FEHR PEERS

DRAFT TECHNICAL MEMORANDUM

Date: May 26, 2021

To: Lisa Brownfield, MIG

From: Miguel Núñez, Dongyang Lin, Jeremy Klop, Fehr & Peers

Subject: ***Transportation Impact Analysis (TIA) for the Whittier General Plan***

Ref: LA17-2953

EXECUTIVE SUMMARY

This memorandum summarizes the results of the transportation impact analysis conducted by Fehr & Peers for the Whittier General Plan and contextualizes this analysis in light of the changes to technical practices that are evolving due to the implementation of SB 743. This 2013 law is shifting transportation impact analysis for CEQA purposes away from vehicle LOS and measures of vehicle delay to vehicle miles of travel (VMT). This shift is intended to better align CEQA transportation impact analysis with State goals to encourage infill development, promote active transportation, and reduce greenhouse gases (GHGs).

In December 2018, new CEQA Guidelines implementing SB 743 (Section 15064.3), along with the Office of Planning and Research (OPR) Technical Advisory on Evaluating Transportation Impacts for CEQA, were finalized and made effective. Guidelines Section 15064.3, and the associated OPR Technical Advisory, provide that use of VMT is the preferred CEQA transportation metric, and correspondingly eliminate auto delay/LOS as the metric for assessing significant impacts under CEQA statewide. Under Section 15064.3, statewide application of the new VMT metric is required beginning on July 1, 2020.

In response to SB 743, the City of Whittier is in the process of adopting new transportation impact thresholds to adhere to CEQA requirements and provided guidance on conducting transportation studies in the City. The City has determined that a dual analysis process will be applied for identifying and evaluating potential transportation impacts and necessary roadway improvements associated with new land development and infrastructure projects located within the City. The first analysis will consist of an approach using the metric of vehicle miles traveled (VMT) to identify potential transportation impacts by applying CEQA designated methodologies and thresholds. The second analysis will be a localized approach for non-CEQA analysis conducted primarily to identify potential safety and operational issues when applied against criteria the City has established.

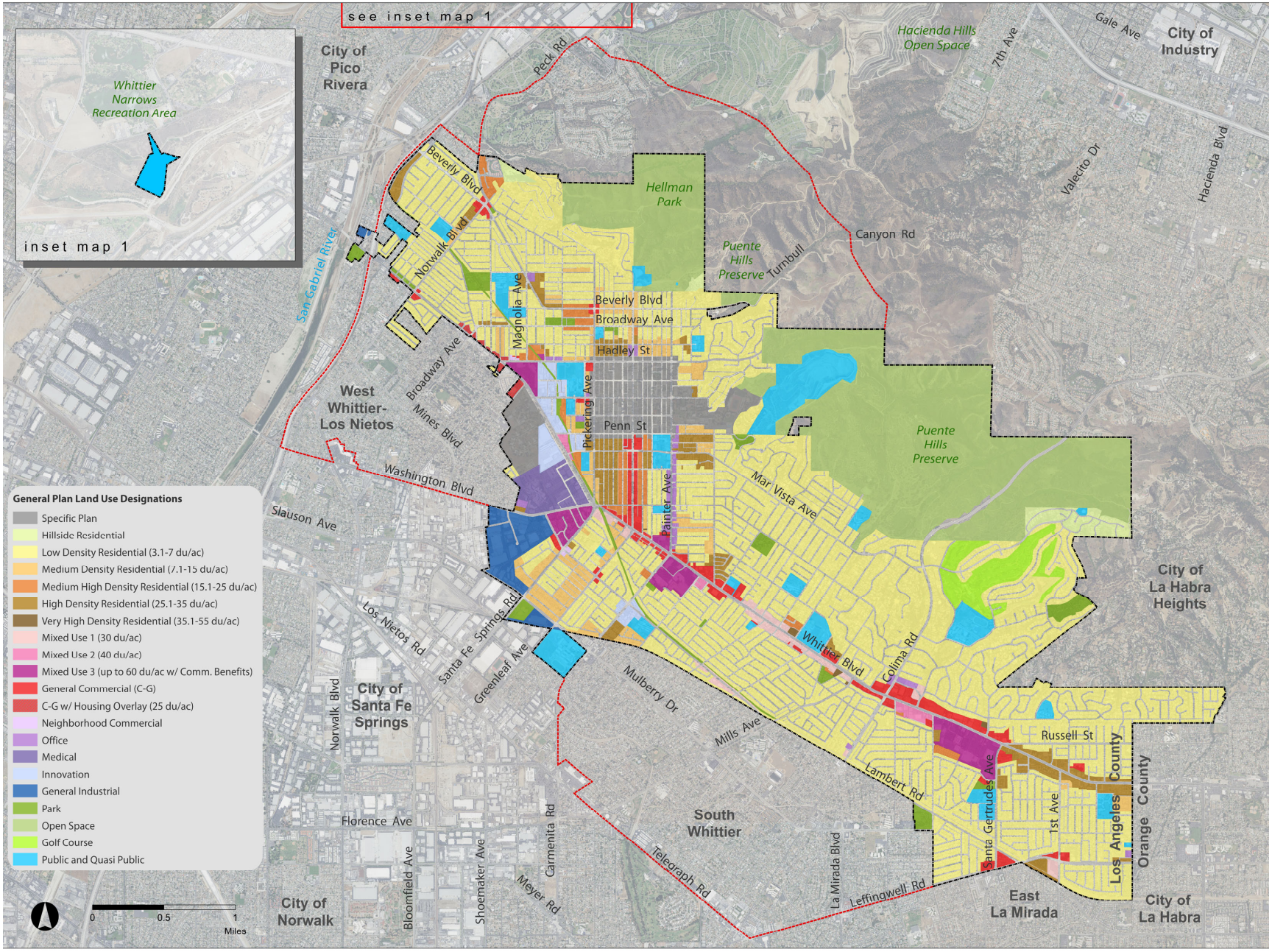
Given these evolving changes to practice, the transportation impact analysis for Whittier's General Plan has been analyzed using both VMT and LOS. This memo aims to document the approach and outcomes associated with each analysis.

Project Description

The comprehensive update of the Whittier General Plan and Housing Element serves as the guide for the City's future growth and development. The General Plan and Housing Element contain goals, policies, and programs that will provide City staff and discretionary bodies with a foundation for

decisions for long-range planning related to physical development and public services. Between now and the 2040 planning horizon for the City of Whittier, the Planning Area is estimated to see increases of approximately 472 single family dwellings, 7,023 multifamily dwellings, 828,448 square feet of office space, 193,819 square feet of industrial space, and a reduction of 300,102 square feet of commercial space. An estimated increase of approximately 20,190 residents and 1,396 jobs is projected for the 2040 horizon year. The proposed Land Use Plan is shown on Figure 1.

This memo provides the approach taken and results from analyzing and evaluating potential impacts to the transportation system from the Land Use Plan of Whittier General Plan and Housing Element for the year 2040.



City of Whittier Sphere of Influence

Image Source: MIG.

Figure 1

Proposed General Plan Land Use Map

Whittier's Goals

The analysis of the General Plan utilizes the land use program and transportation network as inputs for performance metrics such as VMT and LOS. The development and assessment of the General Plan is also intended to reflect the goals set forth for Whittier in the General Plan. A summary of goals in the GP include:

- Providing a connected, balanced, and integrated multimodal transportation system
- Improving local and regional transit service
- Promoting a 15% reduction of per capita VMT
- Developing plans and effective management strategies for existing and emerging elements of the transportation system such as:
    - Neighborhood walkability
    - Vehicle congestion
    - Urban freight and goods movement
    - Shared mobility such as vehicles and personal mobility devices
    - Curb space and deliveries
    - Parking
    - Electric, and autonomous vehicles

VMT ANALYSIS

What is VMT?

Pursuant to SB 743, VMT is the State of California's new metric to assess transportation impacts under the California Environmental Quality Act (CEQA) by evaluating the changes in VMT caused by a project. The simple definition of VMT is a measurement of the total mileage travelled by all vehicles in an area or generated by a project. This methodology is preferred because it is directly related to fuel consumption and emissions, which harm the environment.

Vehicle LOS is a measure of driver comfort and convenience, and while projects do change these aspects of driving, the State has determined that these effects on drivers do not constitute environmental impacts. Cities can continue to measure LOS as part of land use development plans and projects and require improvements to alleviate identified deficiencies. Those actions; however, occur outside the CEQA process.

VMT growth associated with land use and transportation projects is part of adopted regional transportation plans (RTPs), regional transportation plans/sustainable communities strategies (RTP/SCSs), and general plans. These plans typically consider the acceptability of VMT growth at a cumulative or programmatic level. Additional VMT reduction may be achieved at the project level especially through transportation demand management (TDM) strategies, which are not fully accounted for in regional level travel forecasting models.

Although VMT is focused on auto travel, the goal of a zero-or-less per capita VMT growth rate leads to an emphasis on the effects of development patterns (e.g., land use mix and density) together with pedestrian, bicycle, and transit infrastructure, given that all of these factors have an impact on the number and length of vehicle trips. Efforts to reduce VMT may include TDM strategies and improvements to pedestrian, bicycle, and transit infrastructure.

Why VMT?

SB 743 includes the following two statements of legislative intent:

1. Ensure that the environmental impacts of traffic, such as noise, air pollution, and safety concerns, continue to be properly addressed and mitigated through the California Environmental Quality Act.

2. More appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas emissions.

These statements are important because they provide direction to OPR and to lead agencies. For OPR, the direction is largely about what new metrics should achieve. For lead agencies, the direction is about expected changes in transportation analysis plus what factors to consider for significance thresholds.

To implement this intent, SB 743 contains amendments to current congestion management law that has allowed and resulted in cities and counties opting out of the regional LOS standards that

would otherwise apply. This is the case for the County of Los Angeles, who opted out of the Congestion Management Program in summer of 2019. Furthermore, SB 743 requires OPR to update the CEQA Guidelines and establish "...criteria for determining the significance of transportation impacts of projects within transit priority areas." The new criteria "...shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses."

In December 2018, new CEQA Guidelines implementing SB 743 (Section 15064.3), along with the Office of Planning and Research (OPR) Technical Advisory on Evaluating Transportation Impacts for CEQA, were finalized and made effective. Guidelines Section 15064.3, and the associated OPR Technical Advisory, provide that use of automobile Vehicle Miles Traveled, or VMT, is the preferred CEQA transportation metric, and correspondingly eliminate auto delay/LOS as the metric for assessing significant impacts under CEQA statewide. Under Section 15064.3, statewide application of the new VMT metric was required beginning on July 1, 2020.

SB 743 does not prevent a city or county from continuing to analyze delay or LOS as part of other plans (e.g., the general plan), fee programs, or ongoing network monitoring, but these metrics will no longer constitute the sole basis for CEQA impacts. Whittier has opted for continued use of vehicle LOS as a component of their transportation analysis process (outside of CEQA). Jurisdictions can also continue to condition projects to build transportation improvements through the entitlement process in a variety of ways, such as using general plan consistency findings.

Until SB 743, transportation impact analysis performed to comply with CEQA commonly focused on the perspective of automobile drivers when measuring potential impacts, specifically by measuring the level of delay for drivers traveling through certain intersections or on certain roadway segments. This perspective reflects general traffic engineering practices and how traffic operations are measured based on quantitative metrics such as vehicle speed or delay.

Since LOS is directly related to driving convenience (e.g., measurement of delay), it generally found acceptance by public agencies needing to measure roadway network performance and assessing how that performance may change as a result of a land use development or transportation project.

Part of the acceptance was the ability to communicate network performance in a form that was directly relevant to drivers and generally understood by the public and decision makers. The LOS metrics, however, do have limitations and consequences that contributed to the decision to shift away from vehicle LOS in SB 743. These limitations include, but are not limited to:

1. Vehicle LOS does not fully capture potential effects on transit, bicycle, and pedestrian modes.

2. Conventional vehicle LOS analysis does not describe network-wide performance.

3. LOS thresholds are established without recognizing the influence on air pollution, greenhouse gases (GHG), and energy consumption.

4. LOS thresholds are used to determine roadway sizes and speeds, which influence land use form and traffic safety.

The OPR Technical Advisory provides state guidance for lead agencies to consider related to VMT thresholds, methodology, and screening criteria for implementation of SB 743, and identifies that generally travel demand models are the appropriate tool for evaluating VMT. The CEQA Guidelines (section 15064.3) state that:

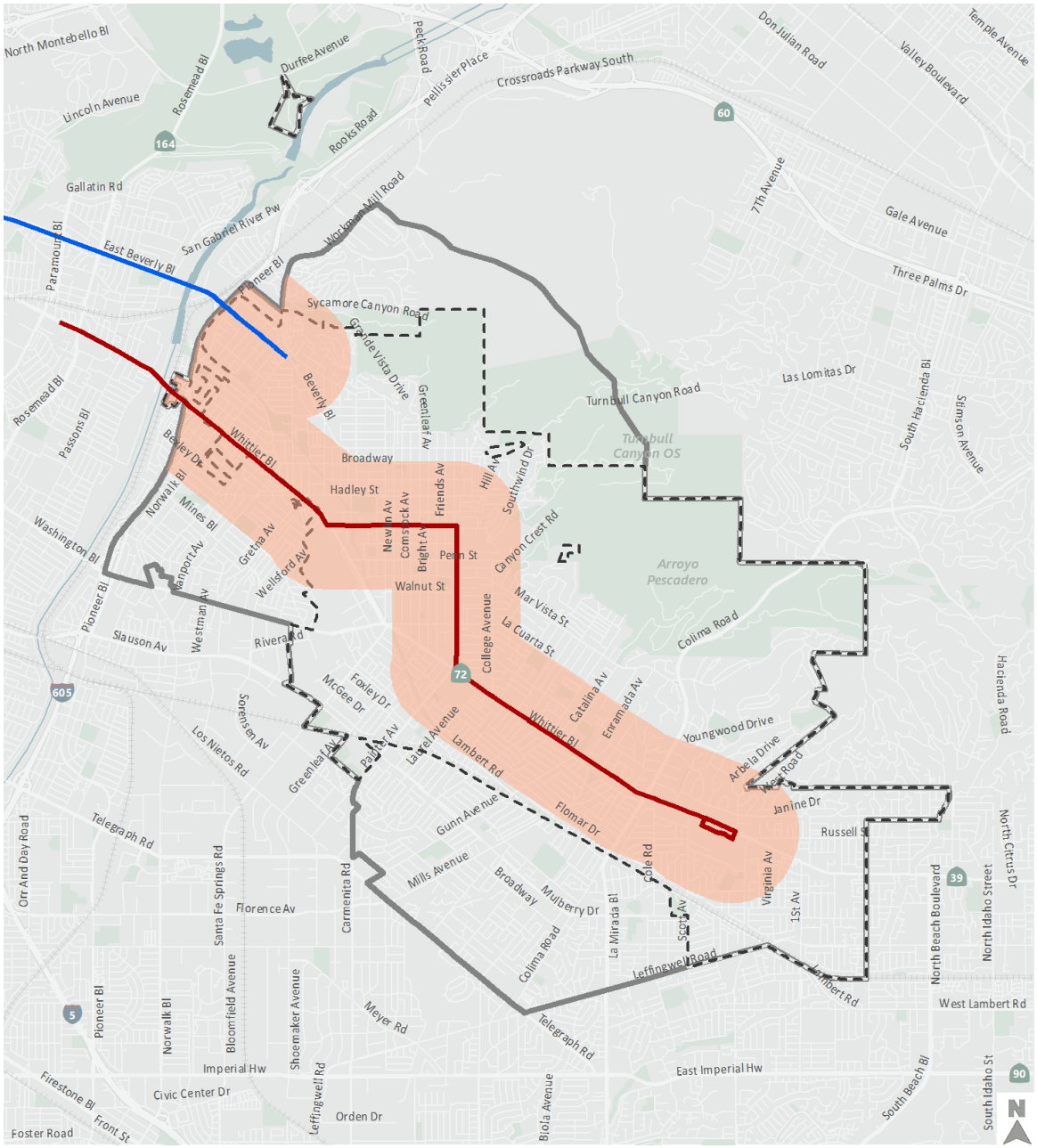
"A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section."

In this case, the lead agency is the City of Whittier. The City of Whittier is in the process of adopting guidelines for evaluating VMT to comply with SB743. The details of the methodology and VMT thresholds are described in the following section.

Transit Priority Areas

The City of Whittier has determined the current Transit Priority Areas to be areas within one-half mile of where two or more 15-minute (during commute hours) bus routes intersect or within one-half mile of a corridor served by 15-minute (during commute hours) bus service. Whittier's current Transit Priority Areas is shown in Figure 2. LA Metro is evaluating the Eastside Transit Corridor Phase 2, an extension of the Metro L Line (Gold) further east. The project is currently undergoing environmental review and is planned to have two stations serving Whittier, one at Norwalk Boulevard/Washington Boulevard and one at Lambert Road/Washington Boulevard as the terminus. With the completion of the Eastside Transit Corridor Phase 2, the future boundary of Whittier's Transit Priority Areas would expand to include areas within ½ mile of the two stations mentioned above (Figure 3).

FIGURE 2 – TRANSIT PRIORITY AREAS IN WHITTIER (EXISTING)



Montebello Route 10
Montebello Route 40
Transit Priority Areas
City of Whittier
Sphere of Influence

Figure 2

Transit Priority Areas in Whittier (2019)

FIGURE 3 – TRANSIT PRIORITY AREAS IN WHITTIER (FUTURE WITH EASTSIDE TRANSIT CORRIDOR PHASE 2 BUILT OUT)

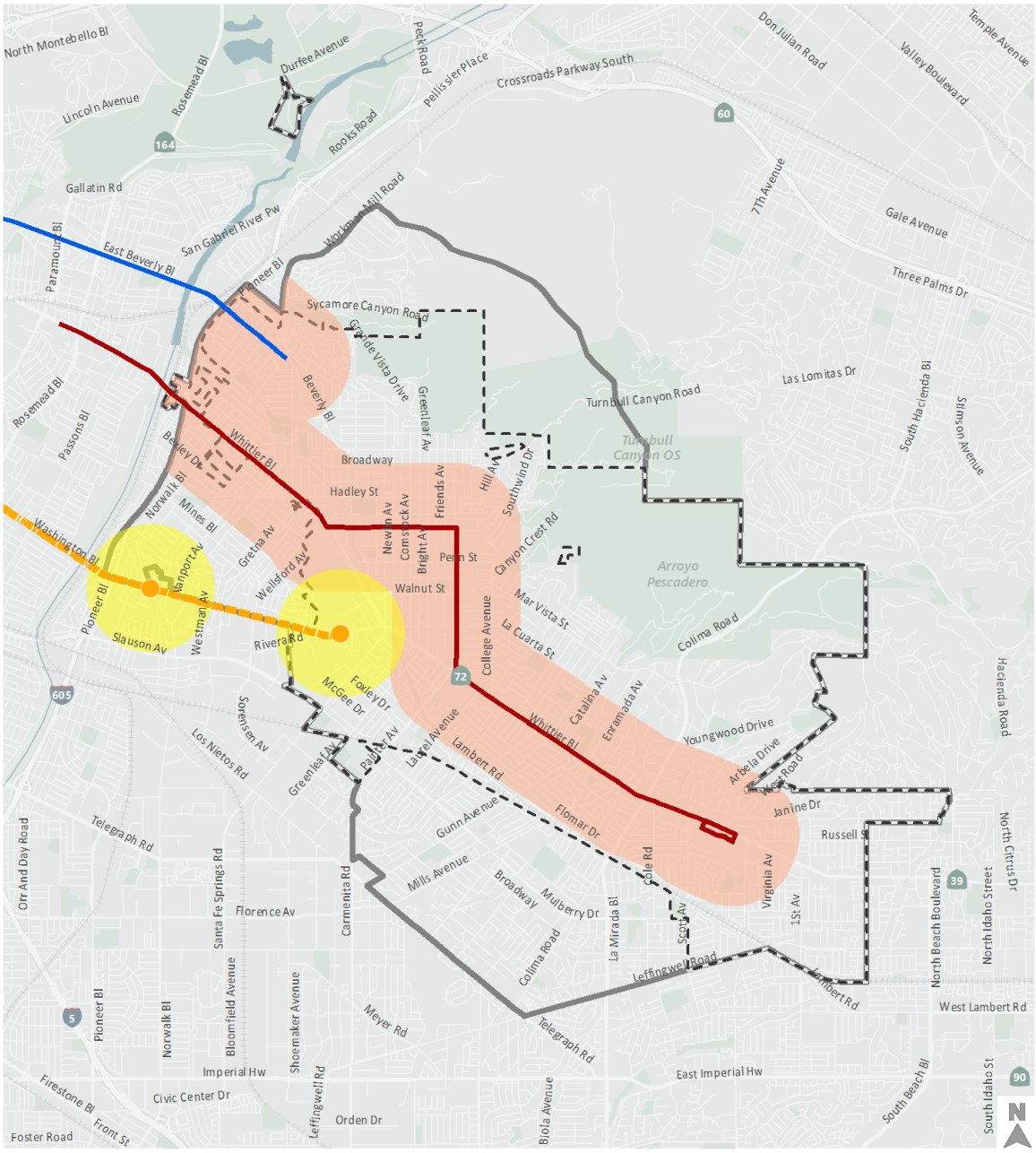


Figure 3

Future Transit Priority Areas in Whittier
(With Eastside Transit Corridor Phase 2 Built Out)

VMT Methodology

The methodology for determining VMT transportation impacts in the City of Whittier is contained in its Transportation Study Guidelines (TSG). The TSG outlines the following process for performing analysis:

1. Determine if VMT analysis is necessary by comparing project characteristics for each land use to the City's screening criteria.
2. If a project component does not meet any of the screening criteria, perform VMT analysis for the component(s) that do not meet the screening criteria to determine that component's VMT (using the appropriate metric based on land-use type).
3. Compare the project component VMT to the significance criteria to determine if there is VMT transportation impact.
4. If there is an impact, identify mitigation measures to reduce the project impact.

The Southern California Association of Government (SCAG) Regional Travel Demand Model (hereinafter, "SCAG Model"), to estimate a project's VMT. VMT is presented in numerous different forms depending on the analysis being conducted. "Home-Based VMT" per capita is used for residential projects and "Home-Based Work VMT" per employee for office projects. For general plans, Total VMT per service population is used to determine potential impacts.

Pursuant to OPR and Whittier's TSG, this VMT analysis includes 'project generated VMT' for the project TAZs and 'project effect on VMT' estimates under the following conditions.

- The Existing/Baseline 2019 Conditions (pre-Covid 19) represent the existing baseline conditions for the project based on the Notice of Preparation and conditions on the ground at the time the project was started.

- The Cumulative Base 2040 Conditions represent the 2016-2040 SCAG Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS).

- The Cumulative Plus Project 2040 Conditions represent the General Plan scenario. The amended General Plan land use is represented in the assumed growth of the cumulative year socioeconomic input data in the model for the City's planning area, and regional land uses and transportation improvements are consistent with the 2040 SCAG RTP/SCS.

Project-generated VMT were extracted from the SCAG Model by multiplying the origin-destination trip matrix by the final assignment skims under the Cumulative Plus Project 2040 Conditions. The summarized project generated VMT per service population is compared back to the thresholds of significance the City of Whittier has opted to use. Whittier's TSG provides that "Home-Based VMT" per capita to be prepared for residential projects and "Home-Based Work VMT" per employee for office projects, therefore this section also presents these two metrics along with Total VMT per service population and Total VMT, which are summarized in Table 1.

Under Existing/Baseline Conditions, the service population of 174,518 in the City and Sphere of Influence generates 5,739,547 vehicle miles traveled (VMT), including autos and trucks. This results in 32.9 VMT per service population, 16.2 Home-Based VMT per capita for residential land uses, and 17.9 Home-Based Work VMT per employee for employment land uses.

Under Cumulative Base 2040 Conditions, the service population of 187,169 shows a total VMT of 5,520,899. This results in 29.5 VMT per service population, 14.7 VMT per resident for residential land uses, and 14.5 VMT per employee for employment land uses.

Under the Cumulative Plus Project 2040 Conditions, VMT increases to reflect additional development in the City of Whittier. The service population of 196,453 generates5,885,614 total VMT. This results in 30.0 VMT per service population, 14.5 VMT per resident for residential land uses, and 14.7 VMT per employee for employment land uses. **Error! Reference source not found.**

Table 1
VMT SUMMARY BY SCENARIO

SED / VMT Metrics	2019 Existing/Baseline Conditions	Cumulative Base 2040 Conditions	Cumulative Plus Project 2040 Conditions
Population	142,851	152,338	161,291
Employment	31,667	34,831	35,162
Service Population	174,518	187,169	196,453
Total VMT (Include Auto and Trucks)	5,739,547	5,520,899	5,885,614
Home-Based VMT (Production)	2,314,225	2,242,577	2,338,722
Home-Based Work VMT (Attraction)	567,120	506,193	515,187
Total VMT per Service Population	32.9	29.5	30.0
Home-Based VMT per Capita	16.2	14.7	14.5
Home-Based Work VMT per Employee	17.9	14.5	14.7

VMT Modeling

The SCAG Model is a 4-step, trip based convergence model covering the entire SCAG 6-county region. The Model is structured geographically into approximately 4,100 tier 1 Transportation Analysis Zones (TAZs) and 11,267 tier 2 TAZs. Socioeconomic Data, Highway network, and Transit network are primary in puts to the SCAG Model to estimate trip generation and assign vehicle trips. The Project area is represented by 29 tier 1 TAZs and 79 tier 2 TAZs (Appendix A).

For no project scenarios, base year (2016) model (hereinafter, "2016 Base Model") and future base (2040) model (hereinafter, "2040 Base Model") were used. Compared to the 2016 Base Model, the 2040 Base Model uses the same number of TAZs and boundaries, but SCAG has made different assumptions for socioeconomic and network inputs, as well as parameters such as Auto Operating Cost, TDM Factors, etc, that are consistent with the 2016-2040 Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS). These assumptions are independent from Whittier's General Plan, which results in different estimates in vehicle trips, traffic volumes and VMT between no project scenarios.

In addition to the regional network assumptions in SCAG model, additional modifications were made to socioeconomic and transportation network inputs in the no project scenarios to match with local geographic boundaries and reflect local transportation improvements. Details are described in the following section.

Socioeconomic Inputs and Boundaries

The Project-generated VMT were estimated using zone-based methods, and the Project area boundary (the City of Whittier and Sphere of Influence) is not consistent with the TAZ boundaries. To reflect actual municipal boundaries for VMT analysis that are consistent through different analysis scenarios, socioeconomic inputs were disaggregated in 10 tier 2 TAZs that cross the Project area boundary (hereinafter, "edge TAZs") for 2016 Base Model and 2040 Base Model. In those edge TAZs, socioeconomic data was modified to represent the land uses in and out of the Project area boundary. In addition, K-12 school enrollment in the Project area for 2016 Base Model and 2040 Base Model are adjusted to match with the existing and planned school enrollment data collected from the school districts.

