

June 8, 2009

Mr. Manuel Valencia  
Adobe Oaks, LLC  
1253 Enterprise Court  
Corona, CA 92882

**LLG Reference: 2.07.2896.1**

Subject: **Supplemental General Plan Buildout and Construction Traffic  
Impact Analysis Assessment for the Rancho De Paseo Annex  
Project (TTM No. 34760)**  
Corona, California

Dear Mr. Valencia:

As requested, Linscott, Law & Greenspan, Engineers (LLG) is pleased to submit the following Supplemental General Plan Buildout and Construction Traffic Impact Analysis Assessment for the Rancho De Paseo Annex Project (TTM No. 34760) located in Corona, California. This letter will outline our General Plan Buildout traffic impact analysis assessment consistent with the City of Corona Traffic Impact Study Guidelines and our Construction traffic impact analysis for construction access via Malaga Street as well as an alternative construction access via the proposed secondary fire access from Shepard Crest Drive at Concord Way.

## INTRODUCTION

This traffic impact analysis assessment evaluates the potential Year 2025 General Plan Buildout traffic impacts and potential construction traffic impacts for the proposed TTM No. 34760 Residential Development project (hereinafter referred to as Project), on the area traffic circulation. The proposed Project is located in Corona, California. The proposed residential development project consists of developing thirty-four (34) estate residential single-family detached dwelling units on approximately one-half-acre lots. In addition, 24.5 acres in Riverside County will be annexed into the City of Corona as part of the approval process for this development. *Figure 1* presents a Vicinity Map, which illustrates the general location of the Project and depicts the surrounding street system.

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The traffic impact analysis assessment evaluates the General Plan Buildout potential traffic impacts of the proposed Project on the key study intersections consistent with the approved traffic impact analysis report for the site, prepared by LLG on May 30, 2008.

## PROJECT DESCRIPTION

This Traffic Impact Analysis Assessment Letter analyzes the proposed Project under the General Plan Buildout traffic conditions. The proposed Project site is generally located on the southerly terminus of Malaga Street south of Upper Drive. The project site is a total of 64.3 acres of vacant land (39.8 acres in the City of Corona & 24.5 acres in the unincorporated area of Riverside County). The proposed Project consists of developing thirty-four (34) estate residential single-family detached dwelling units on approximately one-half-acre lots.

*Figure 2* presents the site plan for the proposed Project, prepared by Armstrong & Brooks Consulting Engineers. As shown in *Figure 2*, access to the Project site will be provided via the southerly extension of Malaga Street and will be gate-controlled with a pass-by lane and turn-around area prior to the gate at the call-box. In addition, a secondary gated access will be provided for fire access only along the westerly portion of the site. This secondary access will be evaluated as an alternative construction access in this assessment letter.

*Figure 3* presents the roadway conditions and intersection controls that were utilized for the General Plan Buildout analysis.

## PROJECT TRAFFIC CHARACTERISTICS

### *Project Traffic Generation*

Traffic generation is expressed in vehicle trip ends, defined as one-way vehicular movements, either entering or exiting the generating land use. Generation factors used in the traffic forecasting procedure are typically found in the Seventh Edition of *Trip Generation*, published by the Institute of Transportation Engineers (ITE) [Washington, D.C., 2003].

*Table 1* summarizes the trip generation rates used in forecasting the vehicular trips generated by the proposed residential development as well as the trip generation of the Project. As shown in the upper portion of this table, the trip generation potential for the proposed Project was estimated using the ITE rates for Land Use Code 210: Single Family Detached Housing.

Review of the lower portion of *Table 1 (Table 5-1 in the 05.30.08 TIA)* indicates that the proposed Project is expected to generate 325 daily trips, with 25 trips (6 inbound, 19 outbound) produced in the AM peak hour and 35 trips (22 inbound, 13 outbound) produced in the PM peak hour.

### ***Project Traffic Distribution and Assignment***

The Project directional traffic distribution pattern is presented in *Figure 4*. Project traffic volumes, both entering and exiting the site, have been distributed and assigned to the adjacent street system based on the following considerations:

- 1) expected localized traffic flow patterns based on adjacent street channelization and presence of traffic signals;
- 2) ingress/egress availability at the Project site;
- 3) the traffic-carrying capacity and travel speed available on roadways serving the Project site; and
- 4) input from City of Corona staff. The Project trip distribution pattern was submitted to the City staff for their review and approval prior to proceeding with further analyses.

The anticipated AM and PM peak hour Project traffic volumes at the three key study intersections are presented in *Figures 5 and 6*, respectively. The traffic volume assignment presented in the above mentioned figures reflect the traffic distribution characteristics shown in *Figure 4* and the traffic generation forecast presented in the lower portion of *Table 1*.

## **GENERAL PLAN BUILDOUT TRAFFIC**

### ***Year 2025 General Plan Buildout Travel Demand Model Methodology<sup>1</sup>***

The Year 2025 General Plan Buildout traffic volume forecasts were obtained through utilization of the travel demand model developed by Iteris, Inc. for the City of Corona Circulation Element update, based on data from the Revised Travel Demand Model of the City of Corona's General Plan, with selected regional projects from the SCAG Regional Transportation Plan (RTP) added as well as the Riverside County to Orange County connection project.

### ***Volume Adjustment***

Using the City of Corona Current General Plan transportation model with selected SCAG RTP projects added as well as the Riverside County-to-Orange County Connection, projected traffic volumes were obtained for each intersection. The model

<sup>1</sup> Source: Meyer, Mohaddes Associates (MMA)

produces peak period and off-peak period volumes (6:00 AM – 9:00 AM, 9:00 AM – 3:00 PM, 3:00 PM – 7:00 PM and 7:00 PM – 6:00 AM). Before converting the model peak period link volumes to future turning movement volumes for analysis, the model volumes must be reviewed and adjusted.

The first step is to obtain the approach and departure volumes from the model for each leg of the analyzed intersections. The next step converts the model approach and departure volumes from AM and PM peak period volumes to peak hour volumes. The AM peak hour volumes are calculated by multiplying the AM peak period volumes by 38%. Similarly, the PM peak hour volumes are calculated by multiplying the PM period volumes by 28%. These are the percentages of vehicles that are assumed to occur in the peak hour of the peak period. These factors are derived from SCAG research. The next step is to determine the difference between the base year (2002) peak hour model volumes and the Buildout peak hour model volumes. This “difference” represents the projected growth in traffic on each approach to the Buildout of the General Plan using the SCAG 2025 CTP model.

### ***B-turn Methodology***

The base year turning movement counts (adjusted to 2002) for each intersection must be converted to approach and departure volumes for each leg of the intersection. Once the base counts are in this format, the difference between the Buildout model and base model are then added to the base year counts for each corresponding approach and departure volume. This step provides the adjusted volumes that will be used to determine the Buildout turning movement volumes. The next process in the forecasting of future turning volumes applies the B-turn methodology. The B-turn methodology is generally described in the “*National Cooperative Highway Research Program Report (NCHRP) 255: Highway Traffic Data for Urbanized Area Project Planning and Design*”, Chapter 8. The B-turn method uses the base year turning percentages (from traffic counts) and proceeds through an iterative computational technique to produce a final set of future year turning volumes. The computations involve alternatively balancing the rows (approaches) and the columns (departures) of a turning movement matrix until an acceptable convergence is obtained. Future year link volumes are fixed using this method and the turning movements are adjusted to match. The results must be checked for reasonableness, and manual adjustments are sometimes necessary.

Finally, it should be noted that all provided volumes are from a Citywide General Plan level model that was not specifically developed for analysis of individual intersection turning movements. Therefore each projected volume was reviewed carefully and adjustments were applied as warranted based on local conditions and professional judgment.

Copies of the traffic model post-processing worksheets and a detailed description of the traffic volume derivation are contained in *Appendix A*. Please note that the post-processing methodology utilized in this report is consistent with SCAG requirements.

