

FINAL

**VAN NESS CORRIDOR BUS RAPID TRANSIT
TRAFFIC ANALYSIS**

**VEHICULAR TRAFFIC ANALYSIS
TECHNICAL MEMORANDUM**

Prepared for:
San Francisco County Transportation Authority

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TABLE OF CONTENTS

1.0 TRAFFIC ANALYSIS AND EVALUATION METHODOLOGY.....1

1.1 TRAFFIC STUDY AREA.....1

1.2 TRAFFIC ANALYSIS SCENARIOS1

1.3 TRANSPORTATION ANALYSIS METHODOLOGY4

1.4 MEASURES OF EFFECTIVENESS.....8

1.5 METHODOLOGY TO DEVELOP SYNCHRO MODELS FOR TRAFFIC EVALUATION9

2.0 EXISTING CONDITIONS.....14

2.1 ROADWAY TRAFFIC VOLUMES.....14

2.2 EXISTING CONDITION SYNCHRO MODEL DEVELOPMENT AND CALIBRATION15

2.3 VEHICULAR TRAVEL SPEED18

2.4 PM PEAK HOUR INTERSECTION LEVELS OF SERVICE19

3.0 FUTURE YEAR TRAFFIC CONDITIONS AND IMPACTS21

3.1 SIGNIFICANCE CRITERIA22

3.1.1 *Project-Specific Impacts*.....22

3.1.2 *Cumulative Impacts*23

3.2 NEAR-TERM (2015).....24

3.2.1 *2015 Alternative 1: No Build (Baseline Alternative)*.....24

3.2.1.1 Vehicular Travel Speed.....27

3.2.1.2 PM Peak Hour Intersection Levels of Services28

3.2.2 *2015 Build Alternatives*30

3.2.2.1 Travel Speed: 2015 Build Alternatives31

3.2.2.2 Traffic Impacts: 2015 Build Alternative32

3.2.2.2.1 2015 Near-Term Build Alternative 2: Side Lane BRT with Street Parking.....33

3.2.2.2.2 2015 Near-Term Build Alternatives 3 and 4: Center Lane BRT Configuration.....37

3.2.2.2.3 2015 Near-Term Build Alternatives 3 and 4: Design Option B: Center Lane BRT Configuration with Design Option B42

3.2.2.2.4 2015 Near-Term Horizon Locally Preferred Alternative (LPA).....46

3.3 LONG-TERM HORIZON YEAR (2035).....50

3.3.1 *2035 Alternative 1: No Build (Baseline Alternative)*.....50

3.3.1.1 Vehicular Travel Speed.....52

3.3.1.2 PM Peak Intersection Levels of Service.....52

3.3.2 *2035 Horizon Year Build Alternatives*55

3.3.2.1 Travel Speed: Build Alternatives55

3.3.2.2 Traffic Impacts: 2035 Build Alternatives.....57

3.3.2.2.1 2035 Long-Term Build Alternative 2: Side Lane BRT with Street Parking57

3.3.2.2.2 2035 Long-Term Build Alternatives 3 and 4: Center Lane BRT Configuration.....63

3.3.2.2.3 2035 Long-Term Build Alternatives 3 and 4 with Design Option B: Center Lane BRT with Design Option B Configuration69

3.3.2.2.4 2035 Long-Term Horizon Year Locally Preferred Alternative (LPA).....75

3.4 SUMMARY OF VEHICULAR TRAFFIC IMPACTS82

4.0 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES84

4.1 NEAR-TERM (2015) BUILD ALTERNATIVES85

4.1.1 *2015 Near-Term Build Alternative 2: Side-Lane BRT with Street Parking*85

4.1.2 *2015 Near-Term Build Alternatives 3 and 4: Center-Lane BRT*.....86

4.1.3 *Year 2015 Near-Term Build Alternatives 3 and 4 with Design Option B and the LPA: Center-Lane BRT* 86

4.2 LONG-TERM (2035) BUILD ALTERNATIVES87

4.2.1 *2035 Long-Term Horizon Year Build Alternative 2: Side-Lane BRT with Street Parking*88

4.2.2 *2035 Long-Term Horizon Year Build Alternatives 3 and 4: Center-Lane BRT*.....89

4.2.3 *2035 Long-Term Horizon Year Build Alternatives 3 and 4 with Design Option B and the LPA: Center-Lane BRT*.....90

4.3 TRAFFIC MANAGEMENT “TOOLBOX”92



TABLES

Table 1 – Comparison of SF County Land Use Projections Based on ABAG 20077

Table 2 – Van Ness Avenue Northbound Left-Turn Opportunity – Future Scenarios 12

Table 3 – Van Ness Avenue Southbound Left-Turn Opportunity – Future Scenarios 12

Table 4 – Existing (2007) Traffic Counts – Average Weekday, Saturday and Sunday Daily, AM and PM Peak Hour Traffic Link Volumes.....14

Table 5 – Existing Conditions Travel Time Validation.....18

Table 6 – Queue Length Validation.....18

Table 7 – Average Speed – 2007 Existing Condition.....19

Table 8 – Near-Term (2015) Average Annual Traffic Growth Factors – No Build Alternative26

Table 9 – 2015 No Build Southbound Average Speed27

Table 10 – 2015 No Build Northbound Average Speed27

Table 11 – 2007 Existing Condition and 2015 No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F28

Table 12 – 2015 Southbound Average Speed.....32

Table 13 – 2015 Northbound Average Speed.....32

Table 14 – Near-Term (2015) Change in Traffic Volumes – From 2015 No Build to 2015 Build Alternative 2.....34

Table 15 –No Build to 2015 Build Alternative 2 (Side Lane BRT) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F.....35

Table 16 – Near-Term (2015) Change in Traffic Volumes – From 2015 No Build to 2015 Build Alternative 2.....38

Table 17 – No Build to 2015 Build Alternatives 3 and 4 (Center Lane BRT) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F.....39

Table 18 – No Build to 2015 Build Alternatives 3 and 4 (Center Lane BRT) with Design Option B Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F.....43

Table 19 – No Build to 2015 Locally Preferred Alternative (LPA) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F.....47

Table 20 – Long-Term (2035) Average Annual Traffic Growth Factors – No Build Alternative.....51

Table 21 – 2035 No Build Southbound Average Speed52

Table 22 – 2035 No Build Northbound Average Speed52

Table 23 – 2007 Existing Condition and 2035 No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F53

Table 24 – 2015 Southbound Average Speed.....56

Table 25 – 2015 Northbound Average Speed.....56

Table 26 – Long-Term (2035) Change in Traffic Volumes – From 2035 No Build to 2035 Build Alternative 2.....59

Table 27 – 2035 Build Alternative 2 (Side Lane BRT) and No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F60

Table 28 – Long-Term (2035) Change in Traffic Volumes – From 2035 No Build to 2035 Build Alternatives 3 and 464

Table 29 – 2035 Build Alternatives 3 and 4 (Center Lane BRT) and No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F.....65

Table 30 – 2035 Build Alternatives 3 and 4 (Center Lane BRT) with Design Option B and No Build Intersection
LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F70

Table 31 – 2035 Locally Preferred Alternative (LPA) Intersection LOS (Delay), and Critical V/C Ratio for
Intersections that Operate at LOS E or F77

Table 32 - Summary of Vehicular Traffic Impacts83



FIGURES

Figure 1 – Street Network in the Proposed VN BRT Project Traffic Study Area3

Figure 2 – Three Step Modeling Approach4

Figure 3 – Intersection Turning Movement Count Locations.....17

Figure 4 – 2007 Existing PM Park Hour Intersection LOS20

Figure 5 – Hayes Street and Fell Street Two-Way Conversion25

Figure 6 – Near-Term (2015) Alternative 1 Intersection LOS29

Figure 7 – Near-Term (2015) Build Alternative 2 Intersection LOS.....36

Figure 8 – Near-Term (2015) Build Alternatives 3 and 4 Intersection LOS41

Figure 9 – Near-Term (2015) Build Alternatives 3 and 4 with Design Option B Intersection LOS45

Figure 10 – Near-Term (2015) Locally Preferred Alternative (LPA) Intersection LOS49

Figure 11 – Long-Term (2035) No Build Intersection LOS54

Figure 12 – Long-Term (2035) Build Alternative 2 Intersection LOS61

Figure 13 – Long-Term (2035) Build Alternatives 3 and 4 Intersection LOS.....68

Figure 14 – Long-Term (2035) Alternatives 3 and 4 with Design Option B Intersection LOS.....74

Figure 15 – Long-Term (2035) Locally Preferred Alternative (LPA) Intersection LOS.....81

APPENDICES

- Appendix 1: SF-CHAMP Validation Report
- Appendix 2: Land Use Inputs to SF-CHAMP model
- Appendix 3: Cross Transit Delay and Travel Time Reduction Proposals
- Appendix 4: VISSIM Data Portfolio and VISSIM Outputs for All Scenarios
- Appendix 5: Diversion Analysis
- Appendix 6: Build Alternative 2 and 3 with Design Option B Diversions
- Appendix 7: Vehicular Traffic Volume Balancing Memorandum
- Appendix 8: Existing Condition Turning Movement Counts and Pedestrians Counts
- Appendix 9: Comparison of Existing Condition Counts and Synchro Volumes
- Appendix 10: Synchro Model Inputs and Outputs for All Scenarios
- Appendix 11: LOS Comparison for All Scenarios
- Appendix 12: Signal Warrant Analysis and Significant Impact Calculations
- Appendix 13: Mitigations – Synchro Model Inputs and Outputs
- Appendix 14: Local Preferred Alternative (LPA) Comparison Memorandum
- Appendix 15: Pedestrian Volume Sensitivity Analysis
- Appendix 16: Change in Vehicular Traffic Volumes: North-South Streets



This technical memorandum presents detailed methodologies and assumptions used for the technical analyses. It also presents study findings and proposed mitigation measures that could mitigate significant traffic impacts, and presents avoidance and minimization measures that would reduce less-than-significant traffic impacts. Please note that in this section “traffic” refers to automobile and truck traffic only unless otherwise explicitly stated.

1.0 TRAFFIC ANALYSIS AND EVALUATION METHODOLOGY

1.1 Traffic Study Area

The Van Ness Avenue BRT (VN BRT) Project traffic study (Figure 1) includes six north-south streets that would most likely be affected by the VN BRT Project: Van Ness Avenue, Franklin Street, and Gough Street from Mission Street to Lombard Street; Polk Street from Market Street to Pacific Street; Larkin Street from Market Street to California Street; and Hyde Street from Market Street to Pine Street. This traffic study area was selected based on the likelihood of intersections and roadways that may be negatively impacted by the VN BRT Project. Since the provision of exclusive bus lanes along Van Ness Avenue would cause traffic diversion from Van Ness Avenue to other parallel streets in the immediate vicinity of Van Ness Avenue, the traffic analysis study area includes two parallel major arterial roads on the west side of Van Ness Avenue and three parallel roads on the east side of Van Ness Avenue. The section of Polk Street, Larkin Street and Hyde Street north of California Street were excluded from the traffic analysis because these streets are not desirable for traffic diversions: these streets are mostly residential in character, narrower, and with numerous stops signs.

1.2 Traffic Analysis Scenarios

VN BRT Project traffic operations analyses were performed for the existing conditions and future year (2015 and 2035) No-Build Alternative and three build alternatives and the Locally Preferred Alternative (LPA). These BRT build alternatives include: Build Alternative 2 (Side-Lane BRT with Street Parking), Build Alternative 3 (Center-Lane BRT with Right-Side Boarding and Dual Medians), and Build Alternative 4 (Center-Lane BRT with Left-Side Boarding and Single Medians), and the LPA. Build Alternatives 3 and 4 would have same the volumes, and thus the same vehicular traffic operation. Both Build Alternatives 3 and 4 have a design variation, Design Option B. The Locally Preferred Alternative (LPA) is a refinement of the two center-running build alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B).

For the purpose of the traffic operations analysis, the following scenarios were modeled:

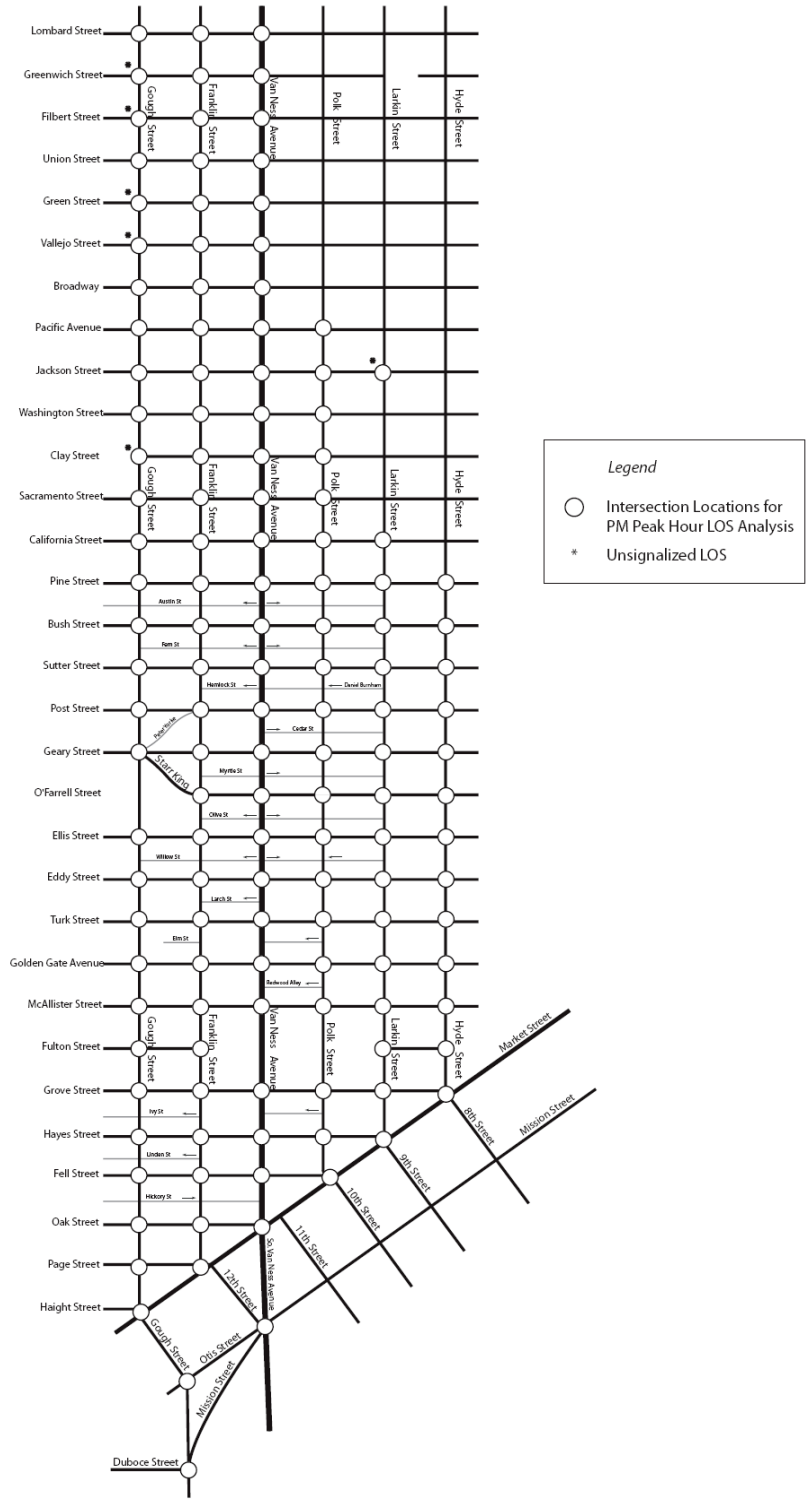
- 2007 Existing Conditions
- 2015 Near-Term Alternative 1: No Build Alternative
- 2015 Near-Term Build Alternative 2: Side Lane BRT with Street Parking
- 2015 Near-Term Build Alternatives 3 and 4: Center Lane BRT Configuration
- 2015 Near-Term Build Alternatives 3 and 4 with Design Option B: Center Lane BRT Configuration with Design Option B
- 2015 Locally Preferred Alternative
- 2035 Long-Term Alternative 1: No Build
- 2035 Long-Term Build Alternative 2: Side Lane BRT with Street Parking
- 2035 Long-Term Build Alternatives 3 and 4: Center Lane BRT Configuration



- 2035 Long-Term Build Alternatives 3 and 4: with Design Option B: Center Lane BRT Configuration with Design Option B
- 2035 Locally Preferred Alternative



Figure 1 – Street Network in the Proposed VN BRT Project Traffic Study Area



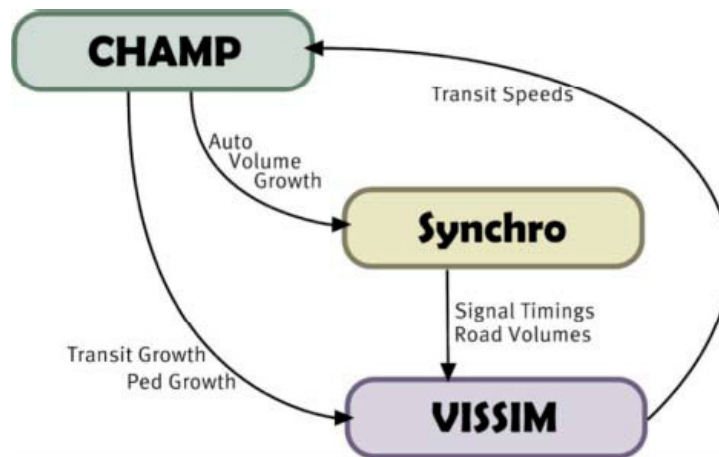
1.3 Transportation Analysis Methodology

Three-Step Modeling Approach

Three primary models were used for the traffic analyses (Figure 2):

- San Francisco’s Countywide Travel Demand Forecasting model (SF-CHAMP) for travel demand forecasts;
- Synchro traffic operations model for traffic operations analysis;
- VISSIM micro-simulation model for transit analysis;

Figure 2 – Three Step Modeling Approach



SF-CHAMP Model

The San Francisco County Transportation Authority’s travel demand forecasting model, the San Francisco Chained Activity Modeling Process (SF-CHAMP), is the official travel forecasting tool for San Francisco. SF-CHAMP is a computer-based tool that can be used to assess the impacts of land use, socioeconomic, and transportation system changes on the performance of the local transportation system. SFCHAMP was developed to reflect San Francisco’s unique transportation system and socioeconomic and land use characteristics. The relationships and parameters in SF-CHAMP were statistically estimated from San Francisco residents’ observed travel patterns and then tested to make sure the model matched observed transit line boardings, roadway volumes, and numbers of vehicles. For each modeled scenario, a detailed representation of San Francisco’s transportation system is used, as well as population and employment characteristics, to produce measures relevant to transportation and land use planning. Using future year transportation, land use, and socioeconomic inputs, the model forecasts future travel demand.

The SF-CHAMP Model incorporates a state-of-the-art approach to forecasting travel demand called “tour,” or “activity-based travel demand modeling.”¹ This activity-based model is more sensitive than

¹ Activity models are tour-based models. A tour is a chain of trips made by an individual that begins and ends at home without any intermediate stops at home. An activity-based model is more sensitive than traditional four-step models to a broader array of conditions that influence

traditional four-step models to a broader array of conditions that influence travelers' choices. The federal government, as part of the Travel Model Improvement Program (TMIP) and the Second Strategic Highway Research Program (SHRP2) administered by the Transportation Research Board, has recently invested a great deal of resources to get as many metropolitan areas as possible to adopt this state-of-the-art approach (see tmiponline.org, TRB Special Report 288, and SHRP2 C10 and C46 scope of work).

SF-CHAMP has been reviewed by local, regional, and federal agencies, published in numerous peer reviewed transportation and modeling journals, and has been approved for use on federal projects by the MTC as part of their bi-annual model consistency process. SF-CHAMP is commonly used by multiple San Francisco agencies, including the SFMTA and the Planning Department's Environmental Planning section for the travel demand forecasting component of transportation impact analyses. More information on the SF-CHAMP model can be found at www.sfcta.org/modeling, and a validation report can be found in Appendix 1

For purposes of this project, SF-CHAMP incorporated projected land use growth for both the 2015 and 2035 scenarios as inputs, using ABAG 2007 projections which were used in the most recently adopted Regional Transportation Plan (RTP) (Transportation 2035) for which an EIR was prepared.

travelers' choices. A traditional four-step model is trip-based where a trip is a single movement from an origin to a destination. As such, an activity model structure is more complex than the traditional four-step modeling approach.

Table 1 summarizes the ABAG bi-annual forecasts for employment, households, and employed residents inside the City and County of San Francisco based on ABAG 2007 projections. State of California Government Code 65089 states that data bases (i.e., land use inputs) for models such as SF-CHAMP used to determine quantitative impacts of development on the circulation system "...shall be consistent with the data bases used by the regional planning agency [i.e., MTC]". For this reason, land use projections used in the SF-CHAMP model for EIRs led by the San Francisco Planning Department as well as this EIS/EIR are required to use land use projections that are within one percent of regional ABAG projections for population, employed residents, households, and employment. The San Francisco Planning Department takes San Francisco's employment and housing growth provided by ABAG and distributes the growth to better reflect anticipated developments in San Francisco such as the California Pacific Medical Center and the Market and Octavia Area Plan. This methodology has been approved by the MTC such that the project remains federally compliant. See Appendix 2 for details on how the Planning Department allocates future growth in San Francisco. SF-CHAMP also incorporates all anticipated transportation network changes separate from the Van Ness BRT Project in both the 2015 and 2035 scenarios. Between 2005 and 2035, the key changes to the transportation network in San Francisco assumed in the baseline and all of the build alternatives include:

- Two-way circulation on Hayes and Fell by 2015 (see Section 3.2.1, 2015 No Build Alternative for details).
- Central Subway rail project by 2035. This project involves an extension of the T-Third Street light-rail line underground from the SoMa area beneath Fourth Street to Chinatown. For more information on this project, visit www.sfmta.com/cms/mcsp/cspover.htm.
- Geary Boulevard BRT by 2035. This project involves similar improvements as the proposed project for Van Ness Avenue, including a dedicated transit lane, proof of payment/all-door boarding, and Transit Signal Priority (TSP). For more information on the Geary Boulevard BRT, visit www.gearybrt.org.

Table 1 – Comparison of SF County Land Use Projections Based on ABAG 2007

Year	Employment	Households	Employed Residents
2005	553,073	338,920	388,100
2015	636,840	357,810	404,700
2035	832,860	396,310	518,800

SF-CHAMP was used as the primary technical modeling tool to predict changes in travel patterns for private vehicles with the implementation of BRT in both the near term (2015) and horizon year (2035). The SF-CHAMP model takes into account the “attractiveness” (i.e., relative capacity, driving travel time, left turn opportunities, etc.) of streets relative to each other, as well as the relative “attractiveness” of other modes (e.g., cost, travel time, frequency, etc.) when determining the changes in traveler behavior with the implementation of BRT. In other words, Van Ness Avenue would be less attractive to drivers when compared with the No Build Alternative and BRT service on Van Ness Avenue would be slightly more attractive than the 47/49 service under the No Build Alternative. SF-CHAMP does not take into account changes in signal timing (although it does take into account transit travel time improvements through the implementation of TSP) or the nuances of operations such as queuing for specific directional movements (e.g., a right turn at a specific intersection).

For the build alternatives, SF-CHAMP was coded to show one lane of mixed traffic converted to transit only in each direction, representing a reduced capacity of slightly less than 1/3 (the buses would no longer be operating in the mixed traffic lanes). SF-CHAMP was also coded to reflect the BRT benefits that are expected to accrue to 47/49 service. Since SF-CHAMP calculations are based on observed San Francisco traveler behavior in circumstances that reflect changes in streets’ auto capacity or increases in transit performance, the outputs are representative of behavior changes to be expected with the implementation of BRT.

Synchro Model

Synchro is a macro-simulation traffic model developed by Trafficware commonly used by transportation agencies throughout the country to perform traffic operation analysis. Synchro was selected to model vehicular traffic operations for the VN BRT Project because of its ability to model multiple intersections utilizing the same methodology as specified in the Highway Capacity Manual (HCM) 2000, and its ability to optimize and coordinate intersection traffic signal timings along corridors. The key assumptions utilized in developing the Synchro models are as follows:

- Parking maneuvering data along Van Ness Avenue between Duboce Avenue and Clay Street was based on field counts conducted in 2008 by SFCTA. Synchro default values were assumed for all other locations. Parking maneuvers per hour were assumed to be the same as under Existing Conditions for all future scenarios.
- Pedestrian traffic volumes at major Van Ness Avenue intersections between Duboce Avenue and Union Street were based on field counts conducted in 2008 by SFCTA. Synchro default values were assumed for all other locations. Pedestrian traffic volumes for Year 2015 were provided by SFCTA using SF-CHAMP growth factors. These same factors and volumes were used for Year 2035 pedestrian volume inputs². The assumptions for geometry, traffic volumes and signal timings vary for each scenario and are discussed in detail in the later sections of this report.

² A sensitivity analysis looking at the potential increase in pedestrian volumes due to transit ridership was performed to confirm that this would not affect environmental impact findings and can be found in Appendix 15

Synchro model outputs were also used to assess the potential delay to transit vehicles crossing Van Ness Avenue that could result from implementation of the Van Ness Bus Rapid Transit (BRT) project. This analysis is provided in Appendix 3

VISSIM Model

VISSIM is a multi-modal micro-simulation model developed by PTV. VISSIM is capable of simulating transit, automobile, and pedestrian operations, parking operations, and incorporating transit signal priority (TSP) systems. VISSIM was selected to model VN BRT transit operations due to its ability to model bus operations in exclusive bus lanes with TSP, as well as bus dwell time. The VISSIM data portfolio and the VISSIM model outputs for the 2015 PM-peak hour models are provided in Appendix 4.

For the VN BRT Avenue Project, VISSIM models were primarily utilized to compare the relative travel time and speed difference between autos and buses, differences in speeds and delays between the BRT alternatives, and bus reliability. However, only Synchro results were used to assess vehicular traffic impacts based on intersection Levels of Service (LOS) impacts along Van Ness Avenue and the five parallel north-south streets.

1.4 Measures of Effectiveness

For NEPA and CEQA purposes, vehicular traffic impacts of the VN BRT Project are assessed in terms of the concept of intersection Level of Service (LOS). LOS is used to describe how efficiently an intersection operates for automobile and truck traffic. The method used for signalized intersections generally defines LOS in terms of “control delay per vehicle,” which refers to the average time spent by vehicles decelerating, stopping and accelerating at traffic signals. Signalized intersection LOS is affected by traffic volumes, conflicting pedestrian volumes, intersection lane configuration, and signal timing and coordination in a corridor. Unsignalized intersection LOS is defined in terms of average delay experienced per vehicle along the stop controlled approach(es) at the intersection. According to the Highway Capacity Manual 2000, Intersection LOS designations range from “A,” which indicates negligible delays with free flow speed (less than 10 seconds per vehicle for both signalized and unsignalized intersections) to “F,” which indicates delays with queuing that may block upstream intersections (greater than 80 seconds per vehicle for signalized intersections and greater than 50 seconds for unsignalized intersections). Criteria used to assess the significance of automobile traffic impacts are presented in Section 3.1.

The VN BRT Project traffic study area includes a total of 139 intersections: 134 signalized and 5 unsignalized intersections. Due to the large number of intersections analyzed in the traffic study area, the discussion of existing (and future) intersection LOS focuses only on those operating at LOS E and F. The City and County of San Francisco has established LOS D as a threshold, so there is no need to present LOS for intersections operating at LOS D or better condition.

The critical volume to capacity ratio (v/c) and average vehicular travel speed are also presented in this report for informational purposes only. V/C ratio for a lane group³ describes the physical ability of that lane group to service the traffic demand. The critical v/c at an intersection is the highest v/c ratio among all lane groups. A high v/c lane group means the lane group does not have sufficient number of lanes to serve the traffic demand. Thus, when a lane group has high v/c ratio, additional lanes would be required to remedy traffic congestion. While v/c ratio is an important measure of effectiveness of intersection

³ A lane group is one or more lanes of the same approach that serves one particular type of movement through an intersection.

capacity, there are no criteria established by the City and County of San Francisco to assess vehicular traffic impacts using critical v/c ratio.