Transportation Network Changes

In consultation with City staff, several key network improvements were appropriate to include in the 2040 Base Model in reflecting the future transportation network baseline improvements in the City of Whittier and Sphere of Influence. It includes:

- Eastside Transit Corridor Phase 2
- Completion of the Whittier Greenway Trail to the eastern City limit
- Roadway capacity expansion/reduction, including Beverly Boulevard, Norwalk Boulevard, Colima Road, Painter Avenue, and Santa Fe Springs Road.

For the Cumulative Plus Project scenario, Project land uses were input in the 2040 Model. Table 2 compares five key socioeconomic inputs between the 2040 Base Model and the Plus Project Model that associates with the Project land uses. Note that total employment is forecast to decrease slightly in both the 2040 Base Model condition and the General Plan 2040 Plus Project condition.

TABLE 2
KEY SOCIOECONOMIC INPUTS BY SCENARIO

Scenario	Population	Households	Employment	K-12 School Enrollment	College/University Enrollment
2019 Existing	142,851	45,120	21,902	1,834	31,667
2040 Base Model	152,338	48,551	20,451	1,834	34,831
2040 Plus Project Model	161,291	53,711	20,458	1,834	35,162

VMT Impact Thresholds

The City of Whittier has established the following significance threshold for VMT transportation impacts for each land use type in a project:

- For land use plans: Plans exceeds 15% below City and Sphere of Influence (SOI) Baseline VMT for Total VMT per service population.
- For residential projects: Project exceeds 15% below City and Sphere of Influence (SOI) Baseline VMT for home-based VMT per capita.
- For office (commercial or light industrial) projects: Project exceed 15% below City and Sphere of Influence (SOI) Baseline VMT for home-based work VMT per employee.
- For regional retail projects: Project results in a net increase in total VMT in comparison to the City + SOI Baseline VMT
- For mixed-use projects: Evaluate each project land use component separately using the criteria above.

Project VMT Impact Analysis

In order to determine if the General Plan Project results in a project impact several steps are completed:

- Compare the proposed General Plan for consistency with the SCAG RTP/SCS
- If consistent, that my support a finding of less than significant if the change from the existing baseline VMT to the project VMT baseline demonstrates a 15 percent reduction in per capita VMT for the Service Population
- For informational purposes, a comparison of 2040 no project and 2040 with project is also provided to help the public and stakeholders understand how the General Plan would affect travel patterns relative to the currently adopted plan

TABLE 3
BASELINE VMT AND THRESHOLDS IN THE CITY OF WHITTIER AND SOI

VMT Metrics	Average VMT (2019 Baseline)	Threshold (15% reduction)
Total VMT per Service Population	32.9	28.0
Home-Based VMT per Capita	16.2	13.8
Home-Based Work VMT per Employee	17.9	15.2

TABLE 4 2040 PLUS PROJECT VMT COMPARED TO EXISTING BASELINE VMT			
VMT Metrics	**Average VMT (2019 Baseline)**	**2040 Plus Project**	**Percent Difference**
Total VMT per Service Population	32.9	30.0	-9%
Home-Based VMT per Capita	16.2	14.5	-10%
Home-Based Work VMT per Employee	17.9	14.7	-18%

TABLE 5 2040 PLUS PROJECT VMT COMPARED TO 2040 BASE VMT			
VMT Metrics	**2040 Base**	**2040 Plus Project**	**Percent Difference**
Total VMT per Service Population	29.5	30.0	1.6%
Home-Based VMT per Capita	14.7	14.5	-1.5%
Home-Based Work VMT per Employee	14.5	14.7	0.8%

Based on the three VMT metrics presented in Table 4 and compared to the impact thresholds shown in Table 3, the home-based work VMT per employee is estimated to be 15% or more below the cities Baseline VMT and would therefore not result in a significant impact. For the Total VMT per Service Population and Home Base VMT per Capita the results in Table 4 show that he City's General plan is estimated to achieve a nine and 10 percent reduction, respectively. However, per State guidance and the City's impact thresholds, not achieving a 15 percent or more reduction, would result in a significant impact.

VMT Mitigation

As displayed in Table 4, the evaluation of transportation impacts based on application of the VMT impact thresholds and performance of the General Plan, relative to the Baseline scenario, shows that all three VMT metrics perform better than the City's Baseline (9% to 18% better). However, per the State's guidance and the City's adopted VMT approach, the VMT metrics must perform 15% better than the City's baseline average in order to not exceed the significant impact threshold. Therefore, mitigation strategies for Home-Based VMT per Capita and Total VMT per Service Population were analyzed and could be achieved through the following strategies:

- Expand the local transit network by adding shuttle routes connecting several destinations such as Uptown Whittier, the Groves, the proposed Lambert Road/Washington Boulevard Station of the Eastside Transit Corridor Phase 2 (L Line, formerly Gold Line), the Quad, and Whittier College. The local shuttle analysis analyzed shuttle operations that would occur on weekdays during on-/off-peak hours, with 15-minute headways and a route and stops serving several areas and key destinations. This analysis was completed by incorporating the shuttle route, stops, and anticipated operational characteristics in the SCAG model to estimate reductions in trips and trip lengths that are factored into the VMT calculations for the mitigation scenario.

- Buildout of the proposed bicycle and pedestrian facility network proposed in the City's Bicycle Master Plan and General Plan. The City has already designed and secured funding for the completion of the Whittier Greenway Trial to the eastern City limit, which will fill in a missing gap and significantly expand access, along with other proposed facilities, to Uptown Whittier, major destinations along Lambert Road and Whittier Boulevard (such as The Quad, Whitwood Town Center, and the Groves), and the future L Line Station at Washington Boulevard and Lambert Road. This strategy would help reduce Total VMT per service population as any trip, whether for employment, residential, or other trip purposes, that shifts to utilizing the bicycle or pedestrian network would lead to a reduction in VMT.

- Quantifying the potential reduction in trips and trip length that would arise from the encouragement of telecommuting and alternative work schedules, and the shift to telecommuting from Covid-19 and continuing advances in technology. This mitigation was applied to selected employment categories, such as professional employees (not applied to retail employees who would continue to work on-site), and also analyzed up to one day a week of telecommuting, which would reduce the number of commute trips and therefore the total and per capita VMT traveled by employees.

Mitigation strategies above were applied using a combination of the SCAG model and trip adjustment factors. Based on the three VMT metrics presented in Table 6 and compared to the impact thresholds shown in Table 3, the Home-Based VMT per Capita and Home-Based Work VMT per Employee is estimated to achieve a 17 and 21 percent reduction relative to Whittier's baseline, respectively. Total VMT per Service Population is estimated to achieve a 13% percent reduction (see Table 7). Per State guidance and City's impact thresholds, not achieving a 15 percent or more reduction, would result in a significant impact.

TABLE 6
2040 PLUS PROJECT VMT WITH MITIGATION

VMT Metrics	2040 Plus Project	2040 Plus Project with Mitigation	Percent Difference
Total VMT per Service Population	30.0	28.6	-4.5%
Home-Based VMT per Capita	14.5	13.5	-7.2%
Home-Based Work VMT per Employee	14.7	14.2	-3.3%

TABLE 7
2040 PLUS PROJECT VMT WITH MITIGATION COMPARED TO EXISTING BASELINE VMT

VMT Metrics	Average VMT (2019 Baseline)	2040 Plus Project with Mitigation	Percent Difference
Total VMT per Service Population	**32.9**	**28.6**	**-13%**
Home-Based VMT per Capita	16.2	13.5	-17%
Home-Based Work VMT per Employee	17.9	14.2	-21%

LEVEL OF SERVICE EVALUATION

This analysis evaluates how changes in the general plan land uses could affect peak hour traffic operations in Whittier. Peak hour traffic impacts for the project were evaluated during prevailing weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods. The following traffic scenarios were analyzed in the study, per the City's Transportation Study Guidelines section regarding non-CEQA analysis:

- Existing Year 2019 Conditions – The analysis of existing weekday AM and PM peak hour traffic conditions provided a basis for the assessment of future traffic conditions. Existing project traffic volumes were taken from counts collected in September 2017.

- Cumulative Base (Future Baseline) 2040 Conditions – This scenario projected the future traffic growth and intersection operating conditions that could be expected from regional growth and the current adopted land use plan in the City of Whittier in the future. These analyses provided the "baseline" conditions by which project impacts were evaluated.

- Cumulative plus Project 2040 Conditions – This scenario identified the potential incremental impacts of the proposed project on future traffic operation conditions by adding the traffic expected to be generated by the updated General Plan in the City of Whittier to cumulative base traffic forecasts.

The study examined eleven intersections for each of the above traffic scenarios. The study intersection locations are listed below and illustrated on Figure 4.

Study Intersections

1) Norwalk Boulevard & Beverly Boulevard
2) I-605 SB Off Ramp & Whittier Boulevard
3) I-605 NB Off Ramp & Whittier Boulevard
4) Norwalk Boulevard & Whittier Boulevard
5) Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard
6) Painter Avenue & Mar Vista Street
7) Painter Avenue & Whittier Boulevard
8) Laurel Avenue & Lambert Road
9) Colima Road & Mar Vista Street
10) Colima Road & Whittier Boulevard
11) Colima Road & Lambert Road

Intersection Level of Service Methodology

The eleven study intersections studied in Whittier are all signalized. The Intersection Capacity Utilization (ICU) methodology was used for the signalized intersections, as the City of Whittier follows the Los Angeles County Traffic Impact Analysis (TIA) Report Guidelines to determine level of service and is in the process of adopting the new Transportation Study Guidelines. The ICU methodology provides a comparison of the number of vehicles passing through an intersection during a given hour to the theoretical hourly vehicular capacity of that intersection.

A saturation flow rate of 1,600 vehicles per hour per lane for all through/turn lanes is used. The ICU calculation returns a volume-to-capacity (V/C) ratio that translates into a corresponding level of service (LOS). In urban settings, LOS D or better is commonly considered the desired LOS (LA County General Plan, 2014) and Whittier has established LOS D as the desired LOS throughout the City, with the exception of Transit Priority Areas and Uptown Whittier where a decrease in LOS is allowed in light of tradeoffs associated with priority given to multimodal access, speed reduction for safety, opportunities for outdoor dining and walkability of selected areas.

The City recognizes several limitations to these selected methodologies. Notably, these methods rely on isolated intersection analysis that does not consider the influence of upstream or downstream traffic conditions. Further, severe congestion in the study area often associated with queueing from nearby freeway interchanges can block or limit the amount of peak hour traffic traveling through the study intersections. As such, traditional peak hour traffic counts used in these methods may underestimate driver delay because demand stuck in queue is not fully accounted for. These limitations may result in reported LOS results that are better than observed conditions.

FIGURE 4 - STUDY INTERSECTIONS

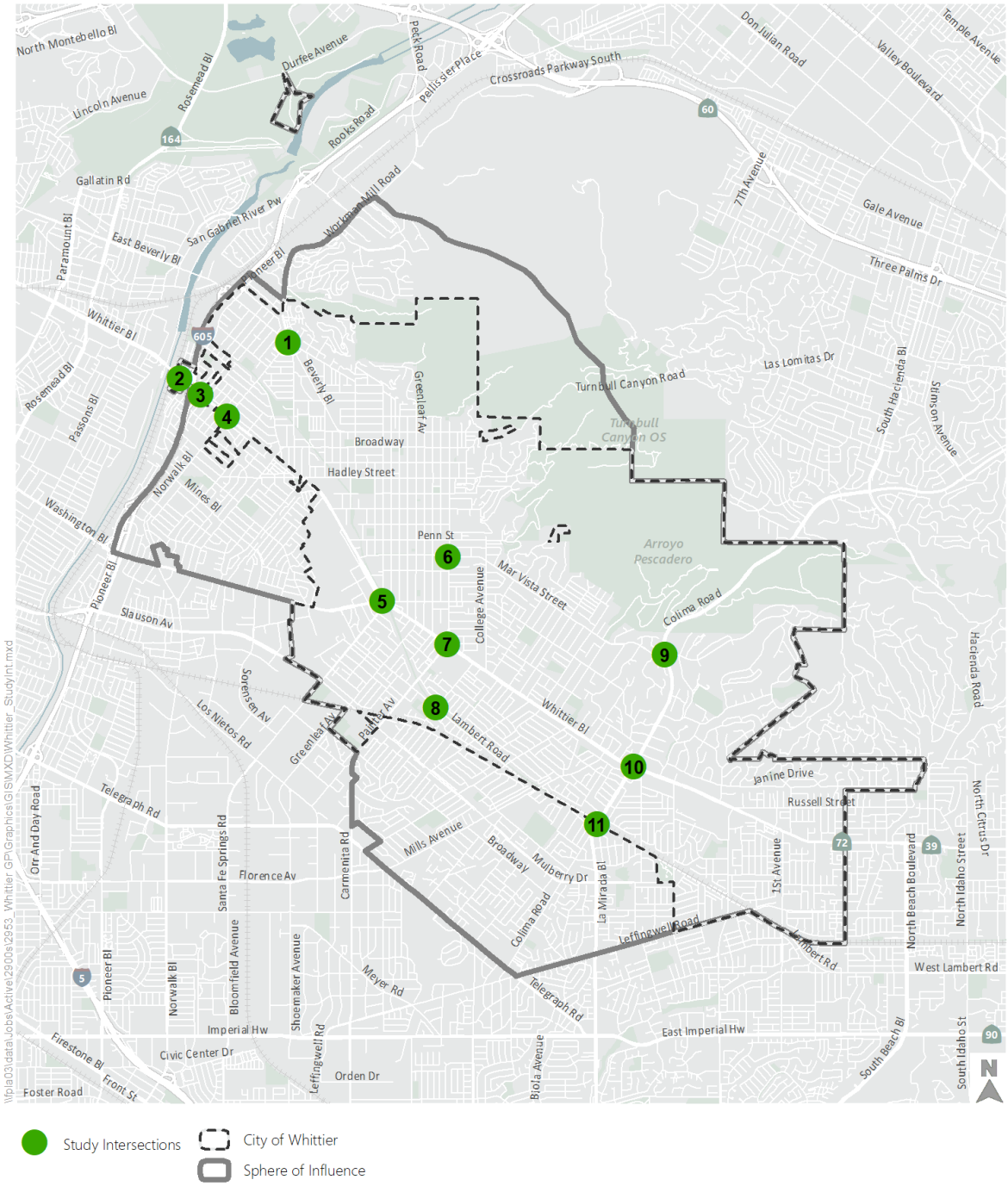


Figure 4

Study Intersections

Criteria for Determination of Operational Deficiency

Table 8 below provides a description of each LOS grade and the corresponding V/C ratio.

TABLE 8
INTERSECTION CAPACITY UTILIZATION LEVEL OF SERVICE CRITERIA

Level of Service	V/C Ratio	Definition
A	0.00 – 0.60	At LOS A, there are no cycles that are fully loaded, and few are even close to loaded. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	>0.60 – 0.70	LOS B represents stable operation. An occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel somewhat restricted with platoons of vehicles.
C	>0.70 – 0.80	In LOS C stable operation continues. Full signal cycle loading is still intermittent, but more frequent. Occasionally drivers may have to wait through more than one red signal indication and backups may develop behind turning vehicles.
D	>0.80 – 0.90	LOS D encompasses a zone of increasing restriction, approaching instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.
E	>0.90 – 1.00	LOS E represents the most vehicles that any particular intersection approach can accommodate. At capacity (V/C = 1.00) there may be long queues of vehicles waiting upstream of the intersection, and delays may be great (up to several signal cycles).
F	> 1.00	LOS F represents jammed conditions. Backups from location downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration; hence, volumes carried are not predictable. V/C values are highly variable, because full utilization of the approach may be prevented by outside conditions.

Source: *Los Angeles County Metropolitan Transportation Authority,* 2010

The City of Whittier applies standards or threshold criteria, used to determine if a project may have an operational deficiency at a specific intersection. Based on these standards, a signalized intersection in the City of Whittier is considered to have an operational deficiency if the project related increase in the volume to capacity (v/c) ratio equals or exceeds the threshold shown on Table 9 below.

TABLE 9
OPERATIONAL DEFICIENCY THRESHOLDS FOR INTERSECTIONS

Pre-project Conditions		
LOS	**V/C**	**Project V/C Increase**
C	0.71 to 0.80	0.04 or more
D	0.81 to 0.90	0.02 or more
E/F	0.91 or more	0.01 or more

Source: *Whittier Transportation Study Guidelines, 2021*

Existing Traffic Volumes

The existing project traffic volumes were taken from counts collected in September 2017. To calculate the ambient growth factor from 2017 to 2019 baseline, traffic data from the Caltrans Performance Measurement System (PeMS) between September 2016 and September 2019 were collected at operating stations that are in or around City of Whittier and the Sphere of Influence and analyzed to determine local travel trends. The summarized PeMS data does not show a consistent growth pattern through these years. Some locations grew slightly, others decreased, and most volumes remained within the range of daily variation. Therefore, the 2017 intersection counts were used as reasonable representations of existing volumes and then analyzed to determine the delay and LOS for the study intersections.

Existing Intersection Level of Service Analysis

Table 10 summarizes the results of the analysis of the existing weekday morning and afternoon peak hour V/C ratio and corresponding LOS at each of the study intersections. As depicted in Table 10, four of the study intersections operate at unacceptable LOS E or LOS F during the weekday AM peak hour and PM peak hour. Two intersections operate at LOS F during the weekday AM peak hour. Analysis volumes and intersection geometry are shown in Appendix B, the intersection count sheets in Appendix C, and detailed LOS calculations are provided in Appendix D.

TABLE 10
EXISTING INTERSECTION LEVEL OF SERVICE

	Intersection	Peak Hour	EXISTING	
			V/C	LOS
1	**Norwalk Boulevard & Beverly Boulevard**	**Weekday AM**	**0.949**	**E**
		Weekday PM	**0.910**	**E**
2	I-605 SB Off Ramp & Whittier Boulevard	Weekday AM	0.763	C
		Weekday PM	0.804	D
3	I-605 NB Off Ramp & Whittier Boulevard	Weekday AM	0.821	D
		Weekday PM	0.669	B
4	Norwalk Boulevard & Whittier Boulevard	Weekday AM	0.729	C
		Weekday PM	0.765	C
5	**Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard**	**Weekday AM**	**0.915**	**E**
		Weekday PM	**0.964**	**E**
6	Painter Avenue & Mar Vista Street	Weekday AM	0.732	C
		Weekday PM	0.852	D
7	Painter Avenue & Whittier Boulevard	Weekday AM	0.707	C
		Weekday PM	0.831	D
8	Laurel Avenue & Lambert Road	Weekday AM	0.859	D
		Weekday PM	0.832	D
9	**Colima Road & Mar Vista Street**	**Weekday AM**	**1.021**	**F**
		Weekday PM	0.828	D
10	**Colima Road & Whittier Boulevard**	**Weekday AM**	**0.905**	**E**
		Weekday PM	**0.905**	**E**
11	**Colima Road & Lambert Road**	**Weekday AM**	**1.023**	**F**
		Weekday PM	**0.940**	**E**

Source: Fehr & Peers, 2021

Traffic Projections

SCAG Travel Demand Model

The SCAG model and scenario used to develop volume forecasts is consistent with the land use, socioeconomic data, and transportation network described above and used to develop the VMT

estimates. Volumes were forecast and LOS analysis was conducted for the scenarios described at the beginning of this section.

Cumulative Intersection Level of Service Analysis

Cumulative Base 2040 Conditions

The traffic volumes projected for Cumulative conditions take into account the expected changes in traffic over existing conditions from ambient growth in existing traffic volumes due to the effects of overall regional growth and development outside the Plan Area. The annual change for the Plan Area intersections was forecasted at approximately a nine percent reduction. This negative growth factor between the existing base and future year no project scenario is attributable to future regional transportation network improvements and transportation demand management (TDM) factors that SCAG has assumed for 2040, consistent with planned and programmed regional projects and the SCAG RTP/SCS:

- LA Metro's Eastside Transit Corridor Phase 2, an extension of the Metro L Line (Gold) further east, is planned to have two stations serving Whittier. This would result in a mode shift from autos to transit.
- SCAG's RTP/SCS assumes the implementation of several TDM factors, such as increased auto ownership costs, shifts to telecommuting, and further implementation of regional trip reduction strategies in the 2040 Base Model compared to the 2016 Base Model.

As shown in Table 11, the following four intersections are expected to operate at LOS E or F during their AM peak hour under Future Base conditions.

1) Norwalk Boulevard & Beverly Boulevard (LOS E in AM peak hour)
5) Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard (LOS E in AM and LOS F in PM peak hour)
9) Colima Road & Mar Vista Street (LOS E in AM peak hour)
11) Colima Road & Lambert Road (LOS E in AM peak hour)

TABLE 11
CUMULATIVE INTERSECTION LEVEL OF SERVICE

	Intersection	Peak Hour	CUMULATIVE BASE	
			V/C	LOS
1	Norwalk Boulevard & Beverly Boulevard	**Weekday AM**	**0.909**	**E**
		Weekday PM	0.852	D
2	I-605 SB Off Ramp & Whittier Boulevard	Weekday AM	0.731	C
		Weekday PM	0.771	C
3	I-605 NB Off Ramp & Whittier Boulevard	Weekday AM	0.809	D
		Weekday PM	0.669	B
4	Norwalk Boulevard & Whittier Boulevard	Weekday AM	0.682	B
		Weekday PM	0.716	C
5	Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard	**Weekday AM**	**0.954**	**E**
		Weekday PM	**1.001**	**F**
6	Painter Avenue & Mar Vista Street	Weekday AM	0.685	B
		Weekday PM	0.797	C
7	Painter Avenue & Whittier Boulevard	Weekday AM	0.686	B
		Weekday PM	0.799	C
8	Laurel Avenue & Lambert Road	Weekday AM	0.809	D
		Weekday PM	0.791	C
9	Colima Road & Mar Vista Street	**Weekday AM**	**0.952**	**E**
		Weekday PM	0.776	C
10	Colima Road & Whittier Boulevard	Weekday AM	0.859	D
		Weekday PM	0.860	D
11	Colima Road & Lambert Road	**Weekday AM**	**0.961**	**E**
		Weekday PM	0.885	D

Source: Fehr & Peers, 2021

Cumulative Plus Project 2040 Conditions

The proposed project traffic volumes were added to the Cumulative traffic volumes to develop the Cumulative plus Project volumes illustrated in Appendix B. The Cumulative Base and Cumulative plus Project volumes were analyzed to determine change in V/C and LOS for the study intersections.

As shown in Table 12 below, the following four intersections are expected to operate at LOS E or F during their AM peak hour or/and PM peak hour under Future Plus Project conditions.

1) Norwalk Boulevard & Beverly Boulevard (LOS E in AM peak hour)
5) Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard (LOS E in AM and LOS F in PM peak hour)
9) Colima Road & Mar Vista Street (LOS E in AM peak hour)
11) Colima Road & Lambert Road (LOS F in AM and LOS E in PM peak hour)

TABLE 12
CUMULATIVE AND CUMULATIVE PLUS PROJECT
INTERSECTION LEVEL OF SERVICE

Intersection		Peak Hour	EXISTING		CUMULATIVE BASE		CUMULATIVE PLUS PROJECT		Change in V/C
			V/C	LOS	V/C	LOS	V/C	LOS	COMPARED TO CUMULATIVE BASE
1	Norwalk Boulevard & Beverly Boulevard	Weekday AM	**0.949**	**E**	**0.909**	**E**	**0.951**	**E**	**0.042**
		Weekday PM	**0.910**	**E**	0.852	D	0.888	D	**0.036**
2	I-605 SB Off Ramp & Whittier Boulevard	Weekday AM	0.763	C	0.731	C	0.758	C	0.027
		Weekday PM	0.804	D	0.771	C	0.801	D	**0.030**
3	I-605 NB Off Ramp & Whittier Boulevard	Weekday AM	0.821	D	0.809	D	0.842	D	**0.033**
		Weekday PM	0.669	B	0.669	B	0.689	B	0.020
4	Norwalk Boulevard & Whittier Boulevard	Weekday AM	0.729	C	0.682	B	0.707	C	0.025
		Weekday PM	0.765	C	0.716	C	0.738	C	0.022
5	Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard	Weekday AM	**0.915**	**E**	**0.954**	**E**	**0.979**	**E**	**0.025**
		Weekday PM	**0.964**	**E**	**1.001**	**F**	**1.037**	**F**	**0.038**
6	Painter Avenue & Mar Vista Street	Weekday AM	0.732	C	0.685	B	0.712	C	0.027
		Weekday PM	0.852	D	0.797	C	0.825	D	**0.028**
7	Painter Avenue & Whittier Boulevard	Weekday AM	0.707	C	0.686	B	0.713	C	0.027
		Weekday PM	0.831	D	0.799	C	0.832	D	**0.033**
8	Laurel Avenue & Lambert Road	Weekday AM	0.859	D	0.809	D	0.840	D	**0.031**
		Weekday PM	0.832	D	0.791	C	0.820	D	**0.029**

TABLE 12
CUMULATIVE AND CUMULATIVE PLUS PROJECT
INTERSECTION LEVEL OF SERVICE

Intersection		Peak Hour	EXISTING		CUMULATIVE BASE		CUMULATIVE PLUS PROJECT		Change in V/C
			V/C	LOS	V/C	LOS	V/C	LOS	COMPARED TO CUMULATIVE BASE
9	Colima Road & Mar Vista Street	Weekday AM	**1.021**	**F**	**0.952**	**E**	**0.991**	**E**	**0.039**
		Weekday PM	0.828	D	0.776	C	0.803	D	0.027
10	Colima Road & Whittier Boulevard	Weekday AM	0.905	**E**	0.859	D	0.893	D	**0.034**
		Weekday PM	0.905	**E**	0.860	D	0.895	D	**0.035**
11	Colima Road & Lambert Road	Weekday AM	**1.023**	**F**	**0.961**	**E**	**1.000**	**F**	**0.039**
		Weekday PM	**0.940**	**E**	0.885	D	**0.920**	**E**	**0.035**

Source: Fehr & Peers, 2021

OPERATIONAL IMPROVEMENT

Based on Whittier's operational deficiency thresholds for intersections (shown in Table 9), ten of the 11 study intersections are projected to have operational deficiencies. Improvement measures were developed to alleviate the operational deficiencies through following steps:

- Adjustment of volume forecasts to reflect the benefit of VMT mitigation strategies discussed in the VMT section. After applying the VMT mitigation strategies to the Cumulative with Project conditions, the traffic volumes adjustment applied was forecast at approximately a 2.5 percent reduction, compared to the Cumulative with Project condition without the VMT mitigations.

- Physical and operation improvements were also considered for all the intersections with an operational deficiency. Due to the built out nature of the City and street network, feasible operational enhancements were identified for the following intersections:

    - Intersection #1: Norwalk Boulevard & Beverly Boulevard – The intersection operation of Norwalk Boulevard & Beverly Boulevard can be improved by reconfiguring the intersection at the eastbound and westbound approaches. The configuration of the east and westbound approaches provides one left turn lane, two through lanes, and one right-turn lane. The proposed lane configuration would be one left-turn lane, two through lanes, and one shared through/right-turn lane for both approaches. This modification would require the Class II bike lane on Beverly Boulevard to be removed one block east and west of Norwalk Boulevard due to right-of-way constraints. Additionally, the added through lanes would need to transition back to the existing four lane cross-section to maintain the existing bicycle lane.

