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ATTACHMENT H

MEMORANDUM -

DATE: April 10, 2015

TO:
Elois Thornton
Department of Planning and Building
City of Oakland (City)

FROM:
Lynette Dias, AICP
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RE: CEQA Compliance for MacArthur Station[1] Parcel A and Parcel C-1 FDP

A. OVERVIEW/SUMMARY

1. Current Proposal

In accordance with the Standard Conditions of Approval for the MacArthur Station[2] (MS) Project PUD/PDP and the terms of the Development Agreement, the City is in receipt of an application for a Final Development Plan (FDP) for Parcel A and Parcel C-1. For Parcel A/Stage 3, the FDP proposes 287 apartment residential units and 22,287 square feet of ground-floor commercial. An alternate development program for Parcel A, which would accommodate a grocery store is also proposed. The alternate plan includes 292 residential units, 33,983 square feet of ground-floor commercial space including approximately 22,085 square feet for a grocery store. The FDP for Parcel C-1 proposes 96 apartment residential units, 1,202 square feet of ground floor retail see Project Included Data Tables at the end of this memorandum.

The key purpose of this review is to determine whether the environmental effects of the FDP are adequately analyzed in the 2008 certified MacArthur Transit Village Project Environmental Impact Report (2008 EIR). As described below, development of Parcel A and Parcel C-1 are considered in the 2008 EIR and as proposed would not result in new significant impacts or a substantial increase or severity of a previously identified significant impact from those identified

[1] The Project was previously called the MacArthur Transit Village Project.

[2] See note 1 above.

in the 2008 EIR. As a result, the City does not need to prepare a Subsequent or Supplemental EIR to satisfy the environmental review requirements of CEQA. The 2008 EIR remains adequate for the FDP proposed for Parcel A and Parcel C-1.

The discussion below provides: (1) an overview of MS Project approvals and environmental review; (2) a summary of the relationship of the current proposed Parcel A and Parcel C-1 FDP with the approved MS Project PUD/PDP and the project analyzed in the 2008 EIR; and (3) findings that Parcel A and Parcel C-1 FDP fall within the scope of the 2008 EIR and do not require preparation of subsequent or supplemental environmental review pursuant to CEQA Guidelines Section 15162 and Section 15163.

2. Prior Project Approvals and Environmental Review

The City has granted several approvals for the MS Project. The PUD/PDP approved in 2008 authorizes the development of up to 675 residential units, 49,000 square feet of commercial, 5,000 square feet of community space, a parking structure for BART patrons, and various infrastructure improvements. The PUD/PDP also establishes the approved land uses, density, bulk, massing and design guidelines for the site. Prior to approving the PUD/PDP, the City certified an EIR for the MS Project (SCH No. 2006022075) on July 1, 2008. The City also subsequently approved addenda to the EIR in 2010 for Phases/Stages 1 and 2. Each addendum found determined that no new information or changes in the project or project circumstances required subsequent or supplemental environmental review.

Each of the previous approvals for the MS Project is detailed in the PUD/PDP Substantial Conformance Memo dated March 24, 2015.

3. Summary

Urban Planning Partners reviewed the requested subsequent approvals and found that there: (1) are no substantial project changes, (2) are no substantial changes in the project circumstances, and (3) is no new information of substantial importance, which could not have been known with the exercise of reasonable diligence when the 2008 EIR was certified, that would require major revisions of the certified 2008 EIR because of a new significant effect or an increase in the severity of a previously identified significant effect. Under CEQA section 21166 and CEQA Guidelines sections 15162 and 15163, no further environmental review is required.

A summary of the relationship of these approvals relative to Parcel A and Parcel C-1 FDP to prior MS Project approvals and the certified 2008 EIR is provided below.

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B. RELATIONSHIP OF PROPOSED FDP TO PUD/PDP AND 2008 EIR (PROJECT CHANGES)

1. Relationship to Modified PUD/PDP

Urban Planning Partners and City staff evaluated the proposed FDP for Parcel A and Parcel C-1 and found that in all fundamental respects the FDP is in substantial compliance with the modified PUD/PDP and is consistent with the terms of the Development Agreement (see memo PUD/PDP Conformance Memo, dated March 25, 2015). The Memorandum and the April 15, 2015 Planning Commission Staff Report find that the MacArthur BART Transit Village Development Agreement, the modified PUD/PDP, and the COAs and associated exhibits do not preclude any of the refinements proposed as part of the Parcel A/Stage 3 and Parcel C-1/Stage 4 FDP. Based on the analysis included in the Memorandum and Staff Report, the Parcel A/Stage 3 and Parcel C-1/Stage 4 FDP is in substantial conformance with the approved PUD/PDP. Additionally, the FDP complies with the COAs and is consistent with the terms of the Development Agreement.

2. Relationship to 2008 EIR

The Parcel A and Parcel C-1 FDP is within the scope of the MS Project evaluated in the 2008 EIR and would not trigger any new significant impacts or a substantial increase or severity of a previously identified significant impact from those identified in the 2008 EIR. The MS Project analyzed in the certified 2008 EIR consisted of a new BART parking garage; improvements to the BART Plaza; up to 675 residential units (both market-rate and affordable); up to 44,000 square feet of commercial space (including live/work units) (note that 49,000 square feet of commercial was approved); 5,000 square feet of community space or childcare space; approximately 1,000 structured parking spaces, including the 300 space BART parking garage (which was increased to 480 spaces pursuant to the Conditions of Approval); approximately 30-45 on-street parking spaces, pedestrian and bicycle friendly internal streets and walkways; improvements to the Frontage Road; a new internal street, Village Drive (now called 39th Street), located between Frontage Road and Telegraph Avenue; two new traffic signals at the intersections of 39th Street/Telegraph Avenue and West MacArthur Boulevard/Frontage Road; a rezoning of the MS Project site to S-15, and a text amendment to the S-15 zone. Multiple FDPs were contemplated in the 2008 EIR (See Draft EIR, pages 72-74) to implement the Preliminary PUD/PDP.

a) Parcel A/Stage 3

The Parcel A/Stage 3 portion of the FDP proposes 287 apartment residential units and 22,287 square feet of commercial ground-floor retail. An alternate development program for Parcel A, which would accommodate a grocery store is also proposed. The alternate plan includes 292 residential units, 33,983 square feet of ground-floor commercial space including approximately 22,287 square feet for a grocery store. The PUD/PDP allows and the EIR evaluated up to 240 residential units and 26,000 square feet of commercial space on Parcel A. The EIR did not specify to whether the units would be for sale or rental units and such a distinction would not affect the EIR findings. Additionally, the refinement of the development buildout approved as part of the modified PUD/PDP and the Stage1 and 2 FDPs and the further refinement that is proposed as part of the FDP for Parcel, A and C-1,

would not result in a net increase in the overall development approved (675 units and 49,000 square feet of commercial) in the 2008 EIR.

The two key project revisions that are considered in this analysis are whether (1) the increase in residential units from 240 to 287 or 292—a net increase of 47 or 52 units for Parcel A; and (2) the potential increase in commercial space on Parcel A by up to 7,983 square feet if the alternate plan with the grocery store is developed would result in any new or substantially greater impacts. The analysis considers that the proposed refinements to Parcel A would not result in any net changes to the approved buildout for the modified PUD/PDP of up to 675 units and 49,000 square feet of commercial.

b) Parcel C-1/Stage 4

The Parcel C-1 portion of the FDP proposes 96 apartment residential units and 1,202 square feet of ground floor retail. A total of 51 or 46 units and 17,311 or 5,615 square feet of commercial would remain for Parcel C-2 which if developed would result in a total on Parcel C of up to 148 or 142 (with Stage 3 Alternate Plan) residential units and 18,513 or 6,817 (with Stage 3 Alternate Plan) square feet of commercial. The proposed FDP is limited to C-1 and does not include C-2. The 2008 PUD/PDP allows, and the EIR evaluated up to 195 (47 or 53 units more than proposed) for-sale residential units and 12,500 (6,013 square feet more or 5,683 square feet less than proposed) square feet of commercial space on the entirety of Parcel C. The EIR did not specify to whether the units would be for sale or rental units and such a distinction would not substantially affect the EIR findings.

The refinements in the approved FDP for the Parking Structure/Stage 1 and the proposed refinements for Parcels A and C-1 being considered as part of the current FDP application, would not result in net changes of commercial or residential units for the entire MS Project over what was analyzed in the EIR. The COAs and the EIR support development of up to 675 units and 49,000 square feet of commercial. **The modified distribution of these uses between blocks do not constitute a substantial changes to the project evaluated in the EIR that would require major revisions of the certified 2008 EIR, because of a new significant effect or a substantial increase in the severity of a previously identified significant effect.**

C. CHANGED CIRCUMSTANCES AND NEW INFORMATION

In the six years since certification of the EIR, there have been some intervening events with the potential to affect the 2008 EIR findings. The most notable event being that mid-2014 the City Council approved the Broadway Valdez District Specific Plan (BVDSP), which is approximately one mile from the MS Project site, and certified the associated EIR. Additionally a few new small infill sites in the MS Project vicinity have been developed with projects that were already entitled in 2008 and there have been some minor right of way and bike lane improvements.

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Finally, since the 2008 EIR was certified, there have been updates to local, regional and State policies that may be applicable to the current FDP proposal.

The authors of this memorandum utilized the findings and analysis in the BVDSP EIR, which considers current conditions in the MS Project area and surrounding areas to assist in determining whether the changes referenced above or other new information, including changes to City, State, and regional policies and regulations, would constitute (1) a change in circumstances under which the MS Project would be taken or (2) new information of substantial importance that would require major revisions of the certified 2008 EIR, because of a new significant impact or a substantial increase in the severity of a previously identified significant impact under CEQA section 21166 and CEQA Guidelines sections 15162 and 15163.

Each environmental topic assessed under CEQA and in the 2008 EIR was considered, including Land Use and Planning Policy; Transportation and Circulation; Air Quality and Greenhouse Gases; Noise and Vibration; Hydrology and Water Quality; Public Services and Utilities; Cultural and Paleontological Resources; and Aesthetic Resources. There is no new information or changes in circumstances that would result in new significant impacts or a substantial increase or severity of a previously identified significant impact from those identified in the 2008 EIR.

The impacts associated with the Stage 2 and Stage 4 FDP are consistent with the findings of the 2008 EIR for the MS Project and no new impacts or more severe impacts would result due to new information or changed circumstances. No new mitigation measures would be required.

Each impact identified in the 2008 EIR, except two cumulative impacts, would be mitigated to a less-than-significant level with implementation of the 2008 EIR's Mitigation Measures and the City's Standard Conditions of Approval, which are both included in the MTV Mitigation Monitoring Program. The Stage 2 and Stage 4 FDP will be required to comply with the Mitigation and Monitoring Program as a Condition of Approval. The two significant and unavoidable impacts from the 2008 EIR are associated with the MS Project's contribution to cumulative impacts at two intersections (Telegraph Avenue/51st Street intersection and Broadway/MacArthur Boulevard intersection). The MS Project (including the Stage 3 and 4 FDP) would continue to contribute to these two cumulative significant and unavoidable impacts consistent with the findings of the 2008 EIR.

A summary of the assessment prepared for Transportation and Circulation and the Air Quality and Greenhouse Gas findings is provided below as these are the two topics most likely affected by changed circumstances and/or new information.

1. Transportation, Circulation, and Parking

A supplemental traffic analysis was prepared by Fehr & Peers that considered changes in background conditions that have occurred since the 2008 EIR was prepared. New information

was also considered including the City's current Traffic Impact Analysis Guidelines that include updated methods for trip generation and thresholds of significance. The analysis also looked at a variation in the type of commercial uses, including a grocery store. The updated analysis is provided as Attachment A.

The analysis utilizes the traffic analysis from the BVDSP EIR and concluded that the MS project as refined by the Parcel A and Parcel C-1 FDP would not result in any new significant transportation impacts or a substantial increase or severity of a previously identified significant transportation impact from those identified in the 2008 EIR, nor are new mitigation measures or alternatives warranted to address potential transportation impacts.

2. Air Quality and Greenhouse Gas Emissions

As described in the 2008 EIR, no significant construction-related air quality impacts would occur with implementation of the City Standard Conditions of Approval. Additionally no significant operation-period air quality impacts were identified in the 2008 EIR. No changes in the MS Project or the Parcel A or C-1 FDP or existing conditions warrant any new analysis.

Since 2008, the BAAQMD has revised its CEQA thresholds with respect to air quality and global climate change. The new thresholds, and the information used to help develop these thresholds, however, do not represent "new information" as specifically defined under CEQA. As a result, an analysis of the MS project according to the recommended May 2011 Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines and Thresholds is not required.

D. CONCLUSION

As discussed above, the development associated with the Parcel A and Parcel C-1 FDPs was adequately considered in the 2008 EIR. The refinements incorporated into the FDP applications do not represent changes that would result in new or more severe impacts (or require new or significantly altered mitigation measures) beyond those already identified in the 2008 EIR. The 2008 EIR is adequate for the Parcel A and Parcel C-1 FDP and no subsequent or supplemental environmental review is warranted.

The following discussion summarizes the reasons why no supplemental or subsequent CEQA review is necessary pursuant to *CEQA Guidelines* Section 15162 and the City can rely on the previously certified EIR.

Substantial Changes to the Project. The refinements incorporated into the Parcel A and Parcel C-1 FDP, including an increase in the amount of commercial retail and office space would **not** result in new significant impacts or a substantial increase or severity of a previously identified significant impact from those identified in the 2008 EIR. Therefore, the proposed changes

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included in the Parcel A and Parcel C-1 FDP are considered *minor* refinements, not *substantial* changes.

Project Circumstances. Since certification of the 2008 EIR, conditions in and around the MS Project area have not substantially changed and thus implementation of the Parcel A and Parcel C-1 FDP would **not** result in new significant environmental effects or a substantial increase in the severity of environmental effects already identified in the 2008 EIR. No substantial changes in noise levels, air quality, traffic, or other conditions have occurred within and around the MS Project site since certification of the EIR.

New Information. No new information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the 2008 EIR was certified, has been identified which is expected to result in: 1) new significant environmental effects or a substantial increase in the severity of environmental effects already identified in the EIR; or 2) mitigation measures or alternatives which were previously determined to be infeasible would in fact be feasible, or which are considerably different from those recommended in the 2008 EIR, and which would substantially reduce significant effects of the project, but the project applicant declines to adopt them.

As described previously, changes to the Parcel A and Parcel C-1 FDP would not result in significant environmental effects (including effects that would be substantially more severe than impacts identified in the 2008 EIR). Existing regulations (including City General Plan policies and ordinances in the Municipal Code) and mitigation measures included in the 2008 EIR would be adequate to reduce the impacts resulting from the Parcel A and Parcel C-1 FDP to less-than-significant levels.

Consequently, there are no substantial project changes, no substantial changes in the project circumstances, and no new information of substantial importance that would require major revisions of the certified 2008 EIR, because of a new significant effect or an increase in the severity of a previously identified significant effect. Under CEQA section 21166 and CEQA Guidelines sections 15162 and 15163, no further environmental review is required. Thus, in considering approval of the Parcel A and Parcel C-1 FDP, the City should rely on the previously certified 2008 EIR.

