

TRAFFIC IMPACT STUDY

Centerstone Subdivision

City of Highland, California

Prepared for:

City of Highland
27215 Base Line
Highland, CA 92346
(909) 864-8732

Prepared by:

Hernandez, Kroone & Associates

234 East Drake Drive
San Bernardino, CA 92408
(909) 884-3222

January 2009

INTRODUCTION

This analysis was prepared to determine the potential traffic impacts of the Centerstone Subdivision, a housing development proposed at the southeast corner of the Greenspot Road / Orange Street intersection. The project will provide 133 units of single family detached housing. The 21 acre site is located approximately 800 feet east of the intersection of Boulder Avenue / Greenspot Road in the City of Highland, California. (See Vicinity Map)

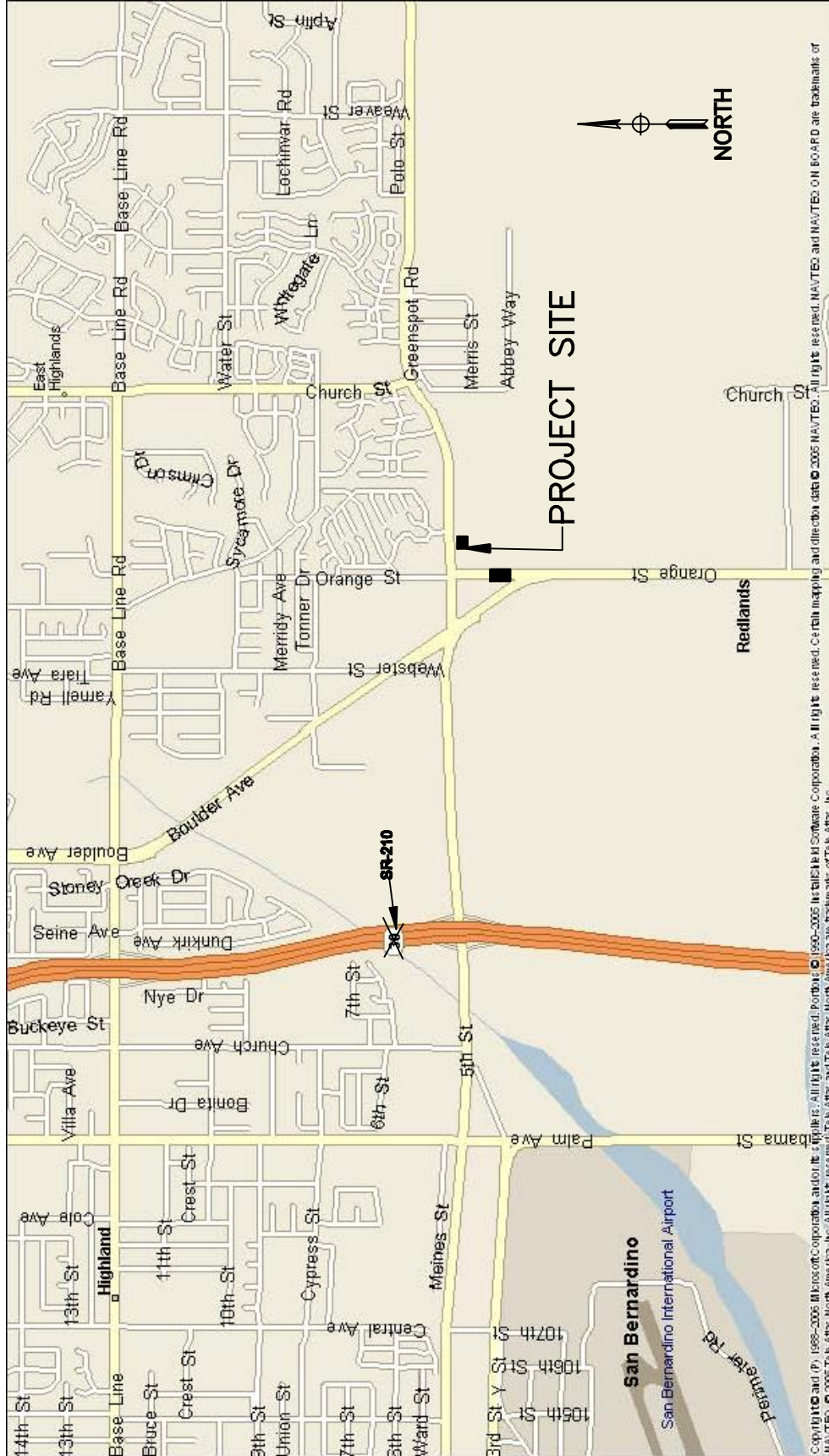
The site is currently undeveloped land. There is a mobile home park west of the project at the southwest corner of the Greenspot Road / Orange Street intersection. The property directly north of the site is developed as single family homes, with two operating schools and a post office under construction nearby. The property south of the project includes the easement for the Metropolitan Water District of Southern California Inland Feeder Pipeline, the Santa Ana River Wash and two land leases to gravel mining companies.

The land immediately to the east of the project is vacant. The site is proposed to be developed as Blossom Trails Subdivision consisting of 14 single family homes and 306 condos / town homes. The 14 single family homes will be north of Greenspot Road and the 306 condos / town homes will be south of Greenspot Road. Urban Crossroads completed a traffic study for the Blossom Trails project on January 27, 2006.

In the January 2006 traffic study the Blossom Trails Subdivision and the Centerstone Subdivision were anticipated to share an access to Greenspot Road about 1,320 feet east of Orange Street. Since that access was on the west side of the Blossom Trails project, it was called the "West Access Driveway". This access will be called the "Greenspot Access Driveway" this traffic study. (See Site Plan)

Centerstone Subdivision's other access will be at Orange Street / Greenspot Road. The main thrust of the study will be to analyze the Greenspot Access Driveway in the absence of the Blossom Trails development. This traffic study is a revision of the one completed December 2008. The number of dwelling units was changed from 120 to 133. This is an increase of 13 trips during the PM Peak Period. The exhibits, tables, analysis and conclusions have been revised to reflect this change.

