Appendix G:
Traffic Evaluation

Kimley-Horn
and Associates, Inc.

October 19, 2009

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95670

Mr. Trevor Macenski, REA
Branch Manager
Michael Brandman Associates
2000 "O" Street, Suite 200
Sacramento, CA 95811

Re: Traffic Evaluation
Chapin Batch Plant
Volta, Merced County, California
KHA Project No.: 097129027

Dear Mr. Macenski:

Kimley-Horn and Associates, Inc. ("KHA") is pleased to submit this traffic evaluation for the above referenced project in Volta, Merced County, California (the "proposed project" or "project"). The purpose of this evaluation is to document near-term intersection operations (with and without the project), and to qualitatively evaluate the proposed project trip routes. The following is a discussion of both of these topics:

Project Description

The project proposes to construct and operate a concrete batch plant along the north side of Ingomar Grade Road, east of Volta Road, in the community of Volta. The project is anticipated to have a daily production capacity of 300 cubic yards. Access to the project site will be provided via one full access driveway along Ingomar Grade Road. The following intersections are included in this evaluation:

1. Ingomar Grade Road @ Volta Road (South)
2. Ingomar Grade Road @ Volta Road (North)
3. Ingomar Grade Road @ Badger Flat Road

Figure 1 illustrates the study facilities, existing traffic control, and existing lane configurations.

Assessment of Proposed Project

Proposed Project Trip Generation

Trip generation approximation for the proposed project is comprised of multiple components representing the various users of the project site. More specifically, the proposed project will generate truck trips entering the site with raw materials, trucks leaving the site with finished products, and employee trips.

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Trip generation for a proposed project is typically derived using data included in *Trip Generation*, *8th Edition*, published by the Institute of Transportation Engineers (ITE). However, *Trip Generation* does not currently contain an appropriate comparable land use for the proposed project. As such, trip generation rates for the proposed project were derived from driveway count data collected at sites similar to the proposed batch plant, as well as operational information provided by the project applicant.

Both AM and PM peak-hour traffic counts were previously conducted at three (3) concrete batch plants in the greater Sacramento area in 2005. This data included the number of vehicular trips (including trucks) in and out of the site, as well as the size and capacity of each facility. Counts include trips for employees, vehicles delivering raw materials, and outbound concrete delivery trucks. The data obtained in the driveway counts were used to derive the 70th percentile trips for both AM and PM peak hours. The 70th percentile was selected to conservatively represent the number of peak hour trips that are expected to occur 70 percent of the time, thus accounting for daily fluctuations and/or irregular operations captured during the data collection efforts for the sample sites. For this analysis, it was assumed the sample site data is normally distributed.

The 70th percentile trip generation for the three sample sites (Table 1) results in 26 AM peak hour trips and 11 PM peak hour trips (Table 2). Table 2 also indicates the assumed percentage of vehicles entering and leaving the project site. These percentages are weighted averages (weighted by plant capacity) derived from the sample site data shown in Table 1.

Table 1 – Sample Site Trip Generation Data

Sample Site	Daily Output Capacity (yd^3)	AM Peak Hour					PM Peak Hour				
		Total Trips	IN		OUT		Total Trips	IN		OUT	
			%	Trips	%	Trips		%	Trips	%	Trips
North Highlands	**343**	**25**	60	15	40	10	**9**	22	2	78	7
Rancho Cordova	**445**	**17**	65	11	35	6	**9**	33	3	67	6
Lincoln	**600**	**26**	50	13	50	13	**13**	38	5	62	8

Table 2 – Proposed Project Trip Generation

AM Peak Hour					PM Peak Hour				
Total Trips	IN		OUT		Total Trips	IN		OUT	
	%	Trips	%	Trips		%	Trips	%	Trips
26	57	15	43	11	**11**	32	4	68	7

It should be noted that using the 70th percentile trip generation from the sample sites results in a conservative analysis when compared to determining the 70th percentile trip rate of the sample sites. This difference can likely be attributed to the fact that all three sample sites have a larger plant capacity than that of the proposed project (300 cubic yards per day). The use of the 70th percentile trip generation (AM 26 trips, PM 11 trips) results in analyzing more trips than using the 70th percentile trip rate (AM 17 trips, PM 7 trips), and is, therefore, more conservative.

