ATTACHMENT F
FUTURE CONDITIONS TRAFFIC MODEL RESULTS TECHNICAL MEMORANDUM

ATTACHMENT F

Date: January 27, 2014

To: Caltrain Electrification EIR Project Team

From: Katie Leung and Matt Haynes, Fehr & Peers

Subject: Future Conditions Process and Results

SJ13-1440

Introduction

This memorandum describes the methodology and results of an analysis of 82 intersections along the Caltrain line in San Francisco, San Mateo, and Santa Clara Counties under Year 2020 and Year 2040 conditions with and without the proposed Peninsula Corridor Electrification Project (PCEP). Fehr & Peers developed traffic microsimulation models to analyze the environmental impacts of the proposed project. Most of the intersections (64) were modeled using the Synchro/SimTraffic software package. The remaining 18 intersections were modeled using the VISSIM software package. The process consisted of the following key steps:

- Future Volume Forecast
- Future Caltrain Gate Down Times
- Model Development
- Model Analysis

Future traffic volumes, train frequencies, and crossing times served as inputs for the microsimulation models under future conditions. The remainder of this memorandum describes these steps in more detail and provides the results of the analysis.

Future Volumes Forecast

Vehicle Volumes

Fehr & Peers forecasted AM and PM peak hour vehicular turning movement volumes at the study intersections. The forecasts were completed using the Valley Transportation Authority (VTA)

model. Additional adjustments were made based on the results of the Fehr & Peers' Direct Ridership model (DRM). The DRM fine-tunes the ridership estimates produced by the VTA model for station-level detail. Recalibration of the number of individuals accessing Caltrain stations via park-and-ride and kiss-and-ride were reflected in the turning movement forecasts.

Existing and future AM and PM peak hour turning movement volumes are shown in Figures 1-5 appended to the end of this memorandum.

Pedestrian and Bicycle Volumes

Future pedestrian and bicycle volumes around Caltrain stations were developed from the DRM. The DRM provides estimates for the number of riders accessing and egressing Caltrain stations by walking and biking. Using these volumes, an approximate pedestrian and bike growth factor was estimated around each Caltrain station for both the no project and project scenarios. Bicycle volumes were not modeled in SimTraffic.

Future Caltrain Gate Down Times

For VISSIM intersections, railroad crossing preemption and gate down events were triggered using data from the prototypical 2020 and 2040 schedules. For SimTraffic intersections, railroad crossing preemption and gate down events were triggered using random arrivals that approximated the prototypical schedules.

For the 2020 and 2040 scenarios, the average single-train gate down time per event was calculated and inputted into the models. The average was calculated over the vehicular peak hour for the study intersections at or near each grade crossing. The AM vehicular peak hour of travel is the greatest 60 minute period of vehicular traffic from 7:00-9:00 AM. The PM vehicular peak hour of travel is the greatest 60 minute period of vehicular traffic from 4:00-6:00 PM. Only single-train events were used to calculate the average. Since VISSIM models have a higher level of detail and allow for the input of the actual train schedule, the VISSIM models can more exactly replicate 2-for-1 events.[1] While SimTraffic models do not allow for the input of the actual train schedule, these models are capable of estimating 2-for-1 events by using random train arrivals that approximate the train schedule.

[1] A 2-for-1 event is when two trains traveling in opposite directions (one southbound and one northbound) pass through an at-grade crossing at the same time, triggering a joint gate down-time event.

Future Conditions Model Development

The development of VISSIM and SimTraffic models under Existing Conditions is described in the Existing Conditions Memorandum. These models were also used for 2020 and 2040 No Project Conditions with adjustments made for:

- Future vehicle, pedestrian, and bicyclist volumes
- Optimized intersection signal timing
- Future train frequency, pre-emption times, and crossing times when applicable

The 2020 and 2040 No Project models were then used for the 2020 and 2040 Plus Project Conditions models with adjustments made for:

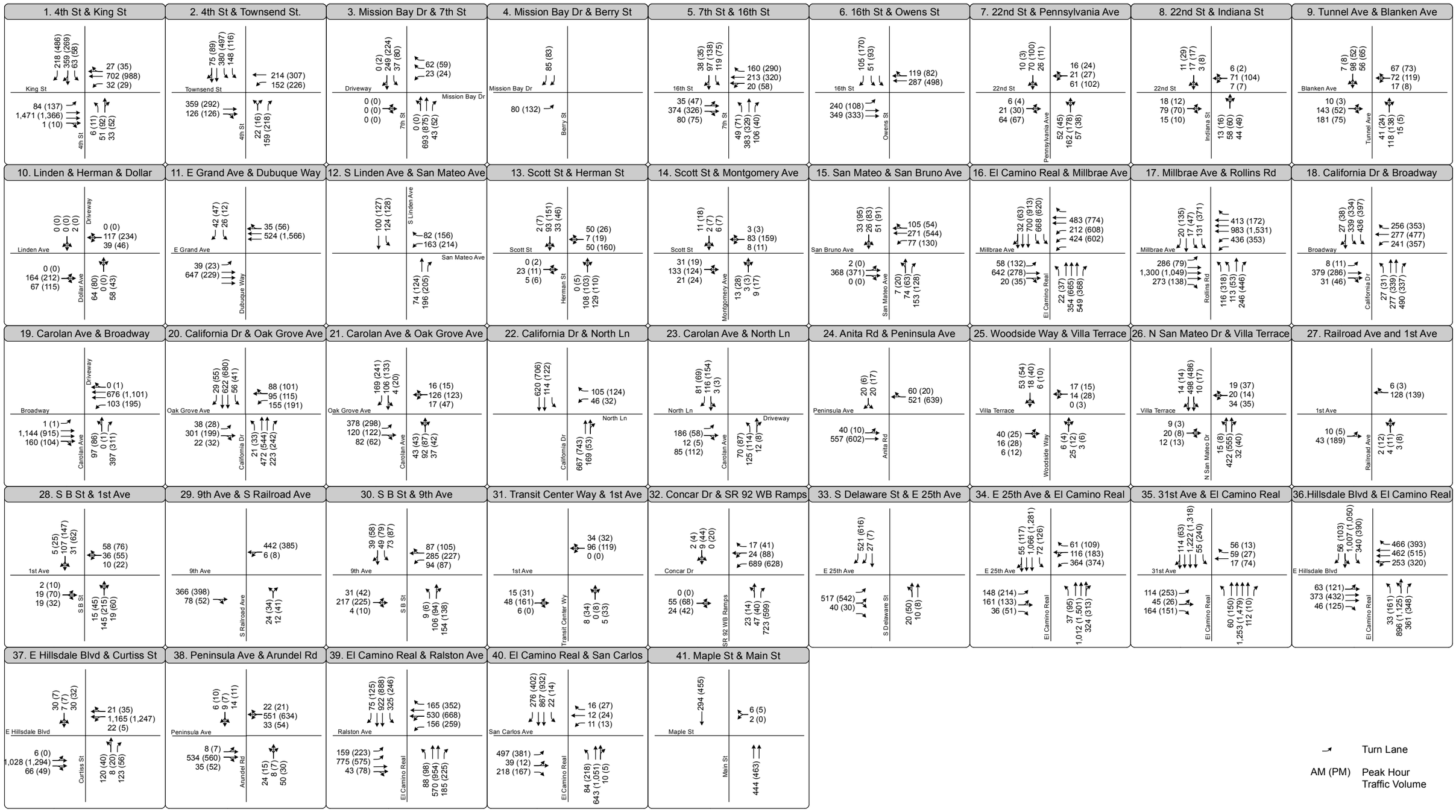
- Future vehicle, pedestrian, and bicyclist volumes *with* the Project
- Future train frequency, pre-emption times, and crossing times *with* the Project, when applicable

No changes were made to the signal timings from the corresponding year under No Project Conditions, since it was assumed that the signal timings would not change with the addition of the Project.

As described in the *Existing Conditions VISSIM and SimTraffic Models Calibration and Validation* memorandum (Attachment E) these models were used to generate measures of corridor performance such as vehicle and transit average speeds, vehicle hours of delay and other performance measures consistent with the Highway Capacity Manual (HCM) (Transportation Research Board, 2000) such as intersection delay and level of service.

Future Conditions Results

Traffic operations results were determined using the AM and PM peak hour VISSIM and SimTraffic models. Year 2020 No Project and 2020 Project intersection delay and level of service are presented in **Tables 3-25 and 3-26** in the Transportation Impact Analysis.



Appendix Figure 1.A

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - Existing Conditions

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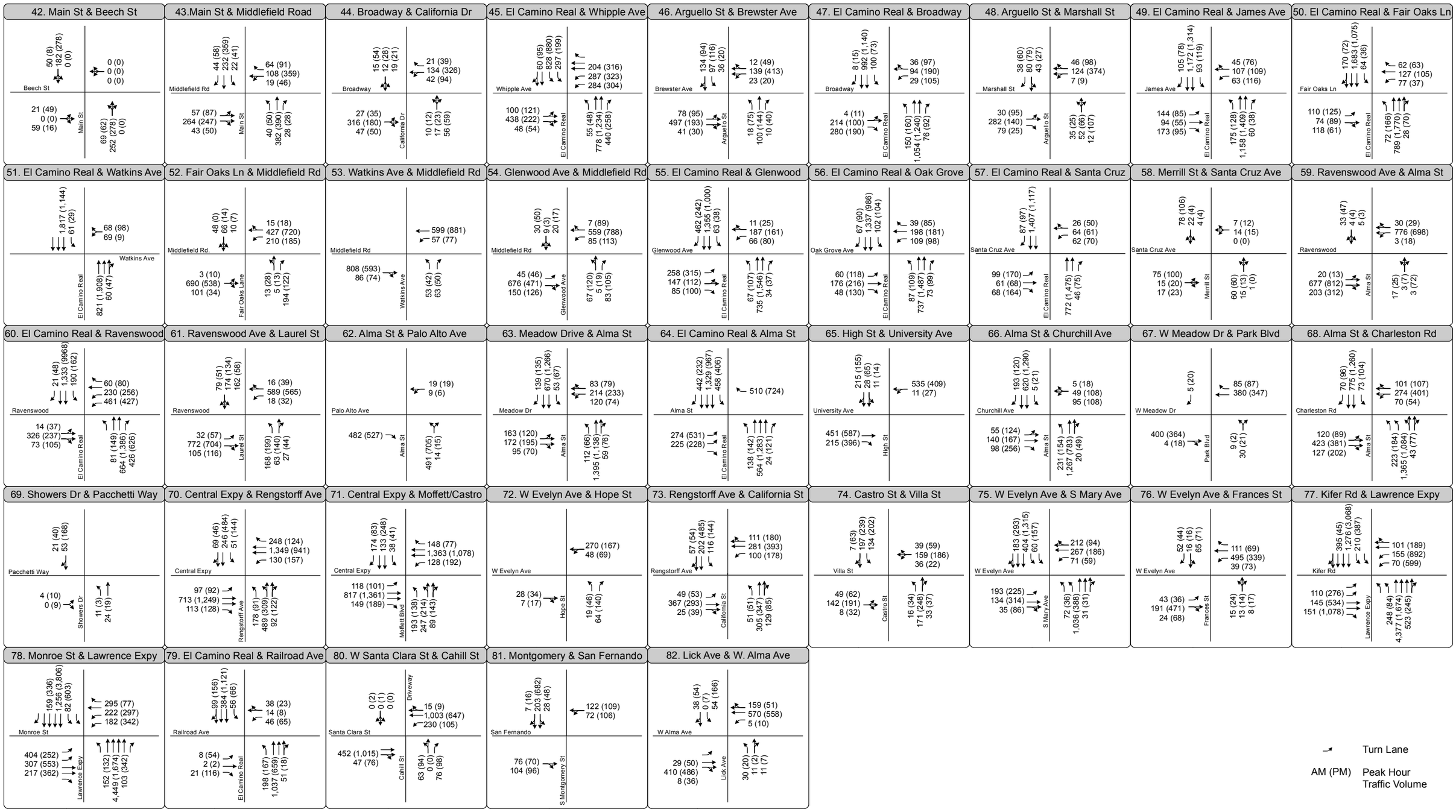