Average vehicular speed is another important measure of effectiveness of roadway operations. However, there are no criteria established by the City and County of San Francisco to assess vehicular traffic impacts using average travel speeds. The travel speed data provided in this report should be used to compare overall changes in the operating conditions of roadway operations.

Thus, critical v/c ratio and travel speed data is provided for informational and planning purposes only and are not utilized to identify impacts.

1.5 Methodology to Develop Synchro Models for Traffic Evaluation

Existing Conditions (Year 2007)

Traffic volumes used to analyze existing conditions for the PM peak hour (5 to 6PM) were based on field counts collected in 2007, 2008, and 2009; signal timing plan data (2007) were obtained from the SFMTA. Section 2.2 of this memorandum provides a detailed description of the geometry, traffic volumes and signal timings used to develop the 2007 Existing Conditions Synchro model.

Future No Build Alternatives

The forecast traffic volumes from the SF-CHAMP model for the near-term 2015 and long-term 2035 horizon years were used to calculate growth factors⁴ between the years of 2005 and 2015 and between 2005 and 2035 for each north-south street in four different sections (northern, mid, and southern sections of Van Ness Avenue plus South-of-Market area) and for the east-west streets by facility type (e.g. arterial, collector, and local streets) in the traffic study area. These growth factors were applied to the existing condition Synchro volumes to estimate 2015 near-term No Build and 2035 long-term No Build traffic volumes to minimize margins of errors. The initial set of future traffic volumes were balanced between the upstream departure volumes and downstream arrival volumes to ensure equilibrium of traffic volumes within the study area. Detailed descriptions of the growth factors, traffic volume estimation, geometry and signal timings assumptions for the 2015 near-term No Build and 2035 long-term No Build are provided in Section 3.2.1 and Section 3.3.1 respectively.

The Future No Build alternatives and all build alternatives assumes conversion of Hayes Street from one-way to two-way from Gough to Polk Streets, and conversion of Fell Street from one-way to two-way from Van Ness Avenue to Franklin Street. These changes were initially recommended by the San Francisco Planning Department as part of the Market Octavia Better Neighborhoods Plan; the lane geometry and signal phasing and timing were subsequently evaluated and confirmed by SFMTA for implementation in 2009⁵. The 2015 No Build traffic volumes along Hayes and Fell Streets and other streets in the vicinity were developed in two steps. The first step involves estimation of traffic volumes for Hayes and Fell Streets and other streets that would be affected by the two-way conversion project if the conversion were made today. The second step involves applying traffic growth factors from the SF-CHAMP model for the study area streets. Again, balancing of upstream departure volume and downstream arrival volumes was made before the Future No-Build Synchro Alternative model was finalized. Additionally, for year 2035 scenarios, traffic volumes for the intersections in the vicinity of the proposed CPMC Cathedral Hill Hospital and Medical Office Building were modified to reflect the

⁴ Growth factor – auto volume growth between base year and future scenario expressed as a percentage

⁵ As part of phased implementation, the block of Hayes Street between Van Ness Avenue and Polk Street remains one-way

projected vehicle trip generation for these two buildings in the CPMC EIR for the 2035 build alternatives and manually adjusted for reasonableness.

Build Alternatives

The build alternatives include a full complement of BRT improvements in the project area, including signal priority for buses, BRT bus stops and level boarding, and dedicated bus lanes along Van Ness Avenue. The VN BRT Project would convert two mixed-travel lanes to bus only lanes (one lane each in both northbound and southbound directions) and reduce left-turn opportunities along Van Ness Avenue. Synchro models for the 2015 and 2035 Build Alternatives were built by applying percentage changes in traffic volumes to the no-build alternative traffic volume for each respective horizon year. This data were provided by the SFCTA. Future year Build Alternative Synchro model was developed iteratively with several adjustments and then balanced between the upstream departure volumes and downstream arrival volumes to ensure equilibrium of traffic volumes within the study area after each round of adjustments as described below:

- **Traffic Diversion Adjustment** – There are two rounds of traffic diversion adjustments.
 - The first round of traffic diversion adjustment involves a manual adjustment to the growth provided by the SF-CHAMP model. The proposed project would reduce the mixed-traffic capacity along Van Ness Avenue by slightly less than one-third. The decrease in roadway capacity would cause motorists to divert from Van Ness Avenue to avoid delays. The SF-CHAMP model estimates that approximately 24 to 32 percent of the Van Ness Avenue traffic would change travel patterns, including driving on parallel streets within and outside the study corridor, shifting the trip to other times of day, or shifting to other modes, such as transit, walking, and bicycling.⁶ These SF-CHAMP estimates were refined by manually diverting traffic to reduce the number of trips predicted to divert outside the study corridor and put them back on parallel streets within the corridor (i.e. Gough and Franklin). This manual diversion to the five parallel streets within the corridor considers: 1) whether a street is discontinuous in its alignment, and thus not attractive for through traffic; 2) whether a street has steep grade and thus not likely to attract diversions; and 3) whether a street is already congested during the PM peak hour and thus not likely to attract traffic diversions. Traffic assigned to streets having the above three characteristics was reassigned to the five north-south parallel streets in the study area. Detailed descriptions of this diversion methodology can be found in Appendix 5. This set of forecast traffic volumes were then balanced between the upstream departure volumes and downstream arrival volumes to ensure equilibrium of traffic volumes within the study area
 - The second round of manual adjustments was applied after the completion of the first set of Synchro model runs. The completion of the Synchro model runs showed substantial degradation of traffic operations along the northern portion of Gough Street This northern section of Gough Street has only one southbound lane, instead of 3-5 southbound lanes as in the southern section, and many intersections have stops signs, while Van Ness Avenue has a lower volume to capacity ratio. Manual adjustments were made to relocate some traffic from Gough Street to Van Ness and Polk Street southbound in order to balance overall traffic demand in the southbound direction in the northern section of the study

⁶ For Design Option B and the LPA, the reduction of additional left turns along Van Ness Avenue would cause NB drivers to divert to other parallel streets before they enter South Van Ness and Van Ness avenues. Consequently, the very southern end of the corridor near Market Street would experience a significantly greater reduction in vehicle traffic volumes on Van Ness Avenue, particularly in the NB direction (up to 965 fewer vph than in the No Build Alternative – nearly 50 percent).

area. Approximately 100 to 120 vehicles were reassigned for the 2015 build alternatives. Approximately 150 to 170 vehicles were reassigned for the 2035 build alternatives.

- **Intersection Geometric Change Adjustments** – There are two locations where the number of left-turn bays would be reduced from two to one to accommodate BRT facilities within the available right-of-way:
 - Hayes Street in the NB direction for all build alternatives;
 - Mission Street in the EB direction for all build alternatives.

Similar to existing conditions and to the No Build Alternative (Alternative 1), under Build Alternative 2, Van Ness Avenue would have one exclusive left-turn lane and one shared left-turn/through lane at the SB approach to Broadway. Under Build Alternatives 3 and 4 and the LPA, there would be two exclusive SB left-turn lanes at the Van Ness Avenue SB approach to Broadway.⁷ The reason for the difference in design at this approach between Build Alternative 2 and Build Alternatives 3 and 4 is because under Build Alternatives 3 and 4, left-turn movements can only be made during the dedicated left-turn signal phase, in order to not cause potential collisions with SB Muni and GGT buses in the BRT lane. This is different than Build Alternative 2, under which SB left-turn vehicles can make a turn when there is a gap in the traffic stream in the NB direction. This results in a higher capacity for the exclusive left-turn lane and shared left-turn/through lane under Build Alternative 2 than under Build Alternatives 3 and 4, and this capacity is similar to that under existing conditions.

- **Left-Turn Prohibition Adjustments** - The build alternatives would include elimination of 13 left-turn bays along Van Ness Avenue in both northbound (6 bays) and southbound directions (7 Bays) as seen in Table 2 and Table 3

With the reduced number of left-turn opportunities, left turn volumes from the existing left turn bays are adjusted based on the following assumptions:

- Approximately one-third of the left-turn traffic would be diverted to the upstream left turn bay if there is one available within two blocks of the affected intersection.
- Approximately one-third of the left-turn traffic would be diverted to the downstream left turn bay if there is one available within two blocks of the affected intersection.
- Approximately one-third of the left-turn traffic would circle the block to reach its desired destination points. Additionally, if upstream and downstream left-turn opportunities are unavailable within two-blocks of the affected intersection, then traffic would circle the block.

⁷ This additional left-turn lane would require removal of some on-street parking spaces on the west side of Van Ness Avenue, north of Broadway.



Table 2 – Van Ness Avenue Northbound Left-Turn Opportunity – Future Scenarios

Northbound	Alternative 1 (No-Build)	Alternative 2 (Side Lane BRT)	Alternative 3 and 4 (Center Lane BRT)	Alternative 3 and 4 (Center Lane BRT) with Design Option B
Hayes	✓	✓	✓	
Grove	✓	✓	✓	
Turk	✓	✓	✓	
Ellis	✓			
Geary	✓			
Pine	✓	✓	✓	
Sacramento	✓			
Jackson	✓			
Pacific	✓			
Green	✓			
Union	✓	✓	✓	
Lombard	✓	✓	✓	✓

Table 3 – Van Ness Avenue Southbound Left-Turn Opportunity – Future Scenarios

Southbound	Alternative 1 (No-Build)	Alternative 2 (Side Lane BRT)	Alternative 3 and 4 (Center Lane BRT)	Alternative 3 and 4 (Center Lane BRT) with Design Option B
Fell	✓	✓	✓	
Grove	✓			
McAllister	✓			
Golden Gate	✓	✓	✓	
Eddy	✓			
O'Farrell	✓			
Bush	✓	✓	✓	
Clay	✓			
Washington	✓			
Broadway	✓	✓	✓	✓
Filbert	✓			

The two center-lane BRT alternatives have a design variation (Design Option B) where left-turn bays would only be provided at Broadway in the southbound direction and at Lombard in the northbound direction. The LPA would have the same left-turn configuration as Build Alternatives 3 and 4 with Design Option B. Based on data about origin-destinations of left-turning drivers from the SF-CHAMP model as well as the relative capacities, operations and characteristics of the numerous intersections in the Van Ness BRT Traffic Study Area, left-turning traffic at the left turn bays for Build Alternatives 3 and 4 was reassigned to other routes within the study area to develop the Design Option B and LPA traffic volumes. Appendix 6 shows the reassignment for the 9 eliminated left-turn opportunities in Alternatives 3 and 4 with Design Option B and the LPA.

- **Right-Turn Lane Reduction Adjustments** - Under Build Alternative 4 (Center-Lane BRT with Left-Side Boarding and Single Median) Van Ness Avenue between Geary and O'Farrell streets would have the same geometric design as Build Alternative 3 (Center-Lane BRT with Dual Medians). Due to the transition of Build Alternative 4 from a single-median BRT north of Geary Street to a dual-median BRT for this block, the SB Van Ness Avenue exclusive right-turn lane to Geary Street would not be provided under Build Alternative 4 or its design variation, Build Alternative 4 with Design Option B. This exclusive right turn would also be eliminated under the LPA. Under the LPA right-turn pockets would be provided only at three intersections along southbound Van Ness Avenue at Mission/Otis/South Van Ness, Market Street, and Pine Street.⁸

The process used to develop future-year traffic volumes for build alternatives is similar to that for the No-Build Alternative for all movements except the Van Ness Avenue turning movements. The SF-CHAMP model provided the percentage change in traffic volumes for each north-south street in four different sections and for the east-west streets by facility type. The percentage change tables will be discussed for each alternative in the ensuing sections. For all movements except Van Ness Avenue turning movements, the growth factor utilized was an average of the upstream and downstream link growth factors for a particular movement.

For the Van Ness Avenue right-turn and left-turn movements, the balancing method uses a weighted average method of several factors, considering volume reductions from Van Ness Avenue left turns, capacity changes along Van Ness Avenue, and growth factor for the east-west streets. A step-by-step discussion on balancing methodology is provided in Appendix 7.

⁸ The Vallejo Northbound Station Variant would have one fewer (2 vs. 3) mixed traffic lanes in the southbound direction for the block between Vallejo and Green streets versus the LPA. Under the LPA without the variant, this lane would be used to store left turning traffic onto Broadway. Under the Vallejo Northbound Station Variant, that roadway space would be used for the additional far side northbound station at Vallejo Street.

2.0 EXISTING CONDITIONS

2.1 Roadway Traffic Volumes

Twenty-four hour traffic counts were collected in March 2007 at five locations along Van Ness Avenue and one location each along Franklin and Gough Streets. These locations were selected because they represent blocks in the traffic study area with arterial roads as cross streets in the northern, mid-, and southern sections. These counts were taken to determine the peak hour for the intersection LOS analysis⁹. Table 4 shows that Van Ness Avenue carries approximately 37,500 to 41,500 vehicles daily in the northern and mid-sections; approximately 7 percent of this volume occurs during the PM peak hour (5-6 pm) and approximately 6 percent occurs during the AM peak hour. Traffic volumes are generally higher in the southern portion of the corridor with approximately 44,500 daily vehicles in both directions. The bi-directional Van Ness Avenue traffic volumes are higher during an average weekday PM peak hour than during an average weekday AM peak hour and weekend peak hours. Thus, the PM Peak hour represents the worst-case scenario to assess the vehicular traffic impacts of the VN BRT Project, and was selected for the intersection LOS analysis. The two arterial roads to the west of Van Ness Avenue, Franklin and Gough Streets, carry approximately 31,000 and 27,000 daily vehicles respectively.

Table 4 – Existing (2007) Traffic Counts – Average Weekday, Saturday and Sunday Daily, AM and PM Peak Hour Traffic Link Volumes

Street Segment	Average Weekday			Saturday			Sunday		
	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour
Van Ness Avenue Northbound and Southbound									
Greenwich and Filbert	38,281	2,541	2,625	38,977	1,363	2,523	33,042	969	2,257
Pacific and Broadway	36,487	1,981	2,553	39,394	1,361	2,351	34,275	932	2,336
Geary and Post	41,499	2,356	2,762	--	--	--	39,357	1,042	2,500
Hayes and Grove	42,910	2,662	2,947	--	--	--	--	--	--
Market and Fell	44,499	2,702	2,966	--	--	--	--	--	--
Gough Street Southbound									
Ellis To Geary	27,007	1,959	1,787	25,435	920	1,637	21,315	510	1,425
Franklin Street Northbound									
Post to Sutter	30,901	2,309	2,225	29,681	1,335	1,857	24,556	735	1,725

Source: SFCTA, March 2007

⁹ These 24-hour counts were a separate effort from the turning movement counts taken at 91 intersections by the Authority in Spring 2007 (with some additional counts in 2008 and 2009) to calibrate the existing condition (2007) Synchro model.

2.2 Existing Condition Synchro Model Development and Calibration

The VN BRT 2007 Existing Condition Synchro Model includes traffic, and pedestrian volumes and parking maneuvering data collected in 2007-2008, and roadway geometry and signal timings provided by the SFMTA as they existed in 2007.

SFCTA collected the following data:

Traffic counts – SFCTA collected intersection turning movement counts at 91 out of the 139 intersections in the traffic study area from April to June 2007, in July 2008 and July 2009 during the PM peak period (4 PM to 6PM) as seen in Figure 3. The counts were collected at all intersections on Gough Street, Franklin Street and Van Ness Avenue within the traffic study area and an additional 11 intersections on Polk, Larkin and Hyde streets within the traffic study area. Traffic counts were also collected at the intersection of the Duboce/13th/US 101 Freeway off-ramp. Appendix 8 provides the existing condition PM peak period intersection turning movement counts at 91 locations.

Pedestrian Counts - SFCTA collected pedestrian counts at major Van Ness Avenue intersections between Duboce Avenue and Union Street in June, July, and October 2008. For intersections along Van Ness where SFCTA pedestrian counts information was unavailable, SFMTA provided order-of-magnitude pedestrian volumes. Appendix 8 provides the existing condition pedestrian counts conducted at select locations.

Parking maneuvering counts - SFCTA collected parking maneuvers per hour (5 to 6 PM) counts for every block along Van Ness Avenue between Duboce Avenue and Clay Street in December 2008 and again in June 2009.

Travel time and queue length data – SFCTA collected field travel time data along Gough Street, Franklin Street and Van Ness Avenue in the study area between 4 and 6 PM in early December 2007. SFCTA also collected queue length data along the turn bays at 4 intersections along Van Ness Avenue (as seen in Table 6) during the same time period as travel time data collection for Van Ness.

The intersection turning movement counts were balanced between upstream and downstream volumes and modified as necessary to validate the Existing Conditions Synchro model. A comparison of field intersection counts and Synchro Existing Conditions volumes along the major north-south corridors shows the following:

- Along Gough Street, the total southbound volume (Sum of southbound through, right and left turning volumes for all the intersections along Gough Street) in Synchro is approximately 9% higher than the corresponding total southbound traffic volume from field counts,
- Along Franklin Street, the total northbound volume in Synchro is approximately 3% lower than the corresponding total northbound traffic volume from field counts, and
- Along Van Ness Avenue, the total northbound volume in Synchro is approximately 1% higher than the corresponding total northbound traffic volume from field counts. The total southbound volume in Synchro is approximately 3% higher than corresponding total southbound traffic volume from field counts.

Appendix 9 provides a detailed comparison of original intersection traffic counts and final validated and balanced existing condition Synchro model traffic volumes. Appendix 10 provides Synchro model inputs and outputs for major intersections under existing conditions and all other modeled scenarios.

Table 5 presents a comparison of the calibrated model vs. observed travel time. It shows a difference of up to 5% to 9% for Van Ness Avenue and 1% for Franklin and Gough. The model also shows a difference of 1 to 3 vehicles queue length between observed vehicle queues and 95th percentile modeled

queue length for the left-turning vehicles along Van Ness at Bush, Geary, McAllister, and Hayes Streets as seen in Table 6.



Figure 3 – Intersection Turning Movement Count Locations



Table 5 – Existing Conditions Travel Time Validation

Name	From	To	Dir.	Dist. (mi)	Average Observed Travel Time (5 -6 PM)	Synchro Travel Time	Validation (Difference %)
Franklin	Market	Greenwich	N	1.83	656	646	-1%
Gough	Pine	Oak	S	0.97	382	380	-1%
Van Ness	Greenwich	Market	S	1.77	736	813	9%
Van Ness	Market	Greenwich	N	1.77	577	608	5%

Table 6 – Queue Length Validation

Intersection	Approach	Lane Configuration	Left Pocket Length (Vehicles)	Observed Queue Length (Vehicles)	Synchro Queue Length (Vehicles)	Difference
Van Ness / Bush	Southbound	1L/3T	6	5	6	1
Van Ness / Geary	Northbound	1L/3T	6	6	3	-3
Van Ness / McAllister	Southbound	1L/2T/1T-R	7	3	1	-2
Van Ness / Hayes	Northbound	2L/3T	7	7	6	-1

2.3 Vehicular Travel Speed

Table 7 provides the average vehicular travel speeds for Van Ness Avenue and the five major north-south parallel streets in the traffic study area for the existing PM peak hour conditions. Under the 2007 existing conditions, the speed within the traffic study area is lowest along Van Ness Avenue in the southbound direction and highest along Van Ness Avenue in the northbound direction. This is because during the PM peak hour traffic signals are well synchronized in the northbound direction, but not in the southbound direction. In other words, vehicles in the northbound direction can have an uninterrupted flow of traffic, but vehicles in the southbound direction often have to stop at a red traffic light because of the lack of synchronization. The average vehicular speeds along Van Ness Avenue shown in Table 7 are lower than the vehicular speed from the VISSIM model by approximately 1.3 to 2.5 mph. This variation in vehicular traffic speed along Van Ness Avenue is mainly due to the difference in study area boundaries between the two models and the Otis Street configuration, and VISSIM's capability in modeling the benefits of signal priority for buses.

Table 7 – Average Speed – 2007 Existing Condition

Street	Average Speed (Mph)	
	Southbound	Northbound
Gough	8.4	-
Franklin	-	10.1
Van Ness	7.7	10.5
Polk	8.9	9.1
Larkin	-	9.5
Hyde	8.5	-

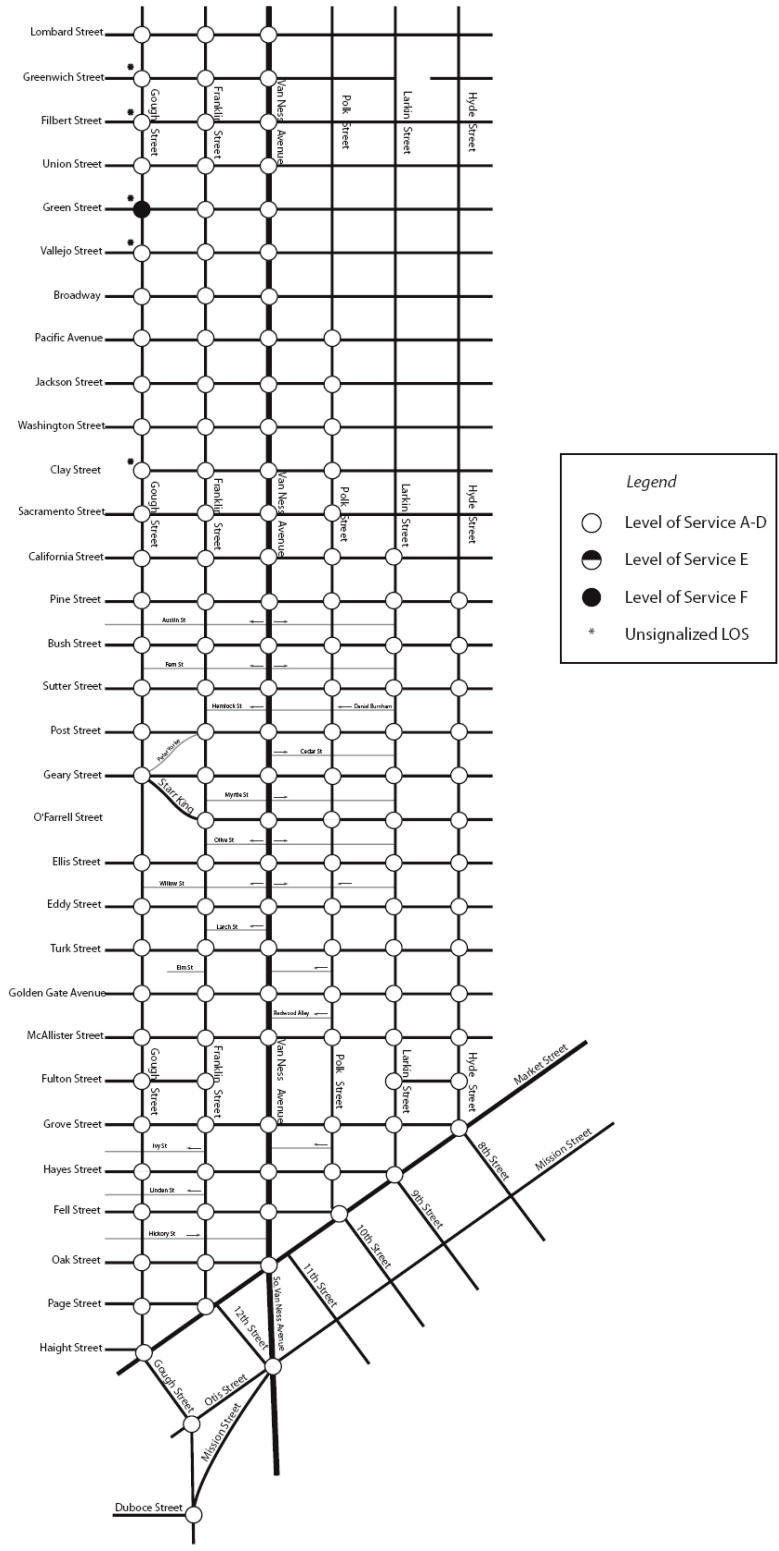
Source: Synchro model, CHS Consulting Group, 2010

2.4 PM Peak Hour Intersection Levels of Service

All the intersections in the traffic study area (except for the intersection of Gough Street and Green Street) operated at LOS D or better conditions in 2007. The SB Gough Street approach is the only approach that operates at LOS F at the four-way stop-controlled intersection of Gough Street and Green Street. This is mainly due to the high volumes of SB traffic (531 vehicles) that must stop at the intersection. Figure 4 shows the intersection LOS for all 139 intersections analyzed for the 2007 existing conditions scenario. Appendix 11 provides the intersection LOS for all the intersections within the study area for the existing conditions.

Although most intersections within the traffic study area operate with minimal delays overall, certain specific movements along the six north-south roadways operate in stop-and-go conditions, especially the southern sections of Van Ness Avenue and Gough Street. As presented before, the primary reasons for the differences are: 1) higher traffic volumes in multiple, conflicting directions in this section; and 2) a resulting lack of signal synchronization in the southbound direction.

Figure 4 – 2007 Existing PM Park Hour Intersection LOS



3.0 FUTURE YEAR TRAFFIC CONDITIONS AND IMPACTS

At the time of the Notice of Preparation the VN BRT Project was scheduled to begin operations in Year 2015; therefore, Year 2015 was chosen as the near-term year for traffic analysis. Year 2035 was chosen as the long-term horizon year because it represents 20 years after the opening of the project. This section presents the anticipated traffic conditions in 2015 and 2035 for the No Build Alternative, the three build alternatives, Design Option B, and the LPA. It presents the future-year traffic volumes, and assumptions used to forecast future volumes, future travel speeds, intersection LOS for signalized intersections, and approach LOS for unsignalized intersections.

For the VNBRT EIS/EIR, the project-specific impacts were determined by comparing the existing conditions to the build alternatives in Year 2015. It is important to note that this approach is a conservative way to define traffic impacts because the build alternatives in Year 2015 reflect traffic volumes and operations associated with population and employment growth in the study area expected between 2007 and 2015, in addition to the traffic volumes and operational changes associated with the project. Industry standard practice is to compare the build alternatives to the No Build Alternative in the future baseline year; however, in order to comply with the California Court of Appeal ruling for *Sunnyvale West Neighborhood Association v. City of Sunnyvale City Council* regarding selection of a CEQA baseline year, traffic impacts in this EIS/EIR were identified by comparing scenarios as follows:

- 1. Project-Specific Impacts:** Existing conditions compared with existing plus project¹⁰ conditions;
- 2. Cumulative Impacts:** Existing conditions compared with Year 2035 Build Alternatives conditions; and the LPA
- 3. Project Contribution to Cumulative Impacts:** 2035 No Build Alternative conditions compared with Year 2035 Build Alternatives conditions.

Traffic operating conditions under the No Build Alternative are also presented in Year 2015 for informational purposes. This section presents the criteria used to assess traffic impacts and identifies significant impacts that would not be mitigated, and less-than-significant traffic impacts per the impact thresholds described in Section 3.1 below. As described before, there are three build alternatives and the LPA: Build Alternative 2 (Side-Lane BRT with Street Parking), Build Alternative 3 (Center-Lane BRT with Right-Side Boarding and Dual Medians), and Build Alternative 4 (Center-Lane BRT with Left-Side Boarding and Single Median) and the LPA.

This section presents traffic impacts for existing conditions, No Build Alternative, Build Alternative 2, Build Alternatives 3 and 4 together, Build Alternatives 3 and 4 with Design Option B together, and the LPA (including the Vallejo Northbound Design Variant). Build Alternatives 3 and 4 have identical vehicular traffic operations, with the exception of right-turning movements at the intersection of Van Ness Avenue and Geary Street; therefore, traffic impacts for Build Alternatives 3 and 4 are presented together. Build Alternatives 3 and 4 may incorporate a design variation – Design Option B. Along Van Ness Avenue, Design Option B for these two build alternatives has only one SB left-turn opportunity (at Broadway) and only one NB left-turn opportunity (at Lombard Street). All of the other left-turn pockets in the NB and SB directions would be removed under Design Option B for Build Alternatives 3 and 4.