Operational information provided by the project applicant estimates the total number of daily site trips (including both entering and existing vehicles) to be approximately 100. Understanding that not all of the site trips will occur during the traditional AM and PM peak-hours, it can be reasoned that the proposed project trip generation provided in Table 2 appropriately mimics the applicants daily trip approximation by assuming a significant portion of the trips occur throughout the day, not just the peak-hours.

Proposed Project Trip Distribution

The distribution of project traffic was previously approved by the County through their consultation with the project applicant. Project trip distribution is illustrated in Figure 2. The resulting AM and PM peak-hour traffic volumes attributed to the proposed project at the study intersections are presented in Figure 3.

Traffic Impact Analysis Methodology

Analysis of significant environmental impacts at intersections is based on the concept of Level of Service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Intersection LOS for this study was determined using methods defined in the *Highway Capacity Manual, 2000* (HCM) and appropriate traffic analysis software.

The HCM includes procedures for analyzing two-way stop controlled (TWSC) and all-way stop controlled (AWSC) intersections. The TWSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC intersection procedure define LOS as a function of average control delay for the intersection as a whole. Table 3 presents intersection LOS definitions as defined in the HCM.

Table 3 – Intersection Level of Service Criteria

Level of Service (LOS)	Un-Signalized
	Average Control Delay* (sec/veh)
A	≤ 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

Source: Highway Capacity Manual, 2000
* Applied to the worst lane/lane group(s) for TWSC

Based on the above assumptions and the County's requirements, this LOS analysis was conducted for the study intersections for the weekday PM peak-hour for the following scenarios:

A. Opening Day (2010) Conditions
B. Opening Day (2010) plus Proposed Project Conditions

The following is a discussion of the analyses for these scenarios:

Opening Day (2010) Conditions

Peak period turning movement traffic counts were conducted in October 2009 for the study facilities. These counts were conducted between the hours of 7:00-9:00 a.m., and 4:00–6:00 p.m. The Opening Day (2010) peak-hour turn movement volumes were established by adding a conservative 2-percent growth rate to the 2009 traffic counts. The resulting Opening Day (2010) volumes are presented in Figure 4, and the 2009 traffic count data sheets are provided in Appendix A. Table 4 presents the peak-hour intersection operating conditions for this analysis scenario.

Table 4 – Opening Day (2010) Intersection Levels of Service

#	Intersection	Traffic Control	AM Peak-Hour		PM Peak-Hour	
			Delay (seconds)	LOS	Delay (seconds)	LOS
1	Ingomar Grade Rd. @ Volta Rd. (South)	TWSC*	12.9 (NB)	B	10.9 (NB)	B
2	Ingomar Grade Rd. @ Volta Rd. (North)	TWSC*	11.8 (SB)	B	10.3 (SB)	B
3	Ingomar Grade Rd. @ Badger Flat Rd.	AWSC	10.3	B	12.4	B

* Control delay for worst minor approach (worst minor movement) for TWSC.

As indicated in Table 4, the study intersections operate at LOS B during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix B.

Opening Day (2010) plus Proposed Project Conditions

Peak-hour traffic associated with the proposed project was added to the Opening Day (2010) traffic volumes, and levels of service were determined at the study intersections. Table 5 provides a summary of the intersection analysis, and Figure 5 provides the PM peak-hour traffic volumes at the study intersections for this analysis scenario.

Table 5 – Opening Day (2010) and Opening Day (2010) plus Proposed Project Intersection Levels of Service

#	Intersection	Traffic Control	Analysis Scenario[+]	AM Peak-Hour		PM Peak-Hour	
				Delay (seconds)	LOS	Delay (seconds)	LOS
1	Ingomar Grade Rd. @ Volta Rd. (South)	TWSC[*]	Opening	12.9 (NB)	B	10.9 (NB)	B
			Open + PP	13.1 (NB)	B	11.1 (NB)	B
2	Ingomar Grade Rd. @ Volta Rd. (North)	TWSC[*]	Opening	11.8 (SB)	B	10.3 (SB)	B
			Open + PP	12.1 (SB)	B	10.3 (SB)	B
3	Ingomar Grade Rd. @ Badger Flat Rd.	AWSC	Opening	10.3	B	12.4	B
			Open + PP	10.6	B	12.6	B

[+] Opening = Opening Day (2010), Open + PP = Opening Day (2010) plus Proposed Project
[*] Control delay for worst minor approach (worst minor movement)

As indicated in Table 5, the study intersections operate at LOS B during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix C.