This traffic study was completed with generally accepted procedures and reflects the opinions of Hernandez, Kroone & Associates.

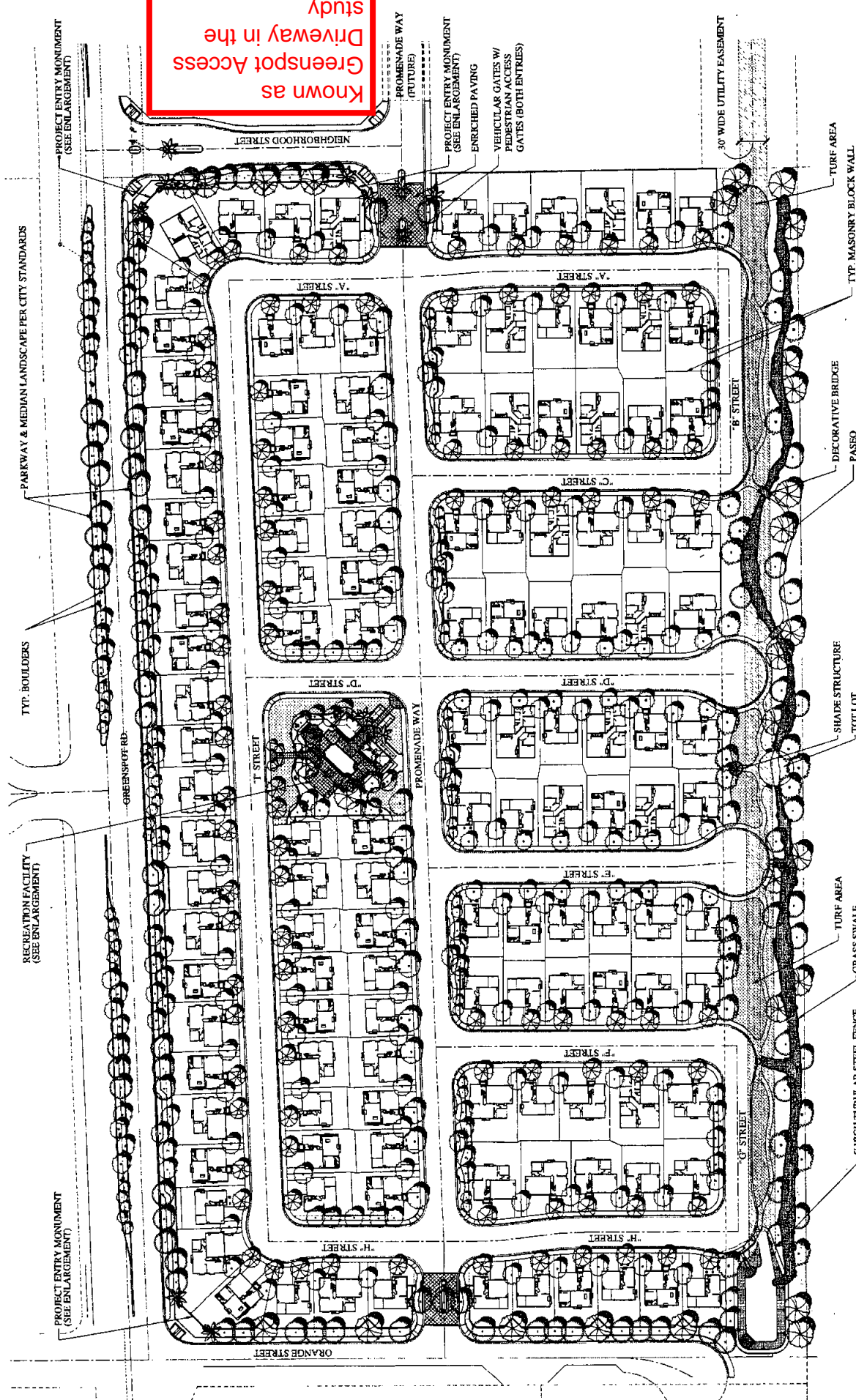


Copyright © 2005 Microsoft Corporation and/or its affiliates. All rights reserved. Portions © 1990-2005 Intel, Microsoft, and other companies. All rights reserved. NAVTEQ and NAVTEQ ON BOARD are trademarks of NAVTEQ. © 2005 TekeNav, North America, Inc. All rights reserved. TekeNav and TekeNav North America are trademarks of TekeNav, Inc.

Hernandez, Kroone & Associates, Inc
 — CONSULTING ENGINEERS —
 PLANNING - DESIGN - SURVEYING
 234 EAST DRAKE DRIVE
 SAN BERNARDINO, CA 92408
 (909) 884-3222 FAX (909) 383-1577
 E-MAIL anna@hka.com

OWNER CENTERSTONE SUBDIVISION
DESCRIPTION VICINITY MAP

08-1030
DATE 12/08/08



Known as
Greenspot Access
Driveway in the
study

NVIS
NATIONAL VISUAL
INSTITUTE
1100 PALM BLVD
SUITE 100
COSTA MESA, CA 92626
TEL: 714.761.7111
FAX: 714.761.7111
WWW.NVIS.COM



Preliminary Landscape Plan
Centerstone @ Woodbridge Trails
 Highland, California
 Centerstone Communities, Inc.

BACKGROUND

This project is just east of the area known as the “Golden Triangle”. Bounded by State Route 210 (SR-210), Boulder Avenue and Greenspot Road, this area is experiencing rapid development. A number of traffic studies have been reviewed in this area and the City of Highland has prepared a master plan for the development of the roads in this area.