#### ***Year 2025 General Plan Buildout Traffic Volumes***

The General Plan Buildout traffic volumes were obtained by post-processing the General Plan Buildout peak hour approach and departure traffic volumes based on the relationship of the base year validation model run output to the base year ground traffic counts. The projected volume was reviewed carefully and adjustments were applied as warranted based on local conditions and professional judgment.

The anticipated AM and PM peak hour traffic volumes, at the key study intersections, associated with General Plan Buildout traffic conditions, are presented in *Figures 7* and *8*, respectively.

#### ***Year 2025 General Plan Buildout Plus Project Traffic Volumes***

The estimates of the Project-generated traffic volumes were added to the General Plan Buildout conditions to develop traffic projections for the General Plan Buildout Plus Project traffic conditions. *Figures 9* and *10* present the AM and PM peak hour General Plan Buildout Plus Project traffic volumes, respectively, at the key intersections.

### **TRAFFIC IMPACT ANALYSIS ASSESSMENT**

The relative impact of the added Project traffic volumes generated by the proposed Project during the AM and PM peak hours was evaluated based on analysis of future operating conditions at the three key area intersections, with and without, the proposed Project. The previously discussed capacity analysis procedures were utilized to investigate the future delay and service level characteristics at each study intersection. The significance of the potential impacts of the Project at each key intersection was then evaluated using traffic impact criteria published in the City's *Traffic Impact Study Guidelines*, dated July 2006.

#### ***Impact Criteria and Thresholds***

The City of Corona considers LOS D to be the minimum acceptable LOS for all intersections that consist of collector and arterial roadways. In addition, The City of Corona considers LOS C to be the minimum acceptable LOS for local intersections in residential and industrial areas.

## YEAR 2025 GENERAL PLAN BUILDOUT ANALYSIS

*Table 2* summarizes the AM and PM peak hour LOS results at the key study intersections for the Project traffic conditions for the Year 2025 General Plan Buildout plus Project scenario. The first column (1) of Delay values in *Table 2* presents a summary of AM and PM peak hour for General Plan Buildout traffic conditions. The overall intersection delay value and corresponding LOS are reported in this summary table. The second column (2) presents General Plan Buildout plus Project traffic conditions. The third column (3) indicates whether the traffic associated with the Project will have a significant impact based on the LOS standards and the significance impact criteria defined in this report. The fourth column (4) presents the Level of Service with the implementation of mitigation measures, if necessary. *Appendix B* contains the General Plan Buildout Plus Project Delay/LOS worksheets for the above analysis.

As presented in *Table 2*, none of the key study intersections will be significantly impacted with the addition of Project traffic based on City of Corona LOS impact criteria.

## RECOMMENDED TRAFFIC IMPROVEMENTS

For those intersections where projected traffic volumes are expected to result in unacceptable operating conditions, this report recommends (identifies) improvement measures that change the intersection geometry to increase capacity. These capacity improvements involve roadway widening and/or re-striping to reconfigure (add lanes) to specific approaches of a key intersection. The identified improvements are expected to:

- mitigate the impact of existing traffic, project traffic and future non-project (ambient traffic growth and cumulative project) traffic, and
- improve Levels of Service to an acceptable range and/or to pre-project conditions

### *General Plan Buildout Plus Project Traffic Recommended Improvements*

As there are no significant impacts at the three study intersections, therefore no traffic mitigation measures are required or recommended, other than the recommendation to install an all-way stop at the intersection of Malaga Street and Shepard Crest Drive for traffic calming purposes.

## CONSTRUCTION TRAFFIC IMPACTS ANALYSIS

This section of the report summarizes the potential traffic impacts due to construction activities at the project site.

*Figure 11* presents the construction access site plan for the proposed Project, prepared by Armstrong & Brooks Consulting Engineers, which shows the primary construction access and staging area via the southerly extension of Malaga Street as well as the alternative construction access and staging area via the proposed secondary fire access from Shepard Crest Drive at Concord Way.

It is anticipated that 1.2 million cubic yards of soil/rock will be graded within the project site but no import or export of material is needed prior to construction of the proposed Project. In addition, it is anticipated that approximately 20 pieces of equipment will be utilized for the site grading (6 Scrapers, 6 Dozers, 4 Loaders, and 3 Water trucks). However, these trucks will be stored on site and therefore will only consist of only one inbound and one outbound trip for each piece of equipment.

In order to forecast the potential construction related trips associated with the grading of the project site, the following assumptions have been assumed.

### Grading Operation

- A five-day work week (Monday through Friday from 8:15 AM to 4:15 PM) was assumed.
- The grading is anticipated to last a maximum of approximately six (6) months.
- No trucks will be entering or exiting the site on a daily basis during the grading process other than the inbound trip at the beginning of the grading process and the outbound trip at the end of the grading process.
- A total of 25 employees will be on the site Monday through Friday from 8:15 AM to 4:15 PM.

Using the aforementioned assumptions results, it is assumed that there will be no daily truck traffic on the adjacent street network and a total of 25 employees will be on site during the export. It was assumed that each employee would make 3 trips per day on average (one during the AM peak hour, one out of two employees leaving the site during the lunch hour and one during the PM peak hour) resulting in 75 daily employee trips with 25 AM peak hour employee trips (25 inbound and 0 outbound) and 25 PM peak hour employee trips (0 inbound and 25 outbound).

### Site Preparation Operation (Undergrounding, Dry Utility, & Street Improvements)

- A five-day work week (Monday through Friday from 8:15 AM to 4:15 PM) was assumed.
- The undergrounding and dry utility installation is anticipated to last a maximum of approximately four (4) months and the street improvements are anticipated to last a maximum of approximately two (2) months.

- No trucks will be entering or exiting the site on a daily basis during the undergrounding and dry utility installation other than construction equipment delivery and bulk material delivery, which will be stored on site.
- A total of six (6) employees will be on the site Monday through Friday from 8:15 AM to 4:15 PM for the undergrounding and dry utility installation.
- No trucks will be entering or exiting the site on a daily basis during the street improvement operation (AC paving and Curb & Gutter) other than construction equipment delivery and the delivery of the concrete and asphalt, which requires immediate installation. To the extent possible, staging for the asphalt and concrete trucks will occur on site.
- A maximum of (8) employee will be on the site Monday through Friday from 8:15 AM to 4:15 PM for the street improvements.

Using the aforementioned assumptions results it is assumed that there will be nominal daily truck traffic on the adjacent street network and a total of six (6) employees will be on site during the undergrounding and dry utility installation, which would occur after the grading operation. It was assumed that each employee would make 3 trips per day on average (one during the AM peak hour, one out of two employees leaving the site during the lunch hour and one during the PM peak hour) resulting in 18 daily employee trips with 6 AM peak hour employee trips (6 inbound and 0 outbound) and 6 PM peak hour employee trips (0 inbound and 6 outbound).

Using the aforementioned assumptions results it is assumed that there will be nominal daily truck traffic on the adjacent street network and a maximum of eight (8) employees will be on site during the street improvements operation which would occur after the undergrounding and dry utility installation. It was assumed that each employee would make 3 trips per day on average (one during the AM peak hour, one out of two employees leaving the site during the lunch hour and one during the PM peak hour) resulting in 24 maximum daily employee trips with 6 AM peak hour employee trips (8 inbound and 0 outbound) and 8 PM peak hour employee trips (0 inbound and 6 outbound).

#### Custom Home Construction Operation

- A five-day work week (Monday through Friday from 8:15 AM to 4:15 PM) was assumed.
- The custom home construction is anticipated to last approximately twelve (12) months and it is anticipated that only two homes would be constructed at a time.
- No trucks will be entering or exiting the site on a daily basis during the custom home construction other than construction equipment delivery and bulk material delivery, which will be stored on site.
- A total of 10 employees (five per home) will be on the site Monday through Friday from 8:15 AM to 4:15 PM for the custom home construction operation.