Evaluation of Project Trip Routes

The purpose of this effort was to qualitatively evaluate the proposed project trip routes by observing existing roadway geometry, traffic control, and other characteristics determined to potentially affect the operation and distribution of project site trips.

As depicted in Figure 2, the project trip distribution scheme generally involves a clockwise route for the raw material trucks anticipated to serve the site. More specifically, the loaded trucks will approach West Pacheco Boulevard (SR-152/33) from the south and turn left (west) toward Volta Road. Due to the existing traffic control at this intersection (side street stop only), the return trips (empty trucks) to the source site will instead travel eastbound on Ingomar Grade Road to Badger Flat Road and proceed south toward the signalized intersections along West Pacheco Boulevard (SR-152/33) to gain access back to southbound Ortigalita Road. Although there are other minimal project trips (i.e., delivery trucks and employees) anticipated to utilize other project area facilities, it is this clockwise route for the loaded and unloaded material trucks that is the specific focus of this discussion due to the routine, predictable use by the large material hauling vehicles.

For the most part, the clockwise material truck circulation pattern will require right-turns at the project area intersections. With the exception of one location, the existing geometry is anticipated to accommodate these movements. The layout of the Ingomar Grade Road intersection with Badger Flat Road will require modification to accommodate the eastbound right turn movement for the return (empty) material trucks. As shown in the photo below, and as concluded by the County Roads Department, the southwest corner will require minor widening.

Ingomar Grade Road @ Badger Flat Road – Looking Southeast

Furthermore, the westbound right-turning (loaded) material trucks at the West Pacheco Boulevard (SR-152/33) intersection with Volta Road will be required to decelerate in the number 2 (right most) westbound through lane to turn right (north) onto Volta Road to access the project site. As shown in the following photo, the existing geometry may require these vehicles to decelerate significantly to make this maneuver, in particular if there is concurrently a southbound Volta Road vehicle at the limit line.

West Pacheco Boulevard (SR-152/33) @ Volta Road – Looking West

In general, the relatively low volumes along the study area roadways, and the specific routes identified by the County and agreed upon by the applicant for the material trucks, combine to minimize the adverse effects of the addition of the proposed project's off-site trips.

In conclusion, and consistent with the County's requirements[1], the proposed project should be conditioned as follows:

1. To utilize the clockwise material truck circulation pattern, therefore avoiding crossing West Pacheco Boulevard (SR-152/33) with project trucks; and,
2. To improve the southwest corner of the Ingomar Grade Road intersection with Badger Flat Road to accommodate the eastbound right-turn truck movement.

[1] Email from Steve Lyon, Merced County Roads Department, to Trevor Macenski, MBA, September 22, 2009.

We appreciate the opportunity to provide these services to you. Please contact me at (916) 858-5800 if you have any questions or require additional information.

Very truly yours,

KIMLEY-HORN AND ASSOCIATES, INC.

Matthew D. Weir, P.E., T.E.
Project Manager
PE No. C70216 & TR2424

Enclosures:

Figure 1 – Project Location, Study Intersections, and Lane Geometry
Figure 2 – Proposed Project Trip Distribution
Figure 3 – Proposed Project Trip Assignment
Figure 4 – Opening Day (2010) Peak-Hour Traffic Volumes
Figure 5 – Opening Day (2010) plus Proposed Project Peak-Hour Traffic Volumes

Appendix A – Traffic Count Data Sheets
Appendix B – Analysis Worksheets for Opening Day (2010) Conditions
Appendix C – Analysis Worksheets for Opening Day (2010) plus Proposed Project Conditions

