenario, the proposed developments at the three sites are consistent with the developments described in Section 4. The 48,400 sf of general office space at 321 Middlefield Road would be replaced with similarly sized medical offices, the office space at 75 Willow Road would be replaced by 33 residential units, and the vacant office space at 8 Homewood would be replaced with 37 residential units. The estimated net new project trips from the three development sites were added to the Long Range No Project baseline traffic volumes.

During the AM peak hour, the intersection El Camino Real and Ravenswood and the intersection of Middlefield Road and Willow Road would operate at LOS E. At the intersection of El Camino Real and Ravenswood, the critical movements on the local approaches would experience a delay increase greater than 0.8 seconds, which is considered a potentially significant impact. Similarly to the Project Conditions scenario, the intersection of Ravenswood Avenue and Alma Street would experience a potentially significant impact as the critical approach would increase by approximately 9.3 seconds. At the intersection of




00 AM Peak Hour
(00) PM Peak Hour

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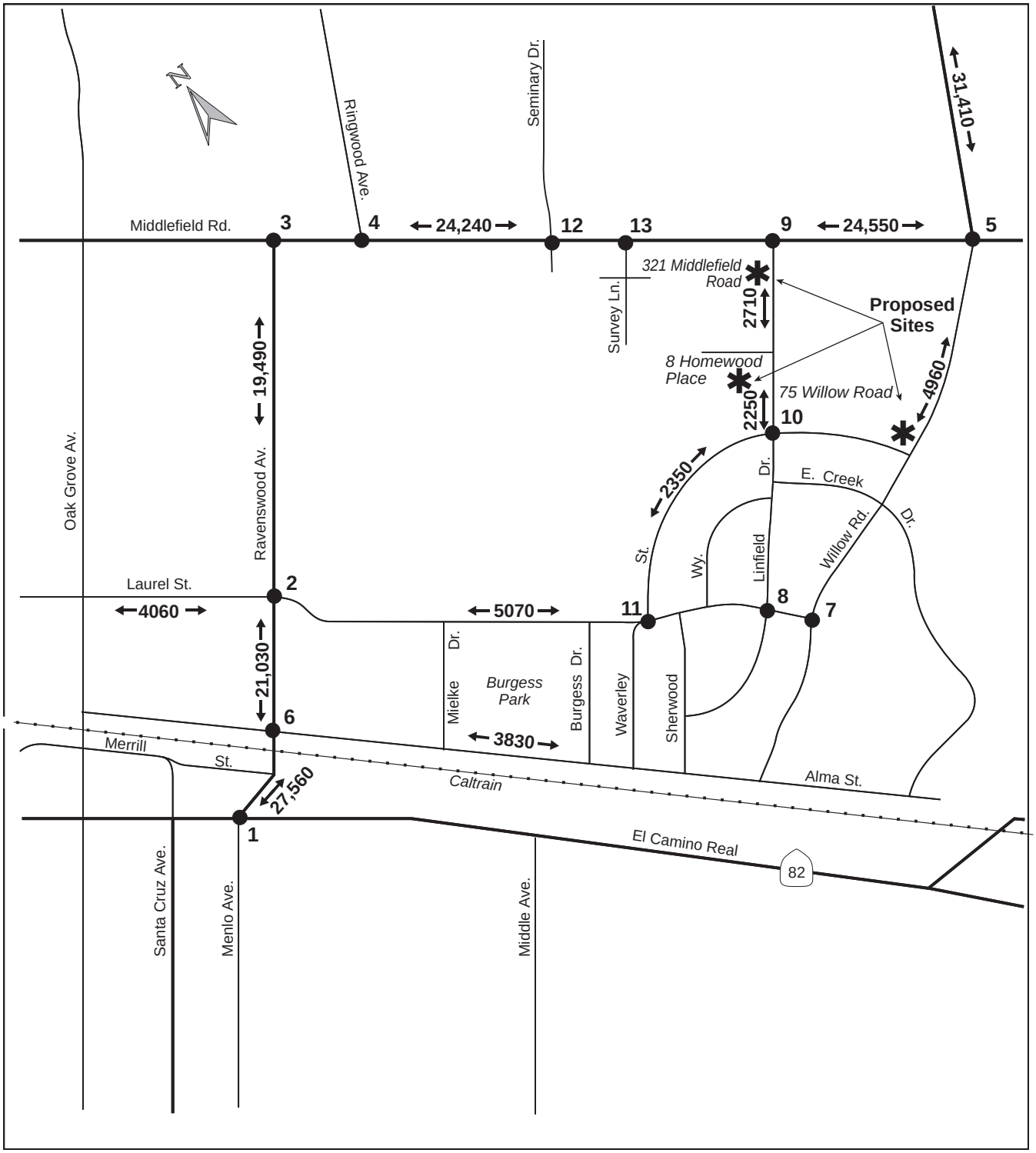
P05253•Menlo Pk LMN Long Range No Proj Vols.ai•2/7/06

**Figure 19**
**Long Range No Project Conditions Peak Hour Volumes**




Study Intersection

P05253•Menlo Pk LMN Long Range No Proj ADT.ai•2/24/06

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**Figure 20**
**Long Range No Project Conditions ADT**