    - Intersection #5: Pickering Avenue/Santa Fe Springs Road & Washington Boulevard & Whittier Boulevard – The intersection operation of this 5-leg intersection can be improved by adding a right-turn lane to the southbound Whittier boulevard approach. The current lane configuration of this approach provides two through lanes, one through/right-turn lane, and one right-turn lane. The proposed lane configuration would be two through lanes onto Whittier Boulevard, one shared through/right lane onto Whittier Boulevard/Santa Fe Springs Road, and a new right-turn lane onto Santa Fe Springs Road. This improvement would require widening the western leg of Whittier Boulevard towards the Whittier Boulevard frontage road and modifying the island that separates the existing stop-controlled right-turn lane (which would remain). Specific changes to this approach would include:

        - Pulling back the crosswalk and the stop bar sightly northwest at this approach so that westbound Whittier boulevard traffic onto Washington boulevard would not conflict with the new southbound right-turn lane onto Santa Fe Springs Road.

        - Adding "cat track" striping through the intersection that delineates the new lane leading toward the outside lane on Santa Fe Springs Road.

- Intersection #8: Laurel Avenue & Lambert Road – The intersection operation of Laurel Avenue & Lambert Road can be improved by widening the Lambert Road right-of-way and reconfiguring the westbound approach. The current approach includes one left-turn lane, one through lane, an one shared through/right-turn lane. The proposed westbound approach would provide one left-turn lane, two through lanes, and one right-turn lane. This improvement would require coordination with the Whittier Greenway Trail right-of-way and widening of Lambert Road.

- Intersection #9: Colima Road & Mar Vista Street – The intersection operation of Colima Road & Mar Vista Street can be improved by restriping the lane configuration on eastbound, westbound, and northbound approaches. The eastbound and westbound approaches currently provide one left-turn lane, one shared through/left-turn lane, and one right-turn lane. The northbound approach provides one left-turn lane, two through lanes, and one right-turn lane. Both the eastbound and westbound approaches can be restriped to provide two left-turn lanes and one shared through/right-turn lane, which would allow for removal of the east-west split phase. The northbound approach includes on left-turn lane, two through lanes, and one right-turn lane. The northbound approach would be proposed to include one left-turn lane, two through lanes, and one shared through/right-turn lane with a prohibition of no right-turn on red (RTOR). There is an existing northbound receiving lane that becomes a right-turn lane approximately 200 feet north of the intersection and would require merging back into this segment of Colima Road with two northbound lanes.

- Intersection #11: Colima Road & Lambert Road – The intersection operation of Colima Road & Lambert Road can be improved by widening the Lambert Road through right-of-way acquisition and reconfiguring the eastbound and westbound approaches. The eastbound and westbound approaches include one left-turn lane, one through lane, and one shared through/right-turn lane. The resulting lane configuration would be one left-turn lane, two through lanes, and one right-turn lane. This improvement would require widening of the roadway and shifting the striping to north (which may require coordination with the Southern Pacific Railroad right-of-way).

- Based on the information described above, physical and operational enhancements alleviate the operational deficiency at analysis intersections 1, 5, 8, 9, and 11.

- Intersections 2, 6, and 7 are alleviated of the operational deficiency as a result of the 2.5% reduction in traffic volumes based on an estimate of reduced VMT discussed in the VMT section.

- Intersection 4 was not found to trigger an operational deficiency and no additional analysis is required for that location.

- Finally, while operational and physical enhancements were explored and tested for intersections 3 and 10, no feasible operational enhancements that alleviate the operational deficiency were identified. Strategies including modification to lane configurations and signal phasing were evaluated, however, due to constrained right-of-way at these locations that accommodate significant amounts of local and regional

vehicle traffic, the tested measures did not result in sufficient change in vehicle to capacity ratio to be below the operational deficiency threshold presented in Table 9.

Given the constraints of the intersections and right-of-way, the operational deficiencies would remain unavoidable at the intersection of I-605 Northbound Off Ramp & Whittier Boulevard (Intersection 3) during the AM peak hour, and the intersection of Colima Road & Whittier Boulevard (Intersection 10) during both PM and AM peak hours. Table 13 shows the LOS results after the evaluation of the VMT mitigation and proposed intersection improvements.

TABLE 13
CUMULATIVE AND CUMULATIVE PLUS PROJECT with VMT MITIGATION AND OPERATIONAL IMPROVEMENTS
INTERSECTION LEVEL OF SERVICE

Intersection		Peak Hour	EXISTING		CUMULATIVE BASE		CUMULATIVE PLUS PROJECT WITH VMT MITIGATION AND OPERATIONAL IMPROVEMENTS		Change in V/C
			V/C	LOS	V/C	LOS	V/C	LOS	COMPARED TO CUMULATIVE BASE
1	Norwalk Boulevard & Beverly Boulevard	Weekday AM	0.949	E	0.909	E	0.897	D	-0.012
		Weekday PM	0.910	E	0.852	D	0.833	D	-0.019
2	I-605 SB Off Ramp & Whittier Boulevard	Weekday AM	0.763	C	0.731	C	0.745	C	0.014
		Weekday PM	0.804	D	0.771	C	0.785	D	0.014
3	I-605 NB Off Ramp & Whittier Boulevard	Weekday AM	0.821	D	0.809	D	0.833	D	**0.024**
		Weekday PM	0.669	B	0.669	B	0.680	B	0.011
4	Norwalk Boulevard & Whittier Boulevard	Weekday AM	0.729	C	0.682	B	0.698	C	0.016
		Weekday PM	0.765	C	0.716	C	0.728	C	0.012
5	Pickering Avenue, Santa Fe Springs Road & Washington Boulevard, Whittier Boulevard	Weekday AM	0.915	E	0.954	E	0.934	E	-0.020
		Weekday PM	0.964	E	1.001	F	0.987	E	-0.014
6	Painter Avenue & Mar Vista Street	Weekday AM	0.732	C	0.685	B	0.709	C	0.024
		Weekday PM	0.852	D	0.797	C	0.816	D	0.019
7	Painter Avenue & Whittier Boulevard	Weekday AM	0.707	C	0.686	B	0.706	C	0.020
		Weekday PM	0.831	D	0.799	C	0.821	D	0.022
8	Laurel Avenue & Lambert Road	Weekday AM	0.859	D	0.809	D	0.812	D	0.003
		Weekday PM	0.832	D	0.791	C	0.810	D	0.019

TABLE 13
CUMULATIVE AND CUMULATIVE PLUS PROJECT with VMT MITIGATION AND OPERATIONAL IMPROVEMENTS
INTERSECTION LEVEL OF SERVICE

Intersection		Peak Hour	EXISTING		CUMULATIVE BASE		CUMULATIVE PLUS PROJECT WITH VMT MITIGATION AND OPERATIONAL IMPROVEMENTS		Change in V/C
			V/C	LOS	V/C	LOS	V/C	LOS	COMPARED TO CUMULATIVE BASE
9	Colima Road & Mar Vista Street	Weekday AM	1.021	F	0.952	E	0.943	E	-0.009
		Weekday PM	0.828	D	0.776	C	0.808	D	0.032
10	Colima Road & Whittier Boulevard	Weekday AM	0.905	E	0.859	D	0.883	D	**0.024**
		Weekday PM	0.905	E	0.860	D	0.881	D	**0.021**
11	Colima Road & Lambert Road	Weekday AM	1.023	F	0.961	E	0.966	E	0.005
		Weekday PM	0.940	E	0.885	D	0.870	E	-0.015

Source: Fehr & Peers, 2021

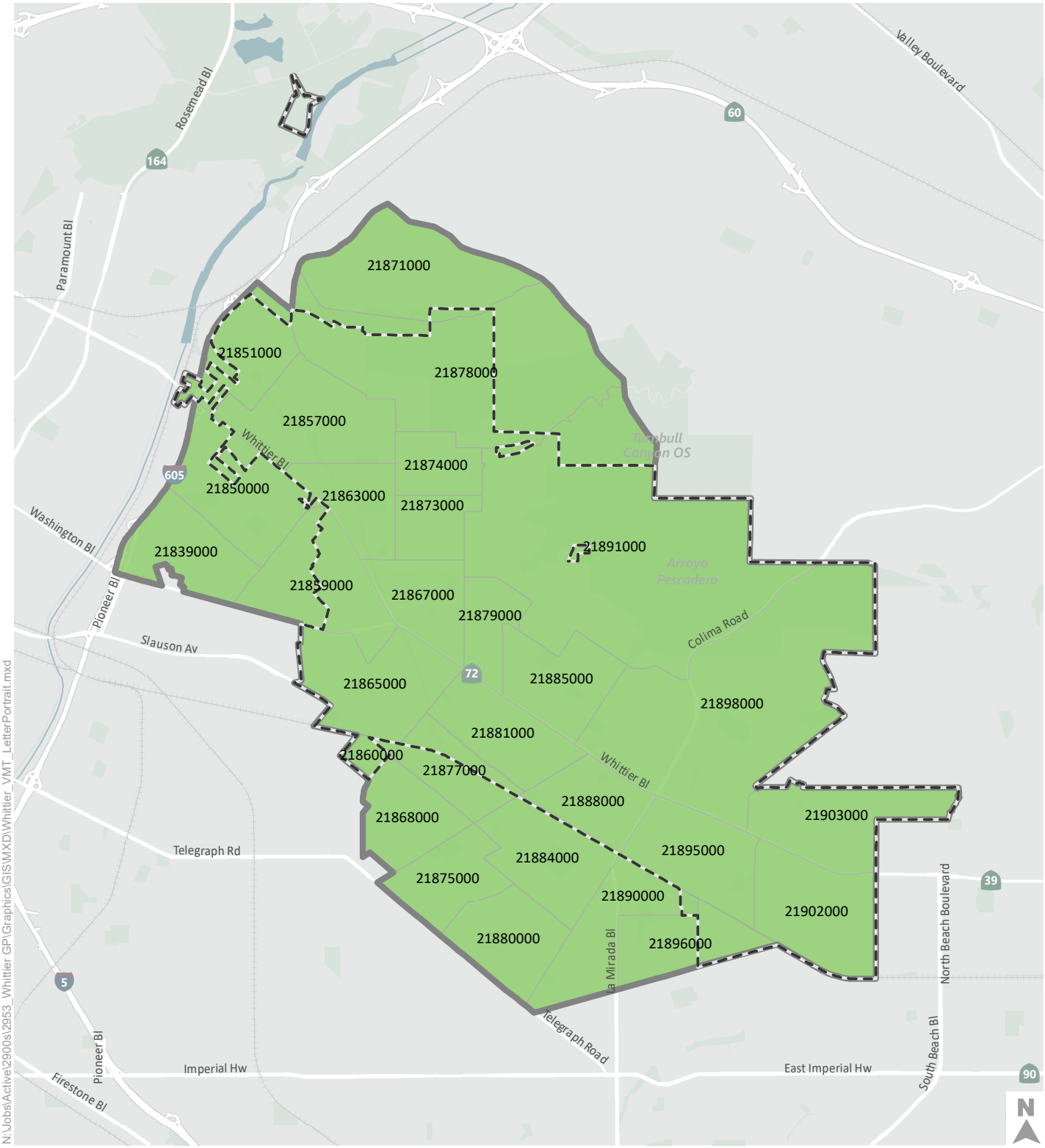
Summary

The purpose of this traffic technical memorandum was to present the results of the transportation analysis conducted for the proposed Whittier General Plan. The following presents a summary of the findings of this memorandum:

- VMT Analysis:
    - The proposed Whittier General Plan is estimated to perform better than the City's baseline average for all three VMT metrics: Total VMT by Service Population, Employee VMT per Employee, and Residential VMT per Resident.
    - However, per state and local guidelines, the VMT metrics would need to perform at least 15% better to avoid a significant impact. Based on the analysis of the General Plan, VMT per Service Population and VMT per resident would not meet the 15% or better threshold and would result in a significant impact per State guidance and the City's impact thresholds.
    - Mitigation measures were developed and evaluated for the Whittier General Plan including adding a local shuttle to expand the transit network, expanding opportunities to walk and bike, and accounting for changes in policy and travel patterns that would allow an increase in teleworking from home.
    - With the implementation of these mitigation measures, the Employee VMT per Employee would improve and perform at better than 15% less than Whittier's baseline average, therefore mitigating the significant impact with the proposed Whittier General Plan.
    - With the implementation of these mitigation measures, the total VMT per Service Population would improve to 28.6, which is roughly 13% better than the regional average; however, the impact would remain significant with the proposed Whittier General Plan. Additional policy, TDM, and physical measures were considered; however, there was not sufficient evidence to support additional VMT reductions that achieved mitigation of this VMT metric.

- Level of Service Evaluation:
    - The proposed Whittier General Plan would result in operational deficiencies at ten of 11 study intersections.
    - Operational and physical improvements were evaluated including widening roadways, reconfiguring intersection approaches, and relocating crosswalks and islands for geometric compatibility at the intersection.
    - With VMT mitigation measures and operational improvement strategies implemented, operations at study intersections would improve, resulting in operational deficiencies at two of the 11 intersections analyzed.

APPENDIX A:
TRANSPORTATION ANALYSIS ZONES



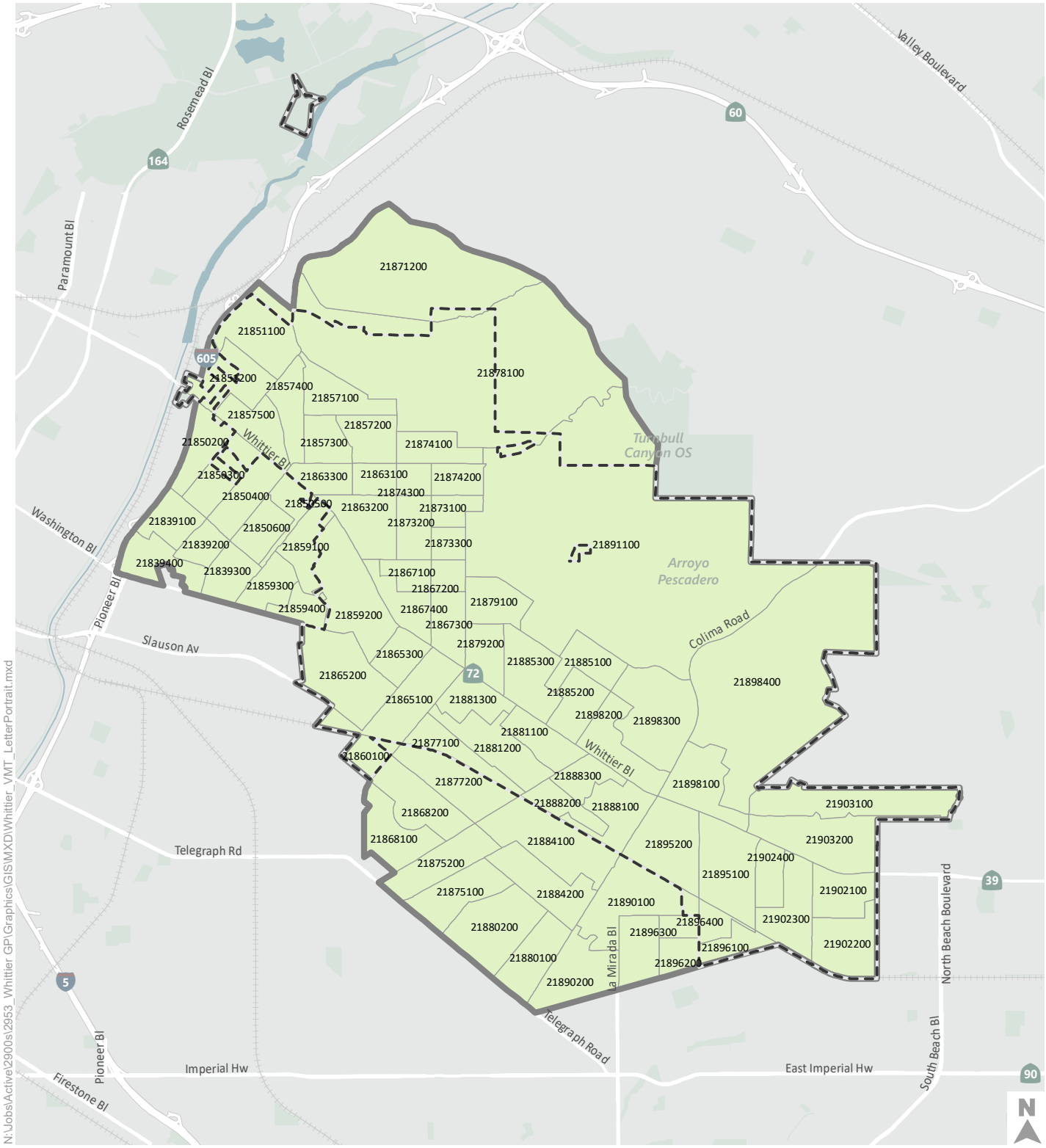
City of Whittier

Sphere of Influence

Transportation Analysis Zones (Tier 1)

Figure 1

Transportation Analysis Zones (Tier1)



City of Whittier

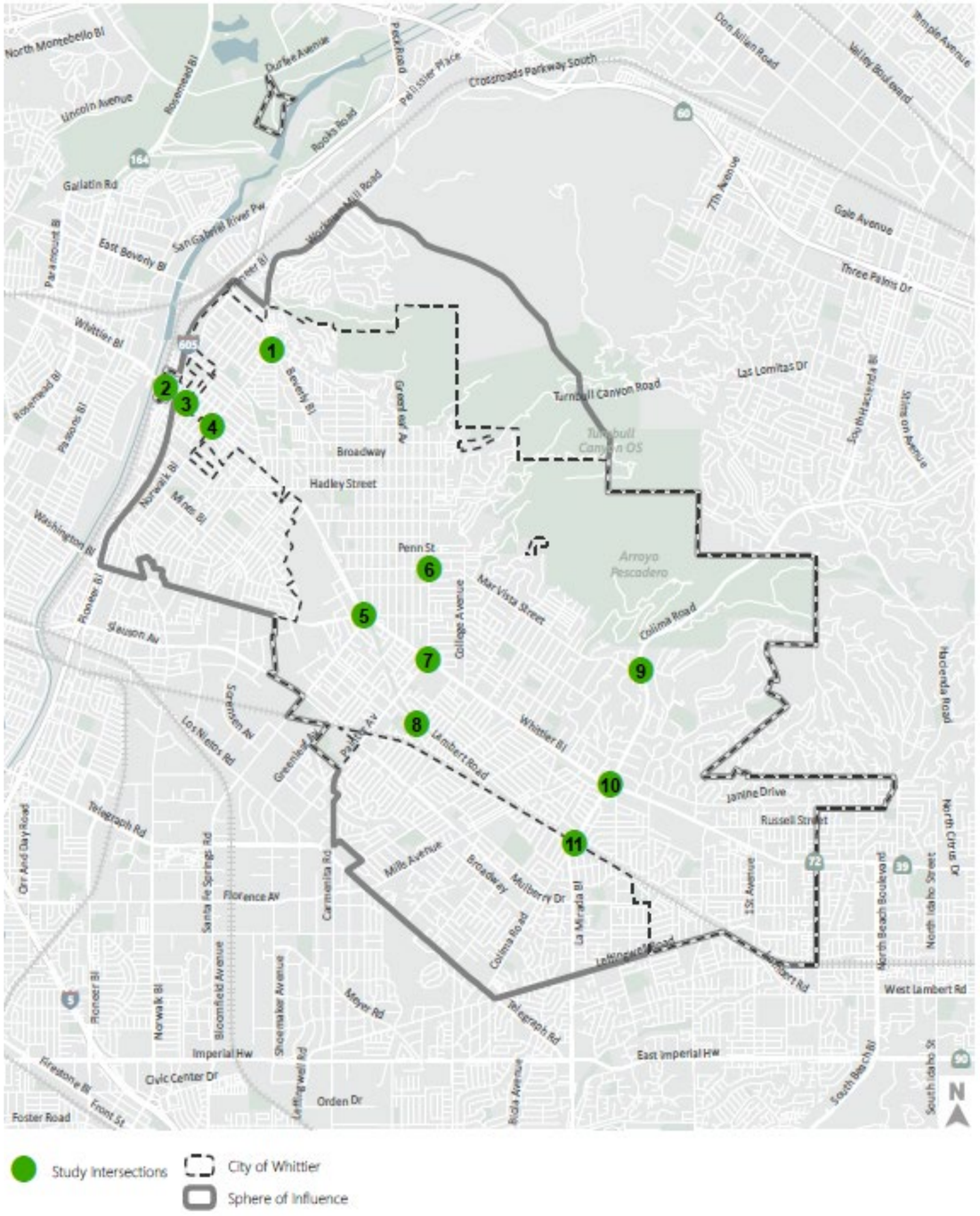
Sphere of Influence

Transportation Analysis Zones (Tier 2)

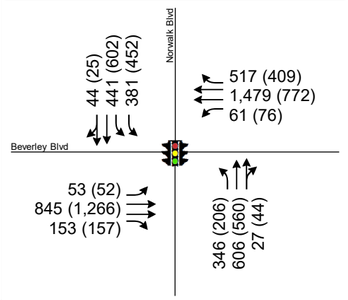
Figure 2

Transportation Analysis Zones (Tier2)

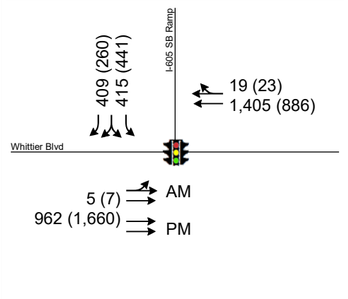
APPENDIX B:
TURNING MOVEMENT VOLUME FIGURES



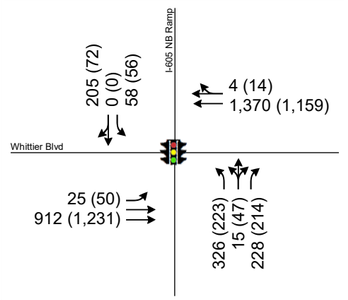
1. Norwalk Blvd/Beverley Blvd



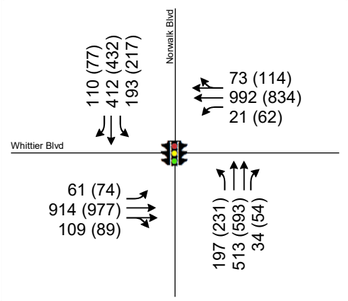
2. I-605 SB Ramp/Whittier Blvd *



3. I-605 NB Ramp/Whittier Blvd



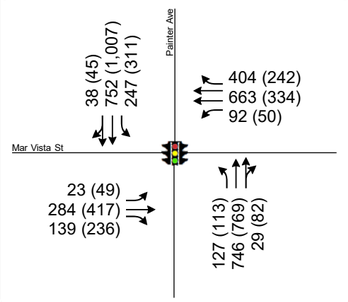
4. Norwalk Blvd/Whittier Blvd



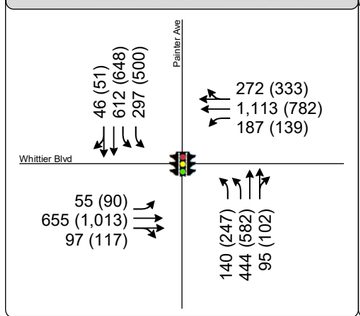
5. Pickering Ave, Santa Fe Springs Rd & Washington Blvd, Whittier Blvd