Using the aforementioned assumptions results it is assumed that there will be nominal daily truck traffic on the adjacent street network and a total of ten (10) employees will be on site during the custom home construction which would occur after the street improvements. It was assumed that each employee would make 3 trips per day on average (one during the AM peak hour, one out of two employees leaving the site during the lunch hour and one during the PM peak hour) resulting in 30 maximum daily employee trips with 10 AM peak hour employee trips (10 inbound and 0 outbound) and 10 PM peak hour employee trips (0 inbound and 10 outbound).

As a result, with the aforementioned construction activities, there is a minimal potential for short-term adverse traffic in the project vicinity during construction of the project since the level of service of the adjacent roadways are operating at acceptable levels of service B or better and there will be nominal daily truck traffic on the adjacent local streets. Construction related trips associated with trucks and employees traveling to and from the site in the morning and afternoon may result in some minor traffic delays; however, potential traffic interference caused by construction vehicles would create a temporary/short-term impact to vehicles using Malaga Street and Mountain Gate Drive in the morning and afternoon hours and the number of construction workers will vary depending on the specific construction activities over time. Traffic impacts to the adjacent roadway network will be minimal and not long-term. Therefore, aside from the nuisance traffic that will occur as a result of construction-related traffic (e.g., construction materials, construction workers, etc.) impacts resulting from construction traffic would be less than significant.

#### **ALTERNATIVE CONSTRUCTION ACCESS TRAFFIC IMPACT ANALYSIS**

This section of the report summarizes the potential traffic impacts due to the utilization of an alternative construction access for some or all activities at the project site.

As presented in *Figure 11*, the alternative construction access and staging area would be located along the proposed secondary fire access from Shepard Crest Drive at Concord Way, which is an existing path beginning on the south side of Shepard Crest Drive immediately east of the knuckle at Concord Way and Shepard Crest Drive.

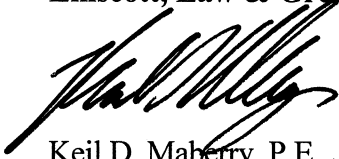
Due to the some of the grading and site preparation activities that would need to be completed on the western portion of the site, it may be necessary to utilize both construction access roadways for the initial phases of construction, such that the alternative access from Shepard Crest Drive may be utilized during a certain phase of construction and the Malaga Street access for the other.

Based on our review of the roadway and neighborhood characteristics of the two construction access paths to the site from Upper Drive, which is a Collector roadway, the traffic impacts of either path are essentially equal. The primary construction

access path along Malaga Street is slightly shorter than the Alternative with 19 homes fronting the path, while the Alternative path along Mountain Gate Drive, Windy Ridge Drive, and Concord Way has several more turns and 21 homes fronting the path. As a result, while Malaga Street is the more logical construction access path based on the layout of the site and has slightly less homes fronting along it, use of the alternative access for certain construction activities would be acceptable without causing any significant impacts to the adjacent transportation system.

We appreciate the opportunity to provide this supplemental traffic impact analysis assessment letter. Should you have any questions, please call me at (714) 641-1587.

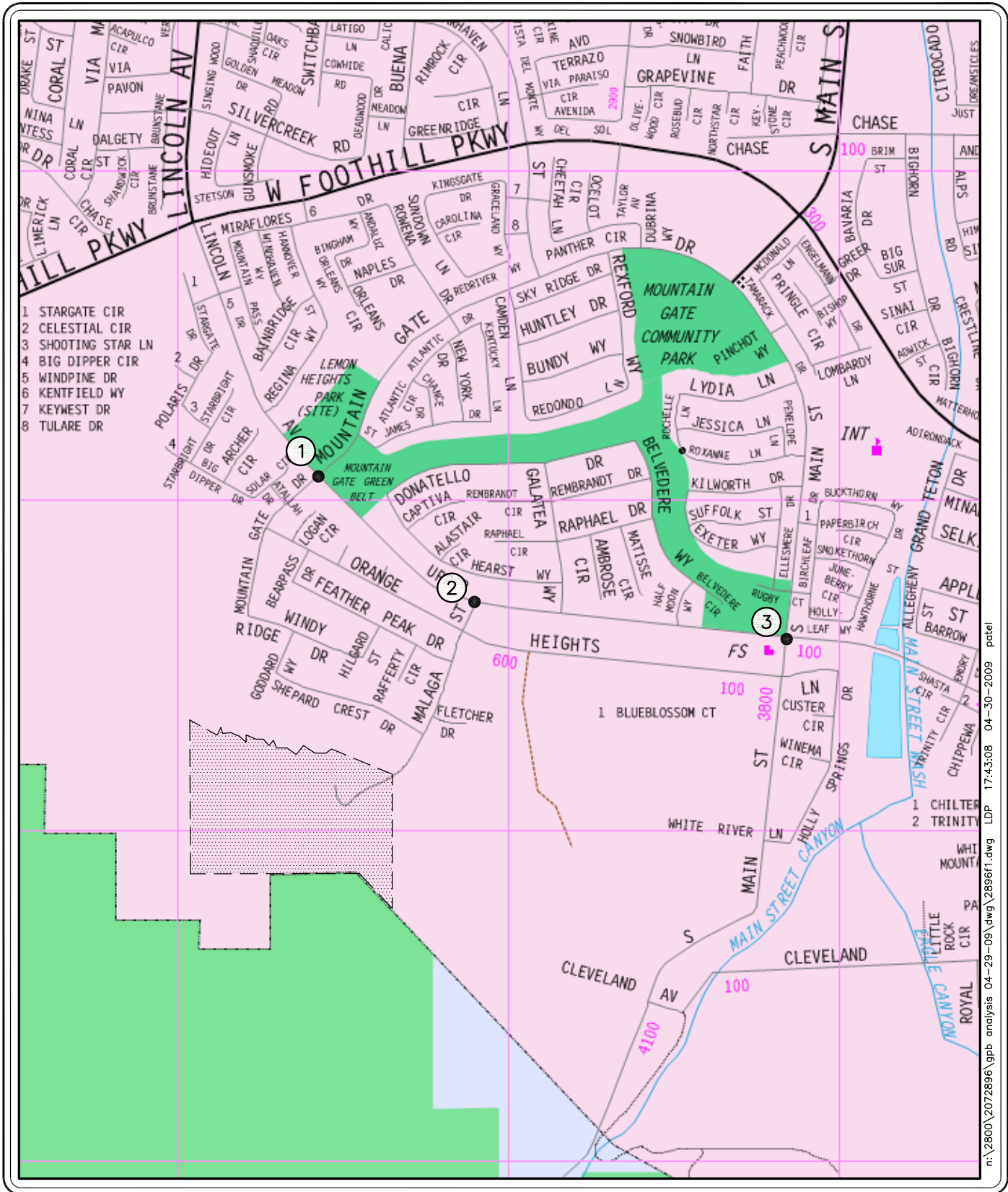
Very truly yours,  
**Linscott, Law & Greenspan, Engineers**



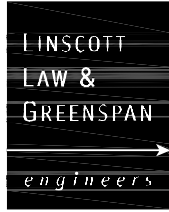
Keil D. Maberry, P.E.  
Principal



Attachments



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NO SCALE

SOURCE: THOMAS BROS.

