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TRAFFIC IMPACT ANALYSIS

ORCHARD HILLS

San Diego County, California
August 6, 2012

LLG Ref. 3-12-2142

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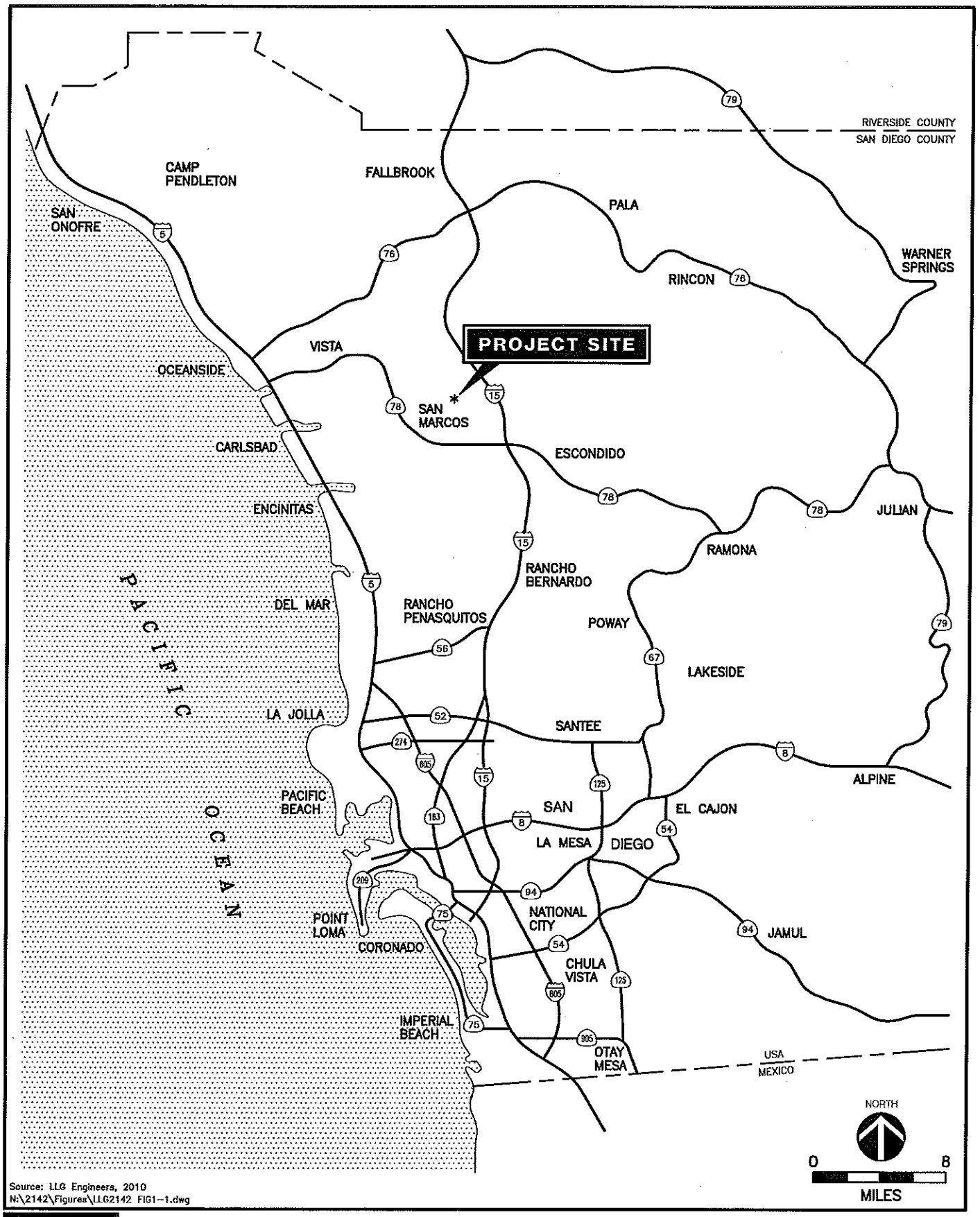
1.0 INTRODUCTION

Linscott, Law & Greenspan Engineers (LLG) has been retained to prepare a traffic study for the Orchard Hills project. The purpose of this study is to assess the potential impacts on the circulation system due to the proposed Orchard Hills project.

Figure 1–1 depicts the vicinity of the project and ***Figure 1–2*** depicts the project area. The following sections are included in this report.

- Project description
- Existing Conditions Discussion
- Analysis Approach and Methodology
- Significance Criteria
- Analysis of Existing Conditions
- Trip Generation/Distribution/Assignment
- Cumulative Projects Discussion
- Analysis of Near-term Conditions
- Congestion Management Program Compliance
- Access Discussion
- Significance of Impacts and Mitigation Measures



Source: LLG Engineers, 2010
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Figure 1-1

Vicinity Map

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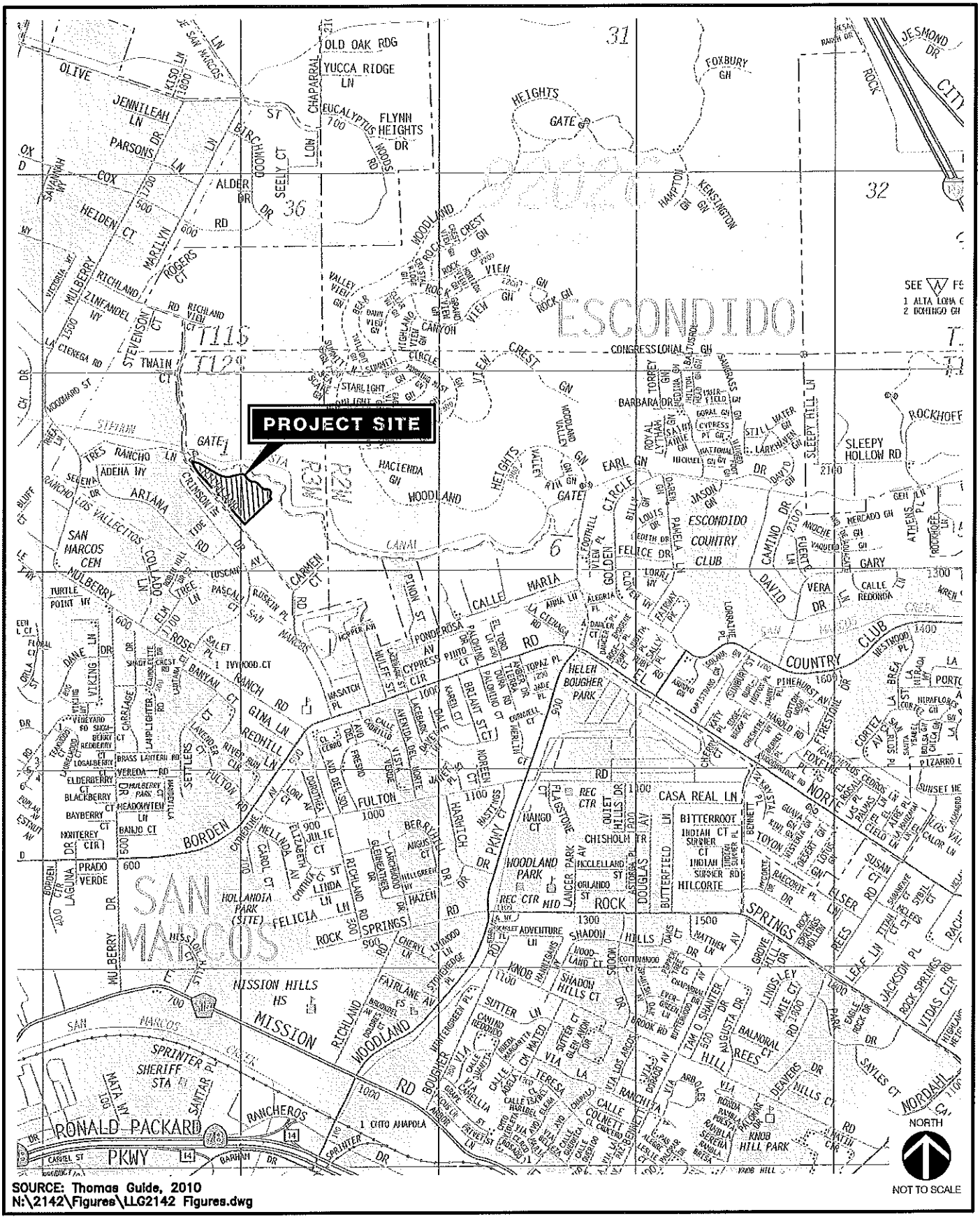