¹⁰ For this EIS/EIR, traffic operations for the Year 2015 build alternatives were used to represent the Existing plus Project scenarios for purposes of impact analysis. Conditions for the 2015 build alternatives are equivalent traffic operations or have a lower LOS than Existing plus Project conditions.

The LPA has nearly identical traffic operations as Build Alternatives 3 and 4 with Design Option B, except that the LPA only has right-turn pockets at three intersections on Van Ness Avenue, all in the SB direction: at Mission/Otis/South Van Ness; Market Street; and Pine Street. In addition, the LPA retains the two SB left-turn pockets at Broadway, similar to Build Alternatives 3 and 4. The LPA may incorporate a Vallejo Northbound Station Variant. The Vallejo Northbound Station Variant would have one fewer (2 vs. 3) mixed-traffic lanes in the southbound direction for the block between Vallejo and Green streets versus the LPA without this variant. Under the LPA without the variant, this lane would be used to store left-turning traffic onto Broadway. Under the Vallejo Northbound Station Variant, this roadway space would be used by the fa- side northbound station at Vallejo Street. Otherwise, the Vallejo Northbound Station Variant would operate identically to the LPA.

3.1 Significance Criteria

To assess the environmental significance of traffic impacts for signalized and unsignalized intersections, the Authority uses the same criteria used by the San Francisco Planning Department, presented in the *San Francisco Traffic Impact Analysis Guidelines for Environmental Review*.

3.1.1 Project-Specific Impacts

Signalized Intersections

1. If the intersection LOS declines from LOS A, B, C, or D in existing conditions to LOS E or F in the existing plus project scenarios (represented by the 2015 build alternatives), then the project would cause a significant project-specific impact.
2. If the intersection LOS declines from LOS E in existing conditions to LOS F in the existing plus project scenarios (represented by the 2015 build alternatives), then the project would cause a significant project-specific impact.
3. If the intersection performs the same at either LOS E or F in both existing conditions and existing plus project scenarios (represented by the 2015 build alternatives), then the project's contribution to significant impacts (i.e., contribution calculations) are performed as follows:
 - a. If the project does not contribute to critical movements at failing intersections or contributes vehicles to critical movements that operate at LOS D or better in existing plus project scenarios (represented by the 2015 build alternatives), then the project impact is considered less than significant;
 - b. If the project contributes vehicles to a failing critical movement of a failing intersection in the existing plus project scenarios (represented by the 2015 build alternatives) at or greater than 5 percent, then the project would cause a significant project-specific impact.

Unsignalized Intersections

1. If the LOS of the worst operating approach declines from LOS A, B, C, or D in existing conditions to LOS E or F in the existing plus project scenarios (represented by the 2015 build alternatives), and the intersection meets the Caltrans signal warrants, then the project would cause a significant project-specific impact.
2. If the worst operating approach performs at LOS E or F in both existing conditions and existing plus project scenarios (represented by the 2015 build alternatives) and the project traffic causes the Caltrans signal warrants to be met, then the project would cause a significant project-specific impact.



3.1.2 Cumulative Impacts

If in the Year 2035 there is a significant project-specific impact, then there is significant cumulative impact.

Significant cumulative impacts for all other signalized and unsignalized intersections are assessed in two steps as follows:

1. Cumulative impacts are assessed by utilizing the same procedure discussed under Project-Specific Impacts, except that the existing conditions scenario is compared with the long-term (2035) with-project scenario instead of the existing plus project scenario to assess cumulative impacts.
2. Significant cumulative impacts are assessed by calculating the project contribution to cumulative impacts for signalized and unsignalized intersections as follows:

Signalized Intersections

1. If the intersection LOS declines from LOS A, B, C, or D in the long-term (2035) No Build Alternative to LOS E or F in the Year 2035 build alternatives, then the project would cause a significant cumulative impact.
2. If the intersection LOS declines from LOS E in the long-term horizon year (2035) No Build Alternative to LOS F in the Year 2035 build alternatives, then the project would cause a significant cumulative impact.
3. If the intersection performs the same, at either LOS E or F, in the long-term horizon year (2035) for both the No Build Alternative and build alternatives, then the same procedure is used as in Criterion #3 under Project-Specific Impacts for signalized intersections to determine the project's contribution to significant cumulative impacts.

Unsignalized Intersections

1. If the LOS of the worst operating approach declines from LOS A, B, C, or D in the long-term horizon year (2035) No Build Alternative to LOS E or F in the Year 2035 build alternatives, and the intersection meets the Caltrans signal warrants, then the project would cause a significant cumulative impact.
2. If the worst approach performs at LOS E or F in the long-term horizon year (2035) for both the No Build Alternative and build alternatives, and the project traffic causes the Caltrans signal warrants to be met, then the project would cause a significant cumulative impact.

This section reports projected traffic conditions in the near-term (Year 2015) for the No Build Alternative and the build alternatives. It presents near-term (Year 2015) traffic volumes and assumptions used in traffic projections, future roadway performance, and summary of the VN BRT Project impacts.¹¹

¹¹ As noted previously, traffic operations for the Year 2015 build alternatives were used to represent the Existing plus Project scenarios for purposes of impact analysis. Conditions for the 2015 build alternatives are equivalent traffic operations or have a lower LOS than Existing plus Project conditions.

3.2 Near-Term (2015)

This section identifies significant traffic impacts for the near-term (Year 2015) No Build Alternative, the build alternatives and the LPA. It presents near-term (Year 2015) traffic volumes and assumptions used in traffic projections, future roadway performance, and a summary of the VN BRT Project impacts.¹²

3.2.1 2015 Alternative 1: No Build (Baseline Alternative)

The 2015 Alternative 1 Synchro model includes the following changes:

Geometry

The 2015 No Build Alternative assumes the roadway network in 2015 would be identical to the 2007 Existing Conditions with the exception of Hayes and Fell Streets. SFMTA proposes to convert Hayes Street between Gough and Polk Streets to a two-way street by converting one of the westbound lanes to an eastbound lane, and Fell Street between Van Ness Avenue and Franklin Street to a two-way street by converting one of the eastbound lanes to westbound as shown in Figure 5. The conversion would involve geometric changes at the following locations:

1. Hayes at Gough – eliminate a shared through and left-turn lane in the westbound direction and allow westbound left turns a single exclusive left turn lane at this intersection;
2. Hayes and Van Ness Avenue – Eliminate the westbound exclusive right-turn lane; left turns in the eastbound direction would be prohibited.

Traffic Volumes

SFCTA provided average annual growth factors between the years of 2005 and 2015 from the SF-CHAMP model for each north-south street in four different sections and for the east-west streets by facility type (as seen in Table 8). These growth factors were applied to the existing counts to obtain future traffic volumes for each intersection. The initially calculated traffic volumes were balanced between the upstream departure volumes and downstream arrival volumes to ensure equilibrium of traffic volumes within the study area. As seen from Table 8, traffic volumes along Van Ness Avenue would increase by approximately 0.54 to 1.92 percent annually from the 2007 levels. Traffic volumes along the east-west streets would increase by approximately 0.43 to 2.67 percent annually. There would be higher increases along collector streets than arterial roads.

SFCTA provided the 2015 Alternative 1 pedestrian volumes along Van Ness Avenue from Duboce Avenue to Union Street based on the SF-CHAMP travel demand forecasts for the Year 2015. Transit volumes for the 2015 Alternative 1 Synchro model were assumed to be the same as in 2007.

¹²As noted previously, traffic operations for the Year 2015 build alternatives were used to represent the Existing plus Project scenarios for purposes of impact analysis. Conditions for the 2015 build alternatives are equivalent traffic operations or have a lower LOS than Existing plus Project conditions.

Figure 5 – Hayes Street and Fell Street Two-Way Conversion

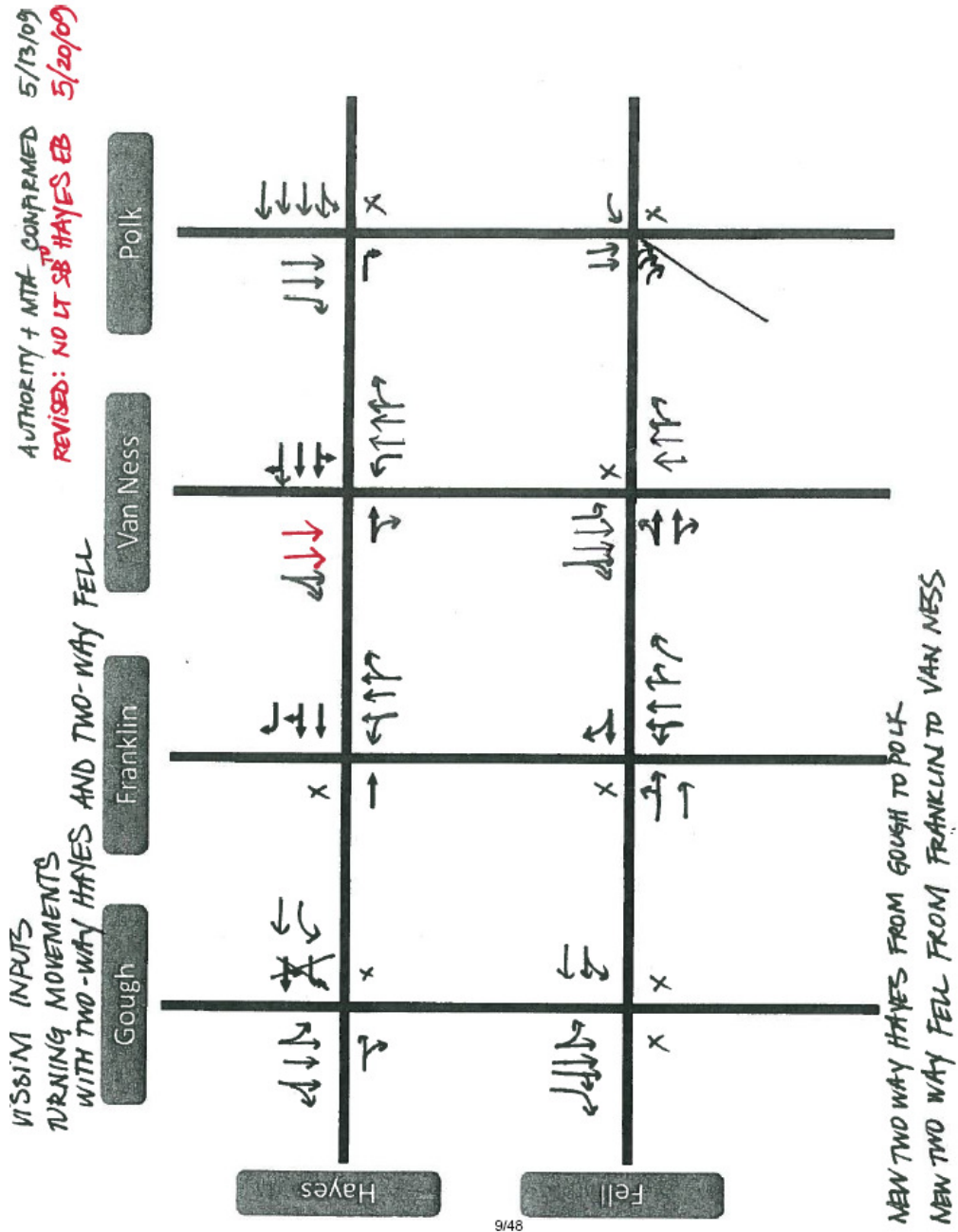


Table 8 – Near-Term (2015) Average Annual Traffic Growth Factors – No Build Alternative

Southbound	Average Annual Growth Factor					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	0.90%	-	0.73%	-	-	-
Broadway to Eddy	0.74%	-	1.20%	0.80%	0.53%	0.83%
Eddy to Market	1.02%	-	1.09%	1.54%	-	1.43%
South of Market	0.61%	-	1.12%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	-0.35%	0.12%	0.54%	-	-	-
Broadway to Eddy	0.34%	0.52%	1.18%	1.61%	0.26%	0.60%
Eddy to Market	-	0.76%	1.04%	2.91%	1.62%	-
South of Market	1.33%	-	1.92%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	0.70%	0.81%	2.49%	1.49%	0.55%	
WESTBOUND	0.48%	0.83%	2.67%	0.68%	0.43%	

SOURCE: SFCTA CHAMP Forecasting Model

Signal Timings

Signal timing for the 2015 No Build conditions is generally the same as in 2007, except for the following locations:

1. Duboce Avenue and Mission Street - The cycle length at this intersection was modified to 90 seconds.
2. Van Ness Avenue and Hayes Street - To accommodate two-way traffic on Hayes Street, signal phasing at this intersection was modified; the westbound only phase in the exiting condition was modified to an eastbound-westbound phase.

Additionally, SFMTA provided new signal timing plans for four intersections along Van Ness Avenue (at Market, Hayes, Grove and McAllister Streets) to accommodate the minimum amount of time needed for pedestrian crossing in 2015. Traffic signal timings were optimized at all intersections within the study area except along Geary Boulevard and O'Farrell Street. Geary Boulevard and O'Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O'Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all study intersections for all 2015 scenarios.

3.2.1.1 Vehicular Travel Speed

Tables 10 and 11 show that vehicular travel speeds would decrease slightly along Van Ness Avenue, Franklin Street, Gough Street, Polk Street (southbound) and Hyde Street from the 2007 Existing Conditions. This decrease in travel speeds would be caused by the increases in traffic volumes in the traffic study area. In the 2015 No Build Alternative, vehicular travel speeds would increase from the 2007 Existing Conditions along northbound Polk Street, and Larkin Street. This is primarily because the synchronization of the traffic signals along these streets can be improved over the current conditions. The average vehicular speeds along Van Ness Avenue shown in Table 9 and Table 10 are lower than the vehicular speed from the VISSIM model by approximately 2 mph (Appendix 4 provides the VISSIM model outputs). This variation in vehicular traffic speed along Van Ness Avenue is mainly due to the difference in study area boundaries between the two models and the Otis Street configuration, and VISSIM’s capability in modeling the benefits of signal priority for buses.

Table 9 – 2015 No Build Southbound Average Speed

Street	Average Speed (Mph)	
	Existing Conditions	2015 No Build
Gough	8.4	7.8
Franklin	-	-
Van Ness	7.7	7.0
Polk	8.9	8.5
Larkin	-	-
Hyde	8.5	8.4

Source: Synchro model, CHS Consulting Group, 2011

Table 10 – 2015 No Build Northbound Average Speed

Street	Average Speed (Mph)	
	Existing Conditions	2015 No Build
Gough	-	-
Franklin	10.1	9.8
Van Ness	10.5	10.1
Polk	9.1	9.8
Larkin	9.5	10.0
Hyde	-	-

Source: Synchro model, CHS Consulting Group, 2011

3.2.1.2 PM Peak Hour Intersection Levels of Services

Under the 2015 No Build Alternative, four intersections would operate at LOS E or F during the PM peak hour. Table 11 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F conditions under the 2007 Existing Condition and 2015 No Build Alternative. Figure 6 presents the 2015 No Build Alternative intersection LOS for all study intersections.

Table 11 – 2007 Existing Condition and 2015 No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

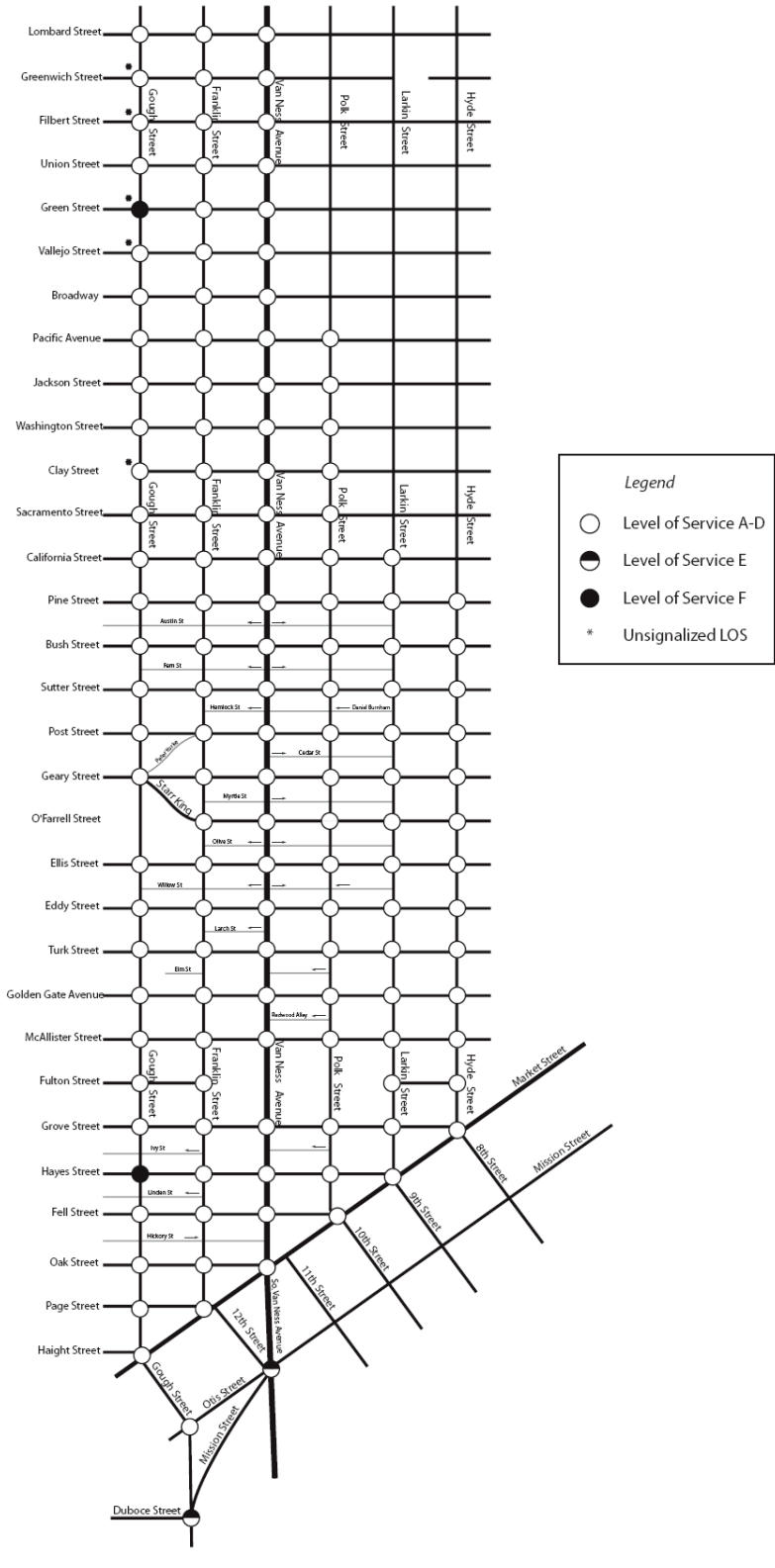
Intersection	2007 Existing		2015 No Build	
	Los (Delay)	Critical V/C (Critical Movement)	Los (Delay)	Critical V/C
Gough/ Green*	F (76.5)	1.05 (SB)	F (80.3)	1.06 (SB)
Gough/ Hayes	D (45.9)	-	F (86.7)	1.17 (WBL)
Otis/ Mission/S Van Ness	D (46.1)	-	E (59.3)	1.05 (SBT)
Duboce/ Mission/ Otis/ US101 Off-Ramp	D (44.4)	-	E (67.1)	1.46 (WBR Off-Ramp)
* Unsignalized intersection. Table shows worst approach LOS (Delay) for an unsignalized intersection. Table shows intersection LOS (intersection average vehicular delay) for signalized intersections.				

Source: Synchro model, CHS Consulting Group, 2011

The four study intersections that would operate at LOS E or F under the 2015 No Build Alternative are described below.

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both existing conditions and the 2015 No Build Alternative (Alternative 1).
- Gough/Hayes. This signalized intersection's operation would decline from LOS D under existing conditions to LOS F under the 2015 No Build Alternative (Alternative 1).
- Duboce/Mission/Otis/US 101 Off-Ramps. This signalized intersection's operation would decline from LOS D under existing conditions to LOS E under the 2015 No Build Alternative (Alternative 1).
- South Van Ness/Mission/Otis. This signalized intersection's operation would decline from LOS D under existing conditions to LOS E under the 2015 No Build Alternative (Alternative 1).

Figure 6 – Near-Term (2015) Alternative 1 Intersection LOS



3.2.2 2015 Build Alternatives

The build alternatives would include a full complement of BRT improvements in the project area, including signal priority for buses, new BRT bus stops and level boarding, and dedicated bus lanes along Van Ness Avenue. The VN BRT Project alternatives would convert two mixed-travel lanes to bus only lanes (one lane each in both northbound and southbound directions) and reduce left-turn opportunities along Van Ness Avenue. The proposed geometric changes and resulting change in traffic patterns are as discussed before under Section 1.5.

After traffic reassignments, on average there would be 19 to 32 percent fewer vehicles on Van Ness Avenue under the 2015 build alternatives and the LPA. This equates to roughly 315 to 680 fewer vehicles on Van Ness Avenue in each direction, depending on the location, than under the No Build Alternative in 2015¹³. These drivers are forecast to split their travel between the following:

- About 35 to 430 vehicles (1 to 7 vehicles per minute) in each direction would continue to drive during the PM peak hour, but use one of the parallel streets in the corridor (Gough, Franklin, Polk, Larkin, or Hyde streets) instead of Van Ness Avenue; and
- The remaining travelers would use transit; walk or bike; shift to other times of day, or divert to streets outside the study corridor

The amount of additional private traffic diverting from Van Ness Avenue would vary widely up and down the two mile stretch of the corridor analyzed but any given segment of Franklin would experience an average addition of 50 to 250 vehicles (1 to 4 vehicles per minute) during the PM peak hour. Gough would add up to 105 vehicles; Polk up to 150 vehicles in each direction; Larkin up to 130 vehicles; and Hyde up to 40 vehicles during the PM peak. The increase in volume for Gough, Polk, Larkin and Hyde would be less than 3 vehicles per minute in one direction.

¹³ For Design Option B (LPA), due to the elimination of left turns along Van Ness Avenue and subsequent traffic diversions to other streets, the very southern end of the corridor near Market Street would experience a significantly greater reduction in vehicle traffic volumes on Van Ness Avenue, particularly in the NB direction (up to 965 fewer vehicles per hour than in the No Build Alternative – nearly 50%).

3.2.2.1 Travel Speed: 2015 Build Alternatives

The average travel speed for all of the study area streets in the SB direction, NB Franklin Street and NB Van Ness Avenue in the 2015 build alternatives would decrease from the existing conditions.

Table 12 and Table 13 present a comparison of the existing conditions, the 2015 build alternatives, and the LPA speed show the following:

- In many instances, there is almost the same amount of reduction in speed between existing conditions and the 2015 No Build Alternative (Alternative 1) as there is between existing conditions and the 2015 build alternatives. In other words, the VN BRT Project alternatives do not impact speeds any more than general growth in citywide traffic in the No Build Alternative scenario would affect speeds. In some instances, speed actually increases under the 2015 build alternatives versus the 2015 No Build Alternative. With the exception of NB Franklin Street and Van Ness Avenue, project contributions to speed reductions are 0.3 mph or less.
- Speed along SB Gough, SB Polk, and NB Franklin would decrease by approximately 0.5-mph under the Year 2015 build alternatives when compared with the existing conditions. Speed along these corridors would decrease slightly more (up to 0.8-mph) under Year 2015 Build Alternatives 3 and 4 with Design Option B and the LPA due to the diversion of left-turning traffic from Van Ness Avenue to the parallel streets.
- Speed along SB Hyde Street would decrease by 0.2 mph from 8.5 mph in existing conditions to 8.3 mph in all three build alternatives and the LPA in Year 2015.
- Speed along NB Polk and Larkin streets would increase between 0.4 and 0.8 mph when compared with the existing conditions. This is primarily because synchronization of the traffic signals along these streets can be improved over the current conditions.
- Speed along Van Ness Avenue in both directions would decrease between 0.1 and 0.5 mph in Year 2015 Build Alternative 2, Build Alternatives 3 and 4 with Design Option B and the LPA when compared with the existing conditions. Speed along Van Ness Avenue in both directions would decrease the most (1 to 1.3 mph) under Year 2015 Build Alternatives 3 and 4. This is mainly due to the increase in traffic volumes for NB left turns from Van Ness Avenue and changes in signal timing and phasing for these left turns. Left turns at these intersections can only be made under a protected phase.
- Speed for the 2015 LPA would be identical to the Year 2015 Build Alternatives 3 and 4 with Design Option B for all arterials except Van Ness Avenue. Under the 2015 LPA, the SB Van Ness Avenue speed would be the same as 2015 Build Alternative 4, with no SB right turn pocket on Van Ness at Geary. However, the speed would be 0.1 mph less than the 2015 Build Alternative 3. NB Van Ness Avenue speed would decrease slightly from 10.2 mph in Design Option B to 10.1 mph in the LPA (0.1 mph decrease). These small changes in speed may be attributed to the increase in right turn traffic making turns from the shared lane and thus slightly decreasing the speed of all movement in the curb lane.
- The speed along SB Van Ness Avenue under the LPA Vallejo Northbound Station Variant, with one less SB Van Ness Avenue through lane at Vallejo Street, would be the same as the LPA speed. This approach performs at LOS A with three SB lanes and would continue to perform at LOS A with two lanes. This shows that the SB movement may have sufficient capacity to serve the 2015 LPA traffic with just 2 lanes.

Table 12 – 2015 Southbound Average Speed

Street	Average Speed (Mph)					LPA ²
	Existing Conditions	No Build (Alternative 1)	Side-Lane BRT (Alternative 2)	Center-Lane BRT (Alternatives 3 And 4)	Center-Lane BRT With Design Option B (Alternatives 3 And 4)	
Gough	8.4	7.8	7.9	8.0	7.6	7.6
Franklin	-	-	-	-	-	
Van Ness	7.7	7.0	7.2	6.7/6.6 ¹	7.6/7.5 ¹	7.5
Polk	8.9	8.5	8.4	8.3	8.2	8.2
Larkin	-	-	-	-	-	
Hyde	8.5	8.4	8.3	8.3	8.3	8.3

1. The two speeds shown on Van Ness Avenue represent Build Alternative 3/Build Alternative 4. The difference in speed is due to the lack of a right-turn pocket for SB traveling vehicles at Geary and Van Ness under Build Alternative 4. Speeds are the Same Between Build Alternatives 3 And 4 for all other streets.

2. The LPA Vallejo Northbound Station Variant, with one less Van Ness Avenue southbound through lane at Vallejo Street, has the same speed as the LPA for all the streets including Van Ness Avenue.

Source: Synchro model, CHS Consulting Group, 2011

Table 13 – 2015 Northbound Average Speed

Street	Average Speed (Mph)					LPA ¹
	Existing Conditions	No Build (Alternative 1)	Side-Lane BRT (Alternative 2)	Center-Lane BRT (Alternatives 3 And 4)	Center-Lane BRT With Design Option B (Alternatives 3 And 4)	
Gough	-	-	-	-	-	-
Franklin	10.1	9.8	9.5	9.6	9.3	9.3
Van Ness	10.5	10.1	10.3	9.2	10.2	10.1
Polk	9.1	9.8	9.5	9.8	9.9	9.9
Larkin	9.5	10.0	9.9	10.1	10.1	10.1
Hyde	-	-	-	-	-	-

1. The LPA Vallejo Northbound Station Variant, with one less Van Ness Avenue southbound through lane at Vallejo Street, has the same speed as the LPA for all the streets including Van Ness Avenue.