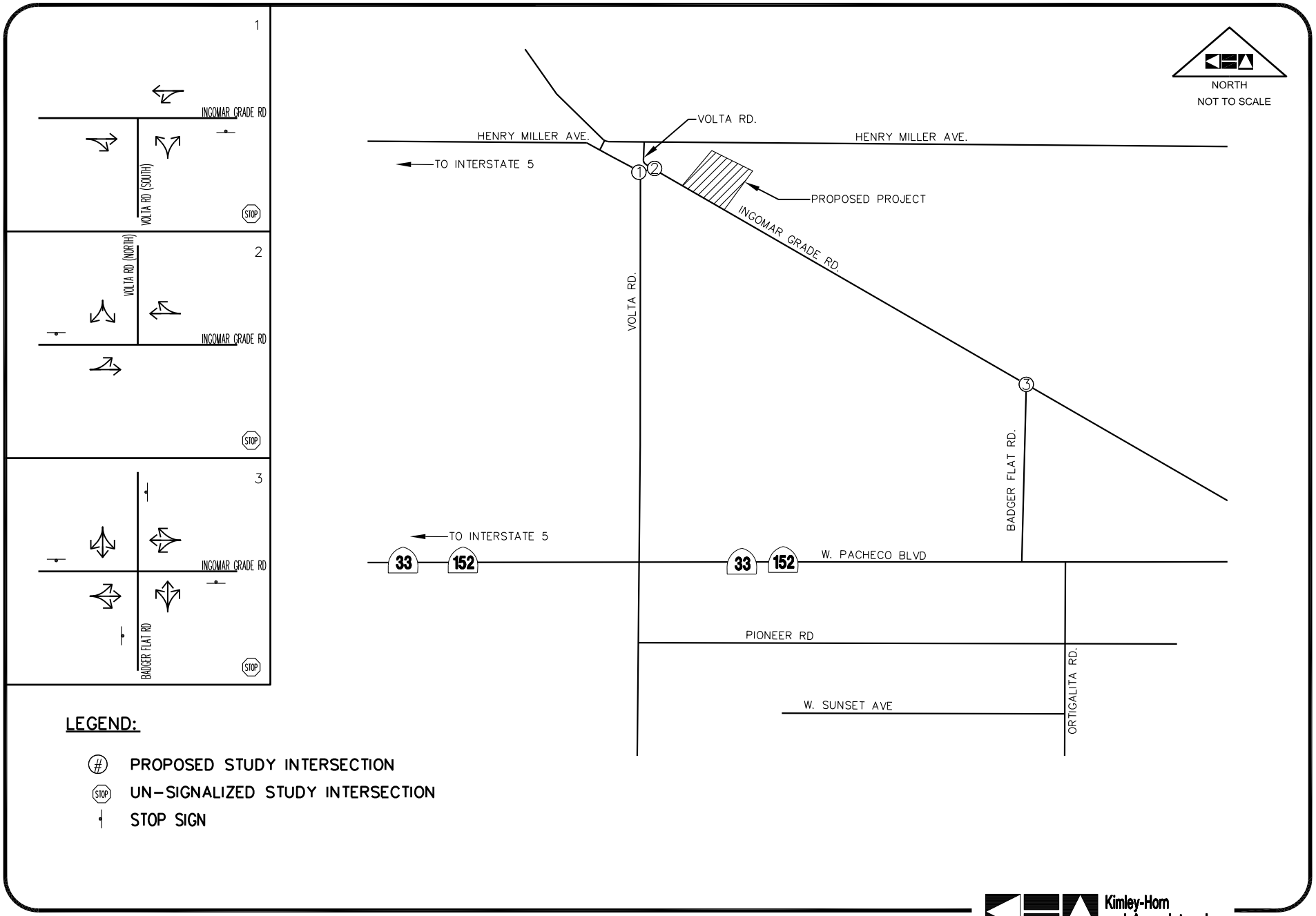

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FIGURE 1