Please refer to Synchro reports for volumes and lane configurations

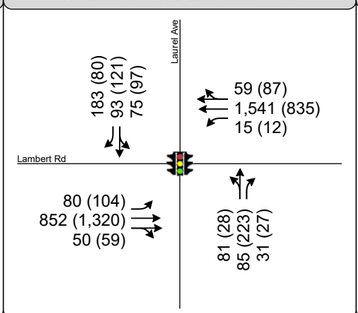
6. Painter Ave/Mar Vista St



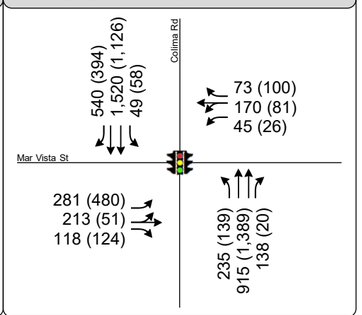
7. Painter Ave/Whittier Blvd



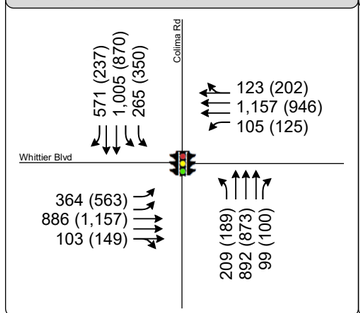
8. Laurel Ave/Lambert Rd



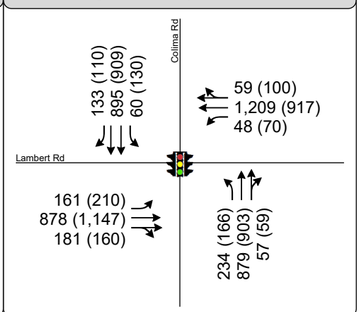
9. Colima Rd/Mar Vista St



10. Colima Rd/Whittier Blvd



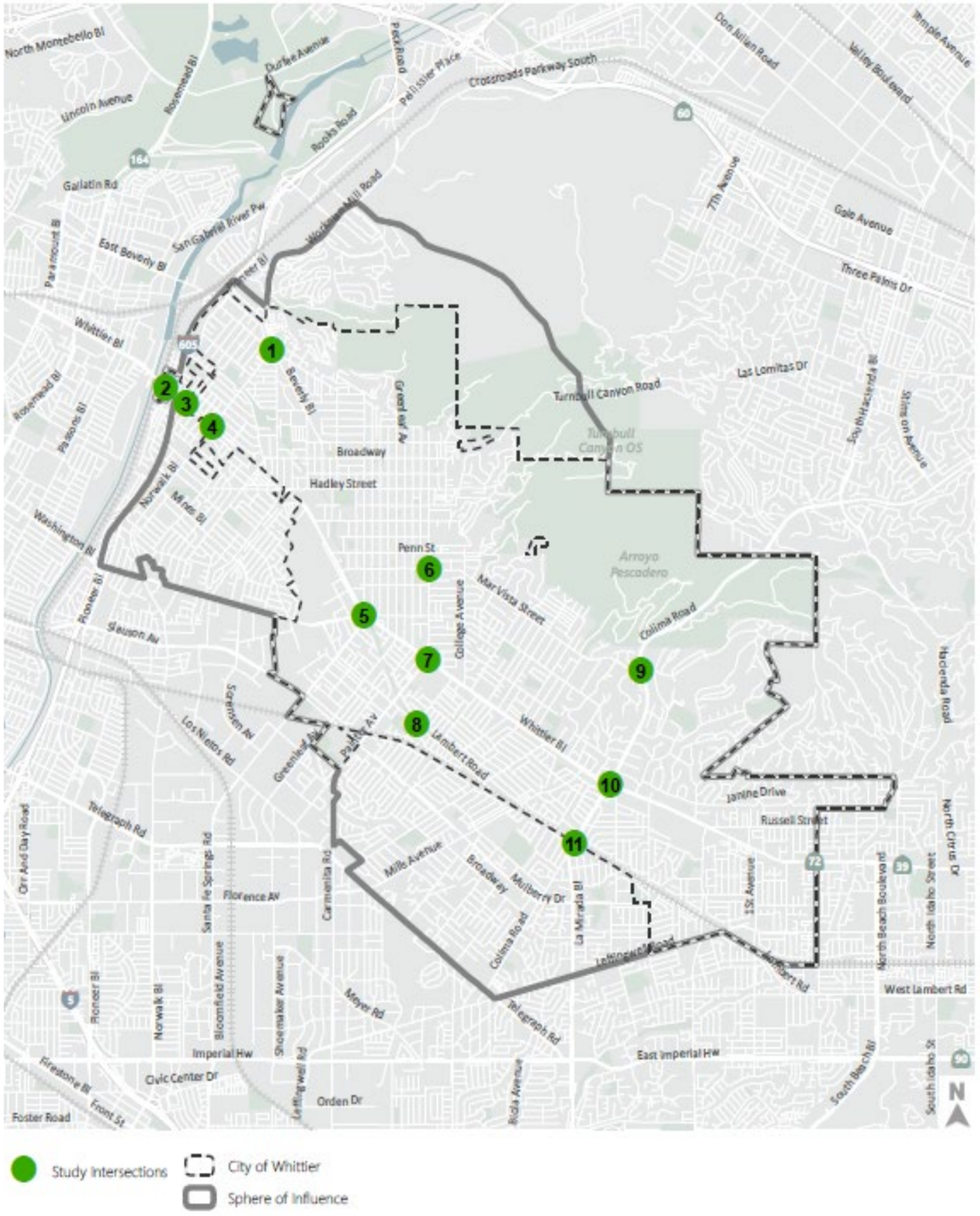
11. Colima Rd/Lambert Rd

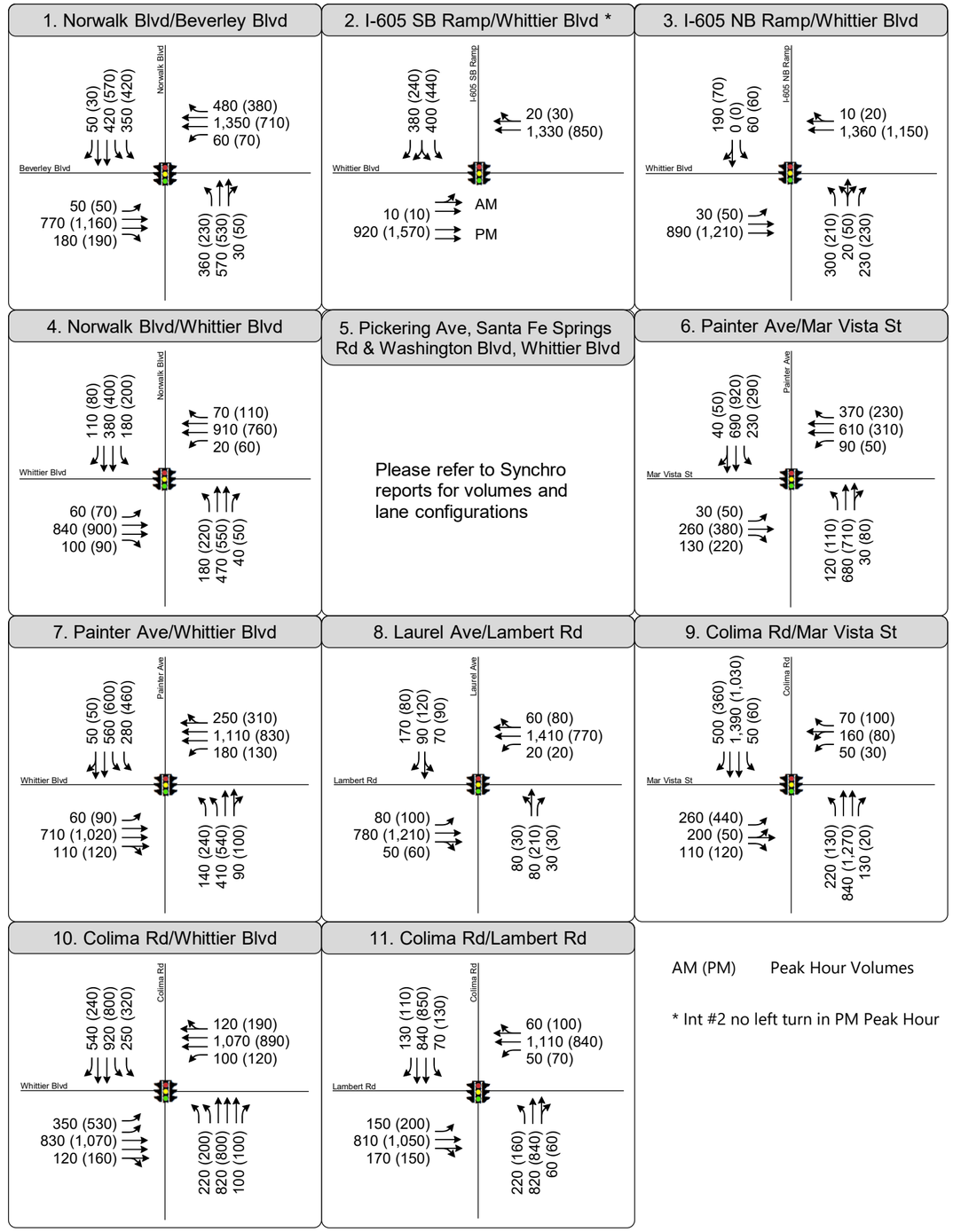


AM (PM) Peak Hour Volumes

* Int #2 no left turn in PM Peak Hour

Figure 1
Peak Hour Volumes and Lane Configurations
Existing Conditions (2019)

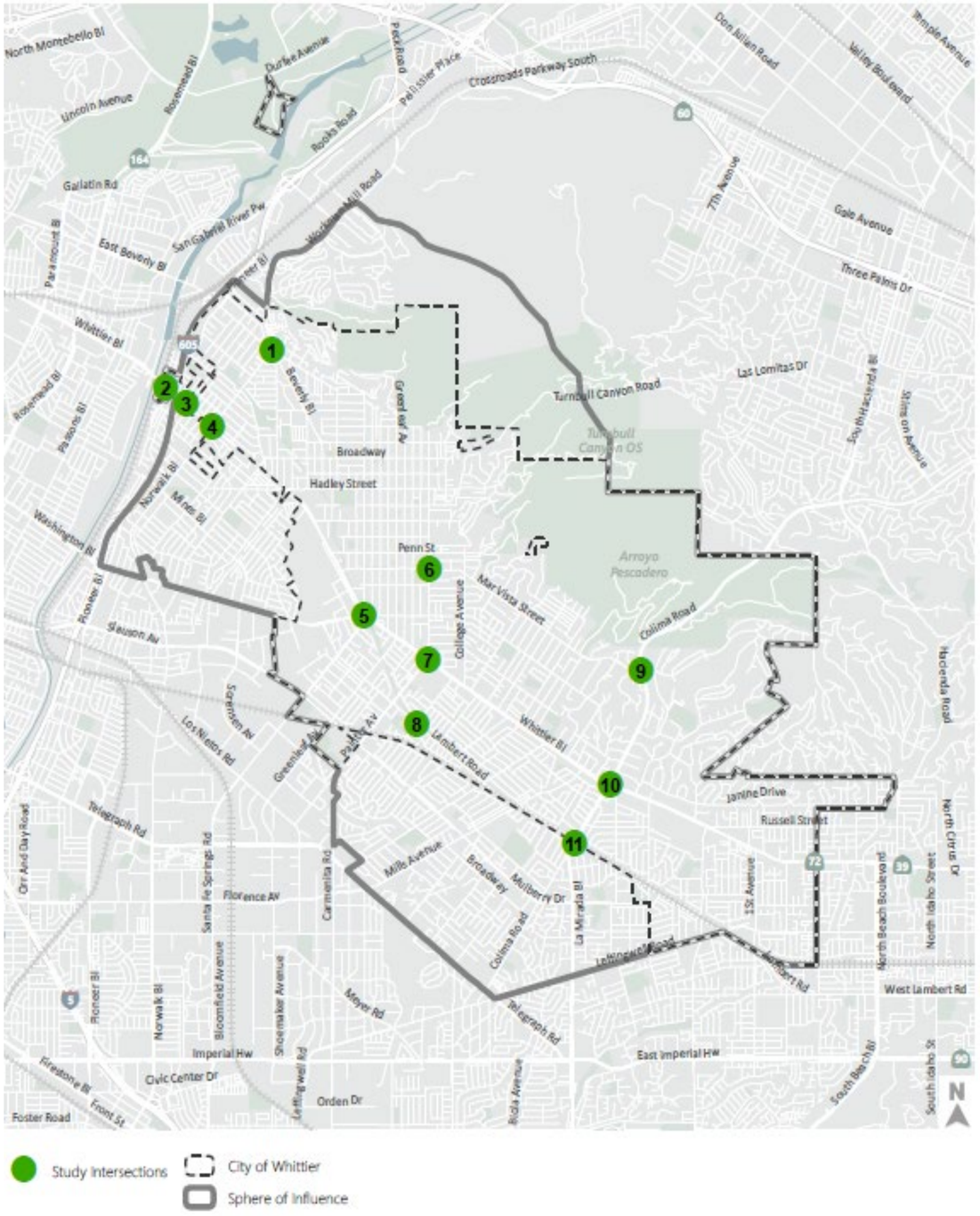


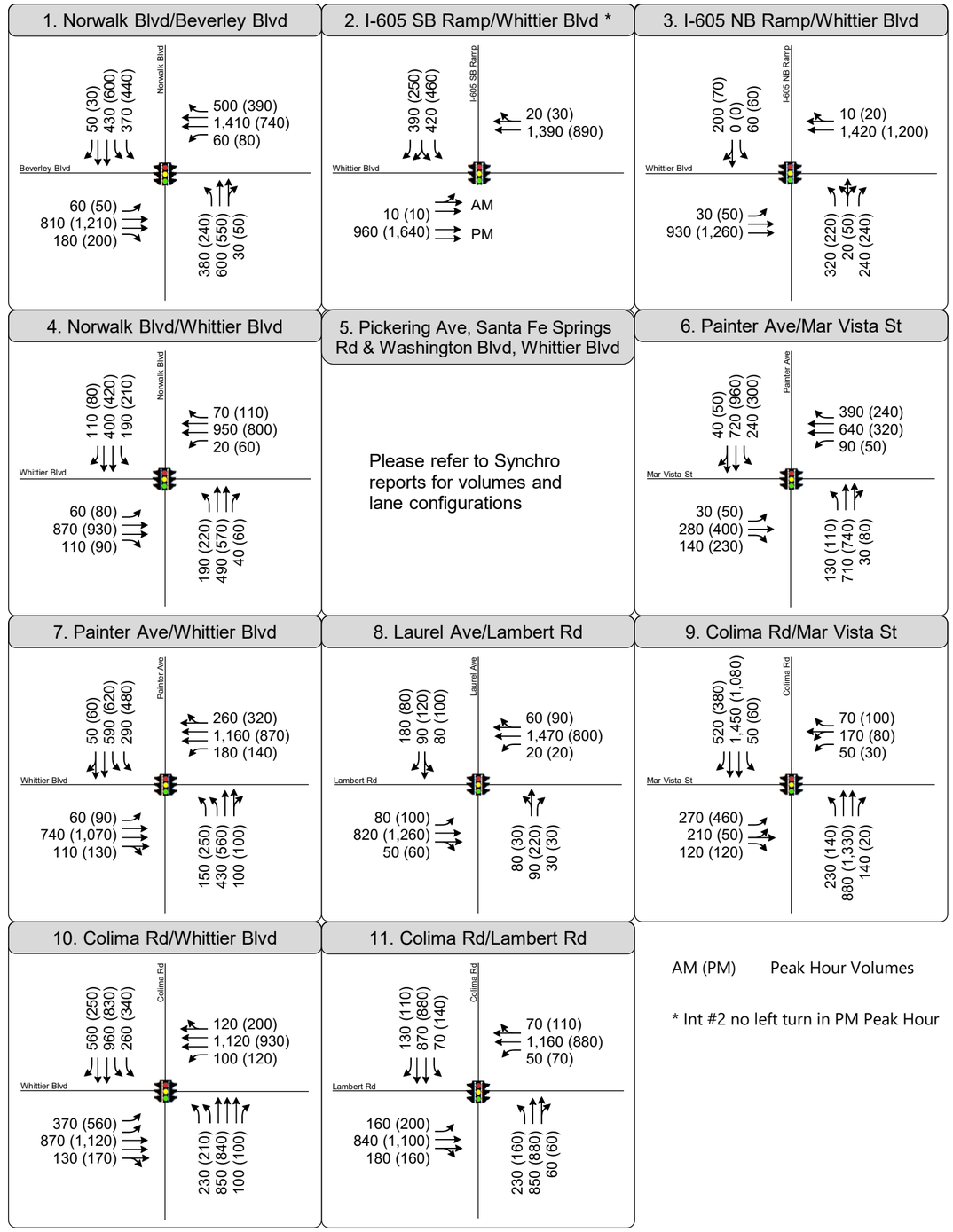


AM (PM) Peak Hour Volumes

* Int #2 no left turn in PM Peak Hour

Figure 2
Peak Hour Volumes and Lane Configurations
Cumulative Base (2040)

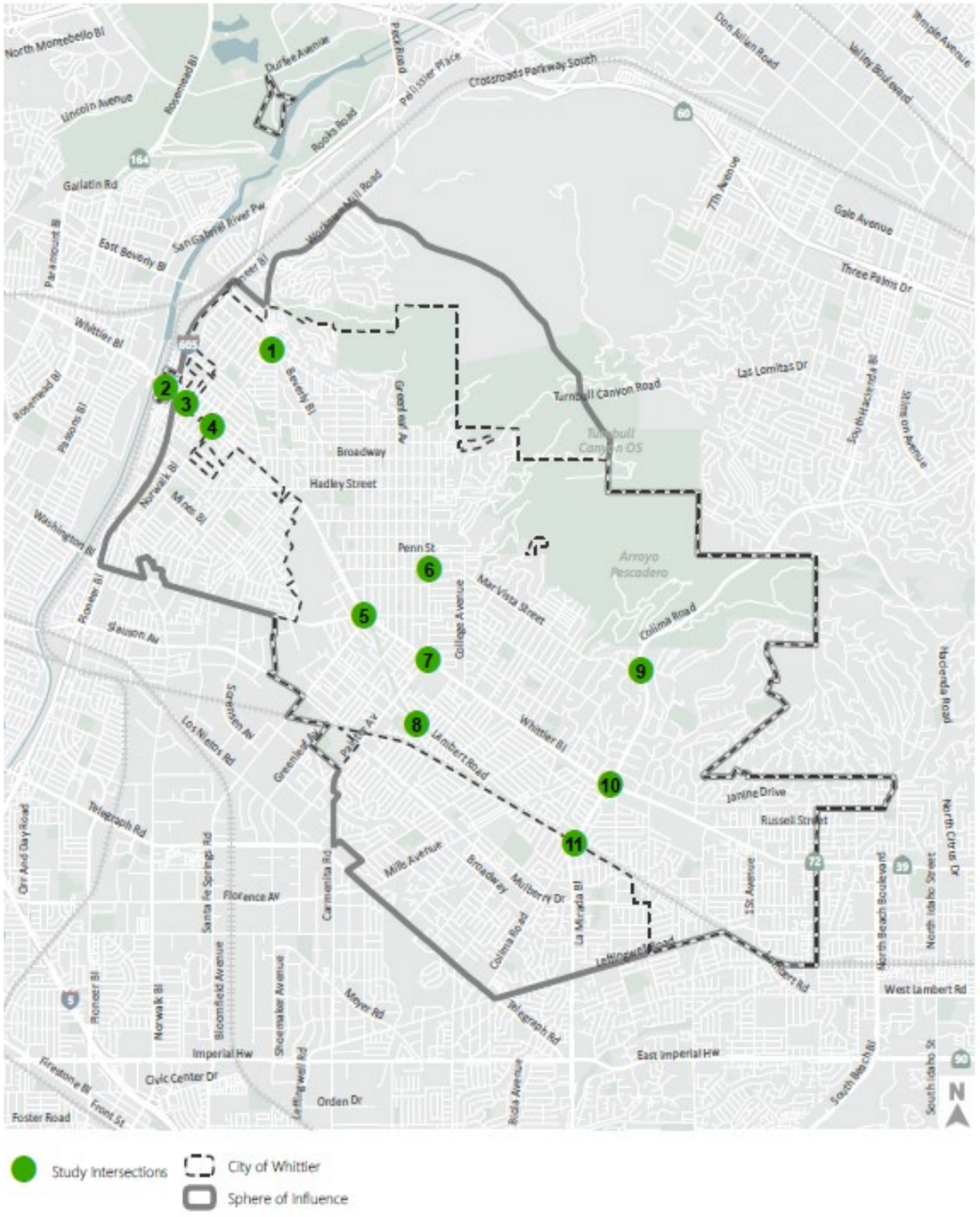




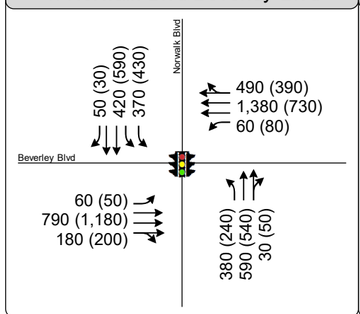
AM (PM) Peak Hour Volumes

* Int #2 no left turn in PM Peak Hour

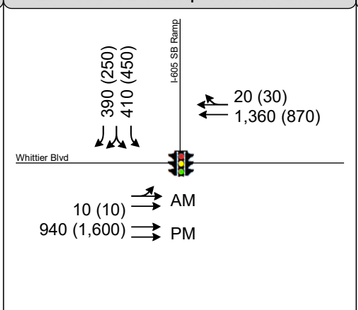
Figure 3
Peak Hour Volumes and Lane Configurations
Cumulative Plus Project (2040)



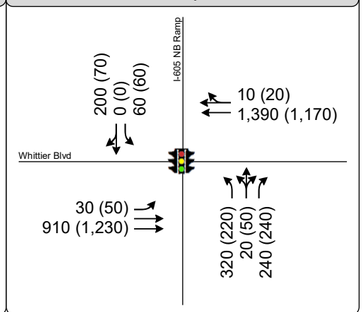
1. Norwalk Blvd/Beverley Blvd



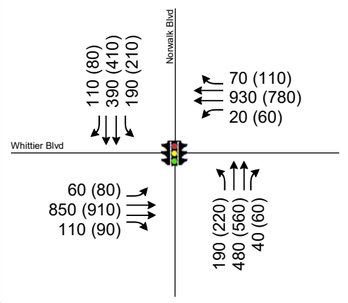
2. I-605 SB Ramp/Whittier Blvd



3. I-605 NB Ramp/Whittier Blvd



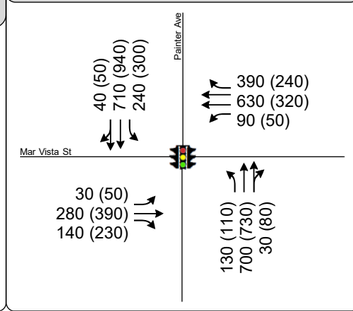
4. Norwalk Blvd/Whittier Blvd



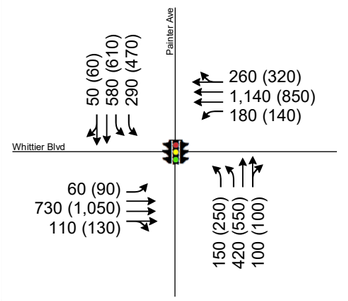
5. Pickering Ave, Santa Fe Springs Rd & Washington Blvd, Whittier Blvd

Please refer to Synchro reports for volumes and lane configurations

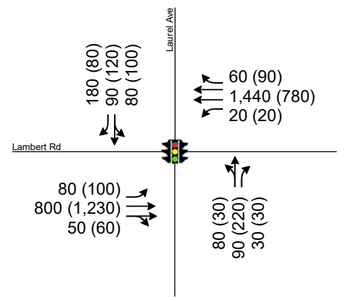
6. Painter Ave/Mar Vista St



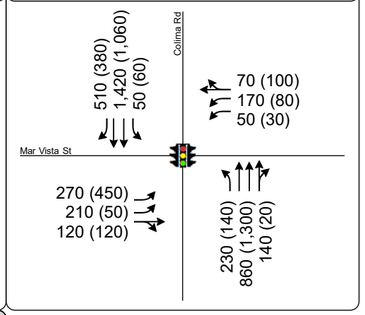
7. Painter Ave/Whittier Blvd



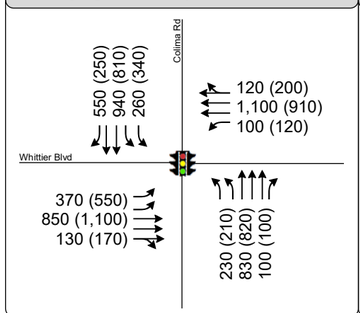
8. Laurel Ave/Lambert Rd



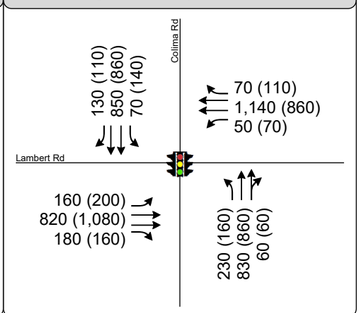
9. Colima Rd/Mar Vista St



10. Colima Rd/Whittier Blvd



11. Colima Rd/Lambert Rd



AM (PM) Peak Hour Volumes

* Int #2 no left turn in PM Peak Hour

Figure 4
Peak Hour Volumes and Lane Configurations
Future Plus Project with VMT Mitigation and Operational Improvement (2040)

APPENDIX C:
TRAFFIC COUNTS

Prepared by National Data & Surveying Services

Norwalk Blvd & Beverly Blvd

Peak Hour Turning Movement Count

ID: 17-05610-001
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM	07:15 AM - 08:15 AM
NOON	NONE
PM	05:00 PM - 06:00 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Norwalk Blvd — SOUTHBOUND

AM	44	441	366	15	1180	AM
NOON	0	0	0	0	0	NOON
PM	31	623	419	34	1056	PM

Beverly Blvd — EASTBOUND

AM	NOON	PM	
1880	0	1027	⇦
11	0	9	↰ 0
42	0	44	↑ 0
845	0	1276	→ 0
153	0	166	↱ 0

CONTROL

Signalized

	AM	NOON	PM
TEV	4953	0	4690
PHF	0.93		0.95

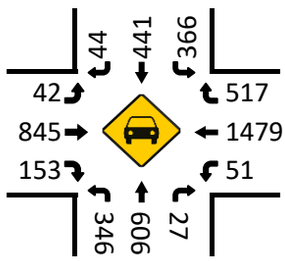
WESTBOUND — Beverly Blvd

PM	NOON	AM	
405	0	517	0 ↰
775	0	1479	0 ←
58	0	51	0 ↰
19	0	10	0 ↰
1760	0	1248	⇨

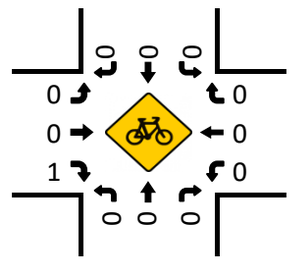
Norwalk Blvd — NORTHBOUND

PM	847	0	212	573	46	PM
NOON	0	0	0	0	0	NOON
AM	645	0	346	606	27	AM

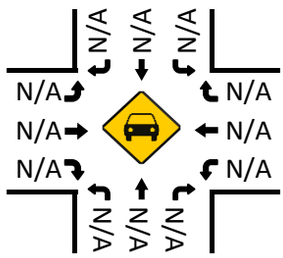
Total Vehicles (AM)



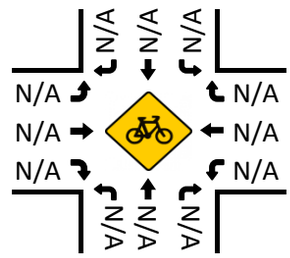
Bikes (AM)



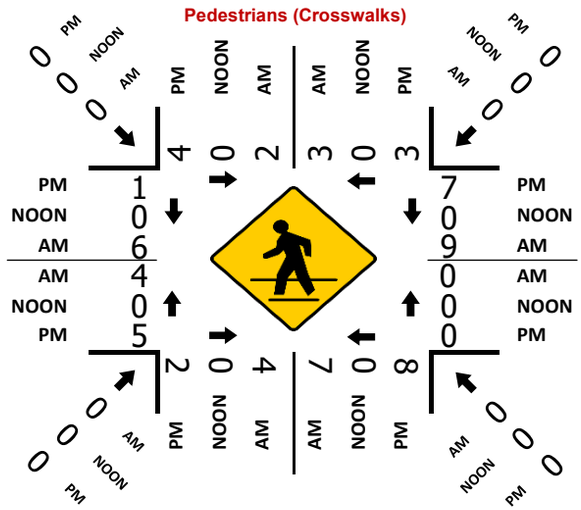
Total Vehicles (NOON)



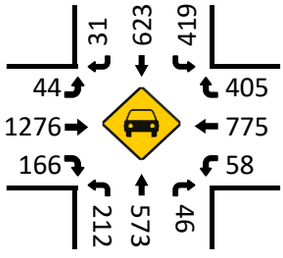
Bikes (NOON)



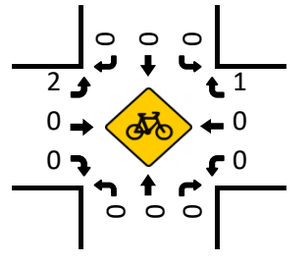
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

I-605 SB Off Ramp & Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-002
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS		COUNT PERIODS
07:15 AM - 08:15 AM	AM	07:00 AM - 09:00 AM
NONE	NOON	NONE
05:00 PM - 06:00 PM	PM	04:00 PM - 06:00 PM

I-605 SB Off Ramp — SOUTHBOUND

	↲	↓	↳	U-turn	⇧
AM	409	0	415	0	24
NOON	0	0	0	0	0
PM	274	0	434	0	32
	0	0	0	0	

Whittier Blvd — EASTBOUND

	AM	NOON	PM	
⇦	1814	0	1161	
U-turn	0	0	0	0
Left	5	0	7	0
Thru	962	0	1690	0
Right	0	0	0	0

Whittier Blvd — WESTBOUND

		PM	NOON	AM
Right	0	25	0	19
Thru	0	887	0	1405
Left	0	0	0	0
U-turn	0	0	0	0
⇨		2124	0	1377