Appendix Figure 1.B

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - Existing Conditions

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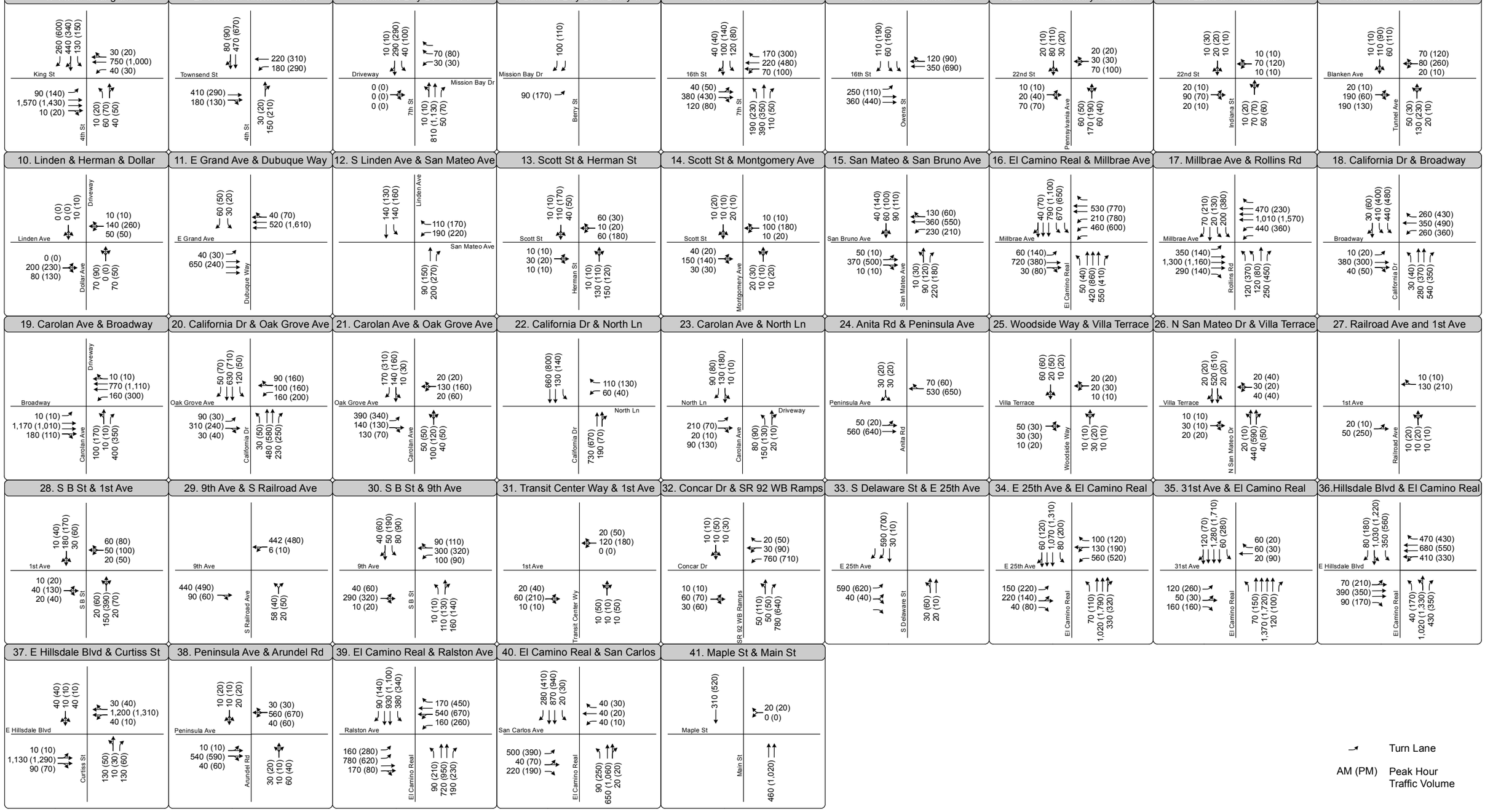