PROJECT LOCATION, STUDY INTERSECTIONS, AND LANE GEOMETRY

CHAPIN BATCH PLANT
VOLTA, MERCED COUNTY, CA

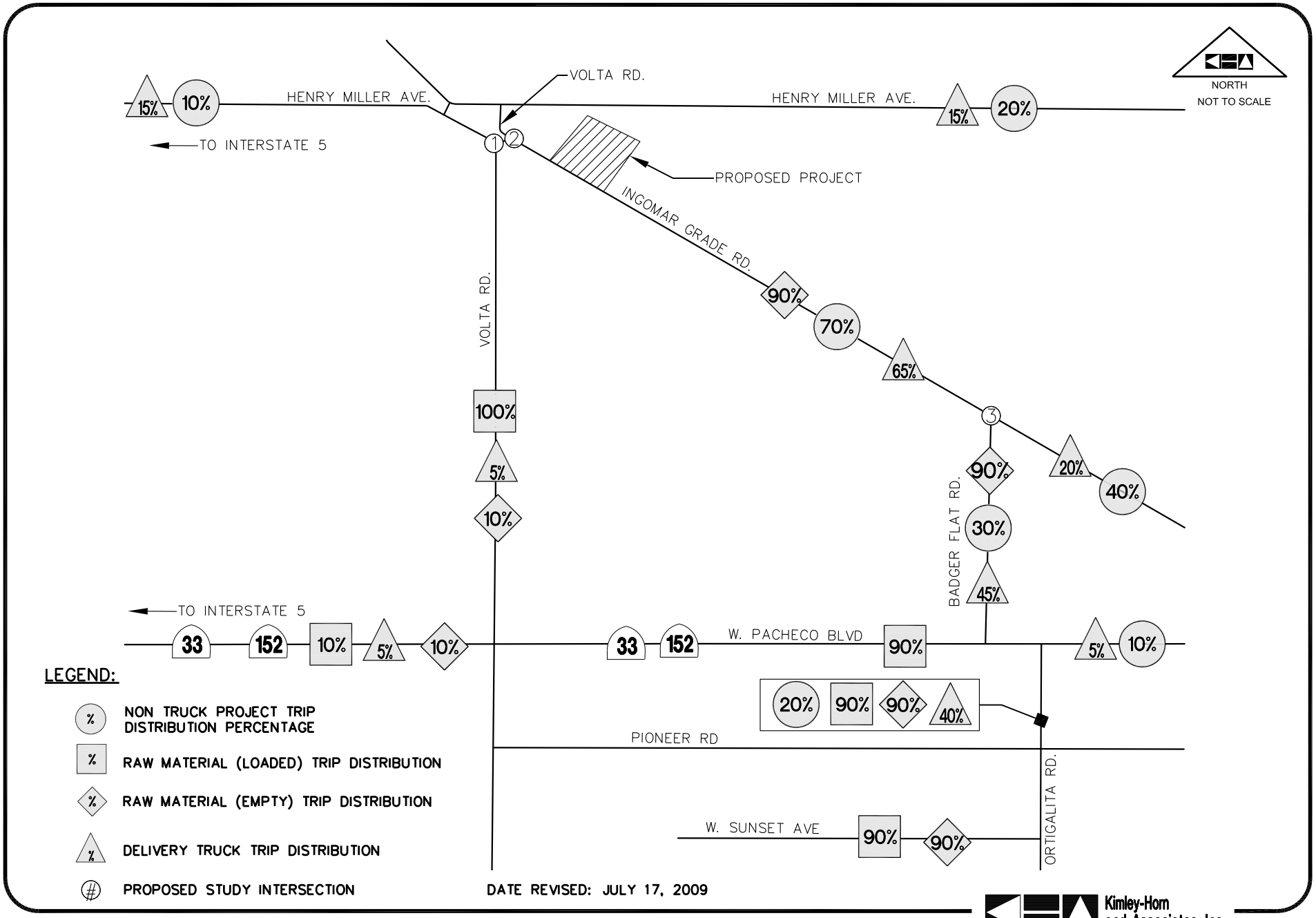
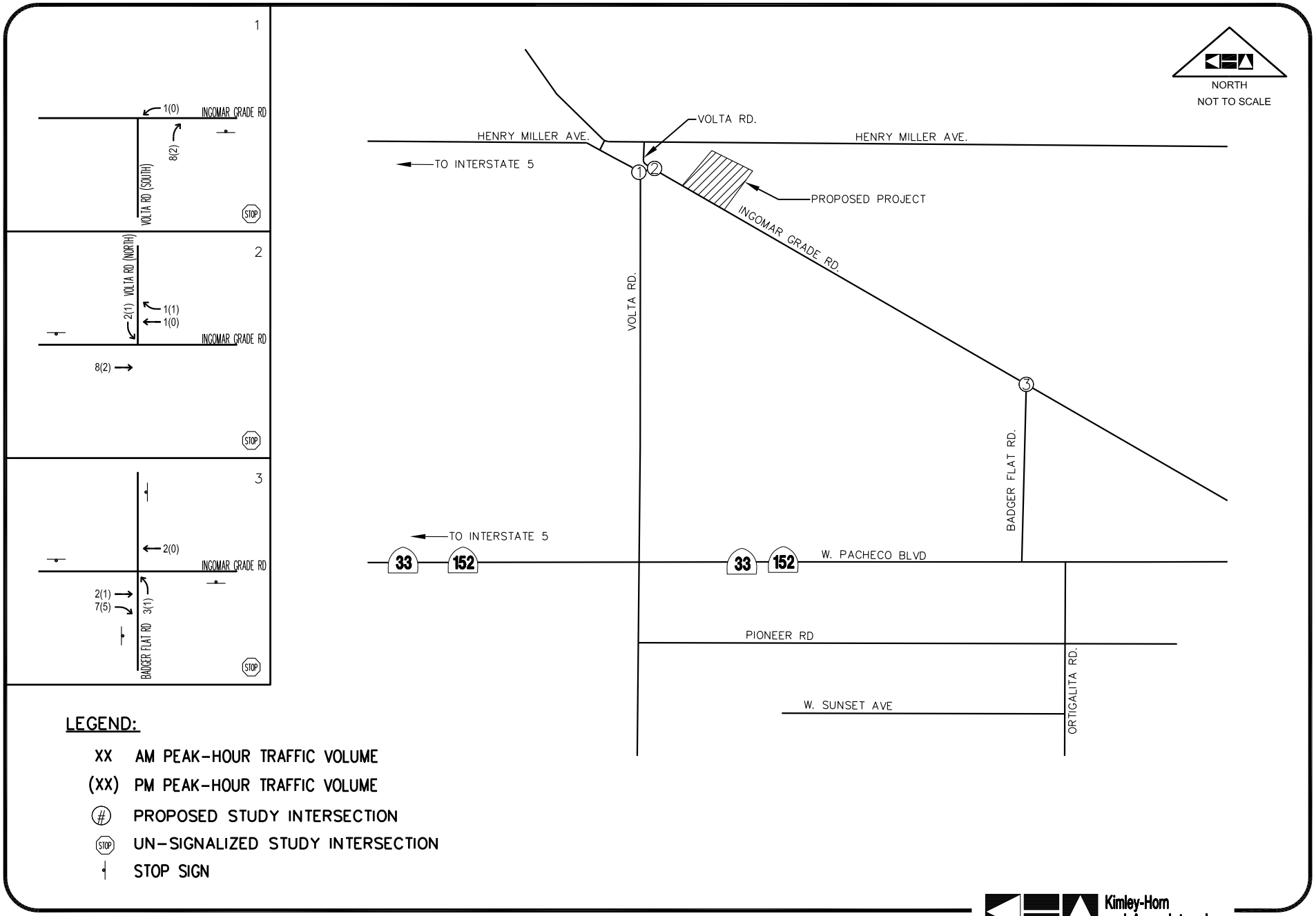