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Figure 1-2

Project Area Map

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2.0 PROJECT DESCRIPTION

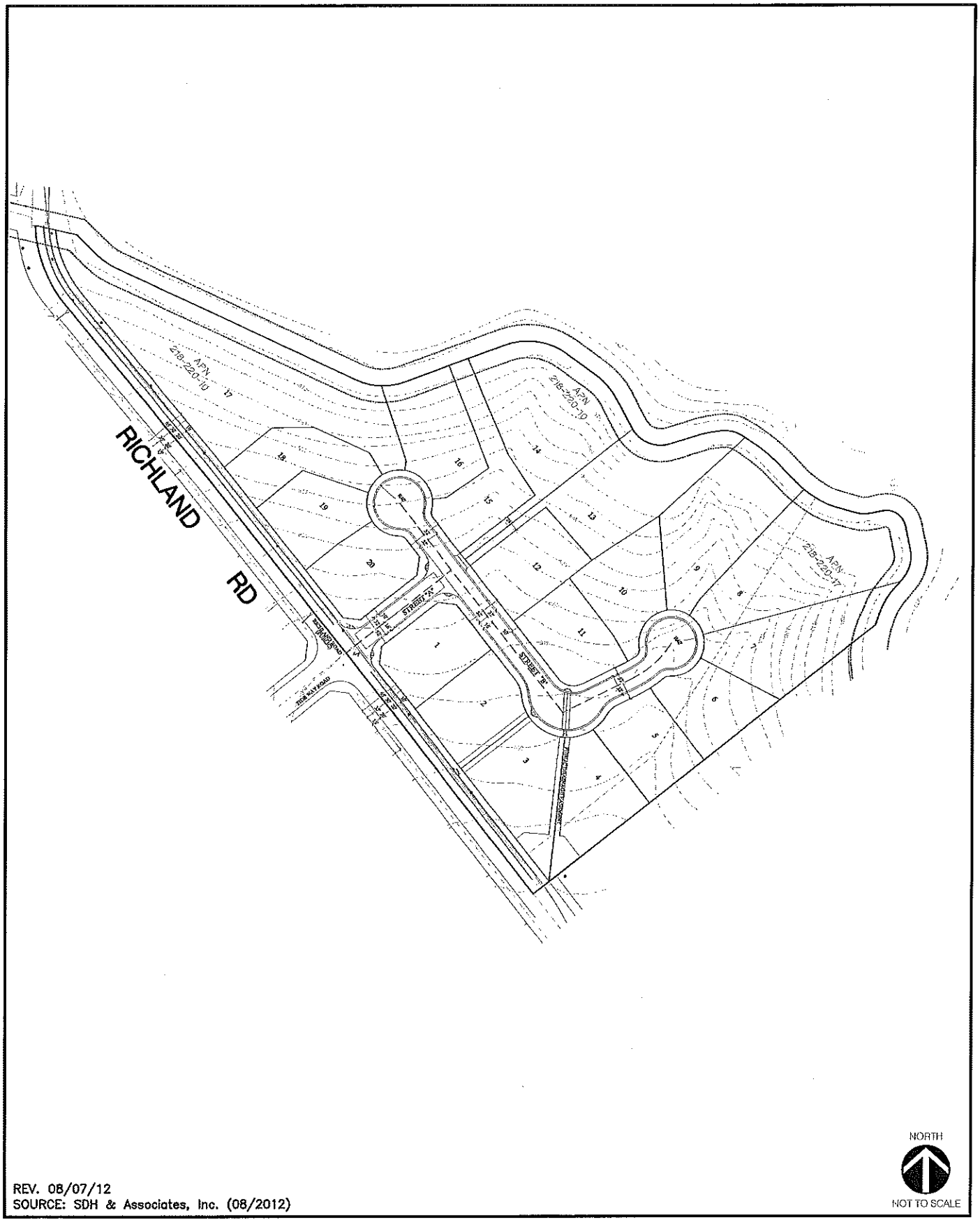
2.1 Project Location

The project site is located on the east side of Richland Road at Tide Way in the County of San Diego jurisdiction, just outside the northeastern portion of the City of San Marcos and near the City of Escondido boundary. The site is located north of State Route 78 (SR 78), east of Twin Oaks Valley Road, north of Borden Road, and west of Interstate 15 (I-15).

2.2 Project Description

The proposed *Orchard Hills* project is a single-family detached home development. Access is via a driveway to Richland Road opposite Tide Way. This traffic study assumes a 25 unit project. Since its completion, the project has been reduced to 20 units. Therefore, the analysis is slightly conservative.

Figure 2–1 depicts the site plan of the project.



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SOURCE: SDH & Associates, Inc. (08/2012)

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Figure 2-1

Site Plan

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3.0 EXISTING CONDITIONS

3.1 Study Area

The study area was determined based on the trip distribution for the project and includes the intersections/segments most likely to be impacted by the project. Weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak hour turning movement counts for each key intersection were conducted on a typical weekday, as described in Section 3.3 Existing Traffic Volumes.

The project study area includes the following locations:

Intersections:

- Richland Road / Mulberry Drive
- Richland Road / Borden Road

Segments:

- **Richland Road**
  - Mulberry Drive to Borden Road

3.2 Existing Street Network

Effective evaluation of the traffic impacts associated with the proposed project requires an understanding of the existing transportation system within the project area.