Appendix Figure 2.A

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2020 No Project Alternative

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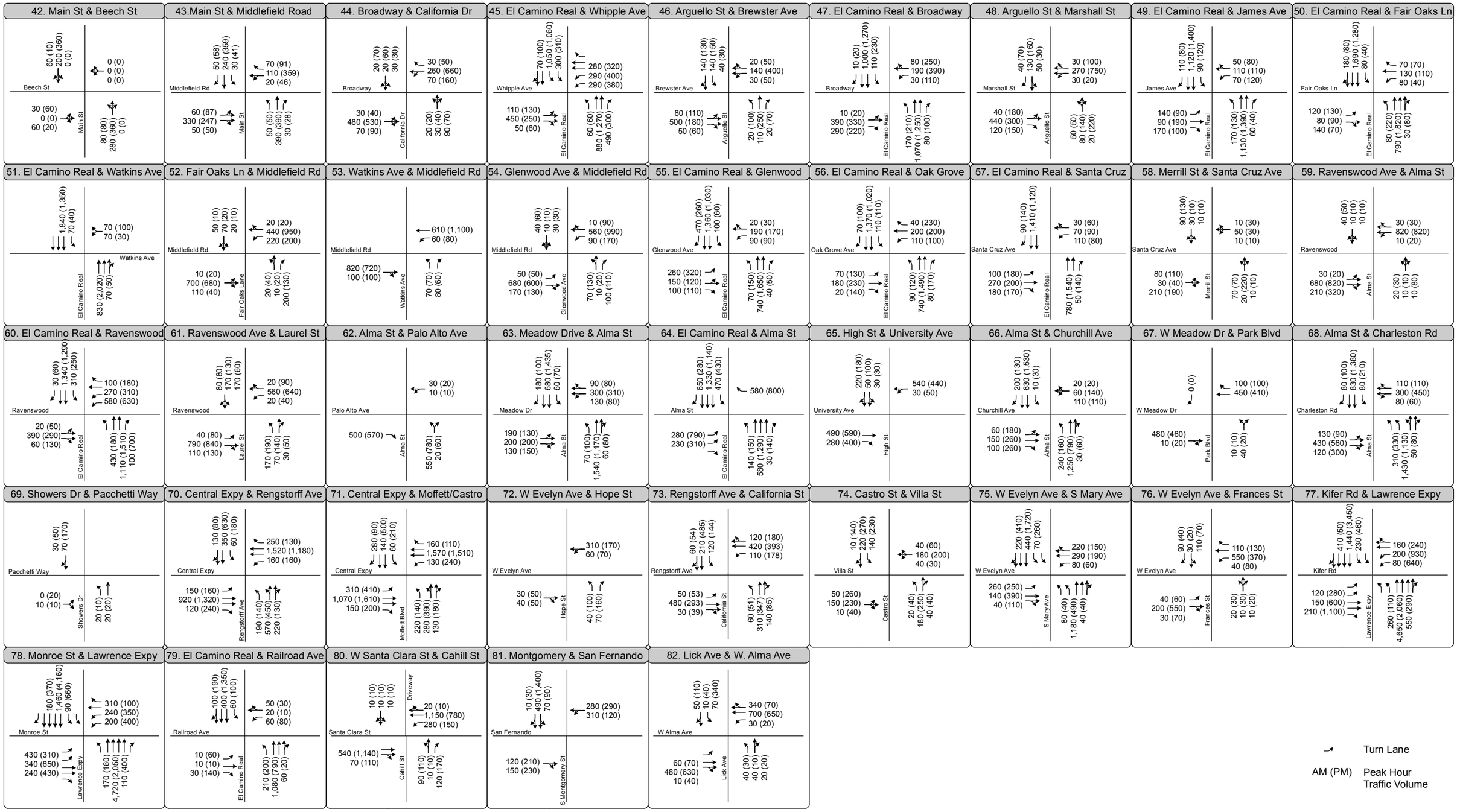