Attachment
Transportation Memorandum

FEHR PEERS

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MEMORANDUM

Date: April 9, 2015

To: Lynette Dias, Urban Planning Partners

From: Sam Tabibnia

Subject: MacArthur Transit Village, 2014 Modified Project – Transportation Impact Analysis

OK14-0015

This memorandum summarizes the results of the transportation impact analysis that Fehr & Peers completed for the MacArthur Transit Village Project as modified in 2014. The impacts of the project were originally analyzed in an Environmental Impact Report (EIR) certified in 2008. The analysis in this memorandum accounts for changes in the project, in background conditions, and in the thresholds of significance since the certification of the EIR.

The MacArthur Transit Village Project as modified as a result of the Final Development Plans (FDPs) for Parcel A and Parcel C-1 would not result in any additional significant or more severe impacts than those identified in the 2008 EIR.

Our analysis assumptions and summary are detailed below.

INTRODUCTION

Figure 1 shows the location of the Project within the local and regional street system. This analysis evaluates the impacts of the project on intersection operations during the weekday morning and evening peak hours.

- ***Existing*** – Represents existing conditions
- ***Existing Plus Project*** – Existing conditions plus traffic generated by the proposed project
- ***2035 No Project*** – 2035 conditions as estimated by the *Broadway Valdez District Specific Plan (BVDSP) Draft EIR* (September 2013), without the traffic generated by the proposed project.

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- ***2035 Plus Project*** – 2035 conditions as estimated by the *BVDSP Draft EIR* plus the traffic generated by the proposed project.

Fehr & Peers assessed intersection operations using Level of Service (LOS)[1] at the study intersections using the 2000 *Highway Capacity Manual* (HCM) methodologies.

PROJECT TRANSPORTATION CHARACTERISTICS

The project, as proposed in 2014, would consist of up to 675 multi-family dwelling units, 23,500 square feet of retail, 5,000 square feet of community space, and 25,500 square feet of supermarket.[2] The project also includes a 450 space garage that replaced the 618-space surface parking lot that served the BART Station.

Vehicular access to and from the project would be same as the previously analyzed project. Access to and from the MacArthur Transit Village would be through signalized intersections on 40th Street at Frontage Road adjacent to the BART Station, and on Telegraph Avenue at Village Drive south of 40th Street. Access to BART parking would be through a signalized intersection on MacArthur Boulevard.

Trip Generation

Trip generation refers to the process of estimating the amount of vehicular traffic a project would add to the local roadway network. **Table 1** summarizes the trip generation for the proposed Project. The estimates are based on rates and equations published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual* (9th Edition) with the following adjustments:

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1 The operations of roadway facilities are described with the term "level of service" (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (i.e., best operating conditions) to LOS F (worst operating conditions). LOS E typically corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F.

2 The current project represents less development than this, but the 675 units represent the worst-case scenario for the number of residential units allowed by the PDP Conditions of Approval and covered in the EIR.

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TABLE 1
MACARTHUR TRANSIT VILLAGE
TRIP GENERATION SUMMARY

Land Use	Units[1]	ITE Code	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
Residential	675 DU	230 [2]	3,387	40	198	238	193	95	288
Retail	23.5 KSF	820 [3]	1,003	14	9	23	42	45	87
Supermarket	25.5 KSF	850[4]	3,096	54	33	87	123	119	242
Community Center	5.0 KSF	565 [5]	370	32	29	61	29	33	62
Subtotal			7,856	140	269	409	387	292	679
Non-Auto Reduction (-43%)[6]			-3,378	-60	-116	-176	-166	-126	-292
Pass-by Reduction (-34%) [7]			-397	0	0	0	-32	-32	-64
Net New Project Trips			**4,478**	**80**	**153**	**233**	**189**	**134**	**323**
Approved Project[8]			4,886	123	201	324	200	158	358
Net Difference			-408	-43	-48	-91	-11	-24	-35

1. DU = Dwelling Units, KSF = 1,000 square feet.
2. ITE Trip Generation (9th Edition) land use category 230 (Residential Condominium/Townhouse):
   Daily: Ln(T) = 0.87*Ln(X) + 2.46
   AM Peak Hour: Ln(T) = 0.80*Ln(X) + 0.26 (17% in, 83% out)
   PM Peak Hour: Ln(T) = 0.82*Ln(X) + 0.32 (67% in, 33% out)
3. ITE Trip Generation (9th Edition) land use category 820 (Shopping Center):
   Daily: (T) = 42.70*(X)
   AM Peak Hour: (T) = 0.96*(X) (42% in, 58% out)
   PM Peak Hour: (T) = 3.71*(X) (36% in, 64% out)
4. ITE Trip Generation (9th Edition) land use category 850 (Supermarket):
   Daily: T = 66.85*(X) + 1391.56
   AM Peak Hour: T = 3.40*(X) (62% in, 38% out)
   PM Peak Hour: T = 9.48*(X) (51% in, 49% out)
5. ITE Trip Generation (9th Edition) land use category 565 (Day Care Center):
   Daily: (T) = 74.06*(X)
   AM Peak Hour: (T) = 12.18*(X) (53% in, 47% out)
   PM Peak Hour: (T) = 12.34*(X) (47% in, 53% out)
6. City of Oakland Transportation Impact Study Guidelines based on BATS 2000 data for developments in an urban environment within 0.5 miles of a BART station.
7. Based on ITE *Trip Generation Handbook (3rd Edition*), the weekday PM peak hour average pass-by rates for land use categories 820 and 850, are 34% and 36%, respectively. A 34% pass-by rate is applied to the retail and supermarket uses to present a more conservative analysis. Pass by rates are not applied to the AM peak hour. Daily pass-by is estimated to be half of the PM peak hour. This reduction was applied to trips after the non-automobile reduction.
8. *MacArthur Transit Village Project Draft EIR, January 2008*.

Source: Fehr & Peers, 2015.

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- ***Non-Automobile Travel Modes*** - The ITE data is based on data collected at mostly single-use suburban sites where the automobile is often the only travel mode. However, the Project site is in a mixed-use urban environment with robust transit available and where many trips are walk, bike, or transit trips. Since the proposed Project is adjacent to the MacArthur BART Station, this analysis reduces the ITE based trip generation by 43 percent to account for the non-automobile trips. This reduction is consistent with City of Oakland *Transportation Impact Study Guidelines* and is based on the Bay Area Travel Survey (BATS) 2000 which shows that the non-automobile mode share within one-half mile of a BART Station in Alameda County is about 43 percent. A 2011 research study shows reducing ITE based trip generation using BATS data results in a more accurate estimation of trip generation for mixed use developments than just using ITE based trip generation.[3]

  Pass-by Trips - Pass-by trips are defined as trips attracted to a site from adjacent roadways as an intermediate stop on the way to a final destination. Pass-by trips alter travel patterns in the immediate study area but do not add new vehicle trips to the roadway network, and should therefore be excluded from trip generation estimates. According to ITE's *Trip Generation Handbook* (3rd Edition), the average weekday PM peak hour pass-by reduction is 34 percent for retail and 36 percent for supermarket uses. To be conservative, this analysis reduces the retail and supermarket trips by 34 percent for the PM.[4] This corresponds to about 64 trips, which is reasonable considering that it corresponds to about two percent of the current PM peak hour traffic volumes on Telegraph Avenue and 40th Street combined.

In addition, the project trip generation presented in Table 1 does not account for the following in order to present a "worst case" analysis:

- ***Existing Parking Lot Trips*** - The project would reduce the parking supply available to BART riders by about 168 spaces. This analysis conservatively assumes that the 450-space BART parking garage would continue to generate the same amount of peak hour traffic as the 618-space parking lot that occupied the site prior to start of construction.

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[3] *Evaluation of the Operation and Accuracy of Five Available Smart Growth Trip Generation Methodologies.* Institute of Transportation Studies, UC Davis, 2011.

[4] Since ITE does not provide pass-by reductions for AM peak hour, this analysis conservatively assumes no pass-by reductions for AM peak hour.

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As summarized in Table 1, the project would generate approximately 4,480 daily, 233 AM peak hour, and 323 PM peak hour trips. Table 1 also compares the project trip generation estimate with the project trip generation estimate in the 2008 certified EIR. The 2014 project would generate about 400 fewer daily trips, 91 fewer AM peak hour trips, and 35 fewer PM peak hour trips than estimated in the 2008 EIR. Note that the traffic impact analysis presented in the subsequent sections is conservative because it is based on a previous project description that generated more traffic than presented in Table 1.[5]

Trip Distribution, Trip Assignment

The trip distribution and assignment process estimates how the vehicle trips generated by a project site would distribute across the roadway network. **Figures 2 and 3** show the trip distribution for the residential and non-residential components of the project, respectively. The trip distribution was developed for the 2008 EIR based on existing travel patterns, locations of complementary land uses and results of the Alameda County Transportation Commission's (ACTC) Travel Demand Model.

Trips generated by the proposed project, as shown in Table 1, were assigned to the roadway network according to the trip distribution shown on Figures 2 and 3. **Figure 4** shows the resulting trip assignment by roadway segment for the weekday PM peak hour because the weekday peak hour has the highest project trip generation. Figure 4 also shows the study intersections analyzed in the 2008 EIR.

Study Intersections

The 2008 EIR analyzed the impacts of the proposed project at 25 study intersections in the vicinity of the project. The 2008 EIR identified significant impacts and improvements to mitigate those impacts to less-than-significant where feasible under cumulative conditions at the following locations:

- Under the Cumulative Year 2015 Baseline Plus Project conditions:

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[5] The traffic impact analysis is based on an earlier iteration of FDP project that included 24,500 square feet of office, 26,900 square feet of retail, and 11,200 square feet of supermarket. In comparison, the project evaluated in the traffic impact analysis included in the memo generated nine additional AM peak hour and 54 additional PM peak hour trips. As a result this analysis represents a worst-case analysis given it would generate more trips than the current FDP proposal.

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1. Telegraph Avenue/51st Street (intersection #3) – Mitigation consisting of optimizing signal timings would mitigate the impact to less-than-significant.
2. Market Street/MacArthur Boulevard (#16) – Mitigation consisting of changing the cycle length and optimizing signal timings would mitigate the impact to less-than-significant.

- Under Cumulative 2030 Baseline Plus Project conditions:

3. Telegraph Avenue/52nd Street/Claremont Avenue (#2) – Mitigation consisting of prohibiting northbound left-turns during peak commute times, changing the cycle length and optimizing signal timings, would mitigate the impact to less-than-significant.
4. Telegraph Avenue/51st Street (#3) – Mitigation consisting of changing the cycle length and optimizing signal timings, would not mitigate the impact. The impact is significant and unavoidable.
5. West Street/40th Street (#8) – Mitigation consisting of optimizing signal timings would mitigate the impact to less-than-significant.
6. Telegraph Avenue/40th Street (#13) – Mitigation consisting of providing protected/ permitted left-turn phasing on eastbound and westbound approaches, changing the cycle length, and optimizing signal timings, would mitigate the impact to less-than-significant.
7. Market Street/MacArthur Boulevard (#16) – Mitigation consisting of striping a left-turn lane on the northbound approach, changing the cycle length, and optimizing signal timings, would mitigate the impact to less-than-significant.
8. Telegraph Avenue/MacArthur Boulevard (#20) – Mitigation consisting of providing protected/permitted left-turn phasing on northbound and southbound approaches, changing the cycle length, and optimizing signal timings, would mitigate the impact to less-than-significant.
9. Broadway/MacArthur Boulevard (#22) – No improvements identified at this intersection. Impact is significant and unavoidable.

The *Broadway Valdez District Specific Plan (BVDSP) Draft EIR* (September 2013) provides the latest published traffic operations analysis at intersections in the vicinity of the MacArthur Transit Village. The BVDSP Draft EIR accounts for the approved MacArthur Transit Village project in the future forecasts. **Table 2** compares total intersection volumes under Existing and Cumulative Plus Project conditions at intersections that were analyzed in both the 2008 Project EIR and BVDSP EIR. In general, a 10 percent fluctuation in traffic volumes is within the typical fluctuation expected in day-to-day traffic volumes. Considering that the more recent traffic volume data shows a decrease or a less than 10 percent increase in volumes at all but one of the intersections listed in Table 2, it is estimated that traffic volumes in the project vicinity have decreased or stayed the same since the completed on the 2008 EIR.

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TABLE 2
INTERSECTION VOLUME COMPARISON

Intersection	Peak Hour	Existing Conditions			Cumulative Plus Project		
		MTV [1]	BVSP [2]	Percent Difference	MTV [3]	BVSP [4]	Percent Difference
Telegraph Avenue/ 52nd Street/Claremont Avenue	AM	2,622	N/A	N/A	4,507	N/A	N/A
	PM	2,907	N/A	N/A	3,662	N/A	N/A
Telegraph Avenue/ 51st Street	AM	3,607	2,817	-22%	5,138	3,896	-24%
	PM	3,856	3,085	-20%	5,064	4,440	-12%
Telegraph Avenue/ 40th Street	AM	2,198	1,766	-20%	4,201	3,540	-16%
	PM	3,360	3,549	6%	5,130	5,880	15%
Market Street/ MacArthur Boulevard	AM	1,239	1,326	7%	3,591	2,650	-26%
	PM	2,165	1,684	-22%	4,100	3,470	-15%
Telegraph Avenue/ MacArthur Boulevard	AM	2,087	1,751	-16%	5,185	3,960	-24%
	PM	3,021	2,613	-14%	5,434	5,550	2%
Broadway/ MacArthur Boulevard	AM	2,525	N/A	N/A	6,054	N/A	N/A
	PM	3,285	3,082	-6%	5,845	5,680	-3%
Telegraph Avenue/ 27th Street	AM	2,011	1,930	-4%	3,822	3,370	-12%
	PM	2,561	2,872	12%	3,958	5,080	28%

[1] Based on existing intersection volumes published in *MacArthur Transit Village Project Draft EIR (January 2008)*.
[2] Based on existing intersection volumes published in *Broadway Valdez District Specific Plan Draft EIR* (September 2013).
[3] Based on Cumulative Plus Project (2030) intersection volumes published in *MacArthur Transit Village Project Draft EIR (January 2008)*.
[4] Based on Cumulative Plus Project (2035) intersection volumes published in *Broadway Valdez District Specific Plan Draft EIR* (September 2013).

Source: Fehr & Peers, 2014.