**Table 15**
**Long Range Peak Hour Levels of Service**

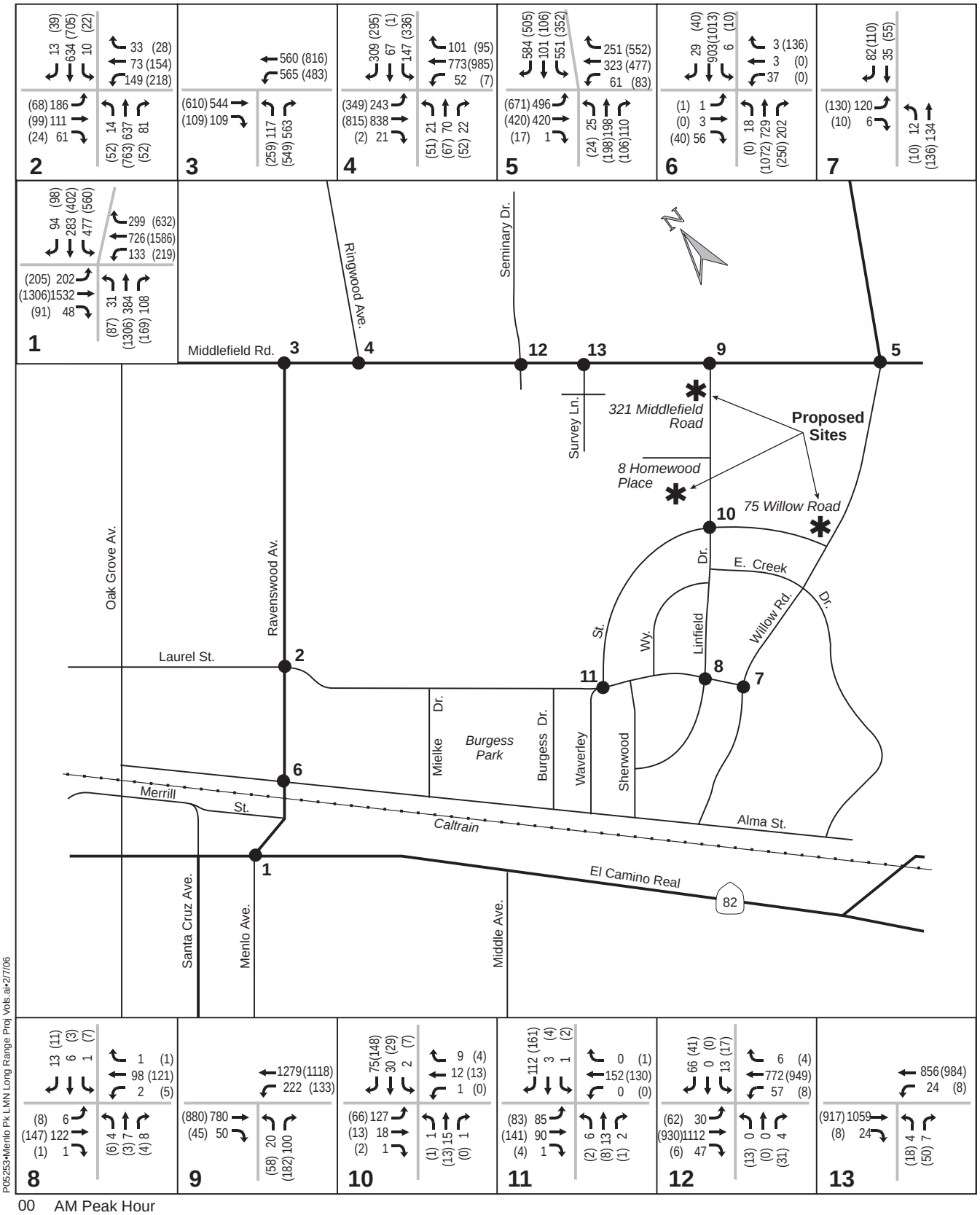
| Study Intersection | Long Range - No Project Scenario | | | | Long Range plus Project Scenario | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | | PM Peak Hour | | |
| | Delay[a] | LOS[b] | Delay[a] | LOS[b] | Delay | LOS | Potentially Significant Impact? | Delay | LOS | Potentially Significant Impact? |
| El Camino Real/Ravenswood Avenue | 58.2 | **E** | 78.1 | **E** | 59.1 | **E** | No | 85.4 | **F** | No |
| | **56.2 / 60.5** | | **63.6 / 98.4** | | **60.5 / 66.7** | | **Yes** | **70.3 / 137** | | **Yes** |
| Ravenswood Avenue/Laurel Street | 18.9 | C | 14.2 | B | 19.6 | C | No | 15.6 | B | No |
| Middlefield Road/Ravenswood Avenue | 35.9 | D | 36.5 | D | 36.7 | D | No | 38.4 | D | No |
| Middlefield Road/Ringwood Avenue | 26.8 | C | 36.4 | D | 26.7 | C | No | 37.3 | D | No |
| Middlefield Road/Willow Road | **54.4** | **D** | **62.3** | **E** | **55.5** | **E** | **Yes** | **63.4** | **E** | **Yes** |
| Alma Street/ Ravenswood Avenue (unsignalized) | **57.4** | **F** | 18.9 | C | **66.2** | **F** | **Yes** | 19.6 | C | **Yes** |
| Laurel Street/Willow Road (unsignalized) | 8.3 | A | 8.5 | A | 8.3 | A | No | 8.5 | A | No |
| Laurel Street/Linfield Drive (unsignalized) | 9.8 | A | 10.3 | B | 9.8 | A | No | 10.4 | B | No |
| Middlefield Road /Linfield Drive (unsignalized) | 19.8 | C | 18.9 | C | 31.1 | D | No | **50.3** | **F** | **Yes** |
| Linfield Drive/Waverley Street (unsignalized) | 7.6 | A | 7.4 | A | 7.8 | A | No | 7.7 | A | No |
| Waverley Street/Laurel Street (unsignalized) | 11.8 | B | 12.1 | B | 12.5 | B | No | 12.7 | B | No |
| Middlefield Road /Seminary Drive (unsignalized) | 21.8 | C | 30.7 | D | 22.5 | C | No | 33.7 | D | No |
| Middlefield Road /Survey Lane (unsignalized) | 23.1 | C | 18.2 | C | 23.9 | C | No | 18.9 | C | No |

Notes: See Appendix B for definitions of LOS for signalized and unsignalized intersections
a. Delay = average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.
b. LOS = Level of service, represents average for signalized and 4-way stop controlled intersections, and worst approach for 2-way stop controlled intersections.

Middlefield Road and Willow Road, the operating conditions would deteriorate from LOS D to LOS E; therefore a potentially significant impact would occur at this intersection. Figure 21 illustrates the Long Range plus Project peak hour volumes.

During the PM peak period, three intersections would operate at unacceptable levels of service: the intersections of Middlefield Road and Linfield Drive, El Camino Real and Ravenswood, and Willow Road and Middlefield Road. The intersection of Middlefield Road and Linfield Drive (two-way stop controlled) would deteriorate from LOS C to LOS E with the addition of the project related traffic. This would be considered a potentially significant impact. The critical local approaches to the intersection of El Camino Real and Ravenswood Avenue would increase by more than 0.8 seconds resulting in a potentially significant impact. The intersection of Middlefield Road and Willow Road is anticipated to operate at LOS E. The addition of net-new trips from the three proposed developments would result in all of the four critical approaches to increase by more than 0.8 seconds of delay. This is considered a potentially significant impact

The net-new daily project trips added in the Long Range Conditions scenario due to the three proposed developments would be the same as in the Near-Term plus Project conditions. As with the Project Conditions scenario, the ADT in the Long Range plus Project scenario would be add to six roadway segments that experience potentially significant impacts under the Near-Term plus Project. These segments include Linfield Drive, Waverley Street, Willow Road, Middlefield Road, and Ravenswood Avenue (between El Camino Real and Alma, and between Alma and Laurel). In addition to the six roadway segments that would experience potentially significant and unavoidable impacts during the Near-Term plus Project scenario, two additional segments would experience potentially significant impacts during the Long Range plus Project scenario. The segment of Laurel Street would increase to slightly more than 5,000 daily vehicles due to the addition of background growth of the long term period, and project related traffic would result in an increase of approximately 16 percent, resulting in a potentially significant impact. Ravenswood Avenue between Middlefield Road and Laurel Street would experience a potentially significant impact with the increase to more than 18,000 vehicles per day, and three proposed developments adding more than 100 new trips. Table 16 compares the Long Range scenario ADT without the three proposed developments and with the proposed developments. Figure 22 illustrates the estimated ADT for the Long Range plus Project conditions.




00 AM Peak Hour
(00) PM Peak Hour

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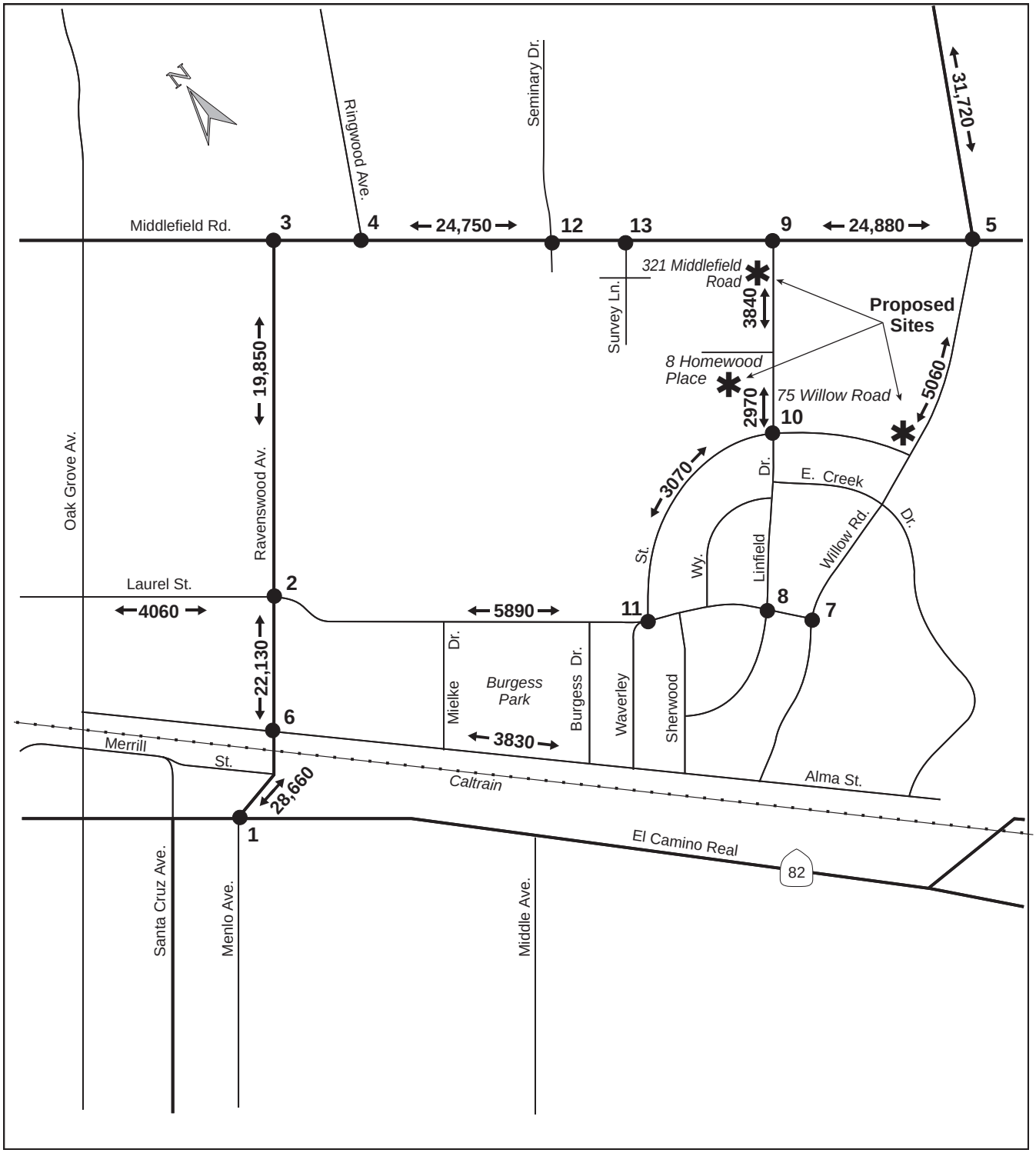
**Figure 21**
**Long Range Project Conditions Peak Hour Volumes**