Source: Synchro model, CHS Consulting Group, 2011

3.2.2.2 Traffic Impacts: 2015 Build Alternative

This section presents the projected vehicular traffic impacts in year 2015 for the build alternatives and the LPA. Implementation of build alternatives and the LPA is anticipated to result in adverse traffic effects, some of which would be significant impacts based on the impact significance criteria described in Section 3.1. The VN BRT Project would cause significant traffic impacts only if the LOS for the 2015 build alternatives and the LPA would be worse than the existing conditions. Intersections that would continue to operate at LOS E or F in the build alternatives, but which are not impacted by project traffic based on the significance criteria presented in Section 3.1, are also identified below as less-than-significant impacts.

3.2.2.2.1 2015 Near-Term Build Alternative 2: Side Lane BRT with Street Parking

Geometry

The 2015 Build Alternative 2 would include conversion of two mixed-flow right-side travel lanes to bus-only lanes (one side lane each in both northbound and southbound directions), reduction of thirteen left-turn opportunities along Van Ness Avenue, and reduction of left-turn lanes at three locations. Additionally, Build Alternative 2 includes right-turn pockets that would be provided at locations with high volumes of right-turning vehicles. At locations without right-turn pockets, right turns would be permitted from the right side BRT lane on Van Ness in both directions. These permitted right turns were modeled in Synchro as an exclusive right turn lane for Alternative 2.

Traffic Volumes

As described in Section 1.5, “Methodology to Develop Synchro Models,” SFCTA provided the percentage change in traffic volumes obtained from the SF-CHAMP model between the 2015 No Build Alternative and 2015 Alternative 2 for each north-south street in four different sections and for the east-west streets by facility type (as seen in Table 14). Under the near-term 2015 Build Alternative 2, traffic volumes along Van Ness Avenue would decrease to approximately 68% to 75% from 2015 No Build Alternative levels due to the loss of one travel lane. However, traffic volumes along north-south streets parallel to Van Ness Avenue would experience a slight increase when compared with 2015 No Build Alternative levels, except along southbound Gough Street and northbound Franklin Street south of Eddy Street. Traffic volumes along the east-west streets would decrease to approximately 95% to 99% of 2015 No Build Alternative levels except along eastbound collector streets. Traffic volumes along the eastbound Collector streets would increase to approximately 114% of the 2015 No Build Alternative levels

These percentage changes were applied to the 2015 No Build Alternative volumes to obtain the initial 2015 Alternative 2 traffic volumes for each intersection. The initial traffic volumes were then manually adjusted to reflect the proposed circulation patterns for Build Alternative 2 (such as reduction in left turn opportunities) as described under Section 1.5, “Methodology to Develop Synchro Models.” Finally, the traffic volumes were balanced within the traffic study area to ensure equilibrium of upstream and downstream traffic volumes within the study area.

SFCTA provided the 2015 Alternative 2 pedestrian volumes along Van Ness Avenue from Duboce Avenue to Union Street based on the SF-CHAMP travel demand forecasts for the Year 2015.

Table 14 – Near-Term (2015) Change in Traffic Volumes – From 2015 No Build to 2015 Build Alternative 2

Southbound	Percentage Change In Traffic Volumes					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	102.13%	-	75.16%	-	-	-
Broadway to Eddy	100.17%	-	69.93%	101.32%	101.76%	100.22%
Eddy to Market	99.83%	-	67.71%	100.62%	-	100.60%
South of Market	99.23%	-	73.07%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	106.39%	104.38%	74.99%	-	-	-
Broadway to Eddy	102.76%	101.21%	68.83%	105.65%	101.42%	101.18%
Eddy to Market	-	99.09%	72.29%	166.19%	100.84%	-
South of Market	100.92%	-	69.13%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	95.93%	98.34%	113.96%	96.26%	95.39%	
WESTBOUND	96.25%	98.64%	96.82%	94.57%	97.50%	

SOURCE: SFCTA CHAMP Forecasting Model

Signal Timings

The traffic signal cycle length and phasing for the 2015 Alternative 2 were assumed to be the same as the 2015 No Build Alternative. However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O’Farrell Street. Geary Boulevard and O’Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements along Geary and O’Farrell Streets were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2015 Build Alternative 2.

Traffic Impacts Based on Intersection Levels of Service

Under Build Alternative 2, three intersections would operate at LOS E or F during the PM peak hour in Year 2015. Table 15 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F conditions under the Existing Conditions, 2015 No Build Alternative, and the 2015 Build Alternative 2 scenarios. Figure 7 presents the 2015 Build Alternative 2 intersection LOS for all study intersections.

Table 15 –No Build to 2015 Build Alternative 2 (Side Lane BRT) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing Condition		2015 No Build Alternative		2015 Build Alternative 2	
	LOS (Delay)	Critical V/C (Critical Movement)	Los (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)
Gough/Green*	F (76.5)	1.06 (SB)	F (80.3)	1.06 (SB)	F (86.3)	1.08 (SB)
Gough/Hayes	D (45.9)	-	F (86.7)	1.17 (WBL)	E (79.0)	1.18 (WBL)
Franklin/O'Farrell	D (39.3)	-	D (43.2)	-	E (60.6)	1.08 (EB)
Otis/Mission/S. Van Ness	D (46.1)	-	E (59.3)	1.05 (SBT)	D (45.7)	-
Duboce/Mission/Otis/Us 101 Off-Ramp	D (44.4)	-	E (67.1)	1.46 (Off-Ramp WBR)	D (51.3)	-

* Unsignalized intersection.

Table shows worst approach LOS (Delay) for an unsignalized intersection.

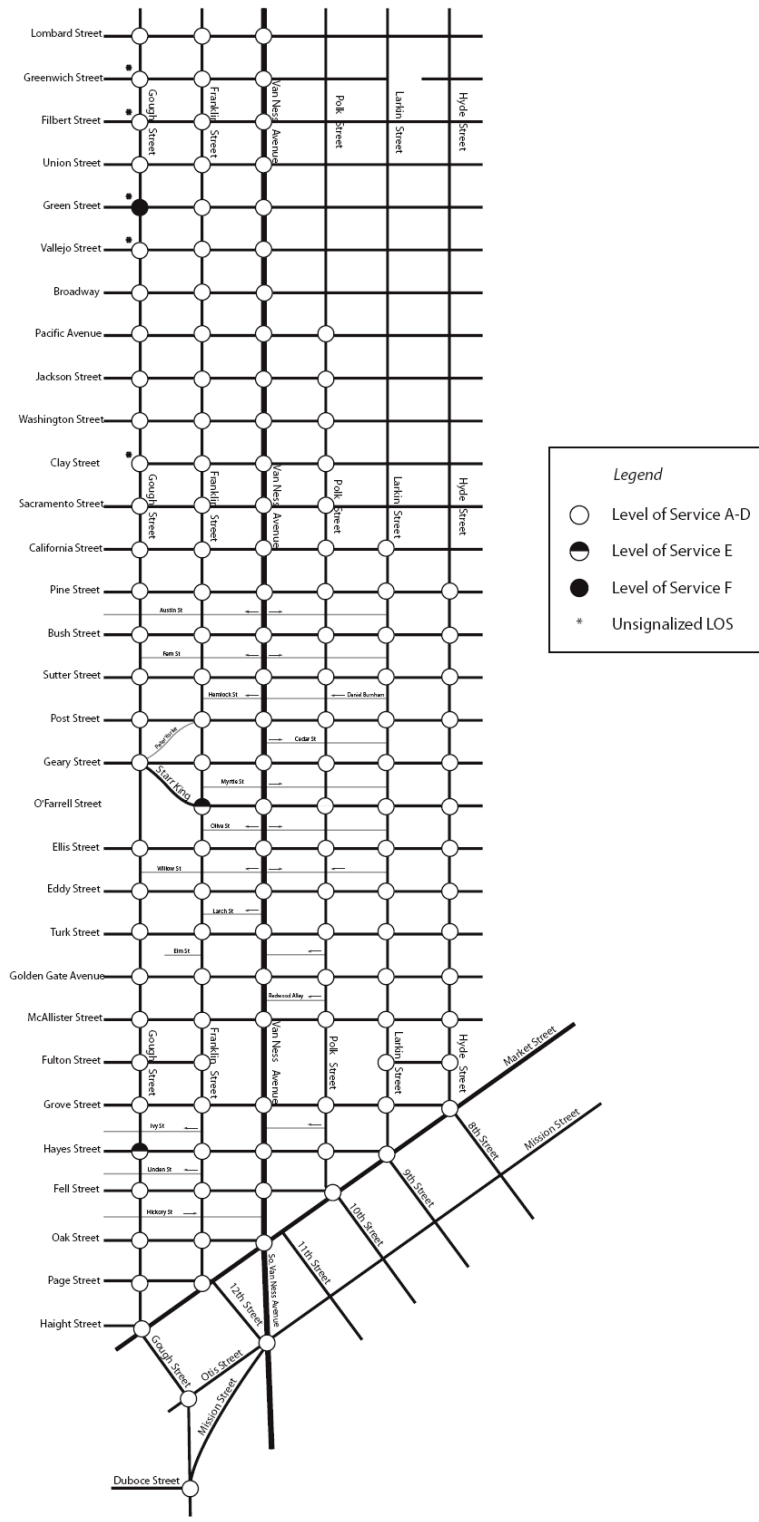
Table shows intersection LOS (intersection average vehicular delay) for signalized intersections.

Source: Synchro model, CHS Consulting Group, 2011

Significant Project-Specific Impacts. The project traffic would cause significant project-specific impacts at two study intersections under the 2015 Build Alternative 2 as follows:

- Gough/Hayes. This intersection would decline from LOS D under the existing conditions to LOS E under the 2015 Build Alternative 2 (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS F under the 2015 No Build Alternative.
- Franklin/O'Farrell. This signalized intersection would decline from LOS D under the existing conditions to LOS E under the 2015 Build Alternative 2 (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS D under the 2015 No Build Alternative.

Figure 7 – Near-Term (2015) Build Alternative 2 Intersection LOS



Less-than-Significant Project-Specific Impacts. Build Alternative 2 would cause less-than-significant traffic impacts at the intersections of Gough and Green streets, South Van Ness/Mission Otis and the Duboce/Mission/Otis/US-101 Off-Ramp as presented below:

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both the existing conditions and the 2015 Build Alternative 2 (representing existing plus project conditions); however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing conditions and the 2015 Build Alternative 2 scenario (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2015 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operation at this intersection, including adding a traffic signal or removing some on-street parking spaces to create an additional SB approach lane; however, removing parking would worsen pedestrian conditions by eliminating the buffer provided by parked cars separating the sidewalk from the traffic lane, and past public outreach has indicated that the community prefers the stop-sign control of the intersection.
- South Van Ness/Mission/Otis and Duboce/Mission/Otis/US-101 Off-Ramp. The intersections of South Van Ness/Mission/Otis and the Duboce/Mission/Otis/US-101 Off-Ramp would decline from LOS D under the existing conditions to LOS E under 2015 No Build Alternative, and then improve to LOS D under the 2015 Build Alternative 2. This decline in performance between the existing conditions and the 2015 No Build Alternative is due to growth in background traffic. The improved performance between the 2015 No Build Alternative and 2015 Build Alternative 2 is mainly due to traffic diversion from the study area. As discussed in Section 1.5, the SF-CHAMP model estimated that due to the reduction of a mixed-traffic lane in each direction along Van Ness Avenue, approximately 24 to 32 percent of traffic would divert their trips away from Van Ness Avenue in the PM peak period, including diverting to other modes or other times of the day. Traffic diversion to streets outside of the project area could potentially improve the operations of some intersections within the traffic study area, such as the intersections of South Van Ness/Mission/Otis and Duboce/Mission/Otis/US 101 off-ramp.

Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection: In anticipation of expected developments, the San Francisco Planning Department proposes to widen the sidewalk on the west side of Van Ness Avenue between Post and Geary streets. This proposed widening would necessitate the removal of the Van Ness Avenue SB exclusive right-turn lane onto Geary Street. A sensitivity analysis has been performed, assuming the proposed sidewalk widening occurs. With the approved sidewalk widening and removal of exclusive right-turn lane, LOS at this intersection would remain unchanged at LOS B.

3.2.2.2.2 2015 Near-Term Build Alternatives 3 and 4: Center Lane BRT Configuration

Geometry

The 2015 Build Alternatives 3 and 4 would include conversion of two mixed-travel center lanes along Van Ness Avenue to bus-only lanes (one lane each in both northbound and southbound directions), reduction in thirteen left-turn opportunities along Van Ness Avenue, and reduction in left-turn lanes at two locations. Additionally, for Build Alternative 4, the southbound Van Ness right turn lane at Geary would be eliminated.



Traffic Volumes

Under the near-term 2015 Build Alternatives 3 and 4, traffic volumes along Van Ness Avenue would decrease to approximately 68% to 76% from 2015 No Build Alternative levels due to the loss of one travel lane (Table 16). However, traffic volumes along north-south streets parallel to Van Ness Avenue would experience a slight increase when compared with 2015 No Build Alternative levels except along northbound Franklin Street south of Eddy Street. Traffic volumes along the east-west streets would decrease to approximately 95% to 99% of 2015 No Build Alternative levels, except along eastbound collector streets. Traffic volumes along the eastbound collector streets would increase to approximately 114% of 2015 No Build Alternative levels.

These percentage changes were applied to the 2015 No Build Alternative intersection traffic volumes to obtain the initial 2015 Alternatives 3 and 4 traffic volumes for each intersection. The initial traffic volumes were then manually adjusted to reflect the proposed circulation patterns for Build Alternatives 3 and 4 (such as reduction in left turn opportunities) as described under Section 1.5, “Methodology to Develop Synchro Models.” Finally, the traffic volumes were balanced within the traffic study area to ensure equilibrium of upstream and downstream traffic volumes within the study area.

SFCTA provided the 2015 Alternatives 3 and 4 pedestrian volumes along Van Ness Avenue from Duboce Avenue to Union Street based on the SF-CHAMP travel demand forecasts for the Year 2015.

Table 16 – Near-Term (2015) Change in Traffic Volumes – From 2015 No Build to 2015 Build Alternative 2

Southbound	Percentage Change In Traffic Volumes					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard To Broadway	100.01%	-	75.35%	-	-	-
Broadway To Eddy	100.49%	-	69.45%	101.62%	101.85%	100.90%
Eddy To Market	100.52%	-	67.61%	101.32%	-	100.54%
South Of Market	100.47%	-	72.99%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard To Broadway	101.93%	104.53%	76.10%	-	-	-
Broadway To Eddy	103.32%	101.00%	69.49%	107.55%	102.00%	100.79%
Eddy To Market	-	99.63%	73.12%	163.01%	101.36%	-
South Of Market	102.40%	-	69.11%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	97.15%	97.71%	113.80%	95.47%	95.19%	
WESTBOUND	94.67%	98.63%	95.76%	94.94%	97.68%	

SOURCE: SFCTA CHAMP Forecasting Model

Signal Timings

Build Alternatives 3 and 4 would include protected-only left-turn phasing at all intersections with left-turn bays along Van Ness Avenue to provide safe movement for traffic crossing the center BRT lanes. The

traffic signal phasing at the intersections of Van Ness Avenue with Filbert Street and South Van Ness Avenue, Mission Street, and Otis Street would also be modified to allow buses to transition from a center-running configuration to mixed-flow traffic lanes along Van Ness Avenue. Traffic signal cycle length and phasing for all other 2015 Alternatives 3 and 4 were assumed to be the same as the 2015 No Build Alternative. Additionally, the traffic signal splits would be optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O'Farrell Street. Geary Boulevard and O'Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O'Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2015 Build Alternatives 3 and 4.

Traffic Impacts Based on Intersection Levels of Service

Under Build Alternatives 3 and 4, four intersections would operate at LOS E or F during the PM Peak hour in 2015. Table 17 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F conditions under the Existing Condition, 2015 No Build Alternative, and the 2015 Build Alternatives 3 and 4 scenarios. Figure 8 graphically presents the 2015 Build Alternatives 3 and 4 intersection LOS for all intersections.

Table 17 – No Build to 2015 Build Alternatives 3 and 4 (Center Lane BRT) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing Condition		2015 No Build Alternative		2015 Build Alternatives 3 And 4	
	LOS (Delay)	Critical V/C (Critical Movement)	Los (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)
Gough/Green*	F (76.5)	1.06 (SB)	F (80.3)	1.06 (SB)	F (80.7)	1.06 (SB)
Gough/Hayes	D (45.9)	-	F (86.7)	1.17 (WBL)	E (79.7)	1.18 (WBL)
Franklin/O'Farrell	D (39.3)	-	D (43.2)	-	E (57.2)	1.08 (EB)
Otis/Mission/S. Van Ness	D (46.1)	-	E (59.3)	1.05 (SBT)	E (68.8)	1.06 (SBT)
Duboce/Mission/Otis/US 101 Off-Ramp	D (44.4)	-	E (67.1)	1.46 (Off-Ramp WBR)	D (47.2)	-

* Unsignalized intersection.
 Table shows worst approach LOS (Delay) for an unsignalized intersection.
 Table shows intersection LOS (intersection average vehicular delay) for signalized intersections.

Source: Synchro model, CHS Consulting Group, 2011

Significant Project-Specific Impacts. Build Alternatives 3 and 4 would cause significant project-specific impacts at three study intersections in Year 2015.

- Gough/Hayes. This intersection would decline from LOS D under existing conditions to LOS E under 2015 Build Alternatives 3 and 4 (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS F under the 2015 No Build Alternative.
- Franklin/O'Farrell. This signalized intersection would decline from LOS D under existing conditions to LOS E under 2015 Build Alternatives 3 and 4 (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS D under the 2015 No Build Alternative.
- South Van Ness/Mission/Otis. This signalized intersection would decline from LOS D under existing conditions to LOS E under 2015 Build Alternatives 3 and 4 (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS E under the 2015 No Build Alternative.

Less-than-Significant Project-Specific Impacts. Build Alternatives 3 and 4 would cause less-than-significant traffic impacts at the intersection of Gough and Green streets, and the Duboce/Mission/Otis/US-101 Off-Ramp as presented below:

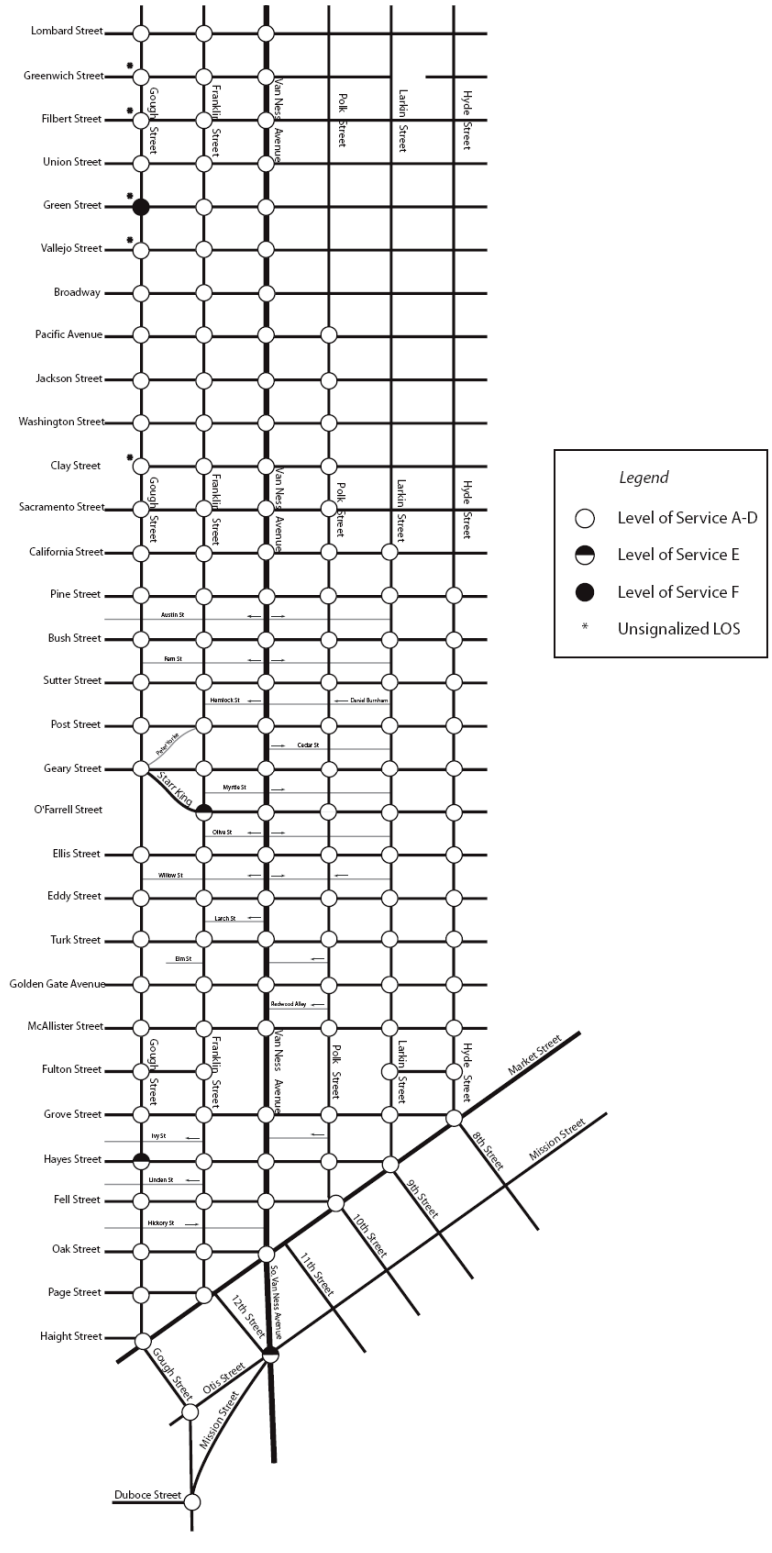
- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both the existing conditions and the 2015 Build Alternatives 3 and 4 (representing existing plus project conditions); however, the intersection would not meet the Caltrans peak-hour signal warrant under both existing conditions and 2015 Build Alternatives 3 and 4 (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2015 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operation at this intersection, including adding a traffic signal; removing some on-street parking spaces to create an additional SB approach lane; however, past public outreach has indicated that the community prefers the stop-sign control of the intersection.
- Duboce/Mission/Otis/US 101 Off-Ramp. Similar to Build Alternative 2, the intersection of Duboce/Mission/Otis/US 101 off-ramp would decline from LOS D under the existing conditions to LOS E under the 2015 No Build Alternative, and then improve to LOS D under Build Alternatives 3 and 4 in Year 2015.

Design Variation between Build Alternative 3 and Build Alternative 4 and Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection.

As discussed before, Van Ness Avenue between Geary and O'Farrell streets under Build Alternative 4 would have the same geometric design as Build Alternative 3. Due to this transition from a center-running BRT with a single median north of Geary Street to a right-side loading BRT with two medians for this block, the SB Van Ness Avenue exclusive right-turn lane to Geary Street would not be provided under Build Alternative 4. This intersection would operate at LOS B under 2015 Build Alternative 3. Without the exclusive SB right-turn lane, LOS at this intersection would remain at LOS B under 2015 Build Alternative 4. The analysis for Build Alternative 4 also serves as the sensitivity analysis if the San Francisco Planning Department were to approve the proposed widening of the sidewalk under Build Alternative 3, thus requiring the elimination of the exclusive SB right-turn lane onto Geary Street from Van Ness Avenue.



Figure 8 – Near-Term (2015) Build Alternatives 3 and 4 Intersection LOS



3.2.2.2.3 2015 Near-Term Build Alternatives 3 and 4: Design Option B: Center Lane BRT Configuration with Design Option B

Geometry

The 2015 Build Alternatives 3 and 4 with Design Option B would have the same roadway geometry as 2015 Build Alternatives 3 and 4 except that there would be only two left-turn opportunities along Van Ness Avenue northbound and only one Van Ness southbound left-turn lane at Broadway. Left turns will be allowed at Broadway in the southbound direction and at Lombard in the northbound direction.

Traffic Volumes

The traffic volumes estimated for Build Alternatives 3 and 4 (Center Lane BRT) were modified to develop the Alternatives 3 and 4 with Design Option B traffic volumes. Under Design Option B, the left turn opportunities would be further reduced in comparison to Build Alternative 3 and 4 without Design Option B. Left-turn opportunities at Hayes, Grove, Turk, Pine and Union along northbound Van Ness and at Fell, Golden Gate and Bush along southbound Van Ness would be eliminated. Based on data about the origins and destinations of left-turning drivers from the SFCTA's SF-CHAMP travel demand forecasting model, left-turning traffic at the above locations in Build Alternatives 3 and 4 without Design Option B were reassigned to other routes within the study area to develop the 2015 Alternatives 3 and 4 Design Option B traffic volumes.

After applying the adjustments and diversions discussed in Section 1.5, and the reassignment discussed above, the resulting 2015 Design Option B volumes indicate that on average, there would be 400 to 650 fewer vehicles on Van Ness Avenue with the implementation of BRT.

The amount of additional private traffic diverting from Van Ness Avenue would vary widely up and down the two mile stretch of the corridor analyzed, but the very southern end of the corridor near Market Street would experience the greatest reduction in vehicle traffic volumes on Van Ness Avenue, particularly in the NB direction (up to 965 fewer vph than in the No Build Alternative – a reduction of nearly 50 percent). Over 600 of these vehicles would divert to Franklin near Market. Detailed figures of the reassignment for each eliminated left turn are presented in Appendix 6.

Signal Timings

The traffic signal cycle length and phasing for Build Alternatives 3 and 4 with Design Option B were assumed to be the same as the 2015 Alternatives 3 and 4, as discussed in Section 3.2.2.2.2. However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O'Farrell Street. Geary Boulevard and O'Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O'Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2015 Build Alternatives 3 and 4 with Design Option B.

Traffic Impacts based on Intersection Levels of Service

Under Build Alternatives 3 and 4 with Design Option B, four intersections would operate at LOS E or F during the PM peak hour in Year 2015. Table 18 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at

LOS E or F conditions under the Existing Conditions, 2015 No Build Alternative and 2015 Build Alternatives 3 and 4 with Option B scenarios. Figure 9 presents the 2015 Build Alternatives 3 and 4 with Design Option B intersection LOS.

Table 18 – No Build to 2015 Build Alternatives 3 and 4 (Center Lane BRT) with Design Option B Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing condition		2015 No Build Alternative		2015 Build Alternatives 3 and 4 with Design Option B	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)
Gough/Green*	F (76.5)	1.06 (SB)	F (80.3)	1.06 (SB)	F (108.1)	1.15 (SB)
Gough/Hayes	D (45.9)	-	F (86.7)	1.17 (WBL)	E (74.6)	1.15 (WBL)
Franklin/O'Farrell	D (39.3)	-	D (43.2)	-	E (55.9)	1.07 (EB)
Franklin/Market/Page	C (27.2)	-	C (28.7)	-	F (103.7)	1.29 (EBL)
Otis/Mission/S. Van Ness	D (46.1)	-	E (59.3)	1.05 (SBT)	D (51.4)	-
Duboce/Mission/Otis/US 101 Off-Ramp	D (44.4)	-	E (67.1)	1.46 (Off-Ramp WBR)	D (46.4)	-

* Unsignalized intersection.
 Table shows worst approach LOS (Delay) for an unsignalized intersection.
 Table shows intersection LOS (intersection average vehicular delay) for signalized intersections.

Source: Synchro model, CHS Consulting Group, 2011

Significant Project-Specific Impacts. Build Alternatives 3 and 4 with Design Option B would cause significant project-specific impacts at three intersections in Year 2015 as follows:

- Gough/Hayes. This intersection would decline from LOS D under existing conditions to LOS E under 2015 Build Alternatives 3 and 4 with Design Option B (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would operate at LOS F under the 2015 No Build Alternative.
- Franklin/O'Farrell. This signalized intersection would decline from LOS D under existing conditions to LOS E under 2015 Build Alternatives 3 and 4 with Design Option B (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS D under the 2015 No Build Alternative.
- Franklin/Market. This signalized intersection would degrade from LOS C under the existing conditions to LOS F under 2015 Build Alternatives 3 and 4 with Design Option B (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS C under the 2015 No Build Alternative.