Given that the Centerstone development is small, will generate less than 135 peak hour project trips, and is in an area that has been extensively studied for circulation issues, a focused traffic study will be completed. The analysis will follow the guidelines in the San Bernardino Congestion Management Program as to saturation rates, minimum green times, etc. but the scope of the analysis will be more limited than for a traffic impact analysis.

After discussing the development with City of Highland staff, the following intersections were identified to be studied for the Centerstone’s traffic analysis:

- SR-210 SB Ramp / 5th Street
- SR-210 NB Ramp / Greenspot Road
- Boulder Avenue / Greenspot Road
- Orange Street / Greenspot Road
- Greenspot Access Driveway / Greenspot Road (project access, does not exist yet)

The analysis will include review of the AM and PM Peak Periods under the current years traffic, the opening day traffic and the future traffic scenarios.

Traditionally the peak volume on the road system is found during what is called the AM Peak Period and the PM Peak Period. These periods are usually between the hours of 7:00-9:00 AM and 4:00-7:00 PM respectively.

Turning movement counts were taken during each of the peak periods at the first four intersections listed above. The counts were taken by the Moreno Valley based company, Counts Unlimited, in April of 2008. Their counts are included in Appendix A.

The City of Highland’s General Plan has designated Greenspot Road as a Major Highway with a raised center median, two lanes in both directions and 8 foot lanes for parking and bike traffic on each side. The posted speed limit in this area is 45 mph.

The configurations of the four existing intersections can be found in Appendix B and are summarized below. They are all signalized.

Table 1: Number of Lanes by Approach at Existing Intersections

Intersection with Greenspot Road	NB Leg			SB Leg			EB Leg			WB Leg		
	L	T	R	L	T	R	L	T	R	L	T	R
SR-210 SB	-	-	-	S	1	1	-	2	1	2	2	-
SR-210 NB	S	1	1	-	-	-	1	2	-	-	3	S
Boulder Avenue	1	2	1	1	1	1	1	2	1	1	2	1
Orange Street	1	1	S	1	1	1	1	2	S	1	2	S

An S in the table above indicates that the movement is shared with the through adjacent lane (IE, a shared through-right turn lane).

If the Greenspot Access Driveway is built without the Blossom Trail development, the configuration will be a tee intersection. The eastbound approach will be a through and a shared through-right turn lane. The westbound approach will be a dedicated left turn lane and two through lanes. The northbound approach will serve only the project trips and will probably be a shared left-right turn lane. Traffic control will probably be a two way stop for the project traffic with free flow for traffic on Greenspot Road.

PROJECT TRIP GENERATION

Project trips are the volume of traffic that will be added to the road system because of the development of the project. Since this land is currently undeveloped, all trips that will be generated by the project are considered to be project trips for the purposes of this study.

There are several ways to estimate the trips generated by a project. One way is to use data collected from a large number of similar projects. Such data has been compiled by the Institute of Transportation Engineers (ITE, 8th Edition). These data points have been plotted and best fit curves through these data points have been developed. This method was used to estimate the project trips for this study.

The Single Family-Detached Housing category was used to approximate the number of AM and PM Peak Period trips in and out of the proposed 133 units housing development. These trips are summarized in Table 2 below. The detailed calculations can be found in Appendix C.

Table 2: Project Trip Summary Table

Development Type	AM Peak Period			PM Peak Period			ADT ¹
	Total	In	Out	Total	In	Out	
Single Family-Detached Housing	100	25	75	134	84	50	1,273

¹ADT (Average Daily Trips) is the average number of vehicles expected to enter or leave the site during one day.

