



Gadsden School District Schools

Traffic Impact Analysis and
Traffic Signal Needs Assessment

San Luis, Arizona

September 2015

CivTech Project No. 15-860

Prepared For:

Core Engineering Group, PLLC
200 East 16th Street, Suite 150
Yuma, Arizona 85364

For Submittal to:

City of San Luis

Prepared By:



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GADSDEN SCHOOL DISTRICT SCHOOLS TRAFFIC IMPACT ANALYSIS AND TRAFFIC SIGNAL NEEDS ASSESSMENT

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EXECUTIVE SUMMARY

This report documents a traffic impact study and a traffic signal needs assessment performed to analyze alternative access scenarios being considered for the site of three Gadsden Elementary School District schools: two elementary schools (Arizona Desert and Rio Colorado) and the San Luis Middle School. This study was prompted by the need for the District to define permanent (i.e., paved) access on a parcel of State Trust Land east of the site that has been improperly used as for access to the site. At present, the only paved access is from US 95 on the west side of the site while most trips to/from the site are via two unpaved accesses across the State Trust Land. In the absence of any TIA guidelines having been formally adopted by the City of San Luis, CivTech prepared this study in conformance with the City of Yuma's traffic impact study guidelines as outlined in Yuma Standard No. 2-100 and detailed in separate *Traffic Impact Study Guidelines* dated September 20, 2006. These guidelines recommend that text be kept to a minimum.

Three options are considered herein: **Option A**, the 1st Street option, is paving southerly from the southeast corner of the site to intersect Juan Sanchez Boulevard opposite 1st Street. **Option B**, the Union Street/4th Avenue option, is paving easterly from the southeast corner of the site to intersect 4th Avenue across from Union Street while the school children and other pedestrians would continue to cross at the existing crosswalk at 1st Street, which would be upgraded to a new pedestrian hybrid beacon (PHB) or rectangular rapid flashing beacon (RRFB), and site-generated vehicular traffic would be directed east to 4th Avenue at Union Street to Juan Sanchez Boulevard, at which it is recommended a traffic signal be installed. **Option C** would provide the two paved accesses described above with the access at 1st Street at Juan Sanchez Boulevard having a westbound right turn lane and movements restricted to right-in/right-out only; the schoolchildren and other pedestrians would continue to cross at 1st Street and some vehicular traffic will be directed east to 4th Avenue at Union Street, which would be converted to an all-way stop or a traffic signal.

The following conclusions and recommendations are documented in this study:

- ◆ The AM and PM peak hour intersection level of service analyses for the existing conditions and the conditions expected under each option revealed the following on an intersection-by-intersection basis:
 - 4th Avenue & Union Street – The analyses revealed that implementation of Option A and the closure of the de facto west leg of the intersection, should improve existing good levels of service to better levels of service north- and southbound. Bringing traffic across from the schools to 4th Avenue under Option B or C increases the inbound trips in the morning, specifically the site-bound, northbound left turns, which is expected to cause average delays of 43.7 seconds (nearly $\frac{3}{4}$ of a minute) for the northbound movement. While such delays are considered LOS E at the unsignalized intersection, as noted above, similar waits would be LOS D if this were a signalized intersection. Under Option C, in which some of the trips would not be redirected from 1st Street,