Table 3 shows intersection operations at major intersections in the vicinity of the MacArthur Transit Village project under Existing and 2035 Plus Project conditions as documented in the BVDSP Draft EIR. BVDSP Draft EIR does not identify any intersections in the vicinity of the MacArthur Transit Village project as operating at a deficient level under Existing conditions and identifies the following intersections as operating at a deficient level in 2035:

1. Telegraph Avenue/40th Street
2. Telegraph Avenue/MacArthur Boulevard
3. Telegraph Avenue/27th Street

ATTACHMENT H

TABLE 3
INTERSECTION LOS SUMMARY
BASED ON RECENT PUBLISHED DOCUMENTS

Intersection	Traffic Control[1]	Peak Hour	Existing Conditions		2035 Plus Project[3]	
			Delay [2] (seconds)	LOS	Delay [2] (seconds)	LOS
Telegraph Avenue/52nd Street/Claremont Avenue	Signal	AM	14.3	B	21.1	C
		PM	13.7	B	24.7	C
Telegraph Avenue/ 51st Street	Signal	AM	30.6	C	40.1	D
		PM	42.0	D	72.3	E
Telegraph Avenue/ 40th Street	Signal	AM	21.2	C	36.9	D
		PM	31.9	C	**135.0 (v/c=1.80)**	**F**
Market Street/ MacArthur Boulevard	Signal	AM	15.9	B	27.8	C
		PM	15.2	B	29.9	C
Telegraph Avenue/ MacArthur Boulevard	Signal	AM	19.5	B	36.3	D
		PM	12.5	B	**126.5 (v/c=2.23)**	**F**
Broadway/ MacArthur Boulevard	Signal	AM	30.0	C	62.6	E
		PM	38.8	D	79.1	E
Telegraph Avenue/ 27th Street	Signal	AM	22.0	C	29.3	C
		PM	22.9	C	**138.1 (v/c=1.91)**	**F**

Bold indicates intersections operating at an unacceptable level. All intersection located in Downtown or on arterials that provide direct access to Downtown where LOS E (not LOS D) is the threshold.

[1] Signal = intersection is controlled by a traffic signal

[2] For signalized intersections, average intersection delay and LOS based on the 2000 HCM method is shown. For side-street stop-controlled intersections, delays for worst movement and average intersection delay are shown: intersection average (worst movement)

[3] The 2035 Plus Project scenario includes the buildout of the MacArthur Transit Village project. Source: *Broadway Valdez District Specific Plan Draft EIR* (September 2013), Fehr & Peers, 2014.

Considering that the current project is estimated to generate fewer trips than the approved project during both AM and PM peak hours, and that recently published environmental documents show that existing and future traffic volumes in the study area have generally decreased, and that most intersections operate at same or better conditions under existing and future conditions, this analysis focuses on intersections for which recent documents (i.e., BVDSP EIR) project future operating deficiencies.

Therefore, this assessment focuses on the analysis of project impacts at these three intersections only. The proposed project is not expected to cause a significant impact at the other

intersections because the other intersections are expected to operate at LOS E[6] or better under 2035 Plus Project conditions.

SIGNIFICANCE CRITERIA

This analysis uses City of Oakland's CEQA Thresholds of Significance Guidelines (November 2013) to determine if the proposed Project would cause significant impact. The Project would have a significant impact on the environment if it were to:

Traffic Load and Capacity Thresholds

1. At a study, signalized intersection which is located **outside the Downtown**[7] **area and that does not provide direct access to Downtown**, the project would cause the motor vehicle level of service (LOS) to degrade to worse than LOS D (i.e., LOS E or LOS F) and cause the total intersection average vehicle delay to increase by four (4) or more seconds;

2. At a study, signalized intersection which is located **within the Downtown area or that provides direct access to Downtown**, the project would cause the motor vehicle LOS to degrade to worse than LOS E (i.e., LOS F) and cause the total intersection average vehicle delay to increase by four (4) or more seconds;

3. At a study, signalized intersection **outside the Downtown area and that does not provide direct access to Downtown** where the motor vehicle level of service is LOS E, the project would cause the total intersection average vehicle delay to increase by four (4) or more seconds;

4. At a study, signalized intersection **outside the Downtown area and that does not provide direct access to Downtown** where the motor vehicle level of service is LOS E, the project would cause an increase in the average delay for any of the critical movements of six (6) seconds or more;

5. At a study, signalized intersection for all areas where the motor vehicle level of service is LOS F, the project would cause (a) the overall volume-to-capacity ("V/C") ratio to increase 0.03 or more or (b) the critical movement V/C ratio to increase 0.05 or more;

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[6] Based on City of Oakland's latest CEQA Thresholds of Significance Guidelines (November 2013), LOS E is considered the threshold on arterials that provide direct access to Downtown.

[7] The Downtown area is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by the West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south, and I-980/Brush Street to the west. Intersections that provide direct access to downtown are generally defined as principal arterials within two (2) miles of Downtown and minor arterials within one (1) mile of Downtown, provided that the street connects directly to Downtown.

6. At a study, unsignalized intersection the project would add ten (10) or more vehicles to the critical movement, and after project completion, satisfy the California Manual on Uniform Traffic Control Devices (MUTCD) peak-hour volume traffic signal warrant;

Cumulative Impacts

18. A project's contribution to cumulative impacts is considered "considerable" (i.e., significant) when the project exceeds at least one of the thresholds listed above in a future year scenario.

TRAFFIC OPERATIONS ANALYSIS

This section discusses the impacts of the proposed Project on traffic operations under Existing and 2035 conditions based on the City of Oakland's Thresholds of Significance described above.

Existing Plus Project Intersection Analysis

This section presents the extent of Project impacts relative to existing conditions based on application of Significance Thresholds #1 through #6 as listed on page 7 of this memorandum. **Figure 5** shows traffic volumes under Existing and Existing Plus Project conditions. Existing traffic volumes are based on existing counts presented in the BVDSP Draft EIR and the Existing Plus Project traffic volumes consist of Existing Conditions traffic volumes plus added traffic volumes generated by the Project.

Table 4 summarizes the intersection operations results for the Existing No Project and Existing Plus Project conditions. All study intersections would continue to operate at an acceptable LOS C or better under Existing Plus Project conditions. The proposed Project would not cause a significant impact at the study intersections under Existing Plus Project conditions. Consistent with the findings of the 2008 EIR, the project would not result in any significant impacts under Existing Plus Project conditions.

ATTACHMENT H

TABLE 4
INTERSECTION LOS SUMMARY
EXISTING PLUS PROJECT CONDITIONS

Intersection	Traffic Control[1]	Peak Hour	Existing Conditions		Existing Plus Project Conditions		Significant Impact?
			Delay [2] (seconds)	LOS	Delay [2] (seconds)	LOS	
1. Telegraph Avenue/ 40th Street	Signal	AM	21.2	C	21.2	C	No
		PM	31.9	C	28.4	C	No
2. Telegraph Avenue/ MacArthur Boulevard	Signal	AM	19.5	B	19.7	B	No
		PM	12.5	B	13.9	B	No
3. Telegraph Avenue/ 27th Street	Signal	AM	22.0	C	22.0	C	No
		PM	22.9	C	23.2	C	No

Bold indicates intersections operating at an unacceptable level. All intersection located in Downtown or on arterials that provide direct access to Downtown where LOS E (not LOS D) is the threshold.

[1] Signal = intersection is controlled by a traffic signal

[2] For signalized intersections, average intersection delay and LOS based on the 2000 HCM method is shown. For side-street stop-controlled intersections, delays for worst movement and average intersection delay are shown: intersection average (worst movement)

Source: *Broadway Valdez District Specific Plan Draft EIR* (September 2013), Fehr & Peers, 2014.

2035 Intersection Analysis

Project impacts at intersections under 2035 conditions is based on direct application of Significance Threshold #18, which references Significance Thresholds #1 through #6.

Traffic Forecasts

This analysis uses the year 2035 traffic forecasts from BVDSP Draft EIR, which was based on the most recent ACTC Model (released in June 2011), which uses land use data consistent with Association of Bay Area Government (ABAG) *Projection 2009*.

The 2035 Plus Project conditions forecasts are based on the traffic forecasts published in the BVDSP Draft EIR because the land use database used to develop the BVDSP Draft EIR forecasts include the approved MacArthur Transit Village Project. The 2035 No Project conditions forecasts were estimated by subtracting the Project trips from the 2035 Plus Project conditions forecasts.

Figure 8 shows the traffic volumes for the 2035 No Project and 2035 Plus Project scenarios.

ATTACHMENT H

2035 Roadway Network

The 2035 No Project and the 2035 Plus Project conditions assume the following approved and fully funded modifications to the roadway network at the three study intersections:

- The Telegraph Avenue Complete Streets Project will provide buffered Class 2 bicycle lanes on northbound and southbound Telegraph Avenue between 20th and 41st Streets by eliminating one travel lane in each direction. The project will also provide right-turn lanes in both directions of Telegraph Avenue at most intersections.
- The MacArthur Boulevard Bikeway project will provide Class 2 bicycle lanes on MacArthur Boulevard. The project will also convert the shared left/through lane on both eastbound and westbound MacArthur Boulevard at Telegraph Avenue to exclusive left-turn lanes. The project will also upgrade the signal equipment at the Telegraph Avenue/MacArthur Boulevard intersection to provide protected east/west left-turn phasing.

2035 Intersection Operations

Table 5 summarizes intersection LOS calculations for 2035 No Project and 2035 Plus Project conditions. The three study intersections are estimated to operate at LOS F during the PM peak hour regardless of the proposed project. The project would reduce the intersection delay and/or V/C ratio at the Telegraph Avenue/40th Street intersection because it would decrease the traffic volume for some movements, such as the eastbound left-turn, due to the relocation of the BART parking access from 40th Street to MacArthur Boulevard.

The project would not cause a significant impact at the Telegraph Avenue/27th Street intersections because the project would not cause the overall volume-to-capacity (V/C) ratio to increase by 0.03 or more or the critical movement V/C ratio to increase by 0.05 or more.

Consistent with the findings of the 2008 EIR, the MTV project with the FDPs for Parcel A and C-1 would cause significant impacts at the Telegraph Avenue/40th Street and Telegraph Avenue/ MacArthur Boulevard intersections. The mitigations included in the 2008 EIR would adequately mitigate these impacts to a less-than-significant level; no new mitigation is needed. The findings are also consistent with the findings of the *Broadway Valdez District Specific Plan Draft EIR* (September 2013).

ATTACHMENT H

TABLE 5
INTERSECTION LOS SUMMARY
2035 CONDITIONS

Intersection	Traffic Control[1]	Peak Hour	2035 No Project Conditions		2035 Plus Project Conditions		Significant Impact?	2035 Plus Project Conditions (Mitigated)		Significance after Mitigation
			Delay [2] (seconds)	LOS	Delay [2] (seconds)	LOS		Delay [2] (seconds)	LOS	
1. Telegraph Avenue/ 40th Street	Signal	AM	51.9	D	55.8	E	No	60.9	E	Less than Significant
		PM	**>120 (v/c=2.58)**	**F**	**>120 (v/c=2.49)**	**F**	**Yes[3]**	**>120 (v/c=1.70)**	**F**	
2. Telegraph Avenue/ MacArthur Boulevard	Signal	AM	79.4	E	**93.4 (v/c=1.59)**	**F**	**Yes[4]**	**77.9**	E	Less than Significant
		PM	**>120 (v/c=3.22**)	**F**	**>120 (v/c=3.28)**	**F**	**Yes[5]**	**>120 (v/c=1.58)**	**F**	
3. Telegraph Avenue/ 27th Street	Signal	AM	31.9	C	32.8	C	No	32.8	C	No Impact
		PM	**>120 (v/c=2.42)**	**F**	**>120 (v/c=2.43)**	**F**	No	**>120 (v/c=2.43)**	**F**	

Bold indicates intersections operating at an unacceptable level. All intersection located in Downtown or on arterials that provide direct access to Downtown where LOS E (not LOS D) is the threshold.

[1] Signal = intersection is controlled by a traffic signal

[2] For signalized intersections, average intersection delay and LOS based on the 2000 HCM method is shown. For side-street stop-controlled intersections, delays for worst movement and average intersection delay are shown: intersection average (worst movement)

[3] The project would cause a significant impact at this intersection because the project would cause the critical movement V/C ratio to increase by 0.05 or more at an intersection operating at LOS F regardless of the project.

[4] The project would cause a significant impact at this intersection because the project would cause the intersection LOS to degrade from LOS E to LOS F.

[5] The project would cause a significant impact at this intersection because the project would cause the overall intersection V/C ratio to increase 0.03 or more and critical movement V/C ratio to increase by 0.05 or more at an intersection operating at LOS F regardless of the project.

Source: *Broadway Valdez District Specific Plan Draft EIR* (September 2013), Fehr & Peers, 2014.

ATTACHMENT H

Please contact us with questions or comments.

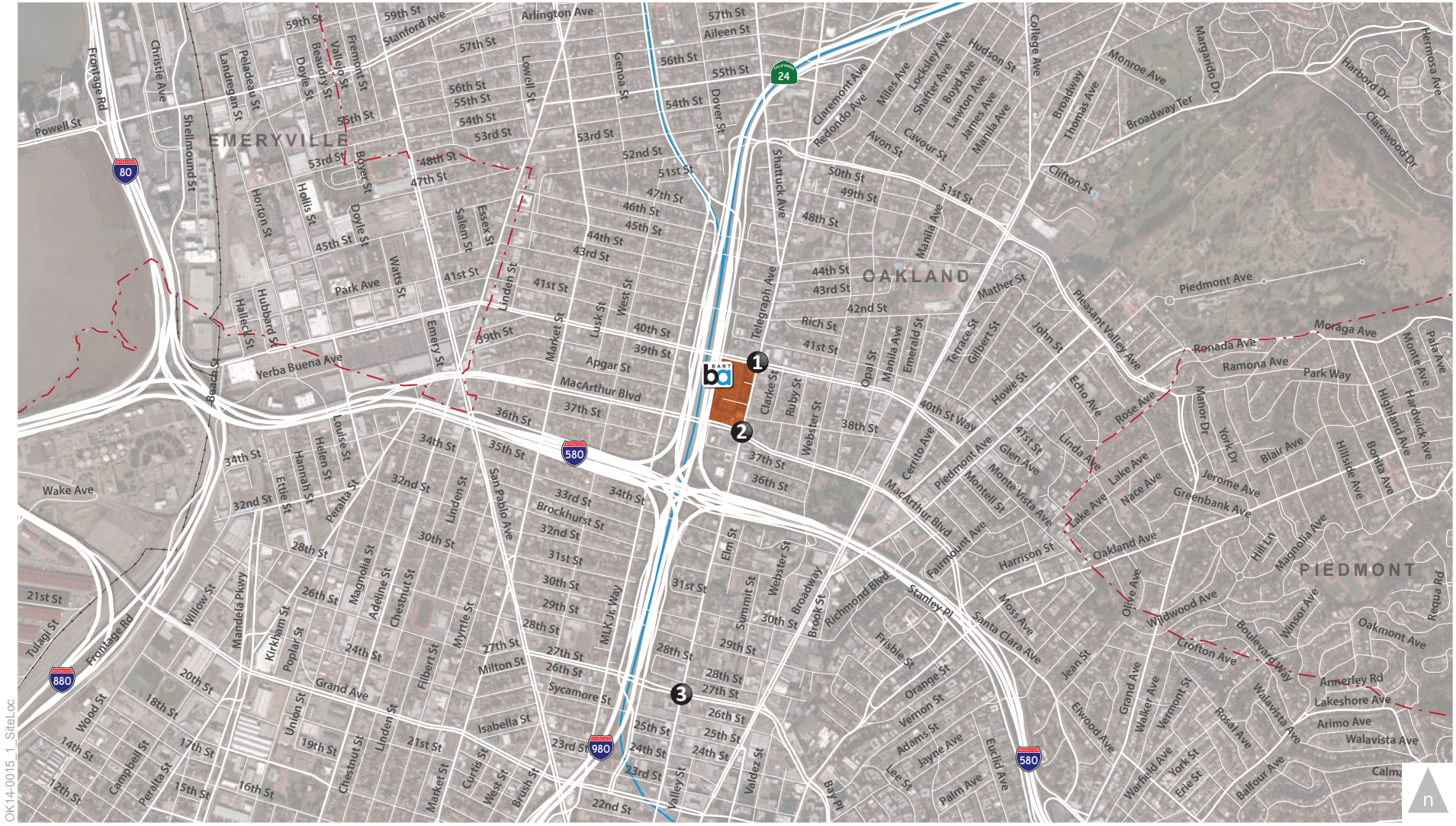
Attachments:

Figures:

Figure 1 Site Location
Figure 2 Residential Trip Distribution
Figure 3 Non-Residential Trip Distribution
Figure 4 Project Peak Hour Net Change in Traffic Volume
Figure 5 Existing Peak Hour Traffic Volumes
Figure 6 2035 Peak Hour Traffic Volumes

Appendix:

Intersection LOS Calculations



OK14-0015_1_SiteLoc

LEGEND

Study Intersection

MacArthur Transit Village

Figure 1

Site Location

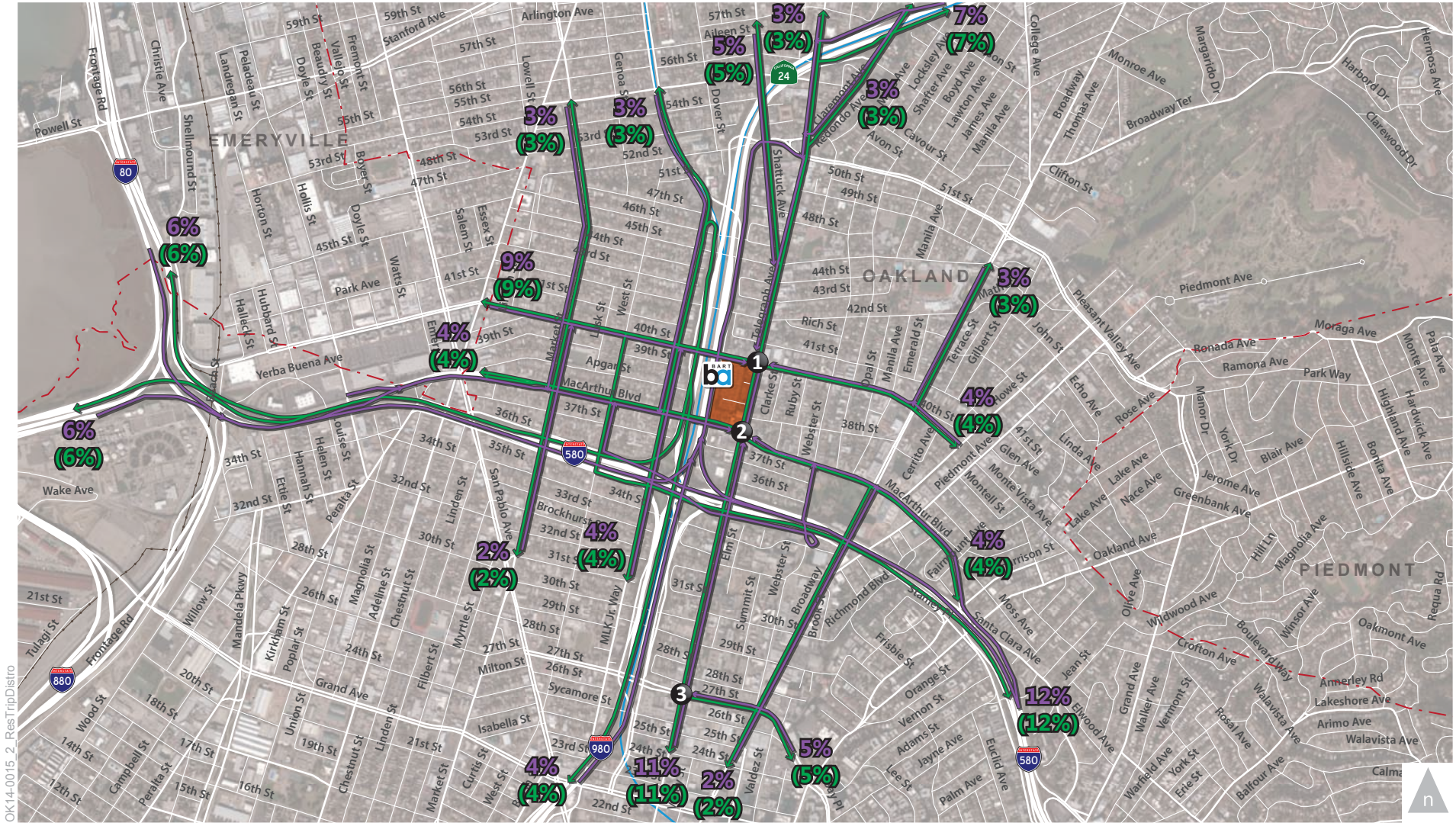
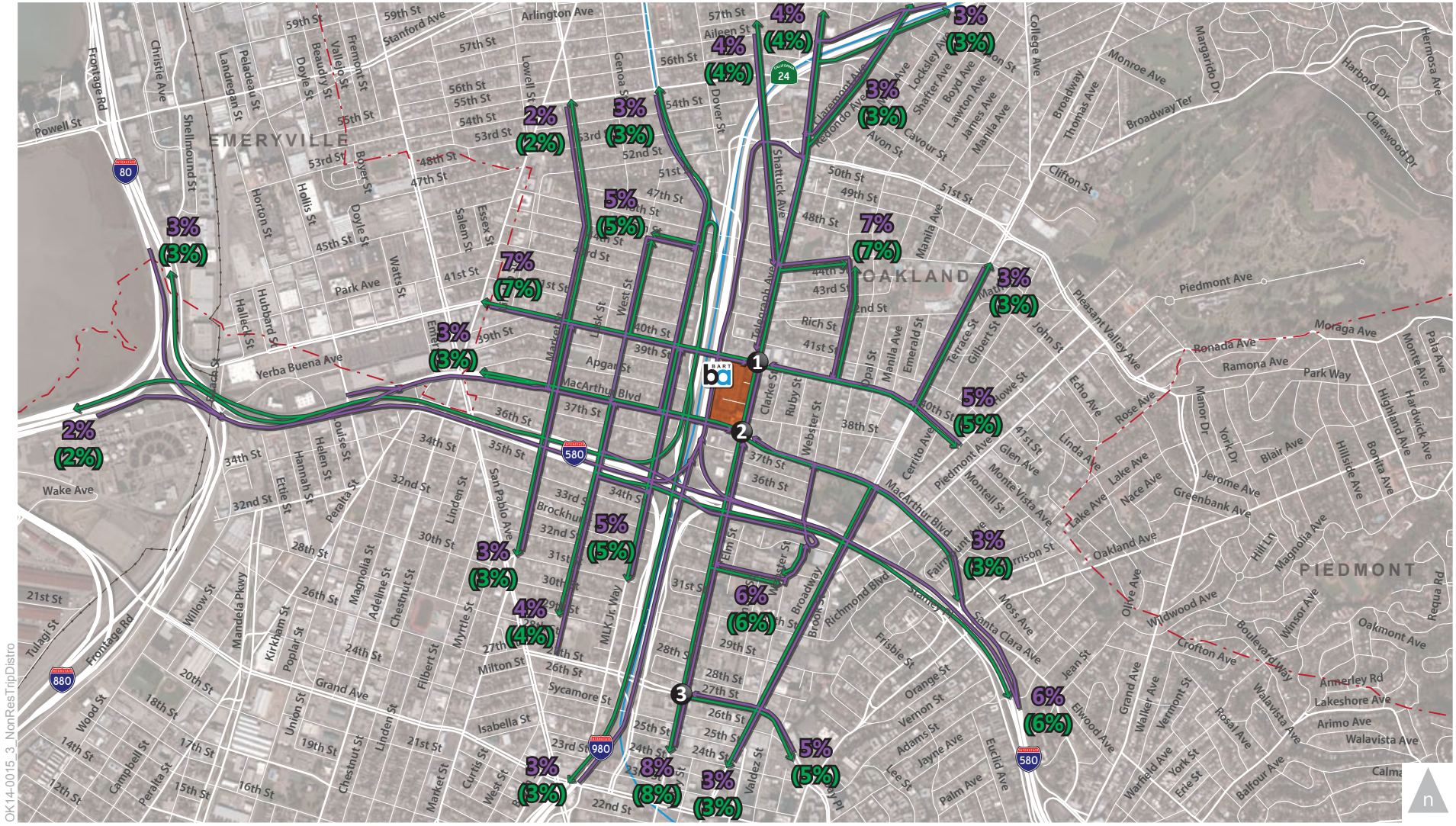


Figure 2

Residential Trip Distribution



LEGEND

X% (Y%) Inbound % (Outbound %) Project Trip Distribution

Inbound Travel Route

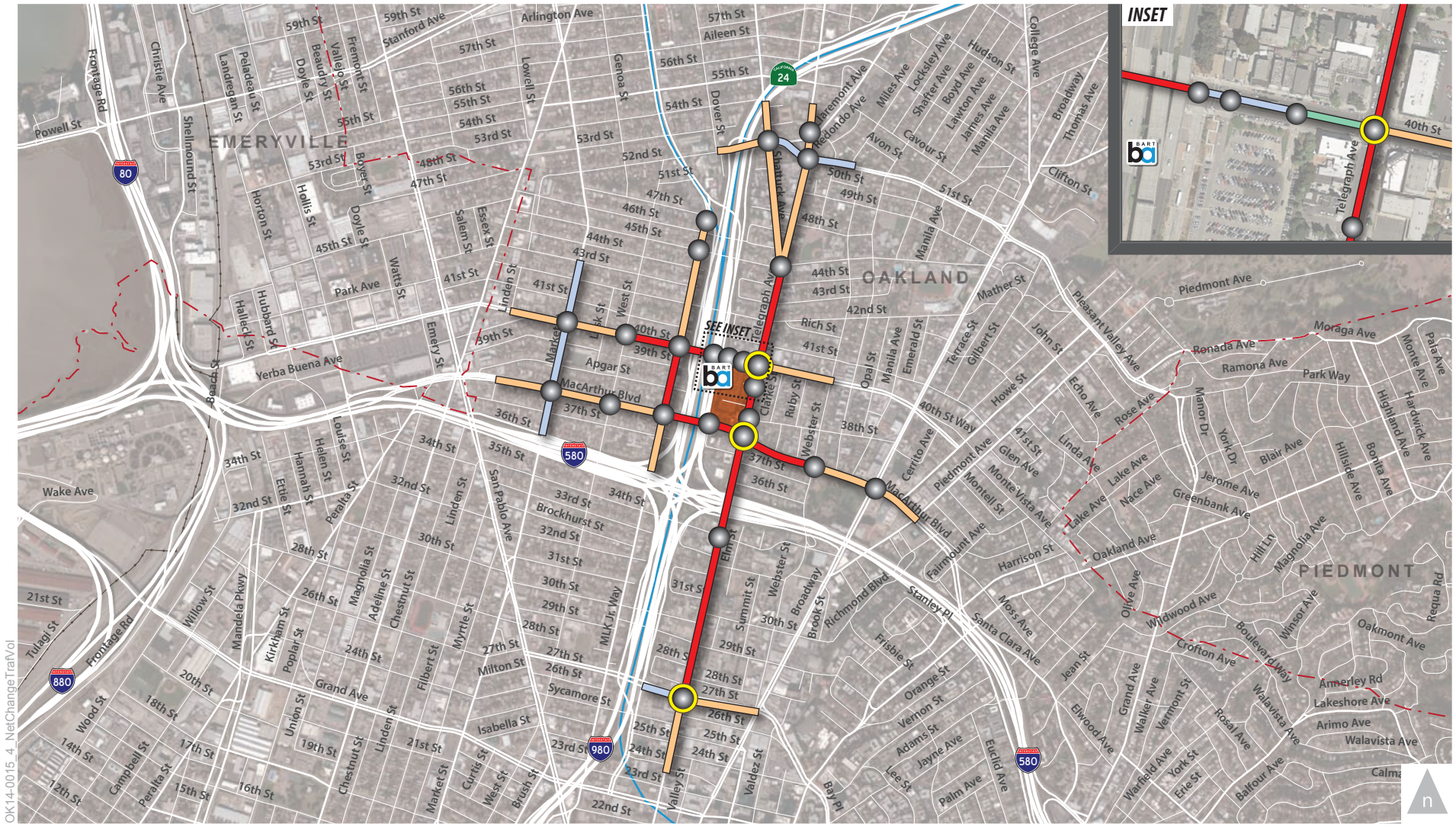
Outbound Travel Route

Study Intersection

MacArthur Transit Village

Figure 3

Non-Residential Trip Distribution



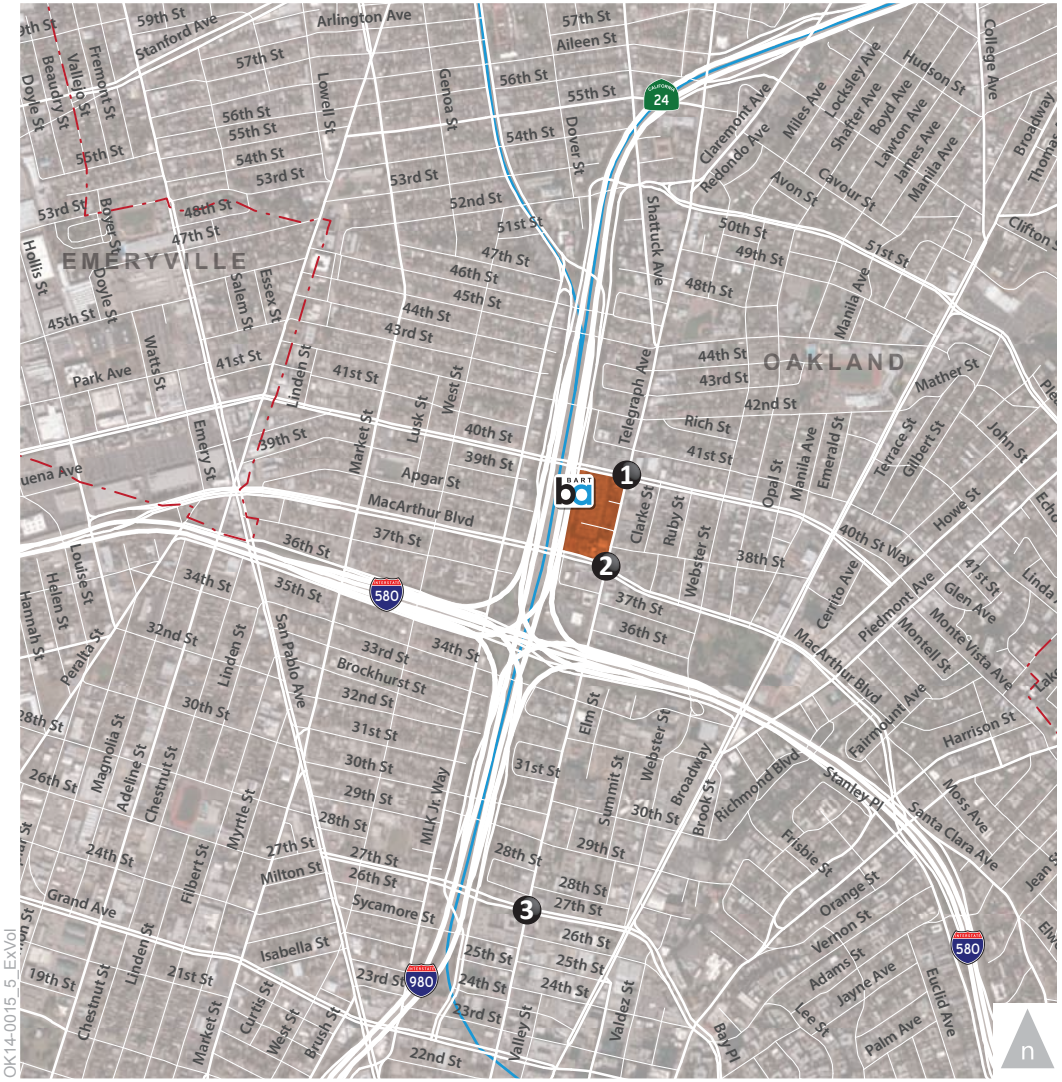
OK14-0015_4_NetChangeTrafVol

LEGEND

- Previous Study Intersection
- Recently Analyzed as Operating Deficiently
- MacArthur Transit Village
- Street Segment where Project would Increase Peak Hour Traffic by 50 or more trips
- Street Segment where Project would Increase Peak Hour Traffic by between 10 to 50 trips
- Street Segment where Project would Increase or decrease Peak Hour Traffic by 10 or fewer trips
- Street Segment where Project would Decrease Peak Hour Traffic by between 10 to 50 trips
- Street Segment where Project would Decrease Peak Hour Traffic by 50 or more trips