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● Study Intersection

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**Figure 22**
**Long Range Project Conditions ADT**

**Table 16**
**Long Range Average Daily Traffic Comparison Summary**

| | | Near Term | Long Range – No Project | | | Long Range plus Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Study Roadway Segment | Roadway Class | ADT | ADT | Volume Added for Near Term | % Change in ADT from Near Term | ADT | Net Volume Added for Project | % Change in ADT from Long Range | Potentially Significant Impact? |
| Linfield Drive (Homewood to Waverley) | L | 2,040 | 2,254 | 213 | 10.5% | 2,967 | 713 | 31.7% | **Yes** |
| Linfield Drive (Homewood to Middlefield) | | 2,455 | 2,711 | 257 | 10.5% | 3,842 | 1,130 | 41.7% | |
| Waverley Street (Linfield to Laurel) | L | 2,126 | 2,348 | 222 | 10.5% | 3,072 | 724 | 30.8% | **Yes** |
| Ravenswood Ave. (El Camino Real to Alma) | MA | 24,951 | 27,561 | 2,610 | 10.5% | 28,662 | 1,102 | 4.0% | **Yes** |
| Ravenswood Ave. (Alma tot Laurel) | MA | 19,035 | 21,026 | 1,991 | 10.5% | 22,128 | 1,102 | 5.2% | **Yes** |
| Ravenswood Avenue (Middlefield to Laurel) | MA | 17,709 | 19,561 | 1,852 | 10.5% | 19,848 | 286 | 1.5% | **Yes** |
| Middlefield Road (Ringwood to Linfield) | MA | 21,941 | 24,236 | 2,295 | 10.5% | 24,747 | 511 | 2.1% | **Yes** |
| Middlefield Road (Willow to Linfield) | | 22,229 | 24,554 | 2,325 | 10.5% | 24,879 | 325 | 1.3% | |
| Laurel Street (Ravenswood to Waverley) | C | 4,591 | 5,071 | 480 | 10.5% | 5,886 | 815 | 16.1% | **Yes** |
| Willow Road (Middlefield to Bay) | MA | 28,432 | 31,406 | 2,974 | 10.5% | 31,718 | 312 | 1.0% | **Yes** |
| Willow Road (Middlefield to Laurel) | C | 4,488 | 4,957 | 469 | 10.5% | 5,064 | 107 | 2.2% | No |
| Alma Street (Willow to Ravenswood) | C | 3,468 | 3,831 | 363 | 10.5% | 3,831 | 0 | 0.0% | No |

Key:
L = Local Street. Impact if ADT is >1,350 vehicles and project adds 25 or more trips, or if 1,350 > ADT > 750 and project increases ADT by 12.5% or ADT reaches 1,350, or if ADT is <750 and project increases ADT by 25%.
C = Collector Street. Impact if ADT is >9,000 vehicles and project adds 50 or more trips, or if 9,000 > ADT > 5,000 and project increases ADT by 12.5% or ADT reaches 9,000, or ADT is <5,000 and project increases ADT by 25%.
MA = Minor Arterial. Impact if ADT is >18,000 vehicles and project adds 100 or more trips, or if 18,000 > ADT > 10,000 and project increases ADT by 12.5% or ADT reaches 18,000, or ADT is <10,000 and project increases ADT by 25%.

# 8. Mitigation Measures

As part of a systematic transportation program, the City of Menlo Park Staff and City Council members have identified several potential transportation improvement measures. Table 17 summarizes a list of potential projects provided by the City. As shown in the table, each of the improvement measures are noted if potentially significant impacts occur due to the three proposed developments. The rightmost column of Table 17 indicates if the mitigation or improvement measure would reduce a potential impact to a less than significant level. The following section summarizes the potentially significant impacts and potential mitigation measure.

In addition to the mitigation measures identified below, this report qualitatively evaluates the identified improvement measures provided by the City. For each of the potential mitigation and improvement measures, a percent contribution of traffic to the identified facility was identified for each of the three proposed developments. In addition to the three proposed developments, the proposed residential developments at 110 and 175 Linfield Drive were included in the analysis of percent contribution.

## Intersection Impact 1 (Near Term plus Project Conditions, Near Term plus Project Alternative, Long Range plus Project Conditions)

The northbound approach from Alma Street to Ravenswood Avenue would operate at LOS F under each of the analysis scenarios. With the proposed project, there would be an increase of average delay to the northbound approach of approximately five seconds for the Near Term plus Project scenario and the Long Range plus Project scenario. This is considered a potentially significant impact under the City's Transportation Impact Analysis Guidelines. During the PM peak hour, the intersection operates at acceptable levels of service due to restricting on the northbound approach to right turns only.

Based on an analysis of net new daily vehicle trips generated by each of the proposed developments, approximately 70 percent of the net-new daily trips would be going to/coming from the proposed project at 321 Middlefield Road, 11 percent to/from 8 Homewood Place, two percent from 75 Willow Road, and 17 percent to/from 110-175 Linfield Drive.

**City of Menlo Park Improvement Measure**

Several mitigation measures were considered for this intersection. Signalization of the intersection would allow adequate time for the approaches on Alma Street. Signalization would be difficult and expensive due to the close proximity of the intersection to the Caltrain railroad tracks and limited right of way. An alternative mitigation measure would involve prohibiting left and through movements from Alma Street during the AM peak period (similar to current operations during the PM peak period). The City has identified a possible improvement measure to construct a median on Ravenswood Avenue at this intersection.

**Table 17**
**Identified Transportation Improvement Measures**

| Facility | Transportation Improvement Measure Description | Source | Potentially Significant Impact? | Reduces Impact to Less than Significant |
|---|---|---|---|---|
| Linfield Drive Roadway | Physical changes to roadways such as constructing a raised median on Linfield Drive and potentially installing a roundabout at the intersection with Homewood Place to transition between the Middlefield Road corridor and the residential neighborhood. | June 14, 2005 Staff Report | Yes | No[a] |
| USGS Access | Eliminating employee vehicular access to the USGS campus from Homewood Place. This measure would potentially necessitate the installation of a traffic signal at the intersection of Middlefield Road and Seminary Drive. | June 14, 2005 Staff Report | n/a | No |
| Alma / Ravenswood Intersection | Constructing a median on Ravenswood Avenue at the intersection with Alma Street to eliminate through traffic on Alma Street and left turns at the intersection. An option would involve restricting movements to right turns only during the both the AM and PM peak periods with the updating of the existing regulatory signage. | June 14, 2005 Staff Report | Yes | Yes |
| Middlefield / Ravenswood Intersection | Adding a second left turn lane from northbound Middlefield Road to westbound Ravenswood Avenue to offset any lost capacity at Alma Street and Ravenswood and to minimize the use of Laurel Street. | June 14, 2005 Staff Report and 1994 General Plan EIR, Figure 9 | No | n/a |
| Ravenswood Adaptive Signal Technology | Implementation of adaptive signal timing technology, similar to El Camino Real on the Ravenswood Avenue, Middlefield Road, and/or Willow Road corridor(s). | June 14, 2005 Staff Report | Yes | No[a] |
| Middlefield / Willow | Add second southbound left turn lane (using existing right of way) resulting in two dedicated left turn lanes, one through lane and one through-right turn lane. Re-stripe eastbound approach. Modify signal phasing. | 1994 General Plan EIR, Figure 10 | Yes | Yes |
| Caltrain Bike Shelter Improvements | Caltrain Bike Shelter Improvements | 2005 Comprehensive Bicycle Development Plan | n/a | n/a |
| Ravenswood Bike Lanes | Ravenswood Class III Bike Lanes from Noel Drive to El Camino Real | 2005 Comprehensive Bicycle Development Plan | n/a | n/a |
| Willow Road Adaptive Signal Technology | Willow Road adaptive signal technology from Middlefield Road to US 101. | City Staff | Yes | No[a] |
| Middlefield Road | Addition of a two-way center turn lane on Middlefield Road | City Council | Yes | No |
| Middlefield / Linfield | Enhanced Pedestrian Crossing Facilities across Middlefield Road | City Staff | Yes | Yes[b] |
| Signalized intersections | Additional video detection devices including bicycle detection at the study area's signalized intersections | City Staff | n/a | n/a |