Figure 3–1 is the Existing Conditions Diagram.

Richland Road

Portions of Richland Road are within the County of San Diego and portions are within the City of San Marcos. Richland Road is not classified on the City of San Marcos Circulation Element or the County of San Diego Mobility Element. The portion of the segment of Richland Road fronting the project site is within the County of San Diego limits. It is currently constructed as a two-lane undivided north-south roadway. Bike lanes and bus stops are not provided. Curbside parking is provided intermittently along the roadway. The posted speed limit ranges from 25-40 mph within the project vicinity.

Mulberry Drive

Mulberry Drive is classified as a secondary four-lane arterial south of Borden Road on the City of San Marcos Circulation Element, and is currently constructed as a two-lane undivided north-south roadway within the project vicinity with no bike lanes or parking provided. The posted speed limit is 40 mph within the project vicinity.

Borden Road

Borden Road is classified as a secondary four-lane arterial on the City of San Marcos Circulation Element. It is currently constructed as a two-lane undivided east-west roadway. Bike lanes are provided. Curbside parking is provided intermittently along the roadway. The posted speed limit ranges from 25-40 mph within the project vicinity.

3.3 Existing Traffic Volumes

Table 3–1 is a summary of the most recent available average daily traffic (ADT) volume count conducted in 2012.

Appendix A contains the manual count sheets and the daily segment volume counts. ***Figure 3–2*** depicts the existing peak hour intersection and ADT volumes.

TABLE 3–1
EXISTING TRAFFIC VOLUMES

Street Segment	ADT [a]	Date	Source
Richland Road			
Mulberry Drive to Borden Road	1,000	2012	LLG Engineers

Footnotes:

a. Average Daily Traffic Volumes.