Appendix Figure 2.B

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2020 No Project Alternative

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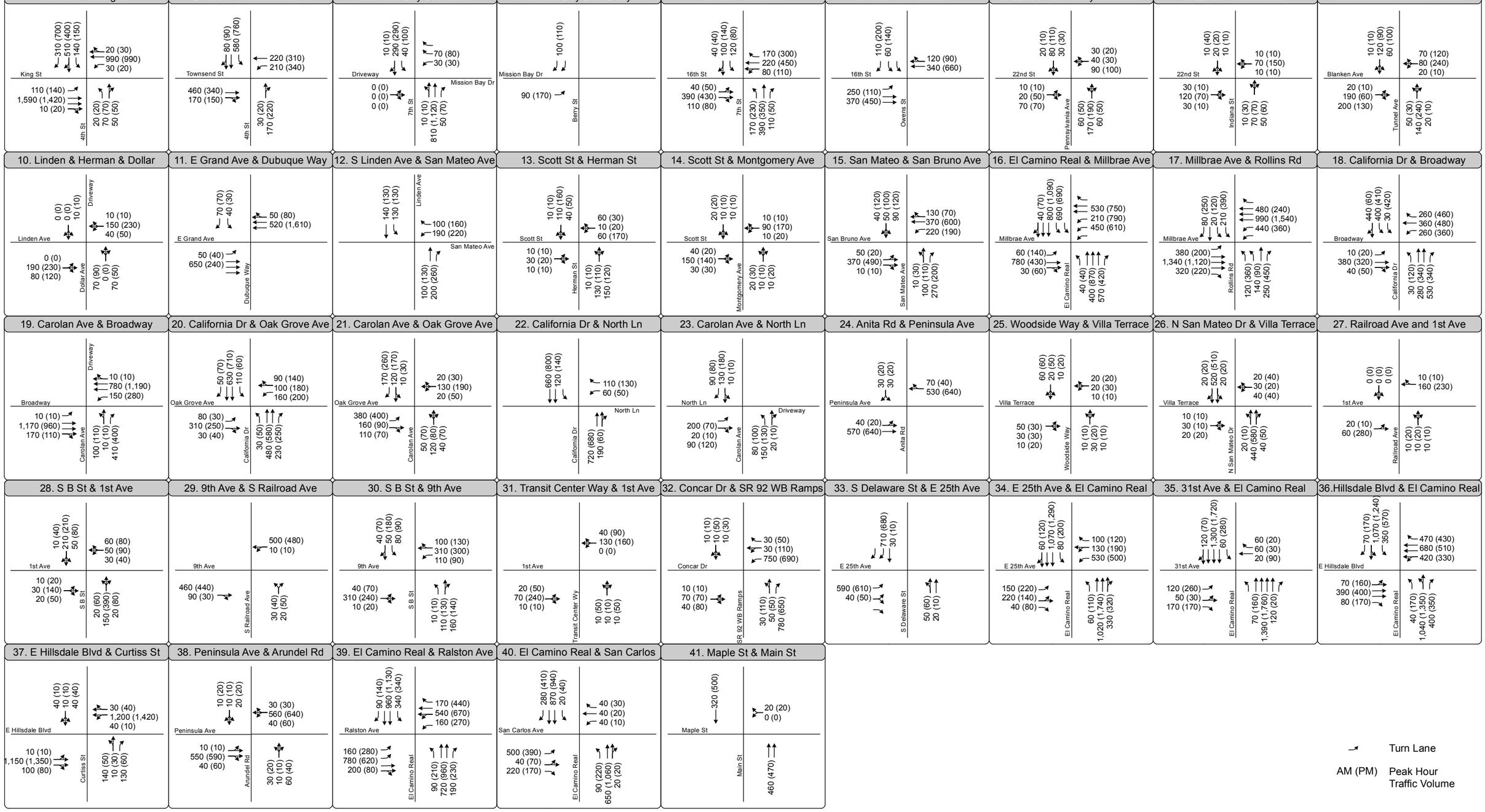

Appendix Figure 3.A

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2020 Project Alternative

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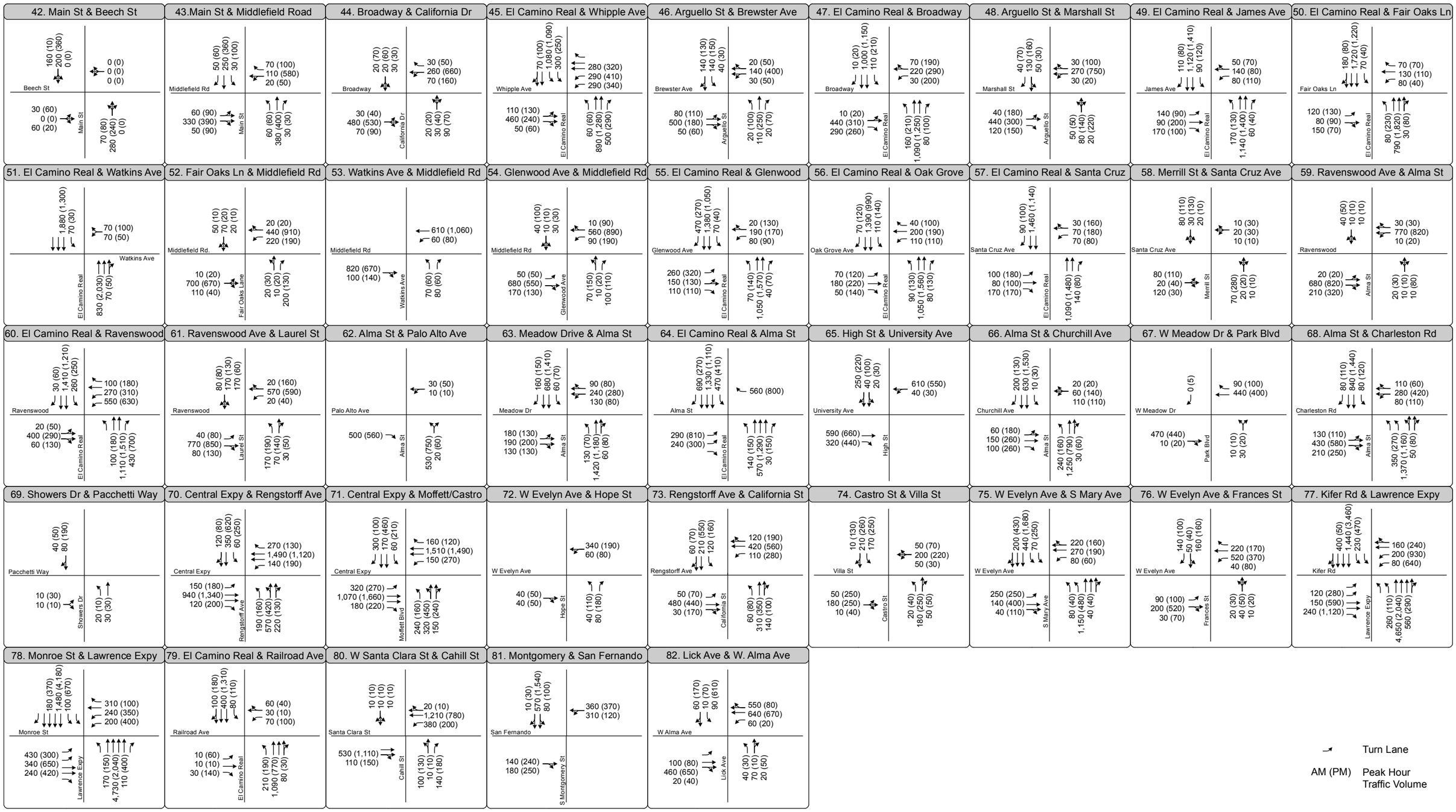