I-605 SB Off Ramp — NORTHBOUND

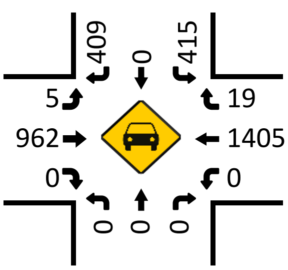
	⇩	U-turn	Left	Thru	Right
		0	0	0	0
PM	0	0	0	0	0
NOON	0	0	0	0	0
AM	0	0	0	0	0

CONTROL

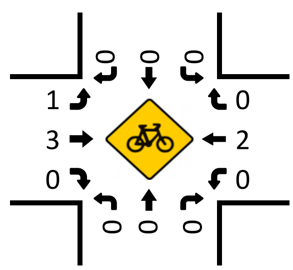
Signalized

	AM	NOON	PM
TEV	3215	0	3317
PHF	0.93		0.99

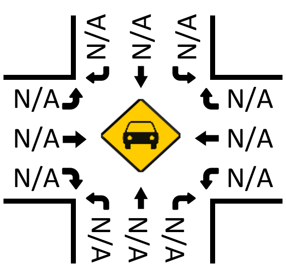
Total Vehicles (AM)



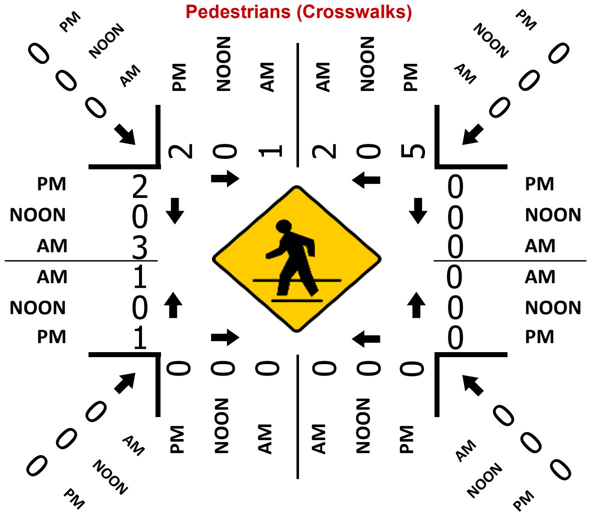
Bikes (AM)



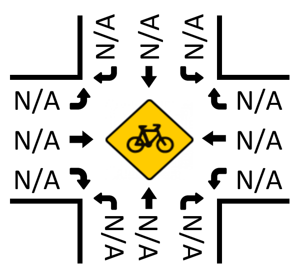
Total Vehicles (NOON)



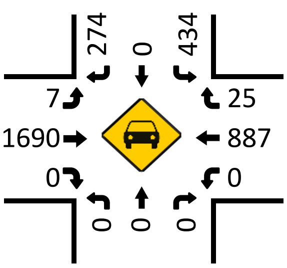
Pedestrians (Crosswalks)



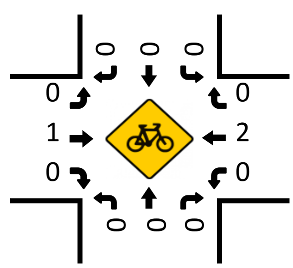
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

I-605 NB Off Ramp & Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-003
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

I-605 NB Off Ramp — SOUTHBOUND

AM	205	0	58	0	44	AM
NOON	0	0	0	0	0	NOON
PM	72	0	56	0	111	PM

Whittier Blvd — EASTBOUND

AM	NOON	PM		
1901	0	1454	⇦	
0	0	0	↶	0
25	0	50	↱	0
912	0	1231	→	0
0	0	0	↷	0
AM	NOON	PM		

CONTROL

Signalized

TEV	3143	0	3066
	AM	NOON	PM
PHF	0.93		0.98

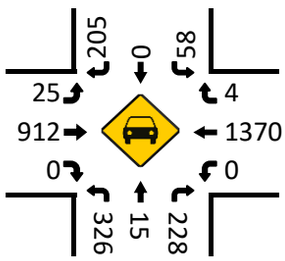
Whittier Blvd — WESTBOUND

PM	NOON	AM		
14	0	4	↶	0
1159	0	1370	←	0
0	0	0	↰	0
0	0	0	↷	0
1501	0	1198	⇨	
PM	NOON	AM		

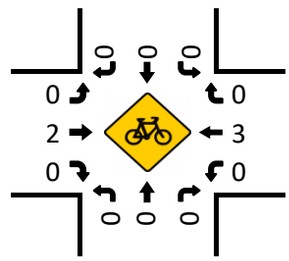
I-605 NB Off Ramp — NORTHBOUND

PM	0	0	223	47	214	PM
NOON	0	0	0	0	0	NOON
AM	0	0	326	15	228	AM

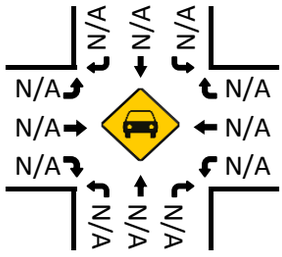
Total Vehicles (AM)



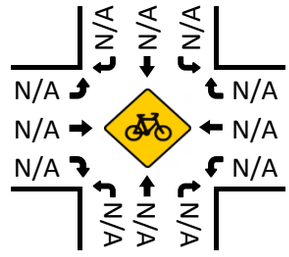
Bikes (AM)



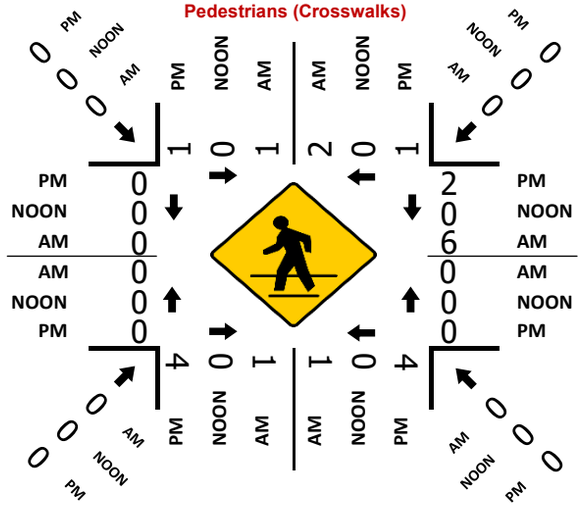
Total Vehicles (NOON)



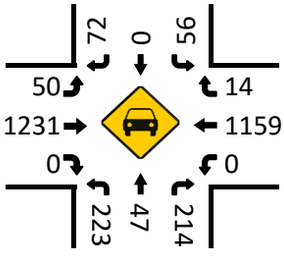
Bikes (NOON)



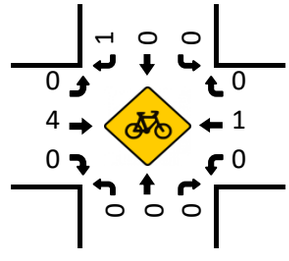
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Norwalk Blvd & Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-004
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

CONTROL: Signalized

	AM	NOON	PM
TEV	3629	0	3754
PHF	0.96		0.97

SOUTHBOUND (Norwalk Blvd)

	Left	Thru	Right	U-Turn	Total	
AM	110	412	193	0	647	AM
NOON	0	0	0	0	0	NOON
PM	77	432	217	0	781	PM

EASTBOUND (Whittier Blvd)

	Left	Thru	Right	U-Turn	
AM	0	0	0	0	AM
NOON	0	0	0	0	NOON
PM	0	0	0	0	PM
	1299	0	1142		
AM	0	0	0	0	AM
NOON	61	0	74	0	NOON
PM	914	0	977	0	PM
	109	0	89	0	

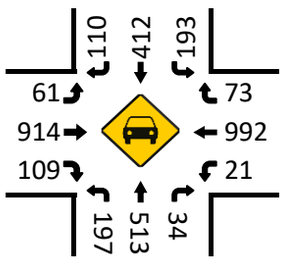
WESTBOUND (Whittier Blvd)

	Left	Thru	Right	U-Turn	
PM	0	0	0	0	PM
NOON	114	0	73	0	NOON
AM	834	0	992	0	AM
	62	0	21	0	
PM	0	0	0	0	PM
NOON	1248	0	1141		NOON
AM					AM

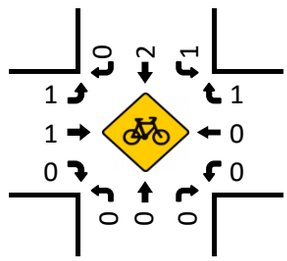
NORTHBOUND (Norwalk Blvd)

	Left	Thru	Right	U-Turn	Total	
PM	583	0	231	593	54	PM
NOON	0	0	0	0	0	NOON
AM	542	0	197	513	34	AM

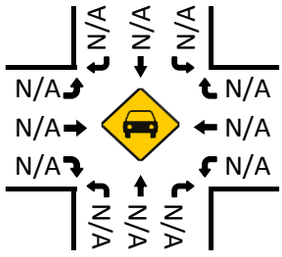
Total Vehicles (AM)



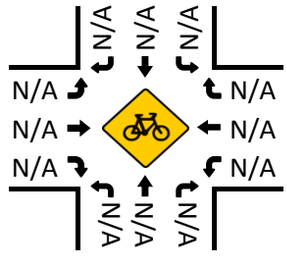
Bikes (AM)



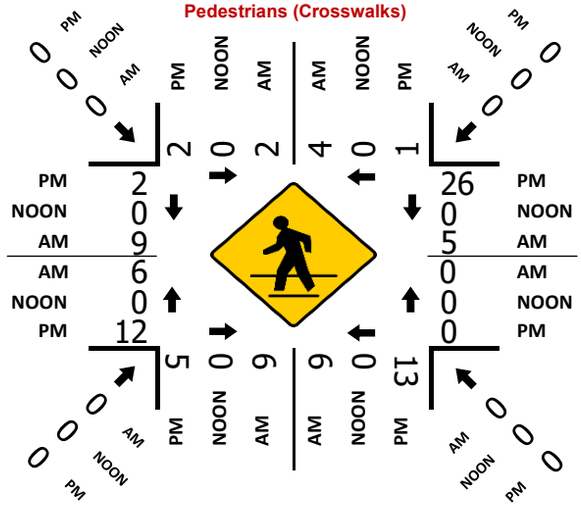
Total Vehicles (NOON)



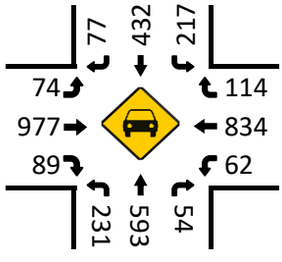
Bikes (NOON)



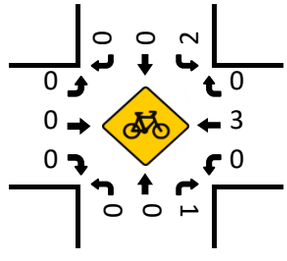
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Pickering Ave/Santa Fe Springs Rd & Washington Blvd/Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-005
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM	07:15 AM - 08:15 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Pickering Ave/Santa Fe Springs Rd — SOUTHBOUND

AM	28	222	422	0	920	AM
NOON	0	0	0	0	0	NOON
PM	29	238	550	0	806	PM

Washington Blvd/Whittier Blvd — EASTBOUND

AM	NOON	PM	
563	0	437	
0	0	0	0
31	0	43	0
279	0	563	0
3	0	22	0
AM	NOON	PM	

Washington Blvd/Whittier Blvd — WESTBOUND

PM	NOON	AM	
568	0	669	0
405	0	526	0
74	0	98	0
1	0	0	0
1352	0	792	
PM	NOON	AM	

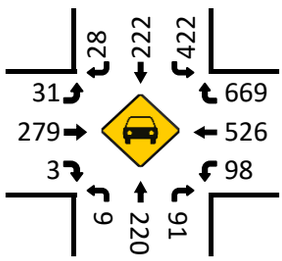
CONTROL: Signalized

TEV	2598	0	2929
	AM	NOON	PM
PHF	0.93		0.97

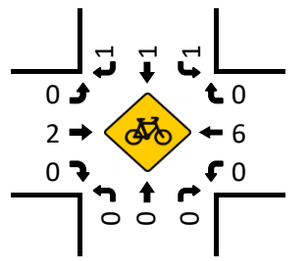
Pickering Ave/Santa Fe Springs Rd — NORTHBOUND

PM	334	0	3	195	238	PM
NOON	0	0	0	0	0	NOON
AM	323	0	9	220	91	AM

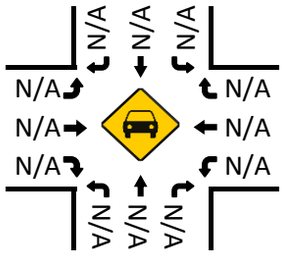
Total Vehicles (AM)



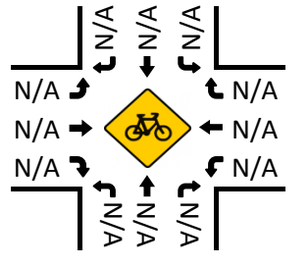
Bikes (AM)



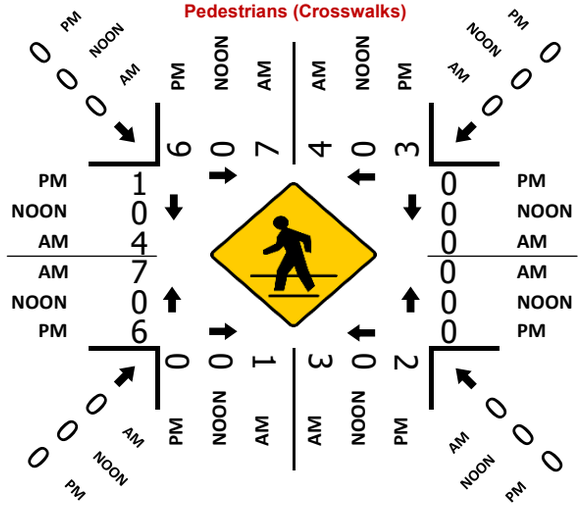
Total Vehicles (NOON)



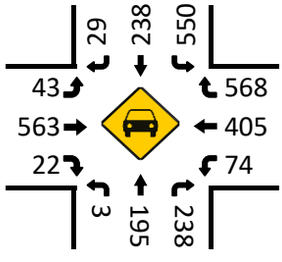
Bikes (NOON)



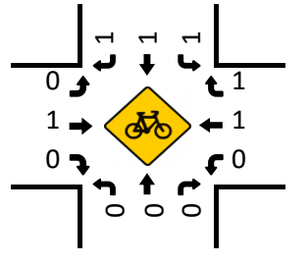
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Painter Ave & Mar Vista St

Peak Hour Turning Movement Count

ID: 17-05610-006
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:30 AM - 08:30 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

Painter Ave — SOUTHBOUND

AM	38	775	241	0	1230	AM
NOON	0	0	0	0	0	NOON
PM	45	1007	311	0	1060	PM

Mar Vista St — EASTBOUND

AM	NOON	PM	
841	0	492	
0	0	0	0
24	0	49	0
268	0	417	0
136	0	236	0
AM	NOON	PM	

CONTROL

Signalized

	AM	NOON	PM
TEV	3613	0	3655
PHF	0.93		0.98

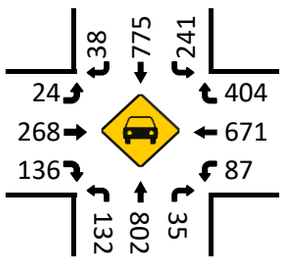
WESTBOUND — Mar Vista St

PM	NOON	AM	
242	0	404	0
334	0	671	0
50	0	87	0
0	0	0	0
810	0	544	
PM	NOON	AM	

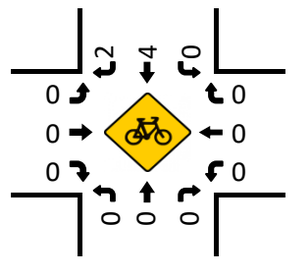
Painter Ave — NORTHBOUND

PM	1293	0	113	769	82	PM
NOON	0	0	0	0	0	NOON
AM	998	0	132	802	35	AM

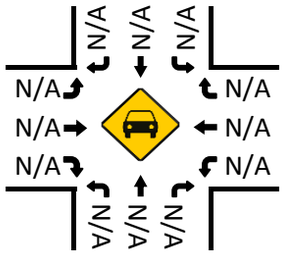
Total Vehicles (AM)



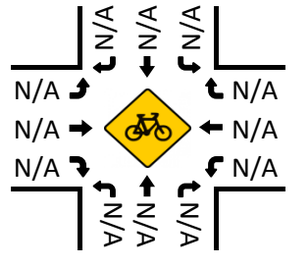
Bikes (AM)



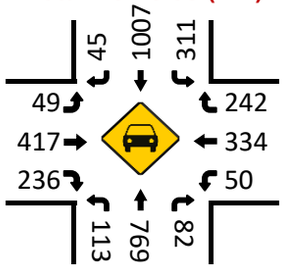
Total Vehicles (NOON)



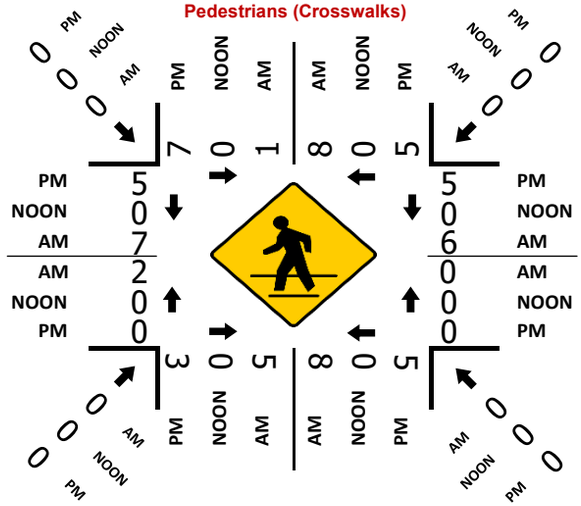
Bikes (NOON)



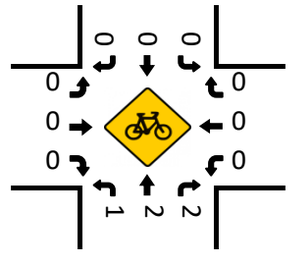
Total Vehicles (PM)



Pedestrians (Crosswalks)



Bikes (PM)



Prepared by National Data & Surveying Services

Painter Ave & Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-007
City: Whittier

Day: Tuesday
Date: 09/19/2017

	PEAK HOURS	COUNT PERIODS
AM	07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Painter Ave — SOUTHBOUND

					Departing
AM	49	599	301	1	845
NOON	0	0	0	0	0
PM	51	648	499	1	977
	0	0	0	0	

Whittier Blvd — EASTBOUND

	AM	NOON	PM	
Departing	1295	0	1067	
	0	0	0	0
	54	0	77	0
	661	0	1013	0
	99	0	117	0

Whittier Blvd — WESTBOUND

		PM	NOON	AM
	0	327	0	298
	0	782	0	1105
	0	139	0	169
	0	0	0	1
Departing		1614	0	1059

Painter Ave — NORTHBOUND

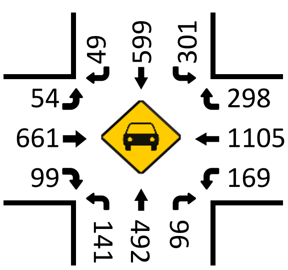
		0	0	0	0
PM	917	13	234	572	102
NOON	0	0	0	0	0
AM	870	3	141	492	96

CONTROL

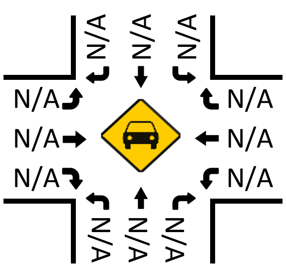
Signalized

	AM	NOON	PM
TEV	4069	0	4575
PHF	0.96		0.96

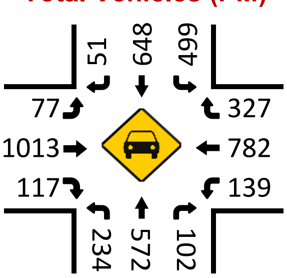
Total Vehicles (AM)



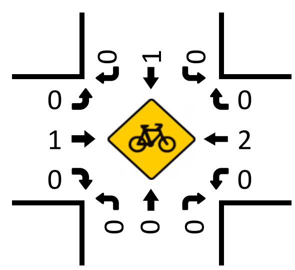
Total Vehicles (NOON)



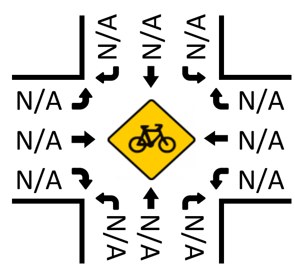
Total Vehicles (PM)



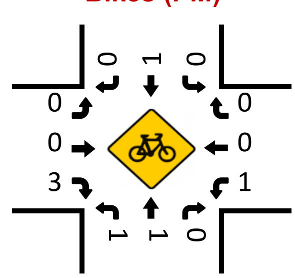
Bikes (AM)



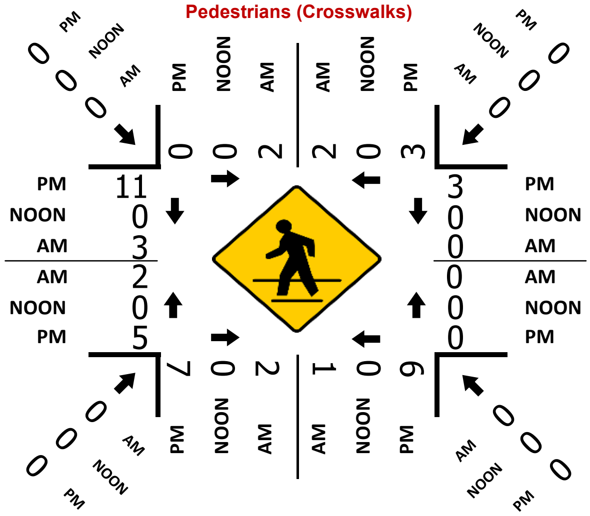
Bikes (NOON)



Bikes (PM)



Pedestrians (Crosswalks)



Prepared by National Data & Surveying Services

Laurel Ave & Lambert Rd

Peak Hour Turning Movement Count

ID: 17-05610-008
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

SOUTHBOUND — Laurel Ave

AM	183	93	75	0	224	AM
NOON	0	0	0	0	0	NOON
PM	80	121	97	0	414	PM

EASTBOUND — Lambert Rd

AM	NOON	PM	
1805	0	943	⇦
0	0	0	↶ 0
80	0	104	↱ 0
852	0	1320	→ 0
50	0	59	↳ 0
AM	NOON	PM	

WESTBOUND — Lambert Rd

PM	NOON	AM	
87	0	59	0 ↰
835	0	1541	0 ←
12	0	15	0 ↶
0	0	0	0 ↶
1444	0	958	⇨
PM	NOON	AM	

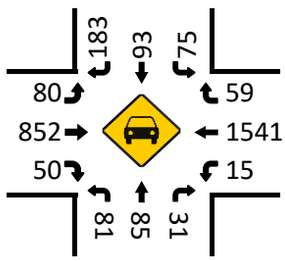
CONTROL: Signalized

TEV	3145	0	2993
	AM	NOON	PM
PHF	0.92		0.97

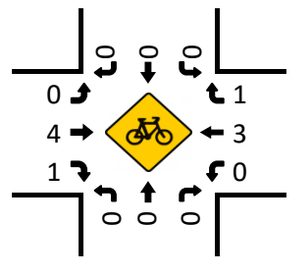
NORTHBOUND — Laurel Ave

PM	192	0	28	223	27	PM
NOON	0	0	0	0	0	NOON
AM	158	0	81	85	31	AM

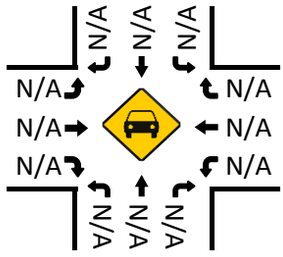
Total Vehicles (AM)



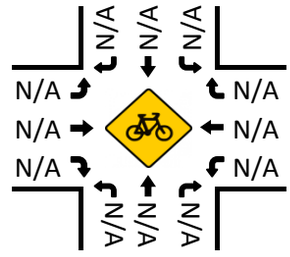
Bikes (AM)



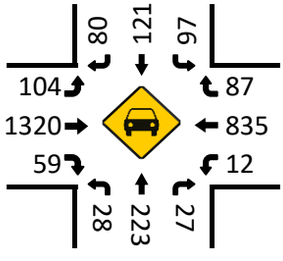
Total Vehicles (NOON)



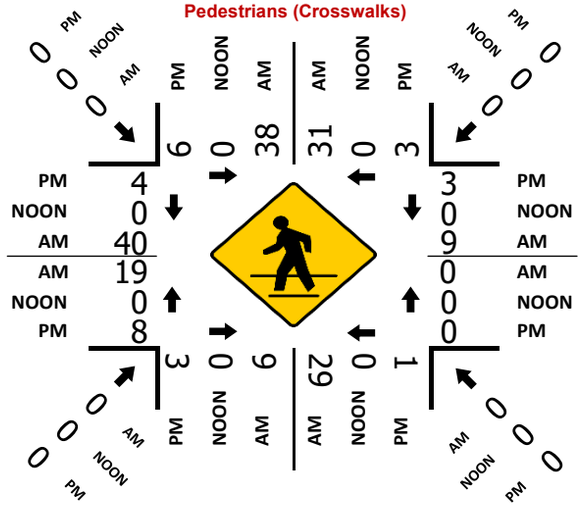
Bikes (NOON)



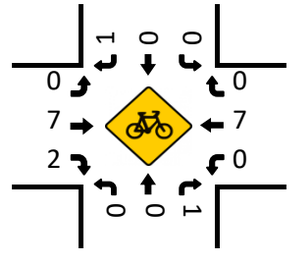
Total Vehicles (PM)



Pedestrians (Crosswalks)



Bikes (PM)



Prepared by National Data & Surveying Services

Colima Rd & Mar Vista St

Peak Hour Turning Movement Count

ID: 17-05610-009
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:00 AM - 08:00 AM
NOON: NONE
PM: 05:00 PM - 06:00 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

SOUTHBOUND (Colima Rd)

AM	567	1553	45	1	1282	AM
NOON	0	0	0	0	0	NOON
PM	399	1140	49	2	2006	PM

EASTBOUND (Mar Vista St)

AM	NOON	PM	
916	0	615	
0	0	0	0
275	0	449	0
218	0	59	0
108	0	140	0

WESTBOUND (Mar Vista St)

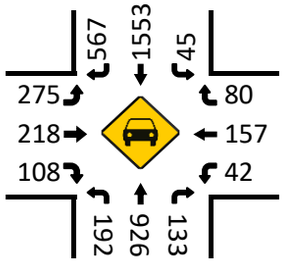
PM	NOON	AM	
104	0	80	0
73	0	157	0
23	0	42	0
0	0	0	0
135	0	396	