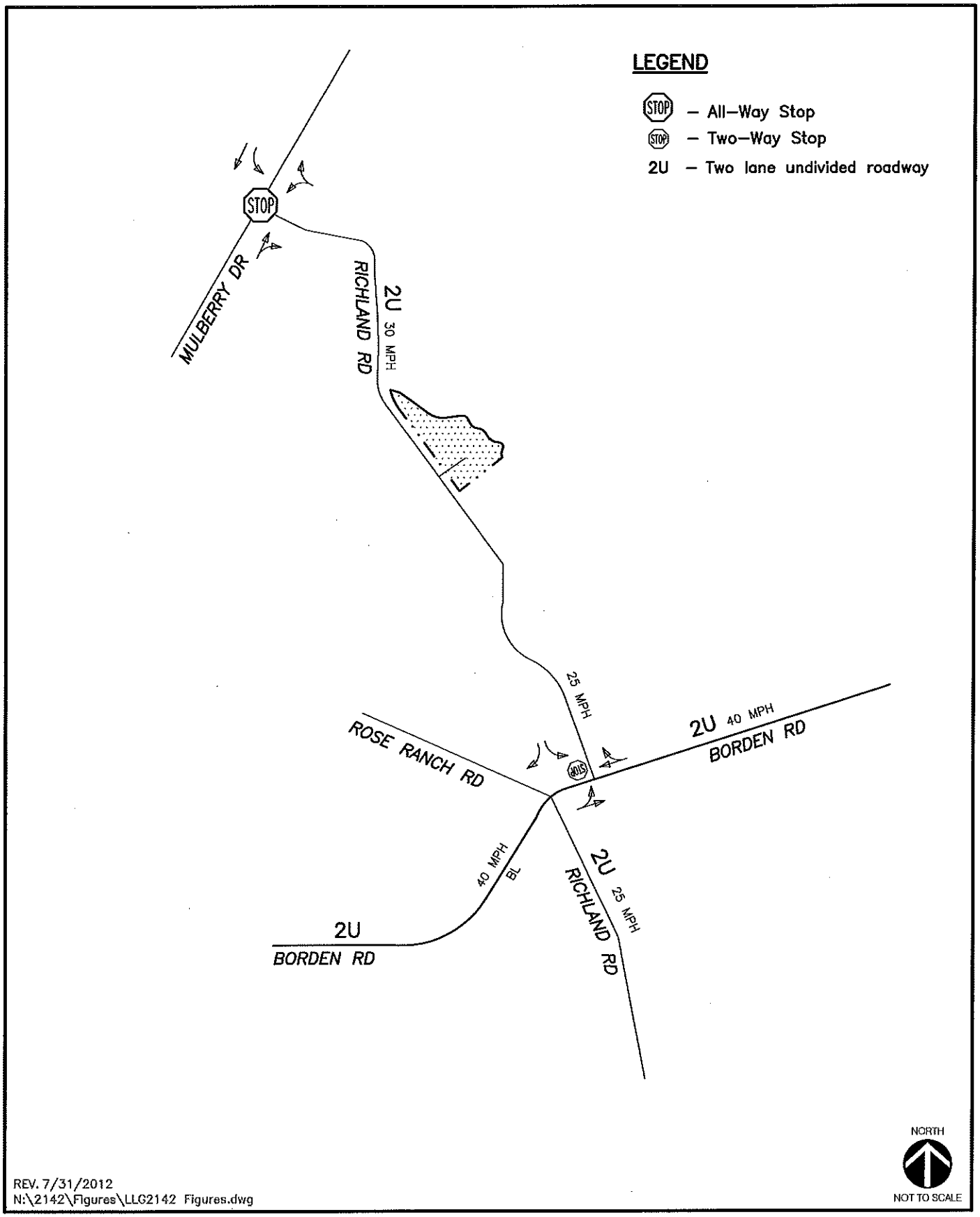

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Figure 3-1

Existing Conditions Diagram

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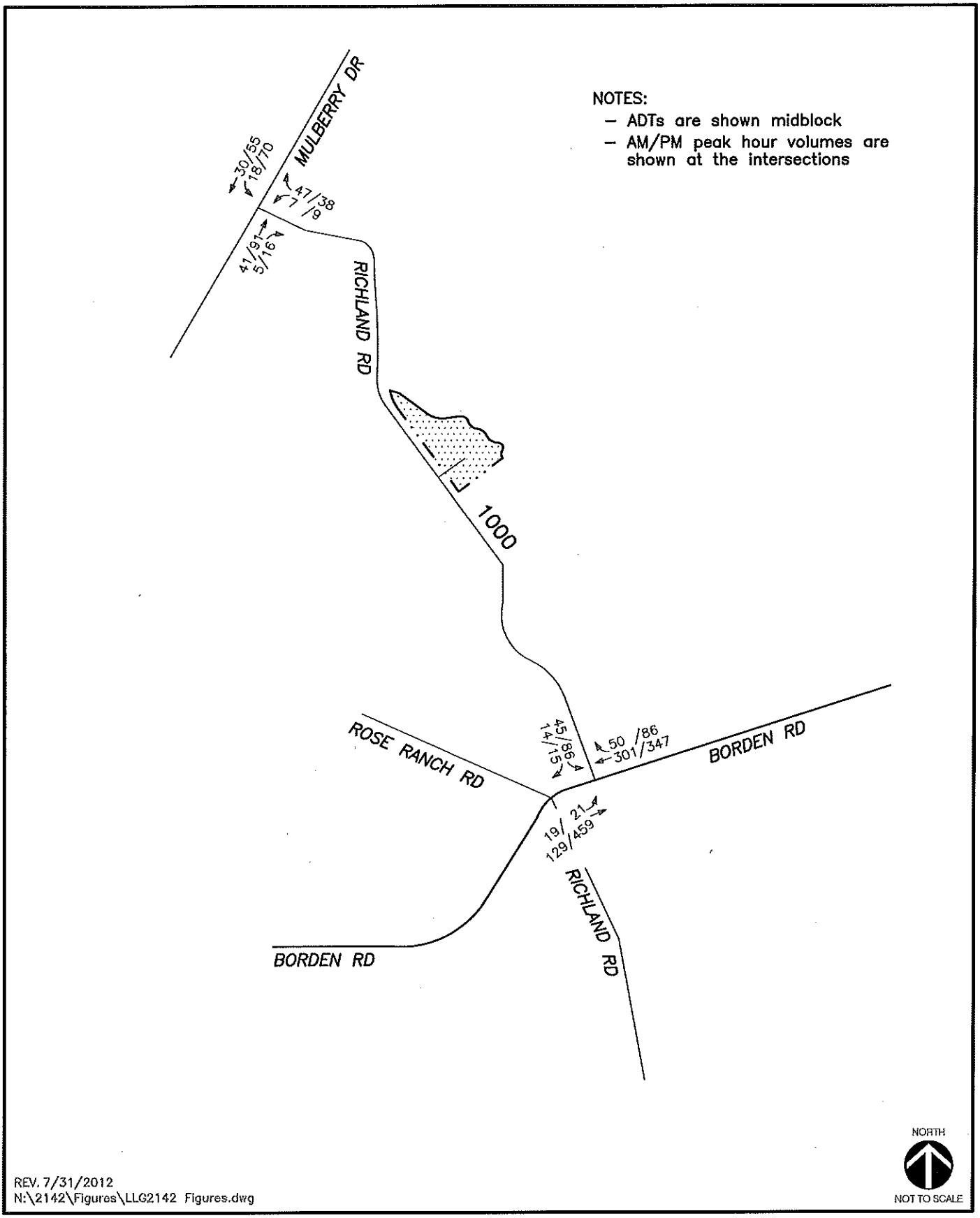

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Figure 3-2

Existing Traffic Volumes AM/PM Peak Hours & ADT

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4.0 ANALYSIS APPROACH AND METHODOLOGY

Level of service (LOS) is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. Level of service designation is reported differently for signalized and unsignalized intersections, as well as for roadway segments.

4.1 Intersections

Signalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 16 of the *2000 Highway Capacity Manual (HCM)*, with the assistance of the *Synchro* version 7 computer software. The delay values (represented in seconds) were qualified with a corresponding intersection Level of Service (LOS). Signalized intersection calculation worksheets and a more detailed explanation of the methodology are attached in ***Appendix B***.

Unsignalized intersections were analyzed under AM and PM peak hour conditions. Average vehicle delay and Levels of Service (LOS) was determined based upon the procedures found in Chapter 17 of the *2000 Highway Capacity Manual (HCM)*, with the assistance of the *Synchro* 7 computer software. Unsignalized intersection calculation worksheets and a more detailed explanation of the methodology are attached in *Appendix B.*

4.2 Street Segments

Street segment analysis is based upon the comparison of daily traffic volumes (ADTs) to the County of San Diego's *Roadway Classification, Level of Service, and ADT Table*. This table provides segment capacities for different street classifications, based on traffic volumes and roadway characteristics. Richland Road is located in both the County of San Diego and the City of San Marcos. For the purpose of this report, County standards were used to analyze Richland Road.

5.0 SIGNIFICANCE CRITERIA

For the purpose of this traffic study, County of San Diego Significance Criteria was utilized.

5.1 County of San Diego

The following criterion was utilized to evaluate potential significant impacts, based on the *County of San Diego Guidelines for Determining Significance—Transportation and Traffic*, dated June 30, 2009 with a first modification effective February 19, 2010. The County of San Diego's General Plan Mobility Element discusses the County's Level of Service criteria under Goal M-2. It requires that development projects provide associated road improvements necessary to achieve a level of service of "D" or higher on all Mobility Element roads except for those where a failing level of service has been accepted by the County. The County maintains a list of such roads.

5.1.1 *Road Segments*

This section provides guidance for evaluating adverse environmental effects a project may have on street segments. The allowable ADT increases on LOS E/F operation roadways was obtained from County guidelines and are summarized in ***Table 5–2***. The thresholds in *Table 5–2* are based upon average operating conditions on County roadways. Exceeding the thresholds in Table 5–2 would result in a significant impact. It should be noted that these thresholds only establish general guidelines, and that the specific project location must be taken into account in conducting an analysis of traffic impact from new development.

TABLE 5–2
MEASURES OF SIGNIFICANT PROJECT IMPACTS TO CONGESTION ON
CIRCULATION ELEMENT ROAD SEGMENTS
ALLOWABLE INCREASES ON CONGESTED ROAD SEGMENTS

Level of Service	Two-Lane Road	Four-Lane Road	Six-Lane Road
LOS E	200 ADT	400 ADT	600 ADT
LOS F	100 ADT	200 ADT	300 ADT

General Notes:

1. By adding proposed project trips to all other trips from a list of projects, this same table must be used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes additional trips must mitigate a share of the cumulative impacts.
2. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.

5.1.2 *Intersections*

This section provides guidance for evaluating adverse environmental effects a project may have on signalized and unsignalized intersections. ***Table 5–3*** was obtained from County guidelines and summarizes the allowable increases in delay or traffic volumes at signalized and unsignalized intersections. Exceeding the thresholds in Table 5–3 would result in a significant impact.

TABLE 5–3
MEASURES OF SIGNIFICANT PROJECT IMPACTS TO CONGESTION ON INTERSECTIONS
ALLOWABLE INCREASES ON CONGESTED INTERSECTIONS

Level of service	Signalized	Unsignalized
LOS E	Delay of 2 seconds or less	20 or less peak hour trips on a critical movement
LOS F	Either a Delay of 1 second, or 5 peak hour trips or less on a critical movement	5 or less peak hour trips on a critical movement

General Notes:

1. A critical movement is an intersection movement (right-turn, left-turn, through-movement) that experiences excessive queues, which typically operate at LOS F.
2. By adding proposed project trips to all other trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project is responsible for mitigating its share of the cumulative impact.
3. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable level of service, when such traffic uses a significant amount of remaining road capacity.
4. For determining significance at signalized intersections with LOS F conditions, the analysis must evaluate both the delay ***and*** the number of trips on a critical movement, exceedance of either criteria result in a significant impact.

