

*Corte Madera General Plan EIR
Transportation Analysis*

Report Appendices



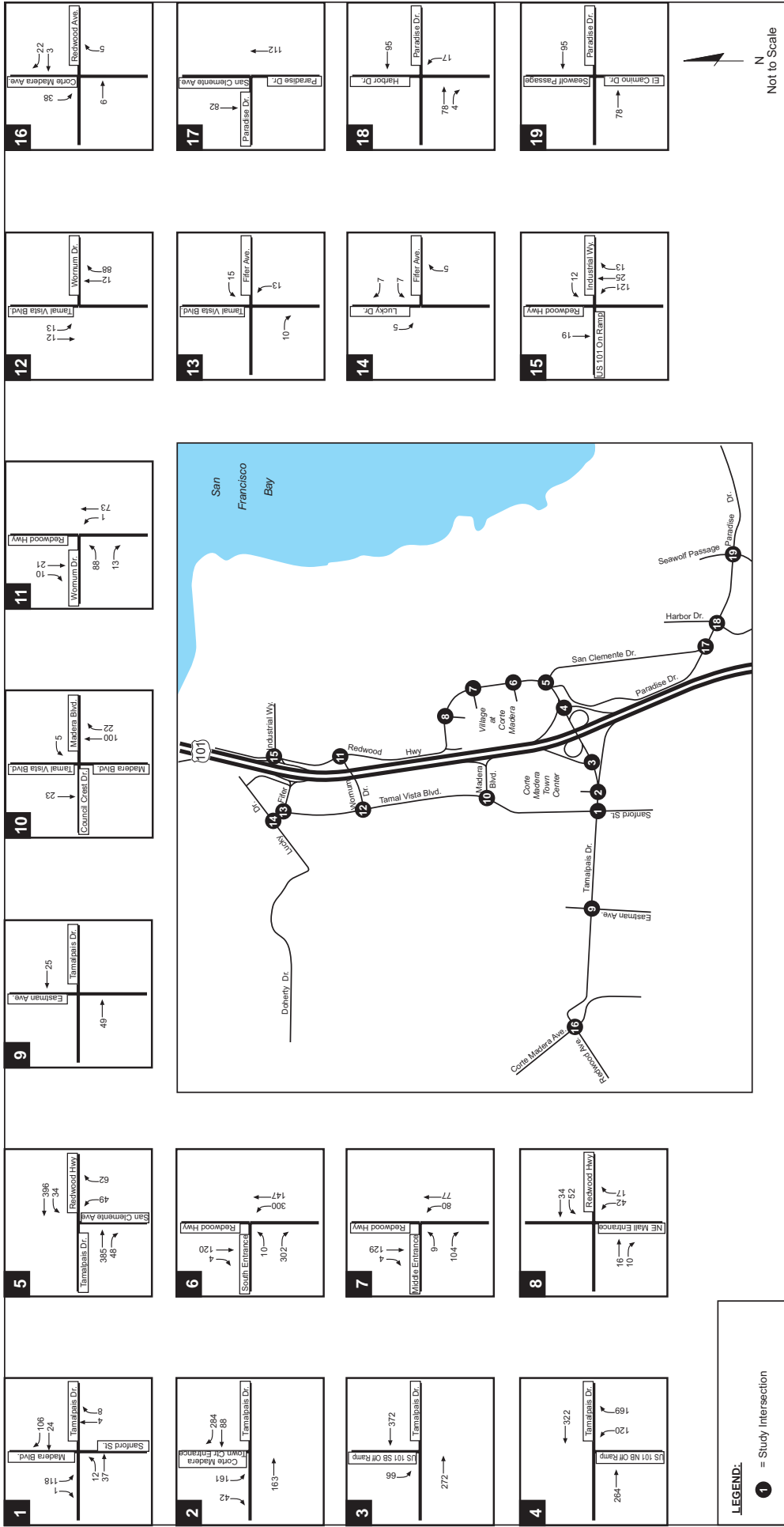
FEHR & PEERS
TRANSPORTATION CONSULTANTS

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August 2008

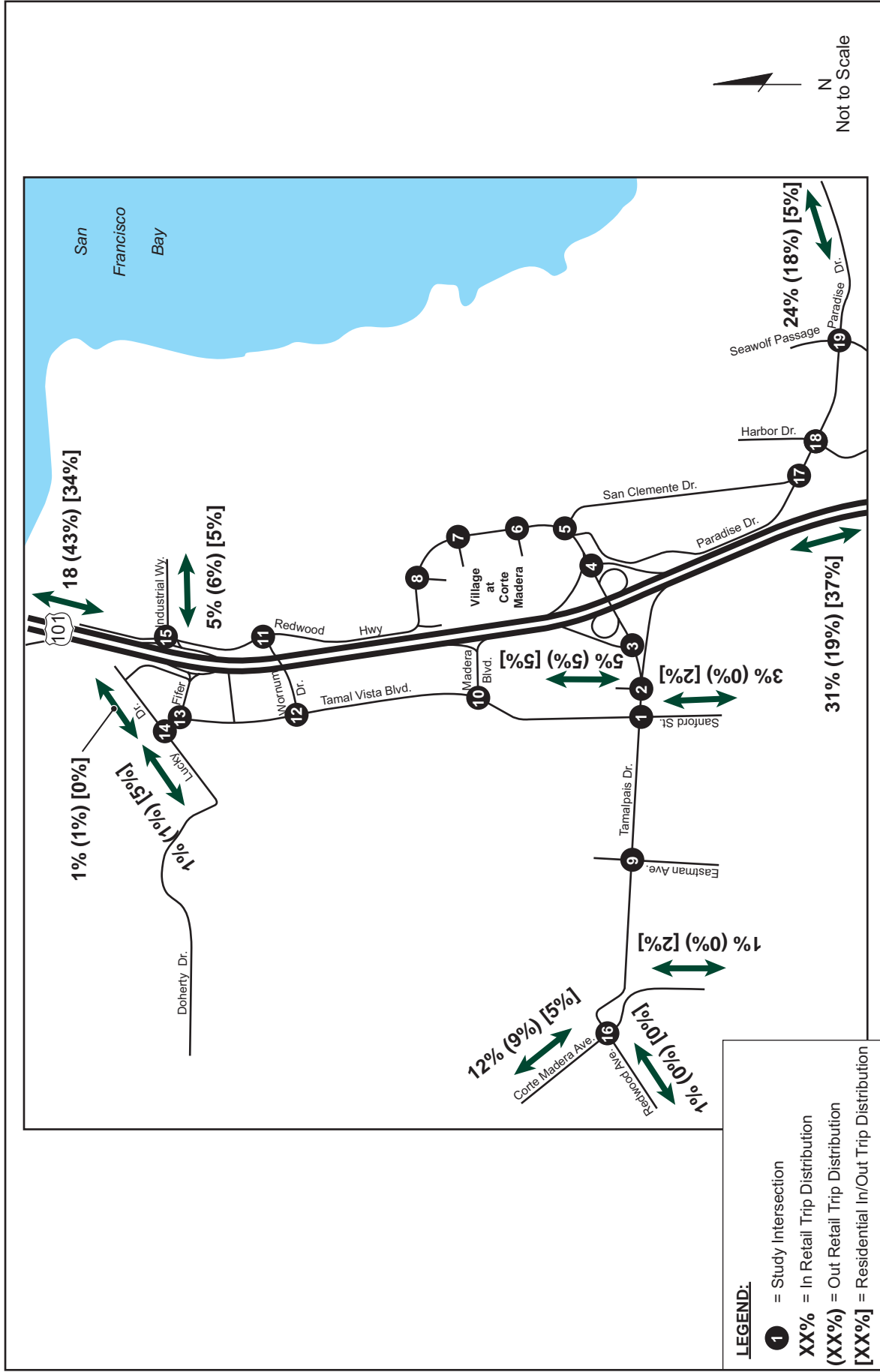
APPENDIX A: ADDITIONAL FIGURES



Cortes Madera General Plan

PROPOSED GENERAL PLAN: CUMULATIVE PM PEAK HOUR PROJECT TRIP ASSIGNMENT

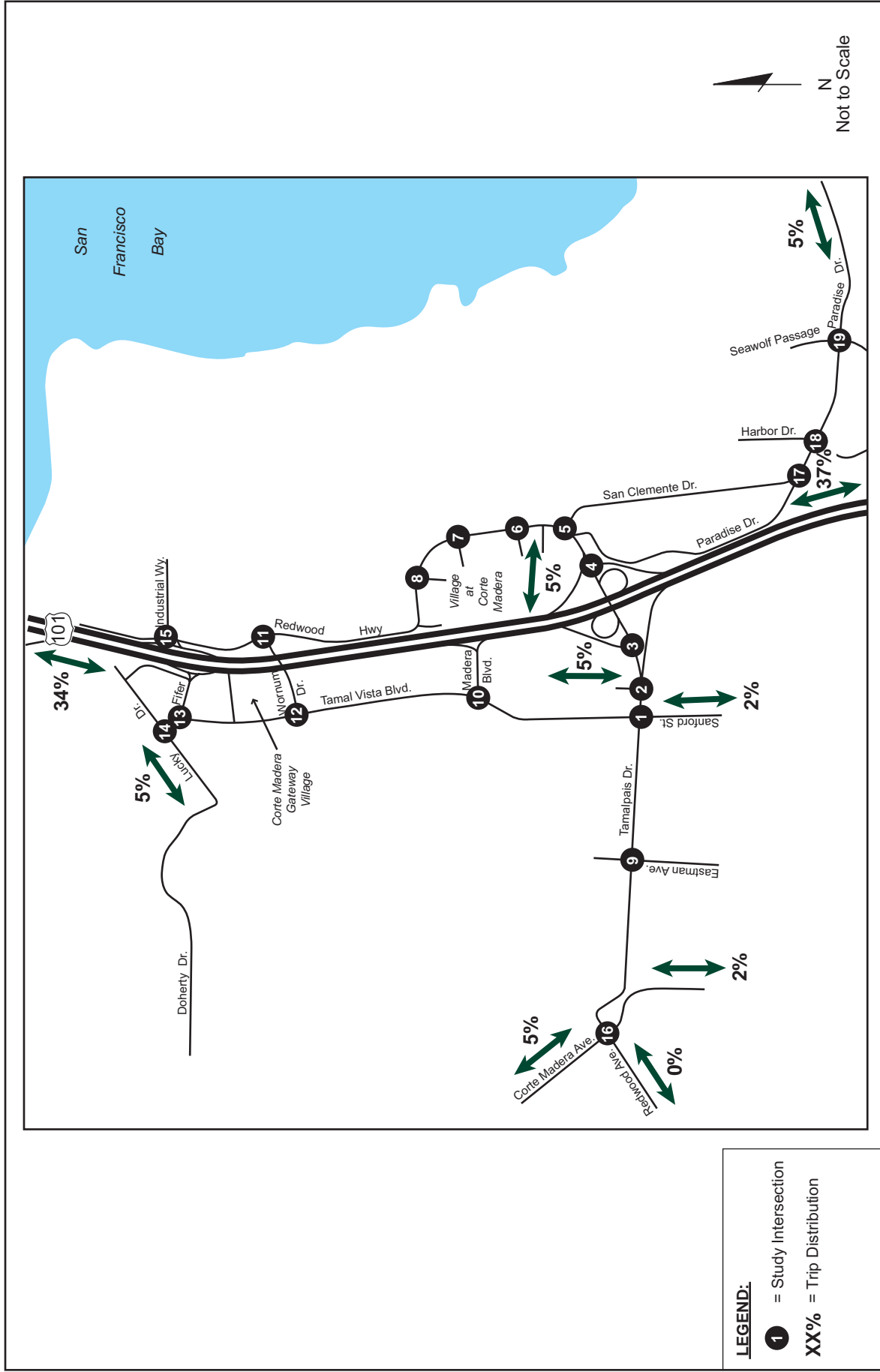
FIGURE A-4