- the inbound volumes are lower in the morning than with Option B and no movements operate at poor or unacceptable levels of service
- 4th Avenue & Arizona Street – The analyses revealed that this intersection would be little affected by either option. All movements would continue to operate at LOS C or better under any of the options.
 - 4th Avenue & Juan Sanchez Boulevard – The analyses revealed that, under Option A, without installation of a traffic signal (or conversion to an all-way stop, which would spread the delays around), the north- and southbound movements are expected to operate at poor to failing levels of service. With the installation of a traffic signal, as is assumed under Options B and C, it is expected that the all movements approaching the intersection would operate at not less than LOS C or with an average delay of more than 35 seconds.
 - 1st Street & Juan Sanchez Boulevard – Under Option A, with the intersection remaining as-is and only the existing 4th Avenue traffic redirected to 1st Street, there is little change from the existing condition with east- and westbound Juan Sanchez Boulevard operating at similar levels of service with delays of similar magnitude and a law enforcement officer still required each school day. Under Option B, the existing southbound approach would be effectively closed, the existing crosswalk would be left in place and converted to a PHB or RRFB (the effect of which, unfortunately, cannot be analyzed using HCM 2010 methods), and, with removal of the stop signs on Juan Sanchez Boulevard, the intersection would be converted from an all-way to a one-way stop (northbound approach only). The analyses revealed that the levels of service should be improved on Juan Sanchez Boulevard during the AM peak hour and should operate at about the same LOS during the PM peak hour and the stop-controlled northbound approach would operate at LOS D. Under Option C, with all-way stop control, both accesses paved, a new westbound right turn lane into 1st Street, and the conversion of the pedestrian crossing to a PHB or RRFB, the only average delays expected to operate at poor levels of service are the east- and westbound through movements during the PM peak hour. The eastbound through movement is expected to operate at LOS F with an average delay of 62.0 seconds, just over a minute. The westbound through movement is expected to operate at LOS E with an average delay of 37.3 seconds, less than $\frac{2}{3}$ of a minute. The eastbound delay of 62.0 seconds would be considered a “high” LOS E at a signalized intersection (55 seconds is the break point between LOS D and LOS E) and the westbound delay of 37.3 seconds would be a high LOS D at a signalized intersection (35 seconds is the break point between LOS C and LOS D).
 - *Analysis:* Based on the levels of service and V/C ratios on the intersection approaches, Option C, consisting of two paved accesses with access restricted to right-in/right-out only at 1st Street, a westbound right turn lane approaching 1st Street, the existing pedestrian crossing upgraded to a PHB or RRFB, and a traffic signal installed at 4th Avenue and Juan Sanchez Boulevard, offers the best comprehensive approach without having to construct capacity improvements (additional lanes, etc.) at any of the intersections.

- ◆ To summarize the traffic signal needs assessment, a traffic signal at the intersection of 4th Avenue and Juan Sanchez Boulevard may currently be warranted. However, it must be cautioned that satisfying a warrant does not dictate that a traffic signal must be installed. If the City determines that the anticipated delays at the intersection in an all-way stop condition are acceptable for the foreseeable future, then a signal does not have to be provided. This may be part of a “wait-and-see” approach to see if the predicted delays actually occur. With the existing all-way stop at 1st Street, traffic may be metered such that the anticipated delays do not materialize.
- ◆ The heavy pedestrian volumes at 1st Street revealed that pedestrians do not require sidewalks; however, separate facilities for motorized and non-motorized travel are desirable if such can be provided. The following is a summary of areas where sidewalk is not currently provided along the routes to the schools:
 - 1st Street – east and west sides, Juan Sanchez Boulevard south to E Street
 - 4th Avenue – west side, Juan Sanchez Boulevard south to E Street
 - 4th Avenue – east side, Juan Sanchez Boulevard south to south of E Street
 - 4th Avenue – east side, Juan Sanchez Boulevard north to Arizona Street
 - 4th Avenue – west side, Juan Sanchez Boulevard north to Union Street
 - Juan Sanchez Boulevard – north and south sides, 1st Street to 4th Avenue
- ◆ CivTech recommends Option C as the preferred alternative. Under Option C, with two paved accesses and the access to Juan Sanchez Boulevard at 1st Street restricted to right-in/right-out movements only, some portion of the vehicular trips will be directed from the school site to the east to 4th Avenue and the majority of the schoolchildren will be allowed to cross at 1st Street as they currently do. The operation of the existing crosswalk would be enhanced by upgrading to a PHB or RRFB crossing and a school crossing guard could be used instead of a law enforcement officer as is now needed. The operation of the intersection of 4th Avenue and Juan Sanchez Boulevard would also be enhanced by the installation of a traffic signal, warrants for which are already satisfied by existing traffic volumes.