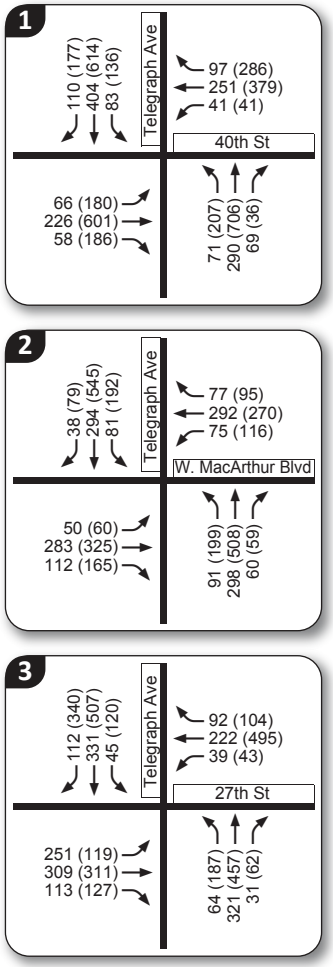
Figure 4

Project Peak Hour Net Change in Traffic Volume

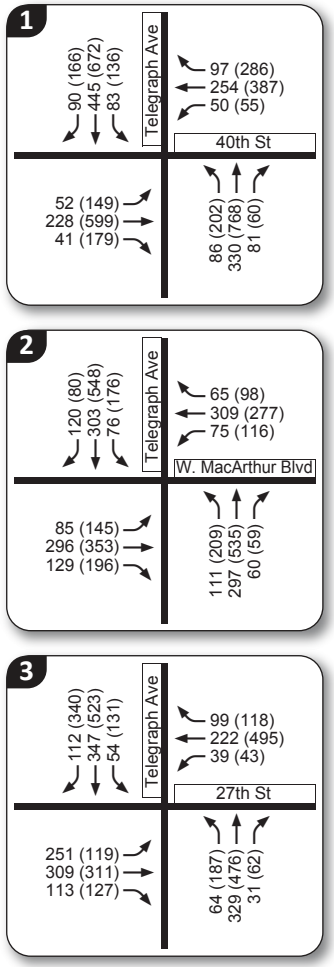


OK14-0015_5_ExVol

EXISTING



EXISTING PLUS PROJECT



LEGEND

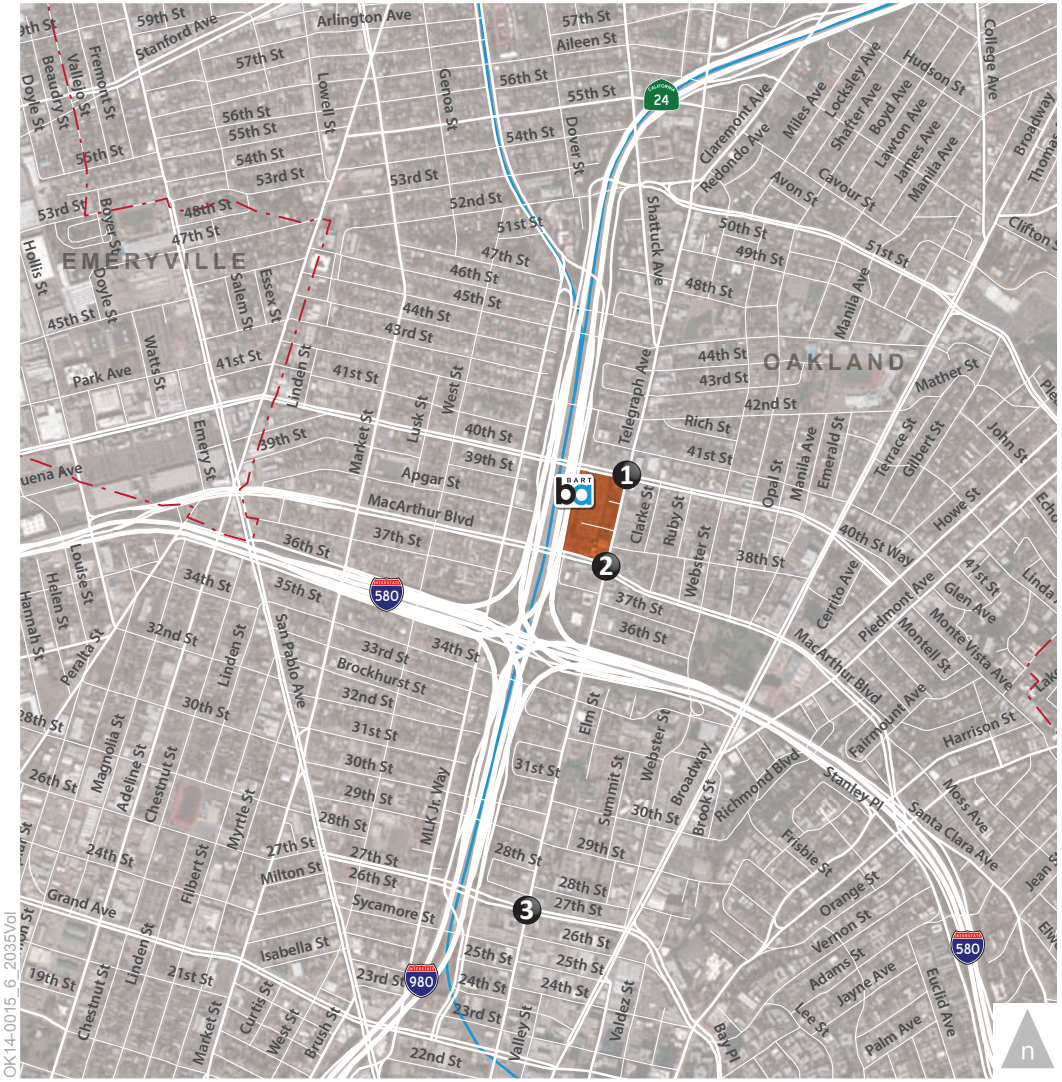
XX (YY) AM (PM) Peak Hour Trafffic Volumes