Corte Madera General Plan

PROJECT TRIP DISTRIBUTION VILLAGE AT CORTE MADERA MIXED USE

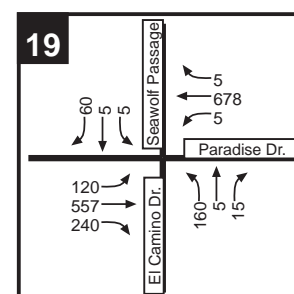
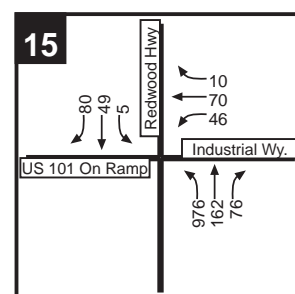
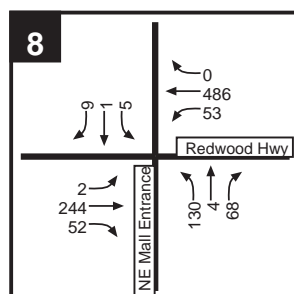
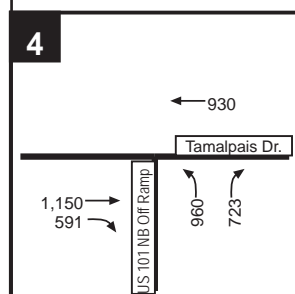
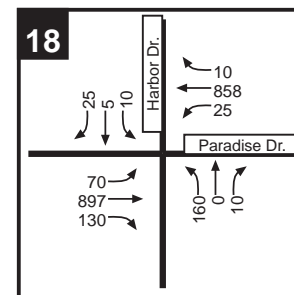
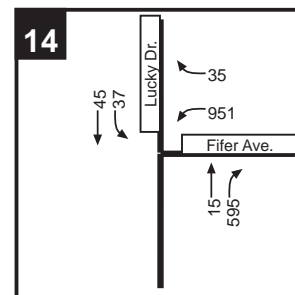
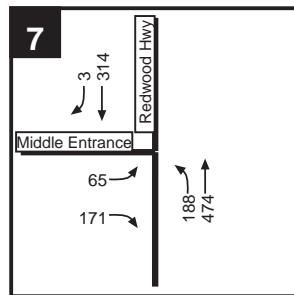
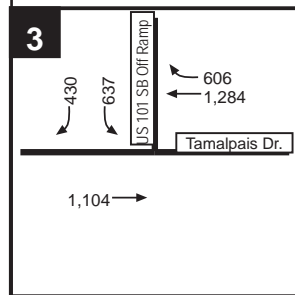
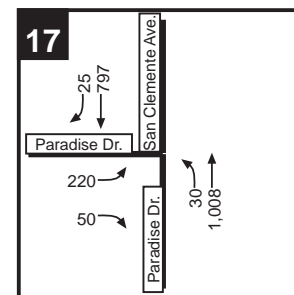