INTRODUCTION

The Arizona State Land Department is allowing the City of San Luis and/or the Gadsden Elementary School District to define the extent of permanent, paved access across State Trust Land located immediately east of the site of three schools. The schools are located east of US 95/Main Street and north of Joe Orduño Memorial Park and the San Luis Recreation Center. New vehicular access will be constructed on the State Trust Land to replace two unpaved paths. At present, the only paved access is from US 95 on the west side of the site and most trips to/from the site are via unpaved accesses on the east side of the site. **Figure 1** is a vicinity map showing the study area.

PURPOSE OF REPORT AND STUDY OBJECTIVES

CivTech Inc. was retained by Core Engineering Group of Yuma to prepare this Traffic Impact Analysis and Traffic Signal Needs Assessment (TIA).

The purpose of this report is to assist Core in identifying in terms of traffic impacts appropriate routing for the new access by analyzing the impacts on the existing roadway network of two potential routes that would follow either or both of two existing unpaved paths now in use: one that would extend easterly across a parcel of undeveloped State Trust Land to 4th Avenue and a second route that would extend southerly, intersecting Juan Sanchez Boulevard across from 1st Avenue. In the absence of any TIA guidelines having been formally adopted by the City of San Luis, CivTech prepared this study in conformance with the City of Yuma's traffic impact study guidelines as outlined in Yuma Standard No. 2-100 and detailed in separate *Traffic Impact Study Guidelines* dated September 20, 2006. These guidelines recommend that text be kept to a minimum. The specific objectives of the study are:

- ◆ To determine the effect of each of the potential alternatives being considered to provide the necessary access; and
- ◆ Assess the need for a traffic control signal at either 1st Avenue or 4th Avenue and Juan Sanchez Boulevard, dependent on the result of the alternatives analysis.

An unsealed draft of this document was reviewed by City staff. CivTech received comments (see **Appendix A**) and revised this final version accordingly. Formal responses to the City comments were not prepared.

Study Area

The scope of the study includes the following intersections:

- ◆ 4th Avenue and Union Street
- ◆ 4th Avenue and Arizona Street
- ◆ 4th Avenue and Juan Sanchez Boulevard
- ◆ 1st Street and Juan Sanchez Boulevard
- ◆ US 95/Main Street and Main Access (site traffic only considered)

Analysis Years

This study will analyze two alternate routes briefly described above using the existing volumes and a third option which allows the majority of school children to continue to cross at 1st Street. The new vehicular access is expected to be paved later in 2015 or in early 2016.