(#) Study Intersection

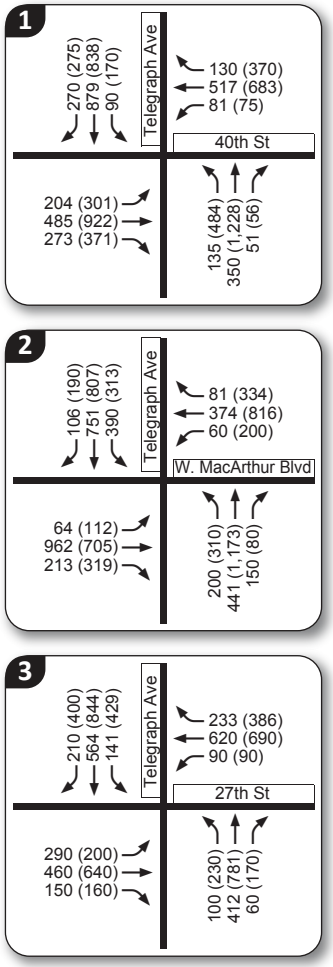
MacArthur Transit Village

Figure 5

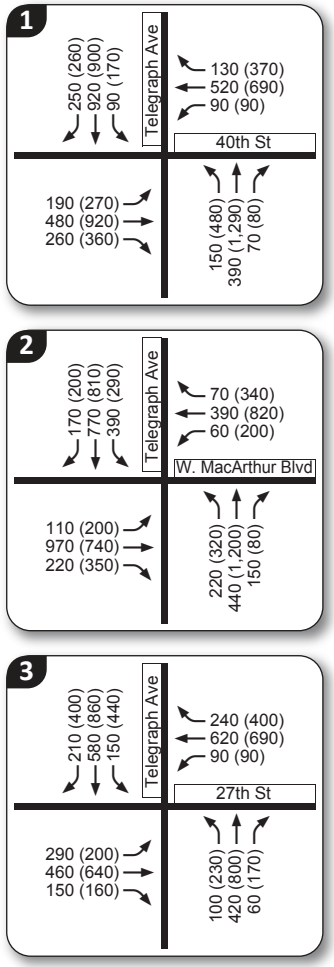
Existing Peak Hour Traffic Volumes



2035 NO PROJECT



2035 PLUS PROJECT



LEGEND

XX (YY) AM (PM) Peak Hour Trafffic Volumes

(#) Study Intersection

MacArthur Transit Village

Figure 6

2035 Peak Hour Traffic Volumes

APPENDIX
Intersection LOS Calculations

MacArthur Transit Village

September 2014

FEHR PEERS

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	226	58	41	251	97	71	290	69	83	404	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.97		1.00	0.97		1.00	0.98	
Flpb, ped/bikes	0.95	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1688	3387		1710	3306		1770	3345		1770	3368	
Flt Permitted	0.46	1.00		0.54	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	820	3387		964	3306		1770	3345		1770	3368	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	66	226	58	41	251	97	71	290	69	83	404	110
RTOR Reduction (vph)	0	30	0	0	53	0	0	18	0	0	22	0
Lane Group Flow (vph)	66	254	0	41	295	0	71	341	0	83	492	0
Confl. Peds. (#/hr)	81		52	52		81			112			59
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	19.5	19.5		19.5	19.5		7.7	43.8		8.2	44.3	
Effective Green, g (s)	19.5	19.5		19.5	19.5		7.7	43.8		8.2	44.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.09	0.52		0.10	0.52	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	777		221	758		160	1724		171	1755	
v/s Ratio Prot		0.07			c0.09		0.04	0.10		c0.05	c0.15	
v/s Ratio Perm	0.08			0.04								
v/c Ratio	0.35	0.33		0.19	0.39		0.44	0.20		0.49	0.28	
Uniform Delay, d1	27.4	27.3		26.4	27.7		36.6	11.1		36.4	11.4	
Progression Factor	1.00	1.00		1.00	1.00		0.85	1.28		1.00	1.00	
Incremental Delay, d2	1.1	0.2		0.4	0.3		1.9	0.3		2.2	0.4	
Delay (s)	28.6	27.5		26.8	28.0		33.2	14.5		38.6	11.8	
Level of Service	C	C		C	C		C	B		D	B	
Approach Delay (s)		27.7			27.9			17.6			15.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	283	112	75	292	77	91	298	60	81	294	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.98	1.00	
Frt		0.96			0.97		1.00	0.97		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4786			4870		1746	3427		1738	3465	
Flt Permitted		0.83			0.77		0.55	1.00		0.54	1.00	
Satd. Flow (perm)		3984			3792		1013	3427		984	3465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	283	112	75	292	77	91	298	60	81	294	38
RTOR Reduction (vph)	0	89	0	0	61	0	0	9	0	0	6	0
Lane Group Flow (vph)	0	356	0	0	383	0	91	349	0	81	326	0
Confl. Peds. (#/hr)	34		41			34	21		29	29		21
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.7			17.7		56.8	56.8		56.8	56.8	
Effective Green, g (s)		17.7			17.7		56.8	56.8		56.8	56.8	
Actuated g/C Ratio		0.21			0.21		0.67	0.67		0.67	0.67	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		830			790		677	2290		658	2315	
v/s Ratio Prot								c0.10			0.09	
v/s Ratio Perm		0.09			c0.10		0.09			0.08		
v/c Ratio		0.43			0.48		0.13	0.15		0.12	0.14	
Uniform Delay, d1		29.3			29.6		5.1	5.2		5.1	5.2	
Progression Factor		1.20			1.00		1.00	1.00		1.26	1.28	
Incremental Delay, d2		0.1			0.2		0.4	0.1		0.4	0.1	
Delay (s)		35.2			29.8		5.6	5.3		6.8	6.7	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		35.2			29.8			5.4			6.7	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	251	309	113	39	222	92	64	321	31	45	331	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3381		1770	3345		1761	3487		1765	3376	
Flt Permitted	0.95	1.00		0.95	1.00		0.46	1.00		0.52	1.00	
Satd. Flow (perm)	1770	3381		1770	3345		852	3487		972	3376	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	251	309	113	39	222	92	64	321	31	45	331	112
RTOR Reduction (vph)	0	39	0	0	57	0	0	7	0	0	33	0
Lane Group Flow (vph)	251	383	0	39	257	0	64	345	0	45	410	0
Confl. Peds. (#/hr)			2			21	10		5	5		10
Confl. Bikes (#/hr)			5			3			4			27
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	15.7	29.4		4.5	18.2		37.6	37.6		37.6	37.6	
Effective Green, g (s)	16.2	28.9		5.0	17.7		39.1	39.1		39.1	39.1	
Actuated g/C Ratio	0.19	0.34		0.06	0.21		0.46	0.46		0.46	0.46	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	337	1150		104	697		392	1604		447	1553	
v/s Ratio Prot	c0.14	c0.11		0.02	0.08			0.10			c0.12	
v/s Ratio Perm							0.08			0.05		
v/c Ratio	0.74	0.33		0.38	0.37		0.16	0.22		0.10	0.26	
Uniform Delay, d1	32.5	20.9		38.5	28.9		13.4	13.8		13.0	14.1	
Progression Factor	1.00	1.00		1.19	0.80		1.26	1.28		1.00	1.00	
Incremental Delay, d2	7.6	0.1		0.8	0.1		0.9	0.3		0.5	0.4	
Delay (s)	40.1	20.9		46.6	23.1		17.8	18.0		13.4	14.5	
Level of Service	D	C		D	C		B	B		B	B	
Approach Delay (s)		28.1			25.7			17.9			14.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	601	186	41	379	286	207	706	36	136	614	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708	3288		1708	3138		1770	3496		1770	3379	
Flt Permitted	0.26	1.00		0.19	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	474	3288		342	3138		1770	3496		1770	3379	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	601	186	41	379	286	207	706	36	136	614	177
RTOR Reduction (vph)	0	37	0	0	172	0	0	4	0	0	33	0
Lane Group Flow (vph)	180	750	0	41	493	0	207	738	0	136	758	0
Confl. Peds. (#/hr)	93		122	122		93			86			39
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	25.5	25.5		25.5	25.5		12.1	30.8		10.2	28.9	
Effective Green, g (s)	25.5	25.5		25.5	25.5		12.1	30.8		10.2	28.9	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.15	0.39		0.13	0.36	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	151	1048		109	1000		268	1346		226	1221	
v/s Ratio Prot		0.23			0.16		c0.12	0.21		0.08	c0.22	
v/s Ratio Perm	c0.38			0.12								
v/c Ratio	1.19	0.72		0.38	0.49		0.77	0.55		0.60	0.62	
Uniform Delay, d1	27.2	24.1		21.1	22.0		32.6	19.2		33.0	21.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	134.1	2.0		0.8	0.1		11.8	1.6		3.1	2.4	
Delay (s)	161.4	26.0		21.9	22.2		44.5	20.8		36.1	23.4	
Level of Service	F	C		C	C		D	C		D	C	
Approach Delay (s)		51.2			22.2			26.0			25.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	325	165	116	270	95	199	508	59	192	545	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			0.99		0.99	1.00		0.99	1.00	
Frt		0.95			0.97		1.00	0.98		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4735			4796		1748	3469		1746	3454	
Flt Permitted		0.82			0.73		0.41	1.00		0.44	1.00	
Satd. Flow (perm)		3920			3554		751	3469		805	3454	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	60	325	165	116	270	95	199	508	59	192	545	79
RTOR Reduction (vph)	0	68	0	0	65	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	482	0	0	416	0	199	563	0	192	618	0
Confl. Peds. (#/hr)	55		54	54		55	37		38	38		37
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.0			15.0		39.4	39.4		39.4	39.4	
Effective Green, g (s)		15.0			15.0		39.4	39.4		39.4	39.4	
Actuated g/C Ratio		0.23			0.23		0.61	0.61		0.61	0.61	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		906			821		456	2106		489	2097	
v/s Ratio Prot								0.16			0.18	
v/s Ratio Perm		c0.12			0.12		c0.27			0.24		
v/c Ratio		0.53			0.51		0.44	0.27		0.39	0.29	
Uniform Delay, d1		21.9			21.7		6.8	6.0		6.6	6.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2		0.2	0.0		0.2	0.0	
Delay (s)		22.2			21.9		7.1	6.0		6.8	6.1	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		22.2			21.9			6.3			6.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	64.9	Sum of lost time (s)	10.5
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	311	127	43	495	104	187	457	62	120	507	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3344		1770	3430		1766	3464		1765	3292	
Flt Permitted	0.95	1.00		0.95	1.00		0.27	1.00		0.43	1.00	
Satd. Flow (perm)	1770	3344		1770	3430		494	3464		795	3292	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	119	311	127	43	495	104	187	457	62	120	507	340
RTOR Reduction (vph)	0	51	0	0	22	0	0	11	0	0	121	0
Lane Group Flow (vph)	119	387	0	43	577	0	187	508	0	120	726	0
Confl. Peds. (#/hr)			20			12	9		6	6		9
Confl. Bikes (#/hr)			9			3			25			13
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	7.9	23.4		4.6	20.1		43.5	43.5		43.5	43.5	
Effective Green, g (s)	8.4	22.9		5.1	19.6		45.0	45.0		45.0	45.0	
Actuated g/C Ratio	0.10	0.27		0.06	0.23		0.53	0.53		0.53	0.53	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	175	901		106	791		262	1834		421	1743	
v/s Ratio Prot	c0.07	c0.12		0.02	c0.17			0.15			0.22	
v/s Ratio Perm							c0.38			0.15		
v/c Ratio	0.68	0.43		0.41	0.73		0.71	0.28		0.29	0.42	
Uniform Delay, d1	37.0	25.7		38.5	30.3		15.1	11.0		11.1	12.1	
Progression Factor	1.00	1.00		0.93	1.36		0.95	0.84		0.89	0.86	
Incremental Delay, d2	8.3	0.1		0.9	2.8		14.9	0.4		1.7	0.7	
Delay (s)	45.3	25.8		36.5	44.0		29.4	9.6		11.6	11.1	
Level of Service	D	C		D	D		C	A		B	B	
Approach Delay (s)		30.0			43.5			14.9			11.1	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Telegraph Ave. & 40th St.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	228	41	50	254	97	86	330	81	83	445	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.95	1.00		0.97	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1688	3426		1709	3308		1770	3340		1770	3404	
Flt Permitted	0.46	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	816	3426		996	3308		1770	3340		1770	3404	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	52	228	41	50	254	97	86	330	81	83	445	90
RTOR Reduction (vph)	0	19	0	0	52	0	0	19	0	0	15	0
Lane Group Flow (vph)	52	250	0	50	299	0	86	392	0	83	520	0
Confl. Peds. (#/hr)	81		52	52		81			112			59
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	19.6	19.6		19.6	19.6		8.3	43.7		8.2	43.6	
Effective Green, g (s)	19.6	19.6		19.6	19.6		8.3	43.7		8.2	43.6	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.10	0.51		0.10	0.51	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	789		229	762		172	1717		170	1746	
v/s Ratio Prot		0.07			c0.09		c0.05	0.12		0.05	c0.15	
v/s Ratio Perm	0.06			0.05								
v/c Ratio	0.28	0.32		0.22	0.39		0.50	0.23		0.49	0.30	
Uniform Delay, d1	26.9	27.1		26.5	27.7		36.4	11.4		36.4	11.9	
Progression Factor	1.00	1.00		1.00	1.00		0.87	1.32		1.00	1.00	
Incremental Delay, d2	0.8	0.2		0.5	0.3		2.3	0.3		2.2	0.4	
Delay (s)	27.7	27.4		27.0	28.0		34.1	15.3		38.6	12.3	
Level of Service	C	C		C	C		C	B		D	B	
Approach Delay (s)		27.4			27.9			18.6			15.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Telegraph Ave. & W MacArthur Blvd.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	296	129	75	309	65	111	297	60	76	303	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.98	1.00	
Frt		0.96			0.98		1.00	0.97		1.00	0.96	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4767			4899		1749	3426		1738	3357	
Flt Permitted		0.77			0.75		0.51	1.00		0.54	1.00	
Satd. Flow (perm)		3709			3698		930	3426		985	3357	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	85	296	129	75	309	65	111	297	60	76	303	120
RTOR Reduction (vph)	0	102	0	0	51	0	0	9	0	0	23	0
Lane Group Flow (vph)	0	408	0	0	398	0	111	348	0	76	400	0
Confl. Peds. (#/hr)	34		41			34	21		29	29		21
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.9			17.9		56.6	56.6		56.6	56.6	
Effective Green, g (s)		17.9			17.9		56.6	56.6		56.6	56.6	
Actuated g/C Ratio		0.21			0.21		0.67	0.67		0.67	0.67	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		781			778		619	2281		655	2235	
v/s Ratio Prot								0.10			0.12	
v/s Ratio Perm		c0.11			0.11		c0.12			0.08		
v/c Ratio		0.52			0.51		0.18	0.15		0.12	0.18	
Uniform Delay, d1		29.8			29.7		5.4	5.3		5.1	5.4	
Progression Factor		1.18			1.00		1.00	1.00		1.26	1.47	
Incremental Delay, d2		0.3			0.2		0.6	0.1		0.4	0.2	
Delay (s)		35.3			29.9		6.0	5.4		6.8	8.1	
Level of Service		D			C		A	A		A	A	
Approach Delay (s)		35.3			29.9			5.6			7.9	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Telegraph Ave. & 27th St.

8/26/2014

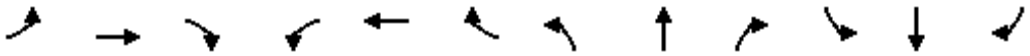
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	251	309	113	39	222	99	64	329	31	54	347	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3381		1770	3335		1761	3488		1765	3381	
Flt Permitted	0.95	1.00		0.95	1.00		0.45	1.00		0.52	1.00	
Satd. Flow (perm)	1770	3381		1770	3335		832	3488		961	3381	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	251	309	113	39	222	99	64	329	31	54	347	112
RTOR Reduction (vph)	0	39	0	0	64	0	0	7	0	0	31	0
Lane Group Flow (vph)	251	383	0	39	257	0	64	353	0	54	428	0
Confl. Peds. (#/hr)			2			21	10		5	5		10
Confl. Bikes (#/hr)			5			3			4			27
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	15.7	29.4		4.5	18.2		37.6	37.6		37.6	37.6	
Effective Green, g (s)	16.2	28.9		5.0	17.7		39.1	39.1		39.1	39.1	
Actuated g/C Ratio	0.19	0.34		0.06	0.21		0.46	0.46		0.46	0.46	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	337	1149		104	694		382	1604		442	1555	
v/s Ratio Prot	c0.14	c0.11		0.02	0.08			0.10			c0.13	
v/s Ratio Perm							0.08			0.06		
v/c Ratio	0.74	0.33		0.38	0.37		0.17	0.22		0.12	0.28	
Uniform Delay, d1	32.5	20.9		38.5	28.9		13.4	13.8		13.1	14.2	
Progression Factor	1.00	1.00		1.20	0.80		1.27	1.29		1.00	1.00	
Incremental Delay, d2	7.6	0.1		0.8	0.1		0.9	0.3		0.6	0.4	
Delay (s)	40.1	20.9		47.2	23.1		18.0	18.1		13.7	14.6	
Level of Service	D	C		D	C		B	B		B	B	
Approach Delay (s)		28.1			25.7			18.1			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Telegraph Ave. & 40th St.

8/26/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	599	179	55	387	286	202	768	60	136	672	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.96	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1709	3295		1707	3143		1770	3474		1770	3398	
Flt Permitted	0.26	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	465	3295		351	3143		1770	3474		1770	3398	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	149	599	179	55	387	286	202	768	60	136	672	166
RTOR Reduction (vph)	0	35	0	0	167	0	0	7	0	0	26	0
Lane Group Flow (vph)	149	743	0	55	506	0	202	821	0	136	812	0
Confl. Peds. (#/hr)	93		122	122		93			86			39
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	25.5	25.5		25.5	25.5		12.1	30.8		10.2	28.9	
Effective Green, g (s)	25.5	25.5		25.5	25.5		12.1	30.8		10.2	28.9	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.15	0.39		0.13	0.36	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	148	1050		111	1001		267	1337		225	1227	
v/s Ratio Prot		0.23			0.16		c0.11	0.24		0.08	c0.24	
v/s Ratio Perm	c0.32			0.16								
v/c Ratio	1.01	0.71		0.50	0.51		0.76	0.61		0.60	0.66	
Uniform Delay, d1	27.2	24.0		22.0	22.1		32.5	19.8		33.0	21.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	75.8	1.8		1.3	0.1		10.3	2.1		3.1	2.8	
Delay (s)	103.0	25.8		23.3	22.3		42.9	21.9		36.1	24.3	
Level of Service	F	C		C	C		D	C		D	C	
Approach Delay (s)		38.2			22.4			26.0			25.9	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Telegraph Ave. & W MacArthur Blvd.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	353	196	116	277	98	209	535	59	176	548	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			1.00		0.99	1.00		0.99	1.00	
Frt		0.96			0.97		1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4716			4798		1748	3472		1746	3453	
Flt Permitted		0.76			0.69		0.40	1.00		0.42	1.00	
Satd. Flow (perm)		3620			3369		735	3472		767	3453	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	145	353	196	116	277	98	209	535	59	176	548	80
RTOR Reduction (vph)	0	60	0	0	64	0	0	5	0	0	6	0
Lane Group Flow (vph)	0	634	0	0	427	0	209	589	0	176	622	0
Confl. Peds. (#/hr)	55		54	54		55	37		38	38		37
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.7			17.7		39.2	39.2		39.2	39.2	
Effective Green, g (s)		17.7			17.7		39.2	39.2		39.2	39.2	
Actuated g/C Ratio		0.26			0.26		0.58	0.58		0.58	0.58	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		950			884		427	2019		446	2008	
v/s Ratio Prot								0.17			0.18	
v/s Ratio Perm		c0.17			0.13		c0.28			0.23		
v/c Ratio		0.67			0.48		0.49	0.29		0.39	0.31	
Uniform Delay, d1		22.2			21.0		8.2	7.1		7.7	7.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.4			0.2		0.3	0.0		0.2	0.0	
Delay (s)		23.6			21.1		8.6	7.1		7.9	7.2	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		23.6			21.1			7.5			7.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	15.5
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Telegraph Ave. & 27th St.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	311	127	43	495	118	187	476	62	131	523	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3344		1770	3418		1766	3467		1765	3296	
Flt Permitted	0.95	1.00		0.95	1.00		0.26	1.00		0.42	1.00	
Satd. Flow (perm)	1770	3344		1770	3418		481	3467		774	3296	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	119	311	127	43	495	118	187	476	62	131	523	340
RTOR Reduction (vph)	0	51	0	0	25	0	0	10	0	0	113	0
Lane Group Flow (vph)	119	387	0	43	588	0	187	528	0	131	750	0
Confl. Peds. (#/hr)			20			12	9		6	6		9
Confl. Bikes (#/hr)			9			3			25			13
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	7.9	23.5		4.6	20.2		43.4	43.4		43.4	43.4	
Effective Green, g (s)	8.4	23.0		5.1	19.7		44.9	44.9		44.9	44.9	
Actuated g/C Ratio	0.10	0.27		0.06	0.23		0.53	0.53		0.53	0.53	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	174	904		106	792		254	1831		408	1741	
v/s Ratio Prot	c0.07	c0.12		0.02	c0.17			0.15			0.23	
v/s Ratio Perm							c0.39			0.17		
v/c Ratio	0.68	0.43		0.41	0.74		0.74	0.29		0.32	0.43	
Uniform Delay, d1	37.0	25.6		38.5	30.3		15.5	11.2		11.4	12.2	
Progression Factor	1.00	1.00		0.93	1.36		0.96	0.85		0.89	0.86	
Incremental Delay, d2	8.5	0.1		0.9	3.1		16.9	0.4		2.1	0.8	
Delay (s)	45.5	25.7		36.8	44.3		31.7	9.9		12.2	11.3	
Level of Service	D	C		D	D		C	A		B	B	
Approach Delay (s)		29.9			43.8			15.5			11.4	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Telegraph Ave. & 40th St.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	204	485	273	81	517	130	135	350	51	90	879	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1722	3273		1745	3371		1770	3410		1770	3351	
Flt Permitted	0.27	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	482	3273		362	3371		1770	3410		1770	3351	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	204	485	273	81	517	130	135	350	51	90	879	270
RTOR Reduction (vph)	0	92	0	0	26	0	0	12	0	0	33	0
Lane Group Flow (vph)	204	666	0	81	621	0	135	389	0	90	1116	0
Confl. Peds. (#/hr)	81		52	52		81			112			59
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	26.5	26.5		26.5	26.5		11.3	36.6		8.4	33.7	
Effective Green, g (s)	26.5	26.5		26.5	26.5		11.3	36.6		8.4	33.7	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.13	0.43		0.10	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1020		112	1050		235	1468		174	1328	
v/s Ratio Prot		0.20			0.18		c0.08	c0.11		0.05	c0.33	
v/s Ratio Perm	c0.42			0.22								
v/c Ratio	1.36	0.65		0.72	0.59		0.57	0.27		0.52	0.84	
Uniform Delay, d1	29.2	25.3		26.0	24.7		34.6	15.6		36.4	23.2	
Progression Factor	1.00	1.00		1.00	1.00		0.85	0.92		1.00	1.00	
Incremental Delay, d2	198.9	1.5		20.5	0.9		3.2	0.4		2.6	6.6	
Delay (s)	228.2	26.8		46.5	25.6		32.5	14.7		39.0	29.8	
Level of Service	F	C		D	C		C	B		D	C	
Approach Delay (s)		69.5			27.9			19.2			30.4	
Approach LOS		E			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Telegraph Ave. & W MacArthur Blvd.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	962	213	60	374	81	200	441	150	390	751	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.97			0.98		1.00	0.96		1.00	0.98	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4889			4899		1760	3369		1748	3459	
Flt Permitted		0.87			0.71		0.26	1.00		0.39	1.00	
Satd. Flow (perm)		4265			3479		483	3369		720	3459	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	64	962	213	60	374	81	200	441	150	390	751	106
RTOR Reduction (vph)	0	43	0	0	47	0	0	28	0	0	9	0
Lane Group Flow (vph)	0	1196	0	0	468	0	200	563	0	390	848	0
Confl. Peds. (#/hr)	34		41			34	21		29	29		21
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.5			31.5		43.0	43.0		43.0	43.0	
Effective Green, g (s)		31.5			31.5		43.0	43.0		43.0	43.0	
Actuated g/C Ratio		0.37			0.37		0.51	0.51		0.51	0.51	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1580			1289		244	1704		364	1749	
v/s Ratio Prot								0.17			0.25	
v/s Ratio Perm		c0.28			0.13		0.41			c0.54		
v/c Ratio		0.76			0.36		0.82	0.33		1.07	0.48	
Uniform Delay, d1		23.4			19.5		17.7	12.5		21.0	13.7	
Progression Factor		1.15			1.00		1.00	1.00		1.05	0.93	
Incremental Delay, d2		1.8			0.1		25.5	0.5		56.8	0.6	
Delay (s)		28.8			19.5		43.2	13.0		78.7	13.4	
Level of Service		C			B		D	B		E	B	
Approach Delay (s)		28.8			19.5			20.6			33.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Telegraph Ave. & 27th St.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	460	150	90	620	233	100	412	60	141	564	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3392		1770	3346		1763	3462		1763	3350	
Flt Permitted	0.95	1.00		0.95	1.00		0.24	1.00		0.42	1.00	
Satd. Flow (perm)	1770	3392		1770	3346		438	3462		776	3350	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	460	150	90	620	233	100	412	60	141	564	210
RTOR Reduction (vph)	0	31	0	0	45	0	0	13	0	0	44	0
Lane Group Flow (vph)	290	579	0	90	808	0	100	459	0	141	730	0
Confl. Peds. (#/hr)			3			32	15		8	8		15
Confl. Bikes (#/hr)			8			5			6			41
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	16.9	32.4		7.7	23.2		31.4	31.4		31.4	31.4	
Effective Green, g (s)	17.4	31.9		8.2	22.7		32.9	32.9		32.9	32.9	
Actuated g/C Ratio	0.20	0.38		0.10	0.27		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	362	1272		170	893		169	1339		300	1296	
v/s Ratio Prot	c0.16	0.17		0.05	c0.24			0.13			0.22	
v/s Ratio Perm							c0.23			0.18		
v/c Ratio	0.80	0.46		0.53	0.90		0.59	0.34		0.47	0.56	
Uniform Delay, d1	32.2	20.0		36.6	30.1		20.7	18.4		19.5	20.4	
Progression Factor	1.00	1.00		1.06	1.10		1.16	1.17		1.00	1.00	
Incremental Delay, d2	11.4	0.1		0.6	5.8		13.5	0.7		5.2	1.8	
Delay (s)	43.5	20.1		39.2	39.0		37.6	22.3		24.7	22.2	
Level of Service	D	C		D	D		D	C		C	C	
Approach Delay (s)		27.6			39.1			24.9			22.6	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Telegraph Ave. & 40th St.