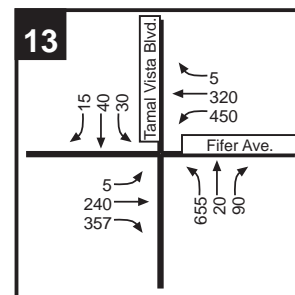
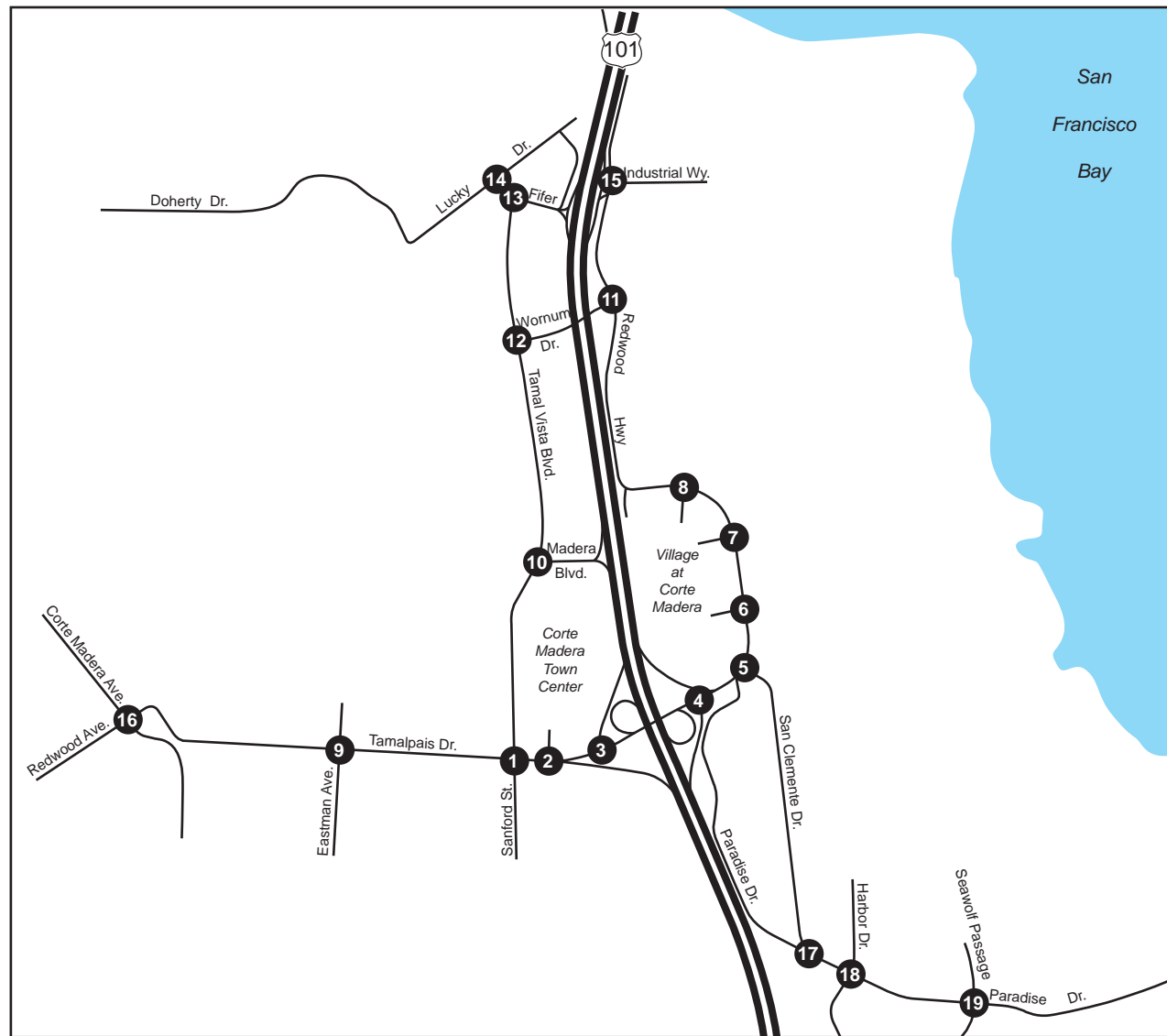
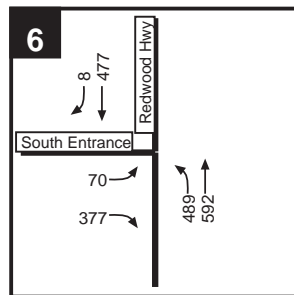
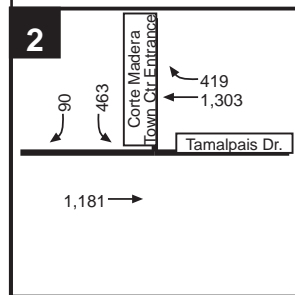
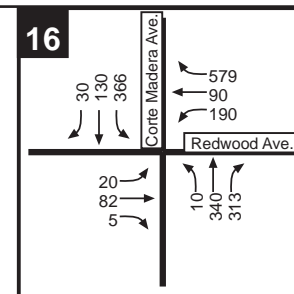
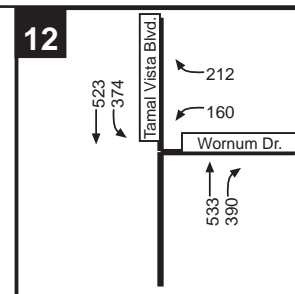
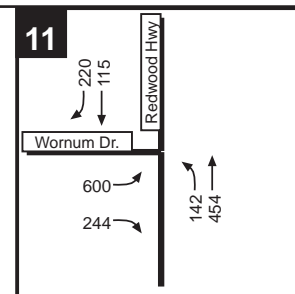
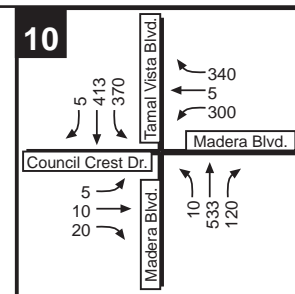
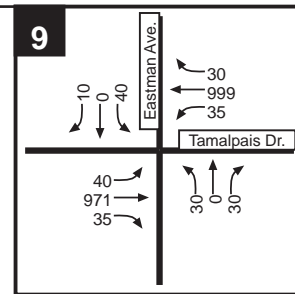
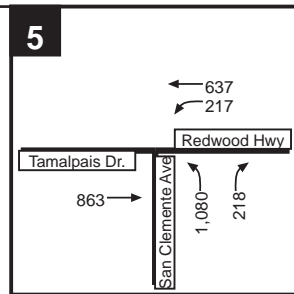
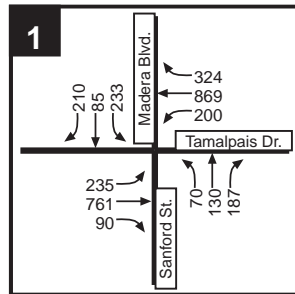
FIGURE A-5