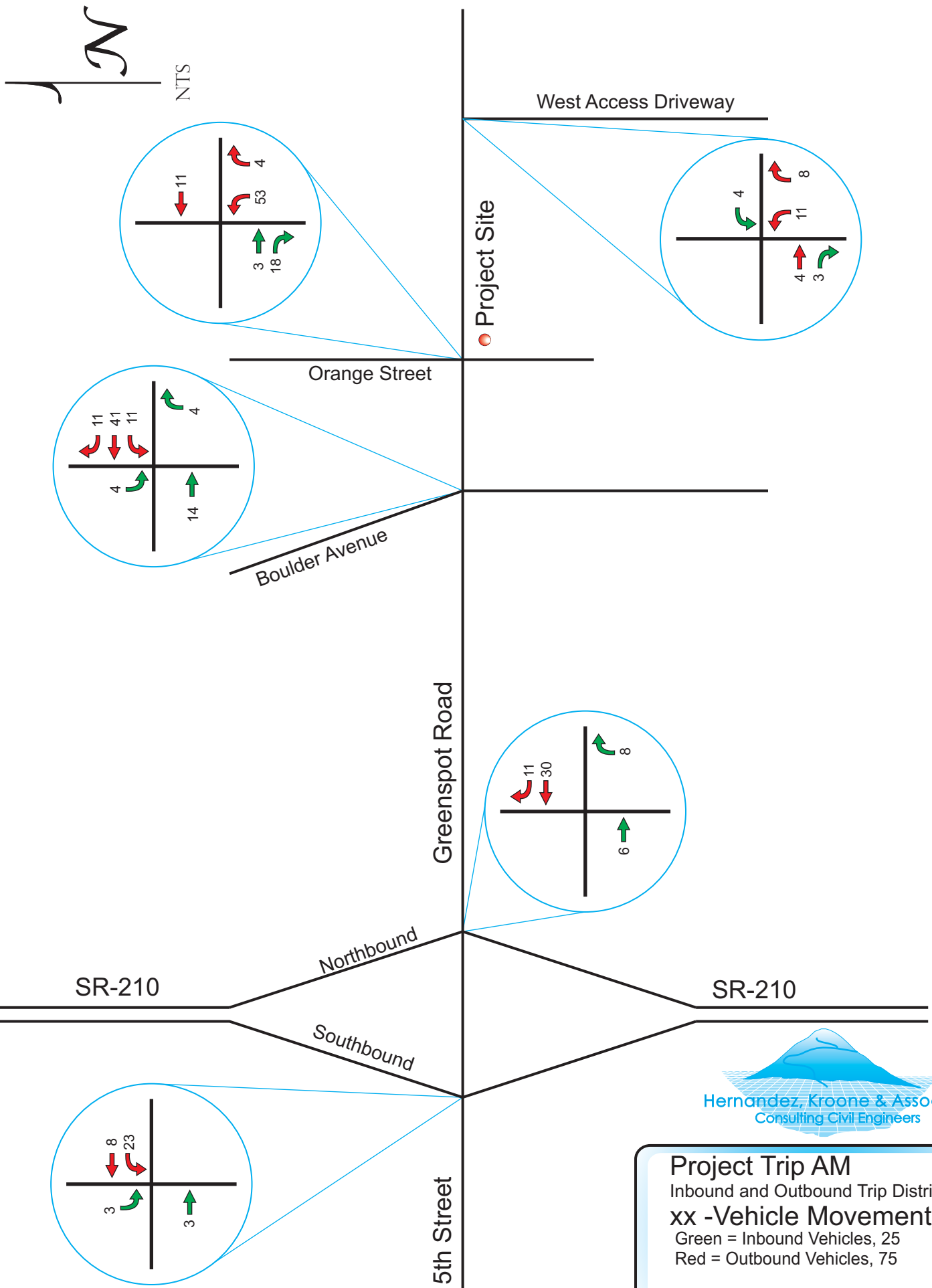
PROJECT TRIP DISTRIBUTION

To the west of the Centerstone Subdivision is access to the Cities of Highland, San Bernardino, Redlands, schools, post office, or shopping via Boulder Avenue and SR-210 to Interstate 10 (I-10) or Interstate 215 (I-215). The Golden Triangle area west of Centerstone will be developing in the next few years and will provide a major attraction for shopping, entertainment, work and dining. To the east of the site are smaller shopping centers, subdivisions and indirect rural access to the unincorporated area of Mentone and the mountains. The Urban Crossroads study anticipated that 85% of the project traffic would leave to the west or arrive from the west. This distribution will be used for this analysis of the Centerstone development. The project's trip distribution is shown in Appendix C.