NORTHBOUND (Colima Rd)

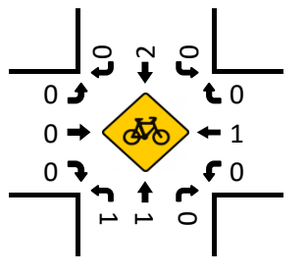
PM	1304	1	143	1451	27	PM
NOON	0	0	0	0	0	NOON
AM	1711	8	192	926	133	AM

CONTROL			
Signalized			
TEV	4305	0	4060
	AM	NOON	PM
PHF	0.94		0.89

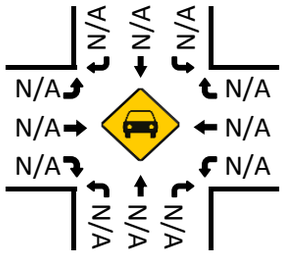
Total Vehicles (AM)



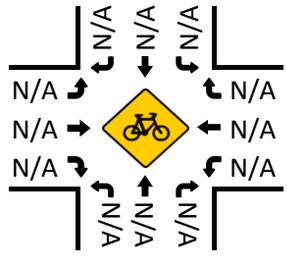
Bikes (AM)



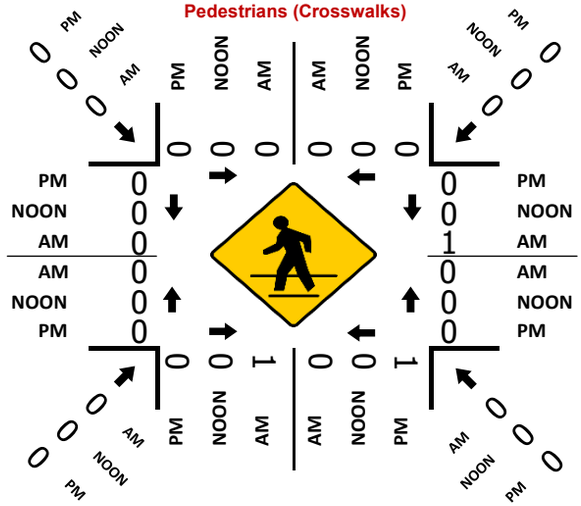
Total Vehicles (NOON)



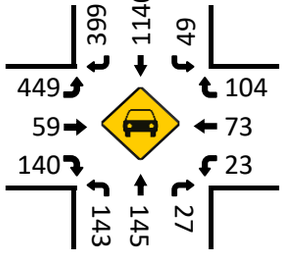
Bikes (NOON)



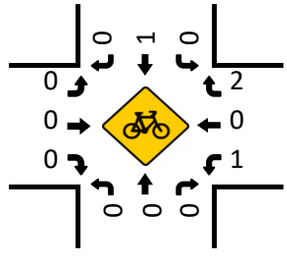
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Colima Rd & Whittier Blvd

Peak Hour Turning Movement Count

ID: 17-05610-010
City: Whittier

Day: Tuesday
Date: 09/19/2017

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:30 PM - 05:30 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

Colima Rd — SOUTHBOUND

AM	571	1005	265	0	1379	AM
NOON	0	0	0	0	0	NOON
PM	240	850	354	6	1677	PM

Whittier Blvd — EASTBOUND

AM	NOON	PM	
1919	0	1371	⇦
0	0	0	↶ 0
364	0	560	↱ 0
886	0	1118	→ 0
103	0	159	↴ 0
AM	NOON	PM	

Whittier Blvd — WESTBOUND

PM	NOON	AM	
195	0	123	0 ↰
940	0	1157	0 ←
141	0	105	0 ↰
1	0	0	0 ↰
1562	0	1250	⇨
PM	NOON	AM	

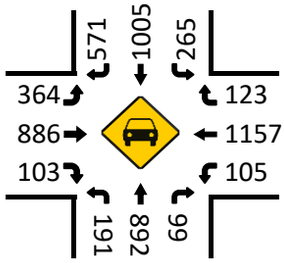
CONTROL: Signalized

TEV	5779 AM	0 NOON	5765 PM
PHF	0.94		0.96

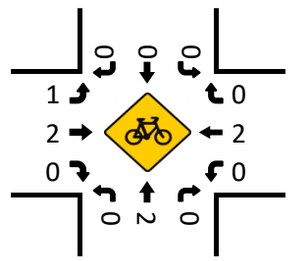
Colima Rd — NORTHBOUND

PM	1155	5	191	916	89	PM
NOON	0	0	0	0	0	NOON
AM	1231	18	191	892	99	AM

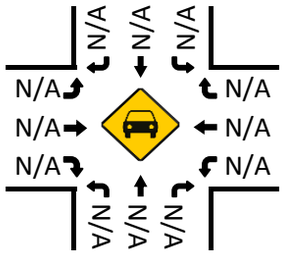
Total Vehicles (AM)



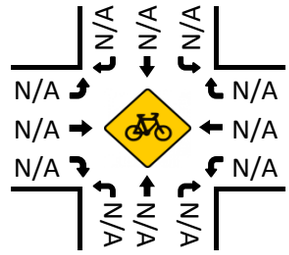
Bikes (AM)



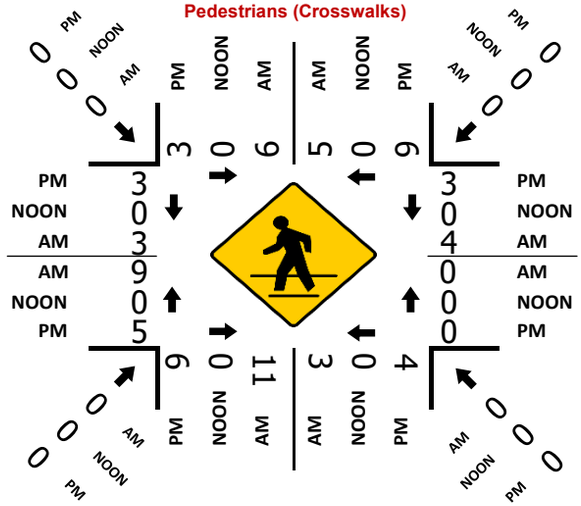
Total Vehicles (NOON)



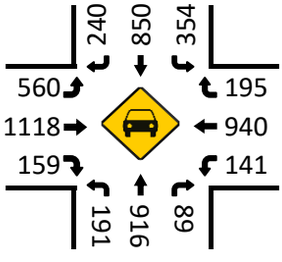
Bikes (NOON)



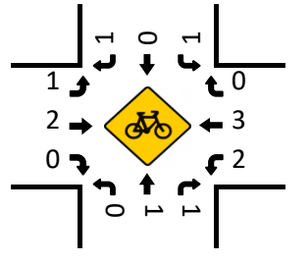
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



Prepared by National Data & Surveying Services

Colima Rd & Lambert Rd

Peak Hour Turning Movement Count

ID: 17-05610-011
City: Whittier

Day: Tuesday
Date: 09/19/2017

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	05:00 PM - 06:00 PM	04:00 PM - 06:00 PM

Colima Rd — SOUTHBOUND

	Right	Thru	Left	U-Turn	Exiting (NB)
AM	133	895	59	1	1100
NOON	0	0	0	0	0
PM	108	901	135	1	1175
(red)	0	0	0	0	

Lambert Rd — EASTBOUND

	AM	NOON	PM	(red)
Exiting (WB)	1570	0	1218	
U-Turn	0	0	0	0
Left	161	0	214	0
Thru	878	0	1153	0
Right	181	0	157	0

Lambert Rd — WESTBOUND

	(red)	PM	NOON	AM
Right	0	92	0	59
Thru	0	962	0	1209
Left	0	85	0	48
U-Turn	0	0	0	0
Exiting (EB)		1352	0	994

Colima Rd — NORTHBOUND

	Exiting (SB)	U-Turn	Left	Thru	Right
(red)		0	0	0	0
PM	1150	7	148	868	64
NOON	0	0	0	0	0
AM	1130	6	228	879	57

CONTROL

Signalized

	AM	NOON	PM
TEV	4794	0	4895
PHF	0.99		0.99

Total Vehicles (AM)

Approach	Left	Thru	Right
Southbound	59	895	133
Eastbound	161	878	181
Westbound	48	1209	59
Northbound	228	879	57

Total Vehicles (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Total Vehicles (PM)

Approach	Left	Thru	Right
Southbound	135	901	108
Eastbound	214	1153	157
Westbound	85	962	92
Northbound	148	868	64

Bikes (AM)

Approach	Left	Thru	Right
Southbound	0	2	0
Eastbound	0	0	1
Westbound	0	0	2
Northbound	0	2	0

Bikes (NOON)

Approach	Left	Thru	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

Bikes (PM)

Approach	Left	Thru	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	0	0
Northbound	0	3	0

Pedestrians (Crosswalks)

Crosswalk	Direction	AM	NOON	PM
North leg	Eastbound	0	0	0
North leg	Westbound	0	0	0
West leg	Southbound	7	0	0
West leg	Northbound	1	0	2
East leg	Southbound	0	0	1
East leg	Northbound	0	0	0
South leg	Eastbound	0	0	0
South leg	Westbound	0	0	0
NW diagonal		0	0	0
NE diagonal		0	0	0
SW diagonal		0	0	0
SE diagonal		0	0	0

APPENDIX D:
LEVEL OF SERVICE CALCULATIONS

Project Title: Whittier General Plan
Intersection: 1 - Norwalk Blvd & Beverley Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	44	1,600	0.011	N-S(1):	0.347
	TH	2.00	441	3,200	0.138 *	N-S(2):	0.354 *
	LT	2.00	381	2,560	0.149	E-W(1):	0.302
Westbound	RT	1.00	517	1,600	0.249	E-W(2):	0.495 *
	TH	2.00	1,479	3,200	0.462 *		
	LT	1.00	61	1,600	0.038	V/C:	0.849
Northbound	RT	0.00	27	0	0.000	Lost Time:	0.100
	TH	2.00	606	3,200	0.198	ITS:	0.000
	LT	1.00	346	1,600	0.216 *		
Eastbound	RT	1.00	153	1,600	0.000	ICU:	0.949
	TH	2.00	845	3,200	0.264		
	LT	1.00	53	1,600	0.033 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	25	1,600	0.000	N-S(1):	0.366 *
	TH	2.00	602	3,200	0.188	N-S(2):	0.317
	LT	2.00	452	2,560	0.177 *	E-W(1):	0.444 *
Westbound	RT	1.00	409	1,600	0.167	E-W(2):	0.274
	TH	2.00	772	3,200	0.241		
	LT	1.00	76	1,600	0.048 *	V/C:	0.810
Northbound	RT	0.00	44	0	0.000	Lost Time:	0.100
	TH	2.00	560	3,200	0.189 *	ITS:	0.000
	LT	1.00	206	1,600	0.129		
Eastbound	RT	1.00	157	1,600	0.034	ICU:	0.910
	TH	2.00	1,266	3,200	0.396 *		
	LT	1.00	52	1,600	0.033	LOS:	E

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 2 - I-605 SB Ramp & Whittier Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.49	409	2,383	0.170	N-S(1):	0.215 *
	TH	0.00	0	0	0.000	N-S(2):	0.170
	LT	1.51	415	1,934	0.215 *	E-W(1):	0.302
Westbound	RT	0.00	19	0	0.000	E-W(2):	0.448 *
	TH	2.00	1,405	3,200	0.445 *		
	LT	0.00	0	0	0.000	V/C:	0.663
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.763
	TH	2.00	962	1,600	0.302		
	LT	0.00	5	1,600	0.003 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.11	260	1,780	0.144	N-S(1):	0.183 *
	TH	0.00	0	0	0.000	N-S(2):	0.144
	LT	1.89	441	2,416	0.183 *	E-W(1):	0.521 *
Westbound	RT	0.00	23	0	0.000	E-W(2):	0.288
	TH	2.00	886	3,200	0.284		
	LT	0.00	0	0	0.000 *	V/C:	0.704
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.804
	TH	2.00	1,660	1,600	0.521 *		
	LT	0.00	7	1,600	0.004	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 3 - I-605 NB Ramp & Whittier Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	Y
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	205	1,600	0.128 *	N-S(1):	0.276 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	58	1,600	0.036	E-W(1):	0.285
Westbound	RT	0.00	4	0	0.000	E-W(2):	0.445 *
	TH	2.00	1,370	3,200	0.429 *		
	LT	0.00	0	0	0.000	V/C:	0.721
Northbound	RT	1.20	228	1,923	0.119	Lost Time:	0.100
	TH	0.08	15	127	0.119	ITS:	0.000
	LT	1.72	326	2,200	0.148 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.821
	TH	2.00	912	3,200	0.285		
	LT	1.00	25	1,600	0.016 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	72	1,600	0.045 *	N-S(1):	0.171 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	56	1,600	0.035	E-W(1):	0.385
Westbound	RT	0.00	14	0	0.000	E-W(2):	0.398 *
	TH	2.00	1,159	3,200	0.367 *		
	LT	0.00	0	0	0.000	V/C:	0.569
Northbound	RT	1.33	214	2,122	0.101	Lost Time:	0.100
	TH	0.29	47	466	0.101	ITS:	0.000
	LT	1.38	223	1,769	0.126 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.669
	TH	2.00	1,231	3,200	0.385		
	LT	1.00	50	1,600	0.031 *	LOS:	B

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 4 - Norwalk Blvd & Whittier Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.031	N-S(1):	0.281 *
	TH	2.00	412	3,200	0.129	N-S(2):	0.252
	LT	1.00	193	1,600	0.121 *	E-W(1):	0.299
Westbound	RT	1.00	73	1,600	0.000	E-W(2):	0.348 *
	TH	2.00	992	3,200	0.310 *		
	LT	1.00	21	1,600	0.013	V/C:	0.629
Northbound	RT	1.00	34	1,600	0.008	Lost Time:	0.100
	TH	2.00	513	3,200	0.160 *	ITS:	0.000
	LT	1.00	197	1,600	0.123		
Eastbound	RT	1.00	109	1,600	0.007	ICU:	0.729
	TH	2.00	914	3,200	0.286		
	LT	1.00	61	1,600	0.038 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	77	1,600	0.002	N-S(1):	0.321 *
	TH	2.00	432	3,200	0.135	N-S(2):	0.279
	LT	1.00	217	1,600	0.136 *	E-W(1):	0.344 *
Westbound	RT	1.00	114	1,600	0.003	E-W(2):	0.307
	TH	2.00	834	3,200	0.261		
	LT	1.00	62	1,600	0.039 *	V/C:	0.665
Northbound	RT	1.00	54	1,600	0.000	Lost Time:	0.100
	TH	2.00	593	3,200	0.185 *	ITS:	0.000
	LT	1.00	231	1,600	0.144		
Eastbound	RT	1.00	89	1,600	0.000	ICU:	0.765
	TH	2.00	977	3,200	0.305 *		
	LT	1.00	74	1,600	0.046	LOS:	C

* - Denotes critical movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	31	75	279	3	98	526	669	108	9	220	292	0
Future Volume (vph)	31	75	279	3	98	526	669	108	9	220	292	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.88			0.91	0.91	
Frt	1.00		1.00		1.00	1.00	0.85			0.95	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			1.00	1.00	
Satd. Flow (prot)	1490		4233		1490	2980	2347			2698	1213	
Flt Permitted	0.95		0.70		0.95	1.00	1.00			1.00	1.00	
Satd. Flow (perm)	1490		2998		1490	2980	2347			2698	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	82	303	3	107	572	727	117	10	239	317	0
RTOR Reduction (vph)	0	0	1	0	0	0	48	0	0	0	0	0
Lane Group Flow (vph)	34	0	387	0	107	572	796	0	0	388	178	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	3.5		33.6		10.8	36.9	65.4			18.3	18.3	
Effective Green, g (s)	3.5		33.6		10.8	36.9	65.4			18.3	18.3	
Actuated g/C Ratio	0.03		0.26		0.08	0.28	0.50			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	40		808		123	845	1180			379	170	
v/s Ratio Prot	0.02		0.01		c0.07	0.19	c0.34			0.14	c0.15	
v/s Ratio Perm			0.11									
v/c Ratio	0.85		2.10dl		0.87	0.68	0.67			1.02	1.05	
Uniform Delay, d1	63.0		40.8		58.9	41.3	24.3			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	83.5		0.3		42.4	4.3	2.0			52.4	82.0	
Delay (s)	146.5		41.1		101.3	45.6	26.3			108.3	137.9	
Level of Service	F		D		F	D	C			F	F	
Approach Delay (s)			49.6			38.8				117.6		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	83.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	422	222	40	419	104
Future Volume (vph)	422	222	40	419	104
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1416		2843	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1416		2843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	459	241	43	455	113
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	413	287	0	611	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	23.1	23.1		23.3	
Effective Green, g (s)	23.1	23.1		23.3	
Actuated g/C Ratio	0.18	0.18		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	481	251		509	
v/s Ratio Prot	0.15	c0.20		c0.21	
v/s Ratio Perm					
v/c Ratio	0.86	1.14		1.20	
Uniform Delay, d1	51.9	53.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	15.4	101.1		107.9	
Delay (s)	67.2	154.5		161.2	
Level of Service	E	F		F	
Approach Delay (s)		103.0		161.2	
Approach LOS		F		F	

Intersection Summary

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	43	144	563	22	74	405	568	68	3	195	359	0
Future Volume (vph)	43	144	563	22	74	405	568	68	3	195	359	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.88			0.91	0.91	
Frt	1.00		1.00		1.00	1.00	0.85			0.93	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			1.00	1.00	
Satd. Flow (prot)	1490		4221		1490	2980	2347			2650	1213	
Flt Permitted	0.95		0.71		0.95	1.00	1.00			1.00	1.00	
Satd. Flow (perm)	1490		3040		1490	2980	2347			2650	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	157	612	24	80	440	617	74	3	212	390	0
RTOR Reduction (vph)	0	0	3	0	0	0	52	0	0	0	0	0
Lane Group Flow (vph)	47	0	790	0	80	440	639	0	0	410	195	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	9.2		42.4		9.7	33.2	59.7			18.3	18.3	
Effective Green, g (s)	9.2		42.4		9.7	33.2	59.7			18.3	18.3	
Actuated g/C Ratio	0.07		0.33		0.07	0.26	0.46			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	105		1075		111	761	1077			373	170	
v/s Ratio Prot	0.03		0.05		c0.05	0.15	0.27			0.15	c0.16	
v/s Ratio Perm			c0.19									
v/c Ratio	0.45		1.47dl		0.72	0.58	0.59			1.10	1.15	
Uniform Delay, d1	58.0		38.8		58.8	42.3	26.1			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	2.2		2.5		17.6	3.2	1.3			76.0	114.1	
Delay (s)	60.2		41.3		76.4	45.5	27.4			131.9	169.9	
Level of Service	E		D		E	D	C			F	F	
Approach Delay (s)			42.4			37.2				144.1		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	97.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	550	238	84	322	74
Future Volume (vph)	550	238	84	322	74
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.98	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1414		2852	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1414		2852	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	598	259	91	350	80
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	538	319	0	521	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	21.1	21.1		23.3	
Effective Green, g (s)	21.1	21.1		23.3	
Actuated g/C Ratio	0.16	0.16		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	440	229		511	
v/s Ratio Prot	0.20	c0.23		c0.18	
v/s Ratio Perm					
v/c Ratio	1.22	1.39		1.02	
Uniform Delay, d1	54.5	54.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	119.1	201.3		44.8	
Delay (s)	173.6	255.8		98.2	
Level of Service	F	F		F	
Approach Delay (s)		204.2		98.2	
Approach LOS		F		F	

Intersection Summary

Project Title: Whittier General Plan
Intersection: 6 - Painter Ave & Mar Vista St
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	38	0	0.000	N-S(1):	0.396 *
	TH	2.00	752	3,200	0.247	N-S(2):	0.326
	LT	1.00	247	1,600	0.154 *	E-W(1):	0.236 *
Westbound	RT	1.00	404	1,600	0.175	E-W(2):	0.221
	TH	2.00	663	3,200	0.207		
	LT	1.00	92	1,600	0.058 *	V/C:	0.632
Northbound	RT	0.00	29	0	0.000	Lost Time:	0.100
	TH	2.00	746	3,200	0.242 *	ITS:	0.000
	LT	1.00	127	1,600	0.079		
Eastbound	RT	1.00	139	1,600	0.047	ICU:	0.732
	TH	1.00	284	1,600	0.178 *		
	LT	1.00	23	1,600	0.014	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	45	0	0.000	N-S(1):	0.460 *
	TH	2.00	1,007	3,200	0.329	N-S(2):	0.400
	LT	1.00	311	1,600	0.194 *	E-W(1):	0.292 *
Westbound	RT	1.00	242	1,600	0.054	E-W(2):	0.135
	TH	2.00	334	3,200	0.104		
	LT	1.00	50	1,600	0.031 *	V/C:	0.752
Northbound	RT	0.00	82	0	0.000	Lost Time:	0.100
	TH	2.00	769	3,200	0.266 *	ITS:	0.000
	LT	1.00	113	1,600	0.071		
Eastbound	RT	1.00	236	1,600	0.112	ICU:	0.852
	TH	1.00	417	1,600	0.261 *		
	LT	1.00	49	1,600	0.031	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 7 - Painter Ave & Whittier Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	46	0	0.000	N-S(1):	0.284 *
	TH	2.00	612	3,200	0.206	N-S(2):	0.261
	LT	2.00	297	2,560	0.116 *	E-W(1):	0.274
Westbound	RT	0.00	272	0	0.000	E-W(2):	0.323 *
	TH	3.00	1,113	4,800	0.289 *		
	LT	1.00	187	1,600	0.117	V/C:	0.607
Northbound	RT	0.00	95	0	0.000	Lost Time:	0.100
	TH	2.00	444	3,200	0.168 *	ITS:	0.000
	LT	2.00	140	2,560	0.055		
Eastbound	RT	0.00	97	0	0.000	ICU:	0.707
	TH	3.00	655	4,800	0.157		
	LT	1.00	55	1,600	0.034 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	51	0	0.000	N-S(1):	0.409 *
	TH	2.00	648	3,200	0.218	N-S(2):	0.314
	LT	2.00	500	2,560	0.195 *	E-W(1):	0.322 *
Westbound	RT	0.00	333	0	0.000	E-W(2):	0.288
	TH	3.00	782	4,800	0.232		
	LT	1.00	139	1,600	0.087 *	V/C:	0.731
Northbound	RT	0.00	102	0	0.000	Lost Time:	0.100
	TH	2.00	582	3,200	0.214 *	ITS:	0.000
	LT	2.00	247	2,560	0.096		
Eastbound	RT	0.00	117	0	0.000	ICU:	0.831
	TH	3.00	1,013	4,800	0.235 *		
	LT	1.00	90	1,600	0.056	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 8 - Laurel Ave & Lambert Rd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	183	1,600	0.089	N-S(1):	0.209 *
	TH	0.55	93	886	0.105 *	N-S(2):	0.209 *
	LT	0.45	75	714	0.105 *	E-W(1):	0.291
Westbound	RT	0.00	59	0	0.000	E-W(2):	0.550 *
	TH	2.00	1,541	3,200	0.500 *		
	LT	1.00	15	1,600	0.009	V/C:	0.759
Northbound	RT	1.00	31	1,600	0.015	Lost Time:	0.100
	TH	0.51	85	819	0.104 *	ITS:	0.000
	LT	0.49	81	781	0.104 *		
Eastbound	RT	0.00	50	0	0.000	ICU:	0.859
	TH	2.00	852	3,200	0.282		
	LT	1.00	80	1,600	0.050 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.018	N-S(1):	0.293 *
	TH	0.56	121	888	0.136 *	N-S(2):	0.293 *
	LT	0.44	97	712	0.136 *	E-W(1):	0.439 *
Westbound	RT	0.00	87	0	0.000	E-W(2):	0.353
	TH	2.00	835	3,200	0.288		
	LT	1.00	12	1,600	0.008 *	V/C:	0.732
Northbound	RT	1.00	27	1,600	0.013	Lost Time:	0.100
	TH	0.89	223	1,422	0.157 *	ITS:	0.000
	LT	0.11	28	178	0.157 *		
Eastbound	RT	0.00	59	0	0.000	ICU:	0.832
	TH	2.00	1,320	3,200	0.431 *		
	LT	1.00	104	1,600	0.065	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 9 - Colima Rd & Mar Vista St
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	Y
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	540	1,600	0.241	N-S(1):	0.317
	TH	2.00	1,520	3,200	0.475 *	N-S(2):	0.622 *
	LT	1.00	49	1,600	0.031	E-W(1):	0.299 *
Westbound	RT	1.00	73	1,600	0.030	E-W(2):	0.000
	TH	1.00	170	1,600	0.106 *		
	LT	1.00	45	1,600	0.028	V/C:	0.921
Northbound	RT	1.00	138	1,600	0.072	Lost Time:	0.100
	TH	2.00	915	3,200	0.286	ITS:	0.000
	LT	1.00	235	1,600	0.147 *		
Eastbound	RT	1.00	118	1,600	0.000	ICU:	1.021
	TH	0.86	213	1,380	0.154		
	LT	1.14	281	1,456	0.193 *	LOS:	F

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	394	1,600	0.143	N-S(1):	0.470 *
	TH	2.00	1,126	3,200	0.352	N-S(2):	0.439
	LT	1.00	58	1,600	0.036 *	E-W(1):	0.258 *
Westbound	RT	1.00	100	1,600	0.044	E-W(2):	0.000
	TH	1.00	81	1,600	0.051 *		
	LT	1.00	26	1,600	0.016	V/C:	0.728
Northbound	RT	1.00	20	1,600	0.004	Lost Time:	0.100
	TH	2.00	1,389	3,200	0.434 *	ITS:	0.000
	LT	1.00	139	1,600	0.087		
Eastbound	RT	1.00	124	1,600	0.034	ICU:	0.828
	TH	0.19	51	307	0.166		
	LT	1.81	480	2,314	0.207 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 10 - Colima Rd & Whittier Blvd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	571	1,600	0.215	N-S(1):	0.290
	TH	2.00	1,005	3,200	0.314 *	N-S(2):	0.396 *
	LT	2.00	265	2,560	0.104	E-W(1):	0.272
Westbound	RT	0.00	123	0	0.000	E-W(2):	0.409 *
	TH	3.00	1,157	4,800	0.267 *		
	LT	1.00	105	1,600	0.066	V/C:	0.805
Northbound	RT	1.00	99	1,600	0.000	Lost Time:	0.100
	TH	3.00	892	4,800	0.186	ITS:	0.000
	LT	2.00	209	2,560	0.082 *		
Eastbound	RT	0.00	103	0	0.000	ICU:	0.905
	TH	3.00	886	4,800	0.206		
	LT	2.00	364	2,560	0.142 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	237	1,600	0.000	N-S(1):	0.319
	TH	2.00	870	3,200	0.272 *	N-S(2):	0.346 *
	LT	2.00	350	2,560	0.137	E-W(1):	0.350
Westbound	RT	0.00	202	0	0.000	E-W(2):	0.459 *
	TH	3.00	946	4,800	0.239 *		
	LT	1.00	125	1,600	0.078	V/C:	0.805
Northbound	RT	1.00	100	1,600	0.000	Lost Time:	0.100
	TH	3.00	873	4,800	0.182	ITS:	0.000
	LT	2.00	189	2,560	0.074 *		
Eastbound	RT	0.00	149	0	0.000	ICU:	0.905
	TH	3.00	1,157	4,800	0.272		
	LT	2.00	563	2,560	0.220 *	LOS:	E