Corte Madera General Plan

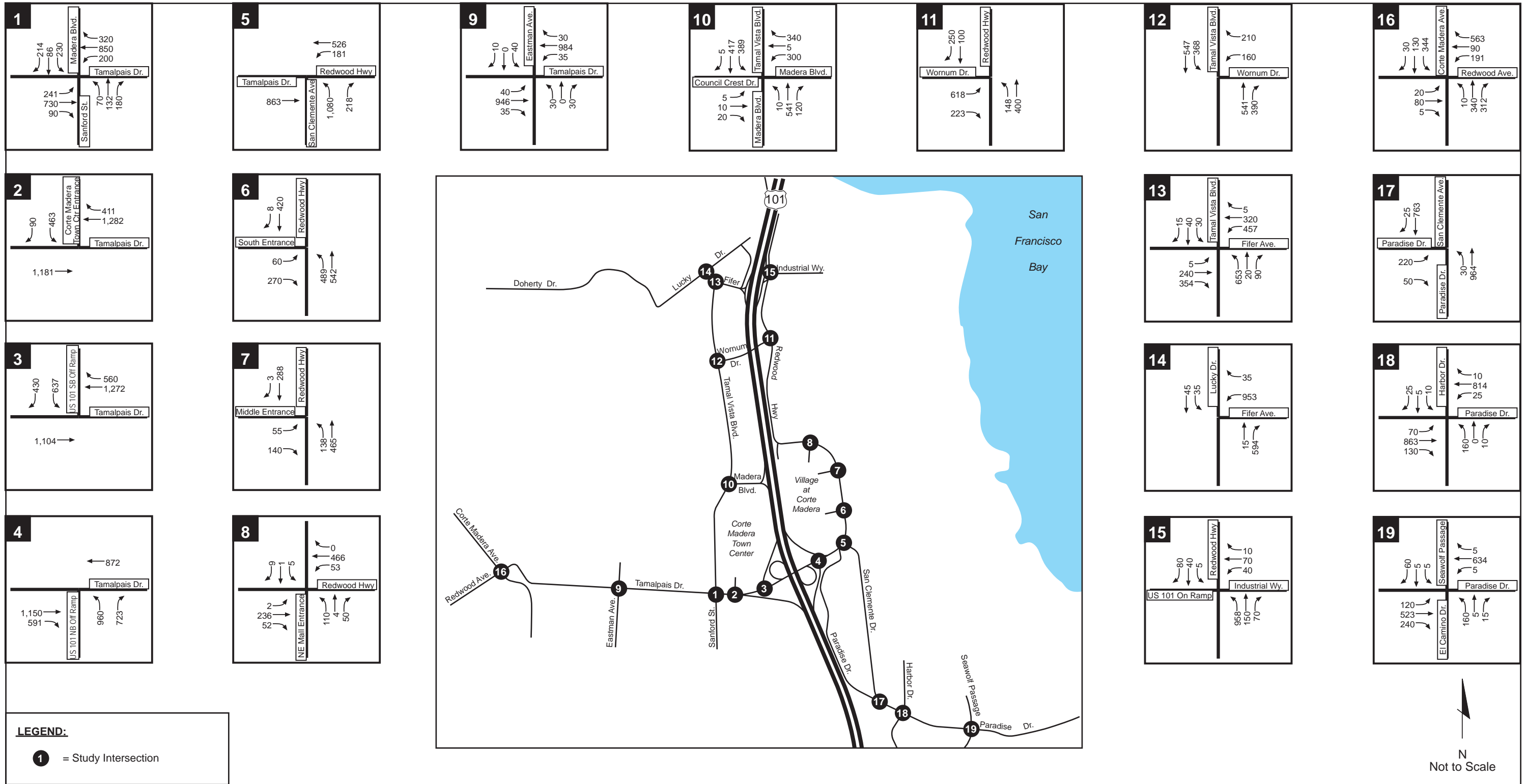
PROJECT TRIP DISTRIBUTION CORTE MADERA GATEWAY VILLAGE

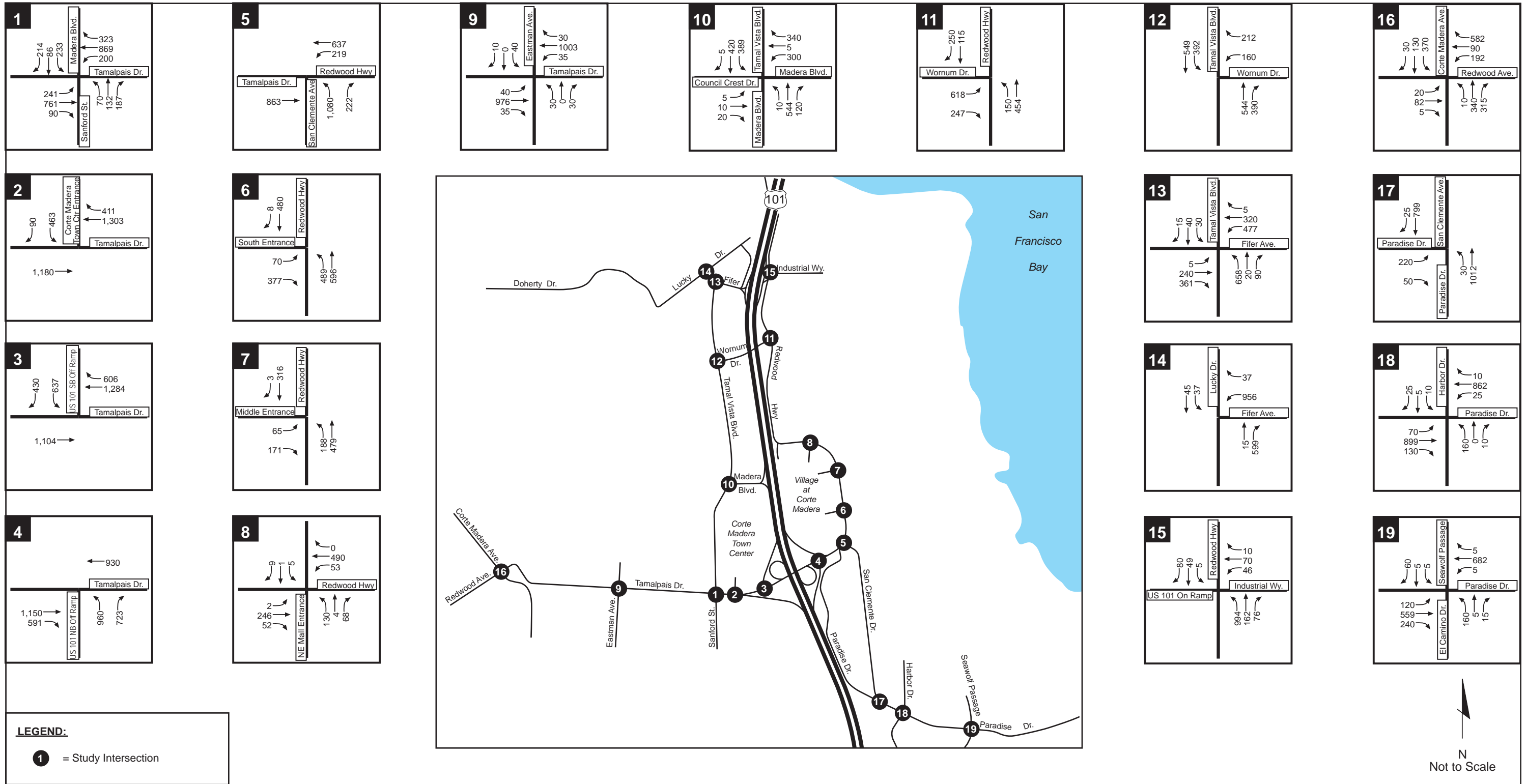
FIGURE A-6



LEGEND:
 = Study Intersection







APPENDIX B: CORTE MADERA TRAVEL DEMAND MODEL

Cumulative General Plan traffic forecasts were developed based on a travel demand and trip assignment model using the VISUM software program. The model was developed to aid in assessing changes in traffic patterns that will result from anticipated roadway network changes and build-out of the General Plan.

Model Study Area

The Corte Madera model which forecasts the effects of the proposed General Plan buildout on traffic conditions is based on the Marin County Travel Model but developed to show a greater level of detail along local streets within the Town of Corte Madera. The model study area, shown on Figure B-1, was selected to encompass Corte Madera, Larkspur, and the section of US Highway 101 between the Tamalpais and Greenbrae/Sir Francis Drake interchanges.

Modeling Methodology

The process to construct the travel demand model and forecast intersection turning movement volumes for the street network along the US-101 corridor in Corte Madera is summarized below:

- **Step 1 – Collect and Organize Data:** PM peak hour intersection turning movement volumes at all major intersections were obtained from traffic counts collected in 2004 and 2005. An origin-destination (O-D) table of PM peak hour vehicle trips originating in, ending in or passing through the study area was created using results from the current Marin County Travel Model.
- **Step 2 – Construct VISUM Model:** Using aerial photos and field data, the model study area, including roadway speeds, number of lanes, and capacities, was constructed using the VISUM software program. The existing intersection turning movement volumes and O-D trip table were then loaded into the VISUM model.
- **Step 3 – Apply VISUM Trip Table Estimator to create calibrated base year model:** VISUM was used to refine the O-D trip tables for the study area based on the Marin County travel model trip table and existing traffic counts. The O-D estimator in VISUM iteratively adjusted the trip table until model turning movements matched existing traffic counts within set tolerances. The results of the calibration process are discussed in greater detail on the following page.
- **Step 4 – Create future year model and forecast future turning movement volumes:** The growth in trips forecast in the Marin County Travel Model was added to the calibrated VISUM base year trip

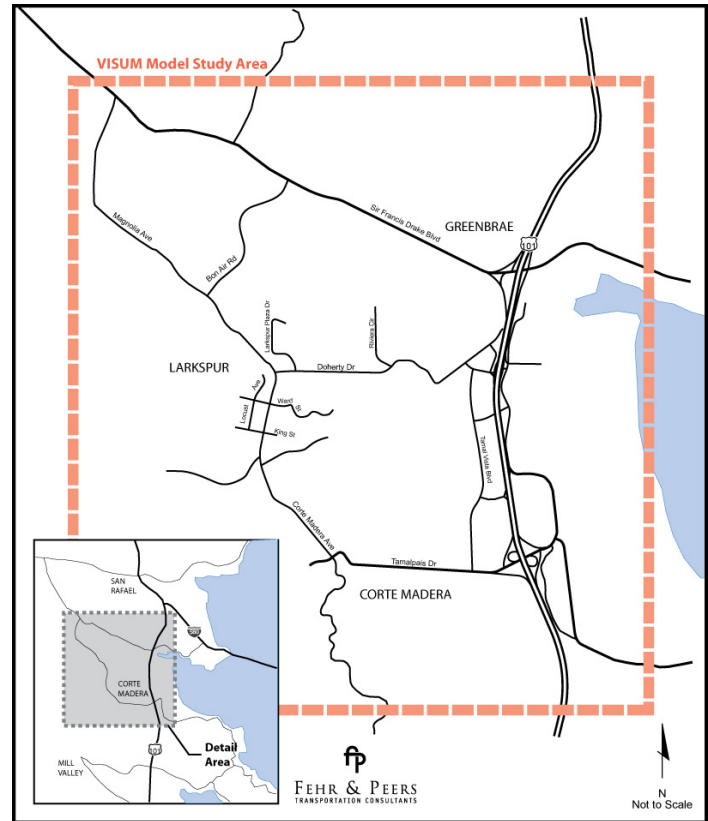


Figure B-1: Corte Madera Travel Model Study Area

table to create a future year trip table. The VISUM trip assignment process was then run on the future year model to forecast the future year intersection turning movement volumes.