KEY

- ⊕ = STUDY INTERSECTION
- ▨ = PROJECT SITE

# FIGURE 1

## VICINITY MAP

TTM NO. 34670 RESIDENTIAL DEVELOPMENT, CORONA



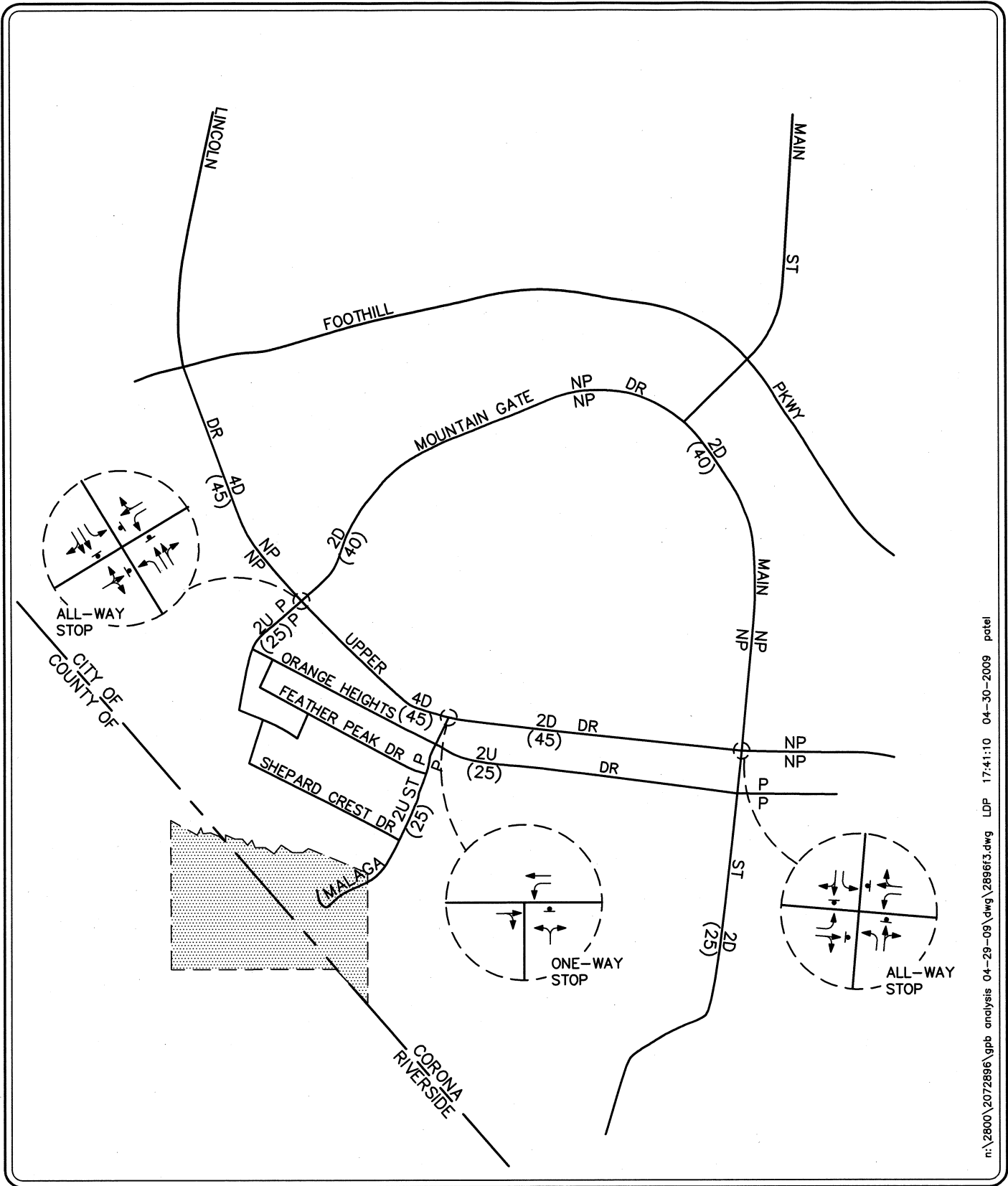
**FIGURE 2**  
**PROPOSED SITE PLAN**  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA

SOURCE: ARMSTRONG & BROOKS CONSULTING ENGINEERS



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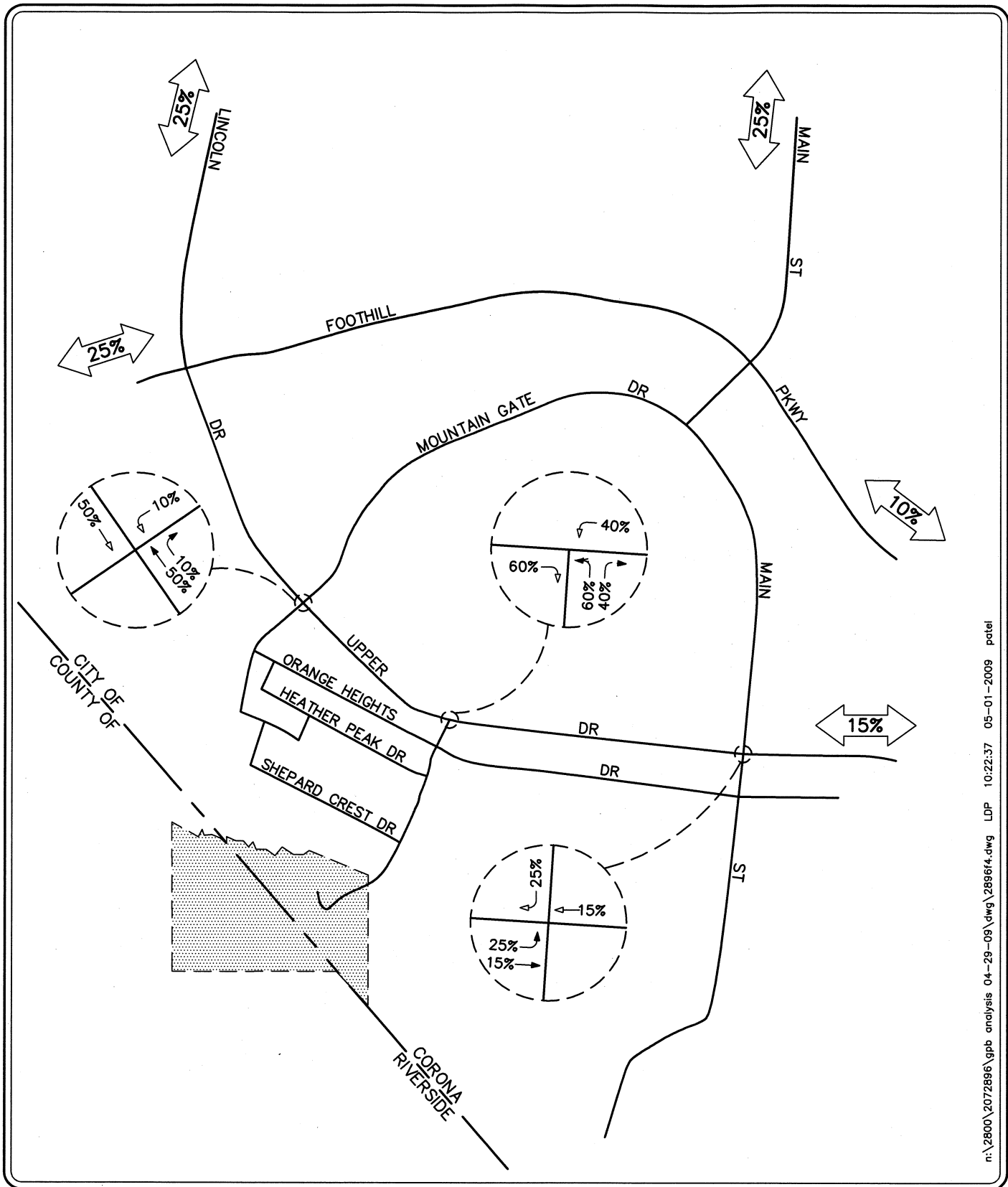
**KEY**