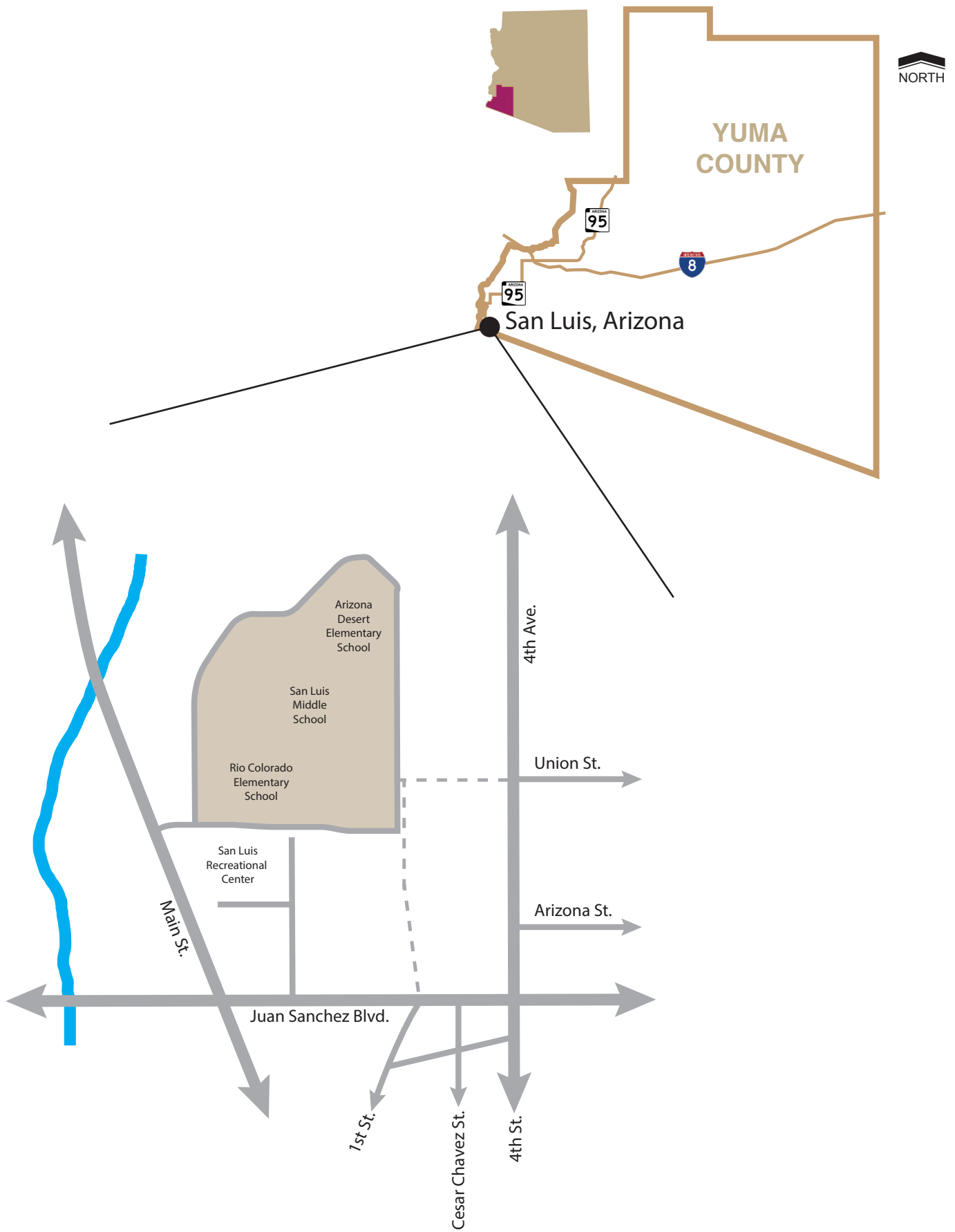


Figure 1: Vicinity Map

EXISTING CONDITIONS

The study area consists of four intersections plus an existing driveway that are located around the site of three Gadsden Elementary School District schools: two elementary schools (Arizona Desert and Rio Colorado) and the San Luis Middle School. Joe Orduño Memorial Park, in which is located the San Luis Recreation Center, is to the south of the site. The De Santiago Auto Center is to the west, between the schools and US 95/Main Street. There is a vacant parcel of State Trust Land to the east and the Main Canal runs generally southwest-northeast separating the auto center and the schools from a residential neighborhood.

Regarding the State Trust Land, CivTech understands that there is no right of access for anyone to traverse the parcel; yet, over time vehicles have worn two existing paths, both from the southeast corner of the schools complex, one to the south toward 1st Street and one to the east toward Union Street, into the surface. The Arizona State Land Department is allowing the City and/or District to define the extent of the access required so that the necessary land can be provided.

Due to the heavy use of these unofficial roadways, the City of San Luis must provide a law enforcement officer every school day morning and afternoon at the intersection 1st Street at Juan Sanchez Boulevard at considerable expense to the City. Trained officers are required because they direct traffic, which a school crossing guard is not permitted to do. The officer is used due to concerns over eastbound Juan Sanchez Boulevard traffic backing up to Main Street/US 95.