Signalized Intersections—Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic volume or level of service traffic impact on a signalized intersection:

- The additional or redistributed ADT generated by the proposed project will significantly increase congestion on a signalized intersection currently operating at LOS E or LOS F, or will cause a signalized intersection to operate at a LOS E or LOS F as identified in *Table 5–3*.
- Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, the project would significantly impact the operations of the intersection.

Unsignalized Intersections—The operating parameters and conditions for unsignalized intersections differ dramatically from those of signalized intersections. Very small volume increases on one leg or turn and/or through movement of an unsignalized intersection can substantially affect the calculated delay for the entire intersection. Significance criteria for unsignalized intersections are based upon a minimum number of trips added to a critical movement at an unsignalized intersection.

Traffic volume increases from public or private projects that result in one or more of the following criteria will have a significant traffic impact on an unsignalized intersection as listed in *Table 5–3* and described as text below:

- The additional or redistributed ADT generated by the proposed project will add 21 or more peak hour trips to a critical movement of an unsignalized intersection, and cause an unsignalized intersection to operate below LOS D, or

- The additional or redistributed ADT generated by the proposed project will add 21 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS E, or
- The additional or redistributed ADT generated by the proposed project will add 6 or more peak hour trips to a critical movement of an unsignalized intersection, and cause the unsignalized intersection to operate at LOS F, or
- The additional or redistributed ADT generated by the proposed project will add 6 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS F, or
- Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, the project would significantly impact the operations of the intersection.

6.0 ANALYSIS OF EXISTING CONDITIONS

6.1 Peak Hour Intersection Levels of Service

Table 6–1 summarizes the Existing peak hour intersection operations. As seen in *Table 6–1*, all of the study area intersections are calculated to currently operate an LOS C or better.

Appendix C includes the Existing peak hour intersection analysis worksheets.

TABLE 6–1
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			Delay [a]	LOS [b]
Richland Road / Mulberry Drive	MSSC [c]	AM PM	8.8 9.4	A A
Richland Road / Project Driveway	MSSC [c]	AM PM	DNE DNE	DNE DNE
Richland Road / Borden Road	MSSC [c]	AM PM	12.7 23.7	B C

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Level of Service.

c. MSSC – Minor Street Stop Controlled intersection. Minor street left turn delay is reported.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 < 10.0	A	0.0 < 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
> 80.1	F	> 50.1	F

6.2 Daily Street Segment Levels of Service

Table 6–2 summarizes the existing roadway segment level of service. As seen in *Table 6–2*, the studied roadway segment is calculated to currently operate at LOS A.

TABLE 6-2
EXISTING SEGMENT OPERATIONS

Street Segment	Functional Classification	LOS E Capacity	ADT [b]	LOS [c]
Richland Road				
Mulberry Drive to Borden Road	Light Collector	16,200	1,000	A

Footnotes:

a. Capacities based on County of San Diego Roadway Classification Table.

b. Average Daily Traffic Volumes.

c. Level of Service.

7.0 TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

7.1 Trip Generation

SANDAG trip generation rates were utilized to determine the amount of traffic the project will generate. ***Table 8–1*** summarizes the trip generation for the proposed project.

As seen in *Table 8–1*, the proposed Project is calculated to generate a total of approximately 250 ADT with 20 trips (6 inbound / 14 outbound) during the AM peak hour and 25 trips (18 inbound / 7 outbound) during the PM peak hour.

7.2 Trip Distribution/Assignment

The project-generated traffic was distributed and assigned to the street system based on site access parameters, roadway network characteristics (i.e. project's proximity to the freeways), and existing traffic turning movement counts. The majority of project traffic is expected to be to or from the south.

Figure 7–1 depicts the estimated project traffic distribution. ***Figure 7–2*** depicts the project traffic assignment.

TABLE 7–1
PROJECT TRIP GENERATION

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour					PM Peak Hour				
		Rate [a]	Volume	% of ADT [b]	In:Out Split	Volume In	Volume Out	Volume Total	% of ADT [b]	In:Out Split	Volume In	Volume Out	Volume Total
Proposed Land Use													
Single Family	25 DU	10 /DU	250	8%	30 : 70	6	14	20	10%	70 : 30	18	7	25

Footnotes:

a. Rate is based on SANDAG's (Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002