Appendix Figure 3.B

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2020 Project Alternative

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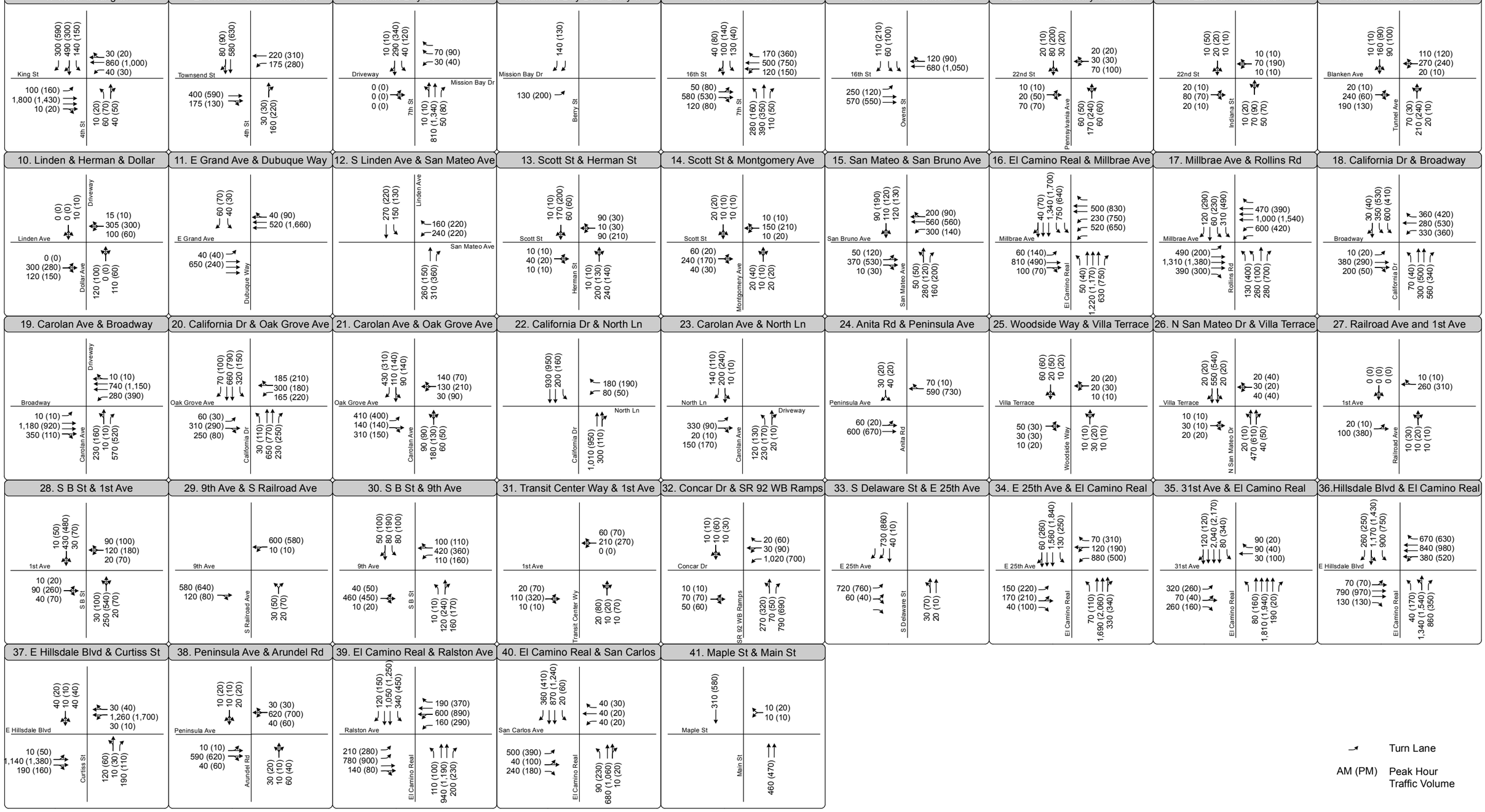