VISUM Calibration Results

Traffic forecasting models are typically calibrated and validated by comparing model forecasts with an established set of criteria (developed by Caltrans) comparing model results with actual vehicle counts. If a certain percentage of the forecasted base year model volumes are within a certain tolerance of actual ground counts, the model is typically considered fully calibrated and validated.

The initial results obtained directly from the Marin County Travel Model were compared using the calibration and validation guidelines described above. As shown in Table B-1, this comparison showed that roughly 27 percent of the turning movements met the calibration criteria. This is a reasonable result for a regional travel demand model designed to predict regional travel patterns.

After performing the trip table refinement in VISUM based on existing traffic demand volumes, Fehr & Peers compared the resulting assigned traffic volumes from the refined VISUM model with the existing traffic counts. Table B-1 shows that the trip table adjustment and refined assignment parameters utilized in VISUM improved the assignment such that over 93 percent of all turning movements are within acceptable tolerances. The high degree of accuracy in vehicle traffic assignment is one of the primary benefits of using the VISUM software for studying future traffic patterns at the local level.

TABLE B-1 PERCENTAGE OF MODEL TURNING MOVEMENT VOLUMES WITHIN ALLOWABLE TOLERANCES OF TRAFFIC COUNTS (PM PEAK HOUR)			
Actual Counts	Criteria	Initial Traffic Assignment	Final VISUM Traffic Assignment
V > 1,000 vph	Within 10%	34.0%	100.0%
601 < V < 1,000	Within 15%	35.8%	98.1%
101 < V < 600	Within 20%	22.1%	94.5%
51 < V < 100	Within 25%	25.5%	78.0%
Total Links		26.9%	93.3%
Note: Calibration targets based on <i>Guidelines for Applying Traffic Microsimulation Modeling Software</i> (California Department of Transportation, 2002) Source: Fehr & Peers, November 2005.			

APPENDIX C: CUMULATIVE TRAFFIC CONDITIONS (UNDER ADOPTED 1989 GENERAL PLAN)

CUMULATIVE TRAFFIC VOLUMES

Cumulative “without Project” traffic forecasts were developed based on a travel demand and trip assignment model using the VISUM software program. The Corte Madera Travel Demand Model was developed to aid in assessing changes in traffic patterns that will result from anticipated roadway network changes and buildout of the General Plan. Model development and calibration results are included in Appendix B.

Cumulative peak hour turning movement and freeway segment volumes were developed based on the Corte Madera Travel Demand Model. PM peak hour volumes for cumulative conditions traffic are shown in Figure C-1.

CUMULATIVE OPERATING CONDITIONS

Intersection Operating Conditions

Cumulative intersection operating conditions under the currently adopted 1989 General Plan were analyzed using the methods, peak hour traffic volumes, lane configurations and control described above. The resulting delay and service levels are presented in Table C-1 on the following page.

Three of the 19 study intersections are expected to operate at LOS D, E, or F under Cumulative without Project conditions.