Less-than-Significant Project-Specific Impacts. In Year 2015, Build Alternatives 3 and 4 with Design Option B would cause less than significant traffic impacts at the intersections of Gough and Green streets, South Van Ness/Mission/Otis, and the Duboce/Mission/Otis/US 101 Off-Ramp as presented below:

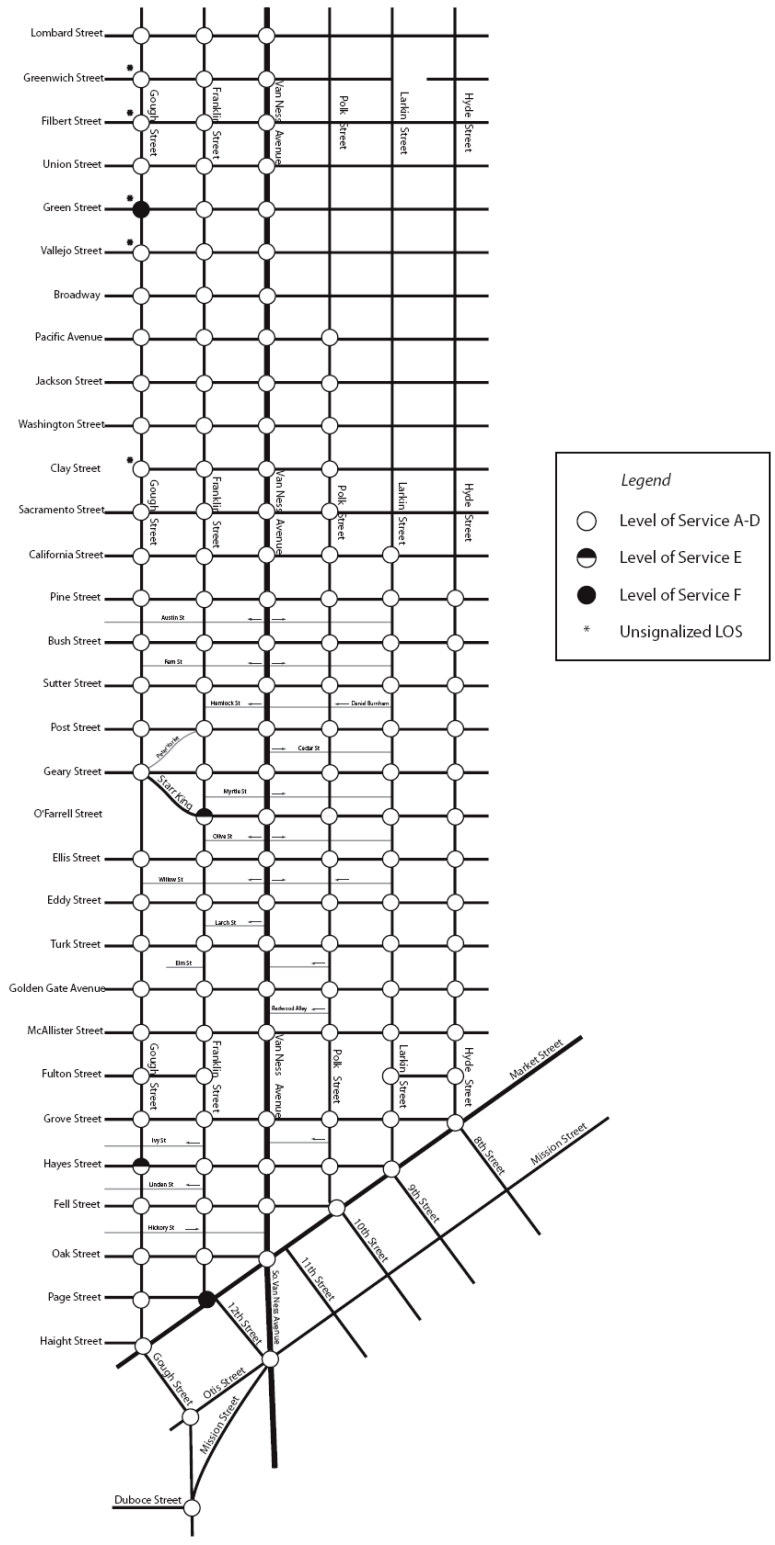
Gough/Green. The SB approach, the worst performing approach at this four-way stop-controlled intersection, would perform at LOS F under both existing conditions and 2015 Build Alternatives 3 and 4 with Design Option B; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing conditions and the 2015 Build Alternatives 3 and 4 with Design Option B (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2015 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operation at this intersection, including adding a traffic signal; removing some on-street parking spaces to create an additional SB approach lane; however, past public outreach has indicated that the community prefers the stop-sign control of the intersection.

South Van Ness/Mission/Otis and Duboce/Mission/Otis/US 101 Off-Ramp. Similar to Build Alternative 2, the intersections of South Van Ness/Mission/Otis and Duboce/Mission/Otis/US 101 off-ramp would decline from LOS D under existing conditions to LOS E under the 2015 No Build Alternative, and then improve to LOS D under Build Alternatives 3 and 4 with Design Option B in Year 2015.

Design Variation between Build Alternative 3 and Build Alternative 4 with Design Option B and Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection.

As discussed in Chapter 2, Van Ness Avenue between Geary and O'Farrell streets under Build Alternative 4 with Design Option B would have the same geometric design as Build Alternative 3 with Design Option B. Due to this transition from a center-running BRT with a single median north of Geary Street to a right-side loading BRT with two medians for this block, the SB Van Ness Avenue exclusive right-turn lane to Geary Street would not be provided under Build Alternative 4 with Design Option B. This intersection operates at LOS B under 2015 Build Alternative 3 with Design Option B. Without the exclusive SB right-turn lane, LOS at this intersection would remain at LOS B under 2015 Build Alternative 4 with Design Option B. The analysis for Build Alternative 4 with Design Option B also serves as the sensitivity analysis if the San Francisco Planning Department were to approve the proposed widening of the sidewalk under Build Alternative 3 with Design Option B, thus requiring the elimination of the exclusive SB right-turn lane onto Geary Street from Van Ness Avenue.

Figure 9 – Near-Term (2015) Build Alternatives 3 and 4 with Design Option B Intersection LOS



3.2.2.2.4 2015 Near-Term Horizon Locally Preferred Alternative (LPA)

Geometry

The Locally Preferred Alternative (LPA) is a refinement of the two center-running build alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B). From a traffic operations perspective, the LPA would have the same roadway geometry as Build Alternatives 3 and 4 with Design Option B, except that the LPA would only have right-turn pockets at three intersections on Van Ness Avenue. These pockets would all be in the SB direction, at Mission/Otis/South Van Ness, Market Street, and Pine Street. Exclusive right-turn lanes would be eliminated at 11 locations along Van Ness Avenue and right-turns could be made from the shared through-and-right lanes in the models at the following locations:

1. NB Market
2. SB McAllister
3. NB Golden Gate
4. NB O'Farrell
5. SB Geary
6. NB Post
7. SB Sutter
8. NB Bush
9. NB California
10. SB Sacramento
11. NB Clay

In addition, the LPA would retain the two SB left-turn pockets at Broadway, similar to Build Alternatives 3 and 4. The LPA could incorporate a design variation (Vallejo Northbound Station Variant) which would have one fewer (2 vs. 3) mixed traffic lane in the southbound direction for the block between Vallejo and Green streets versus the LPA. Under the LPA without the variant, this lane would be used to store left turning traffic onto Broadway. Under the Vallejo Northbound Station Variant, this roadway space would be used by the far side northbound station at Vallejo Street.

Traffic Volumes

The traffic volumes for the 2015 LPA would be the same as the 2015 Build Alternatives 3 and 4 with Design Option B, discussed in Section 3.2.2.2.3. Elimination of right-turn pockets at 11 locations (as compared to Design Option B) would not cause traffic to reroute as these turns could still be made from shared through and right curb lanes at these locations.

Signal Timings

The traffic signal timing and offsets for the LPA were assumed to be the same as the 2015 Build Alternatives 3 and 4 with Design Option B, as discussed in Section 3.2.2.2.3.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2015 LPA.

Traffic Impacts based on Intersection Levels of Service

Under the LPA, four intersections would operate at LOS E or F during the PM peak hour in Year 2015. The LPA would have the same traffic impacts in 2015 as Build Alternatives 3 and 4 with Design Option B. None of the 11 intersections along Van Ness Avenue, where the exclusive right-turn pockets would be eliminated, would have impacts. Analysis and comparison of impacts at these 11 locations are provided in Appendix 14.

Table 19 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F conditions under the Existing Conditions, 2015 No Build Alternative, and 2015 Build Alternative 3 and 4 with Design Option B¹⁴ and the LPA scenarios. Figure 10 presents the 2015 LPA intersection LOS.

Table 19 – No Build to 2015 Locally Preferred Alternative (LPA) Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing Conditions		2015 No Build Alternative		2015 Build Alternatives 3 and 4 with Design Option B		2015 Locally Preferred Alternative (LPA)	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C (Critical Movement)
Gough/Green *	F (76.5)	1.06 (SB)	F (80.3)	1.06 (SB)	F (108.1)	1.15 (SB)	F (108.1)	1.15 (SB)
Gough/Hayes	D (45.9)	-	F (86.7)	1.17 (WBL)	E (74.6)	1.15 (WBL)	E (74.6)	1.15 (WBL)
Franklin/O'Farrell	D (39.3)	-	D (43.2)	-	E (55.9)	1.07 (EB)	E (55.9)	1.07 (EB)
Franklin/Market/Page	C (27.2)	-	C (28.7)	-	F (103.7)	1.29 (EBL)	F (103.7)	1.29 (EBL)
Otis/Mission/S. Van Ness	D (46.1)	-	E (59.3)	1.05 (SBT)	D (51.4)	-	D (51.4)	-
Duboce/Mission/Otis/US 101 Off-Ramp	D (44.4)	-	E (67.1)	1.46 (Off-Ramp WBR)	D (46.4)	-	D (46.4)	-

* Unsignalized intersection.
 Table shows worst approach LOS (Delay) for an unsignalized intersection.
 Table shows intersection LOS (intersection average vehicular delay) for signalized intersections.

Source: Synchro model, CHS Consulting Group, 2011

¹⁴ Since the LPA is a refinement of the 2015 Build Alternatives 3 and 4 with Design Option B, the 2015 Design Option B results are also provided in the table to enable easy comparison of traffic impacts between these scenarios.

Significant Project-Specific Impacts. The LPA would cause significant project-specific impacts at three intersections in Year 2015 as follows:

- Gough/Hayes. This intersection would decline from LOS D under existing conditions to LOS E under the 2015 LPA (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would operate at LOS F under the 2015 No Build Alternative.
- Franklin/O'Farrell. This signalized intersection would decline from LOS D under existing conditions to LOS E under the 2015 LPA (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS D under the 2015 No Build Alternative.
- Franklin/Market. This signalized intersection would degrade from LOS C under the existing conditions to LOS F under the 2015 LPA (representing existing plus project conditions); therefore, the proposed project would cause significant project-specific impacts. This intersection would perform at LOS C under the 2015 No Build Alternative.

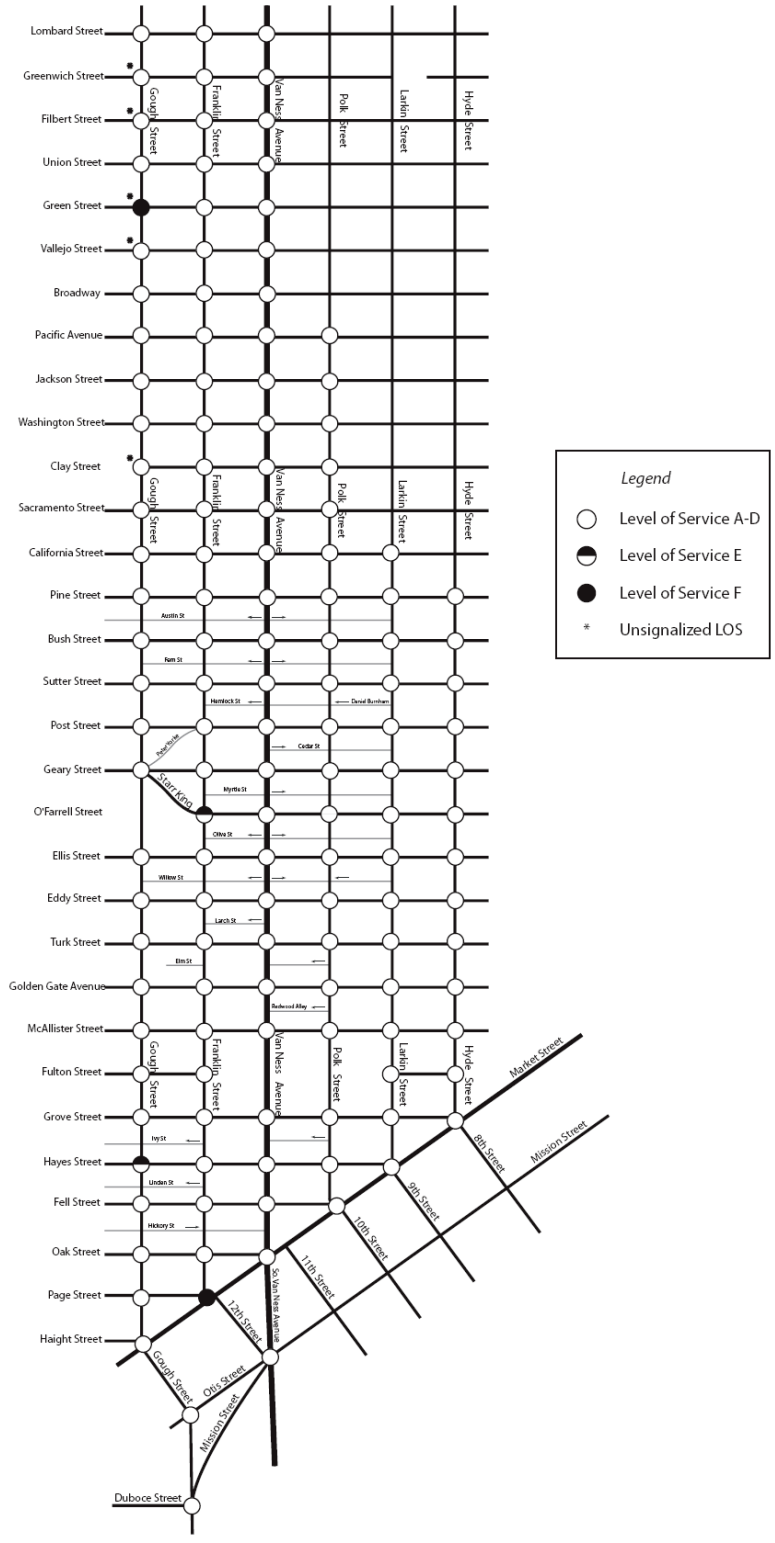
Less-than-Significant Project-Specific Impacts. In Year 2015, the LPA would cause less than significant traffic impacts at the intersection of Gough and Green streets, South Van Ness/Mission/Otis, and the Duboce/Mission/Otis/US 101 Off-Ramp as presented below:

Gough/Green. The SB approach, the worst performing approach at this four-way stop-controlled intersection, would perform at LOS F under both existing conditions and the 2015 LPA; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing conditions and the 2015 LPA (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2015 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operation at this intersection, including adding a traffic signal; removing some on-street parking spaces to create an additional SB approach lane; however, past public outreach has indicated that the community prefers the stop-sign control of the intersection.

South Van Ness/Mission/Otis and Duboce/Mission/Otis/US 101 Off-Ramp. Similar to Build Alternative 2, the intersections of South Van Ness/Mission/Otis and Duboce/Mission/Otis/US 101 off-ramp would decline from LOS D under existing conditions to LOS E under the 2015 No Build Alternative, and then improve to LOS D under the LPA in Year 2015.

LPA Vallejo Northbound Station Variant. The Vallejo Northbound Station Variant would have one fewer (2 vs. 3) mixed traffic lanes in the southbound direction for the block between Vallejo and Green streets versus the LPA. Under the LPA without the variant, this lane would be used to store left turning traffic onto Broadway. Under the Vallejo Northbound Station Variant, that roadway space would be used for the additional far side northbound station at Vallejo Street. In 2015, the Vallejo Intersection would operate at LOS A during the PM Peak under the LPA and would continue to operate at LOS A with implementation of the Vallejo Northbound Station Variant.

Figure 10 – Near-Term (2015) Locally Preferred Alternative (LPA) Intersection LOS



3.3 Long-Term Horizon Year (2035)

This section presents projected traffic conditions in the long-term 2035 scenario for the No Build alternative, three build alternatives and the LPA. It presents long-term horizon year (2035) traffic volumes and assumptions used in traffic projection, future roadway performance, and a summary of the VN BRT Project impacts.

3.3.1 2035 Alternative 1: No Build (Baseline Alternative)

Geometry

The Regional Transportation Plan for San Francisco does not include any roadway capacity improvements within the traffic study area except the Geary BRT Project. Hence, the 2035 No Build Alternative would have the identical roadway network as the 2015 No Build Alternative as discussed under Section 3.2.1.

Traffic Volumes

As described in Section 1.5, Methodology to Develop Synchro Models, SFCTA provided average annual growth factors between the years 2005 and 2035 from the SF-CHAMP model for each north-south street in four different sections and for the east-west streets by facility type. As seen in Table 20, traffic volumes along Van Ness Avenue would increase by approximately 0.42 to 1.12 percent annually from the 2007 levels. Traffic volumes along the east-west streets would increase by approximately 0.05 to 1.49 percent annually. There would be higher increases along collector streets than arterial roads. These growth factors were applied to the existing counts to obtain future traffic volumes for each intersection. The forecasted traffic volumes were balanced within the traffic study area to ensure equilibrium of upstream and downstream traffic volumes within the study area.

Traffic volumes for the intersections in the vicinity of the proposed CPMC hospital and medical office building were modified to reflect the projected vehicle trip generation from these two buildings as reported in the CPMC EIR for the 2035 build alternatives. In particular, traffic volumes were modified at intersections along Geary Street, and at the Franklin/O'Farrell and Van Ness/Pine intersections.

Table 20 – Long-Term (2035) Average Annual Traffic Growth Factors – No Build Alternative

Southbound	Average Annual Growth Factor					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	0.37%	-	0.55%	-	-	-
Broadway to Eddy	0.32%	-	0.59%	0.39%	0.27%	0.50%
Eddy to Market	0.53%	-	0.60%	0.73%	-	0.65%
South of Market	0.29%	-	0.42%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	0.69%	0.41%	0.81%	-	-	-
Broadway to Eddy	0.51%	0.41%	1.12%	1.92%	0.50%	0.47%
Eddy to Market	-	0.53% (0.71%)	0.88%	5.66% (0.71%)	1.16% (0.71%)	-
South of Market	1.89%	-	0.98%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	0.27%	0.56%	1.49%	0.70%	0.25%	
WESTBOUND	0.44%	0.40%	1.14%	0.05%	0.21%	

Source: SFCTA CHAMP forecasting model.
Percentages shown are annual increases starting from the 2005 CHAMP model conditions. In general, assumed growth is relatively high from 2005-2015 and slow from 2015-2035.
Note: the SFCTA growth factor on was modified to accommodate the high annual growth factor on northbound Polk (5.6 percent annual growth factor) as provided by SFCTA. Changes shown in (XX%).

SOURCE: SFCTA CHAMP Forecasting Model

The 2035 Build Alternative 1 Synchro model assumes the same pedestrian volume and parking maneuvers as the 2015 No Build Alternative 1 Synchro model.

Signal Timings

The traffic signal cycle length and phasing for the 2035 No Build Alternative were the same as the 2015 No Build Alternative (Please refer to Section 3.2.1). However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O’Farrell Street. Geary Boulevard and O’Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O’Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2035 No Build Alternative.

3.3.1.1 Vehicular Travel Speed

Under the 2035 No Build Alternative, vehicular travel speeds would decrease along all streets except northbound Polk Street. Speeds would increase slightly on northbound Polk Street because the synchronization of the Polk Street signals could be improved over the current conditions.

Table 21 – 2035 No Build Southbound Average Speed

Street	Average Speed (Mph)	
	Existing Conditions	2035 No Build
Gough	8.4	7.5
Franklin	-	-
Van Ness	7.7	6.6
Polk	8.9	8.1
Larkin	-	-
Hyde	8.5	7.6

Source: Synchro model, CHS Consulting Group, 2011

Table 22 – 2035 No Build Northbound Average Speed

Street	Average Speed (Mph)	
	Existing Conditions	2035 No Build
Gough	-	-
Franklin	10.1	9.1
Van Ness	10.5	8.9
Polk	9.1	8.8
Larkin	9.5	9.5
Hyde	-	-

Source: Synchro model, CHS Consulting Group, 2011

3.3.1.2 PM Peak Intersection Levels of Service

Under the No Build Alternative, seven intersections would operate at LOS E or F during the PM peak hour in Year 2035. Table 23 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F under the Existing Conditions and 2035 No Build Alternative. Figure 11 presents the 2035 No Build Alternative intersection LOS.

Table 23 – 2007 Existing Condition and 2035 No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	2007 Existing		2035 No Build	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C
Gough/ Green	F (76.5)	1.05 (SB)	F (93.6)	1.10 (SB)
Gough/ Hayes	D (45.9)	-	F (98.1)	1.23 (WBL)
Franklin/Pine	D (39.5)	-	E (66.7)	1.03 (NB)
Franklin/ O'Farrell	D (39.3)	-	E (77.5)	1.08 (EB/NB)
Van Ness/Pine	C (26.1)	-	E (64.9)	1.01 (SB)
Otis/ Mission/S Van Ness	D (46.1)	-	E (74.0)	1.09 (Mission to Van Ness EBL and Otis WBR)
Duboce/ Mission/ Otis/ US101 Off-Ramp	D (44.4)	-	F (115.2)	1.91 (Off-Ramp WBR)

Source: Synchro model, CHS Consulting Group, 2011

The traffic study area intersections that would operate at LOS E or F conditions are described below:

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under existing conditions and the 2015 and 2035 No Build Alternative.
- Gough/Hayes. This signalized intersection would decline from LOS D under existing conditions to LOS F under both the 2015 and 2035 No Build Alternative.
- Franklin/Pine. This signalized intersection would slightly improve from LOS D under existing conditions to LOS C under the 2015 No Build Alternative and decline to LOS E under 2035 No Build Alternative.
- Franklin/O'Farrell. This signalized intersection would decline from LOS D under existing conditions and the 2015 No Build Alternative to LOS E under 2035 No Build Alternative.
- Van Ness/Pine. This signalized intersection would decline from LOS C under existing conditions and the 2015 No Build Alternative to LOS E under 2035 No Build Alternative.
- South Van Ness/Mission/Otis. This signalized intersection would decline from LOS D under existing conditions to LOS E under the 2015 and 2035 No Build Alternatives.
- Duboce/Mission/Otis/US 101 Off-Ramp. This signalized intersection would decline from LOS D under existing conditions and LOS E under the 2015 No Build Alternative to LOS F under 2035 No Build Alternative.

3.3.2 2035 Horizon Year Build Alternatives

A brief discussion of the assumed geometry for Synchro models, traffic volume modifications, traffic signal timing modifications, and vehicular traffic impacts for each of the 2035 build alternatives and the LPA is presented below. The following sections analyze the cumulative traffic impacts of the three build alternatives and the LPA, describing anticipated changes to vehicular travel speed, intersection delay, and LOS.

3.3.2.1 Travel Speed: Build Alternatives

As seen in the 2035 No Build Alternative, the average travel speed for all the NB and SB streets in the 2035 build alternatives would decline in comparison to the existing conditions. As seen in Table 24 and Table 25, a comparison of the existing conditions and 2035 build alternatives speed shows the following:

- The speed along SB Gough Street would decrease by approximately 2 mph, and the speed along NB Franklin Street would decrease between 2.8 mph and 3 mph under Year 2035 Build Alternative 2 and 2035 Build Alternatives 3 and 4, respectively, when compared to the existing conditions. Speed along these corridors would decrease the most (2.5 mph on Gough Street and 3.9 mph on Franklin Street) under Year 2035 Build Alternatives 3 and 4 with Design Option B and the LPA. This would occur due to the diversion of most left-turning traffic from Van Ness Avenue to these parallel streets after the elimination of most left-turn opportunities on Van Ness Avenue under Year 2035 Build Alternatives 3 and 4 with Design Option B and the LPA.
- Speed along SB Polk and Hyde streets would decrease between 1.1 mph and 1.5 mph in all three build alternatives and the LPA in Year 2035 when compared with the existing conditions.
- Speed along NB Polk and Larkin streets would decrease between 0.3 and 0.8 mph in all three build alternatives and the LPA in Year 2035 when compared with the existing conditions. Speed along NB Polk Street under the build alternatives and the LPA would be similar to the speed in the 2035 No Build Alternative.
- Speed along Van Ness Avenue in both directions would decrease between 1.2 and 1.9 mph in Year 2035 Build Alternative 2 and Build Alternatives 3 and 4 with Design Option B, and the LPA, when compared with the existing conditions. This speed along Van Ness Avenue under these two alternatives and the LPA would be similar to the speed under the 2035 No Build Alternative (± 0.3 mph). Speed along Van Ness Avenue in both directions would decrease the most (2.1 to 3 mph) under Year 2035 Build Alternatives 3 and 4. This is mainly due to the increase in traffic volumes for NB left turns from Van Ness Avenue and changes in signal timing and phasing for these left turns. Left turns at these intersections can only be made under a protected phase.
- Travel speed for the 2035 LPA would be identical to the Year 2035 Build Alternatives 3 and 4 with Design Option B for all arterials except Van Ness Avenue. Under the 2035 LPA, the SB Van Ness Avenue speed would be the same as 2035 Build Alternative 4, without a SB right turn pocket on Van Ness at Geary. However, the speed would be 0.1 mile lower than the 2015 Build Alternative 3. NB Van Ness Avenue speed would decrease slightly from 9.0 mph in Design Option B to 8.8 mph in the LPA (0.2 mph decrease). These small changes in speed may be attributed to the increase in right turn traffic making turns from the shared lane, thus slightly decreasing the speed of all movement in the curb lane.
- Travel speed along SB Van Ness Avenue under the LPA Vallejo Northbound Station Variant, with one less SB Van Ness Avenue through lane at Vallejo Street, would be the same as the LPA speed. This approach performs at LOS A with three lanes and would continue to perform at LOS A with two lanes. This shows that the SB movement may have enough capacity to serve the 2015 LPA traffic with just 2 lanes.