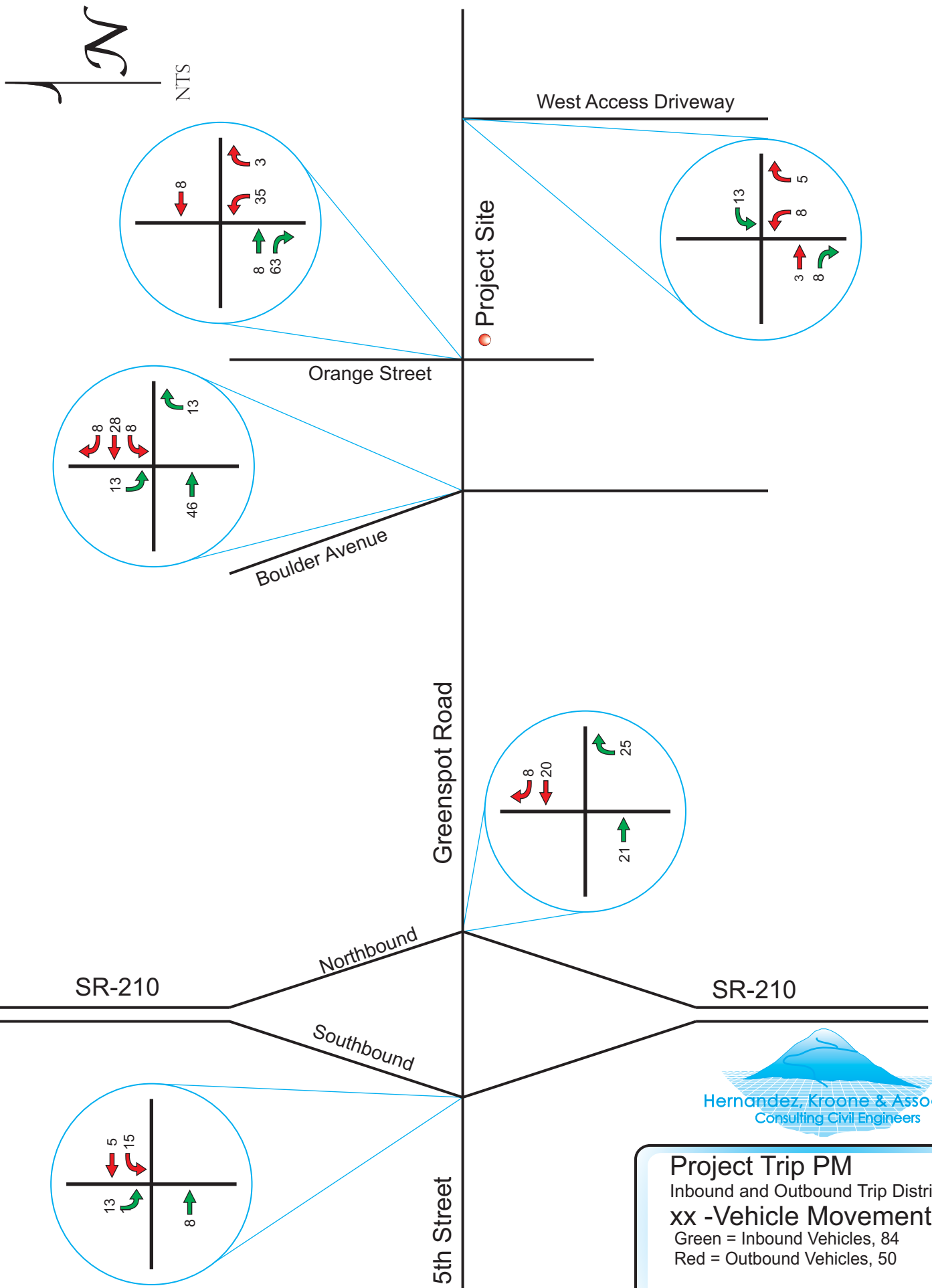
BACKGROUND TRAFFIC GROWTH

Growth Rate

In order to accurately model the traffic conditions for future scenarios, it is necessary to increase the background (existing) traffic in addition to adding in the cumulative project trips. A 2% growth rate per year will be assumed to the Opening Year for this analysis. Opening Year is assumed to be 2011. This will result in an overall increase of 6% to the existing counts at the study intersections.



Project Trip AM
 Inbound and Outbound Trip Distribution
xx -Vehicle Movements
 Green = Inbound Vehicles, 25
 Red = Outbound Vehicles, 75



Project Trip PM
 Inbound and Outbound Trip Distribution
xx -Vehicle Movements
 Green = Inbound Vehicles, 84
 Red = Outbound Vehicles, 50

The Future Year analysis will be completed for the 2030 year. The background volumes for the 2030 year with project analysis will be completed using the volumes projected by Urban Crossroads in their recently completed traffic study for the Greenspot Village and Marketplace Development. The 2030 year volumes were projected using the East Valley Traffic Model adjusted for the recently approved General Plan for the City of Highland. The volumes in this traffic study are being used so the impacts of the various developments can be compared. The 2030 volumes can be found in Appendix E.

Cumulative Analysis

Cumulative projects are developments that are not yet built but will be completed by the opening of the Centerstone Subdivision. Since these projects are not currently contributing vehicles on the areas roads, their traffic volumes were not included in the counts that were taken earlier this year. Their project trips must be estimated and added to the background traffic at the study intersections in order to account for all traffic volumes that will be present on Opening Year.

The City of Highland has a large number of projects in the final stages of planning or engineering review. The following projects are anticipated to be contributing traffic volumes through the studied intersections by the opening year of Centerstone Subdivision. HKA reviewed the citywide project lists from the Planning Department of the City of Highland and identified the following projects:

Table 3: Cumulative Projects

Number	Projects	Traffic Study Completed	Trips added to Study Intersections
1	California Palms Business Center (West)	Yes	No
2	California Palms Business Center (East)	Yes	No
3	Borstein Enterprises	Yes	No
4	Pioneer Industrial Center	Yes	No
5	Redlands Logistic Center	Yes	No
6	Alabama Street / Lugonia Avenue Shopping Center	Yes	No
7	Stater Brothers Headquarters and Distribution Facility	Yes	Yes

Number	Projects	Traffic Study Completed	Trips added to Study Intersections
8	CVS Pharmacy / Baker's Restaurant	Yes	No
9	Highland Main Post Office	Yes	Yes
10	Santa Ana River Wash	In Process	Yes
11	Blossom Trails	Yes	No
12	Calvary Chapel Church	Yes	Yes
13	121 SFH Gated Community	Yes	Yes
15	San Manuel Village	Yes	No
16	Highland Crossing	Yes	Yes
17	64 SFH, Retail Office	Yes	No
19	Highland Mixed Retail (Jack In The Box)	In Process	Yes
21	Regency Center	Yes	Yes
22	Greenspot Village and Marketplace	In Process	Yes
23	Fresh and Easy	In Process	No
24	Dairy Queen	In Process	No
25	Gas / Convenience Store (Base Line & Siene)	In Process	No
26	San Bernardino Wal-Mart Expansion	In Process	No
27	Denny's	Yes	No

A diagram of these project locations are shown in Appendix D along with the project trip information for those projects that add vehicles to the intersections analyzed in this study.

Since the Opening Year is 3 years before the completion of the last phase of the Greenspot Village and Marketplace development, only half of those volumes will be included in the cumulative project trips added to the Opening Year background volumes.

LEVEL OF SERVICE ANALYSIS

To gauge the impact of a project, the operation of an intersection without project traffic is compared to the operation of an intersection with the project traffic. The existing and future condition without project traffic is the yardstick to determine the magnitude of the project or its impacts. The measurement used to compare the operation of the intersection is called level of service (LOS).

LOS is a measure of the effectiveness of an intersection. It rates the intersection by the length of delay or by a volume to capacity ratio. A LOS of A means that the intersection has little delay. A LOS of F means the intersection has delays of over a minute or that traffic may not clear the intersection in one signal cycle. The magnitude of change in the LOS when the project trips are added to the intersection indicates the magnitude of the project's impact.

In addition to the LOS rating, most agencies have a minimal LOS that has to be maintained. The studied intersections are within the City of Highland but the City shares jurisdiction of the two intersections, the SR-210 ramps, with Caltrans. For the City of Highland and Caltrans, the minimum acceptable LOS is D.

The methods used for the analysis will follow the procedures outlined in the Highway Capacity Manual 2000 and the guidelines in the San Bernardino Associated Governments Congestion Management Program (CMP). The Highway Capacity Software program will be used at the unsignalized intersection. Webster software by AI Grover and Associates will be used at the signalized intersections.

The signalized intersections studied are listed below.

- SR-210 SB Ramp / 5th Street
- SR-210 NB Ramp / Greenspot Road
- Boulder Avenue / Greenspot Road
- Orange Street / Greenspot Road

The LOS of each existing intersection was evaluated for the following scenarios:

- Existing conditions without project traffic
- Opening Year (2011) conditions without project traffic
- Opening Year (2011) conditions with project traffic
- Future Year (2030) without project traffic
- Future Year (2030) with project traffic

The intersection of Greenspot Access Driveway / Greenspot Road was not evaluated under the Existing, Opening Year Without Project, or Future Year Without Project conditions because the intersection would not be built in those scenarios.