b. ADT – Average Daily Traffic

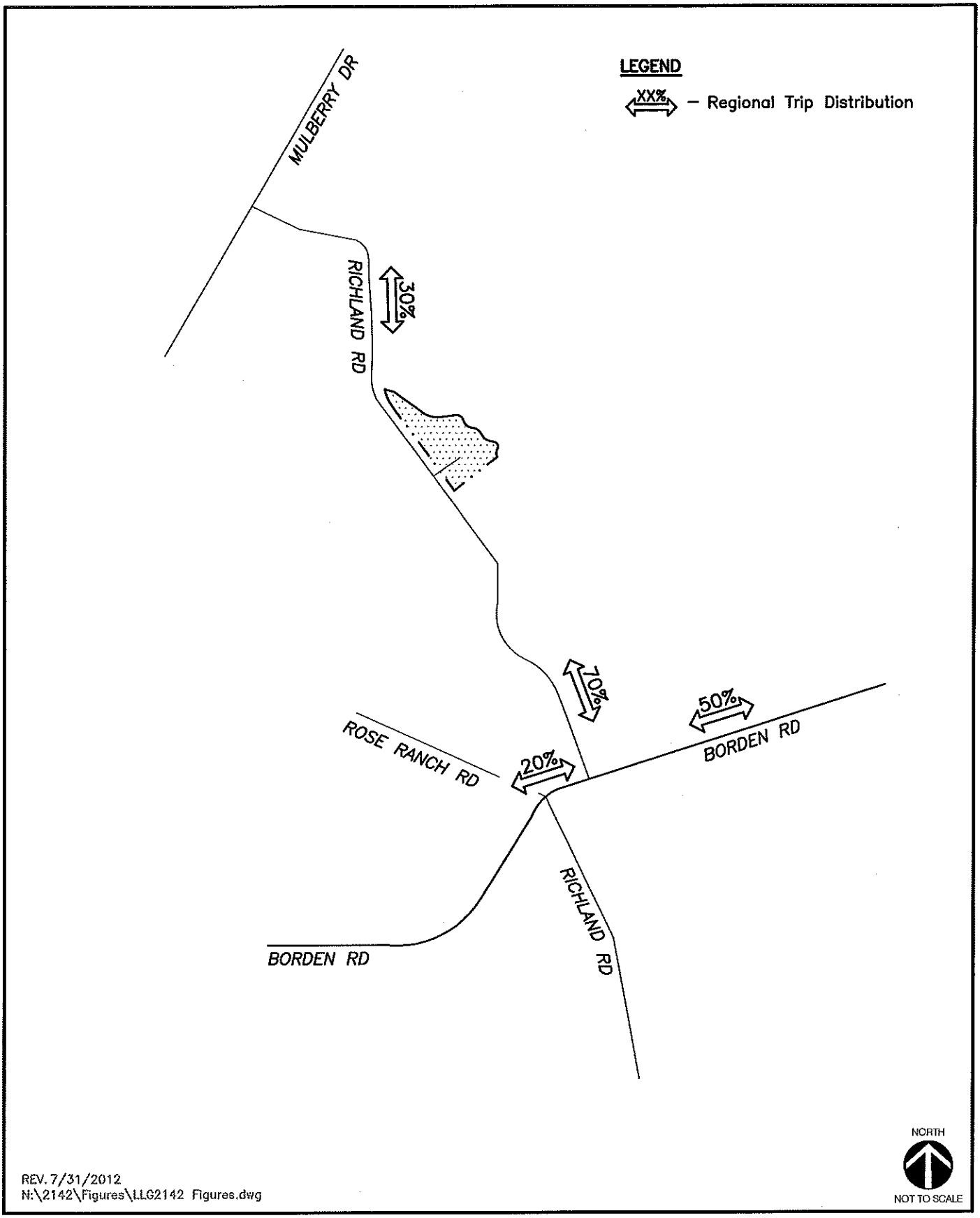

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Figure 7-1

Project Traffic Distribution

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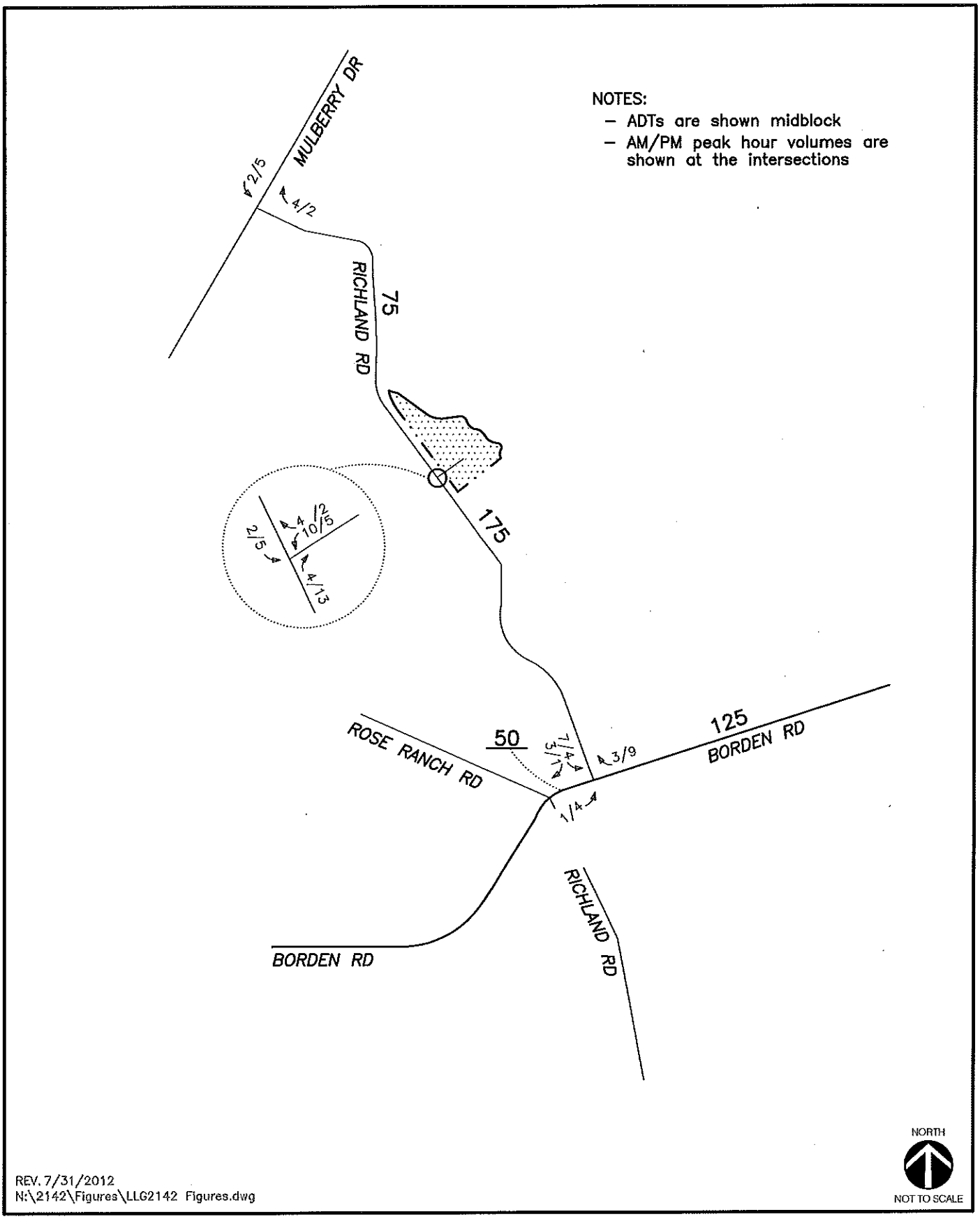

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Figure 7-2

Project Traffic Volumes AM/PM Peak Hours & ADT

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8.0 CUMULATIVE PROJECTS

Cumulative traffic was estimated using the SANDAG traffic model which forecasts future traffic in the Year 2035 time frame. In order to estimate near term cumulative traffic the long range volumes obtained from the model were reduced.

Figure 8–1 depicts the Cumulative project traffic volumes and ADT volumes.