8/26/2014

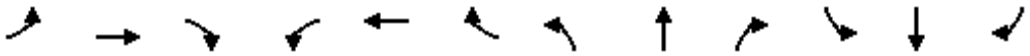
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	301	922	371	75	683	370	484	1228	56	170	838	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.94		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1735	3166		1770	3145		1770	3493		1770	3345	
Flt Permitted	0.16	1.00		0.16	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	286	3166		292	3145		1770	3493		1770	3345	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	301	922	371	75	683	370	484	1228	56	170	838	275
RTOR Reduction (vph)	0	54	0	0	91	0	0	4	0	0	12	0
Lane Group Flow (vph)	301	1239	0	75	962	0	484	1280	0	170	1101	0
Confl. Peds. (#/hr)	140		183	183		140			129			59
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	25.5	25.5		25.5	25.5		13.5	29.8		11.2	27.5	
Effective Green, g (s)	25.5	25.5		25.5	25.5		13.5	29.8		11.2	27.5	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.17	0.37		0.14	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	91	1009		93	1002		298	1301		247	1149	
v/s Ratio Prot		0.39			0.31		c0.27	c0.37		0.10	0.33	
v/s Ratio Perm	c1.05			0.26								
v/c Ratio	3.31	1.23		0.81	0.96		1.62	0.98		0.69	0.96	
Uniform Delay, d1	27.2	27.2		25.0	26.8		33.2	24.9		32.7	25.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1066.1	111.5		36.4	19.4		295.8	21.4		6.2	18.2	
Delay (s)	1093.3	138.7		61.4	46.1		329.0	46.3		39.0	43.9	
Level of Service	F	F		E	D		F	D		D	D	
Approach Delay (s)		319.0			47.2			123.7			43.2	
Approach LOS		F			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	144.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.03		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	124.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Telegraph Ave. & W MacArthur Blvd.

8/26/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	112	705	319	200	816	334	310	1173	80	313	807	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.97			0.97		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.96			0.96		1.00	0.99		1.00	0.97	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4702			4723		1751	3489		1760	3392	
Flt Permitted		0.65			0.65		0.18	1.00		0.10	1.00	
Satd. Flow (perm)		3085			3099		325	3489		190	3392	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	112	705	319	200	816	334	310	1173	80	313	807	190
RTOR Reduction (vph)	0	46	0	0	3	0	0	3	0	0	14	0
Lane Group Flow (vph)	0	1090	0	0	1347	0	310	1250	0	313	983	0
Confl. Peds. (#/hr)	83		81	81		83	56		57	57		56
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Effective Green, g (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Actuated g/C Ratio		0.44			0.44		0.44	0.44		0.44	0.44	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1345			1351		144	1549		84	1506	
v/s Ratio Prot								0.36			0.29	
v/s Ratio Perm		0.35			c0.43		0.95			c1.65		
v/c Ratio		0.81			1.39dl		2.15	0.81		3.73	0.65	
Uniform Delay, d1		21.6			24.7		24.4	21.1		24.4	19.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.6			23.6		541.1	3.0		1255.4	0.8	
Delay (s)		25.2			48.3		565.5	24.1		1279.8	19.9	
Level of Service		C			D		F	C		F	B	
Approach Delay (s)		25.2			48.3			131.5			320.9	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	134.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.53		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	15.5
Intersection Capacity Utilization	123.3%	ICU Level of Service	H
Analysis Period (min)	15		

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

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Telegraph Ave. & 27th St.

8/26/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	640	160	90	690	386	230	781	170	429	844	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.95		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3395		1770	3305		1767	3421		1767	3331	
Flt Permitted	0.95	1.00		0.95	1.00		0.10	1.00		0.20	1.00	
Satd. Flow (perm)	1770	3395		1770	3305		188	3421		371	3331	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	640	160	90	690	386	230	781	170	429	844	400
RTOR Reduction (vph)	0	24	0	0	88	0	0	22	0	0	68	0
Lane Group Flow (vph)	200	776	0	90	988	0	230	929	0	429	1176	0
Confl. Peds. (#/hr)			30			18	14		9	9		14
Confl. Bikes (#/hr)			14			5			38			20
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	9.8	26.1		7.1	23.4		38.3	38.3		38.3	38.3	
Effective Green, g (s)	10.3	25.6		7.6	22.9		39.8	39.8		39.8	39.8	
Actuated g/C Ratio	0.12	0.30		0.09	0.27		0.47	0.47		0.47	0.47	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	214	1022		158	890		88	1601		173	1559	
v/s Ratio Prot	c0.11	c0.23		0.05	c0.30			0.27			0.35	
v/s Ratio Perm							c1.22			1.16		
v/c Ratio	0.93	0.76		0.57	1.11		2.61	0.58		2.48	0.75	
Uniform Delay, d1	37.0	26.9		37.1	31.1		22.6	16.5		22.6	18.6	
Progression Factor	1.00	1.00		0.89	1.29		0.99	0.90		0.86	0.89	
Incremental Delay, d2	42.8	2.9		0.3	51.5		748.6	1.1		681.7	3.2	
Delay (s)	79.8	29.8		33.4	91.6		770.9	15.9		701.2	19.8	
Level of Service	E	C		C	F		F	B		F	B	
Approach Delay (s)		39.8			87.1			163.0			194.5	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	131.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.89		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	480	260	90	520	130	150	390	70	90	920	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1723	3280		1745	3371		1770	3385		1770	3368	
Flt Permitted	0.26	1.00		0.21	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	478	3280		381	3371		1770	3385		1770	3368	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	190	480	260	90	520	130	150	390	70	90	920	250
RTOR Reduction (vph)	0	85	0	0	26	0	0	15	0	0	28	0
Lane Group Flow (vph)	190	655	0	90	624	0	150	445	0	90	1142	0
Confl. Peds. (#/hr)	81		52	52		81			112			59
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	26.5	26.5		26.5	26.5		11.7	36.6		8.4	33.3	
Effective Green, g (s)	26.5	26.5		26.5	26.5		11.7	36.6		8.4	33.3	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.14	0.43		0.10	0.39	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	149	1023		119	1051		244	1458		175	1319	
v/s Ratio Prot		0.20			0.19		c0.08	c0.13		0.05	c0.34	
v/s Ratio Perm	c0.40			0.24								
v/c Ratio	1.28	0.64		0.76	0.59		0.61	0.30		0.51	0.87	
Uniform Delay, d1	29.2	25.1		26.3	24.7		34.5	15.9		36.4	23.8	
Progression Factor	1.00	1.00		1.00	1.00		0.89	0.94		1.00	1.00	
Incremental Delay, d2	165.7	1.3		23.6	0.9		4.2	0.5		2.5	7.8	
Delay (s)	194.9	26.5		49.9	25.6		34.8	15.4		38.9	31.6	
Level of Service	F	C		D	C		C	B		D	C	
Approach Delay (s)		60.9			28.6			20.2			32.1	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	970	220	60	390	70	220	440	150	390	770	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.99	1.00	
Frt		0.97			0.98		1.00	0.96		1.00	0.97	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4881			4921		1762	3369		1749	3423	
Flt Permitted		0.82			0.71		0.21	1.00		0.38	1.00	
Satd. Flow (perm)		4008			3513		398	3369		706	3423	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	110	970	220	60	390	70	220	440	150	390	770	170
RTOR Reduction (vph)	0	40	0	0	35	0	0	29	0	0	17	0
Lane Group Flow (vph)	0	1260	0	0	485	0	220	561	0	390	923	0
Confl. Peds. (#/hr)	34		41			34	21		29	29		21
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		34.1			34.1		40.4	40.4		40.4	40.4	
Effective Green, g (s)		34.1			34.1		40.4	40.4		40.4	40.4	
Actuated g/C Ratio		0.40			0.40		0.48	0.48		0.48	0.48	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1608			1409		189	1601		336	1627	
v/s Ratio Prot								0.17			0.27	
v/s Ratio Perm		c0.31			0.14		c0.55			0.55		
v/c Ratio		0.78			0.34		1.16	0.35		1.16	0.57	
Uniform Delay, d1		22.2			17.7		22.3	14.0		22.3	16.0	
Progression Factor		1.12			1.00		1.00	1.00		1.05	0.97	
Incremental Delay, d2		2.3			0.1		116.6	0.6		90.7	0.9	
Delay (s)		27.2			17.7		138.9	14.6		114.1	16.4	
Level of Service		C			B		F	B		F	B	
Approach Delay (s)		27.2			17.7			48.4			45.1	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	460	150	90	620	240	100	420	60	150	580	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3392		1770	3342		1763	3463		1763	3354	
Flt Permitted	0.95	1.00		0.95	1.00		0.23	1.00		0.41	1.00	
Satd. Flow (perm)	1770	3392		1770	3342		423	3463		765	3354	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	460	150	90	620	240	100	420	60	150	580	210
RTOR Reduction (vph)	0	31	0	0	47	0	0	13	0	0	42	0
Lane Group Flow (vph)	290	579	0	90	813	0	100	467	0	150	748	0
Confl. Peds. (#/hr)			3			32	15		8	8		15
Confl. Bikes (#/hr)			8			5			6			41
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	16.9	32.4		7.7	23.2		31.4	31.4		31.4	31.4	
Effective Green, g (s)	17.4	31.9		8.2	22.7		32.9	32.9		32.9	32.9	
Actuated g/C Ratio	0.20	0.38		0.10	0.27		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	362	1273		171	893		164	1340		296	1298	
v/s Ratio Prot	c0.16	0.17		0.05	c0.24			0.13			0.22	
v/s Ratio Perm							c0.24			0.20		
v/c Ratio	0.80	0.45		0.53	0.91		0.61	0.35		0.51	0.58	
Uniform Delay, d1	32.2	20.0		36.6	30.2		20.9	18.5		19.9	20.6	
Progression Factor	1.00	1.00		1.05	1.10		1.15	1.17		1.00	1.00	
Incremental Delay, d2	11.4	0.1		0.6	6.3		14.9	0.7		6.1	1.9	
Delay (s)	43.5	20.1		39.1	39.6		39.0	22.3		25.9	22.4	
Level of Service	D	C		D	D		D	C		C	C	
Approach Delay (s)		27.6			39.5			25.2			23.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