The peak hour volumes used by the Webster software are the counted volumes from the peak 15-minute period volume multiplied by 4. The east- and westbound volumes at the unsignalized intersection were estimated by the volumes of the two intersections on either side of the proposed project driveway.

The LOS analysis procedures include mathematically applied adjustment factors as part of the process in calculating the final LOS rating of an intersection. One of these adjustment factors is called the peak hour factor (PHF). This helps factor in the differences between an hourly volume and the highest 15 minute peak period volume adjusted to an hourly rate and the inherent discrepancies that may occur in forecasting. The PHF is defined by the *Highway Capacity Manual* as "...the ratio of total hourly volume to the peak rate of flow within the hour..."(actual count for 1 hour / 4 times the peak 15 minute volume). The traffic volume is divided by the PHF to adjust it to the maximum flow through the intersection.

Since the hourly volumes used in the analysis are 4 times the peak 15 minute counted volumes, by definition the PHF will be 1 for Existing and Opening Year analysis. Accurate PHF values are unknown for the Future Conditions so a standard value of 0.95 was used for each turning movement, per the guidelines of the CMP.

The traffic volumes for the Opening Year Without Project scenario were obtained by multiplying the existing background traffic volume by a 6% growth rate and adding the cumulative project trip volumes. This accounts for a 2% annual growth rate compounded over three years. The Opening Year With Project scenario was created by adding the Centerstone Subdivision project trips to the Opening Year Without Project scenario.

For the Future Year Without Project scenario, 2030 volumes from the Urban Crossroads study for the Greenspot Village and Marketplace were reduced by the Centerstone Subdivision project trips. The Future Year With Project scenario was created by using the 2030 volumes from the Urban Crossroads study.

Note: Using the above methods to estimate the volumes, only the Opening Year With Project scenario LOS analysis had to be revised from the December 2008 report. There was no change in the traffic volumes for the Existing, Opening Without Project and the Future Year With Project

scenarios. The increase in the project trips would reduce the Future Year Without Project scenario volumes slightly from those used in the December 2008 LOS analysis so the analysis for that scenario was not revised.

A time allotment for a minimum amount of green time for the pedestrians to cross the street was set in the LOS analysis. To continue the efforts to make the results easy to compare, the pedestrian times for the roadway widths as calculated by Urban Crossroads in the Greenspot Village and Marketplace traffic study were used in this analysis. The Webster software allows the entry of only one minimum green time, so HKA used the width of the widest approach to set a minimum the pedestrian time.

The printouts from the LOS analysis for the study area intersections are included in Appendix F. The resulting LOS for each scenario is shown in the following summary tables:

Table 4: LOS Summary - AM Peak Hour

Intersection	Existing w/o Project Traffic		Opening w/o Project Traffic, 2011		Opening w/ Project Traffic, 2011		Future w/o Project Traffic, 2030		Future w/ Project Traffic, 2030	
	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec
SR-210 SB Ramp / 5 th Street	<u>C</u>	<u>28</u>	<u>D</u>	<u>43</u>	<u>D</u>	<u>45</u>	<u>F</u>	<u>220</u>	<u>F</u>	<u>220</u>
SR-210 NB Ramp / Greenspot Road	<u>B</u>	<u>17</u>	<u>C</u>	<u>24</u>	<u>C</u>	<u>24</u>	<u>F</u>	<u>149</u>	<u>F</u>	<u>153</u>
Boulder Avenue / Greenspot Road	<u>D</u>	<u>36</u>	<u>E</u>	<u>56</u>	<u>E</u>	<u>59</u>	<u>F</u>	<u>125</u>	<u>F</u>	<u>130</u>
Orange Street / Greenspot Road	<u>C</u>	<u>31</u>	<u>C</u>	<u>35</u>	<u>D</u>	<u>36</u>	<u>D</u>	<u>47</u>	<u>D</u>	<u>53</u>
Greenspot Access Dr / Greenspot Road					<u>B</u>	<u>12.1</u>			<u>C</u>	<u>18.2</u>

Table 5: LOS Summary - PM Peak Hour

Intersection	Existing w/o Project Traffic		Opening w/o Project Traffic, 2011		Opening w/ Project Traffic, 2011		Future w/o Project Traffic, 2030		Future w/ Project Traffic, 2030	
	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec	LOS	Delay, sec
SR-210 SB Ramp / 5 th Street	<u>C</u>	<u>22</u>	<u>D</u>	<u>53</u>	<u>E</u>	<u>64</u>	<u>F</u>	<u>87</u>	<u>F</u>	<u>90</u>
SR-210 NB Ramp / Greenspot Road	<u>C</u>	<u>21</u>	<u>F</u>	<u>84</u>	<u>F</u>	<u>88</u>	<u>F</u>	<u>178</u>	<u>F</u>	<u>184</u>
Boulder Avenue / Greenspot Road	<u>C</u>	<u>27</u>	<u>D</u>	<u>45</u>	<u>D</u>	<u>47</u>	<u>F</u>	<u>335</u>	<u>F</u>	<u>339</u>
Orange Street / Greenspot Road	<u>C</u>	<u>21</u>	<u>C</u>	<u>23</u>	<u>C</u>	<u>26</u>	<u>C</u>	<u>34</u>	<u>D</u>	<u>52</u>
Greenspot Access Dr / Greenspot Road					<u>D</u>	<u>29.1</u>			<u>E</u>	<u>41.6</u>

The LOS tables show the general trend of the LOS decreasing in the future due to the background traffic volumes. The reduced LOS reported for the without project conditions is the result of the increase of the ambient traffic. While the delay increased at all signalized intersections with the addition of the project traffic, the LOS only declined to an unacceptable level at SR-210 SB Ramp / 5th Street PM - Opening Year.