- ← = APPROACH LANE ASSIGNMENT
- ▼ = STOP SIGN
- P = PARKING, NP = NO PARKING
- U = UNDIVIDED, D = DIVIDED
- 2 = NUMBER OF TRAVEL LANES
- (XX) = POSTED SPEED LIMIT (MPH)
- ▨ = PROJECT SITE

**FIGURE 3**

**EXISTING ROADWAY CONDITIONS  
AND INTERSECTION CONTROLS**

TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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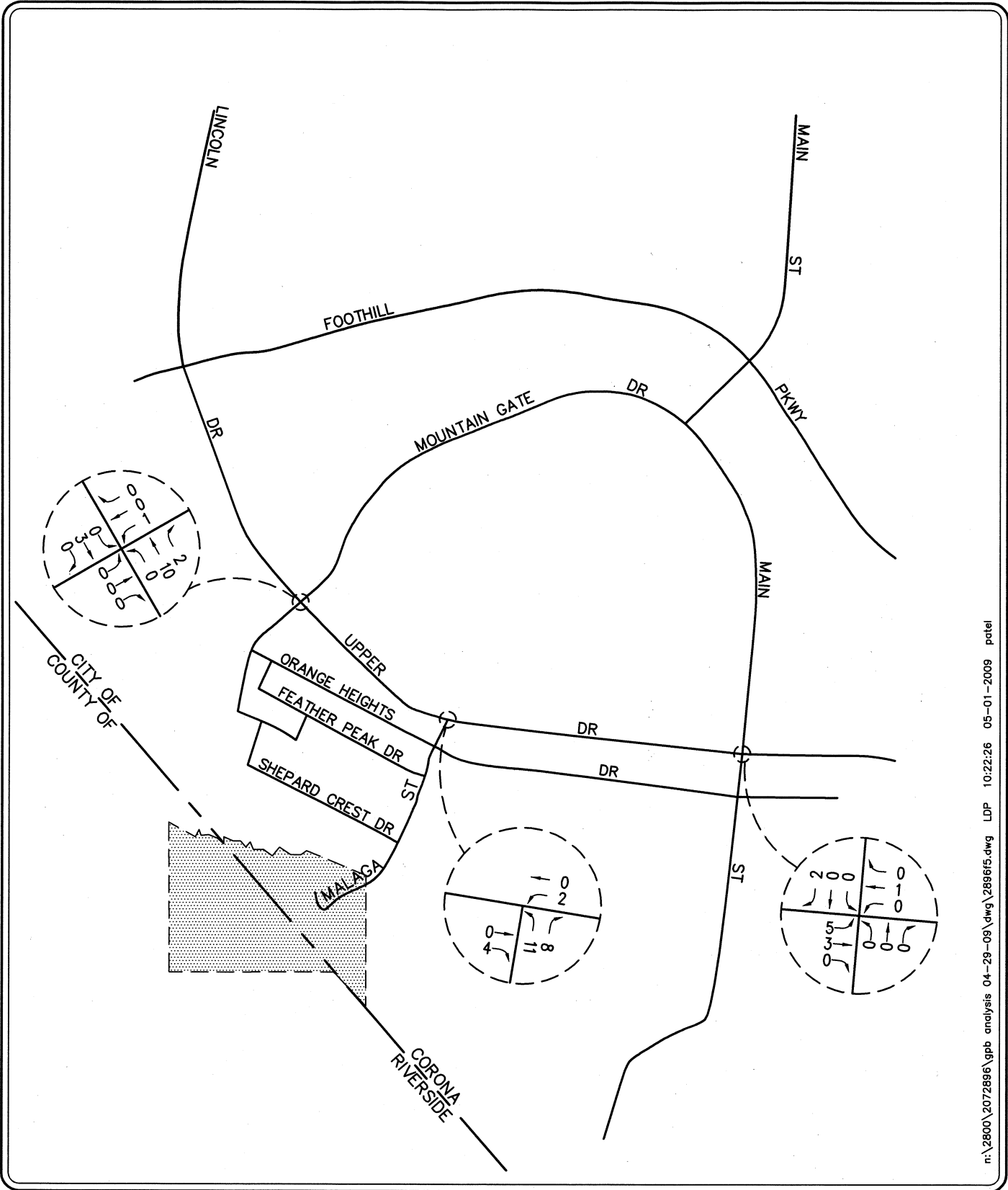
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engineers



- KEY**
- ← = INBOUND PERCENTAGE
  - = OUTBOUND PERCENTAGE
  - [Hatched Box] = PROJECT SITE

# FIGURE 4

**PROJECT TRAFFIC DISTRIBUTION PATTERN**  
TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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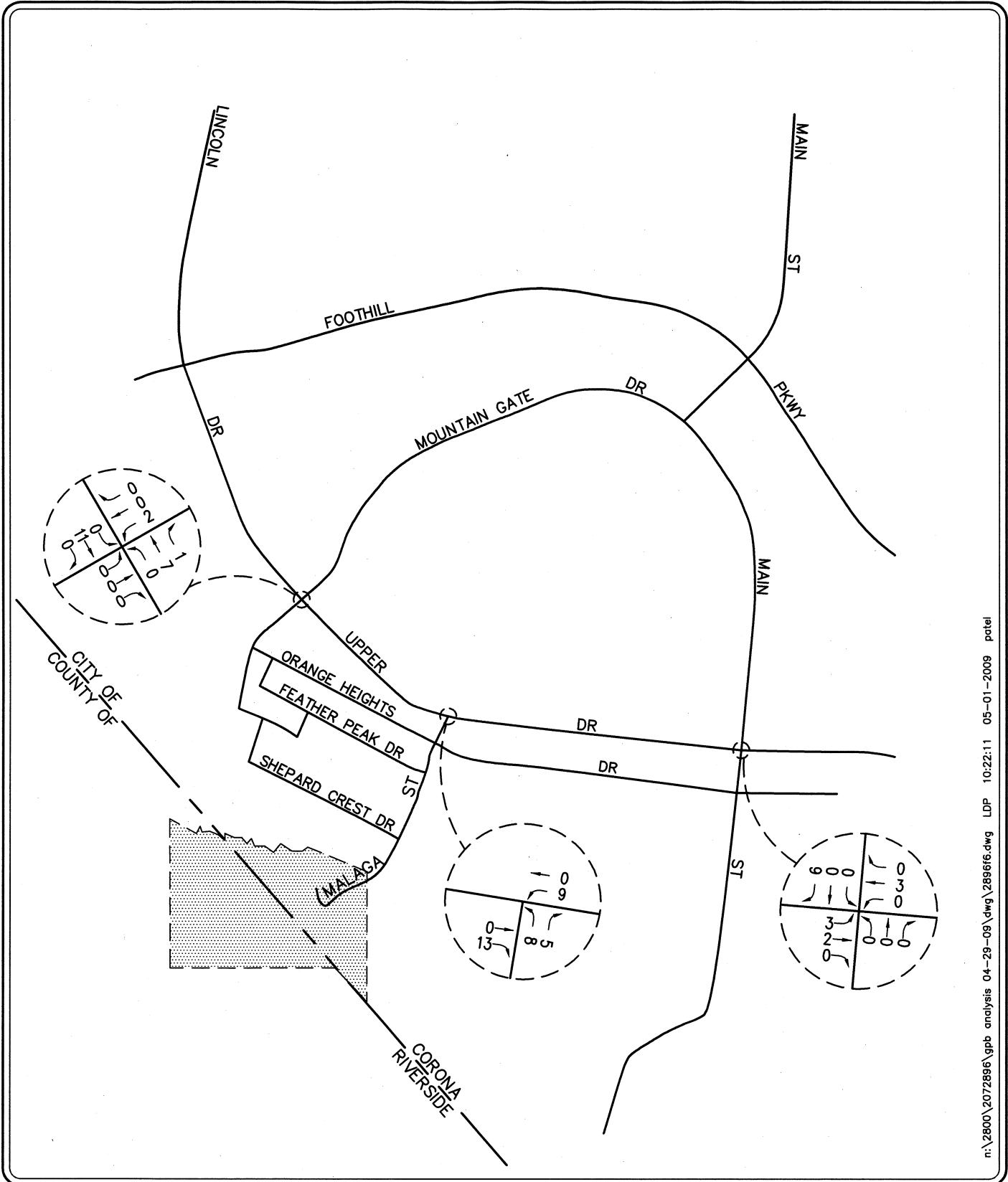
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KEY  
 = PROJECT SITE