FIGURE 2

PROPOSED PROJECT TRIP DISTRIBUTION

CHAPIN BATCH PLANT

VOLTA, MERCED COUNTY, CA



LEGEND:

XX AM PEAK-HOUR TRAFFIC VOLUME

(XX) PM PEAK-HOUR TRAFFIC VOLUME

(#) PROPOSED STUDY INTERSECTION

(STOP) UN-SIGNALIZED STUDY INTERSECTION

STOP SIGN

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FIGURE 3

PROPOSED PROJECT TRIP ASSIGNMENT

CHAPIN BATCH PLANT

VOLTA, MERCED COUNTY, CA

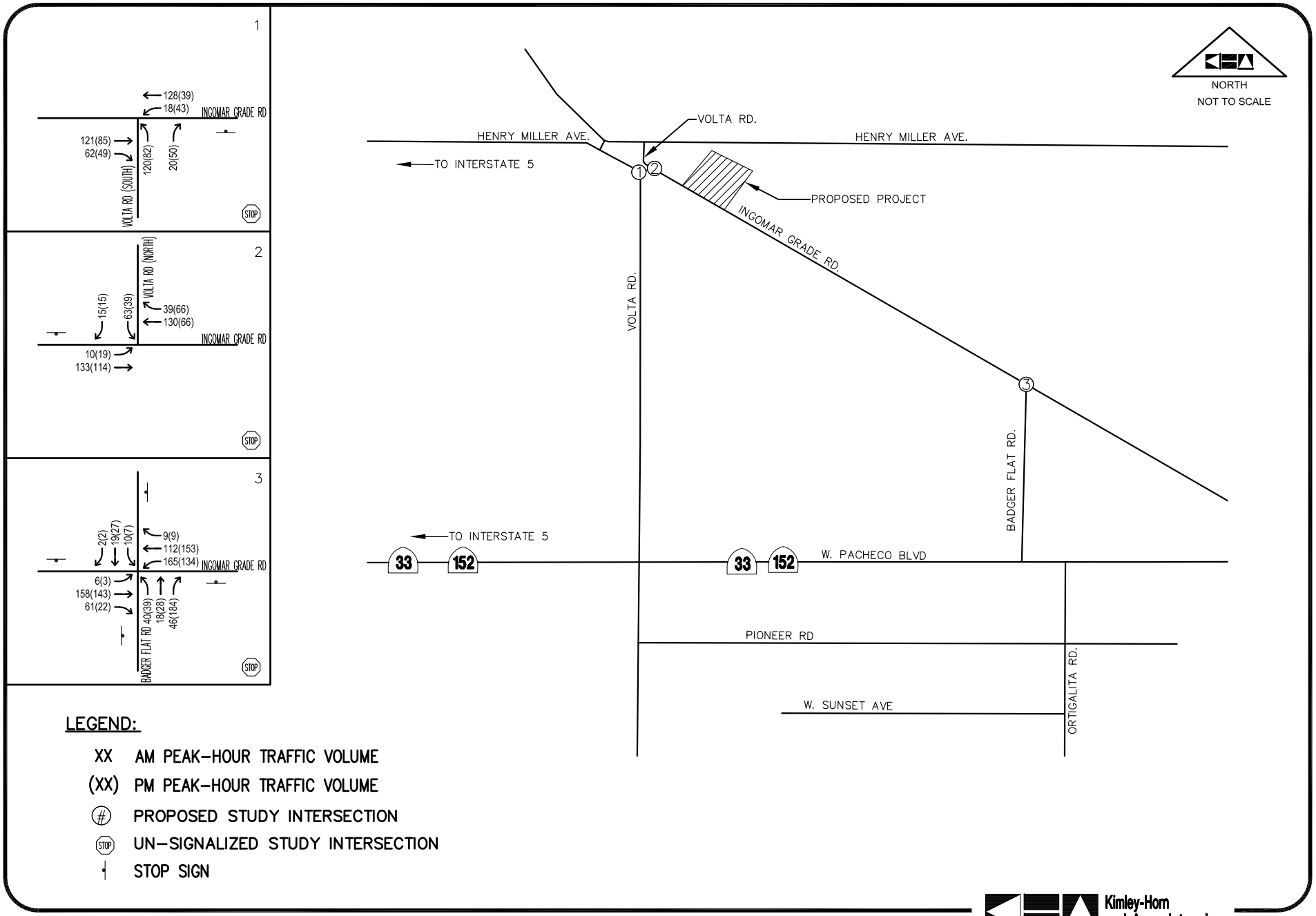

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FIGURE 4

OPENING DAY (2010) PEAK-HOUR TRAFFIC VOLUMES

CHAPIN BATCH PLANT

VOLTA, MERCED COUNTY, CA

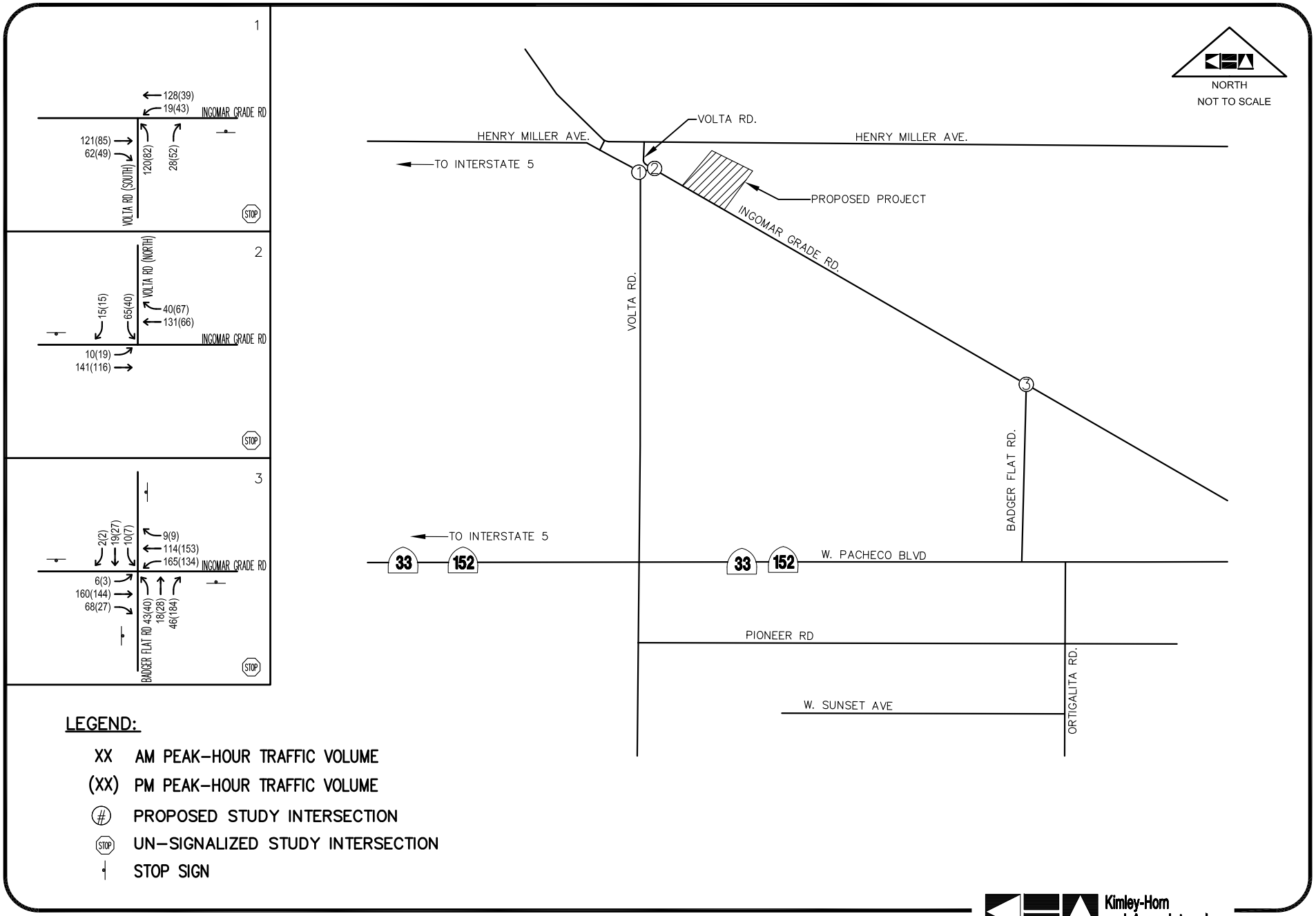

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FIGURE 5

OPENING DAY (2010) PLUS PROPOSED PROJECT PEAK-HOUR TRAFFIC VOLUMES

CHAPIN BATCH PLANT
VOLTA, MERCED COUNTY, CA