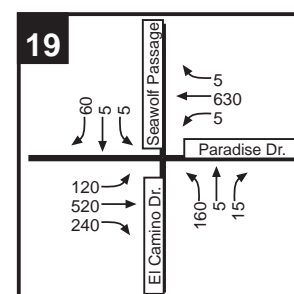
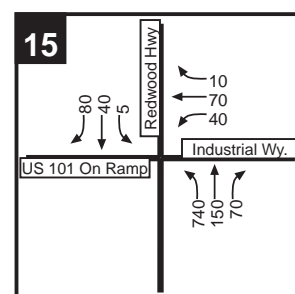
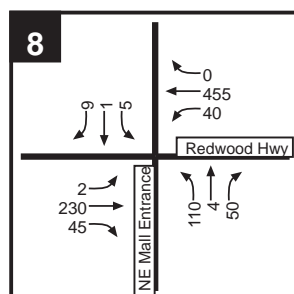
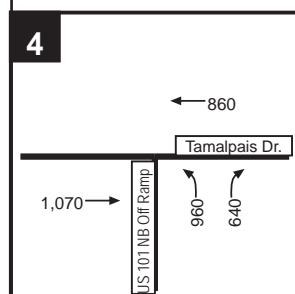
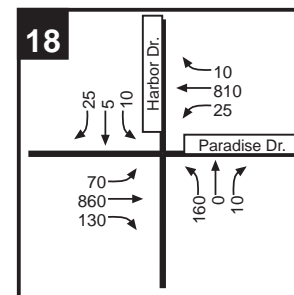
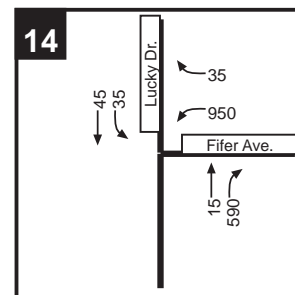
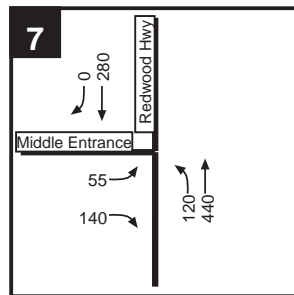
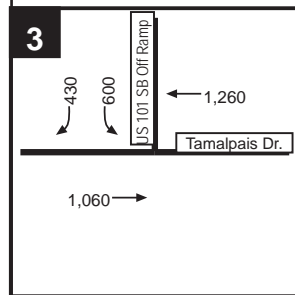
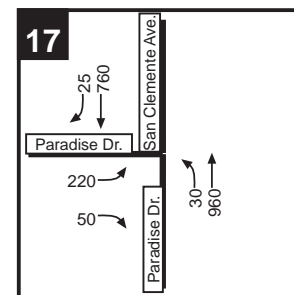
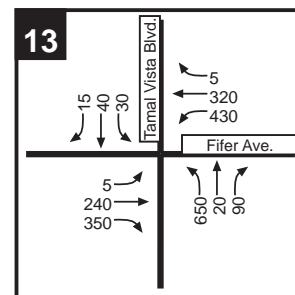
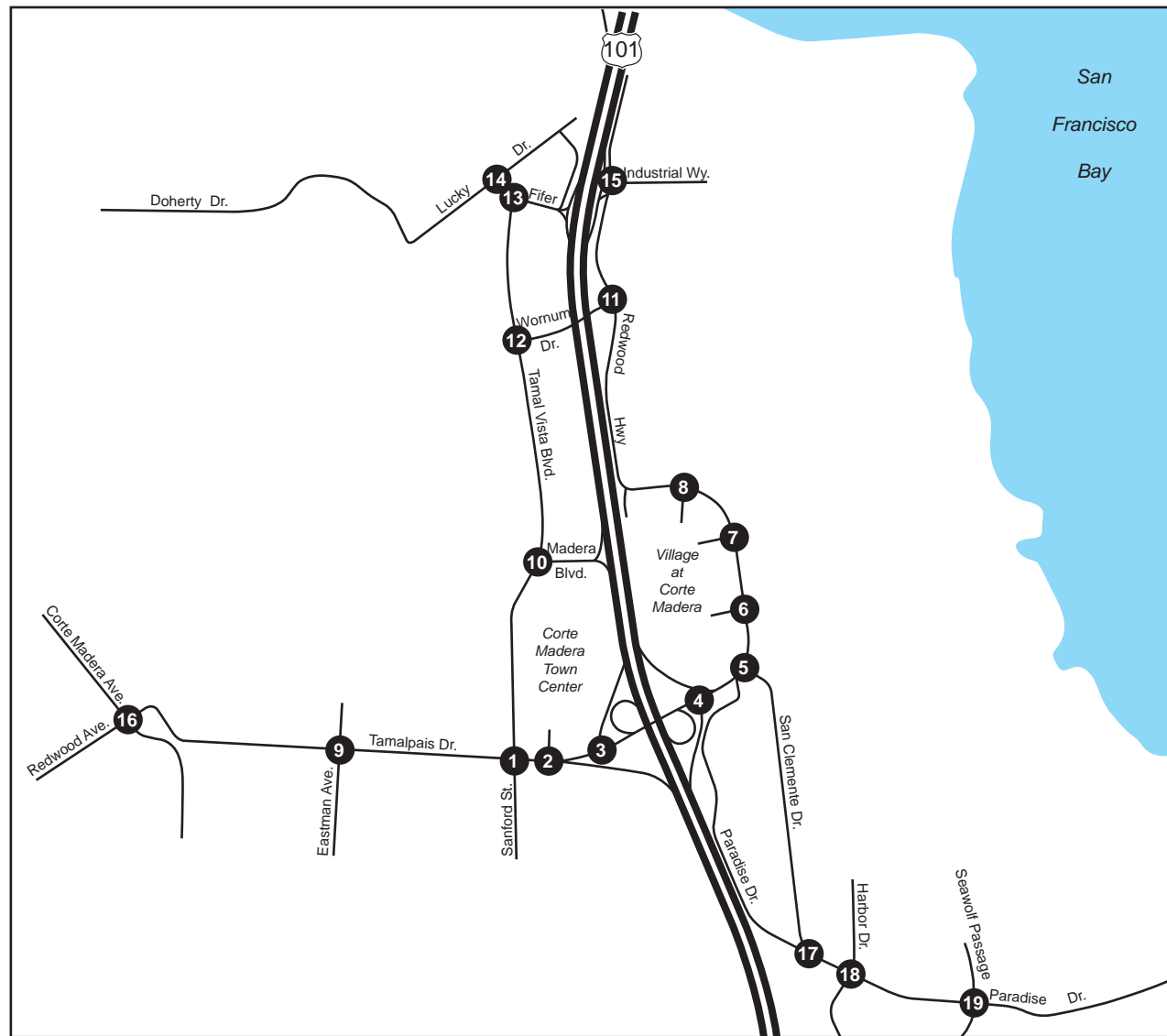
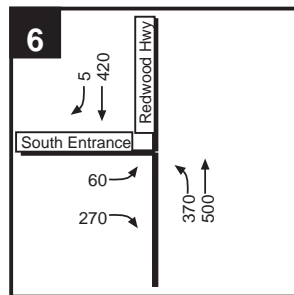
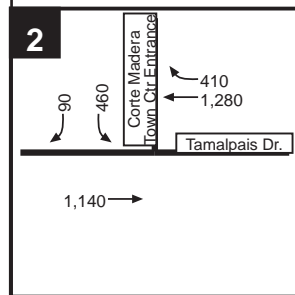
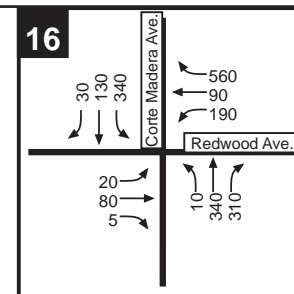
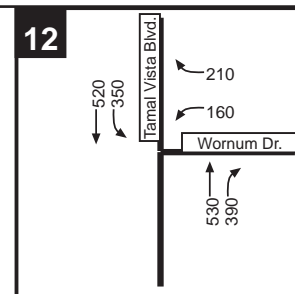
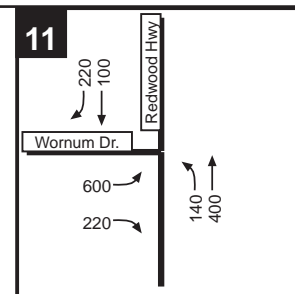
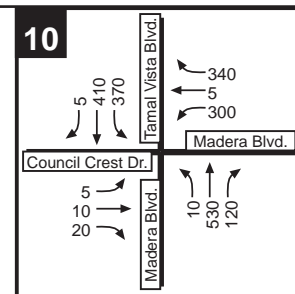
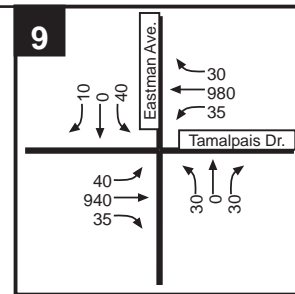
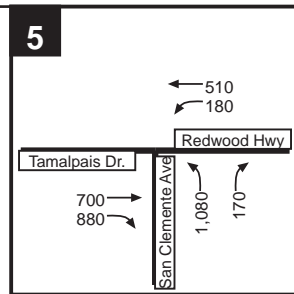
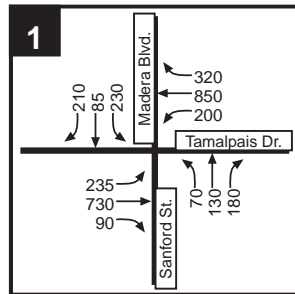
**TABLE C-1
CUMULATIVE INTERSECTION OPERATING CONDITIONS**

Intersection	Control²	Delay³	LOS
1. Tamalpais Dr /Madera Blvd	Signal	35	C
2. Tamalpais Dr/ Corte Madera Town Center Entrance	Signal	10	A
3. Tamalpais Dr/ US 101 SB Off-Ramp	Signal	22	C
4. Tamalpais Dr/ US 101 NB Off-Ramp	Signal	29	C
5. Tamalpais Dr/ San Clemente Dr	Signal	26	C
6. Redwood Hwy/ Village at Corte Madera South Driveway	Signal	11	B
7. Redwood Hwy/ Village at Corte Madera Middle Driveway	Signal	5	A
8. Redwood Hwy/ Village at Corte Madera Northeast Driveway	Signal	8	A
9. Tamalpais Dr/ Eastman Ave	Signal	9	A
10. Madera Blvd/ Council Crest Dr/ Tamal Vista Blvd	AWSC	>50	F
11. Redwood Hwy/ Wornum Dr ⁴	Signal	15	B
12. Tamal Vista Blvd/ Wornum Dr ⁴	Signal	17	B
13. Tamal Vista Blvd/ Fifer Ave	Signal	49	D
14. Lucky Dr/Fifer Ave	SSSC	40 (6)	E A
15. Redwood Hwy/Industrial Wy	Signal	17	B
16. Corte Madera Ave/Redwood Ave	Signal	44	D
17. Paradise Dr/San Clemente Dr	Signal	11	B
18. Paradise Dr/ Harbor Ave	Signal	12	B
19. Paradise Dr / El Camino Dr / Seawolf Passage	Signal	15	B

Note:

- Results for intersections 1-8 along the Tamalpais Drive corridor are based on microsimulation analysis
- Signal = Signalized Intersection; AWSC = All-way stop-controlled intersection; SSSC = Side-street stop-controlled intersection.
- Signalized and all-way stop-controlled intersection level of service based on weighted average control delay per vehicle, according to the Highway Capacity Manual (Transportation Research Board, 2000). For side-street stop controlled intersections, the LOS for the worst side-street movement is presented.

Source: Fehr & Peers, September 2007.



LEGEND:
 = Study Intersection



APPENDIX D: GENERAL PLAN TRIP GENERATION ANALYSIS

Appendix D describes the vehicle trip generation characteristics of the proposed General Plan and project alternatives.

TRIP GENERATION OVERVIEW

Buildout of the proposed General Plan will generate new vehicle trips. A summary of expected trip generation of the proposed General Plan, compared to expected trip generation for General Plan alternatives, is presented in Table D-1 below.