The following signalized intersections will require mitigation due to the increase in the general background traffic volumes:

- SR-210 SB / 5th Street AM and PM Future Year without Project
- SR-210 NB / 5th Street PM Opening Year without Project
- SR-210 NB / 5th Street AM and PM Future Year without Project
- Boulder Avenue / Greenspot Road AM Opening Year without Project
- Boulder Avenue / Greenspot Road AM and PM Future Year without Project

The intersection of the Greenspot Access Driveway / Greenspot Road works at an acceptable LOS for all scenarios except the Future with Project PM scenario. This is due to the delay experienced by vehicles waiting for a gap in the Greenspot Road traffic to make a left turn from

the driveway. This situation is not mitigated with the addition of another northbound lane, or with converting to a 4-way stop controlled intersection.

The trips from this project alone are too small to meet any of the Manual of Uniform Traffic Control Devices warrants for a traffic signal. Based on the January 27, 2006 conclusions of Urban Crossroads' analysis for the Blossom Trails project, a traffic sign is warranted at the Greenspot Access Driveway (West Access Drive) when the south portion of the Blossom Trails development is completed.

MITIGATION AND COSTS

Three of the signalized intersections require mitigation. Only the intersection of SR-210 SB Ramp / 5th Street PM - Opening Year scenario has a direct impact to be mitigated. The other intersections must be mitigated to address reduced LOS due the growth of the background traffic volumes.

The following table depicts the proposed mitigation at each of the intersections. The mitigation selected followed the lanes to be added based on the City's master plan for the Greenspot Corridor.

*Table 6: Number of Lanes by Approach As Mitigated
(Configuration changes are shown in **Bold**)*

Intersection with Greenspot Road	NB Leg			SB Leg			EB Leg			WB Leg		
	L	T	R	L	T	R	L	T	R	L	T	R
SR-210 SB - Existing	-	-	-	S	1	1	-	2	1	2	2	-
Opening²	-	-	-	<u>2</u>	-	1	-	2	1	2	2	-
Future²	-	-	-	2	-	1	-	2	<u>2</u>	2	<u>3</u>	-
SR-210 NB - Existing	S	1	1	-	-	-	1	2	-	-	3	S
Opening²	<u>2</u>	-	<u>2</u>	-	-	-	<u>2</u>	2	-	-	3	<u>1</u>
Future²	2		2				2	<u>3</u>	-		3	1
Boulder Ave - Existing	1	2	1	1	1	1	1	2	1	1	2	1
Opening	1	2	1	1	1	1	1	2	1	<u>2</u>	2	1
Future	<u>2</u>	2	1	<u>2</u>	<u>2</u>	1	<u>2</u>	<u>3</u>	1	2	<u>3</u>	1

²Ramp improvements modeled without through movement (reentering 210 freeway). Since the ramp movement is protected, the incidental through movements can move when the rest of the ramp moves.

The mitigation proposed increases the roadway width and therefore increases the pedestrian crossing times. The minimum green times used in the LOS analysis of the existing configurations were not increased for the LOS analysis of the mitigated configurations. Pedestrians are not expected at every cycle at these intersections. The signals along 5th Street - Greenspot Road, from Palm Avenue to Orange Street, will be coordinated under the City’s plan. The signals timing plan will probably not include green time for pedestrians on every movement for every cycle at every intersection. Doing so would increase the delay time for all vehicles when pedestrians are not using the intersections. The timing plan will accommodate an extended time when a call for pedestrian movement is made at the pedestrian buttons.

LOS analysis was completed for the scenarios that required mitigation. The analysis is in Appendix G. Since the traffic is predominately westbound in the AM peak period and eastbound in the PM Peak Period, LOS analysis of the proposed mitigation was run in both time periods to insure that the improvements were adequate. The tables below summarize the results:

Table 7: LOS Summary - Mitigated Scenarios - AM Peak Hour

Intersection with Greenspot Road	Without Mitigation				With Mitigation			
	2011 w/o Project Traffic	2011 w/ Project Traffic	2030 w/o Project Traffic	2030 w/ Project Traffic	2011 w/o Project Traffic	2011 w/ Project Traffic	2030 w/o Project Traffic	2030 w/ Project Traffic
SR-210 SB	D	D	F	F	N/A	D	D	D
SR-210 NB	C	C	F	F	C	B ³	D	D
Boulder Avenue	E	E	F	F	D	D	D	D

³ Depending on which lanes are nearing capacity and where project trips are added, the LOS can improve when the project trips are added. In this case there is less than 1 second between the delay of the without project trips scenario and the with project trips scenario.

N/A - Mitigation not needed for this scenario.

Table 8: LOS Summary - Mitigated Scenarios - PM Peak Hour

Intersection with Greenspot Road	Without Mitigation				With Mitigation			
	2011 w/o Project Traffic	2011 w/ Project Traffic	2030 w/o Project Traffic	2030 w/ Project Traffic	2011 w/o Project Traffic	2011 w/ Project Traffic	2030 w/o Project Traffic	2030 w/ Project Traffic
SR-210 SB	D	E	F	F	N/A	D	C	C
SR-210 NB	F	F	F	F	C	C	C	C
Boulder Avenue	D	D	F	F	D	D	D	D

N/A - Mitigation not needed for this scenario.

The cost and fair share calculations are shown below for the intersections requiring mitigation. Cost estimates for the improvements at the Boulder Avenue / Greenspot Road intersection are based on the San Bernardino Associated Governments Congestion Management Program for San Bernardino County, 2006. These cost estimates do not include:

- Right of way engineering, appraisal, acquisitions or utility relocation costs
- Minor items and supplemental work
- Mobilization
- Contingencies or
- Landscape

The improvements included in the estimate for the Boulder Avenue / Greenspot Road intersection are those required to bring the current configuration to the City Master Plan configuration.