a – Mitigation would not reduce roadway segment ADT impact to a less than significant level; however would improve operations on the roadway segment.
b – Proposed mitigation measure for signalization would mitigate a potentially significant traffic impact and provide a safe pedestrian crossing.

This would produce similar mitigated results to restricting the northbound and southbound approaches to right-turns during to AM peak period. Based on the number of vehicle trips involved, an analysis of redistributing trips throughout the local network using Alma Street, Burgess Drive and Oak Grove Road was conducted; and operating conditions at adjacent intersections continue to operate at acceptable service levels under the Near Term plus Project and Long Range plus Project scenarios. The redistribution of traffic involved relocating the approximately 33 left turning and one through vehicle for the northbound Alma Street approach, and a total of four vehicles for the southbound Alma Street approach to utilize local streets and make left turns or through movements at the intersection of Laurel Street and Ravenswood Avenue. During the PM peak period, northbound vehicles at Alma Street and Ravenswood Avenue are restricted to right-turns only; therefore no additional redistribution of traffic was necessary. Vehicles making left turns from Ravenswood Avenue to Alma Street were re-directed to make left turns at the intersection of Laurel Street and Ravenswood Avenue and use local streets to their eventual destination. The intersection of Laurel Street and Ravenswood Avenue would continue operate at LOS C during the AM peak period and at LOS B during the PM peak period. Therefore, the redistribution of traffic would not cause adverse impacts at other study intersections.

A conservative estimate of ADT added to Laurel Street and Burgess Drive would be approximately 300 vehicles (assuming that AM peak represents 10-12 percent of daily traffic). Laurel Street is not anticipated to experience potentially significant impacts during the Near-Term plus Project scenario, and the addition of 300 additional daily trips would not trigger a potentially significant impact. The estimate of 300 additional daily vehicles is very conservative due to the high probability that much of the traffic currently using Alma Street also uses Laurel Street as part of the same trip. These vehicles would potentially be double counted when redirecting trips from Alma Street to Laurel Street. Under the long range scenario, the Laurel Street segment would potentially be impacted by the proposed project, however the mitigation measure of installing a median on Ravenswood in itself would not result in a potentially significant impact. The addition of 300 vehicle trips to Laurel Street represents approximately six percent increase. For Collector streets serving between 5,000 and 9,000 daily vehicles, this is not considered a potentially significant impact. Further explanation is included later in this section under potentially significant roadway impacts. The addition of 300 daily vehicles to Burgess Drive (Local Street) would trigger a potentially significant impact. The existing ADT on Burgess Drive is approximately 1050 vehicles, and 300 vehicles would result in a 29 percent increase. Although Burgess would continue to serve less than its estimated capacity, this would be considered a potentially significant impact. Restricting movements during the peak periods only with the use of regulatory signage would result in a negligible increase in ADT traffic to the Burgess Drive and Laurel Street (approximately 35 daily trips).

**Significance after Mitigation**

The impact would be reduced to a less than significant level at the intersection of Alma Street and Ravenswood with either installing a raised median or restricting the left and through movements during the AM peak period. During the AM peak hour, both the northbound and

southbound approaches would operate at LOS D. Detailed calculations of the operating conditions are included in Appendix E.

## Intersection Impact 2 (Near Term plus Project, Near Term plus Project Alternative Long Range plus Project Conditions)

The intersection of El Camino Real and Ravenswood Avenue would operate at LOS E during the PM peak hour of the Near Term Scenario and for both the AM and PM peak hour of the Long Range No Project scenario. With the addition of project related traffic, the critical movements on the eastbound and westbound approaches increase by more than 0.8 seconds of delay during these analysis periods resulting in potentially significant impacts.

The Near-Term plus Project Alternative would also result in the critical local approaches to increase by more than 0.8 seconds of delay for both the AM and PM peak periods. This would also be considered a potentially significant impact.

**Mitigation Measure**

The City of Menlo Park has identified several improvement measures in the 1994 General Plan including the addition of a third through lane in the northbound and southbound directions, a protected northbound right-turn arrow, and adding an exclusive westbound right turn lane. Although these improvements were not included in the initial list of improvement measures to be evaluated, they are presented here as mitigation measures to address the potentially significant impacts associated with the three proposed developments.

**Significance after Mitigation Measure**

The impact would be reduced to a less than significant level with implementation of the mitigation measure. During the Near Term plus Project and Long Range plus Project Scenarios, this intersection would operate at an acceptable LOS D during both the AM and PM peak periods. Detailed calculations of the intersection operating conditions are included in Appendix E.

Similar to the Near Term plus Project conditions, the recommended mitigation measures would also improve the operating conditions during the Near Term plus Project Alternative to a less than significant level.

## Intersection Impact 3 (Long Range plus Project Conditions)

The intersection of Middlefield Road and Willow Road would deteriorate from LOS D to LOS E with the addition of net new traffic during the AM peak hour resulting in a potentially significant impact. During the PM peak hour, this intersection operates at LOS E for the Long Range No Project Scenario. The addition of project related traffic to the Long Range conditions would result in the delay increasing at all four of the critical movements by more than 0.8 seconds. This is considered a potentially significant impact under the City's Transportation Impact Analysis Guidelines.

**Mitigation Measure**

The mitigation measure for this intersection is included in the list of potential improvement measure identified by City Staff. The improvement measure consists of adding an additional southbound approach lane (with possible right-of-way acquisition) to provide two dedicated left turn lanes, one through lane and one shared through-right turn lane.

**Significance after City Improvement Measure**

The impact would be reduced to a less than significant level with implementation of the mitigation measure. During the PM peak hour of the Long Range plus Project scenario, the intersection would operate at an acceptable LOS D with approximately 53.9 seconds of average delay. In addition, although a potentially significant impact would not occur during the AM peak hour of the Long Range plus Project scenario, this improvement measure would reduce delays at the intersection, resulting in the AM peak hour LOS improving from an unacceptable LOS E to an acceptable LOS D.

## Intersection Impact 4 (Long Range plus Project Conditions)

The intersection of Middlefield Road and Linfield Drive would deteriorate from LOS C to LOS E during the PM peak hour. The eastbound approach (Linfield Drive) is stop controlled while Middlefield Road is uncontrolled. Vehicles making a left turn from Linfield onto Middlefield experience high delays. This is considered a potentially significant impact under the City's Transportation Impact Analysis Guidelines. A traffic signal would be warranted based on projected peak hour traffic volumes (See Appendix C).

**Mitigation Measure**

Based on discussions with City Staff, the addition of a traffic signal at this intersection would be a potential improvement measure. During the peak hours, the estimated traffic demand under the Project Conditions would satisfy several traffic signal warrants established in the Manual on Uniform Traffic Control Devices (2003 Edition, Chapter 4). Due to the close proximity to the intersection of Willow Road and Middlefield Road, the signals would ideally be coordinated.

An analysis of a signalized intersection at this location would result in improved operating conditions. An analysis of permitted left turns from Middlefield Road (existing lane geometry) showed that the intersection would operate at LOS B or better for both the AM and PM peak periods for each of the analysis scenarios. Potential re-striping, addition of left turn lanes on Middlefield Road, and phasing parameters would need to be confirmed with potential right of way issues. The improvement due to signalization of this intersection may result in minor changes to the local traffic circulation in the area. An accurate estimate of changes in traffic patterns is not quantifiable; however significant shifts in traffic are not anticipated.