Table 24 – 2015 Southbound Average Speed

Street	Average Speed (Mph)					
	Existing Conditions	No Build (Alternative 1)	Side-Lane BRT (Alternative 2)	Center-Lane BRT (Alternatives 3 And 4)	Center-Lane BRT With Design Option B (Alternatives 3 And 4)	LPA ²
Gough	8.4	7.5	6.1	6.5	5.9	5.9
Franklin	-	-	-	-	-	
Van Ness	7.7	6.6	6.5	5.6/ 5.6*	6.6/ 6.5*	6.5
Polk	8.9	8.1	7.7	7.8	7.6	7.6
Larkin	-	-	-	-	-	
Hyde	8.5	7.6	7.0	7.2	7.2	7.2
<p>1. The two speeds shown on Van Ness Avenue represent Build Alternative 3/Build Alternative 4. The difference in speed is due to the lack of a right-turn pocket for SB traveling vehicles at Geary and Van Ness under Build Alternative 4. Speeds are the Same Between Build Alternatives 3 And 4 for all other streets.</p> <p>2. The LPA Vallejo Northbound Station Variant, with one less Van Ness Avenue southbound through lane at Vallejo Street, has the same speed as the LPA for all the streets including Van Ness Avenue.</p>						

Source: Synchro model, CHS Consulting Group, 2011

Table 25 – 2015 Northbound Average Speed

Street	Average Speed (Mph)					
	Existing Conditions	No Build (Alternative 1)	Side-Lane BRT (Alternative 2)	Center-Lane BRT (Alternatives 3 And 4)	Center-Lane BRT With Design Option B (Alternatives 3 And 4)	LPA ¹
Gough	-	-	-	-	-	-
Franklin	10.1	9.1	7.1	7.3	6.2	6.2
Van Ness	10.5	8.9	8.6	7.5	9.0	8.8
Polk	9.1	8.8	8.5	8.5	8.5	8.5
Larkin	9.5	9.5	9.2	8.8	8.7	8.7
Hyde	-	-	-	-	-	-
<p>1. The LPA Vallejo Northbound Station Variant, with one less Van Ness Avenue southbound through lane at Vallejo Street, has the same speed as the LPA for all the streets including Van Ness Avenue.</p>						

Source: Synchro model, CHS Consulting Group, 2011

3.3.2.2 Traffic Impacts: 2035 Build Alternatives

This section presents the cumulative traffic impacts and the project traffic impacts in year 2035 for the build alternatives. Implementation of each of the proposed build alternatives and the LPA is anticipated to result in adverse traffic effects, some of which are considered significant impacts based on the impact significance thresholds established in the San Francisco Traffic Impact Analysis Guidelines for Environmental Review (see Section 3.1). The cumulative traffic growth due to development projects by year 2035 would cause cumulative significant impacts only if the LOS for the 2035 build alternatives and the LPA would be worse than the existing conditions. The VN BRT Project would cause significant project impacts only if the LOS for the 2035 build alternatives would be worse than the 2035 No Build Alternative based on the significance criteria presented in Section 3.1, or if a project-specific impact was already identified in Year 2015 (representing existing-plus-project conditions). Other adverse traffic effects that would result from the proposed build alternatives and the LPA considered less than significant per the San Francisco impact significance thresholds are also identified in the following subsections. Intersections that would continue to operate at LOS E or F in the build alternatives, but are not impacted by project traffic based on the significance criteria, are identified below as less than significant impacts.

3.3.2.2.1 2035 Long-Term Build Alternative 2: Side Lane BRT with Street Parking

Geometry:

The 2035 Build Alternative 2 assumes the same geometry as the 2015 Build Alternative 2 as discussed under Section 3.2.2.2.1.

Traffic Volumes:

Under the long-term 2035 Build Alternative 2, traffic volumes along Van Ness Avenue would decrease to approximately 70% to 75% of 2035 No Build Alternative levels due to the loss of one travel lane (



Table 26). However, traffic volumes along north-south streets parallel to Van Ness Avenue would experience an increase when compared with the 2035 No Build Alternative. Traffic along the east-west streets would decrease to approximately 99% of 2035 No Build Alternative levels along eastbound Local Streets and westbound Super Arterials and Major Arterials, based on the SF-CHAMP model forecasts. Traffic along other east-west streets would increase to approximately 101% to 120% of 2035 No Build Alternative levels

These percentage changes were applied to the 2035 No Build Alternative volumes to obtain the initial 2035 Alternative 2 traffic volumes for each intersection. The initial traffic volumes were then manually adjusted to reflect the proposed circulation patterns for Build Alternative 2 (such as reduction in left turn opportunities) as described under Section 1.5, “Methodology to Develop Synchro Models.” Finally, the traffic volumes were balanced within the traffic study area to ensure equilibrium of upstream and downstream traffic volumes within the study area.

Traffic volumes for the intersections in the vicinity of the proposed CPMC hospital and medical office building were modified to reflect the projected vehicle trip generation from these two buildings as reported in the CPMC EIR for the 2035 build alternatives. In particular, traffic volumes were modified at intersections along Geary Street, and at the Franklin/O’Farrell and Van Ness/Pine intersections.



Table 26 – Long-Term (2035) Change in Traffic Volumes – From 2035 No Build to 2035 Build Alternative 2

Southbound	Percentage Change In Traffic Volumes					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	102.30%	-	74.01%	-	-	-
Broadway to Eddy	103.18%	-	70.41%	101.98%	104.10%	103.62%
Eddy to Market	103.40%	-	69.71%	104.01%	-	105.00%
South of Market	103.98%	-	75.15%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	110.08%	105.50%	73.59%	-	-	-
Broadway to Eddy	102.98%	102.69%	70.52%	105.47%	102.88%	101.16%
Eddy to Market	-	102.19%	70.03%	111.30%	103.57%	-
South of Market	104.81%	-	74.96%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	99.10%	100.16%	120.15%	101.02%	96.73%	
WESTBOUND	100.03%	100.92%	103.67%	99.28%	99.49%	

SOURCE: SFCTA CHAMP Forecasting Model

The 2035 Build Alternative 2 Synchro model assumes the same pedestrian volume and parking maneuvers as the 2015 Build Alternative 2 Synchro model

Signal Timings:

The traffic signal cycle length and phasing for the 2035 Build Alternative 2 would be the same as the 2035 No Build Alternative. However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O’Farrell Street. Geary Boulevard and O’Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O’Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2035 Build Alternative 2.

Traffic Impacts Based on Intersection Levels of Service

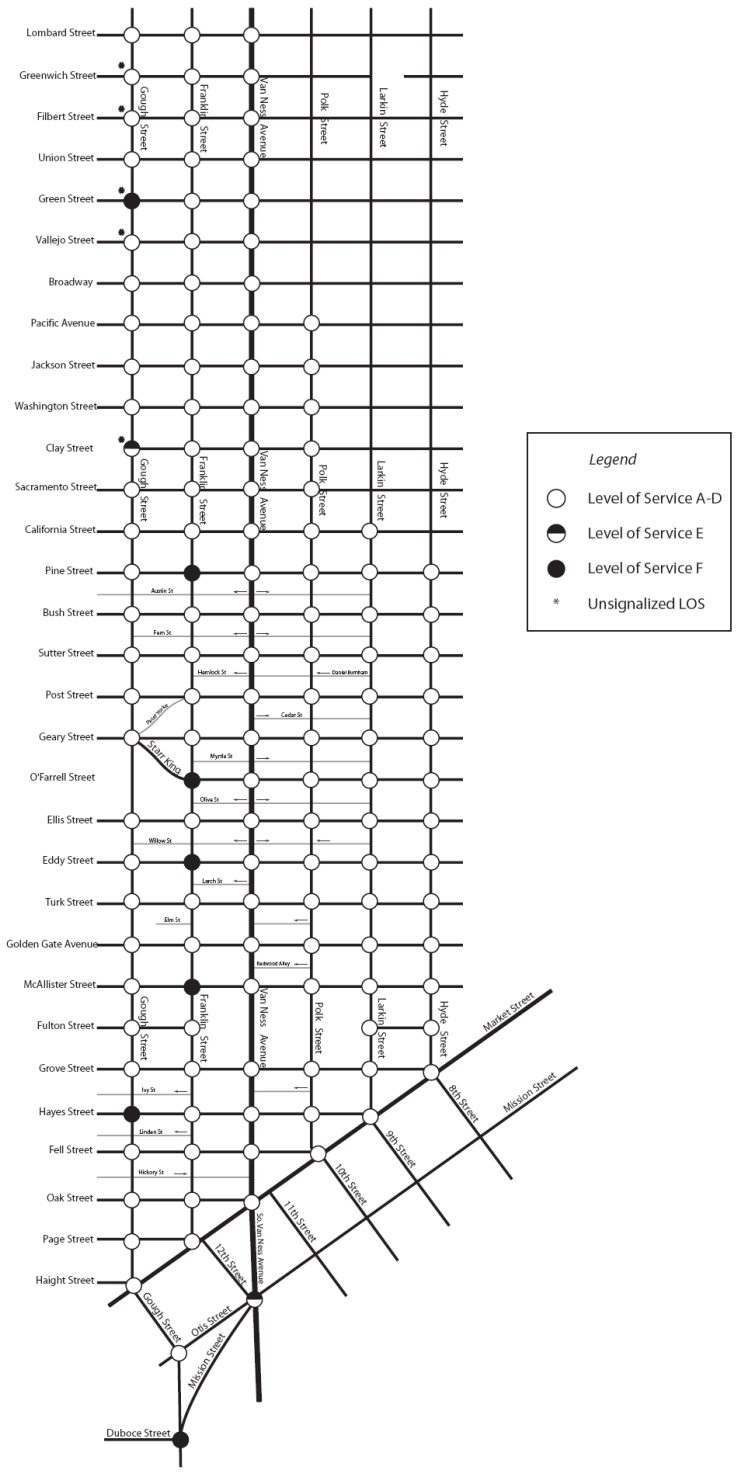
Under Build Alternative 2, nine intersections would operate at LOS E or F during the PM peak hour in Year 2035. Table 27 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F under the Existing Conditions, 2035 No Build Alternative and 2035 Build Alternative 2. Figure 12 presents the 2035 Build Alternative 2 intersection LOS.

Table 27 – 2035 Build Alternative 2 (Side Lane BRT) and No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing		2035 No Build		2035 Build Alternative 2	
	Los (Delay)	Critical V/C (Critical Movement)	Los (Delay)	Critical V/C	LOS (Delay)	Critical V/C
Gough/ Green	F (76.5)	1.05 (SB)	F (93.6)	1.10 (SB)	F (131.0)	1.20 (SB)
Gough/ Clay	C (23.9)	-	D (29.8)	-	E (38.5)	0.4 (WBL)
Gough/ Hayes	D (45.9)	-	F (98.1)	1.23 (WBL)	F (177.4)	1.40 (SB)
Franklin/ Pine	D (39.5)	-	E (66.7)	1.03 (NB)	F (88.7)	1.11 (WB)
Franklin/ O'Farrell	D (39.3)	-	E (77.5)	1.08 (EB/NB)	F (133.1)	1.19 (EB)
Franklin/ Eddy	B (10.7)	-	C (24.1)	-	F (105.9)	1.10 (NB)
Franklin/ McAllister	B (15.7)	-	C (29.7)	-	F (90.2)	1.14 (NB)
Van Ness/Pine	C (26.1)	-	E (64.9)	1.01 (SB)	D (53.9)	-
Otis/ Mission/ S Van Ness	D (46.1)	-	E (74.0)	1.09 (Mission to Van Ness EBL and Otis WBR)	E (65.7)	1.08 (SBT and Mission to Van Ness EBL)
Duboce/ Mission/ Otis/ US101 off-ramp	D (44.4)	-	F (115.2)	1.91 (Off-Ramp WBR)	F (93.5)	1.69 (Off-Ramp WBR)

Source: Synchro model, CHS Consulting Group, 2011

Figure 12 – Long-Term (2035) Build Alternative 2 Intersection LOS



Significant Cumulative Impacts. Based on the significance criteria, the project traffic under Build Alternative 2 in the Year 2035 would cause significant cumulative impacts at five intersections as follows:

- Gough/Hayes. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternative 2. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/Pine. This signalized intersection would decline from LOS D under existing conditions to LOS F under 2035 Build Alternative 2; therefore, this intersection would have significant cumulative impacts under 2035 Build Alternative 2. Furthermore, this signalized intersection would decline from LOS E under the 2035 No Build Alternative to LOS F under 2035 Build Alternative 2; therefore, the proposed project would cause significant cumulative impacts.
- Franklin/O'Farrell. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternative 2. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/Eddy. This signalized intersection would decline from LOS B under existing conditions to LOS F under 2035 Build Alternative 2; therefore, this intersection would have significant cumulative impacts under 2035 Build Alternative 2. Furthermore, this signalized intersection would decline from LOS C under the 2035 No Build Alternative to LOS F under 2035 Build Alternative 2; therefore, the proposed project would cause significant cumulative impacts.
- Franklin/McAllister. This signalized intersection would decline from LOS B under the existing conditions to LOS F under 2035 Build Alternative 2; therefore, this intersection would have cumulative impacts under 2035 Build Alternative 2. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternative 2; therefore, the proposed project would cause significant cumulative impacts.

Less-than-Significant Cumulative Impacts. Five additional intersections would operate at LOS E or F under Build Alternative 2 in the 2035 ; however, the contribution of project traffic is not significant based on the significance criteria. The intersections with less-than-significant project impacts include:

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both the existing condition and 2035 Build Alternative 2; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing conditions and 2035 Build Alternative 2 (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2035 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operation at this intersection, including adding a traffic signal; removing some on-street parking spaces to create an additional SB approach lane; however, removing parking would worsen pedestrian conditions by eliminating the buffer provided by parked cars separating the sidewalk from the traffic lane, as discussed in Section 4 and past public outreach has indicated that the community prefers the stop-sign control of the intersection.
- Gough/Clay. The WB Clay Street approach at this unsignalized intersection would perform at LOS C under the existing conditions and would decline to LOS E at the worst approach under 2035 Build Alternative 2; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing conditions and 2035 Build Alternative 2 (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. Potential options that may be used to improve traffic operations of this intersection include

adding a traffic signal, removing some on-street parking spaces on Clay Street to create an additional WB-to-SB approach lane, or widening Gough Street SB to two lanes by removing on-street parking spaces; however, these improvements would have the adverse effect of parking removal on pedestrian conditions along Clay and/or Gough Streets and are not recommended.

- South Van Ness/Mission/Otis. This signalized intersection would perform at LOS D under existing conditions and would decline to LOS E under Build Alternative 2; therefore, this intersection would have cumulative impacts under 2035 Build Alternative 2. Furthermore, this signalized intersection would perform at LOS E under both 2035 No Build Alternative and Build Alternative 2 conditions; however, the contribution of project traffic is less than 5 percent to all critical movements (Appendix 12). Thus, based on the significance criteria, the proposed project would cause less than significant cumulative impacts. The LOS cannot be improved because there is no ROW available to add lanes at this intersection, and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements.
- Duboce/Mission/Otis/US 101 Off-Ramps. This signalized intersection would decline from LOS D under existing conditions to LOS F under Build Alternative 2; therefore, this intersection would have cumulative impacts under 2035 Build Alternative 2. Furthermore, this signalized intersection would perform at LOS F under both 2035 No Build Alternative and Build Alternative 2; however, the project does not contribute traffic to any critical movement that performs at LOS E or F (Appendix 12). Thus, based on the significance criteria, the proposed project would cause less than significant cumulative impacts. The LOS cannot be improved because there is no ROW available to add lanes at this intersection, and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements.
- Van Ness/Pine. The intersections of Van Ness and Pine would decline from LOS C under existing conditions to LOS E under 2035 No Build Alternative, and then improve to LOS D under Build Alternative 2. This decline in performance between the existing conditions and 2035 No Build Alternative is due to growth in background traffic. The improved performance between 2035 No Build Alternative and 2035 Build Alternative 2 is mainly due to traffic diversion away from the intersection.

Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection: In anticipation of expected developments, the San Francisco Planning Department proposes to widen the sidewalk on the west side of Van Ness Avenue between Post and Geary streets. This proposed widening would necessitate removal of the Van Ness Avenue SB exclusive right-turn lane onto Geary Street. A sensitivity analysis has been performed, assuming the proposed sidewalk widening occurs. With the approved sidewalk widening and removal of exclusive right-turn lane, LOS at this intersection would remain unchanged at LOS B.

3.3.2.2.2 2035 Long-Term Build Alternatives 3 and 4: Center Lane BRT Configuration

Geometry:

The 2035 Build Alternatives 3 and 4 assume the same geometry as the 2015 Build Alternatives 3 and 4, as discussed under Section 3.2.2.2.2.

Traffic Volumes:

Under the long-term 2035 Build Alternatives 3 and 4, traffic volumes along Van Ness Avenue would decrease to approximately 70% to 75% of 2035 No Build Alternative levels (Table 28). However, traffic volumes along north-south streets parallel to Van Ness Avenue would experience an increase when compared with the 2035 No Build Alternative. Traffic volumes along the east-west streets would decrease between approximately 97% to just below 100% of the 2035 No Build Alternative levels along

westbound Local Streets, Super Arterials and eastbound Major Arterials based on the SF-CHAMP model forecasts. Traffic along other east-west streets would increase to approximately 101% to 121% of the 2035 No Build Alternative levels

These percentage changes were applied to the 2035 No Build Alternative volumes to obtain the initial 2035 Alternatives 3 and 4 traffic volumes for each intersection. The initial traffic volumes were then manually adjusted to reflect the proposed circulation patterns for Build Alternatives 3 and 4 (such as reduction in left turn opportunities) as described under Section 1.5, Methodology to Develop Synchro Models. Finally, the traffic volumes were balanced within the traffic study area to ensure equilibrium of traffic volumes within the study area.

Traffic volumes for the intersections in the vicinity of the proposed CPMC hospital and medical office building were modified to reflect the projected vehicle trip generation from these two buildings as reported in the CPMC EIR for the 2035 build alternatives. In particular, traffic volumes were modified at intersections along Geary Street, and at the Franklin/O’Farrell and Van Ness/Pine intersections.

Table 28 – Long-Term (2035) Change in Traffic Volumes – From 2035 No Build to 2035 Build Alternatives 3 and 4

Southbound	Percentage Change In Traffic Volumes					
	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	102.65%	-	74.24%	-	-	-
Broadway to Eddy	102.94%	-	70.60%	102.12%	104.39%	103.81%
Eddy to Market	103.53%	-	69.55%	104.00%	-	104.71%
South of Market	104.20%	-	75.10%	-	-	-
Northbound	Gough	Franklin	Van Ness	Polk	Larkin	Hyde
Lombard to Broadway	107.80%	105.54%	74.41%	-	-	-
Broadway to Eddy	103.35%	102.70%	70.83%	106.12%	103.29%	100.96%
Eddy to Market	-	102.17%	70.15%	113.26%	103.70%	-
South of Market	104.18%	-	75.16%	-	-	-
	Local	Minor Arterial	Collector	Super Arterial	Major Arterial	
EASTBOUND	100.02%	100.47%	121.45%	100.85%	97.41%	
WESTBOUND	99.90%	100.88%	104.12%	99.33%	99.61%	

SOURCE: SFCTA CHAMP Forecasting Model

The 2035 Alternatives 3 and 4 Synchro model assumes the same pedestrian volume and parking maneuvers as the 2015 Build Alternatives 3 and 4 model.

Signal Timings:

The traffic signal cycle length and phasing for the 2035 Alternatives 3 and 4 would be the same as the 2015 Build Alternatives 3 and 4 discussed under Section 3.2.2.2.2. However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study

area except along Geary Boulevard and O'Farrell Street. Geary Boulevard and O'Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O'Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2035 Build Alternatives 3 and 4.

Traffic Impacts based on Intersection Levels of Service

Under Build Alternatives 3 and 4, twelve intersections would operate at LOS E or F during the PM peak hour in 2035. Table 29 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F conditions under the Existing Conditions, 2035 No Build Alternative and 2035 Build Alternatives 3 and 4. Figure 13 presents the 2035 Build Alternatives 3 and 4 intersection LOS for all intersections.

Table 29 – 2035 Build Alternatives 3 and 4 (Center Lane BRT) and No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing		2035 No Build		2035 Build Alternatives 3 And 4	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C	LOS (Delay)	Critical V/C
Gough/ Green	F (76.5)	1.05 (SB)	F (93.6)	1.10 (SB)	F (105.8)	1.13 (SB)
Gough/ Sacramento	C(27.1)	-	C (25.2)	-	F (81.6)	1.06 (EBL)
Gough/ Eddy	A (8.9)	-	B (14.8)	-	E (55.6)	1.00 (SB)
Gough/ Hayes	D (45.9)	-	F (98.1)	1.23 (WBL)	F (122.0)	1.29 (WBL)
Franklin/ Pine	D (39.5)	-	E (66.7)	1.03 (WB)	E (77.7)	1.05 (WB)
Franklin/ O'Farrell	D (39.3)	-	E (77.5)	1.08 (EB/NB)	F (125.7)	1.16 (NB)
Franklin/ Eddy	B (10.7)	-	C (24.1)	-	F (102.0)	1.07 (NB)
Franklin/ McAllister	B (15.7)	-	C (29.7)	-	F (91.4)	1.14 (NB)
Van Ness/Pine	C (26.1)	-	E (64.9)	1.01 (SB)	E (59.4)	0.99 (NBL)
Van Ness/ Hayes	B (17.9)	-	D (47.7)	-	E (74.0)	1.69 (NBL)
Otis/ Mission/ S Van Ness	D (46.1)	-	E (74.0)	1.09 (Mission EBL and SWR)	F (128.2)	1.37 (Mission EBL/EBT)
Duboce/ Mission/ Otis/ US101 Off-Ramp	D (44.4)	-	F (115.2)	1.91 (Off-Ramp WBR)	F (97.9)	1.74 (Off-Ramp WBR)

Source: Synchro model, CHS Consulting Group, 2011

Significant Cumulative Impacts. The VN BRT Project would cause significant cumulative impacts at eight study intersections under 2035 Build Alternatives 3 and 4:

- Gough/Sacramento. This signalized intersection would decline from LOS C under existing conditions to LOS F under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Eddy. This signalized intersection would decline from LOS A under existing conditions to LOS E under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. This signalized intersection would decline from LOS B under 2035 No Build Alternative to LOS E under 2035 Build Alternatives 3 and 4; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Hayes. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/O'Farrell. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/Eddy. This signalized intersection would decline from LOS B under existing conditions to LOS F under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. This signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4; therefore, the proposed project would cause significant cumulative impacts.
- Franklin/McAllister. This signalized intersection would decline from LOS B under existing conditions to LOS F under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. This signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4; therefore, the proposed project would cause significant cumulative impacts.
- Van Ness/Hayes. This signalized intersection would decline from LOS B under existing conditions to LOS E under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. This signalized intersection would decline from LOS D under 2035 No Build Alternative to LOS E under 2035 Build Alternatives 3 and 4; therefore, the proposed project would cause significant cumulative impacts.
- South Van Ness/Mission/Otis. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.

Less-than-Significant Cumulative Impacts. Four additional intersections would operate at LOS E or F under Build Alternative 2 in the 2035 ; however, the contribution of project traffic is not significant based on the significance criteria. The intersections with less than significant project impacts include:

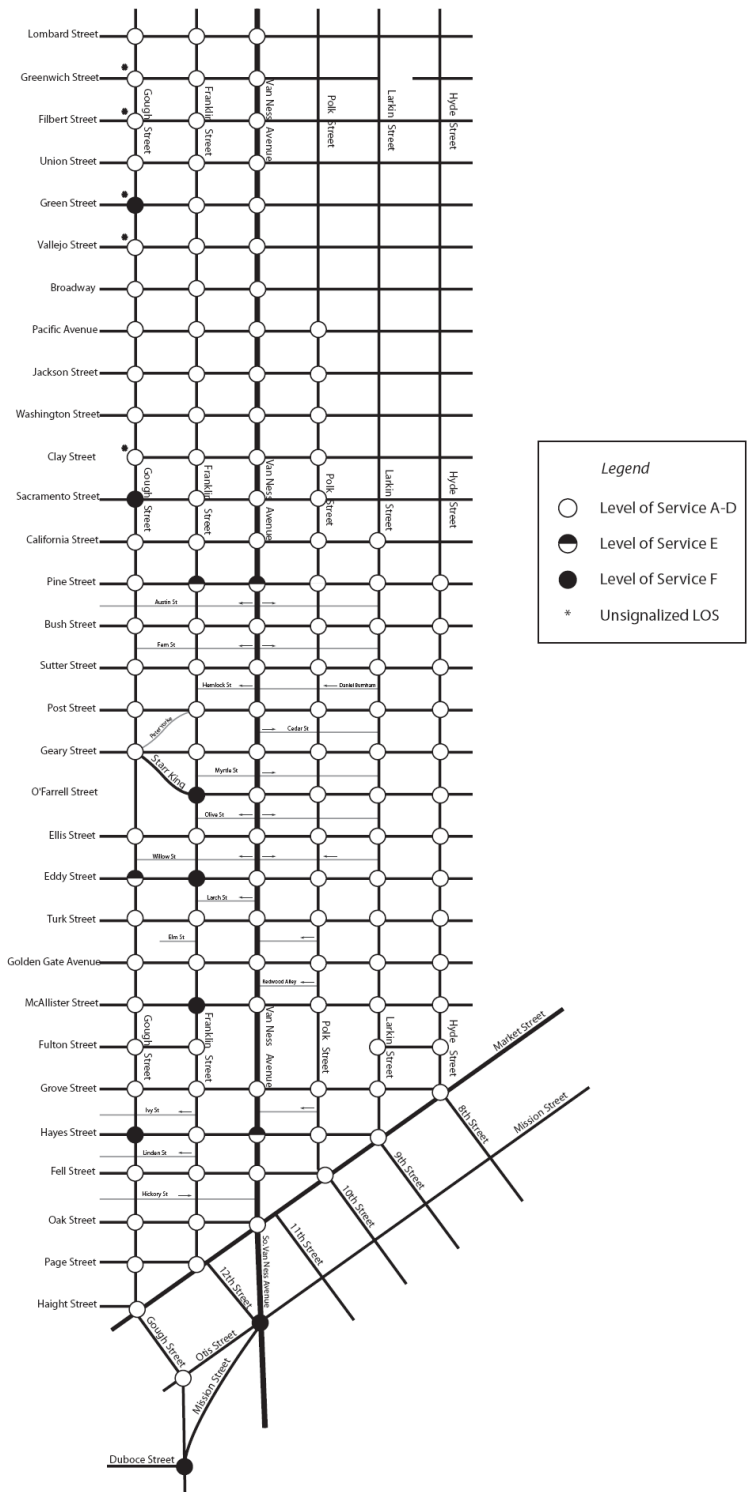
- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both existing conditions and 2035 Build Alternatives 3 and 4; however, the intersection would not meet the Caltrans peak-hour signal warrant under both existing conditions and 2035 Build Alternatives 3 and 4 (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The SB approach would also operate at LOS F under 2035 No Build Alternative. There are several possibilities to improve traffic operations at this intersection, including adding a traffic signal; removing some



on-street parking spaces to create an additional SB approach lane; however, removing parking would worsen pedestrian conditions by eliminating the buffer provided by parked cars separating the sidewalk from the traffic lane, as discussed in Section 4 and past public outreach has indicated that the community prefers the stop-sign control of the intersection.

- Franklin/Pine. This signalized intersection would degrade from LOS D under existing conditions to LOS E under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would perform at LOS E under 2035 No Build Alternative and Build Alternatives 3 and 4; however, the project does not contribute traffic to any critical movement that performs at LOS E or F (Appendix 12). Thus, based on the significance criteria, the proposed project would cause less than significant cumulative impacts. One potential improvement measure is providing an exclusive WB right-turn lane from Van Ness Avenue to Franklin Street. This can be implemented by instituting a PM peak-hour tow-away zone along the north side of Pine between Van Ness Avenue and Franklin Street; however, this would have the adverse effect of parking removal on pedestrian conditions along Franklin Street.
- Van Ness/Pine. This signalized intersection would perform at LOS C under existing conditions and degrade to LOS E under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would perform at LOS E under 2035 No Build Alternative and Build Alternatives 3 and 4. The contribution of project traffic to the critical movement is not significant (i.e., no project traffic added to any critical movement) (Appendix 12); therefore, the proposed project would not cause significant cumulative impacts. One potential improvement measure is providing an exclusive WB right-turn storage lane of 50 feet. This can be implemented by eliminating two parking spaces on the north side of Pine Street; however, this mitigation measure is not recommended due to the adverse effects of parking removal on pedestrian conditions along Pine Street.
- Duboce/Mission/Otis/US 101 Off-Ramps. This signalized intersection would perform at LOS D under existing conditions and degrade to LOS F under 2035 Build Alternatives 3 and 4; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would perform at LOS F under 2035 No Build Alternative and Build Alternatives 3 and 4. However, the project does not contribute traffic to any critical movement that performs at LOS E or F (Appendix 12); therefore, the proposed project would not cause significant cumulative impacts. The LOS cannot be improved because there is no ROW available to add lanes at this intersection, and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements. This intersection would experience a reduction in traffic volumes under Build Alternatives 3 and 4 in 2035 caused by the diversion of traffic volumes from Van Ness Avenue.