# FIGURE 5

AM PEAK HOUR PROJECT TRAFFIC VOLUMES  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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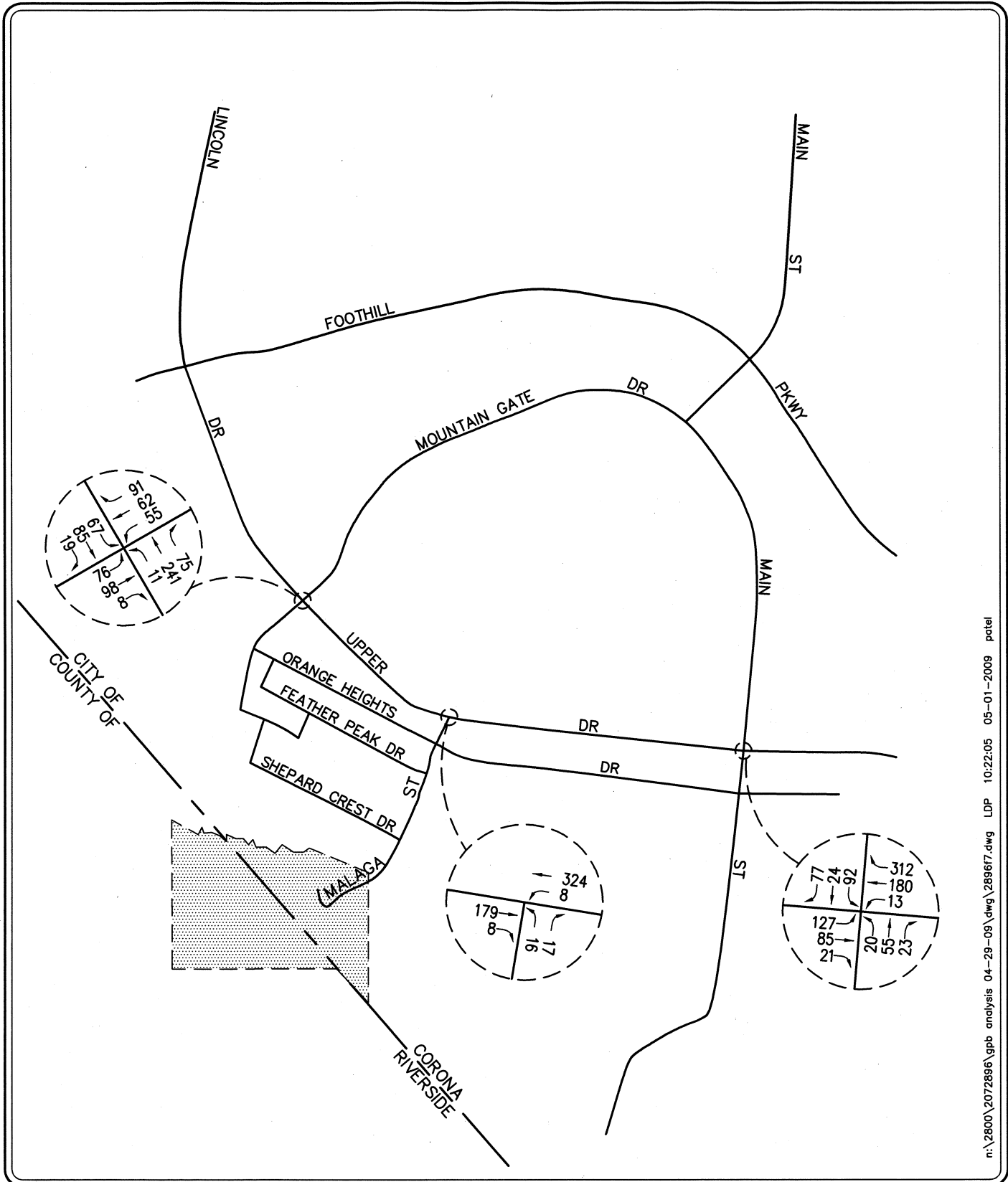


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# FIGURE 6

PM PEAK HOUR PROJECT TRAFFIC VOLUMES  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA





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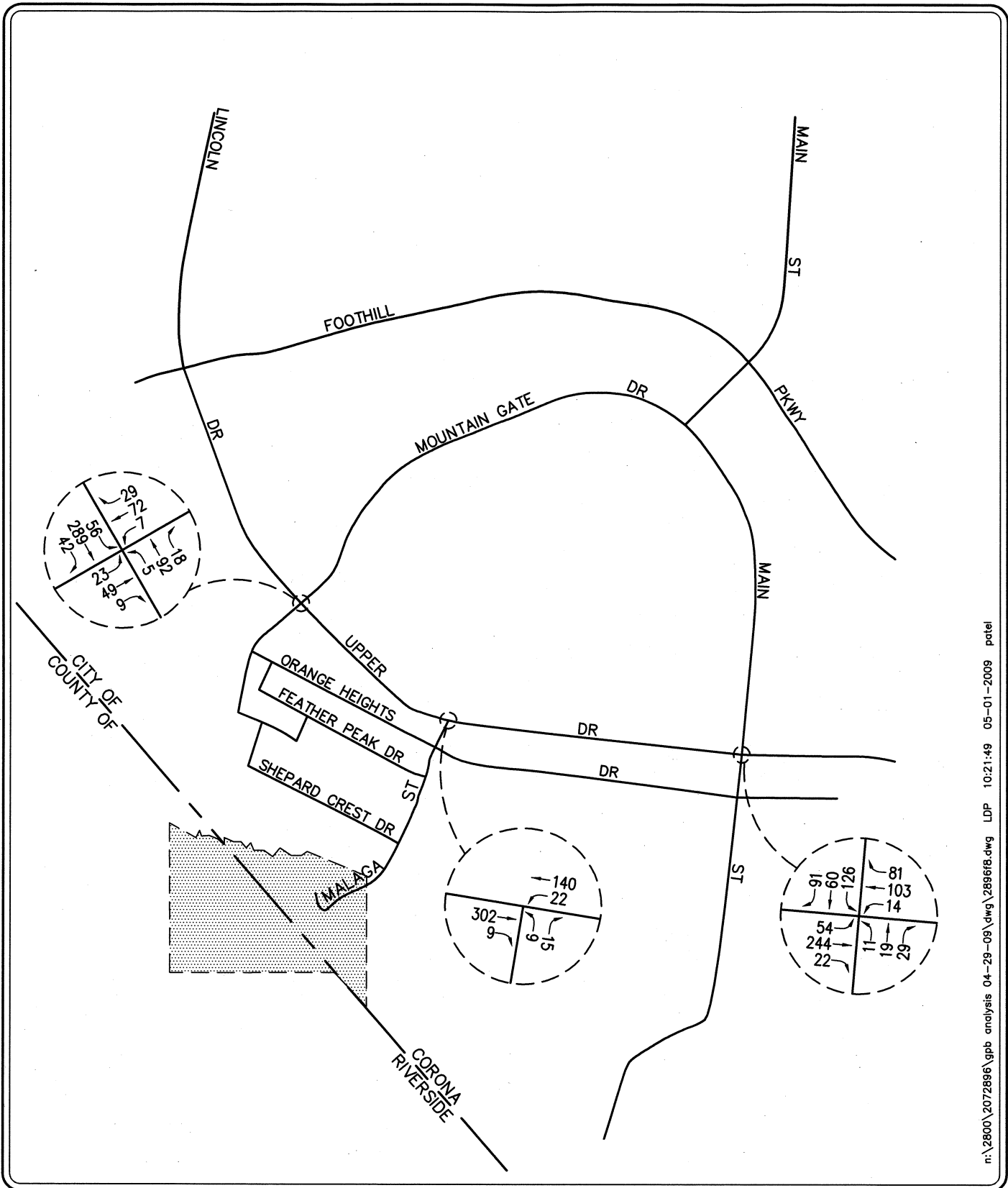
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# FIGURE 7