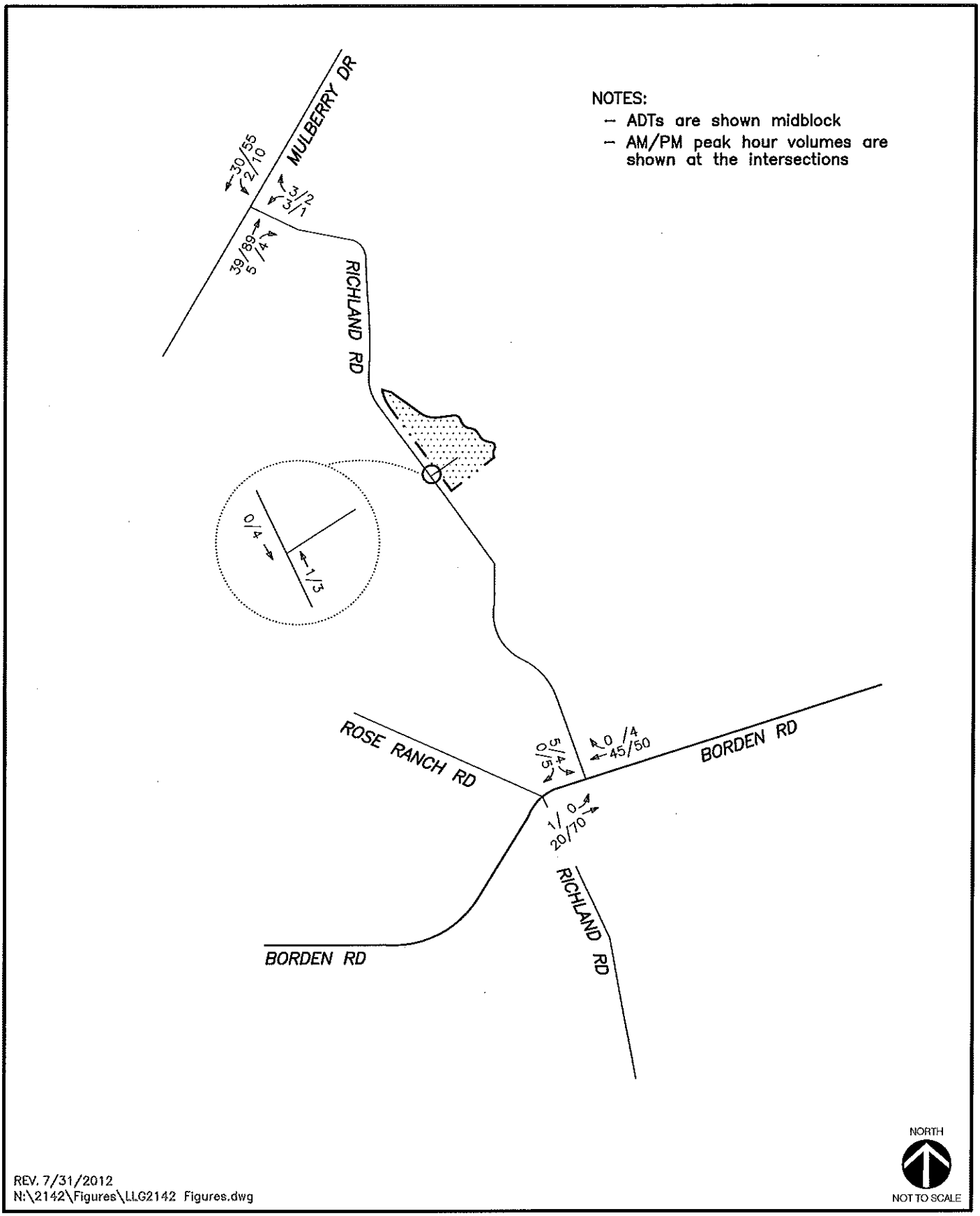

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Figure 8-1

Cumulative Project Traffic Volumes AM/PM Peak Hours & ADT

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9.0 ANALYSIS OF NEAR-TERM SCENARIOS

9.1 Existing + Project

9.1.1 *Intersection Analysis*

Table 9–1 summarizes the Existing + Project AM and PM peak hour intersection operations. As seen in Table 9–1, with the addition of the proposed project traffic, all study area intersections are calculated to continue to operate at LOS C or better.

Appendix D includes the Existing + Project peak hour intersection analysis worksheets.

9.1.2 *Segment Operations*

Table 9–2 summarizes the Existing + Project segment operations. As seen in *Table 9–2,* with the addition of the proposed project traffic, the studied segment is calculated to continue to operate at LOS A.

Figure 9–1 depicts the Existing + Project traffic volumes and ADT volumes.

9.2 Existing + Project + Cumulative Projects

9.2.1 *Intersection Analysis*

Table 9–1 summarizes the Existing + Project + Cumulative Projects AM and PM peak hour intersection operations. As seen in Table 9–1, with the addition of the proposed project traffic, all study area intersections are calculated to continue to operate at LOS D or better.

Appendix E includes the Existing + Project + Cumulative Projects peak hour intersection analysis worksheets.

9.2.2 *Segment Operations*

Table 9–2 summarizes the Existing + Project + Cumulative segment operations. As seen in *Table 9–2,* with the addition of the proposed project traffic, the studied segment is calculated to operate at LOS B.

Figure 9–2 depicts the Existing + Project + Cumulative traffic volumes and ADT volumes.

TABLE 9–1
NEAR-TERM INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing		Existing + Project		Existing + Project + Cumulative Projects	
			Delay[a]	LOS[b]	Delay	LOS	Delay	LOS
Richland Road / Mulberry Drive	MSSC [c]	AM	8.8	A	8.8	A	9.2	A
		PM	9.4	A	9.4	A	10.3	B
Richland Road / Project Driveway	MSSC [c]	AM	DNE	DNE	9.1	A	9.1	A
		PM	DNE	DNE	9.7	A	9.7	A
Richland Road / Borden Road	MSSC [c]	AM	12.7	B	12.9	B	14.0	B
		PM	23.7	C	24.9	C	32.7	D

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Level of Service.

c. MSSC – Minor Street Stop Controlled intersection. Minor street left turn delay is reported.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 < 10.0	A	0.0 < 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
> 80.1	F	> 50.1	F

TABLE 9–2
NEAR-TERM STREET SEGMENT OPERATIONS

Street Segment	Classification	Existing Capacity (LOS E)[a]	Existing		Existing + Project		Existing + Project + Cumulative Projects		Impact Type
			ADT[b]	LOS[c]	ADT	LOS	ADT	LOS	
Richland Road									
Mulberry Drive to Borden Road	Light Collector	16,200	1,000	A	1,250	A	3,250	B	None

Footnotes:

a. Capacities based on the City of San Marcos Roadway Classification & LOS table (See Appendix B).