TABLE D-1 PROPOSED GENERAL PLAN VEHICLE TRIP GENERATION				
Description	Size	Daily Trips	AM Peak Hour Trips	PM Peak Hour Trips
<i>Proposed General Plan</i>	659 ksf	15,799	328	1,511
<i>Alternative 1</i>	185 ksf & 300 du	5,103	294	475
<i>Alternative 2</i>	10 ksf & 180 du	1,413	114	132
<i>Alternative 3</i>	195 ksf & 180 du	6,516	408	607
Notes: 1. Size of project is measured in thousand square feet and dwelling units. 2. For Alternatives 1, 2, and 3, the ITE Trip Generation Handbook was used to account for mixed-use internalization. Source: Fehr & Peers, 2008.				

DESCRIPTION OF PROPOSED GENERAL PLAN

Buildout of the proposed Corte Madera General Plan, also referred to as “the project,” includes expansion of the Village at Corte Madera and the Corte Madera Town Center shopping centers to an FAR of 0.6 and development of two parcels at the southwest corner of Paradise Drive and San Clemente Avenue. The Corte Madera Town Center and Village at Corte Madera are located north of Tamalpais Drive to the west and east of Highway 101 respectively.

Project Trip Generation

A full retail expansion at the Corte Madera Town Center and Village at Corte Madera was assumed in this analysis. Office land use was assumed for the Koch Road development. Based on these assumptions, buildout of the proposed General Plan would consist of:

- 585 ksf of retail at the Corte Madera Town Center (360 ksf exists)
- 835 ksf of retail at the Village at Corte Madera (415 ksf exists)
- 14.1 ksf of office at the Koch Road development area

While the proposed General Plan Implementation Program LU-4.3a promotes establishing a mix of land uses at the Town Center and Village shopping centers, this analysis assumes all expansion would be retail in nature. Because retail land uses generate more vehicle trips per square foot than office or residential uses, the results shown below represent a “worst case” scenario. Analysis of a worst case condition is consistent with CEQA guidelines. Establishing a mix of land uses at the Village and Town Center, instead of only retail uses, would result in a lower number of vehicle trips being generated.

Trips generated by existing development, buildout of the proposed General Plan, and the resulting net new project trips from the Village at Corte Madera and the Corte Madera Town Center are shown in Table D-2. Trips from existing development and buildout of the proposed General Plan were estimated based on trip generation equations presented in *ITE Trip Generation, 7th Edition*. The difference between the two represents the number of net new trips.

TABLE D-2 VILLAGE AT CORTE MADERA AND CORTE MADERA TOWN CENTER TRIP GENERATION								
Description	Size ^{1,2}	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
<i>Village at Corte Madera</i>								
Buildout of Proposed General Plan	835 ksf	26,985	341	218	559	1,220	1,321	2,541
Existing	415 ksf	17,134	224	144	368	769	833	1,602
Net New	420 ksf	9,851	117	74	191	451	488	939
<i>Corte Madera Town Center</i>								
Buildout of Proposed General Plan	585 ksf	21,404	276	176	452	964	1,044	2,008
Existing	360 ksf	15,609	206	131	337	699	758	1,457
Net New	225 ksf	5,795	70	45	115	265	286	551
<i>Village at Corte Madera & Corte Madera Town Center Combined</i>								
Buildout of Proposed General Plan	1,420 ksf	48,389	617	394	1,011	2,184	2,365	4,549
Existing	775 ksf	32,743	430	275	705	1,468	1,591	3,059
Net New	645 ksf	15,646	187	119	306	716	774	1,490
Notes:								
1. Existing and Proposed General Plan description based on data provided to Fehr & Peers on August 17, 2005.								
2. Trip generation based on ITE Trip Generation equations for Land Use 820, Shopping Center (based on GLA).								
Source: Fehr & Peers, 2008.								

Trips generated by parcels in the Koch Rd/Industrial Area, at the southwest corner of San Clemente Avenue and Paradise Drive are shown in Table D-3.

**TABLE D-3
KOCH RD/INDUSTRIAL AREA TRIP GENERATION**

Description	Size ¹	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Office	14.1 ksf	155	19	3	22	4	17	21

Notes:
 1. Trip generation based on ITE Trip Generation equations for Land Use 720, General Office.
 Source: Fehr & Peers, 2006.

The project, proposed General Plan Buildout as described above, would generate 15,801 daily trips, 328 AM peak hour, and 1,511 PM peak hour trips.

PM Peak Hour Trip Generation

The project, as described above, consists primarily of retail use. Few retail trips are generated during the AM peak (7:00 – 9:00 AM) and thus, the PM peak (4:00 – 6:00 PM) was the primary period of interest. The full retail expansion land use scenario analyzed represents the CEQA worst case scenario during the PM peak hour. However, if the land use at the Village at Corte Madera were altered to include a mix of retail and residential, fewer trips would be generated.

AM Peak Hour Trip Generation

Full retail expansion of the project would generate roughly 1,500 trips during the PM peak hour and 300 trips during the AM peak hour. While certain existing intersection turning movements may be higher during the AM peak hour, it is expected that the additional traffic volume generated by the General Plan during the PM peak would increase overall intersection volumes by enough during the PM peak to exceed AM peak hour background growth and additional project trips.

Non-primary Trips

For this analysis, net new trips generated by the Corte Madera Town Center and Village at Corte Madera were divided into primary, diverted linked, passby and internal trips. Primary, diverted linked, and passby trips are those defined in the ITE *Trip Generation Handbook*.

“Internal” trips are shared trips between the Corte Madera Town Center and Village at Corte Madera. These trips will first visit one site then proceed to the other before leaving the project area. Internal trips account of about 20% of new new PM peak hour trips. These were calculated by applying ITE trip generation equations to the developments separately and then as a single retail development.

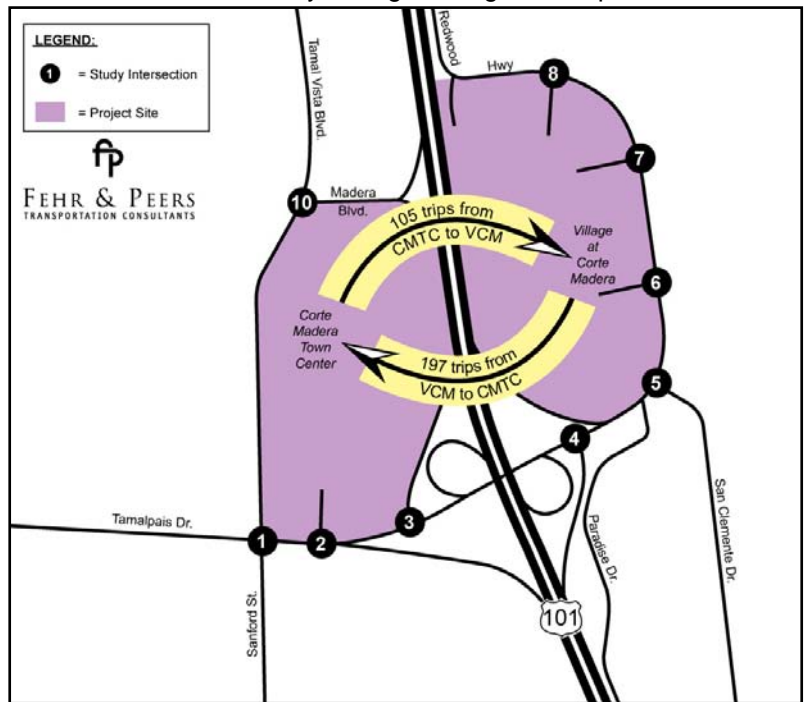


Figure D-1: Internal Project Trip Distribution (Trips between Shopping Centers)

The difference in net new project trips (3,249 daily, 72 AM peak hour, and 302 PM peak hour trips) was used to represent the number of “internal” project trips (see Figure D-1). The site first visited by an internal trip was determined by the proportion of net new trips generated by each (when calculated individually). These trips will be routed on Tamalpais Drive, which serves as the primary connection between the two developments.