GENERAL PLAN BUILDOUT  
AM PEAK HOUR TRAFFIC VOLUMES  
TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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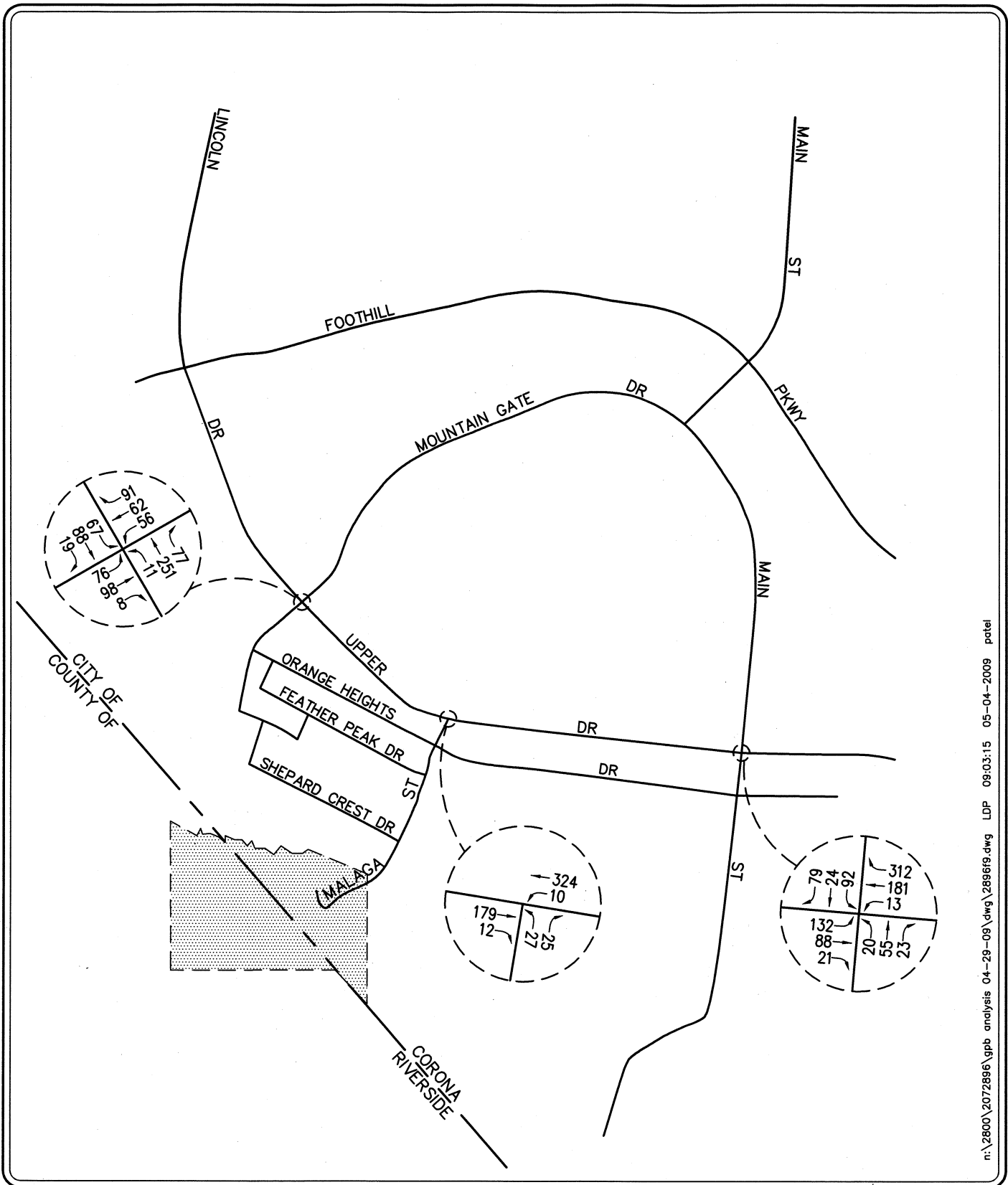


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# FIGURE 8

GENERAL PLAN BUILDOUT  
 PM PEAK HOUR TRAFFIC VOLUMES  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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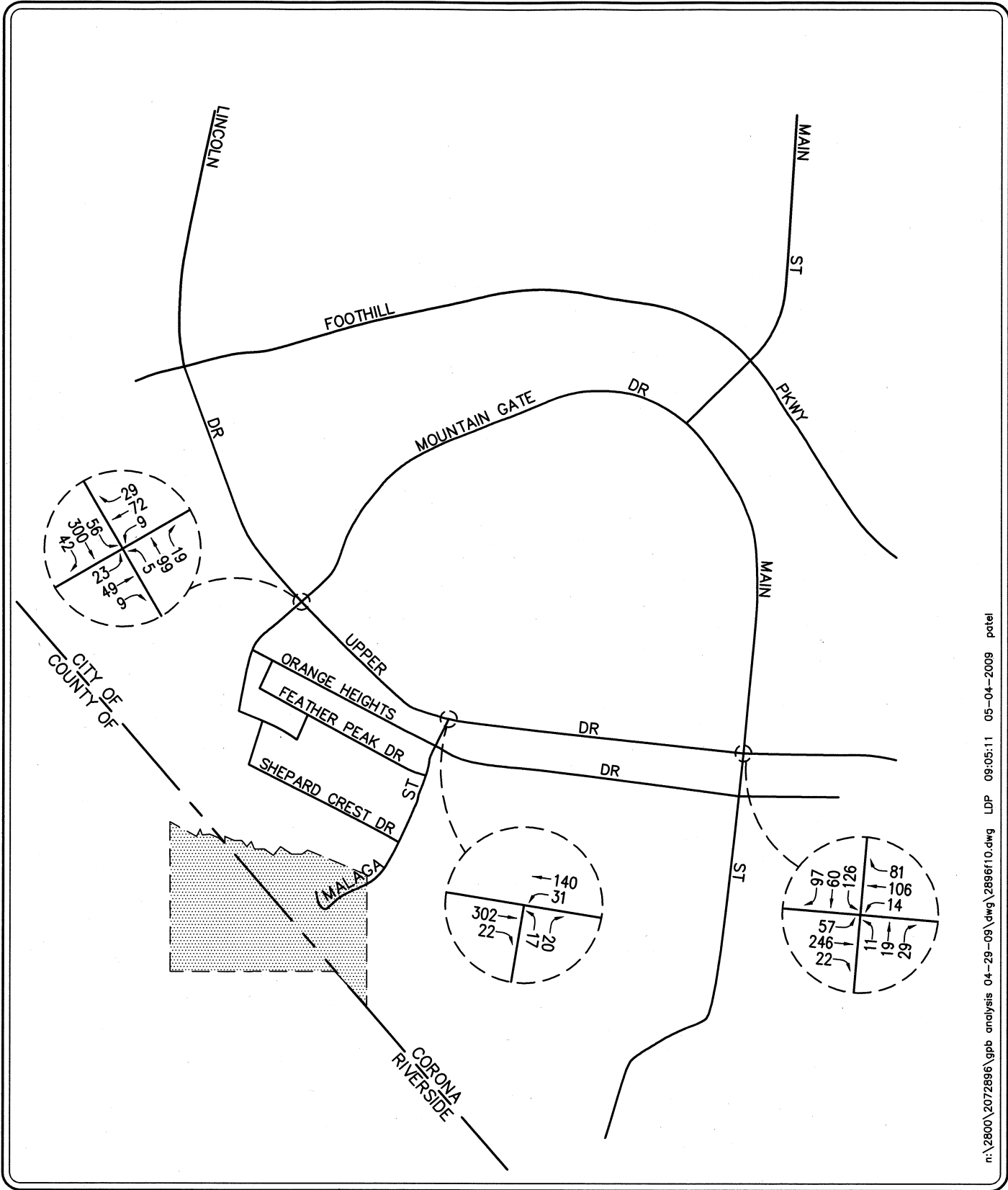
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**KEY**  
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# FIGURE 9