The City has completed an estimate for the improvements needed at the SR-210 Ramp intersections with 5th Street / Greenspot Road. It includes the widening of 5th Street / Greenspot Road under the overcrossing in the interchange improvements and improvements to construct the interchange to the City's Master Plan configurations. While this is not the typical procedure for traffic studies, it was the procedure used in the recently completed traffic study for the Greenspot Village and Marketplace and other studies in the area.

The detailed cost estimate table is included in Appendix H.

Table 9: Mitigation Cost Estimate Summary

Intersection	Scenario	Mitigation Improvements	Cost of Mitigation to Master Plan, \$
with 5th Street - Greenspot Road		(Improvements above Mitigation to meet City's Master Plan Improvements in <i>Italics</i>)	
SR - 210 SB	Opening Year (2011)	Add 2 nd SB left turn lane on ramp Stripe existing SB shared left turn - through lane as left turn lane	-
	Future Year (2030)	Add 2 nd EB right turn lane Add 3 rd WB through lane (requires addition of receiving lane) <i>Widen Overcrossing by 3 lanes</i> <i>Add 3rd and 4th EB through lanes</i>	2,259,000
	Opening Year (2011)	Add 2 nd NB left turn lane on ramp Stripe existing NB shared left turn - through lane as left turn lane Add 2 nd NB right turn lane on ramp Add 2 nd EB left turn lane Add 1 st WB dedicated right turn lane	-
	Future Year (2030)	Add 3 rd EB through lane (requires addition of receiving lane) <i>Widen Overcrossing by 3 lanes</i> <i>Add 4th WB through lane</i>	2,917,900
Boulder Avenue	Opening Year (2011)	Add 2 nd WB left turn lane (requires addition of receiving lane)	
Boulder Avenue	Future Year (2030)	Add 2 nd NB left turn lane Add 2 nd SB left turn lane Add 2 nd SB through lane (requires addition of receiving lane) Add 2 nd EB left turn lane Add 3 rd EB through lane (requires addition of receiving lane) Add 3 rd WB through lane (requires addition of receiving lane)	322,700

The fair share calculations were based on the PM Peak Hour volumes.

Table 10: Project Fair Share Contribution

Intersection with 5th Street - Greenspot Road	Total Cost, \$	Existing Traffic	2030 with Project Traffic	New Traffic	Project Trips	Project % of New Traffic	Project Cost Share, \$
SR - 210 SB	2,259,000	2,484	5,338	2,854	41	1.4 %	31,600
SR -210 NB	2,917,900	2,568	5,926	3,358	74	2.2%	64,200
Boulder Avenue	322,700	2,848	6,896	4,048	116	2.9%	9,400
Total Costs	5,499,600						105,600

CONCLUSIONS AND RECOMMENDATIONS

The traffic impact study analyzed the impacts of the proposed Centerstone Subdivision housing development in Highland, California. The intersections studied were:

- SR-210 SB Ramp / 5th Street
- SR-210 NB Ramp / Greenspot Road
- Boulder Avenue / Greenspot Road
- Orange Street / Greenspot Road
- Greenspot Access Driveway / Greenspot Road (project access, does not exist yet)

The intersections were analyzed for the following scenarios:

- Existing conditions without project traffic
- Opening Year (2011) conditions without project traffic
- Opening Year (2011) conditions with project traffic
- Future Year conditions (2030) without project traffic
- Future Year (2030) with project traffic

The existing and the future condition without project traffic are the yard stick to determine the magnitude of the project or cumulative impacts. The measurement used for the impact of a project is the LOS. The City's criteria is to achieve and maintain a LOS of D at all intersections.

Tables 4 and 5 show the general trend of the LOS decreasing in the future due to the background traffic volumes. The reduced LOS reported for the without project conditions is a result of the increase of the ambient traffic. While the delay increased at all signalized intersections with the addition of the project traffic, the LOS only declined to an unacceptable level at SR-210 SB Ramp / 5th Street PM - Opening Year.

The following signalized intersections will require mitigation due to the increase in the general background traffic volumes:

- SR-210 SB / 5th Street AM and PM Future Year without Project
- SR-210 NB / 5th Street PM Opening Year without Project
- SR-210 NB / 5th Street AM and PM Future Year without Project
- Boulder Avenue / Greenspot Road AM Opening Year without Project
- Boulder Avenue / Greenspot Road AM and PM Future Year without Project

The intersection of the Greenspot Access Driveway / Greenspot Road works at an acceptable LOS for the Opening Year. No signal is needed for Opening Year. This intersection meets the City's LOS criteria for all scenarios except the Future with Project PM scenario. This is due to the delay experienced by vehicles waiting for a gap in the Greenspot Road traffic to make a left turn from the side street. This situation is not mitigated with the addition of another northbound lane, or with converting to a 4-way stop controlled intersection.

Tables 6 - 8 show the proposed improvements so that the intersections meet the City's LOS criteria.

Improvements will be needed at the intersections of the SR-210 Ramps and Boulder Avenue with Greenspot Road for the Opening Year. The City and the developer will determine the method of achieving those improvements (Developer Fees, Conditions of Approval, construction, etc). The improvements needed to move from the Opening Year configuration to the City's Master Plan Ultimate Configuration are shown in Table 9. These improvements will be accomplished by the payment of Developer Fees, fair share fees, and/or other methods.

Cost estimates were based on the CMP Construction Cost information. A detailed cost estimate table is included in Appendix H and is summarized in Table 9 and 10. The estimate cost of the mitigation needed for the Future Year is \$5,499,600. The project's fair share contribution is estimated at \$105,200.