Appendix Figure 4.A

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2040 No Project Alternative

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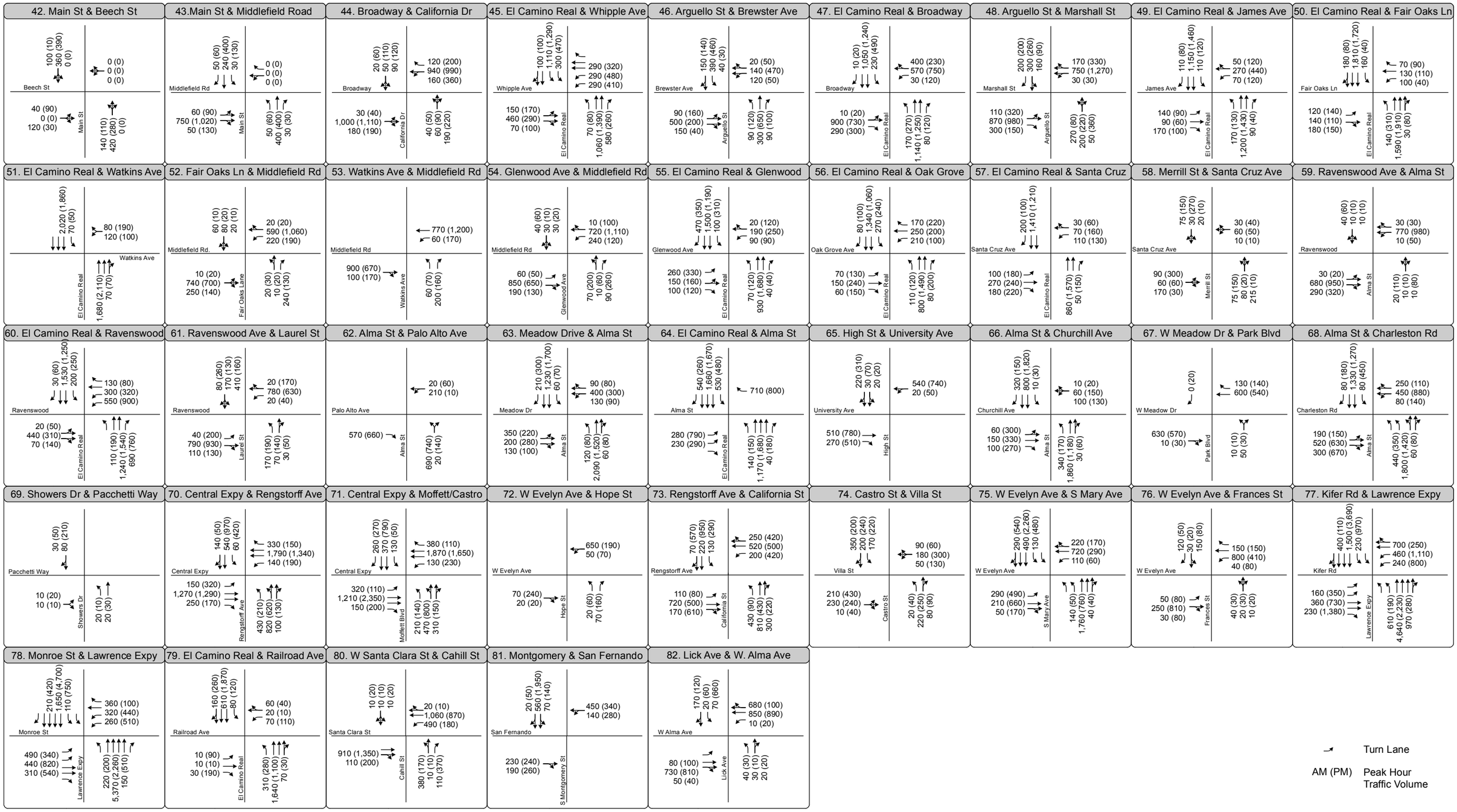

Appendix Figure 4.B

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2040 No Project Alternative

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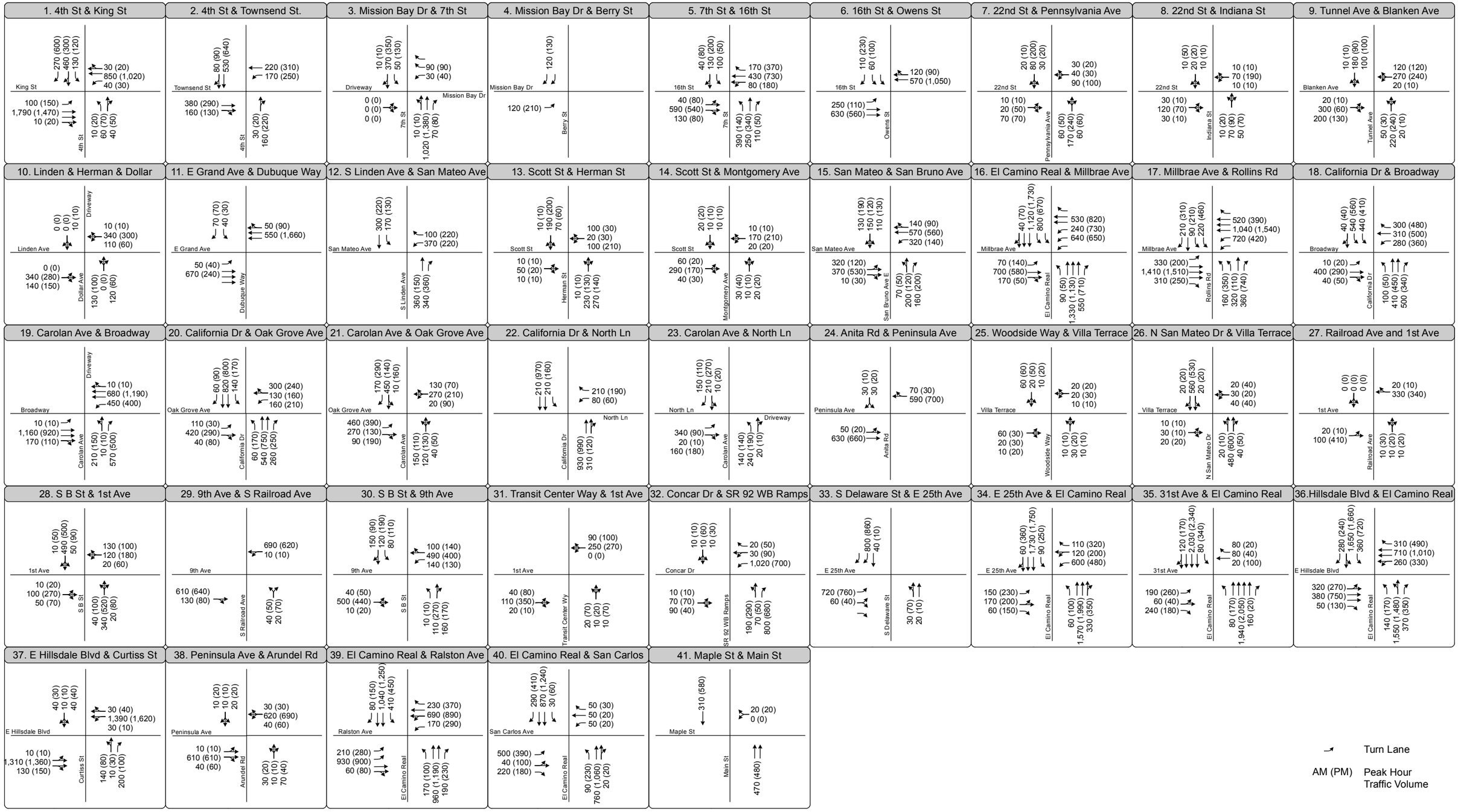