b. Average Daily Traffic

c. Level of Service

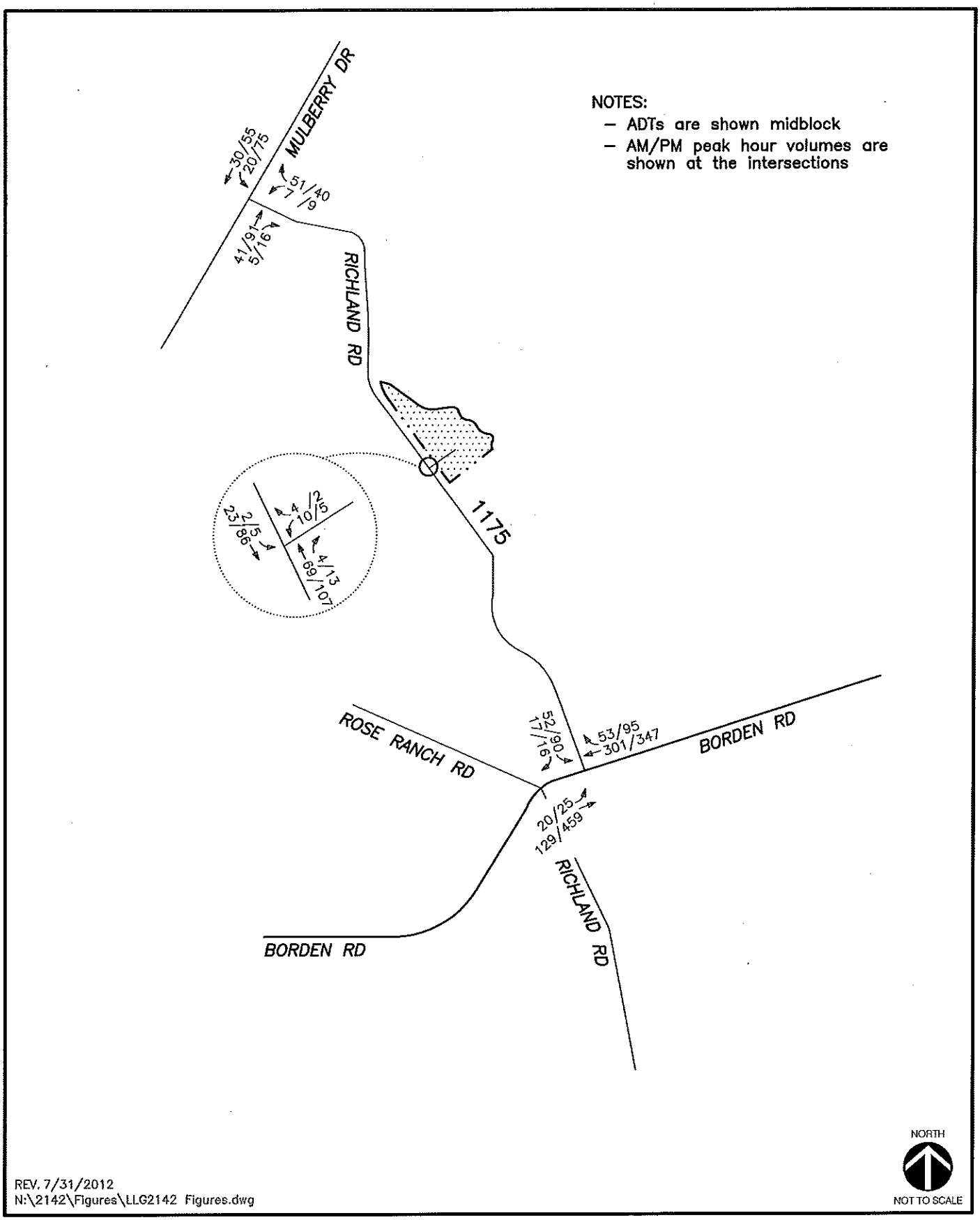

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Figure 9-1

Existing + Project Traffic Volumes AM/PM Peak Hours & ADT

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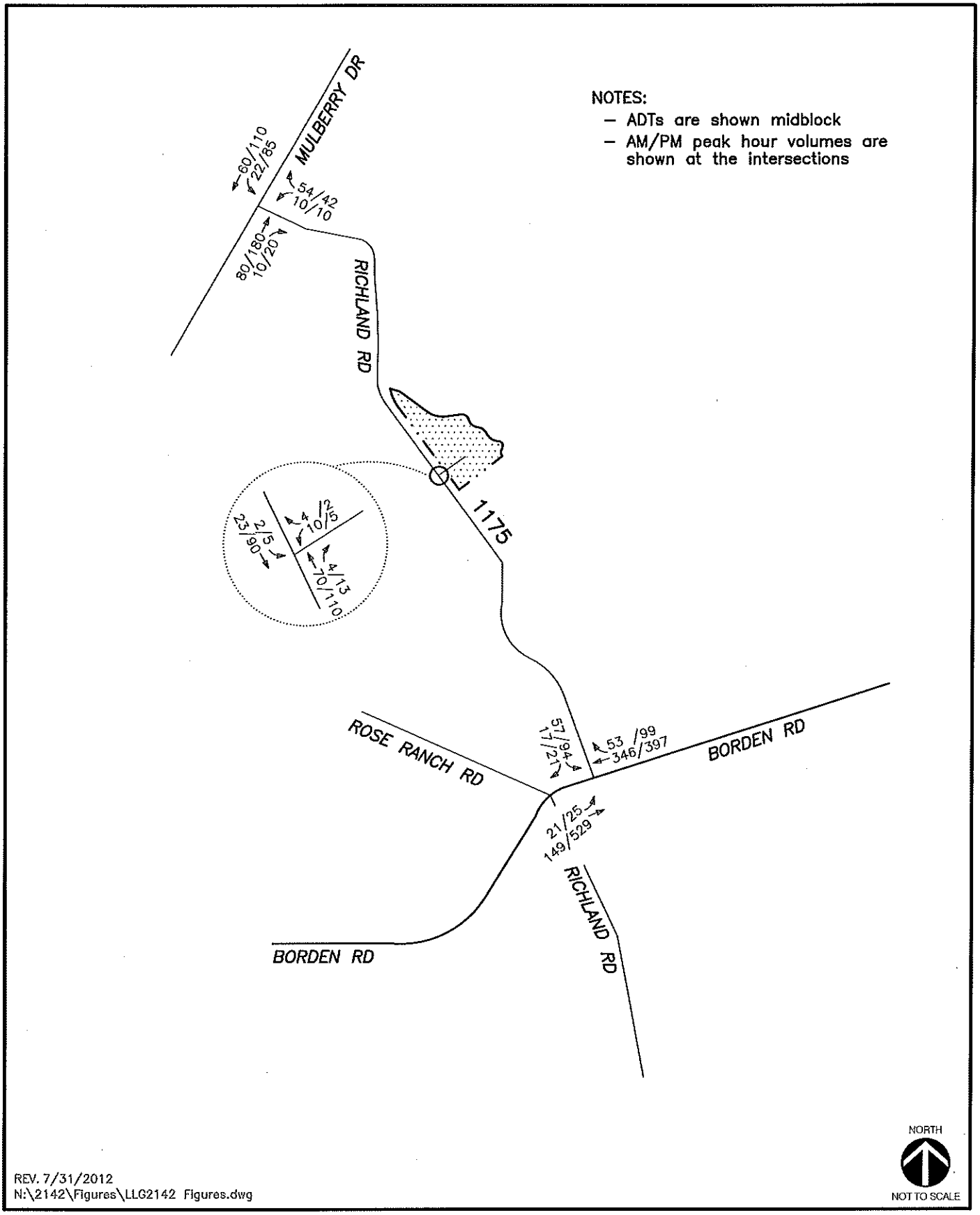

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Figure 9-2

Existing + Project + Cumulative Projects Traffic Volumes AM/PM Peak Hours & ADT

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10.0 SIGNIFICANCE OF IMPACTS AND MITIGATION MEASURES

10.1 Significance of Impacts

The intersection analysis indicates that all intersections are calculated to operate at LOS D or better in the near-term scenarios. The segment analysis indicates that Richland Road is calculated to operate at LOS A in the near-term scenarios. Therefore, no intersection or segment impacts are determined based on the established significance criteria.

10.2 Mitigation Measures

Since no significant impacts are identified, no mitigation measures are required. However, since the project is located within the County of San Diego and would add traffic to the County of San Diego street system, the project should pay the appropriate County Traffic Impact Fee (TIF).