A separate improvement measure at this intersection discussed later involves the installation of a lighted crosswalk crossing Middlefield Road. Although this would significantly improve the pedestrian safety conditions, it is not anticipated to provide a significant improvement to the operating conditions of traffic coming from Linfield Drive. If a full signal were to be installed at this intersection, there would no longer be a need for a lighted pedestrian crosswalk.

**Significance after City Improvement Measure**

The impact would be reduced to a less than significant level with implementation of the signalized intersection. With signalization, the intersection of Middlefield Road and Linfield Drive would operate at LOS A (see detailed calculations in Appendix E). In addition, a signalized intersection would also provide a safe pedestrian crossing as identified by City Staff as a potential improvement measure.

## Local Streets Impact 1 (Near Term plus Project, Long Range plus Project Conditions)

The addition of daily project-generated traffic to Linfield Drive would create potentially significant and unavoidable impacts due to these roadway segments already serving more vehicles than the recommended daily capacity. The proposed developments at 321 Middlefield Road and 8 Homewood Place would add approximately 1,130 net new daily vehicle trips. This is greater than the threshold for potentially significant roadway impacts for local streets serving more than 1,350 daily vehicles.

**City of Menlo Park Improvement Measure – Linfield Drive Roadway Modifications**

As shown in Table 16, the City of Menlo Park has identified additional streetscape improvements for the Linfield Oaks neighborhood. These measures would not mitigate the potentially significant impacts; however they may improve safety conditions by slowing down fast moving vehicles, providing safer pedestrian crossings, and discouraging cut-through traffic. In general, the roadway improvements would include the addition of a raised median with breaks for left turns at various access driveways and a potential roundabout at the intersection of Homewood Place. Additional information is provided below in the section describing the various improvement measures.

**Significance after City Improvement Measure**

The study street segments would continue to experience potentially significant and unavoidable impacts due to the streets already serving close to the estimated capacity. Due to the locations of the proposed developments, such measures are not anticipated to significantly affect the travel patterns of vehicles related to the proposed developments. Without a reduction in project size or a change in land use, there is no feasible mitigation measure to lessen the number of vehicles using the immediate local streets.

## Local Streets Impact 2 (Near Term plus Project, Long Range plus Project Conditions)

The addition of daily project-generated traffic to Waverley Street would create potentially significant and unavoidable impacts due to these roadway segments already serving more vehicles than the recommended daily capacity. The three proposed developments would add approximately 724 net new daily vehicle trips to Waverley Street. This is greater than the threshold for potentially significant roadway impacts for local streets serving more than 1,350 daily vehicles.

### Mitigation Measure

With the exception of significantly reducing the proposed project sizes, there is no feasible mitigation measure to improve conditions on Waverley Street.

### Significance after City Improvement Measure

The study street segments would continue to experience potentially significant and unavoidable impacts due to the streets already serving close to the estimated capacity. Without a significant reduction in project size, there is no feasible mitigation measure to lessen the number of vehicles using the immediate local streets.

## Collector Streets Impact 1 (Long Range plus Project Conditions)

The addition of background growth over the Long Range period would result in the ADT on Laurel Street increasing to more than 5,000 vehicles. The three proposed developments would add approximately 815 net new daily vehicle trips to Laurel Street (16.1 percent increase). This is greater than the threshold for potentially significant roadway impacts for collector streets serving more than 5,000 daily vehicles.

### Mitigation Measure

With the exception of reducing the three proposed developments such that the net-new trip generation decreases by approximately 15 percent, there is no feasible mitigation measure to improve conditions on Laurel Street.

### Significance after City Improvement Measure

The study street segments would continue to experience potentially significant and unavoidable impacts due to the streets already serving close to the estimated capacity. Without a significant reduction in project size, there is no feasible mitigation measure to lessen the number of vehicles using the immediate local streets.

## Minor Arterials Impact 1 (Near Term plus Project, Long Range plus Project Conditions)

During the Near Term scenario, the addition of daily project-generated traffic to Ravenswood Avenue between Laurel Street and Alma Street and between Alma Street and El Camino Real would create potentially significant and unavoidable impacts due to these roadway segments already serving more vehicles than the recommended daily capacity. During the Long Range scenario, daily traffic on Ravenswood Avenue between Laurel Street and Middlefield Road would exceed 18,000 vpd, and the addition of project related traffic would trigger a potentially significant impact.

**City of Menlo Park Improvement Measure –Adaptive Signal Timing Program**

The City of Menlo Park has identified Ravenswood Avenue as a potential roadway for adaptive signal timing programs. A similar program on El Camino Real has resulted in delay decreases of five to ten percent (per City Staff). Because many of the nearby street segments serve demands that are close to or greater than the recommended capacity, there is no feasible mitigation measure to reduce the amount of daily traffic from the proposed project sites to a less than significant amount with the exception of significantly reducing the project sizes.

**Significance after City Improvement Measure**

Ravenswood Avenue would continue to experience potentially significant and unavoidable impacts due to local streets that are already close to their estimated capacity. This improvement measure would not noticeably affect the amount of daily traffic through these roadways. Although improvements of five to ten percent decreases in delays have been noticed at other locations with adaptive signal timing programs, the benefits of such programs are typically greater on segments with closely spaced signalized intersections. Ravenswood Avenue has long segments without any signalized intersections, so the benefits of an adaptive signal program may be limited.

## Minor Arterials Impact 2 (Near Term plus Project, Long Range plus Project Conditions)

The addition of daily project-generated traffic to Middlefield Road between Linfield Drive and Ravenswood Avenue would result in a potentially significant and unavoidable impact due to this roadway segment already serving more vehicles than the recommended daily capacity.

**Mitigation Measure**

With the exception of significantly reducing the proposed project sizes, there is no feasible mitigation measure to reduce net-new traffic on Middlefield Road to less than 100 daily trips. Widening Middlefield Road to increase capacity would not be feasible due to the need for additional right-of-way and construction costs.

**Significance after City Improvement Measure**

Middlefield Road would continue to experience potentially significant and unavoidable impacts due to local streets that are already close to their estimated capacity.

## Minor Arterials Impact 3 (Near Term plus Project, Long Range plus Project Conditions)

The addition of daily project-generated traffic to Willow Road between Middlefield Road and Bay Road would result in a potentially significant and unavoidable impact due to this roadway segment already serving more vehicles than the recommended daily capacity.

**City of Menlo Park Improvement Measure –Adaptive Signal Timing Program**

The City of Menlo Park has identified Willow Road as a potential roadway for adaptive signal timing programs. Funding for up to 20 percent of the total cost to implement an adaptive signal program on Willow Road has been received via a grant. A similar program on El Camino Real has resulted in delay decreases of five to ten percent (per City Staff). Because many of the nearby street segments serve demands that are close to or greater than the recommended capacity, there are no additional feasible mitigation measures to reduce the amount of daily traffic from the proposed project sites to a less than significant amount with the exception of significantly reducing the project sizes.

**Significance after City Improvement Measure**

Willow Road would continue to experience potentially significant and unavoidable impacts due to arterial streets that are already close to their estimated capacity. During the peak periods, this improvement measure would potentially reduce delays on Willow Road by up to five to ten percent. However, such a program would not noticeably affect the amount of daily traffic traveling on these roadways.

**Allocation of Potential City Improvement Measures**

As described above, the proposed mitigation measures for the potentially significant impacts were divided proportionally based on net-new ADT generated from each of the three proposed project sites and the planned residential developments at 110 and 175 Linfield Drive. Although the facilities described previously in Table 16 may not be experience potentially significant impacts from the three proposed developments, the City of Menlo Park may consider implementation of selected transportation improvement measures as part of a more comprehensive strategy. Table 18 summarizes the percent allocation from the proposed developments in the Linfield Oaks area for each of the identified improvement measures. The percent contribution allocated for potentially impacted roadway facilities is based on the percentage of net new daily trips from each development added to the roadway segment. For potentially impacted intersections, percent allocation is based on the net new peak hour trips from each development that travel through intersection. For the Linfield Streetscape improvements, percent allocation is based on the length of project frontage on Linfield Drive.