Figure 13 – Long-Term (2035) Build Alternatives 3 and 4 Intersection LOS



Design Variation between Build Alternative 3 and Build Alternative 4 and Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection. As discussed in Chapter 2, Van Ness Avenue between Geary and O'Farrell streets under Build Alternative 4 would have the same geometric design as Build Alternative 3. Due to this transition from a center-running BRT with a single median north of Geary Street to a right-side loading BRT with two medians for this block, the SB Van Ness Avenue exclusive right-turn lane to Geary Street would not be provided under Build Alternative 4. This intersection operates at LOS B under 2035 Build Alternative 3. Without the exclusive SB right-turn lane, LOS at this intersection would operate at LOS C under 2035 Build Alternative 4. The analysis for Build Alternative 4 also serves as the sensitivity analysis if the San Francisco Planning Department were to widen the sidewalk under Build Alternative 3, thus requiring elimination of the exclusive SB right-turn lane onto Geary Street from Van Ness Avenue.

3.3.2.2.3 2035 Long-Term Build Alternatives 3 and 4 with Design Option B: Center Lane BRT with Design Option B Configuration

Geometry:

The 2035 Build Alternatives 3 and 4 with Design Option B assumes the same geometry as the 2015 Build Alternatives 3 and 4 with Design Option B as discussed under Section 3.2.2.2.3.

Traffic Volumes:

The traffic volumes estimated for 2035 Build Alternatives 3 and 4 (Center Lane BRT) were modified to develop the 2035 Alternatives 3 and 4 with Design Option B traffic volumes. The process of reassign the eliminated left-turning traffic to the traffic study area is identical to the 2015 Build Alternatives 3 and 4 (Center Lane BRT) with Design option B discussed under Section 3.2.2.2.3.

Traffic volumes for the intersections in the vicinity of the proposed CPMC hospital and medical office building were modified to reflect the projected vehicle trip generation from these two buildings as reported in the CPMC EIR for the 2035 build alternatives. In particular, traffic volumes were modified at intersections along Geary Street, and at the Franklin/O'Farrell and Van Ness/Pine intersections.

Signal Timings:

The 2035 Build Alternatives 3 and 4 with Design Option B assume the same traffic signal cycle length and phasing for all intersections as the 2015 Alternatives 3 and 4 with Design Option B as discussed in Section 3.2.2.2.3. However, the traffic signal splits were optimized and offsets coordinated for the major movements at all intersections within the traffic study area except along Geary Boulevard and O'Farrell Street. Geary Boulevard and O'Farrell Street are along the proposed Geary BRT project corridors; thus, signal timings for the east-west movements (along Geary and O'Farrell Streets) were set to no more or less than 3 seconds from the Existing Condition timings.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2035 Build Alternatives 3 and 4.

Traffic Impacts Based on Intersection Levels of Service

Under the Build Alternatives 3 and 4, Design Option B, 12 intersections would operate at LOS E or F during the PM peak hour in 2035, which is the same number of intersections operating at LOS E or F under 2035 Build Alternatives 3 and 4. This is because the elimination of left turn opportunities under Build Alternatives 3 and 4 would increase traffic volumes to Franklin and Gough Streets.

Table 30 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F under the Existing Conditions, 2035 No Build Alternative and 2035 Build Alternatives 3 and 4 with Design Option B. Figure 14 presents the 2035 Build Alternatives 3 and 4 with Design Option B intersection LOS for all intersections.

Table 30 – 2035 Build Alternatives 3 and 4 (Center Lane BRT) with Design Option B and No Build Intersection LOS (Delay) and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing		2035 No Build		2035 Build Alternatives 3 And 4 With Design Option B	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C	LOS (Delay)	Critical V/C
Gough/ Green	F (76.5)	1.05 (SB)	F (93.6)	1.10 (SB)	F (142.7)	1.23 (SB)
Gough/ Clay	C (23.9)	-	D (29.8)	-	E (44.5)	0.44 (WBL)
Gough/Sacramento	C (27.1)	-	C (25.2)	-	F (102.2)	1.09 (SB)
Gough/Eddy	A (8.9)	-	B (14.8)	0.87 (SB)	F (107.3)	1.14 (SB)
Gough/ Hayes	D (45.9)	-	F (98.1)	1.23 (WBL)	F (126.2)	1.30 (WBL)
Franklin/Pine	D (39.5)	-	E (66.7)	1.03 (WB)	E (78.8)	1.08 (WB)
Franklin/ O'Farrell	D (39.3)	-	E (77.5)	1.08 (EB/NB)	F (115.3)	1.18 (EB)
Franklin/Eddy	B (10.7)	-	C (24.1)	-	F (113.1)	1.10 (EB/NB)
Franklin/McAllister	B (15.7)	-	C (29.7)	-	F (143.1)	1.30 (NB)
Franklin/Market	B (17.9)	-	C (33.1)	-	F (148.3)	1.44 (EBL)
Van Ness/Pine	C (26.1)	-	E (64.9)	1.01 (SB)	C (21.4)	-
Otis/ Mission/ S Van Ness	D (46.1)	-	E (74.0)	1.09 (Mission EBL and SWR)	E (79.0)	1.23 (SBT)
Duboce/ Mission/ Otis/ US101 Off-Ramp	D (44.4)	-	F (115.2)	1.91 (Off-Ramp WBR)	F (97.2)	1.74 (Off-Ramp WBR)

Source: Synchro model, CHS Consulting Group, 2011



Significant Cumulative Impacts. Under Build Alternatives 3 and 4 with Design Option B, the VN BRT Project would cause significant traffic impacts at the following eight intersections in 2035.

- Gough/Sacramento. This signalized intersection would decline from LOS C under existing conditions to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4 with Design Option B. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Eddy. This signalized intersection would decline from LOS A under existing conditions to LOS F under 2035 Build Alternatives 3 and 4 with Center Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would decline from LOS B under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4 with Center Option B; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Hayes. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4 with Design Option B. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/O'Farrell. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4 with Design Option B. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/Eddy. This signalized intersection would decline from LOS B under existing conditions to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, the proposed project would cause significant cumulative impacts.
- Franklin/McAllister. This signalized intersection would decline from LOS B under existing conditions to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, the proposed project would cause significant traffic impacts.
- Franklin/Market/Page. This intersection is assessed to have significant project-specific impacts under 2015 Build Alternatives 3 and 4 with Design Option B. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- South Van Ness/Mission/Otis. This signalized intersection would decline from LOS D under existing conditions to LOS E under Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4. Furthermore, this signalized intersection would perform at LOS E under 2035 No Build Alternative and Build Alternatives 3 and 4. The contribution of project traffic to the critical movement is significant (i.e., greater than 5 percent) (Appendix 12). Thus, based on the significance criteria, the proposed project would cause significant cumulative impacts.

Less than Significant Cumulative Impacts. Four additional intersections would have less than significant impacts. These intersections would operate at LOS E or F under Build Alternatives 3 and 4 with Design Option B in 2035; however, the contribution of project traffic would not be significant. The intersections with less than significant project impacts are:

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both the existing condition and 2035 Build Alternatives 3 and 4 with Design Option B; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing condition and 2035 Build Alternatives 3 and 4 with Design Option B (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under 2035 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operations at this intersection, including adding a traffic signal; removing some on-street parking spaces to create an additional SB approach lane; removing parking would worsen pedestrian conditions by eliminating the buffer provided by parked cars separating the sidewalk from the traffic lane, as discussed in Section 4, and past public outreach has indicated that the community prefers the stop-sign control of the intersection.
- Gough/Clay. The WB Clay Street approach at this unsignalized intersection would perform at LOS C under the existing conditions and would decline to LOS E at the worst approach under 2035 Build Alternatives 3 and 4 with Design Option B; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing condition and 2035 Build Alternative 3 and 4 with Design Option B (Appendix 12), and would therefore not be significant per the impact significance thresholds described in Section 3.1. Potential options that may be used to improve traffic operations of this intersection include adding a traffic signal, removing some on-street parking spaces on Clay Street to create an additional WB-to-SB approach lane, or widening Gough Street SB to two lanes by removing on-street parking spaces; however, these improvements would have the adverse effect of parking removal on pedestrian conditions along Clay and/or Gough Streets and are not recommended.
- Franklin/Pine. This signalized intersection would decline from LOS D under existing conditions to LOS E under Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4 with Design Option B. Furthermore, this signalized intersection would operate at LOS E under 2035 No Build Alternative and Build Alternatives 3 and 4 with Design Option B; however, the contribution of project traffic to the critical movements performing at LOS E or F would not be significant (i.e., less than 5 percent); therefore, the proposed project would cause less than significant cumulative impacts. One potential improvement measure is providing an exclusive WB right-turn lane between Van Ness Avenue and Pine Street. This can be implemented by instituting a PM peak-period tow-away zone along the north side of Pine; however, this improvement would have the adverse effect of parking removal on pedestrian conditions along Pine Street and is not recommended.
- Duboce/Mission/Otis/US 101 Off-Ramps. This signalized intersection would perform at LOS D under existing conditions and decline to LOS F under 2035 Build Alternatives 3 and 4 with Design Option B; therefore, this intersection would have cumulative impacts under 2035 Build Alternatives 3 and 4 with Design Option B. Furthermore, this signalized intersection would perform at LOS F under 2035 No Build Alternative and Build Alternatives 3 and 4 with Design Option B; however, the contribution of project traffic to the critical movements would not be significant (i.e., less than 5 percent, or LOS D or better) (Appendix 12). The LOS cannot be improved because there is no ROW available to add lanes at this intersection and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements.

Beneficial Impacts. The intersections of Van Ness and Pine would decline from LOS C under the existing conditions to LOS E under 2035 No Build Alternative, and then improve to LOS C under Build Alternatives 3 and 4 with Design Option B. This decline in performance between the existing conditions and 2035 No Build Alternative is due to growth in background traffic. The improved performance between 2035 No Build Alternative and 2035 Build Alternatives 3 and 4 with Design Option B is mainly due to traffic diversions away from the intersection.

Design Variation between Build Alternative 3 and Build Alternative 4 with Design Option B and Sensitivity Analysis at Van Ness Avenue and Geary Street Intersection. As discussed in Chapter 2, Van Ness Avenue between Geary and O'Farrell streets under Build Alternative 4 with Design Option B would have the same geometric design as Build Alternative 3 with Design Option B. Due to this transition from a center-running BRT with a single median north of Geary Street to a right-side loading BRT with two medians for this block, the SB Van Ness Avenue exclusive right-turn lane to Geary Street would not be provided under Build Alternative 4 with Design Option B. This intersection operates at LOS B under 2015 Build Alternative 3 with Design Option B. Without the exclusive SB right-turn lane, LOS at this intersection would operate at LOS C under 2015 Build Alternative 4 with Design Option B. The analysis for Build Alternative 4 with Design Option B also serves as the sensitivity analysis if the San Francisco Planning Department were to widen the sidewalk under Build Alternative 3 with Design Option B, thus requiring elimination of the exclusive SB right-turn lane onto Geary Street from Van Ness Avenue.



Figure 14 – Long-Term (2035) Alternatives 3 and 4 with Design Option B Intersection LOS



3.3.2.2.4 2035 Long-Term Horizon Year Locally Preferred Alternative (LPA)

Geometry:

The 2035 LPA assumes the same geometry as the 2015 Build Alternatives 3 and 4 with Design Option B as discussed under Section 3.2.2.2.4.

Traffic Volumes:

The traffic volumes for 2035 LPA would be the same as the 2035 Build Alternatives 3 and 4 with Design Option B, as discussed in Section 3.3.2.2.3. Elimination of right-turn pockets at 11 locations (as compared to Design Option B) would not cause traffic to reroute as these turns could still be made from shared through and right curb lanes at these locations.

Signal Timings:

The traffic signal timing and offsets for the LPA were assumed to be the same as the 2035 Build Alternatives 3 and 4 with Design Option B, as discussed in Section 3.3.2.2.3.

Appendices 10 and 11 provide the Synchro inputs and the intersection LOS for all the intersections within the study area for all scenarios including the 2035 Build Alternatives 3 and 4.

Traffic Impacts based on Intersection Levels of Service

Under the LPA, 12 intersections would operate at LOS E or F during the PM peak hour in 2035. The LPA would have the same traffic impacts in 2035 as Build Alternatives 3 and 4 with Design Option B. None of the 11 intersections along Van Ness Avenue, where the exclusive right-turn pockets would be eliminated, would have impacts. Analysis and comparison of impacts at these 11 locations are provided in Appendix 14.

Table 31 presents a comparison of the average intersection delay, intersection levels of service and critical intersection v/c ratios for the intersections that would operate at LOS E or F under the Existing Conditions, 2035 No Build Alternative and 2035 Build Alternatives 3 and 4 with Design Option B¹⁵ and the LPA scenarios. Figure 15 presents the 2035 LPA intersection LOS for all intersections.

¹⁵ Since the LPA is a refinement of the 2015 Build Alternatives 3 and 4 with Design Option B, the 2015 Design Option B results are also provided in the table to enable easy comparison of traffic impacts between these scenarios.



Table 31 – 2035 Locally Preferred Alternative (LPA) Intersection LOS (Delay), and Critical V/C Ratio for Intersections that Operate at LOS E or F

Intersection	Existing		2035 No Build		2035 Build Alternatives 3 And 4 With Design Option B		2035 Locally Preferred Alternative (LPA)	
	LOS (Delay)	Critical V/C (Critical Movement)	LOS (Delay)	Critical V/C	LOS (Delay)	Critical V/C	LOS (Delay)	Critical V/C
Gough/ Green	F (76.5)	1.05 (SB)	F (93.6)	1.10 (SB)	F (142.7)	1.23 (SB)	F (142.7)	1.23 (SB)
Gough/ Clay	C (23.9)	-	D (29.8)	-	E (44.5)	0.44 (WBL)	E (44.5)	0.44 (WBL)
Gough/Sacramento	C (27.1)	-	C (25.2)	-	F (102.2)	1.09 (SB)	F (102.2)	1.09 (SB)
Gough/Eddy	A (8.9)	-	B (14.8)	0.87 (SB)	F (107.3)	1.14 (SB)	F (107.3)	1.14 (SB)
Gough/ Hayes	D (45.9)	-	F (98.1)	1.23 (WBL)	F (126.2)	1.30 (WBL)	F (126.2)	1.30 (WBL)
Franklin/Pine	D (39.5)	-	E (66.7)	1.03 (WB)	E (78.8)	1.08 (WB)	E (78.8)	1.08 (WB)
Franklin/ O'Farrell	D (39.3)	-	E (77.5)	1.08 (EB/NB)	F (115.3)	1.18 (EB)	F (115.3)	11.8 (EB)
Franklin/Eddy	B (10.7)	-	C (24.1)	-	F (113.1)	1.10 (EB/NB)	F (113.1)	1.10 (EB/NB)
Franklin/McAllister	B (15.7)	-	C (29.7)	-	F (143.1)	1.30 (NB)	F (143.1)	1.30 (NB)
Franklin/Market	B (17.9)	-	C (33.1)	-	F (148.3)	1.44 (EBL)	F (148.3)	1.44 (EBL)
Van Ness/Pine	C (26.1)	-	E (64.9)	1.01 (SB)	C (21.4)	-	C (21.4)	-
Otis/ Mission/ S Van Ness	D (46.1)	-	E (74.0)	1.09 (Mission EBL and SWR)	E (79.0)	1.23 (SBT)	E (79.0)	1.23 (SBT)
Duboce/ Mission/ Otis/ US101 Off-Ramp	D (44.4)	-	F (115.2)	1.91 (Off-Ramp WBR)	F (97.2)	1.74 (Off-Ramp WBR)	F (97.2)	1.74 (Off-Ramp WBR)

Source: Synchro model, CHS Consulting Group, 2011

Significant Cumulative Impacts. Under the LPA, the VN BRT Project would cause significant traffic impacts at the following eight intersections in 2035.

- Gough/Sacramento. This signalized intersection would decline from LOS C under existing conditions to LOS F under the 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would decline from LOS C under 2035 No Build Alternative to LOS F under the 2035 LPA; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Eddy. This signalized intersection would decline from LOS A under existing conditions to LOS F under the 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would decline from LOS B under 2035 No Build Alternative to LOS F under the 2035 LPA; therefore, the proposed project would cause significant cumulative impacts.
- Gough/Hayes. This intersection is assessed to have significant project-specific impacts under the 2015 LPA. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/O'Farrell. This intersection is assessed to have significant project-specific impacts under the 2015 LPA. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- Franklin/Eddy. This signalized intersection would decline from LOS B under existing conditions to LOS F under the 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would decline from LOS C under the 2035 No Build Alternative to LOS F under the 2035 LPA; therefore, the proposed project would cause significant cumulative impacts.
- Franklin/McAllister. This signalized intersection would decline from LOS B under existing conditions to LOS F under the 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would decline from LOS C under the 2035 No Build Alternative to LOS F under the 2035 LPA; therefore, the proposed project would cause significant traffic impacts.
- Franklin/Market/Page. This intersection is assessed to have significant project-specific impacts under the 2015 LPA. Hence, based on the significance criteria (Section 3.1), the proposed project would cause significant cumulative impacts.
- South Van Ness/Mission/Otis. This signalized intersection would decline from LOS D under existing conditions to LOS E under the 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would perform at LOS E under 2035 No Build Alternative and LPA. The contribution of project traffic to the critical movement is significant (i.e., greater than 5 percent) (Appendix 12). Thus, based on the significance criteria, the proposed project would cause significant cumulative impacts.

Less-than-Significant Cumulative Impacts. Four additional intersections would have less than significant impacts. These intersections would operate at LOS E or F under the LPA in 2035; however, the contribution of project traffic would not be significant. The intersections with less-than-significant project impacts are:

- Gough/Green. The SB approach, the worst approach at this four-way stop-controlled intersection, would perform at LOS F under both the existing condition and the 2035 LPA; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing condition and the 2035 LPA (Appendix 12), and impacts would not be significant per the impact significance thresholds described in Section 3.1. The intersection would also operate at LOS F under the 2035 No Build Alternative, as would the SB approach. There are several possibilities to improve traffic operations at this intersection, including adding a traffic signal, and removing some on-street parking spaces to create an additional SB approach lane; however, removing parking would worsen pedestrian conditions by eliminating the buffer provided by parked cars separating the sidewalk from the traffic lane, as discussed in Section 4, and past public outreach has indicated that the community prefers the stop-sign control of the intersection.
- Gough/Clay. The WB Clay Street approach at this unsignalized intersection would perform at LOS C under the existing conditions and would decline to LOS E at the worst approach under the 2035 LPA; however, the intersection would not meet the Caltrans peak-hour signal warrant under both the existing condition and the 2035 LPA (Appendix 12), and impacts would therefore not be significant per the impact significance thresholds described in Section 3.1. Potential options that may be used to improve traffic operations of this intersection include adding a traffic signal, removing some on-street parking spaces on Clay Street to create an additional WB-to-SB approach lane, or widening Gough Street SB to two lanes by removing on-street parking spaces; however, these improvements would have the adverse effect of parking removal on pedestrian conditions along Clay and/or Gough Streets and are not recommended.
- Franklin/Pine. This signalized intersection would decline from LOS D under existing conditions to LOS E under the LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would operate at LOS E under the 2035 No Build Alternative and the LPA; however, the contribution of project traffic to the critical movements performing at LOS E or F would not be significant (i.e., less than 5 percent); therefore, the proposed project would cause less-than-significant cumulative impacts. One potential improvement measure is providing an exclusive WB right-turn lane between Van Ness Avenue and Pine Street. This can be implemented by instituting a PM peak-period tow-away zone along the north side of Pine; however, this improvement would have the adverse effect of parking removal on pedestrian conditions along Pine Street and is not recommended.
- Duboce/Mission/Otis/US 101 Off-Ramps. This signalized intersection would perform at LOS D under existing conditions and decline to LOS F under 2035 LPA; therefore, this intersection would have cumulative impacts under the 2035 LPA. Furthermore, this signalized intersection would perform at LOS F under the 2035 No Build Alternative and the LPA; however, the contribution of project traffic to the critical movements would not be significant (i.e., less than 5 percent, or LOS D or better) (Appendix 12). The LOS cannot be improved because there is no ROW available to add lanes at this intersection and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements.

- **Beneficial Impacts.** The intersections of Van Ness and Pine would decline from LOS C under the existing conditions to LOS E under the 2035 No Build Alternative, and then improve to LOS C under the LPA. This decline in performance between the existing conditions and the 2035 No Build Alternative is due to growth in background traffic. The improved performance between the 2035 No Build Alternative and the 2035 LPA is mainly due to traffic diversions away from the intersection.

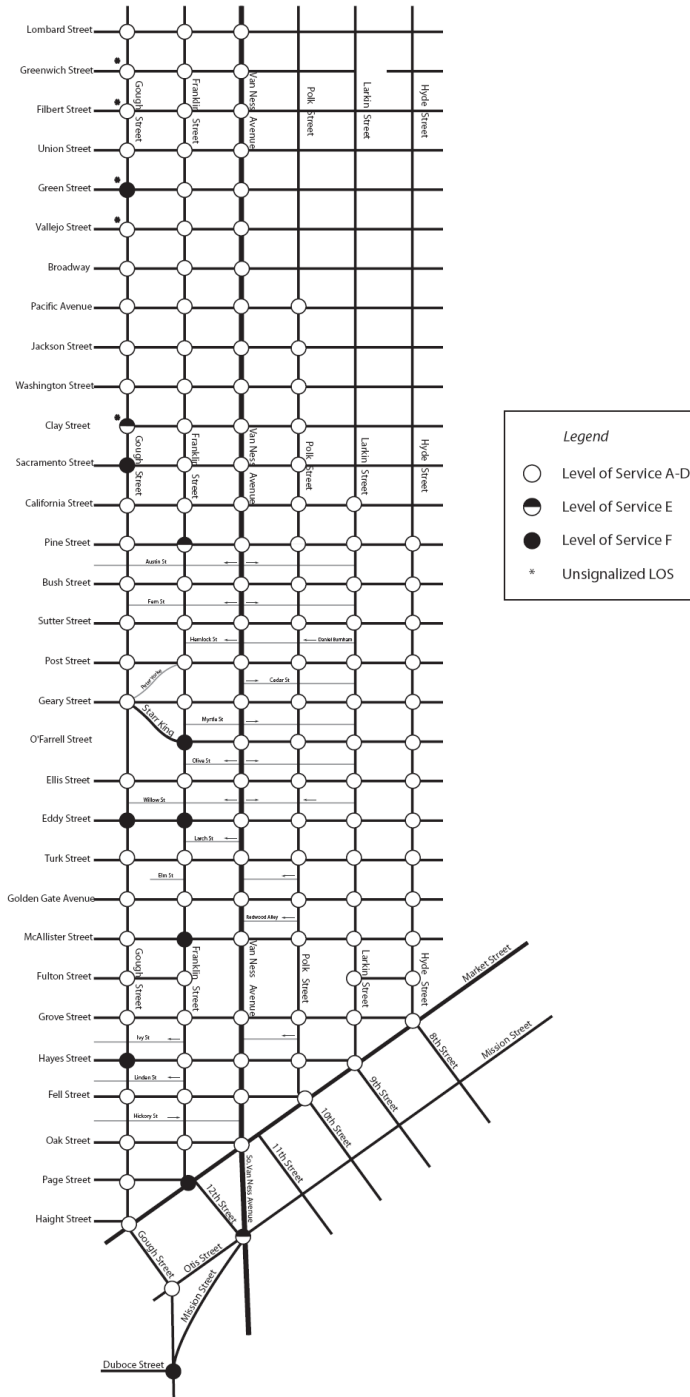
LPA Vallejo Northbound Station Variant. The Vallejo Northbound Station Variant would have one fewer (2 vs. 3) mixed traffic lanes in the southbound direction for the block between Vallejo and Green streets versus the LPA. Under the LPA without the variant, this lane would be used to store left turning traffic onto Broadway. Under the Vallejo Northbound Station Variant, that roadway space would be used for the additional far side northbound station at Vallejo Street. In 2035, the Vallejo Intersection would operate at LOS A during the PM Peak under the LPA and would deteriorate to LOS B with implementation of the Vallejo Northbound Station Variant.

Sensitivity Analysis of Pedestrian Volumes. The 2035 Locally Preferred Alternative (LPA) was utilized for this analysis as it represented the worst case scenario with higher vehicular traffic volumes than the 2015 scenario. With the implementation of the BRT project, pedestrian activity at crosswalks in the vicinity of the BRT stops could increase due to BRT passengers walking to the stops along Van Ness Avenue. However, relocation of some existing Route 47 and 49 bus stops would cause pedestrians to reroute to access the new bus stops and thus pedestrian volumes along crosswalks in the vicinity of relocated bus stops would decrease. The change in pedestrian volumes at crosswalks along select Van Ness Avenue intersections would vary approximately between 50 to 340 pedestrians, except at two locations. The pedestrian traffic along the north crosswalk at O'Farrell and south crosswalk at Geary crossing Van Ness Avenue would increase by over 1,000 pedestrians because of transfers to Geary BRT.

Increase in pedestrian volumes at crosswalks could potentially increase delays for right and left turning vehicles and cause temporary vehicle queuing. A sensitivity analysis has been performed, assuming changed pedestrian volumes for the 2035 LPA scenario¹⁶. With the increased pedestrian volumes at selected Van Ness intersections, the intersection traffic impacts under the 2035 LPA would remain the same. Appendix 15 provides details of this analysis.

¹⁶ 2035 with higher vehicular traffic as compared to 2015 is the worst case scenario

Figure 15 – Long-Term (2035) Locally Preferred Alternative (LPA) Intersection LOS



3.4 Summary of Vehicular Traffic Impacts

This section provides a summary of the VN BRT Project's vehicular traffic impacts for the three project alternatives for the near-term 2015 and long-term 2035. Table 32 provides a summary of PM peak hour¹⁷ traffic impacts at all intersections that would operate at LOS E or F in the existing, No Build, Build Alternative or the LPA conditions. Key findings are listed below.

- Under the existing conditions, only the intersection of Gough and Green streets would perform at LOS E or F.
- Under 2015 No Build Alternative, four intersections would perform at LOS E or LOS F. The intersection of Mission/South Van Ness/Otis is the only intersection on Van Ness Avenue that would perform at LOS E.
- Under the near-term 2015 (representing existing plus project conditions), the project would cause significant project-specific impacts at the intersections of Gough/Hayes and Franklin/O'Farrell under all three build alternatives. Under Build Alternatives 3 and 4, the project would also cause significant project-specific impacts at the intersection at the South Van Ness/Mission/Otis intersection. Under Build Alternatives 3 and 4 with Design Option B and the LPA, the project would also cause significant project-specific impacts at the intersection of Franklin and Market streets.
- Under 2015, the performance of the Mission/South Van Ness/Otis intersection would improve from LOS E to LOS D under Build Alternative 2, Build Alternatives 3 and 4 with Design Option B and the LPA versus Alternative 1 (No Build Alternative), and the performance of the Mission/Duboce/Otis/US 101 off-ramps would also improve from LOS E to LOS D under all of the build alternatives versus Alternative 1 (No Build Alternative). This is due to the diversion of traffic using Van Ness Avenue under 2015 No Build Alternative to other modes, other times of the day, and streets outside the traffic study area because of the implementation of BRT.
- Under both near-term 2015 and long-term 2035 horizon years, Build Alternative 2 would have the least traffic impacts because of the availability of higher capacity for vehicles making turns from Van Ness Avenue with protect-permitted left turns, thus reducing diversions to other parallel streets.
- Under the long-term 2035 No Build Alternative (Alternative 1), seven intersections would perform at LOS E or LOS F. This is three more than in the 2015 build alternatives and the LPA. The intersection of Mission/South Van Ness/Otis is the only intersection on Van Ness Avenue that would perform at LOS E or LOS F under 2035 No Build Alternative.
- Under the long-term year 2035, the project would cause significant traffic impacts at five to eight locations depending on the alternative.
- The project traffic in 2035 would cause significant cumulative impacts at seven of these same intersections under Build Alternatives 3 and 4 with and without Design Option B and the LPA. One additional intersection, the Van Ness/Hayes intersection, would be impacted under Build Alternatives 3 and 4 without Design Option B. Under Build Alternatives 3 and 4 with Design Option B and the LPA, one additional intersection, the Franklin/Market intersection, would be impacted by project traffic.