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 11 - Colima Rd & Lambert Rd
Description: Existing

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	133	1,600	0.033	N-S(1):	0.331
	TH	2.00	895	3,200	0.280 *	N-S(2):	0.426 *
	LT	1.00	60	1,600	0.038	E-W(1):	0.361
Westbound	RT	0.00	59	0	0.000	E-W(2):	0.497 *
	TH	2.00	1,209	3,200	0.396 *		
	LT	1.00	48	1,600	0.030	V/C:	0.923
Northbound	RT	0.00	57	0	0.000	Lost Time:	0.100
	TH	2.00	879	3,200	0.293	ITS:	0.000
	LT	1.00	234	1,600	0.146 *		
Eastbound	RT	0.00	181	0	0.000	ICU:	1.023
	TH	2.00	878	3,200	0.331		
	LT	1.00	161	1,600	0.101 *	LOS:	F

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.003	N-S(1):	0.382
	TH	2.00	909	3,200	0.284 *	N-S(2):	0.388 *
	LT	1.00	130	1,600	0.081	E-W(1):	0.452 *
Westbound	RT	0.00	100	0	0.000	E-W(2):	0.449
	TH	2.00	917	3,200	0.318		
	LT	1.00	70	1,600	0.044 *	V/C:	0.840
Northbound	RT	0.00	59	0	0.000	Lost Time:	0.100
	TH	2.00	903	3,200	0.301	ITS:	0.000
	LT	1.00	166	1,600	0.104 *		
Eastbound	RT	0.00	160	0	0.000	ICU:	0.940
	TH	2.00	1,147	3,200	0.408 *		
	LT	1.00	210	1,600	0.131	LOS:	E

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 1 - Norwalk Blvd & Beverley Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	50	1,600	0.016	N-S(1):	0.325
	TH	2.00	420	3,200	0.131 *	N-S(2):	0.356 *
	LT	2.00	350	2,560	0.137	E-W(1):	0.279
Westbound	RT	1.00	480	1,600	0.232	E-W(2):	0.453 *
	TH	2.00	1,350	3,200	0.422 *		
	LT	1.00	60	1,600	0.038	V/C:	0.809
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.100
	TH	2.00	570	3,200	0.188	ITS:	0.000
	LT	1.00	360	1,600	0.225 *		
Eastbound	RT	1.00	180	1,600	0.000	ICU:	0.909
	TH	2.00	770	3,200	0.241		
	LT	1.00	50	1,600	0.031 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	30	1,600	0.003	N-S(1):	0.345 *
	TH	2.00	570	3,200	0.178	N-S(2):	0.322
	LT	2.00	420	2,560	0.164 *	E-W(1):	0.407 *
Westbound	RT	1.00	380	1,600	0.155	E-W(2):	0.253
	TH	2.00	710	3,200	0.222		
	LT	1.00	70	1,600	0.044 *	V/C:	0.752
Northbound	RT	0.00	50	0	0.000	Lost Time:	0.100
	TH	2.00	530	3,200	0.181 *	ITS:	0.000
	LT	1.00	230	1,600	0.144		
Eastbound	RT	1.00	190	1,600	0.047	ICU:	0.852
	TH	2.00	1,160	3,200	0.363 *		
	LT	1.00	50	1,600	0.031	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 2 - I-605 SB Ramp & Whittier Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.46	380	2,338	0.159	N-S(1):	0.203 *
	TH	0.00	0	0	0.000	N-S(2):	0.159
	LT	1.54	400	1,969	0.203 *	E-W(1):	0.291
Westbound	RT	0.00	20	0	0.000	E-W(2):	0.428 *
	TH	2.00	1,330	3,200	0.422 *		
	LT	0.00	0	0	0.000	V/C:	0.631
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.731
	TH	2.00	920	1,600	0.291		
	LT	0.00	10	1,600	0.006 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.06	240	1,694	0.139	N-S(1):	0.177 *
	TH	0.00	0	0	0.000	N-S(2):	0.139
	LT	1.94	440	2,485	0.177 *	E-W(1):	0.494 *
Westbound	RT	0.00	30	0	0.000	E-W(2):	0.281
	TH	2.00	850	3,200	0.275		
	LT	0.00	0	0	0.000 *	V/C:	0.671
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.771
	TH	2.00	1,570	1,600	0.494 *		
	LT	0.00	10	1,600	0.006	LOS:	C

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 3 - I-605 NB Ramp & Whittier Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	Y
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	190	1,600	0.119 *	N-S(1):	0.262 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	60	1,600	0.038	E-W(1):	0.278
Westbound	RT	0.00	10	0	0.000	E-W(2):	0.447 *
	TH	2.00	1,360	3,200	0.428 *		
	LT	0.00	0	0	0.000	V/C:	0.709
Northbound	RT	1.25	230	2,007	0.115	Lost Time:	0.100
	TH	0.11	20	175	0.115	ITS:	0.000
	LT	1.64	300	2,095	0.143 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.809
	TH	2.00	890	3,200	0.278		
	LT	1.00	30	1,600	0.019 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	70	1,600	0.044 *	N-S(1):	0.172 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	60	1,600	0.038	E-W(1):	0.378
Westbound	RT	0.00	20	0	0.000	E-W(2):	0.397 *
	TH	2.00	1,150	3,200	0.366 *		
	LT	0.00	0	0	0.000	V/C:	0.569
Northbound	RT	1.41	230	2,253	0.102	Lost Time:	0.100
	TH	0.31	50	490	0.102	ITS:	0.000
	LT	1.29	210	1,646	0.128 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.669
	TH	2.00	1,210	3,200	0.378		
	LT	1.00	50	1,600	0.031 *	LOS:	B

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 4 - Norwalk Blvd & Whittier Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.031	N-S(1):	0.260 *
	TH	2.00	380	3,200	0.119	N-S(2):	0.232
	LT	1.00	180	1,600	0.113 *	E-W(1):	0.276
Westbound	RT	1.00	70	1,600	0.000	E-W(2):	0.322 *
	TH	2.00	910	3,200	0.284 *		
	LT	1.00	20	1,600	0.013	V/C:	0.582
Northbound	RT	1.00	40	1,600	0.013	Lost Time:	0.100
	TH	2.00	470	3,200	0.147 *	ITS:	0.000
	LT	1.00	180	1,600	0.113		
Eastbound	RT	1.00	100	1,600	0.006	ICU:	0.682
	TH	2.00	840	3,200	0.263		
	LT	1.00	60	1,600	0.038 *	LOS:	B

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.006	N-S(1):	0.297 *
	TH	2.00	400	3,200	0.125	N-S(2):	0.263
	LT	1.00	200	1,600	0.125 *	E-W(1):	0.319 *
Westbound	RT	1.00	110	1,600	0.006	E-W(2):	0.282
	TH	2.00	760	3,200	0.238		
	LT	1.00	60	1,600	0.038 *	V/C:	0.616
Northbound	RT	1.00	50	1,600	0.000	Lost Time:	0.100
	TH	2.00	550	3,200	0.172 *	ITS:	0.000
	LT	1.00	220	1,600	0.138		
Eastbound	RT	1.00	90	1,600	0.000	ICU:	0.716
	TH	2.00	900	3,200	0.281 *		
	LT	1.00	70	1,600	0.044	LOS:	C

* - Denotes critical movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	40	70	260	10	90	590	610	100	40	210	270	0
Future Volume (vph)	40	70	260	10	90	590	610	100	40	210	270	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		1.00		1.00	1.00	0.85			0.95	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4220		1490	2980	3040			2711	1213	
Flt Permitted	0.95		0.68		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2884		1490	2980	3040			2711	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	76	283	11	98	641	663	109	43	228	293	0
RTOR Reduction (vph)	0	0	2	0	0	0	49	0	0	0	0	0
Lane Group Flow (vph)	43	0	368	0	98	641	723	0	0	388	176	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	4.6		34.9		10.6	35.8	64.3			18.3	18.3	
Effective Green, g (s)	4.6		34.9		10.6	35.8	64.3			18.3	18.3	
Actuated g/C Ratio	0.04		0.27		0.08	0.28	0.49			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	52		821		121	820	1503			381	170	
v/s Ratio Prot	0.03		0.02		c0.07	c0.22	0.24			0.14	c0.15	
v/s Ratio Perm			0.10									
v/c Ratio	0.83		1.41dl		0.81	0.78	0.48			1.02	1.04	
Uniform Delay, d1	62.3		39.5		58.7	43.5	21.8			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	63.4		0.3		30.0	7.3	0.5			50.8	78.6	
Delay (s)	125.7		39.8		88.7	50.8	22.3			106.7	134.5	
Level of Service	F		D		F	D	C			F	F	
Approach Delay (s)			48.8			38.7				115.4		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	90.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	530	250	40	390	100
Future Volume (vph)	530	250	40	390	100
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1415		2842	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1415		2842	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	576	272	43	424	109
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	518	330	0	576	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	23.1	23.1		23.3	
Effective Green, g (s)	23.1	23.1		23.3	
Actuated g/C Ratio	0.18	0.18		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	481	251		509	
v/s Ratio Prot	0.19	c0.23		c0.20	
v/s Ratio Perm					
v/c Ratio	1.08	1.31		1.13	
Uniform Delay, d1	53.5	53.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	63.3	167.0		81.4	
Delay (s)	116.7	220.5		134.7	
Level of Service	F	F		F	
Approach Delay (s)		157.1		134.7	
Approach LOS		F		F	

Intersection Summary

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	50	140	520	30	70	510	520	70	50	180	330	0
Future Volume (vph)	50	140	520	30	70	510	520	70	50	180	330	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		0.99		1.00	1.00	0.85			0.94	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4211		1490	2980	3040			2665	1213	
Flt Permitted	0.95		0.67		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2860		1490	2980	3040			2665	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	152	565	33	76	554	565	76	54	196	359	0
RTOR Reduction (vph)	0	0	3	0	0	0	53	0	0	0	0	0
Lane Group Flow (vph)	54	0	747	0	76	554	588	0	0	419	190	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	9.4		42.9		9.4	33.0	59.5			18.3	18.3	
Effective Green, g (s)	9.4		42.9		9.4	33.0	59.5			18.3	18.3	
Actuated g/C Ratio	0.07		0.33		0.07	0.25	0.46			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	107		1041		107	756	1391			375	170	
v/s Ratio Prot	0.04		c0.05		0.05	c0.19	0.19			c0.16	0.16	
v/s Ratio Perm			0.18									
v/c Ratio	0.50		1.37dl		0.71	0.73	0.42			1.12	1.12	
Uniform Delay, d1	58.1		38.2		59.0	44.5	23.7			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	2.7		2.2		16.8	6.2	0.4			82.2	104.1	
Delay (s)	60.8		40.5		75.8	50.7	24.1			138.0	159.9	
Level of Service	E		D		E	D	C			F	F	
Approach Delay (s)			41.8			38.8				144.9		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	112.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	620	260	80	300	70
Future Volume (vph)	620	260	80	300	70
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.98	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1414		2852	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1414		2852	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	283	87	326	76
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	607	350	0	489	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	21.1	21.1		23.3	
Effective Green, g (s)	21.1	21.1		23.3	
Actuated g/C Ratio	0.16	0.16		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	440	229		511	
v/s Ratio Prot	0.22	c0.25		c0.17	
v/s Ratio Perm					
v/c Ratio	1.38	1.53		0.96	
Uniform Delay, d1	54.5	54.5		52.9	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	184.6	258.7		28.9	
Delay (s)	239.0	313.1		81.8	
Level of Service	F	F		F	
Approach Delay (s)		266.1		81.8	
Approach LOS		F		F	

Intersection Summary

Project Title: Whittier General Plan
Intersection: 6 - Painter Ave & Mar Vista St
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	40	0	0.000	N-S(1):	0.366 *
	TH	2.00	690	3,200	0.228	N-S(2):	0.303
	LT	1.00	230	1,600	0.144 *	E-W(1):	0.219 *
Westbound	RT	1.00	370	1,600	0.159	E-W(2):	0.210
	TH	2.00	610	3,200	0.191		
	LT	1.00	90	1,600	0.056 *	V/C:	0.585
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.100
	TH	2.00	680	3,200	0.222 *	ITS:	0.000
	LT	1.00	120	1,600	0.075		
Eastbound	RT	1.00	130	1,600	0.044	ICU:	0.685
	TH	1.00	260	1,600	0.163 *		
	LT	1.00	30	1,600	0.019	LOS:	B

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	50	0	0.000	N-S(1):	0.428 *
	TH	2.00	920	3,200	0.303	N-S(2):	0.372
	LT	1.00	290	1,600	0.181 *	E-W(1):	0.269 *
Westbound	RT	1.00	230	1,600	0.053	E-W(2):	0.128
	TH	2.00	310	3,200	0.097		
	LT	1.00	50	1,600	0.031 *	V/C:	0.697
Northbound	RT	0.00	80	0	0.000	Lost Time:	0.100
	TH	2.00	710	3,200	0.247 *	ITS:	0.000
	LT	1.00	110	1,600	0.069		
Eastbound	RT	1.00	220	1,600	0.103	ICU:	0.797
	TH	1.00	380	1,600	0.238 *		
	LT	1.00	50	1,600	0.031	LOS:	C

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 7 - Painter Ave & Whittier Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	50	0	0.000	N-S(1):	0.265 *
	TH	2.00	560	3,200	0.191	N-S(2):	0.246
	LT	2.00	280	2,560	0.109 *	E-W(1):	0.284
Westbound	RT	0.00	250	0	0.000	E-W(2):	0.321 *
	TH	3.00	1,110	4,800	0.283 *		
	LT	1.00	180	1,600	0.113	V/C:	0.586
Northbound	RT	0.00	90	0	0.000	Lost Time:	0.100
	TH	2.00	410	3,200	0.156 *	ITS:	0.000
	LT	2.00	140	2,560	0.055		
Eastbound	RT	0.00	110	0	0.000	ICU:	0.686
	TH	3.00	710	4,800	0.171		
	LT	1.00	60	1,600	0.038 *	LOS:	B

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	50	0	0.000	N-S(1):	0.380 *
	TH	2.00	600	3,200	0.203	N-S(2):	0.297
	LT	2.00	460	2,560	0.180 *	E-W(1):	0.319 *
Westbound	RT	0.00	310	0	0.000	E-W(2):	0.294
	TH	3.00	830	4,800	0.238		
	LT	1.00	130	1,600	0.081 *	V/C:	0.699
Northbound	RT	0.00	100	0	0.000	Lost Time:	0.100
	TH	2.00	540	3,200	0.200 *	ITS:	0.000
	LT	2.00	240	2,560	0.094		
Eastbound	RT	0.00	120	0	0.000	ICU:	0.799
	TH	3.00	1,020	4,800	0.238 *		
	LT	1.00	90	1,600	0.056	LOS:	C

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 8 - Laurel Ave & Lambert Rd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	170	1,600	0.081	N-S(1):	0.200 *
	TH	0.56	90	900	0.100 *	N-S(2):	0.200 *
	LT	0.44	70	700	0.100 *	E-W(1):	0.272
Westbound	RT	0.00	60	0	0.000	E-W(2):	0.509 *
	TH	2.00	1,410	3,200	0.459 *		
	LT	1.00	20	1,600	0.013	V/C:	0.709
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.50	80	800	0.100 *	ITS:	0.000
	LT	0.50	80	800	0.100 *		
Eastbound	RT	0.00	50	0	0.000	ICU:	0.809
	TH	2.00	780	3,200	0.259		
	LT	1.00	80	1,600	0.050 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.019	N-S(1):	0.281 *
	TH	0.57	120	914	0.131 *	N-S(2):	0.281 *
	LT	0.43	90	686	0.131 *	E-W(1):	0.410 *
Westbound	RT	0.00	80	0	0.000	E-W(2):	0.329
	TH	2.00	770	3,200	0.266		
	LT	1.00	20	1,600	0.013 *	V/C:	0.691
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.88	210	1,400	0.150 *	ITS:	0.000
	LT	0.13	30	200	0.150 *		
Eastbound	RT	0.00	60	0	0.000	ICU:	0.791
	TH	2.00	1,210	3,200	0.397 *		
	LT	1.00	100	1,600	0.063	LOS:	C

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 9 - Colima Rd & Mar Vista St
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	Y
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	500	1,600	0.223	N-S(1):	0.294
	TH	2.00	1,390	3,200	0.434 *	N-S(2):	0.572 *
	LT	1.00	50	1,600	0.031	E-W(1):	0.280 *
Westbound	RT	1.00	70	1,600	0.028	E-W(2):	0.000
	TH	1.00	160	1,600	0.100 *		
	LT	1.00	50	1,600	0.031	V/C:	0.852
Northbound	RT	1.00	130	1,600	0.066	Lost Time:	0.100
	TH	2.00	840	3,200	0.263	ITS:	0.000
	LT	1.00	220	1,600	0.138 *		
Eastbound	RT	1.00	110	1,600	0.000	ICU:	0.952
	TH	0.87	200	1,391	0.144		
	LT	1.13	260	1,447	0.180 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	360	1,600	0.129	N-S(1):	0.435 *
	TH	2.00	1,030	3,200	0.322	N-S(2):	0.403
	LT	1.00	60	1,600	0.038 *	E-W(1):	0.241 *
Westbound	RT	1.00	100	1,600	0.044	E-W(2):	0.000
	TH	1.00	80	1,600	0.050 *		
	LT	1.00	30	1,600	0.019	V/C:	0.676
Northbound	RT	1.00	20	1,600	0.003	Lost Time:	0.100
	TH	2.00	1,270	3,200	0.397 *	ITS:	0.000
	LT	1.00	130	1,600	0.081		
Eastbound	RT	1.00	120	1,600	0.034	ICU:	0.776
	TH	0.20	50	327	0.153		
	LT	1.80	440	2,299	0.191 *	LOS:	C

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 10 - Colima Rd & Whittier Blvd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	540	1,600	0.201	N-S(1):	0.269
	TH	2.00	920	3,200	0.288 *	N-S(2):	0.374 *
	LT	2.00	250	2,560	0.098	E-W(1):	0.261
Westbound	RT	0.00	120	0	0.000	E-W(2):	0.385 *
	TH	3.00	1,070	4,800	0.248 *		
	LT	1.00	100	1,600	0.063	V/C:	0.759
Northbound	RT	1.00	100	1,600	0.000	Lost Time:	0.100
	TH	3.00	820	4,800	0.171	ITS:	0.000
	LT	2.00	220	2,560	0.086 *		
Eastbound	RT	0.00	120	0	0.000	ICU:	0.859
	TH	3.00	830	4,800	0.198		
	LT	2.00	350	2,560	0.137 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	240	1,600	0.000	N-S(1):	0.292
	TH	2.00	800	3,200	0.250 *	N-S(2):	0.328 *
	LT	2.00	320	2,560	0.125	E-W(1):	0.331
Westbound	RT	0.00	190	0	0.000	E-W(2):	0.432 *
	TH	3.00	890	4,800	0.225 *		
	LT	1.00	120	1,600	0.075	V/C:	0.760
Northbound	RT	1.00	100	1,600	0.000	Lost Time:	0.100
	TH	3.00	800	4,800	0.167	ITS:	0.000
	LT	2.00	200	2,560	0.078 *		
Eastbound	RT	0.00	160	0	0.000	ICU:	0.860
	TH	3.00	1,070	4,800	0.256		
	LT	2.00	530	2,560	0.207 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 11 - Colima Rd & Lambert Rd
Description: Future Base

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	130	1,600	0.034	N-S(1):	0.319
	TH	2.00	840	3,200	0.263 *	N-S(2):	0.401 *
	LT	1.00	70	1,600	0.044	E-W(1):	0.337
Westbound	RT	0.00	60	0	0.000	E-W(2):	0.460 *
	TH	2.00	1,110	3,200	0.366 *		
	LT	1.00	50	1,600	0.031	V/C:	0.861
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	820	3,200	0.275	ITS:	0.000
	LT	1.00	220	1,600	0.138 *		
Eastbound	RT	0.00	170	0	0.000	ICU:	0.961
	TH	2.00	810	3,200	0.306		
	LT	1.00	150	1,600	0.094 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.006	N-S(1):	0.362
	TH	2.00	850	3,200	0.266 *	N-S(2):	0.366 *
	LT	1.00	130	1,600	0.081	E-W(1):	0.419 *
Westbound	RT	0.00	100	0	0.000	E-W(2):	0.419 *
	TH	2.00	840	3,200	0.294 *		
	LT	1.00	70	1,600	0.044 *	V/C:	0.785
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	840	3,200	0.281	ITS:	0.000
	LT	1.00	160	1,600	0.100 *		
Eastbound	RT	0.00	150	0	0.000	ICU:	0.885
	TH	2.00	1,050	3,200	0.375 *		
	LT	1.00	200	1,600	0.125 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 1 - Norwalk Blvd & Beverley Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	50	1,600	0.013	N-S(1):	0.342
	TH	2.00	430	3,200	0.134 *	N-S(2):	0.372 *
	LT	2.00	370	2,560	0.145	E-W(1):	0.291
Westbound	RT	1.00	500	1,600	0.240	E-W(2):	0.479 *
	TH	2.00	1,410	3,200	0.441 *		
	LT	1.00	60	1,600	0.038	V/C:	0.851
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.100
	TH	2.00	600	3,200	0.197	ITS:	0.000
	LT	1.00	380	1,600	0.238 *		
Eastbound	RT	1.00	180	1,600	0.000	ICU:	0.951
	TH	2.00	810	3,200	0.253		
	LT	1.00	60	1,600	0.038 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	30	1,600	0.003	N-S(1):	0.360 *
	TH	2.00	600	3,200	0.188	N-S(2):	0.338
	LT	2.00	440	2,560	0.172 *	E-W(1):	0.428 *
Westbound	RT	1.00	390	1,600	0.158	E-W(2):	0.262
	TH	2.00	740	3,200	0.231		
	LT	1.00	80	1,600	0.050 *	V/C:	0.788
Northbound	RT	0.00	50	0	0.000	Lost Time:	0.100
	TH	2.00	550	3,200	0.188 *	ITS:	0.000
	LT	1.00	240	1,600	0.150		
Eastbound	RT	1.00	200	1,600	0.050	ICU:	0.888
	TH	2.00	1,210	3,200	0.378 *		
	LT	1.00	50	1,600	0.031	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 2 - I-605 SB Ramp & Whittier Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.44	390	2,311	0.166	N-S(1):	0.211 *
	TH	0.00	0	0	0.000	N-S(2):	0.166
	LT	1.56	420	1,991	0.211 *	E-W(1):	0.303
Westbound	RT	0.00	20	0	0.000	E-W(2):	0.447 *
	TH	2.00	1,390	3,200	0.441 *		
	LT	0.00	0	0	0.000	V/C:	0.658
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.758
	TH	2.00	960	1,600	0.303		
	LT	0.00	10	1,600	0.006 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.06	250	1,690	0.145	N-S(1):	0.185 *
	TH	0.00	0	0	0.000	N-S(2):	0.145
	LT	1.94	460	2,488	0.185 *	E-W(1):	0.516 *
Westbound	RT	0.00	30	0	0.000	E-W(2):	0.294
	TH	2.00	890	3,200	0.288		
	LT	0.00	0	0	0.000 *	V/C:	0.701
Northbound	RT	0.00	0	0	0.000	Lost Time:	0.100
	TH	0.00	0	0	0.000 *	ITS:	0.000
	LT	0.00	0	0	0.000		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.801
	TH	2.00	1,640	1,600	0.516 *		
	LT	0.00	10	1,600	0.006	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 3 - I-605 NB Ramp & Whittier Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	Y
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	200	1,600	0.125 *	N-S(1):	0.276 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	60	1,600	0.038	E-W(1):	0.291
Westbound	RT	0.00	10	0	0.000	E-W(2):	0.466 *
	TH	2.00	1,420	3,200	0.447 *		
	LT	0.00	0	0	0.000	V/C:	0.742
Northbound	RT	1.24	240	1,986	0.121	Lost Time:	0.100
	TH	0.10	20	166	0.121	ITS:	0.000
	LT	1.66	320	2,119	0.151 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.842
	TH	2.00	930	3,200	0.291		
	LT	1.00	30	1,600	0.019 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	70	1,600	0.044 *	N-S(1):	0.177 *
	TH	0.00	0	0	0.000	N-S(2):	0.000
	LT	1.00	60	1,600	0.038	E-W(1):	0.394
Westbound	RT	0.00	20	0	0.000	E-W(2):	0.412 *
	TH	2.00	1,200	3,200	0.381 *		
	LT	0.00	0	0	0.000	V/C:	0.589
Northbound	RT	1.41	240	2,259	0.106	Lost Time:	0.100
	TH	0.29	50	471	0.106	ITS:	0.000
	LT	1.29	220	1,656	0.133 *		
Eastbound	RT	0.00	0	0	0.000	ICU:	0.689
	TH	2.00	1,260	3,200	0.394		
	LT	1.00	50	1,600	0.031 *	LOS:	B

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 4 - Norwalk Blvd & Whittier Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.031	N-S(1):	0.272 *
	TH	2.00	400	3,200	0.125	N-S(2):	0.244
	LT	1.00	190	1,600	0.119 *	E-W(1):	0.285
Westbound	RT	1.00	70	1,600	0.000	E-W(2):	0.335 *
	TH	2.00	950	3,200	0.297 *		
	LT	1.00	20	1,600	0.013	V/C:	0.607
Northbound	RT	1.00	40	1,600	0.013	Lost Time:	0.100
	TH	2.00	490	3,200	0.153 *	ITS:	0.000
	LT	1.00	190	1,600	0.119		
Eastbound	RT	1.00	110	1,600	0.009	ICU:	0.707
	TH	2.00	870	3,200	0.272		
	LT	1.00	60	1,600	0.038 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.000	N-S(1):	0.309 *
	TH	2.00	420	3,200	0.131	N-S(2):	0.269
	LT	1.00	210	1,600	0.131 *	E-W(1):	0.329 *
Westbound	RT	1.00	110	1,600	0.003	E-W(2):	0.300
	TH	2.00	800	3,200	0.250		
	LT	1.00	60	1,600	0.038 *	V/C:	0.638
Northbound	RT	1.00	60	1,600	0.000	Lost Time:	0.100
	TH	2.00	570	3,200	0.178 *	ITS:	0.000
	LT	1.00	220	1,600	0.138		
Eastbound	RT	1.00	90	1,600	0.000	ICU:	0.738
	TH	2.00	930	3,200	0.291 *		
	LT	1.00	80	1,600	0.050	LOS:	C