ROADWAY NETWORK AND INTERSECTION CONFIGURATION

4th Avenue is a north-south roadway that begins ½ mile south of Juan Sanchez Boulevard at Urtuzuastegui (or “U”) Street and extends nearly 1½ miles north to County 22nd Street. North of Juan Sanchez Boulevard, it is striped to provide one lane in each direction. with a continuous two-way left turn lane to and then narrows to two lanes and serves as a minor collector roadway with no direct accesses from adjacent properties. South of Juan Sanchez Boulevard, 4th Avenue is not striped and serves as a local residential street. Beginning south of E Street it widens and has curb and gutter and sidewalk.

1st Street is a north-south roadway that begins at the US/Mexico border crossing south of at U Street and extends north through non-residential areas to Juan Sanchez Boulevard, it is striped to provide one lane in each direction its entire length. Beginning at E Street, it widens and has curb and gutter and sidewalk to the south. 1st Street and 4th Avenue are approximately 550 feet apart.

Juan Sanchez is an east-west roadway within the City of San Luis that was abandoned by the Arizona Department of Transportation (ADOT) to the City. The section of Juan Sanchez Boulevard within the City limits was at one time designated State Route 195 (SR 195), which was constructed as a bypass or an alternative for US 95 from the US-Mexico border to Yuma. SR 195 begins approximately four and one-half miles east of 4th Avenue on Juan Sanchez Boulevard. Beginning east of 4th Avenue, on the westbound approach to 4th Avenue, and continuing to west of US 95/Main Street, Juan Sanchez Boulevard has a posted speed limit of 25 mph and consists of one through lane in each direction separated by a continuous two-way left-turn lane.

(1) The intersection of **4th Avenue and Union Street** is a 4-legged, all-way stop-controlled (AWSC) intersection. All approaches provide a single shared lane. The eastbound approach is unpaved.

(2) The intersection of **4th Avenue and Arizona Street** is a 3-legged, one-way stop-controlled “Tee” intersection with stop control on the westbound approach. All approaches provide a single shared lane. Although unpaved and barricaded, there were a few vehicles recorded as approaching from the west; these vehicles will be re-routed in the alternatives analysis.

(3) The intersection of **4th Avenue and Juan Sanchez Boulevard** is a 4-legged, two-way stop-controlled (TWSC) intersection. The intersection is configured thus:

- Northbound: stop-controlled, 1 shared lane;
- Southbound: stop-controlled, 1 shared through/left-turn lane; 1 right turn pocket (40');
- Eastbound: 1 left-turn lane (100'), 1 shared through/right-turn lane; and
- Westbound: 1 left-turn lane (75'), 1 through lane, 1 right-turn lane (75').

(4) The intersection of **1st Street and Juan Sanchez Boulevard** is a 4-legged, all-way stop-controlled (AWSC) intersection. Crosswalks are marked on the west side of 1st Street and across 1st Street south of Juan Sanchez Boulevard. One of the reasons for the all-way stop is that this is a major pedestrian crossing for students of the three schools. The crossing also serves Joe Orduño Park. The intersection is configured thus:

- Northbound: 1 shared lane;
- Southbound: unpaved, 1 shared lane;
- Eastbound: 1 left-turn lane (90'), 1 shared through/right-turn lane; and
- Westbound: 1 left-turn lane (85'), 1 shared through/right-turn lane.