**Table 18**
**Allocation of Average Daily Trip by Proposed Development**

| | Transportation Facility | Mitigation Description | Cost Estimate | Net-New Trips Added[a] | Percent Allocated for Each Proposed Development | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 75 Willow | 8 Homewood | 321 Middlefield | 110 Linfield | 175 Linfield |
| **City Identified Improvement Measures** | | | | | | | | | |
| A | Linfield Drive Roadway | Physical changes to roadways such as constructing a raised median on Linfield Drive and potentially installing a roundabout at the intersection with Homewood Place to transition between the Middlefield Road corridor and the residential neighborhood. | $330,000 | n/a[b] | 0%[b] | 14%[b] | 39%[b] | 23.5%[b] | 23.5%[b] |
| B | USGS Access | Eliminating employee vehicular access to the USGS campus from Homewood Place. This measure would potentially necessitate the installation of a traffic signal at the intersection of Middlefield Road and Seminary Drive. | $175,000 | 1,484 | 2% | 24% | 38% | 15% | 21% |
| C | Alma / Ravenswood Intersection | Constructing a median on Ravenswood Avenue at the intersection with Alma Street to eliminate through traffic on Alma Street and left turns at the intersection. An alternative is to restrict peak period movements with the addition of regulatory signage only | $40,000 / $4,000[c] | 218 | 8% | 12% | 62% | 8% | 10% |
| D | Middlefield / Ravenswood Intersection | Adding a second left turn lane from northbound Middlefield Road to westbound Ravenswood Avenue to offset any lost capacity at Alma Street and Ravenswood and to minimize the use of Laurel Street. | $500,000 | 179 | 2% | 9% | 73% | 7% | 9% |
| E | Ravenswood/ Ringwood Adaptive Signal Technology | Implementation of adaptive signal timing technology, similar to El Camino Real at the intersections of Ravenswood/Middlefield and Ringwood/Middlefield. | $200,000 | 1,255 | 8% | 7% | 69% | 7% | 9% |
| F | Middlefield/ Willow Intersection | Add second southbound left turn lane (using existing right of way) resulting in two dedicated left turn lanes, one through lane and one through-right turn lane. Re-stripe eastbound approach. Modify signal phasing. | *$500,000* | 144 | 0% | 21% | 46% | 14% | 9% |
| G | Caltrain Station | Caltrain Bike Shelter Improvements | $6,500 | 2,589 | 8% | 14% | 58% | 9% | 12% |
| H | Ravenswood Bike Lanes | Ravenswood Class III Bike Lanes from Noel Drive to El Camino Real | $18,000 | 2,589 | 8% | 14% | 58% | 9% | 12% |

**Table 18 (Continued)**
**Allocation of Average Daily Trip by Proposed Development**

| | Transportation Facility | Mitigation Description | Cost Estimate | Net-New Trips Added[a] | Percent Allocated for Each Proposed Development | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 75 Willow | 8 Homewood | 321 Middlefield | 110 Linfield | 175 Linfield |
| **City Identified Improvement Measures (Continued)** | | | | | | | | | |
| I | Willow Road Adaptive Signal Technology | Willow Road adaptive signal technology | $1.3 M [d] | 430 | 0% | 22% | 44% | 14% | 20% |
| J | Middlefield Road | Addition of a two-way center turn lane on Middlefield Road | TBD | 1,111 | 3% | 8% | 76% | 5% | 8% |
| K | Middlefield / Linfield | Signalized Intersection | $220,000 | 345 | 1% | 14% | 63% | 9% | 13% |
| | | Lighted Pedestrian Crosswalk Enhancements | $35,000 | n/a | 20% | 20% | 20% | 20% | 20% |
| L | Various Intersection Improvements | Various video and bicycle detection devices for: | $44,000 | | | | | | |
| | | Middlefield Road and Ravenswood Avenue | ($7,000) | 179 | 2% | 9% | 73% | 7% | 9% |
| | | Middlefield Road and Ringwood Avenue | ($12,000) | 179 | 2% | 9% | 73% | 7% | 9% |
| | | Ravenswood Avenue and Laurel Street | ($25,000) | 218 | 8% | 10% | 66% | 7% | 9% |
| **Other Identified Mitigation Measures** | | | | | | | | | |
| M | El CaminoReal / Ravenswood | Widen northbound approach to add a third northbound through land (requires right of way acquisition from City-owned parcel). | $500,000 | 218 | 8% | 10% | 66% | 7% | 9% |
| N | El CaminoReal / Ravenswood | Re-stripe southbound approach to add a third southbound through lane (eliminates on street parking). | $100,000 | 218 | 8% | 10% | 66% | 7% | 9% |
| O | El CaminoReal / Ravenswood | Modify the traffic signal at El Camino/Ravenswood to include a right turn arrow on northbound El Camino Real to eastbound Ravenswood. | TBD | 218 | 8% | 10% | 66% | 7% | 9% |
| P | El CaminoReal / Ravenswood | Widen westbound approach to add exclusive right turn lane (requires right-of-way acquisition). | $500,000 | 218 | 8% | 10% | 66% | 7% | 9% |

Notes: Preliminary cost estimates based on Year 2005 dollar value

a. Net-New Trips Added includes proposed trips to/from 110 & 175 Linfield Drive Projects. For roadway improvements, ADT volumes is uses. For intersection improvements, peak hour volumes are used.

b. Percent allocation approximately based project site frontage on Linfield Drive.

c. Cost for reduced alternative of adding peak period regulatory signage only.

d. Partial Funding Available (20 percent) via grant.

## Mitigation and Improvement Recommendations

The improvement measures described above were generally organized into four groups. Category 1 includes improvement and mitigation measures that would reduce potential impacts during the Near Term plus Project scenario to a less than significant level. Category 2 includes measures that would reduce potentially significant impacts during the Long Range plus Project scenario to a less than significant level.

Several of the analysis facilities with potentially significant project impacts in the Near Term and Long Range scenarios would not have any feasible mitigation measures that would reduce potential impacts to a less than significant level. For these facilities, various improvement measures (identified by City Staff) are described and included in Category 3. Finally, Category 4 includes identified improvement measures that would improve general operating conditions, or promote additional use of bicycle facilities; however a measurable improvement in traffic operating conditions would not be anticipated.

Based on the findings of the analysis presented, the general recommendation for improvement measures with regards to the three proposed developments would rank the Category 1 and 2 mitigation measures with the highest priority. Determination of final priority and implementation would be determined by the City with consideration also given to the approximate implementation costs. Table 19 summarizes the potential improvement measures and preliminary cost estimates. Additional descriptions of the priority classification process are included below.

### Category 1 Mitigation and Improvement Measures

Of the improvement measures described in Table 16, the following projects were determined to have highest priority. These improvement measures would provide operational improvements to facilities that currently operate at unacceptable levels and would potentially be impacted in the near term conditions plus project conditions.

Ravenswood Avenue Median Construction at Alma Street

This intersection is identified as a potentially impacted intersection during the Near Term plus Project, Near Term plus Alternative Project, and Long Range plus Project scenarios. Of the identified improvement measures, restriction of movements to right-turn only with new signage (and police enforcement) is the least expensive, and would result in an intersection currently operating at an unacceptable level and with potentially significant impacts to operate at an acceptable level. A raised median would restrict movements at all times as opposed to just the peak hour, and would be slightly more expensive. The peak hour operating conditions would be similar. As described previously, a permanent median may result in an increase of daily traffic of up to 300 vehicles on Laurel Street and local streets such as Burgess Drive. A peak hour restriction would not result in significant daily traffic increases on these local streets.