* - Denotes critical movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	40	80	270	10	100	620	640	110	50	210	280	0
Future Volume (vph)	40	80	270	10	100	620	640	110	50	210	280	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		1.00		1.00	1.00	0.85			0.95	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4217		1490	2980	3040			2707	1213	
Flt Permitted	0.95		0.66		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2821		1490	2980	3040			2707	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	87	293	11	109	674	696	120	54	228	304	0
RTOR Reduction (vph)	0	0	2	0	0	0	49	0	0	0	0	0
Lane Group Flow (vph)	43	0	389	0	109	674	767	0	0	404	182	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	4.6		34.7		10.8	35.8	64.3			18.3	18.3	
Effective Green, g (s)	4.6		34.7		10.8	35.8	64.3			18.3	18.3	
Actuated g/C Ratio	0.04		0.27		0.08	0.28	0.49			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	52		802		123	820	1503			381	170	
v/s Ratio Prot	0.03		0.02		c0.07	c0.23	0.25			0.15	c0.15	
v/s Ratio Perm			0.11									
v/c Ratio	0.83		1.61dl		0.89	0.82	0.51			1.06	1.07	
Uniform Delay, d1	62.3		40.1		59.0	44.1	22.2			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	63.4		0.3		46.7	9.1	0.6			63.0	89.0	
Delay (s)	125.7		40.5		105.7	53.2	22.8			118.8	144.9	
Level of Service	F		D		F	D	C			F	F	
Approach Delay (s)			48.9			41.3				126.9		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	97.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	550	260	40	400	100
Future Volume (vph)	550	260	40	400	100
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1415		2843	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1415		2843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	598	283	43	435	109
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	538	343	0	587	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	23.1	23.1		23.3	
Effective Green, g (s)	23.1	23.1		23.3	
Actuated g/C Ratio	0.18	0.18		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	481	251		509	
v/s Ratio Prot	0.20	c0.24		c0.21	
v/s Ratio Perm					
v/c Ratio	1.12	1.37		1.15	
Uniform Delay, d1	53.5	53.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	77.6	188.4		89.5	
Delay (s)	131.0	241.8		142.8	
Level of Service	F	F		F	
Approach Delay (s)		174.2		142.8	
Approach LOS		F		F	

Intersection Summary

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	50	140	540	30	80	540	550	70	50	190	350	0
Future Volume (vph)	50	140	540	30	80	540	550	70	50	190	350	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		0.99		1.00	1.00	0.85			0.94	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4213		1490	2980	3040			2664	1213	
Flt Permitted	0.95		0.67		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2859		1490	2980	3040			2664	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	152	587	33	87	587	598	76	54	207	380	0
RTOR Reduction (vph)	0	0	3	0	0	0	53	0	0	0	0	0
Lane Group Flow (vph)	54	0	769	0	87	587	621	0	0	440	201	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	9.4		40.4		11.9	33.0	59.5			18.3	18.3	
Effective Green, g (s)	9.4		40.4		11.9	33.0	59.5			18.3	18.3	
Actuated g/C Ratio	0.07		0.31		0.09	0.25	0.46			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	107		986		136	756	1391			375	170	
v/s Ratio Prot	0.04		0.06		c0.06	c0.20	0.20			0.17	c0.17	
v/s Ratio Perm			0.19									
v/c Ratio	0.50		0.78		0.64	0.78	0.45			1.17	1.18	
Uniform Delay, d1	58.1		40.7		57.0	45.1	24.0			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	2.7		3.8		7.1	7.7	0.5			102.7	126.6	
Delay (s)	60.8		44.6		64.1	52.8	24.5			158.5	182.4	
Level of Service	E		D		E	D	C			F	F	
Approach Delay (s)			45.6			39.4				166.0		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	124.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	650	270	80	310	80
Future Volume (vph)	650	270	80	310	80
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.91	0.91		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.99		0.96	
Satd. Flow (prot)	2712	1414		2847	
Flt Permitted	0.95	0.99		0.96	
Satd. Flow (perm)	2712	1414		2847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	707	293	87	337	87
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	636	364	0	511	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	21.1	21.1		23.3	
Effective Green, g (s)	21.1	21.1		23.3	
Actuated g/C Ratio	0.16	0.16		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	440	229		510	
v/s Ratio Prot	0.23	c0.26		c0.18	
v/s Ratio Perm					
v/c Ratio	1.45	1.59		1.00	
Uniform Delay, d1	54.5	54.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	213.0	285.0		40.3	
Delay (s)	267.4	339.5		93.7	
Level of Service	F	F		F	
Approach Delay (s)		293.6		93.7	
Approach LOS		F		F	

Intersection Summary

Project Title: Whittier General Plan
Intersection: 6 - Painter Ave & Mar Vista St
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	40	0	0.000	N-S(1):	0.381 *
	TH	2.00	720	3,200	0.238	N-S(2):	0.319
	LT	1.00	240	1,600	0.150 *	E-W(1):	0.231 *
Westbound	RT	1.00	390	1,600	0.169	E-W(2):	0.219
	TH	2.00	640	3,200	0.200		
	LT	1.00	90	1,600	0.056 *	V/C:	0.612
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.100
	TH	2.00	710	3,200	0.231 *	ITS:	0.000
	LT	1.00	130	1,600	0.081		
Eastbound	RT	1.00	140	1,600	0.047	ICU:	0.712
	TH	1.00	280	1,600	0.175 *		
	LT	1.00	30	1,600	0.019	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	50	0	0.000	N-S(1):	0.444 *
	TH	2.00	960	3,200	0.316	N-S(2):	0.385
	LT	1.00	300	1,600	0.188 *	E-W(1):	0.281 *
Westbound	RT	1.00	240	1,600	0.056	E-W(2):	0.131
	TH	2.00	320	3,200	0.100		
	LT	1.00	50	1,600	0.031 *	V/C:	0.725
Northbound	RT	0.00	80	0	0.000	Lost Time:	0.100
	TH	2.00	740	3,200	0.256 *	ITS:	0.000
	LT	1.00	110	1,600	0.069		
Eastbound	RT	1.00	230	1,600	0.109	ICU:	0.825
	TH	1.00	400	1,600	0.250 *		
	LT	1.00	50	1,600	0.031	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 7 - Painter Ave & Whittier Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	50	0	0.000	N-S(1):	0.279 *
	TH	2.00	590	3,200	0.200	N-S(2):	0.259
	LT	2.00	290	2,560	0.113 *	E-W(1):	0.290
Westbound	RT	0.00	260	0	0.000	E-W(2):	0.334 *
	TH	3.00	1,160	4,800	0.296 *		
	LT	1.00	180	1,600	0.113	V/C:	0.613
Northbound	RT	0.00	100	0	0.000	Lost Time:	0.100
	TH	2.00	430	3,200	0.166 *	ITS:	0.000
	LT	2.00	150	2,560	0.059		
Eastbound	RT	0.00	110	0	0.000	ICU:	0.713
	TH	3.00	740	4,800	0.177		
	LT	1.00	60	1,600	0.038 *	LOS:	C

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	0.00	60	0	0.000	N-S(1):	0.394 *
	TH	2.00	620	3,200	0.213	N-S(2):	0.311
	LT	2.00	480	2,560	0.188 *	E-W(1):	0.338 *
Westbound	RT	0.00	320	0	0.000	E-W(2):	0.304
	TH	3.00	870	4,800	0.248		
	LT	1.00	140	1,600	0.088 *	V/C:	0.732
Northbound	RT	0.00	100	0	0.000	Lost Time:	0.100
	TH	2.00	560	3,200	0.206 *	ITS:	0.000
	LT	2.00	250	2,560	0.098		
Eastbound	RT	0.00	130	0	0.000	ICU:	0.832
	TH	3.00	1,070	4,800	0.250 *		
	LT	1.00	90	1,600	0.056	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 8 - Laurel Ave & Lambert Rd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	180	1,600	0.088	N-S(1):	0.212 *
	TH	0.53	90	847	0.106 *	N-S(2):	0.212 *
	LT	0.47	80	753	0.106 *	E-W(1):	0.285
Westbound	RT	0.00	60	0	0.000	E-W(2):	0.528 *
	TH	2.00	1,470	3,200	0.478 *		
	LT	1.00	20	1,600	0.013	V/C:	0.740
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.53	90	847	0.106 *	ITS:	0.000
	LT	0.47	80	753	0.106 *		
Eastbound	RT	0.00	50	0	0.000	ICU:	0.840
	TH	2.00	820	3,200	0.272		
	LT	1.00	80	1,600	0.050 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.019	N-S(1):	0.294 *
	TH	0.55	120	873	0.138 *	N-S(2):	0.294 *
	LT	0.45	100	727	0.138 *	E-W(1):	0.426 *
Westbound	RT	0.00	90	0	0.000	E-W(2):	0.341
	TH	2.00	800	3,200	0.278		
	LT	1.00	20	1,600	0.013 *	V/C:	0.720
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.88	220	1,408	0.156 *	ITS:	0.000
	LT	0.12	30	192	0.156 *		
Eastbound	RT	0.00	60	0	0.000	ICU:	0.820
	TH	2.00	1,260	3,200	0.413 *		
	LT	1.00	100	1,600	0.063	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 9 - Colima Rd & Mar Vista St
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	Y
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	520	1,600	0.231	N-S(1):	0.306
	TH	2.00	1,450	3,200	0.453 *	N-S(2):	0.597 *
	LT	1.00	50	1,600	0.031	E-W(1):	0.294 *
Westbound	RT	1.00	70	1,600	0.028	E-W(2):	0.000
	TH	1.00	170	1,600	0.106 *		
	LT	1.00	50	1,600	0.031	V/C:	0.891
Northbound	RT	1.00	140	1,600	0.072	Lost Time:	0.100
	TH	2.00	880	3,200	0.275	ITS:	0.000
	LT	1.00	230	1,600	0.144 *		
Eastbound	RT	1.00	120	1,600	0.003	ICU:	0.991
	TH	0.88	210	1,400	0.150		
	LT	1.13	270	1,440	0.188 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	380	1,600	0.138	N-S(1):	0.454 *
	TH	2.00	1,080	3,200	0.338	N-S(2):	0.426
	LT	1.00	60	1,600	0.038 *	E-W(1):	0.249 *
Westbound	RT	1.00	100	1,600	0.044	E-W(2):	0.000
	TH	1.00	80	1,600	0.050 *		
	LT	1.00	30	1,600	0.019	V/C:	0.703
Northbound	RT	1.00	20	1,600	0.003	Lost Time:	0.100
	TH	2.00	1,330	3,200	0.416 *	ITS:	0.000
	LT	1.00	140	1,600	0.088		
Eastbound	RT	1.00	120	1,600	0.031	ICU:	0.803
	TH	0.20	50	314	0.159		
	LT	1.80	460	2,309	0.199 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 10 - Colima Rd & Whittier Blvd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :	NBR, SBR,		
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	560	1,600	0.205	N-S(1):	0.279
	TH	2.00	960	3,200	0.300 *	N-S(2):	0.390 *
	LT	2.00	260	2,560	0.102	E-W(1):	0.271
Westbound	RT	0.00	120	0	0.000	E-W(2):	0.403 *
	TH	3.00	1,120	4,800	0.258 *		
	LT	1.00	100	1,600	0.063	V/C:	0.793
Northbound	RT	1.00	100	1,600	0.000	Lost Time:	0.100
	TH	3.00	850	4,800	0.177	ITS:	0.000
	LT	2.00	230	2,560	0.090 *		
Eastbound	RT	0.00	130	0	0.000	ICU:	0.893
	TH	3.00	870	4,800	0.208		
	LT	2.00	370	2,560	0.145 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	250	1,600	0.000	N-S(1):	0.308
	TH	2.00	830	3,200	0.259 *	N-S(2):	0.341 *
	LT	2.00	340	2,560	0.133	E-W(1):	0.344
Westbound	RT	0.00	200	0	0.000	E-W(2):	0.454 *
	TH	3.00	930	4,800	0.235 *		
	LT	1.00	120	1,600	0.075	V/C:	0.795
Northbound	RT	1.00	100	1,600	0.000	Lost Time:	0.100
	TH	3.00	840	4,800	0.175	ITS:	0.000
	LT	2.00	210	2,560	0.082 *		
Eastbound	RT	0.00	170	0	0.000	ICU:	0.895
	TH	3.00	1,120	4,800	0.269		
	LT	2.00	560	2,560	0.219 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 11 - Colima Rd & Lambert Rd
Description: Future Plus Project

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	130	1,600	0.031	N-S(1):	0.328
	TH	2.00	870	3,200	0.272 *	N-S(2):	0.416 *
	LT	1.00	70	1,600	0.044	E-W(1):	0.350
Westbound	RT	0.00	70	0	0.000	E-W(2):	0.484 *
	TH	2.00	1,160	3,200	0.384 *		
	LT	1.00	50	1,600	0.031	V/C:	0.900
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	850	3,200	0.284	ITS:	0.000
	LT	1.00	230	1,600	0.144 *		
Eastbound	RT	0.00	180	0	0.000	ICU:	1.000
	TH	2.00	840	3,200	0.319		
	LT	1.00	160	1,600	0.100 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.006	N-S(1):	0.382 *
	TH	2.00	880	3,200	0.275	N-S(2):	0.375
	LT	1.00	140	1,600	0.088 *	E-W(1):	0.438 *
Westbound	RT	0.00	110	0	0.000	E-W(2):	0.434
	TH	2.00	880	3,200	0.309		
	LT	1.00	70	1,600	0.044 *	V/C:	0.820
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	880	3,200	0.294 *	ITS:	0.000
	LT	1.00	160	1,600	0.100		
Eastbound	RT	0.00	160	0	0.000	ICU:	0.920
	TH	2.00	1,100	3,200	0.394 *		
	LT	1.00	200	1,600	0.125	LOS:	E

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 1 - Norwalk Blvd & Beverley Blvd
Description: Future Plus Project With Operational Improvement

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	50	1,600	0.013	N-S(1):	0.339
	TH	2.00	420	3,200	0.131 *	N-S(2):	0.369 *
	LT	2.00	370	2,560	0.145	E-W(1):	0.240
Westbound	RT	0.00	490	0	0.000	E-W(2):	0.428 *
	TH	3.00	1,380	4,800	0.390 *		
	LT	1.00	60	1,600	0.038	V/C:	0.797
Northbound	RT	0.00	30	0	0.000	Lost Time:	0.100
	TH	2.00	590	3,200	0.194	ITS:	0.000
	LT	1.00	380	1,600	0.238 *		
Eastbound	RT	0.00	180	0	0.000	ICU:	0.897
	TH	3.00	790	4,800	0.202		
	LT	1.00	60	1,600	0.038 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	30	1,600	0.003	N-S(1):	0.352 *
	TH	2.00	590	3,200	0.184	N-S(2):	0.334
	LT	2.00	430	2,560	0.168 *	E-W(1):	0.338
Westbound	RT	0.00	390	0	0.000	E-W(2):	0.381 *
	TH	3.00	730	3,200	0.350 *		
	LT	1.00	80	1,600	0.050	V/C:	0.733
Northbound	RT	0.00	50	0	0.000	Lost Time:	0.100
	TH	2.00	540	3,200	0.184 *	ITS:	0.000
	LT	1.00	240	1,600	0.150		
Eastbound	RT	0.00	200	0	0.000	ICU:	0.833
	TH	3.00	1,180	4,800	0.288		
	LT	1.00	50	1,600	0.031 *	LOS:	D

* - Denotes critical movement

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	40	80	270	10	100	610	630	110	50	210	280	0
Future Volume (vph)	40	80	270	10	100	610	630	110	50	210	280	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		1.00		1.00	1.00	0.85			0.95	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4217		1490	2980	3040			2707	1213	
Flt Permitted	0.95		0.66		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2830		1490	2980	3040			2707	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	87	293	11	109	663	685	120	54	228	304	0
RTOR Reduction (vph)	0	0	2	0	0	0	49	0	0	0	0	0
Lane Group Flow (vph)	43	0	389	0	109	663	756	0	0	404	182	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	4.6		34.7		10.8	35.8	64.3			18.3	18.3	
Effective Green, g (s)	4.6		34.7		10.8	35.8	64.3			18.3	18.3	
Actuated g/C Ratio	0.04		0.27		0.08	0.28	0.49			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	52		804		123	820	1503			381	170	
v/s Ratio Prot	0.03		0.02		c0.07	c0.22	0.25			0.15	c0.15	
v/s Ratio Perm			0.11									
v/c Ratio	0.83		1.61dl		0.89	0.81	0.50			1.06	1.07	
Uniform Delay, d1	62.3		40.1		59.0	43.9	22.1			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	63.4		0.3		46.7	8.4	0.6			63.0	89.0	
Delay (s)	125.7		40.4		105.7	52.3	22.7			118.8	144.9	
Level of Service	F		D		F	D	C			F	F	
Approach Delay (s)			48.9			40.9				126.9		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	76.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	540	260	40	390	100
Future Volume (vph)	540	260	40	390	100
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.86	0.86		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.98		0.96	
Satd. Flow (prot)	2563	2651		2842	
Flt Permitted	0.95	0.98		0.96	
Satd. Flow (perm)	2563	2651		2842	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	283	43	424	109
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	429	441	0	576	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	23.1	23.1		23.3	
Effective Green, g (s)	23.1	23.1		23.3	
Actuated g/C Ratio	0.18	0.18		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	455	471		509	
v/s Ratio Prot	c0.17	0.17		c0.20	
v/s Ratio Perm					
v/c Ratio	0.94	0.94		1.13	
Uniform Delay, d1	52.8	52.7		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	28.9	26.9		81.4	
Delay (s)	81.7	79.7		134.7	
Level of Service	F	E		F	
Approach Delay (s)		80.7		134.7	
Approach LOS		F		F	

Intersection Summary

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	50	140	530	30	80	530	540	70	50	190	350	0
Future Volume (vph)	50	140	530	30	80	530	540	70	50	190	350	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.2		5.4		4.7	5.4	5.4			4.7	4.7	
Lane Util. Factor	1.00		0.91		1.00	0.95	0.76			0.91	0.91	
Frt	1.00		0.99		1.00	1.00	0.85			0.94	0.85	
Flt Protected	0.95		0.99		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (prot)	1490		4212		1490	2980	3040			2664	1213	
Flt Permitted	0.95		0.67		0.95	1.00	1.00			0.99	1.00	
Satd. Flow (perm)	1490		2870		1490	2980	3040			2664	1213	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	152	576	33	87	576	587	76	54	207	380	0
RTOR Reduction (vph)	0	0	3	0	0	0	53	0	0	0	0	0
Lane Group Flow (vph)	54	0	758	0	87	576	610	0	0	440	201	0
Turn Type	Prot	Prot	NA		Prot	NA	pt+ov		Split	NA	Prot	Perm
Protected Phases	1	1	6		5	2	2 4		7	7	7	
Permitted Phases												7
Actuated Green, G (s)	9.4		40.4		11.9	33.0	59.5			18.3	18.3	
Effective Green, g (s)	9.4		40.4		11.9	33.0	59.5			18.3	18.3	
Actuated g/C Ratio	0.07		0.31		0.09	0.25	0.46			0.14	0.14	
Clearance Time (s)	5.2		5.4		4.7	5.4				4.7	4.7	
Vehicle Extension (s)	2.5		2.0		1.5	2.0				3.0	3.0	
Lane Grp Cap (vph)	107		988		136	756	1391			375	170	
v/s Ratio Prot	0.04		0.06		c0.06	c0.19	0.20			0.17	c0.17	
v/s Ratio Perm			0.18									
v/c Ratio	0.50		0.77		0.64	0.76	0.44			1.17	1.18	
Uniform Delay, d1	58.1		40.5		57.0	44.9	23.9			55.9	55.9	
Progression Factor	1.00		1.00		1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	2.7		3.5		7.1	7.1	0.5			102.7	126.6	
Delay (s)	60.8		44.0		64.1	52.0	24.4			158.5	182.4	
Level of Service	E		D		E	D	C			F	F	
Approach Delay (s)			45.1			39.0				166.0		
Approach LOS			D			D				F		

Intersection Summary			
HCM 2000 Control Delay	92.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBT	SWL2	SWL	SWR
Lane Configurations					
Traffic Volume (vph)	640	270	80	310	80
Future Volume (vph)	640	270	80	310	80
Ideal Flow (vphpl)	1600	1600	1600	1600	1600
Total Lost time (s)	4.9	4.9		4.7	
Lane Util. Factor	0.86	0.86		0.97	
Frt	1.00	1.00		0.97	
Flt Protected	0.95	0.98		0.96	
Satd. Flow (prot)	2563	2643		2847	
Flt Permitted	0.95	0.98		0.96	
Satd. Flow (perm)	2563	2643		2847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	696	293	87	337	87
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	487	502	0	511	0
Turn Type	Split	NA	Prot	Prot	
Protected Phases	4	4	8	8	
Permitted Phases					
Actuated Green, G (s)	21.1	21.1		23.3	
Effective Green, g (s)	21.1	21.1		23.3	
Actuated g/C Ratio	0.16	0.16		0.18	
Clearance Time (s)	4.9	4.9		4.7	
Vehicle Extension (s)	5.0	5.0		3.0	
Lane Grp Cap (vph)	415	428		510	
v/s Ratio Prot	c0.19	0.19		c0.18	
v/s Ratio Perm					
v/c Ratio	1.17	1.17		1.00	
Uniform Delay, d1	54.5	54.5		53.4	
Progression Factor	1.00	1.00		1.00	
Incremental Delay, d2	100.8	100.0		40.3	
Delay (s)	155.2	154.5		93.7	
Level of Service	F	F		F	
Approach Delay (s)		154.8		93.7	
Approach LOS		F		F	

Intersection Summary

Project Title: Whittier General Plan
Intersection: 8 - Laurel Ave & Lambert Rd
Description: Future Plus Project With Operational Improvement

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	180	1,600	0.088	N-S(1):	0.212 *
	TH	0.53	90	847	0.106 *	N-S(2):	0.212 *
	LT	0.47	80	753	0.106 *	E-W(1):	0.279
Westbound	RT	1.00	60	1,600	0.000	E-W(2):	0.500 *
	TH	2.00	1,440	3,200	0.450 *		
	LT	1.00	20	1,600	0.013	V/C:	0.712
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.53	90	847	0.106 *	ITS:	0.000
	LT	0.47	80	753	0.106 *		
Eastbound	RT	0.00	50	0	0.000	ICU:	0.812
	TH	2.00	800	3,200	0.266		
	LT	1.00	80	1,600	0.050 *	LOS:	D

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	80	1,600	0.019	N-S(1):	0.294 *
	TH	0.55	120	873	0.138 *	N-S(2):	0.294 *
	LT	0.45	100	727	0.138 *	E-W(1):	0.416 *
Westbound	RT	1.00	90	1,600	0.000	E-W(2):	0.307
	TH	2.00	780	3,200	0.244		
	LT	1.00	20	1,600	0.013 *	V/C:	0.710
Northbound	RT	1.00	30	1,600	0.013	Lost Time:	0.100
	TH	0.88	220	1,408	0.156 *	ITS:	0.000
	LT	0.12	30	192	0.156 *		
Eastbound	RT	0.00	60	0	0.000	ICU:	0.810
	TH	2.00	1,230	3,200	0.403 *		
	LT	1.00	100	1,600	0.063	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 9 - Colima Rd & Mar Vista St
Description: Future Plus Project With Operational Improvement

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	510	1,600	0.266	N-S(1):	0.239
	TH	2.00	1,420	3,200	0.444 *	N-S(2):	0.588 *
	LT	1.00	50	1,600	0.031	E-W(1):	0.226
Westbound	RT	0.29	70	467	0.134	E-W(2):	0.255 *
	TH	0.71	170	1,133	0.150 *		
	LT	2.00	50	2,560	0.020	V/C:	0.843
Northbound	RT	0.00	140	0	0.000	Lost Time:	0.100
	TH	3.00	860	4,800	0.208	ITS:	0.000
	LT	1.00	230	1,600	0.144 *		
Eastbound	RT	0.36	120	582	0.134	ICU:	0.943
	TH	0.64	210	1,018	0.206		
	LT	2.00	270	2,560	0.105 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	380	1,600	0.150	N-S(1):	0.313
	TH	2.00	1,060	3,200	0.331 *	N-S(2):	0.419 *
	LT	1.00	60	1,600	0.038	E-W(1):	0.118
Westbound	RT	0.56	100	889	0.094	E-W(2):	0.289 *
	TH	0.44	80	711	0.113 *		
	LT	2.00	30	2,560	0.012	V/C:	0.708
Northbound	RT	0.00	20	0	0.000	Lost Time:	0.100
	TH	3.00	1,300	4,800	0.275	ITS:	0.000
	LT	1.00	140	1,600	0.088 *		
Eastbound	RT	0.71	120	1,129	0.063	ICU:	0.808
	TH	0.29	50	471	0.106		
	LT	2.00	450	2,560	0.176 *	LOS:	D

* - Denotes critical movement

Project Title: Whittier General Plan
Intersection: 11 - Colima Rd & Lambert Rd
Description: Future Plus Project With Operational Improvement

Thru Lane:	1600 vph	N-S Split Phase :	N
Left Lane:	1600 vph	E-W Split Phase :	N
Double Lt Penalty:	20 %	Lost Time (% of cycle) :	10
ITS:	0 %	V/C Round Off (decs.) :	3
OLA Movements :			
FF Movements:			

Date/Time: AM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	130	1,600	0.031	N-S(1):	0.322
	TH	2.00	850	3,200	0.266 *	N-S(2):	0.410 *
	LT	1.00	70	1,600	0.044	E-W(1):	0.287
Westbound	RT	1.00	70	1,600	0.022	E-W(2):	0.456 *
	TH	2.00	1,140	3,200	0.356 *		
	LT	1.00	50	1,600	0.031	V/C:	0.866
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	830	3,200	0.278	ITS:	0.000
	LT	1.00	230	1,600	0.144 *		
Eastbound	RT	1.00	180	1,600	0.041	ICU:	0.966
	TH	2.00	820	3,200	0.256		
	LT	1.00	160	1,600	0.100 *	LOS:	E

Date/Time: PM PEAK HOUR

APPROACH	MVMT	LANES	VOLUME	CAPACITY	V/C	ICU ANALYSIS	
Southbound	RT	1.00	110	1,600	0.006	N-S(1):	0.376 *
	TH	2.00	860	3,200	0.269	N-S(2):	0.369
	LT	1.00	140	1,600	0.088 *	E-W(1):	0.382
Westbound	RT	1.00	110	1,600	0.025	E-W(2):	0.394 *
	TH	2.00	860	3,200	0.269 *		
	LT	1.00	70	1,600	0.044	V/C:	0.770
Northbound	RT	0.00	60	0	0.000	Lost Time:	0.100
	TH	2.00	860	3,200	0.288 *	ITS:	0.000
	LT	1.00	160	1,600	0.100		
Eastbound	RT	1.00	160	1,600	0.050	ICU:	0.870
	TH	2.00	1,080	3,200	0.338		
	LT	1.00	200	1,600	0.125 *	LOS:	D

* - Denotes critical movement