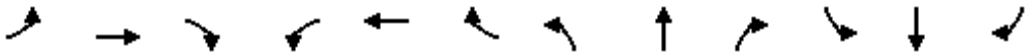
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	920	360	90	690	370	480	1290	80	170	900	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.94		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1735	3173		1770	3147		1770	3478		1770	3363	
Flt Permitted	0.16	1.00		0.16	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	287	3173		292	3147		1770	3478		1770	3363	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	920	360	90	690	370	480	1290	80	170	900	260
RTOR Reduction (vph)	0	52	0	0	89	0	0	6	0	0	12	0
Lane Group Flow (vph)	270	1228	0	90	971	0	480	1364	0	170	1148	0
Confl. Peds. (#/hr)	140		183	183		140			129			59
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	25.5	25.5		25.5	25.5		13.5	29.8		11.2	27.5	
Effective Green, g (s)	25.5	25.5		25.5	25.5		13.5	29.8		11.2	27.5	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.17	0.37		0.14	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	91	1011		93	1003		299	1296		248	1156	
v/s Ratio Prot		0.39			0.31		c0.27	c0.39		0.10	0.34	
v/s Ratio Perm	c0.94			0.31								
v/c Ratio	2.97	1.21		0.97	0.97		1.61	1.05		0.69	0.99	
Uniform Delay, d1	27.2	27.2		26.8	26.9		33.2	25.1		32.7	26.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	914.1	105.9		81.5	20.8		287.5	40.1		6.1	24.8	
Delay (s)	941.3	133.1		108.3	47.6		320.8	65.2		38.9	50.9	
Level of Service	F	F		F	D		F	E		D	D	
Approach Delay (s)		273.9			52.4			131.5			49.4	
Approach LOS		F			D			F			D	

Intersection Summary			
HCM Average Control Delay	135.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	124.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	740	350	200	820	340	320	1200	80	290	810	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.97			0.97		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.96			0.96		1.00	0.99		1.00	0.97	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4698			4723		1752	3491		1760	3387	
Flt Permitted		0.65			0.65		0.17	1.00		0.10	1.00	
Satd. Flow (perm)		3084			3086		316	3491		190	3387	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	740	350	200	820	340	320	1200	80	290	810	200
RTOR Reduction (vph)	0	43	0	0	2	0	0	3	0	0	15	0
Lane Group Flow (vph)	0	1247	0	0	1358	0	320	1277	0	290	995	0
Confl. Peds. (#/hr)	83		81	81		83	56		57	57		56
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Effective Green, g (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Actuated g/C Ratio		0.44			0.44		0.44	0.44		0.44	0.44	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1345			1346		140	1551		84	1504	
v/s Ratio Prot								0.37			0.29	
v/s Ratio Perm		0.40			c0.44		1.01			c1.53		
v/c Ratio		1.45dl			1.80dl		2.29	0.82		3.45	0.66	
Uniform Delay, d1		23.4			24.8		24.4	21.4		24.4	19.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.9			26.7		600.6	3.5		1133.0	0.9	
Delay (s)		34.3			51.4		625.0	24.9		1157.4	20.1	
Level of Service		C			D		F	C		F	C	
Approach Delay (s)		34.3			51.4			144.9			273.8	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	126.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.23		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	10.5
Intersection Capacity Utilization	126.1%	ICU Level of Service	H
Analysis Period (min)	15		

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

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	640	160	90	690	400	230	800	170	440	860	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3395		1770	3300		1767	3423		1767	3334	
Flt Permitted	0.95	1.00		0.95	1.00		0.10	1.00		0.19	1.00	
Satd. Flow (perm)	1770	3395		1770	3300		186	3423		360	3334	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	640	160	90	690	400	230	800	170	440	860	400
RTOR Reduction (vph)	0	25	0	0	85	0	0	22	0	0	66	0
Lane Group Flow (vph)	200	775	0	90	1005	0	230	948	0	440	1194	0
Confl. Peds. (#/hr)			30			18	14		9	9		14
Confl. Bikes (#/hr)			14			5			38			20
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	9.5	25.9		7.0	23.4		38.6	38.6		38.6	38.6	
Effective Green, g (s)	10.0	25.4		7.5	22.9		40.1	40.1		40.1	40.1	
Actuated g/C Ratio	0.12	0.30		0.09	0.27		0.47	0.47		0.47	0.47	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	208	1015		156	889		88	1615		170	1573	
v/s Ratio Prot	c0.11	0.23		0.05	c0.30			0.28			0.36	
v/s Ratio Perm							c1.24			1.22		
v/c Ratio	0.96	0.76		0.58	1.13		2.61	0.59		2.59	0.76	
Uniform Delay, d1	37.3	27.1		37.2	31.1		22.4	16.4		22.4	18.5	
Progression Factor	1.00	1.00		0.89	1.28		0.98	0.90		0.86	0.89	
Incremental Delay, d2	50.9	3.1		0.3	60.4		748.9	1.1		730.4	3.3	
Delay (s)	88.2	30.2		33.3	100.2		770.8	15.8		749.8	19.8	
Level of Service	F	C		C	F		F	B		F	B	
Approach Delay (s)		41.8			95.1			160.6			208.7	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	138.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.91		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

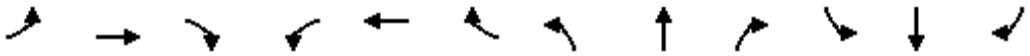
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	480	260	90	520	130	150	390	70	90	920	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1761	3280		1766	3371		1770	3385		1770	3368	
Flt Permitted	0.23	1.00		0.19	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	425	3280		360	3371		1770	3385		1770	3368	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	190	480	260	90	520	130	150	390	70	90	920	250
RTOR Reduction (vph)	0	88	0	0	27	0	0	16	0	0	28	0
Lane Group Flow (vph)	190	652	0	90	623	0	150	444	0	90	1142	0
Confl. Peds. (#/hr)	81		52	52		81			112			59
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	28.6	24.6		27.0	23.8		8.1	32.2		7.5	31.6	
Effective Green, g (s)	28.6	24.6		27.0	23.8		8.1	32.2		7.5	31.6	
Actuated g/C Ratio	0.34	0.29		0.32	0.28		0.10	0.38		0.09	0.37	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	949		167	944		169	1282		156	1252	
v/s Ratio Prot	c0.04	0.20		0.02	0.18		c0.08	0.13		0.05	c0.34	
v/s Ratio Perm	c0.27			0.15								
v/c Ratio	0.92	0.69		0.54	0.66		0.89	0.35		0.58	0.91	
Uniform Delay, d1	26.5	26.8		21.7	27.0		38.0	18.9		37.2	25.4	
Progression Factor	1.00	1.00		1.00	1.00		0.76	0.94		1.00	1.00	
Incremental Delay, d2	41.4	2.1		3.3	1.7		36.6	0.7		5.1	11.6	
Delay (s)	67.9	28.9		25.0	28.7		65.6	18.5		42.3	37.0	
Level of Service	E	C		C	C		E	B		D	D	
Approach Delay (s)		36.8			28.3			30.1			37.3	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM Average Control Delay	34.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	970	220	60	390	70	220	440	150	390	770	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.99	1.00	
Frt		0.97			0.98		1.00	0.96		1.00	0.97	
Flt Protected		1.00			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4881			4921		1762	3369		1749	3423	
Flt Permitted		0.82			0.71		0.21	1.00		0.38	1.00	
Satd. Flow (perm)		4008			3513		398	3369		706	3423	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	110	970	220	60	390	70	220	440	150	390	770	170
RTOR Reduction (vph)	0	40	0	0	35	0	0	29	0	0	17	0
Lane Group Flow (vph)	0	1260	0	0	485	0	220	561	0	390	923	0
Confl. Peds. (#/hr)	34		41			34	21		29	29		21
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		34.1			34.1		40.4	40.4		40.4	40.4	
Effective Green, g (s)		34.1			34.1		40.4	40.4		40.4	40.4	
Actuated g/C Ratio		0.40			0.40		0.48	0.48		0.48	0.48	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1608			1409		189	1601		336	1627	
v/s Ratio Prot								0.17			0.27	
v/s Ratio Perm		c0.31			0.14		c0.55			0.55		
v/c Ratio		0.78			0.34		1.16	0.35		1.16	0.57	
Uniform Delay, d1		22.2			17.7		22.3	14.0		22.3	16.0	
Progression Factor		1.12			1.00		1.00	1.00		0.91	0.84	
Incremental Delay, d2		2.3			0.1		116.6	0.6		90.8	0.9	
Delay (s)		27.2			17.7		138.9	14.6		111.0	14.4	
Level of Service		C			B		F	B		F	B	
Approach Delay (s)		27.2			17.7			48.4			42.7	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	460	150	90	620	240	100	420	60	150	580	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3392		1770	3342		1763	3463		1763	3354	
Flt Permitted	0.95	1.00		0.95	1.00		0.23	1.00		0.41	1.00	
Satd. Flow (perm)	1770	3392		1770	3342		423	3463		765	3354	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	460	150	90	620	240	100	420	60	150	580	210
RTOR Reduction (vph)	0	31	0	0	47	0	0	13	0	0	42	0
Lane Group Flow (vph)	290	579	0	90	813	0	100	467	0	150	748	0
Confl. Peds. (#/hr)			3			32	15		8	8		15
Confl. Bikes (#/hr)			8			5			6			41
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	16.9	32.4		7.7	23.2		31.4	31.4		31.4	31.4	
Effective Green, g (s)	17.4	31.9		8.2	22.7		32.9	32.9		32.9	32.9	
Actuated g/C Ratio	0.20	0.38		0.10	0.27		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	362	1273		171	893		164	1340		296	1298	
v/s Ratio Prot	c0.16	0.17		0.05	c0.24			0.13			0.22	
v/s Ratio Perm							c0.24			0.20		
v/c Ratio	0.80	0.45		0.53	0.91		0.61	0.35		0.51	0.58	
Uniform Delay, d1	32.2	20.0		36.6	30.2		20.9	18.5		19.9	20.6	
Progression Factor	1.00	1.00		1.05	1.10		1.15	1.17		1.00	1.00	
Incremental Delay, d2	11.4	0.1		0.6	6.3		14.9	0.7		6.1	1.9	
Delay (s)	43.5	20.1		39.1	39.6		39.0	22.3		25.9	22.4	
Level of Service	D	C		D	D		D	C		C	C	
Approach Delay (s)		27.6			39.5			25.2			23.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: 40th St. & Telegraph Ave.

6/16/2014

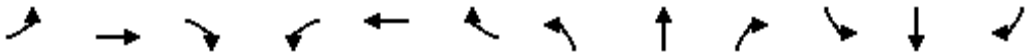
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	920	360	90	690	370	480	1290	80	170	900	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.94		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3173		1770	3147		1770	3478		1770	3363	
Flt Permitted	0.17	1.00		0.18	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	323	3173		334	3147		1770	3478		1770	3363	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	920	360	90	690	370	480	1290	80	170	900	260
RTOR Reduction (vph)	0	50	0	0	87	0	0	6	0	0	34	0
Lane Group Flow (vph)	270	1230	0	90	973	0	480	1364	0	170	1126	0
Confl. Peds. (#/hr)	140		183	183		140			129			59
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	27.1	23.1		25.5	22.3		13.5	30.7		5.5	22.7	
Effective Green, g (s)	27.1	23.1		25.5	22.3		13.5	30.7		5.5	22.7	
Actuated g/C Ratio	0.34	0.29		0.32	0.28		0.17	0.38		0.07	0.28	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	182	916		164	877		299	1335		122	954	
v/s Ratio Prot	c0.07	0.39		0.02	0.31		c0.27	0.39		0.10	c0.33	
v/s Ratio Perm	c0.43			0.15								
v/c Ratio	1.48	1.34		0.55	1.11		1.61	1.02		1.39	1.18	
Uniform Delay, d1	26.8	28.4		21.8	28.9		33.2	24.6		37.2	28.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	244.6	161.4		3.7	64.9		287.5	30.4		219.2	92.2	
Delay (s)	271.4	189.8		25.5	93.8		320.8	55.0		256.5	120.8	
Level of Service	F	F		C	F		F	E		F	F	
Approach Delay (s)		204.0			88.4			124.0			138.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	141.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: W MacArthur Blvd. & Telegraph Ave.

6/16/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	740	350	200	820	340	320	1200	80	290	810	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor		0.91			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.97			0.97		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.96			0.96		1.00	0.99		1.00	0.97	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4698			4723		1752	3491		1760	3387	
Flt Permitted		0.65			0.65		0.17	1.00		0.10	1.00	
Satd. Flow (perm)		3084			3086		316	3491		190	3387	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	740	350	200	820	340	320	1200	80	290	810	200
RTOR Reduction (vph)	0	43	0	0	2	0	0	3	0	0	15	0
Lane Group Flow (vph)	0	1247	0	0	1358	0	320	1277	0	290	995	0
Confl. Peds. (#/hr)	83		81	81		83	56		57	57		56
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Effective Green, g (s)		38.3			38.3		39.0	39.0		39.0	39.0	
Actuated g/C Ratio		0.44			0.44		0.44	0.44		0.44	0.44	
Clearance Time (s)		5.5			5.5		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1345			1346		140	1551		84	1504	
v/s Ratio Prot								0.37			0.29	
v/s Ratio Perm		0.40			c0.44		1.01			c1.53		
v/c Ratio		1.45dl			1.80dl		2.29	0.82		3.45	0.66	
Uniform Delay, d1		23.4			24.8		24.4	21.4		24.4	19.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.9			26.7		600.6	3.5		1133.0	0.9	
Delay (s)		34.3			51.4		625.0	24.9		1157.4	20.1	
Level of Service		C			D		F	C		F	C	
Approach Delay (s)		34.3			51.4			144.9			273.8	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	126.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.23		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	10.5
Intersection Capacity Utilization	126.1%	ICU Level of Service	H
Analysis Period (min)	15		

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

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: 27th St. & Telegraph Ave.

6/16/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	640	160	90	690	400	230	800	170	440	860	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.94		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3395		1770	3300		1767	3423		1767	3334	
Flt Permitted	0.95	1.00		0.95	1.00		0.10	1.00		0.19	1.00	
Satd. Flow (perm)	1770	3395		1770	3300		186	3423		360	3334	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	640	160	90	690	400	230	800	170	440	860	400
RTOR Reduction (vph)	0	25	0	0	85	0	0	22	0	0	66	0
Lane Group Flow (vph)	200	775	0	90	1005	0	230	948	0	440	1194	0
Confl. Peds. (#/hr)			30			18	14		9	9		14
Confl. Bikes (#/hr)			14			5			38			20
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	9.5	25.9		7.0	23.4		38.6	38.6		38.6	38.6	
Effective Green, g (s)	10.0	25.4		7.5	22.9		40.1	40.1		40.1	40.1	
Actuated g/C Ratio	0.12	0.30		0.09	0.27		0.47	0.47		0.47	0.47	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	208	1015		156	889		88	1615		170	1573	
v/s Ratio Prot	c0.11	0.23		0.05	c0.30			0.28			0.36	
v/s Ratio Perm							c1.24			1.22		
v/c Ratio	0.96	0.76		0.58	1.13		2.61	0.59		2.59	0.76	
Uniform Delay, d1	37.3	27.1		37.2	31.1		22.4	16.4		22.4	18.5	
Progression Factor	1.00	1.00		0.89	1.28		0.98	0.90		0.86	0.89	
Incremental Delay, d2	50.9	3.1		0.3	60.4		748.9	1.1		730.4	3.3	
Delay (s)	88.2	30.2		33.3	100.2		770.8	15.8		749.8	19.8	
Level of Service	F	C		C	F		F	B		F	B	
Approach Delay (s)		41.8			95.1			160.6			208.7	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	138.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.91		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			