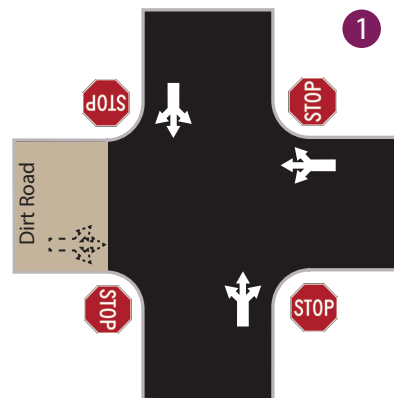
(5) The intersection of **US 95/Main Street and the Main Access** of the site is of interest in this study only as a source of trips that could be redirected to a second access once paved. Only the turns in and out of this driveway were recorded. It is assumed that some of the vehicles approaching from or destined to the south are those of drivers who prefer not to regularly travel on an unpaved surface; thus, when a second, paved access is available, these drivers will alter their regular routes to take advantage of the new access. This intersection is, therefore, not included in the subsequent analysis, but is shown in figures so that the re-distribution of its turns can be tracked.

The existing lane configurations and traffic controls are illustrated in **Figure 2**. Photographs of existing conditions can be found **Appendix B**.

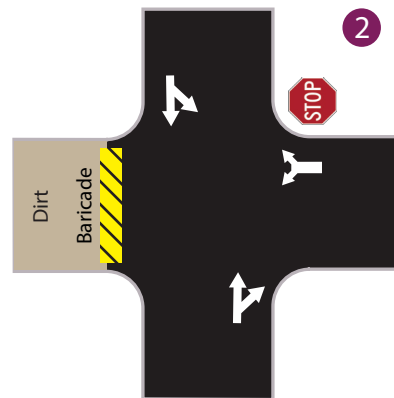
ADOT US 95 San Luis Street Improvements Project. A ribbon-cutting ceremony was scheduled for July 8, 2015 for ADOT's US 95 San Luis Street Improvements project that was completed on June 22. Briefly, south of Juan Sanchez Boulevard, US 95 has now been rerouted from Main Street onto Archibald Street as one-way southbound from D Street to U Street. The paired one-way northbound roadway is 1st Street from U-Street to D Street. All through traffic entering Arizona via the San Luis Port of Entry is directed north via 1st Street to D Street westbound and back onto Main Street/US 95 via a bypass lane at a newly-constructed roundabout. Local traffic will continue to use 1st Street, which remains two-way north of D Street.

LEGEND

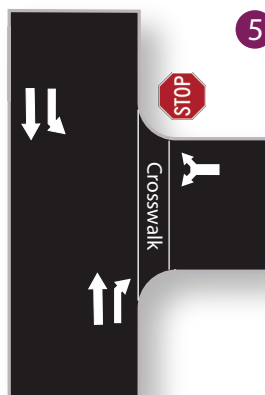
	Thru or Turning Movement		Traffic Signal		NORTH
	Two-Way Left Turn-Lane		Stop Sign		
			Speed Limit		