**GENERAL PLAN BUILDOUT AM PEAK HOUR  
PLUS PROJECT TRAFFIC VOLUMES**  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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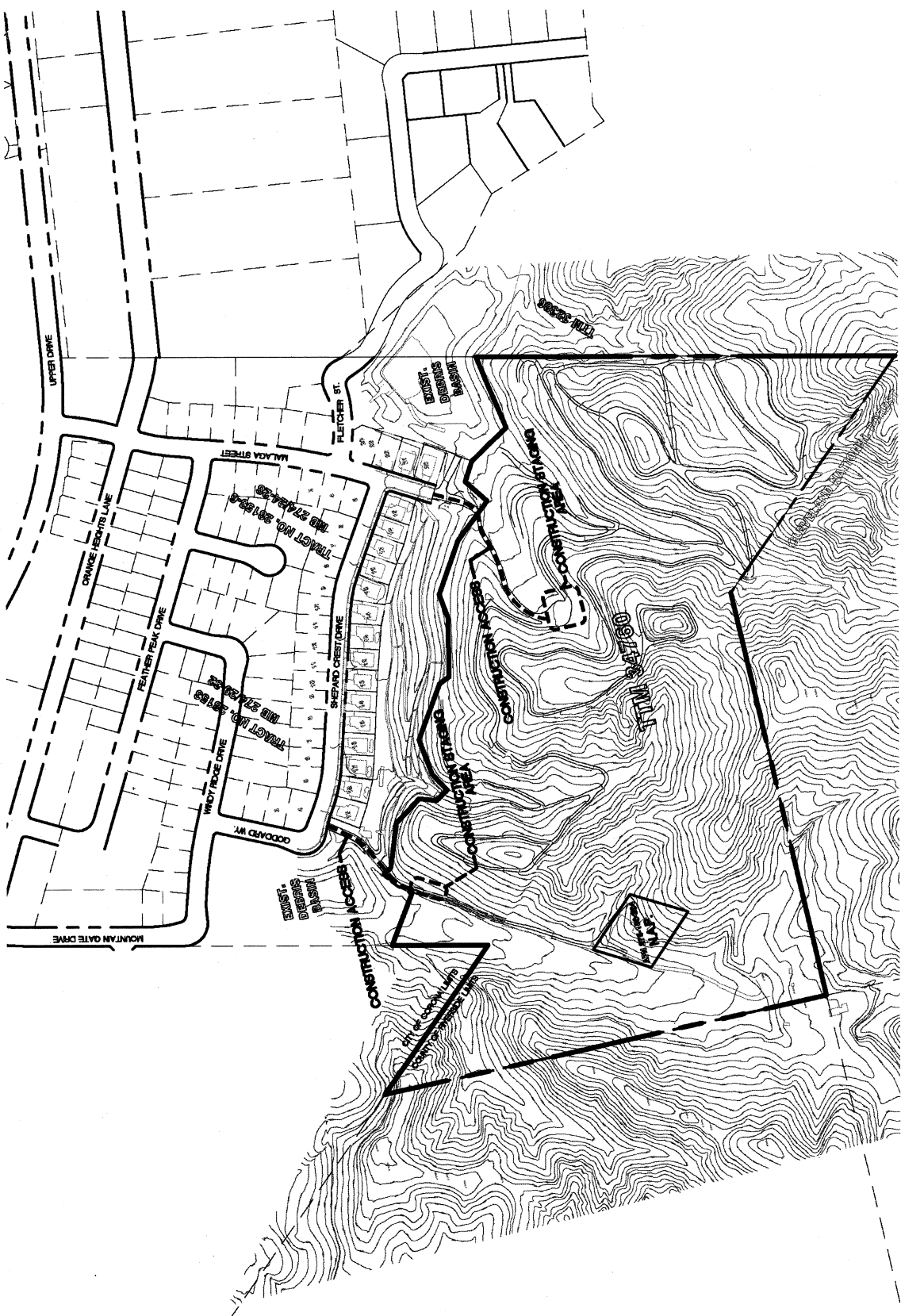


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# FIGURE 10

GENERAL PLAN BUILDOUT PM PEAK HOUR  
 PLUS PROJECT TRAFFIC VOLUMES  
 TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



SOURCE: ARMSTRONG & BROOKS CONSULTING ENGINEERS

# FIGURE 11

## CONSTRUCTION ACCESS SITE PLAN TTM NO. 34760 RESIDENTIAL DEVELOPMENT, CORONA



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engineers

**TABLE 1**  
**PROJECT TRAFFIC GENERATION RATES AND FORECAST<sup>2</sup>**  
**TTM No. 34760 RESIDENTIAL DEVELOPMENT, CORONA**

Land Use	Daily	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
<b>Generation Factors:</b>							
▪ 210: Single Family Detached Housing (TE/DU)	9.57	0.19	0.56	0.75	0.64	0.37	1.01
<b>Generation Forecast:</b>							
▪ Residential - (34 DU)	325	6	19	25	22	13	35
<b>Proposed Project Traffic Generation Forecast</b>	<b>325</b>	<b>6</b>	<b>19</b>	<b>25</b>	<b>22</b>	<b>13</b>	<b>35</b>

Notes:

- TE/DU = Trip ends per Dwelling Unit
- DU = Dwelling Units

<sup>2</sup> Source: *Trip Generation*, 7<sup>th</sup> Edition, Institute of Transportation Engineers (ITE), Washington D.C. (2003).  
NA2800\2072896\GPB Analysis 04-29-09\Report\2896 TTM No. 34760 Residential Development General Plan Buildout TIA Letter 05-04-09.doc

TABLE 2  
GENERAL PLAN BUILDOUT PLUS PROJECT INTERSECTION PEAK HOUR LEVELS OF SERVICE SUMMARY<sup>3</sup>  
TTM No. 34760 RESIDENTIAL DEVELOPMENT, CORONA

Key Intersections	Time Period	(1)		(2)		(3)	(4)	
		General Plan Buildout Traffic Conditions		General Plan Buildout Plus Project Traffic Conditions			General Plan Buildout Plus Project With Mitigation Traffic Conditions	
		Delay (s/v)	LOS	LOS	Delay (s/v)	Delay (s/v)	LOS	Delay (s/v)
1. Mountain Gate Drive at Lincoln Drive/Upper Drive	AM	11.1	B	11.2	B	No	--	--
	PM	9.6	A	9.7	A	No	--	--
2. Malaga Street at Upper Drive	AM	11.0	B	11.4	B	No	--	--
	PM	11.0	B	11.5	B	No	--	--
3. Main Street at Upper Drive	AM	16.9	B	17.0	B	No	--	--
	PM	11.2	A	11.3	B	No	--	--

Notes:

- s/v = seconds per vehicle (delay)
- **Bold LOS values** indicate adverse service levels based on City of Corona LOS standards.

<sup>3</sup> Appendix contains Delay/LOS calculation worksheets for all study intersections.