¹⁷ As explained in Section 2.1, the PM Peak hour represents the worst case scenario to assess vehicular traffic impacts was used for the intersection LOS analysis

Table 32 - Summary of Vehicular Traffic Impacts

Intersection	Project-Specific Impacts						Cumulative Impacts				
	Existing Conditions	2015 No Build Alternative	2015 Build Alternative 2 (Side-Lane BRT)	2015 Build Alternatives 3 and 4 (Center-Lane BRT)	2015 Build Alternatives 3 and 4 (Center-Lane BRT with Design Option B)	2015 Locally Preferred Alternative (LPA)	2035 No Build Alternative	2035 Build Alternative 2 (Side-Lane BRT)	2035 Build Alternatives 3 and 4 (Center-Lane BRT)	2035 Alternatives 3 and 4 (Center-Lane BRT with Design Option B)	2035 Locally Preferred Alternative (LPA)
Gough/Green	NPI	NPI	LSI	LSI	LSI	LSI	NPI	LSI	LSI	LSI	LSI
Gough/Clay	--	--	--	--	--	--	--	LSI	--	LSI	LSI
Gough/Sacramento	--	--	--	--	--	--	--	--	SCI	SCI	SCI
Gough/Eddy	--	--	--	--	--	--	--	--	SCI	SCI	SCI
Gough/Hayes	--	NPI	SPI	SPI	SPI	SPI	NPI	SCI	SCI	SCI	SCI
Franklin/Pine	--	--	--	--	--	--	NPI	SCI	LSI	LSI	LSI
Franklin/O'Farrell	--	--	SPI	SPI	SPI	SPI	NPI	SCI	SCI	SCI	SCI
Franklin/Eddy	--	--	--	--	--	--	--	SCI	SCI	SCI	SCI
Franklin/McAllister	--	--	--	--	--	--	--	SCI	SCI	SCI	SCI
Franklin/Market	--	--	--	--	SPI	SPI	--	--	--	SCI	SCI
Van Ness/ Pine	--	--	--	--	--	--	NPI	BI	LSI	BI	BI
Van Ness/Hayes	--	--	--	--	--	--	--	--	SCI	--	--
Mission/South Van Ness/Otis	--	NPI	BI	SPI	BI	BI	NPI	LSI	SCI	SCI	SCI
Mission/Duboce/Otis/US 101 Off-Ramps	--	NPI	BI	BI	BI	BI	NPI	LSI	LSI	LSI	LSI

Notes:

This EIS/EIR assumes the 2015 Build Alternatives are equivalent to the existing plus project conditions.

NPI – No Project Impact. The intersection performs at LOS E or LOS F under existing or No Build Alternative conditions.

SPI – Significant Project-Specific Impact. Project traffic would contribute significantly towards the decline of intersection operations from existing condition to existing plus project condition.

LSI – Less than Significant Project-Specific Impact or Cumulative Impact. Project traffic would not contribute significantly to intersections operating at the same LOS E or LOS F under (i) existing and existing plus project condition or (ii) cumulative Build and No Build Alternatives.

BI – No Project Impact. Project results in a change in operations from LOS E or LOS F under existing condition or cumulative No Build Alternative conditions, to LOS D or better under existing plus project condition or cumulative Build Alternatives.

SCI - Significant Cumulative Impact. Project traffic would contribute significantly towards the decline of intersection operations from existing condition to cumulative Build Alternatives.

4.0 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

This section describes avoidance, minimization, and mitigation measures that would lessen traffic impacts for each build alternative, and the LPA. Whether to adopt mitigation measures will be decided by the decision-makers (i.e., the Authority Board). Decision-makers will consider the Final EIS/EIR prior to deciding whether to approve the project. As part of that process, decision-makers will make any required findings and, for CEQA purposes, those will include determining whether mitigation measures are feasible or infeasible, considering specific economic, legal, social, technological or other considerations. If the decision-makers determine that mitigation measures or project alternatives that reduce or avoid significant impacts are feasible, they will be adopted and incorporated into the project. If the decision-makers determine that mitigation measures are infeasible and that significant and unavoidable impacts will occur, decision-makers will need to adopt findings that the project will result in economic, legal, social, technological or other benefits, notwithstanding the unavoidable environmental risks of the project.

The discussion also identifies engineering mitigation measures, which may ultimately be found by the Authority Board to be infeasible, to document the Authority's effort to consider means of lessening or avoiding the significant traffic impacts anticipated under each proposed build alternative including the LPA, and to explain in each case some of the policy and engineering challenges. The circulation and public comment period of this Draft EIS/EIR provided an opportunity for input on this approach. Each build alternative, and the LPA, would incorporate features that help avoid or minimize traffic impacts through project design, in keeping with the project's objective to accommodate traffic circulation. These include area-wide signal timing and optimization; signal priority for BRT on Van Ness Avenue, which also benefits (north/south) mixed traffic; reducing left-turn movements along the project alignment; and right-turn pockets at high-demand locations.

Nevertheless, the build alternatives, including the LPA, are forecast to cause traffic delay impacts at the locations identified in Section 3. As discussed in more detail below, engineering measures could, at some affected intersections, mitigate these delay impacts in the near term. The engineering mitigation measures primarily include removal of parking tow-away lanes or traffic turn pockets, which increase roadway capacity at the affected intersections.¹⁸ Such mitigation measures were identified and tested¹⁹ for each project scenario.

These types of mitigation measures, while reducing localized traffic delays in the short term, may ultimately be found by the Authority Board to not be feasible due to policy conflicts, specifically the need to balance traffic circulation with pedestrian and transit circulation and safety. In addition, these engineering techniques function by increasing automobile traffic capacity and are unlikely to be effective in the long term due to the risk of induced demand.

Pedestrian Conflicts. The use of tow-away zones and the addition of right-turn pockets would worsen pedestrian conditions by removing on-street parking, which acts as a buffer from moving traffic, increasing the levels of moving traffic itself and the associated conflicts with pedestrians at intersections, and raising exposure of pedestrians to motorized traffic where turn pockets are added. These outcomes

¹⁸ Other mitigation measures include conversion of Otis Street to two-way and closing Page Street to vehicular traffic for some project scenarios and are discussed in detail in this section .

¹⁹ Traffic signal timings and offsets were optimized for all mitigation measures

would not support the project purpose and need to improve pedestrian comfort and safety (see Section 1.3).

The San Francisco General Plan Transportation Element specifically notes the important role of on-street parking as a buffer between pedestrians and traffic. Policy 18.2 provides that no additional tow-away zones should be instituted if they would worsen pedestrian safety and comfort. The buffer provided by parallel parking is especially important on Franklin and Gough streets, which have narrower sidewalks than the standards recommended in the San Francisco Better Streets Plan, and higher traffic volumes than Van Ness Avenue.

When evaluating this tradeoff between mitigating traffic delays and inducing new automobile trips, or worsening pedestrian conditions through parking removal, the Authority is guided by the Transit First Policy in the City Charter. The Transit First Policy states that “Decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights-of-way by pedestrians, bicyclists, and public transit” (City Charter Article VIIIA, 115, Transit First Policy).

Induced Demand. Substantial evidence indicates that expanding roadway capacity induces new vehicle trips and is not an effective way to address congestion over the long term. New roadway capacity generates new automobile trips that were not previously made, returning delays to previous levels. Researchers, including Robert Cervero, Mark Hansen, and Robert Noland, published key findings on this topic starting in 1995.

In 2009, the California Resources Agency adopted revisions to the State CEQA guidelines that recognize the “induced demand” that results from typical traffic mitigation measures. The revisions removed from the Guidelines a suggestion to measure and mitigate traffic impacts with automobile LOS or volume to capacity ratios, citing induced demand as a key rationale for the change (December, 2009 Final Statement of Reasons, http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf).

The following sections identify those locations that would experience a significant and unavoidable automobile traffic delay impact by 2015 and/or 2035. Even without the engineering mitigation measures described below, the number of intersections operating at LOS E or LOS F under the build alternatives in Year 2015 is no greater than the number of intersections operating at LOS E or F in the No Build Alternative scenario.

4.1 Near-Term (2015) Build Alternatives

This section identifies measures to reduce or eliminate Near-Term (2015) intersection impacts under the build alternatives (representing existing plus project conditions); however, the Authority Board may find these mitigation measures to be infeasible as explained below.

Appendix 13 provides the Synchro inputs and the intersection LOS for all the intersections with mitigations within the study area for all 2015 scenarios.

4.1.1 2015 Near-Term Build Alternative 2: Side-Lane BRT with Street Parking

As presented in Section 3.2.2.2.1, two intersections would have a significant and unavoidable traffic impact in 2015 under Build Alternative 2.

- Gough/Hayes. Traffic impacts at this intersection would primarily result from the Gough Street SB approach. Provision of a fourth SB through lane on Gough Street through the implementation of PM peak-period tow-away along the east side of Gough Street between Ivy and Linden could further improve the intersection’s level of service to LOS D. However, a tow-away lane would worsen

pedestrian conditions along the east side of Gough Street by removing parking during the peak period. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternative 2.

- Franklin/O'Farrell. Traffic impacts at this intersection would primarily result from the approximately 360 vehicles making the EB left turn from O'Farrell Street during the PM peak hour and incurring extensive delays. Adding an exclusive EB left-turn lane would restore the LOS at this intersection to an acceptable level of LOS B; however, this mitigation measure would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side of O'Farrell. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult tradeoff given the planned Geary BRT service. If the Authority Board finds the mitigation measure to be infeasible and does not to adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternative 2.

4.1.2 2015 Near-Term Build Alternatives 3 and 4: Center-Lane BRT

As discussed in Section 3.2.2.2.2, project traffic in Year 2015 under Build Alternatives 3 and 4 would cause a significant impact at three intersections.

- Gough/Hayes. Traffic impacts at this intersection would be primarily a result of the Gough Street SB approach. Provision of a fourth SB through lane on Gough Street through the implementation of a PM peak-period tow-away zone along the east side of Gough Street between Ivy and Linden would improve the intersection's LOS to LOS D. However, a tow-away lane would worsen pedestrian conditions along the east side of Gough Street by removing parking during the peak. If the Authority Board finds the mitigation measure to be infeasible and does not to adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternatives 3 and 4.
- Franklin/O'Farrell. Traffic impacts at this intersection would primarily result from the approximately 360 vehicles making the EB left turn from O'Farrell Street during the PM peak hour and incurring extensive delays. Adding an exclusive EB left-turn lane would restore LOS at this intersection to an acceptable level of LOS B. However, this mitigation measure would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult tradeoff given the planned Geary Corridor BRT service. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternatives 3 and 4.
- South Van Ness/Mission/Otis. The LOS at this intersection cannot be improved because there is no ROW available to add lanes. In addition, the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements. This intersection cannot be mitigated, and project traffic would cause a significant and unavoidable impact in 2015 under Build Alternatives 3 and 4.

4.1.3 Year 2015 Near-Term Build Alternatives 3 and 4 with Design Option B and the LPA: Center-Lane BRT

As discussed under Section 3.2.2.2.4, the 2015 Build Alternative 3 and 4 with Design Option B and the LPA have the same traffic circulation, vehicular traffic volumes and impacts. Hence, the same mitigation measures were tested for both scenarios resulting in the same intersection LOS results and are discussed

together below. Appendix 13 provides the input and results for intersections with mitigations for each alternative.

As discussed in Section 3.2.2.2.3 and 3.2.2.2.4, project traffic in 2015 under Build Alternatives 3 and 4 with Design Option B and the LPA would cause a significant impact at three intersections.

- Gough/Hayes. Traffic impacts at this intersection would be primarily a result of the Gough Street SB approach. Provision of a fourth SB through lane on Gough Street through the implementation of a PM peak-period tow-away zone along the east side of Gough Street between Ivy and Linden would restore the intersection to LOS D. However, a tow-away lane would worsen pedestrian conditions along the east side of Gough Street by removing parking during the peak period. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Franklin/O'Farrell. Traffic impacts at this intersection would be primarily a result of the approximately 360 vehicles making the EB left turn from O'Farrell Street during the PM peak hour and incurring extensive delays. Adding an exclusive EB left-turn lane as a mitigation measure would restore LOS at this intersection to an acceptable level of LOS B; however, this mitigation measure would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult tradeoff given the planned Geary Corridor BRT service. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause a significant and unavoidable impact in 2015 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Franklin/Market. Traffic impacts at this intersection would be primarily a result of the delays for the EB left-turn approach from Market Street. This intersection performs poorly due to the additional NB vehicles making a U-turn onto Otis Street from Mission Street NB, turning right onto Gough Street NB, turning right onto EB Market Street, and turning left onto NB Franklin Street. Rerouting Muni buses from EB Page Street to the proposed two-way Haight Street, closing Page Street to vehicular traffic, and split-phase timing for EB Page Street added to the Market Street EB left-turn movement at this signalized intersection would restore the intersection's performance to an acceptable LOS B; however, this improvement would make it difficult for bicycle users, who heavily utilize Page Street bike lanes, to access Market Street bike lanes. Bicycle users would not be allowed to connect to Market Street from Page Street due to safety concerns at this signal if this mitigation is implemented. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts at this intersection in 2015 under Build Alternatives 3 and 4 with Design Option B and the LPA.

4.2 Long-Term (2035) Build Alternatives

This section identifies measures to reduce or eliminate Long-Term (2035) intersection impacts under the build alternatives; however, the Authority Board may find these measures to be infeasible, as explained below.

Appendix 13 provides the Synchro inputs and the intersection LOS for all the intersections with mitigations within the study area for all 2035 scenarios.

4.2.1 2035 Long-Term Horizon Year Build Alternative 2: Side-Lane BRT with Street Parking

As discussed in Section 3.3.2.2.1, project traffic in 2035 under Build Alternative 2 would cause a significant impact at five intersections.

- Gough/Hayes. Traffic impacts at this intersection would be primarily a result of the delays for the Gough Street SB approach. Provision of a fourth SB through lane on Gough Street through the implementation of a PM peak-period tow-away zone along the east side of Gough Street between Ivy and Linden and a 125-foot exclusive EB right-turn lane created by removing six parking spaces on the south side of Hayes Street would improve the intersection's level of service to LOS D. However, parking removal would worsen pedestrian conditions along the east side of Gough Street and the south side of Hayes Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause a significant and unavoidable impact in 2035 under Build Alternative 2.
- Franklin/Pine. Traffic impacts at this intersection would be primarily a result of the delays for the Pine Street approach. The mitigation measure includes providing an exclusive WB right-turn lane from Van Ness Avenue to Franklin Street. This mitigation measure can be implemented by instituting a PM peak-period tow-away zone along the north side of Pine between Van Ness Avenue and Franklin Street. The intersection would operate at LOS D after implementation of the mitigation. However, the removal of parking would have adverse effects on pedestrian conditions. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternative 2.
- Franklin/O'Farrell. Traffic impacts at this intersection would be primarily a result of the delays for the O'Farrell Street approach. Adding an exclusive EB left-turn lane is a mitigation measure that would restore LOS at this intersection to an acceptable level of LOS D; however, it would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side of O'Farrell. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult trade-off given the planned Geary Corridor BRT service. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts in 2035 under Build Alternative 2.
- Franklin/Eddy. Traffic impacts at this intersection would be primarily a result of the delays for the Eddy Street approach. The mitigation would be to provide a 50-foot-long exclusive EB left-turn lane by eliminating two parking spaces on the south side of Eddy. This mitigation would improve the intersection performance to LOS D. However, the removal of parking would have adverse effects on pedestrian conditions. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternative 2.
- Franklin/McAllister. Traffic impacts at this intersection would be primarily a result of the delays for the Franklin Street approach. The mitigation includes adding a fourth NB through lane created by instituting a PM peak-hour tow-away zone along the west side of Franklin Street between Fulton and McAllister streets. This would extend the existing tow-away zone by one block south and improve the intersection LOS to LOS D. However, the removal of parking would have adverse effects on pedestrian conditions along Franklin Street (see Section 3.4). If the Authority Board chooses not to adopt the mitigation measure, project traffic would cause significant impacts at this intersection in 2035 under Build Alternative 2.

4.2.2 2035 Long-Term Horizon Year Build Alternatives 3 and 4: Center-Lane BRT

As discussed in Section 3.3.2.2.2, the Van Ness Avenue BRT Project would cause a significant traffic impact at eight intersections in 2035 under Build Alternatives 3 and 4.

- Gough/Sacramento. Traffic impacts at this intersection would be primarily a result of the Gough Street approach. One mitigation measure is a second SB through lane along Gough Street. This can be implemented by instituting a PM peak-period tow-away zone on the west side of Gough Street between Clay and Sacramento streets. This mitigation would improve the intersection performance to LOS B. However, the removal of parking would have adverse effects on pedestrian conditions along Gough Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4.
- Gough/Eddy. Traffic impacts at this intersection would be primarily a result of the delays for the Eddy Street approach. The mitigation includes providing a 50-foot-long exclusive EB right-turn lane created by eliminating three parking spaces on the south side of Eddy Street and relocating the bus stop on the near side of Gough to the far side of the intersection. This mitigation would improve the intersection performance to LOS C. However, this mitigation measure would have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Eddy Street in addition to potential transit access impacts. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts at this intersection in 2035 under Build Alternatives 3 and 4.
- Gough/Hayes. Traffic impacts at this intersection would be primarily a result of the delays for the Gough Street SB approach. Conditions would be mitigated with provision of a fourth SB through lane on Gough Street through the implementation of a PM peak-period tow-away zone along the east side of Gough Street between Ivy and Linden. In addition, a 100-foot exclusive EB right-turn lane would be provided through the removal of five parking spaces on the south side of Hayes Street. This mitigation would improve the intersection performance to LOS D. However, this would have the adverse effects of parking removal on pedestrian conditions along Gough Street and Hayes Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts at this intersection in 2035 under Build Alternatives 3 and 4.
- Franklin/O'Farrell. Traffic impacts at this intersection would be primarily a result of the delays for the O'Farrell Street approach. The performance of this intersection would be improved to LOS B by increasing capacity on NB Franklin Street and EB O'Farrell Street through additional lanes; however, there is no ROW available along Franklin Street and the mitigation would impact transit along O'Farrell Street. Also, adding an exclusive EB left-turn lane would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side of O'Farrell. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult trade-off given the planned Geary Corridor BRT service. If the Authority Board finds the mitigation measures to be infeasible and does not adopt them, project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4.
- Franklin/Eddy. Traffic impacts at this intersection would be primarily a result of the delays for the Eddy Street approach. The mitigation measure is providing a 50-foot-long exclusive EB left-turn lane by eliminating two parking spaces on the south side of Eddy Street. This mitigation would improve the intersection performance to LOS D. However, this mitigation measure would



have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Eddy Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4.

- Franklin/McAllister. Traffic impacts at this intersection would be primarily a result of the delays for the Franklin Street approach. The mitigation measure is a fourth NB through lane created by instituting a PM peak-period tow-away zone along the west side of Franklin Street between Fulton and McAllister streets. This would extend the existing tow-away zone by one block south and improve the intersection performance to LOS D; however, this mitigation measure would have adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Franklin Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4.
- Van Ness/Hayes. Traffic impacts at this intersection would be primarily a result of the delays for the Van Ness Avenue left-turn approach. The reduction of two existing NB left-turn bays to one would not accommodate the forecast traffic volumes in 2035. This impact would be mitigated by diverting a portion of the left-turn volumes upstream in the SoMa area. Another mitigation measure would involve signage changes discussed earlier, from the intersection of Duboce/Mission/US 101 off-ramps to Mission and South Van Ness Avenue, and conversion of Otis Street to a two-way street from Duboce/Mission to McCoppin. These changes would potentially divert some of the Van Ness Avenue NB left-turn traffic at Hayes Street to Otis, Gough, Market, and Franklin streets to reach their destinations and decrease average vehicle delay at this intersection by over 10 seconds per vehicle (continuing to operate at LOS E) However, this mitigation measure would potentially cause secondary private vehicle, transit, and bicycle impacts at the Market and Franklin intersection (would cause the intersection to decline to LOS E) and at the Duboce/Mission intersection (would require the removal of parking on one side of the street between Duboce/Mission and Otis/Gough). If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4.
- South Van Ness/Mission/Otis. No improvement is proposed for this intersection because there is no ROW available to add lanes to this intersection, and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements. This intersection cannot be mitigated without significant redesign of the intersection. This intersection cannot be mitigated, and project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4.

4.2.3 2035 Long-Term Horizon Year Build Alternatives 3 and 4 with Design Option B and the LPA: Center-Lane BRT

As discussed under Section 3.3.2.2.4, the 2015 Build Alternative 3 and 4 with Design Option B and the LPA have the same traffic circulation, vehicular traffic volumes and impacts. Hence, the same mitigation measures were tested for both scenarios resulting in the same intersection LOS results and are discussed together below. Appendix 13 provides the input and results for intersections with mitigations for each alternative.

As discussed in Section 3.3.2.2.3 and 3.3.2.2.4, project traffic under 2035 Build Alternatives 3 and 4 with Design Option B and the LPA would cause a significant impact at eight intersections.



- Gough/Sacramento. Traffic impacts at this intersection would be primarily a result of the delays for the Gough Street approach. The mitigation measure is a second SB through lane along Gough Street implemented by instituting a PM peak-period tow-away zone on the west side of Gough Street between Clay and Sacramento streets. This mitigation would improve the intersection performance to LOS B. However, this mitigation measure would have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Gough Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Gough/Eddy. Traffic impacts at this intersection would be primarily a result of the delays for the Eddy Street approach. The mitigation measure is to provide a 50-foot-long exclusive EB right-turn lane implemented by eliminating three parking spaces on the south side of Eddy Street and relocating the bus stop on the near side of Gough to the far side of the intersection. This mitigation would improve the intersection performance to LOS C. However, this mitigation measure would have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Eddy Street in addition to a potential transit access impact. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Gough/Hayes. Traffic impacts at this intersection would be primarily a result of the delays for the Gough Street SB approach. The mitigation is to provide a fourth SB through lane on Gough Street through the implementation of PM peak-period tow-away along the eastside of Gough Street between Ivy and Linden and a 100-foot exclusive EB right-turn lane created through the removal of five parking spaces on the south side of Hayes Street. This mitigation would improve the intersection performance to LOS D. However, parking removal would worsen pedestrian conditions along the east side of Gough Street and the south side of Hayes Street.. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Franklin/O'Farrell. Traffic impacts at this intersection would be primarily a result of the delays for the O'Farrell Street approach. The mitigation is to increase capacity on NB Franklin Street and EB O'Farrell Street through additional lanes and improve the intersection performance to LOS C. However, ROW is unavailable along Franklin Street. Also, adding an exclusive EB left-turn lane would cause adverse impacts on Muni bus services. O'Farrell Street has a bus-only lane on the south side of O'Farrell. Providing an EB left-turn lane at Franklin Street would require this bus-only lane to be converted to a general-purpose lane. Losing this bus lane would adversely impact Muni bus speed and cause delays. This is an especially difficult trade-off given the planned Geary Corridor BRT service. If the Authority Board finds the mitigation measures to be infeasible and does not adopt them, project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Franklin/Eddy. Traffic impacts at this intersection would be primarily a result of the delays for the Eddy Street approach. The mitigation measure is to provide a 50-foot-long exclusive EB left-turn lane by eliminating two parking spaces on the south side of Eddy Street. This mitigation would improve the intersection performance to LOS D. However, this mitigation measure would have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Eddy Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.

- Franklin/McAllister. Traffic impacts at this intersection would be primarily a result of the delays for the Franklin Street approach. The mitigation measure is a fourth NB through lane implemented by instituting a PM peak-period tow-away zone along the west side of Franklin Street between Fulton and McAllister Street. This would extend the existing tow-away zone by one block south and improve the intersection performance to LOS D.; however, this mitigation measure would have the adverse effects of parking removal for auto travel lane purposes on pedestrian conditions along Franklin Street. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant impacts at this intersection in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- Franklin/Market. Traffic impacts at this intersection would be primarily a result of the delays for the EB Market left-turn approach. This intersection would perform poorly mainly due to the additional NB vehicles making a U-turn onto Otis Street from Mission Street NB, turning right onto Gough Street, right onto EB Market Street, and left onto NB Franklin Street. While traffic operations would be improved to LOS D by closing Page Street to EB vehicular traffic and adjusting signal timing at this intersection to provide more time for Market Street EB left-turn movements, these changes would make it difficult for bicycle users, who heavily utilize Page Street bike lanes, to access Market Street bike lanes. If the Authority Board finds the mitigation measure to be infeasible and does not adopt it, project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.
- South Van Ness/Mission/Otis. The LOS at this intersection cannot be improved because there is no ROW available to add lanes, and the traffic signal timings are constrained by the pedestrian minimum timings and cannot be allocated to congested movements. This intersection cannot be mitigated, and project traffic would cause significant and unavoidable impacts in 2035 under Build Alternatives 3 and 4 with Design Option B and the LPA.

4.3 Traffic Management “Toolbox”

In addition, a “toolbox” of short-term traffic management strategies is proposed to improve traffic management in the study area. The approaches in the toolbox are not associated with any specific intersection delay, but they would assist the transition from no-build to build circulation patterns and support smooth multimodal circulation in the corridor and citywide under a build and cumulative scenario. The toolbox effort includes raising public awareness of circulation changes; advising drivers of alternate routes; lessening the effects of automobile delays on other street users; reducing conflicts between regional and local traffic; and better using San Francisco’s existing street grid capacity:

- Driver Wayfinding and Signage. Driver guidance will especially assist infrequent drivers of the corridor who may not be aware of alternate routes, such as along the Larkin/Hyde and Franklin/Gough corridors. Examples of wayfinding/signage opportunities include guidance from the US 101 off-ramps to 9th Street/Civic Center to the Hyde/Larkin NB corridor, and from NB Mission Street and the Duboce off-ramp to the Otis U-turn with access to NB Franklin Street. For infrequent drivers heading SB from the northern part of the corridor, signage/wayfinding could include use of North Point to access downtown, or right turns off of Van Ness Avenue, such as at Pine, to access Gough. The Authority will work with Caltrans to develop a driver wayfinding and signage strategy as part of mitigation measures M-TR-C2 and M-TR-C5, discussed in Section 4.15.1.2. Some or all of these measures could remain after construction and during project operation.
- Public Awareness Campaign and Transportation Management Plan (TMP) during Project Construction. The project construction period is an ideal time to raise public awareness of circulation changes resulting from the project and to implement wayfinding/signage, guidance to alternate routes,

and use of parking control officers. As discussed as part of mitigation measure M-TR-C7 in Section 4.15.1, a TMP would be developed to implement these concepts during construction. These information channels could also create new patterns, helping inform drivers during project operation. This campaign should be carried out with regional agencies, including Caltrans and GGT.

- Pedestrian Amenities at Additional Corridor Locations. Pedestrian amenities, such as countdown signals and pedestrian curb bulbs, could help reduce the effects of automobile traffic delays on pedestrians in other parts of the corridor. Locations would be determined based on a combination of pedestrian and vehicle volumes, infrastructure capabilities, and collision history. These pedestrian improvements cannot be represented in standard traffic or travel demand models to show a reduction in traffic on an individual project/intersection basis. Rather, shifts from driving to walking tend to occur as a network of improvements are implemented. The toolbox of improvements identified in Chapter 3.3 can be used to help build that network, and over the long run may reduce traffic volumes and therefore traffic impacts. As part of this project, they will not worsen traffic conditions.

These above strategies cannot be readily represented in conventional traffic operations models; therefore, their potential effect on minimizing or mitigating traffic delay impacts has not been quantified.