The trip generation analysis also incorporated trip type (primarily, pass-by and diverted trips) information based on the ITE *Trip Generation Handbook*. Unshared Corte Madera Town Center trips were divided into 65% primary, 30% diverted and 5% passby trips. All diverted trips were assumed to come from northbound US 101 and all passby trips from westbound Tamalpais Drive. Due to its location, there were no passby trips taken from the Village at Corte Madera, unshared trips were divided into 70% primary and 30% diverted trips. 75% of these trips were assumed to come from northbound US 101 and the remaining 25% from southbound US 101. The breakdown of primary, diverted linked, and passby trips from the Village at Corte Madera and the Corte Madera Town Center is shown on Table D-4.

TABLE D-4 PRIMARY, DIVERTED, AND PASSBY PROJECT TRIPS								
Description	Percent of Net New Trips ¹	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Corte Madera Town Center								
Primary	65	2,811	33	20	53	129	140	269
Diverted	30	1,298	15	10	25	60	64	124
Passby	5	216	2	2	4	10	11	21
<i>Net New</i>	<i>100</i>	<i>4,325</i>	<i>50</i>	<i>32</i>	<i>82</i>	<i>199</i>	<i>215</i>	<i>414</i>
Village at Corte Madera								
Primary	70	5,650	65	41	106	260	282	542
Diverted	30	2,422	28	18	46	111	121	232
<i>Net New</i>	<i>100</i>	<i>8,072</i>	<i>93</i>	<i>59</i>	<i>152</i>	<i>371</i>	<i>403</i>	<i>774</i>
Notes:								
1. Trip type information based information presented in the ITE <i>Trip Generation Handbook</i> .								
Source: Fehr & Peers, 2006.								

TRIP GENERATION FOR PROJECT ALTERNATIVES

Project Description of Alternatives

Two alternatives exist to the original General Plan Project.

- The Alternative 1 project scenario includes expansion of the Village at Corte Madera shopping center as well as its development as a mixed use site, adding 185 ksf of retail and 300 dwelling units. The Village at Corte Madera is located north of Tamalpais Drive to the east of Highway 101 respectively.
- The Alternative 2 Project scenario is the redevelopment of the northeast corner of the intersection of Tamal Vista Blvd. and Wornum Dr. The Gateway Village Mixed-Use project would include 10 ksf of retail space in addition to 180 dwelling units.

- **Alternative 3:** In addition to future development of vacant and underutilized parcels allowed under the Town's existing 1989 General Plan, the Alternative 3 Project scenario includes both Alternative 1 and Alternative 2 projects.

Trip Generation for Project Alternatives

Alternative 1 assumes the redevelopment of the Village at Corte Madera as a mixed-use development. Based on this assumption, buildout of the proposed Alternative 1 project would consist of:

- 600 ksf of retail at the Village at Corte Madera (415 ksf exists)
- 300 du at the Village at Corte Madera (0 du exists)

The buildout of the proposed Alternative 2 project would consist of:

- 10 ksf of retail at Gateway Village Mixed Use (0 ksf existing)
- 180 du at Gateway Village Mixed Use (0 ksf existing)

The buildout of the proposed Alternative 3 project would consist of:

- 185 ksf of retail at the Village at Corte Madera
- 300 du at the Village at Corte Madera
- 10 ksf of retail at Gateway Village Mixed Use
- 180 du at Gateway Village Mixed Use

Trips generated by existing development and buildout of the proposed General Plan Alternative 1, Alternative 2, and Alternative 3 are shown in Table D-5. Trips from existing development and buildout of the proposed General Plan Alternative 1, 2, and 3 were estimated based on trip generation equations and rates presented in *ITE Trip Generation*, 7th Edition. The difference between the two represents the number of net new trips, which includes appropriate mixed-use internalization deductions.

TABLE D-5 PROPOSED ALTERNATIVES 1, 2, AND 3: THE VILLAGE AT CORTE MADERA MIXED-USE DEVELOPMENT AND THE GATEWAY VILLAGE MIXED USE TRIP GENERATION								
Description ²	Size ¹	Daily Trips ³	AM Peak Hour Trips ³			PM Peak Hour Trips ³		
			In	Out	Total	In	Out	Total
Alternative 1: Village at Corte Madera								
Buildout of Proposed General Plan Alternative 1	600 ksf & 300 du	22,237	357	303	662	1,022	1,054	2,077
Existing	415 ksf	17,134	224	144	368	769	833	1,602
Net New	185 ksf & 300 du	5,103	133	159	294	253	221	475
Alternative 2: Gateway Village Mixed Use								
Net New	10 ksf & 180 du	1,413	34	80	114	80	52	132
Alternative 3: Village at Corte Madera and Gateway Village Mixed Use Projects								
Net New	195 ksf & 480 du	6,500	167	239	408	333	273	607
Notes:								
3. Size of project is measured in thousand square feet and dwelling units.								
4. Proposed Alternatives 1, 2, and 3 description based on data provided to Fehr & Peers in May 2007.								
5. Trip generation based on ITE Trip Generation equations for Land Use 820 Shopping Center (based on GLA) and Land Use 230 Residential Condominium/Townhouse. The ITE Trip Generation Handbook was used to account for mixed-use internalization.								
Source: Fehr & Peers, 2008.								

The two project alternatives consist of a combination of residential and retail uses. The proposed General Plan Alternative 1, as described above, would generate 294 AM peak hour and 475 PM peak hour trips. The proposed General Plan Alternative 2 would generate 114 AM peak hour trips and 132 PM peak hour trips. The proposed General Plan Alternative 3 would generate 400 AM peak hour trips and 610 PM peak hour trips.

AM Peak Hour Trip Generation

Because all three alternatives involve the construction of residential units, both project alternatives would generate some AM peak hour traffic. As a result of the size of the combined Project buildout, the AM peak hour trips generated by the Project and Alternative 1 are comparable, generating 306 and 294 trips, respectively.

While certain existing intersection turning movements may be higher during the AM peak hour, it is expected that the additional traffic volume generated by the General Plan during the PM peak would increase overall intersection volumes by enough during the PM peak to exceed AM peak hour background growth and additional project trips.

Non-primary Trips

For this analysis, net new trips generated by the Village at Corte Madera and Gateway Village Mixed Use were divided into primary, diverted linked, and passby, and internal trips. Primary, diverted linked, and passby trips are those defined in the ITE Trip Generation Handbook.

The alternatives analyses treat trips between the Corte Madera Town Center and the Village at Corte Madera as external trips.

The trip generation analysis incorporated trip type (primarily, pass-by and diverted trips) information based on the ITE *Trip Generation Handbook*. Due to its location, there were no passby trips taken from the Village at Corte Madera, unshared trips were divided into 70% primary and 30% diverted trips. 75% of these trips were assumed to come from northbound US 101 and the remaining 25% from southbound US 101. The breakdown of primary, diverted linked, and passby trips from the Village at Corte Madera is shown in Table D-6.

TABLE D-6								
PRIMARY, DIVERTED, AND PASSBY PROJECT TRIPS								
FOR RETAIL COMPONENTS OF ALTERNATIVES 1, 2, AND 3								
Description	Percent of Net New Trips ¹	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Village at Corte Madera								
Primary	70	2,835	83	63	147	130	139	269
Diverted	30	1,215	36	27	63	56	59	115
<i>Total</i>	<i>100</i>	<i>4,050</i>	<i>119</i>	<i>90</i>	<i>210</i>	<i>185</i>	<i>198</i>	<i>384</i>
Gateway Mixed Use								
Primary	76	303	17	10	27	14	17	30
Diverted	24	96	5	3	8	4	5	10
<i>Total</i>	<i>100</i>	<i>399</i>	<i>22</i>	<i>13</i>	<i>35</i>	<i>18</i>	<i>22</i>	<i>40</i>
Village at Corte Madera and Gateway Mixed Use								
Primary		3,138	100	73	174	144	156	299
Diverted		1,311	41	30	71	60	64	125
<i>Total</i>		<i>4,449</i>	<i>141</i>	<i>103</i>	<i>245</i>	<i>203</i>	<i>220</i>	<i>424</i>
Notes:								
2. Trip type information based information presented in the ITE <i>Trip Generation Handbook</i> .								
Source: Fehr & Peers, 2008.								