Appendix Figure 5.A

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2040 Project Alternative

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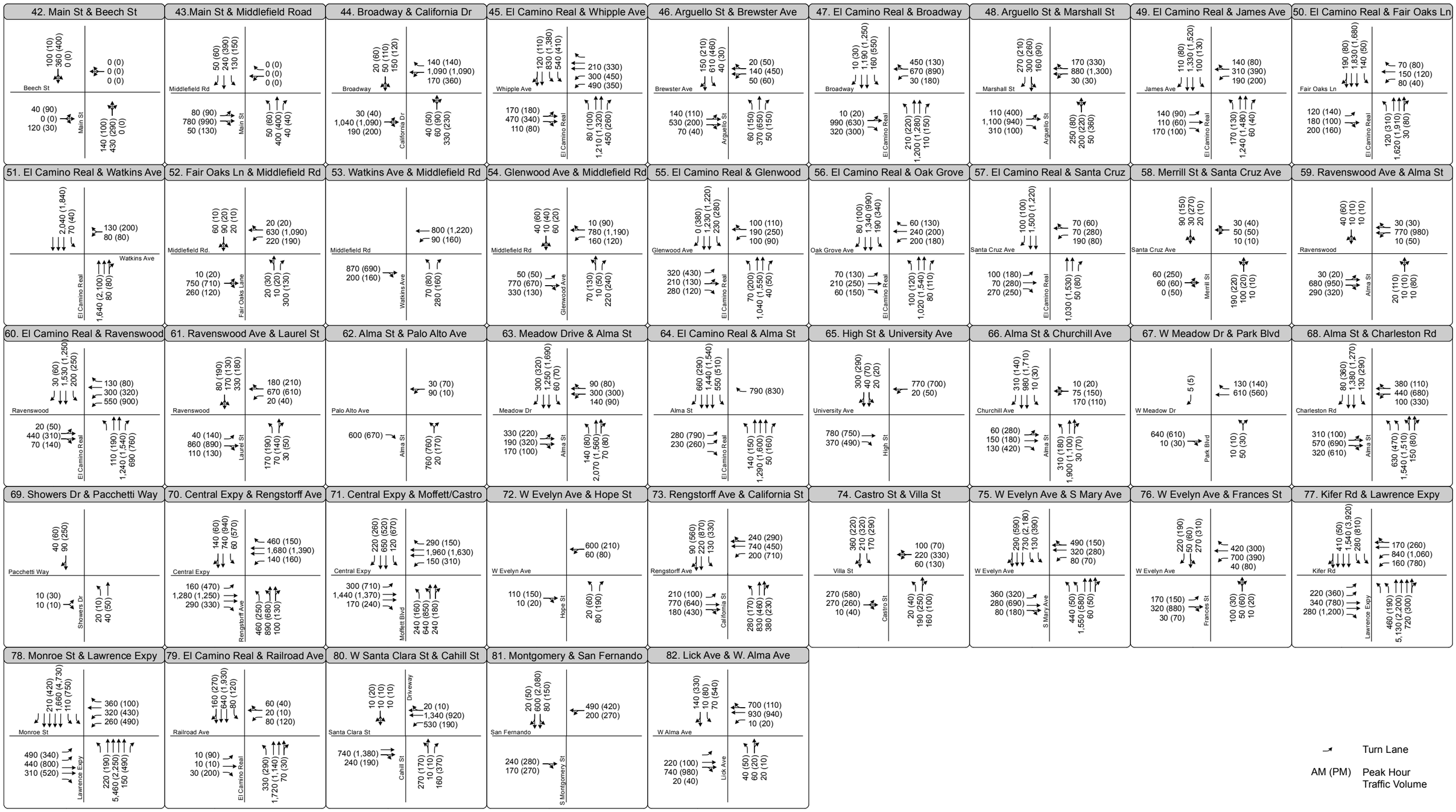

Appendix Figure 5.B

Lane Configurations, Traffic Control, and Peak Hour Traffic Volumes - 2040 Project Alternative

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