**Table 19**
**Classification of Potential Improvement and Mitigation Measures**

| Improvement/Mitigation Measure | Preliminary Cost Estimate |
|---|---|
| **1. Mitigation Measures for Potentially Impacted Facilities (Near Term plus Project Conditions)** | |
| Ravenswood Avenue Median Construction at Alma Street | $40,000 |
| El Camino Real / Ravenswood widening and signal modifications | >$1,000,000 |
| **2. Mitigation Measures for Potentially Impacted Facilities (Long Range plus Project Conditions)** | |
| Middlefield / Willow Intersection Modifications | $500,000 |
| Middlefield Road at Linfield Drive Traffic Signal | $220,000 |
| **3. Improvement Measures to Potentially Impacted Facilities** | |
| USGS Homewood Access Closure | $175,000 |
| Adaptive Signal Technology Program – Ravenswood Avenue and Willow Road | $200,000[a] |
| Linfield Drive Roadway Improvements | $310,000 |
| Middlefield Road Lighted Pedestrian Crosswalk at Linfield Drive | $35,000 |
| **4. General Improvement Measures to Non Impacted Facilities** | |
| Middlefield / Ravenswood Signal Modifications | >$500,000 |
| Bike Lane Improvements: Ravenswood Avenue | $18,000 |
| Caltrain Bike Shelter Improvements | $2,000 |
| Video detection devices at signalized intersections | TBD |

a – Estimated cost is per roadway system

Ravenswood Avenue and El Camino Real: Various Intersection Signal Modifications

As identified previously, this intersection is anticipated to operate at LOS E (unacceptable per City standards). The net-new traffic generated by the three proposed developments would result in potentially significant impacts. The modifications would include widening the northbound and westbound approaches, re-striping the southbound approach, and adding a protected eastbound right-turn phase. The various modifications would result in the intersection operating at an acceptable service level (LOS D) during the both the Near Term plus Project and the Long Range plus Project conditions. The potentially significant impacts for each of the project scenarios would be reduced to a less than significant level. Although the benefits would be substantial to the intersection operations and to the overall area, there would be a relatively high cost and the need for Caltrans approval. It should be noted that the potential widening of the curb to curb distances would likely result in increased pedestrian crossing distances and may require revisions to the current signal timing plans.

**Category 2 Mitigation and Improvement Measures**

The following mitigation measures describe improvements to facilities that would experience potentially significant impacts during the Long Range plus Project scenario. The facilities benefiting from these improvements would improve such that operating conditions would be reduced to less than significant levels.

Middlefield Road at Linfield Drive Traffic Signal

Although this mitigation measure is not included in the identified improvement measurers, a lighted pedestrian crosswalk in the vicinity has been identified as a potential improvement measure. In addition, signalization at this intersection would mitigate a potentially significant transportation impact in the Long Range plus Project scenario. A potentially significant impact at this intersection would only occur after the growth patterns for the Long Range scenario are reached, and not during the Near Term period. The peak hour traffic volumes in the Long Range plus Project scenario would warrant a traffic signal. An improvement to provide a lighted pedestrian crossing in the vicinity of this intersection would not be necessary with the installation of a traffic signal.

Middlefield Road and Willow Road: Intersection Signal Modifications

Future long term growth in the area would result in this intersection operating at an unacceptable LOS E during both the AM and PM peak hours. The three proposed developments would result in a potentially significant impact at this intersection during the PM peak hour of the Long Range plus Project conditions. Intersection modifications that are proposed involve the widening of the southbound approach to have two dedicated left turn lanes, one through lane, and one shared through-right lane as well as re-striping the eastbound approach. This improvement measure would result in the intersection improving to LOS D during both the AM and PM peak periods of the long range plus project. Under the near term plus project scenario, this intersection is anticipated to operate at LOS D during both peak periods. It should be noted that the potential widening of the curb to curb distances would likely result in increased pedestrian crossing distances and may require revisions to the current signal timing plans.

**Category 3 Improvement Measures**

The improvement measures identified in Category 3 summarize measures that would potentially improve conditions on roadway facilities that experience potentially significant impacts. However, these improvement measures would not reduce the potential impacts to less than significant levels.

Willow Road Adaptive Signal Timing Program

Willow Road currently serves over the estimated capacity for minor arterials, and the addition of project related traffic would result in potentially significant roadway impacts. In addition, the intersection of Middlefield Road and Willow Road is anticipated to operate at an unacceptable level under long range conditions. An adaptive signal timing program would operate in real time, adjusting signal timing to accommodate changing traffic patterns. The timing programs adjust the split, offset, cycle lengths, and phase order of the signals using sensors to interpret characteristics of traffic approaching an intersection, and using mathematical and predictive algorithms, adapts the signal timings accordingly, optimizing their performance. Although improvement results for an adaptive signal program would not be quantifiable until after a program is implemented and monitored, similar programs have

been implemented on El Camino Real and show a five to ten percent improvement in average delay at the signalized intersections. Although delays may decrease, an adaptive signal timing program would not reduce daily traffic volumes, therefore would not improve upon the potentially significant impacts that would occur. Partial funding has been identified for this project for approximately 20 percent of the costs, and additional funding would be required.

Ravenswood Adaptive Signal Timing Program

Ravenswood Avenue between El Camino Real and Middlefield Road is approximately 0.6 miles long with Laurel Street as the only signalized intersection in between. Most of the traffic traveling along this section of Ravenswood turns onto El Camino Real or Middlefield Road. The Caltrain at-grade crossing and several unsignalized access points located within these limits result in disruptions or mid-block changes in traffic volumes. While an adaptive signal program would improve operating conditions on Ravenswood, it is estimated that the benefit would be limited to improving conditions at one or two intersections, as compared to similar programs on roadways such as El Camino Real and Willow Road where through traffic passes through a greater number of signalized intersections.

Linfield Drive Streetscape Improvements

Physical changes to the streetscape on Linfield Drive have been identified in an effort to separate the residential and commercial areas. The local residents have identified several measures including a plan to maintain the width of approximately 60 feet, and add a raised median with breaks at each of the main driveways for the proposed developments. This measure may reduce speeds based on perceived roadway width and discourage cut-through traffic through the Linfield Oaks Neighborhood. However the operational benefit to Linfield Drive would be minimal. A potential roundabout on Linfield Drive at Homewood Place would be considered, and would provide a transition to residential areas of the Linfield Oaks neighborhood. The operating conditions at this intersection are not anticipated to significantly change with the addition of a roundabout. The total volume of traffic on Linfield Drive would remain about the same with the Linfield Drive streetscape improvements. With the proposed median streetscape improvements to Linfield Drive, on-street parking would be reduced from approximately 43 spaces to 13 spaces and would be limited to the south side of Linfield Drive. A preliminary improvement design plan is included in Appendix D.

USGS Homewood Place Access Point Closure

A detailed survey of vehicles currently accessing the USGS facility from each driveway was not conducted. However, based on existing traffic counts at adjacent intersections, the redistribution of traffic would result in only slight changes in travel patterns. In 2003, a preliminary study conducted by Fehr and Peers Associates analyzed the potential impacts to the two driveways on Middlefield Road, and concluded that closing the USGS access from Homewood place would be negligible in terms of added overall traffic conditions to the driveways on Middlefield Road. As identified in this report, closing the Homewood access would result in a greater impact at Survey Lane. It should be noted that Survey lane has been

identified by City Staff as a driveway and not a local approach, and therefore would not be subject to the same criteria for determining potentially significant impacts. Prior to closing the USGS access on Homewood Place, an updated circulation analysis involving the Linfield Oaks Neighborhood should be conducted.

Middlefield Road Lighted Pedestrian Crosswalk at Linfield Drive

With the potential addition of significant residential uses in the Linfield Oaks area, an increase in pedestrian traffic would be anticipated. There is an existing crosswalk at this location; however the traffic conditions on Middlefield Road often present difficult crossing situations. The proximity to local schools would justify the enhanced pedestrian safety features such as a lighted crosswalk system.

**Category 4 Improvement Measures**

Caltrain Bicycle Shelter Improvements

Improvements such as bicycle shelter improvements would be relatively inexpensive (approximately $2,000). An increase in bicycle traffic may occur, but the operational improvements to traffic conditions in the area would be minimal. Bicycle shelter improvements would benefit current bicyclist either coming to or leaving Menlo Park, however a significant change in mode share from vehicular traffic would not be anticipated.

Two-way dual left turn lane on Middlefield Road

Two-way dual left turn center lanes on Middlefield would increase capacity on Middlefield Road. The two intersections that currently have shared left-through lanes are at Linfield Drive and at Seminary Drive. The service levels at these intersections are controlled by the side street approaches where vehicles often wait to turn onto Middlefield Road. The addition of a turning lane on Middlefield would not significantly increase the amount of allowable gaps in traffic, therefore would not significantly improve the operating conditions (no change in LOS) for vehicles turning onto Middlefield Road. At Seminary Drive, there are existing left turn pockets in both directions of Middlefield Road. There are existing bike lanes in both directions of Middlefield Road and the estimated cost would be dependant on if the proposed layout would fit within the existing curb to curb distance, within the existing right-of-way, or if acquisition of additional right-of-way would be required.

Ravenswood Avenue Bicycle Lanes and Detection Equipment

Bike lanes currently exist on Ravenswood Avenue between Noel Drive and Middlefield Road. West of Noel Drive, there is no bike lane in the westbound direction, but there is a bike lane between El Camino Real and the Caltrain railroad tracks in the eastbound direction. The addition of bicycle lanes to the segments of Ravenswood Avenue would provide continuity between El Camino Real and Noel Drive, and would potentially improve bicycle safety conditions, although the improvements in traffic operating conditions would be negligible. Re-striping to narrower lanes and increased bicycle traffic would potentially

require additional right-of-way which may be very costly and should be investigated further. Providing bicycle detection at the signalized intersections would also be a convenience to current cyclists. A significant traffic improvement would not be anticipated, however.

# 9. Conclusion

## Existing Conditions

During the AM peak period, the northbound approach at Alma and Ravenswood (two-way stop controlled) operates at an unacceptable LOS F. There are no other existing potentially significant deficiencies at the study area intersections. Five study roadway segments currently serve a demand that is greater than the estimated daily capacity based on roadway classification as outlined in the City of Menlo Park CSA document.

## Near-Term Conditions

Two intersections would not operate at acceptable levels of service under the Near-Term Conditions. The northbound approach on Alma to Ravenswood would continue to operate at LOS F during the AM peak hour. The intersection of El Camino Real and Ravenswood Drive would deteriorate to LOS E during PM peak hour; however this is already documented in the City's current CSA Document. Similar to Existing Conditions, all but three study roadway segments would serve close to or greater than the estimated daily capacity for their respective classifications. No other potentially significant deficiencies are projected under the Near-Term Condition Scenario.

## Near Term plus Project Conditions

The three proposed developments consists of converting 48,400 sf of office space to 48,400 sf of medical office space at 321 Middlefield Road, replacing 21,500 sf of vacant office space with 33 residential units at 8 Homewood Place, and replacing 39,000 sf of occupied office space with 37 residential units at 75 Willow Road. The three proposed developments would generate a total of 112 net new AM peak hour trips, 192 net new PM peak hour trips, and 2,053 net new daily vehicle trips. Trips related to the three proposed developments would not be considered cut-through traffic due to the locations within the Linfield Oaks neighborhood. Potential cut-through traffic impacts in the Linfield-Oaks neighborhood are projected to be minimal and controlled through the Linfield Oaks Neighborhood Traffic Management Plan.

The proposed project would conform to the policies outlined in the Circulation and Transportation Element of the City's General Plan. According to the Menlo Park General Plan, new developments shall be restricted or required to implement mitigation measures in order to maintain the levels of service outlined in the plan. Analysis shows that the three proposed developments would maintain the current level of service standards at each of the study intersections with the exceptions of the intersection at Alma and Ravenswood during the AM peak period and at the intersection of El Camino Real and Ravenswood during the PM peak period. The intersection of Alma and Ravenswood would operate at LOS F for the northbound approach. This is attributed to the volume of uncontrolled traffic traveling east and west on Ravenswood. No new trips would be added to the northbound approach; however the addition of traffic to the east-west movement on Ravenswood would result in an

increase of average delay to the northbound approach greater than the threshold of 0.8 seconds. During the PM peak hour, the intersection of El Camino Real and Ravenswood would continue to operate at the same LOS E as under the Near-Term Conditions; however the increase of average delay to the critical movements on local approaches would be greater than 0.8 seconds; which is considered a potentially significant transportation impact.

The addition of daily traffic to local streets Linfield Drive, Waverley Street, and to several minor arterials such as Middlefield Road, Ravenswood Avenue, and Willow Road, would create potentially significant and unavoidable impacts due to these roadway segments already serving more vehicles then the recommended daily capacity. This is considered a potentially significant impact under the City's Transportation Impact Analysis Guidelines.

## Near Term plus Project Alternative Conditions

A project alternative was analyzed to determine if 55 single family residential units instead of medical offices at 321 Middlefield Road would reduce the potentially significant impacts. Similar to the Near Term plus Project scenario, the addition of net-new trips related to a project alternative would result in potentially significant impacts at the intersection of Ravenswood Avenue and Alma Street during the AM peak hour and at the intersection of El Camino Real and Ravenswood Avenue during the PM peak hour. The six roadway segments that would experience potentially significant impacts would also experience the same potentially significant impacts with addition of net-new daily trips from the project alternative. In general, average delays at the analysis intersections would be slightly lower than with the addition of project related traffic. The project alternative would not reduce the number of potentially significant impacts as the same impacts would occur.

## Near Term plus Occupied Office Conditions

A no project alternative that involves the re-occupancy of the existing buildings with general office use was analyzed. Because the existing buildings are currently zoned and approved for office use, the project sites would not be responsible for potentially significant impacts. This scenario identifies the deficient intersections and roadway segments that would result from the buildings being fully occupied. In general, operating conditions for the study intersections would be slightly improved as compared to the proposed project, but slightly worse than the project alternative. In summary, the intersections that would experience potentially significant impacts during the project and project alternative scenarios would also experience similar deficiencies with the re-occupancy of the general office uses.

## Long Range plus Project Conditions

The increase of baseline traffic based on an ambient growth over a 10-year period would result in several potentially significant transportation impacts. The transportation impacts related to the intersection of Ravenswood Avenue and Alma Street would be the same as was found in each of the other scenarios. During the AM peak period, the northbound approach from Alma to Ravenswood would continue to operate at LOS F.

In addition to the two intersection impacts that occur with the addition of project traffic to the Near Term scenario, the intersection of Linfield Drive and Middlefield Road and the intersection of Middlefield Road and Willow Road would experience potentially significant impacts. The intersection of Linfield Drive and Middlefield Road would deteriorate from LOS C to LOS E during the Long Range plus Project scenario. This would be considered a potentially significant impact. The intersection of Middlefield Road and Willow Road would operate at LOS E during the AM and PM peak hours of the Long Range No Project scenario, and the addition of project traffic during the PM Peak hour would result in each of the critical movements increasing by greater than 0.8 seconds of delay.

Two additional roadway segments would experience potentially significant impacts due to the addition of net-new project related traffic in the Long Range scenario. Due to background ambient growth over ten years, daily traffic Laurel Street would increase to slightly more than 5,000 vehicles per day. Net-new project traffic would result in an increase of approximately 15 percent, which is greater than the threshold of 12.5 percent, resulting in a potentially significant impact. Similarly, the roadway segment of Ravenswood Avenue between Laurel Street and Middlefield Road would increase to more than 18,000 daily vehicle trips due to background growth. With a base volume of 18,000 daily vehicle trips, the net-new project traffic added would exceed the new threshold of 100 additional trips, resulting in a potentially significant impact.

## Mitigation and Improvement Measures

The three proposed developments would result in potentially significant transportation impacts at two signalized intersections, two unsignalized intersections, and at eight of the analysis roadway segments. At Alma Street and Ravenswood, a raised median on Ravenswood or restricting traffic from Alma Street to right-turns only would reduce the potentially significant impact to a less than significant level. At the intersection of Middlefield Road and Linfield Drive, the addition of project related traffic during the Long Range PM peak period would result in a potentially significant impact. The high traffic volumes in the Long Range plus Project conditions would warrant a traffic signal at the intersection of Middlefield Road and Linfield Drive. A traffic signal at Middlefield Road and Linfield Drive would reduce the potentially significant impact to a less than significant level.

Several improvement measures have been identified for the intersection of El Camino Real and Ravenswood Avenue in the 1994 General Plan EIR. These improvement measures would reduce the potentially significant impacts to a less than significant level. Similarly, the City has identified improvement measures for the intersection of Middlefield Road and Willow Road. These improvement measures would mitigate the potentially significant impacts that would occur during the PM peak hour of the Long Range plus Project scenario.

City of Menlo Park Staff and City Council members have identified several improvement measures. The percent of total net-new trips added by the three proposed developments and proposed projects at 110 and 175 Linfield Drive have been summarized in Table 17 to illustrate the allocation of new trips to potentially deficient transportation facilities.