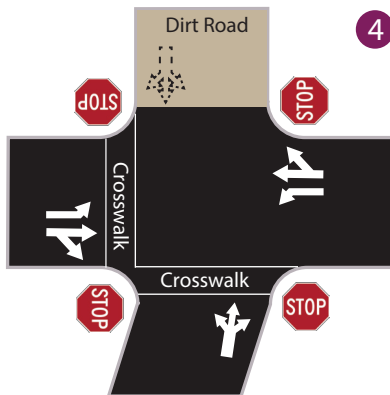
4th Avenue & Union Street



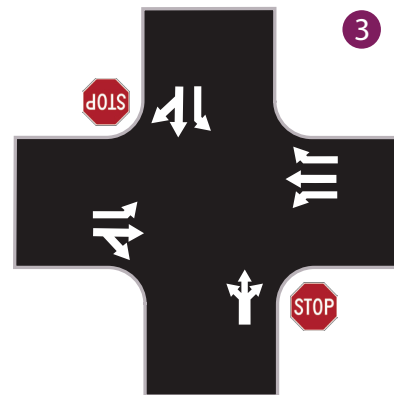
4th Avenue & Arizona Street



Main Street & Main Access



1st Avenue & Juan Sanchez Boulevard



4th Ave/4th St & Juan Sanchez Boulevard

Figure 2: Existing Lane Configurations and Traffic Controls

TRAFFIC VOLUMES

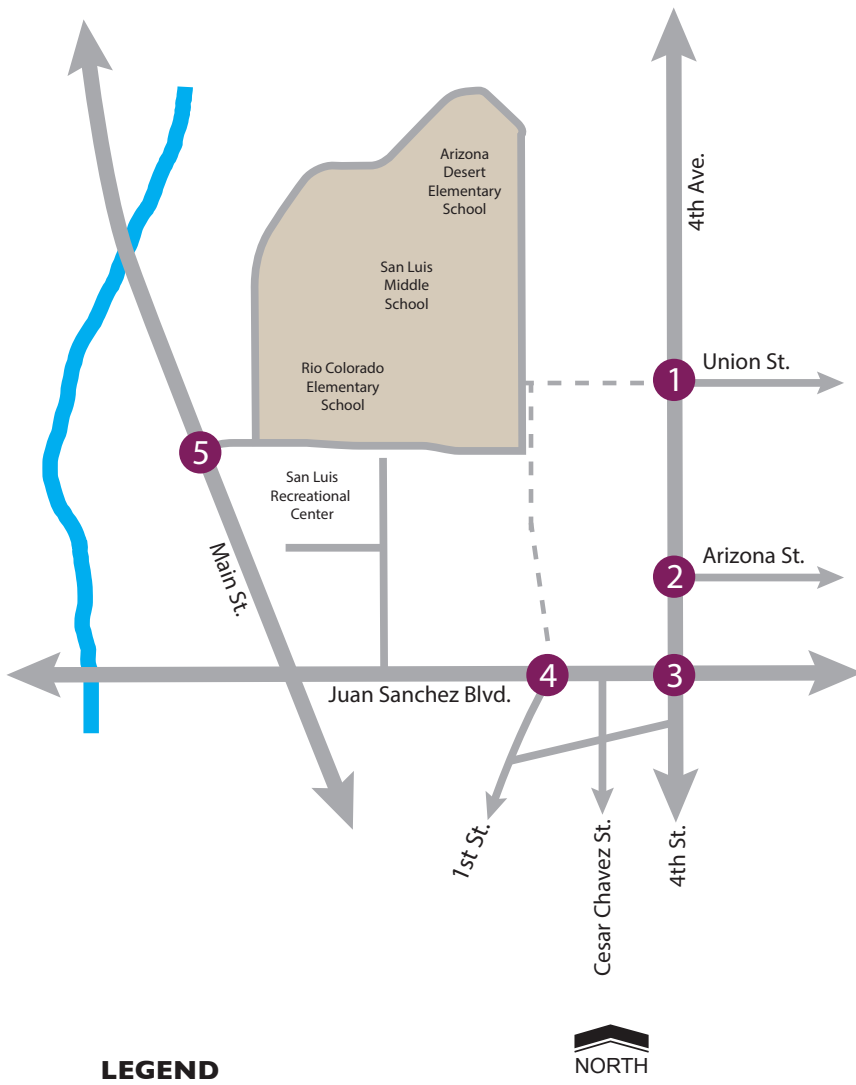
Core Engineering Group conducted AM and school PM peak hour turning movement counts at the five intersections on a day when the schools were in session, Tuesday, May 12, 2015, and Thursday, May 14, 2015 from 6:30 AM to 8:30 AM and 2:30 PM to 4:30 PM. **Figure 3** depicts the recorded AM and school PM peak hour turning movement volumes. The sheets on which the volumes were reported are provided in **Appendix B**. It is not known how the ADOT construction project, which was nearing completion in May, may have affected traffic patterns at that time, if at all.

Seasonal Adjustment Factor. Please note that, since the area attracts a substantial number of visitors and seasonal agricultural workers during the winter months and the traffic counts were conducted during the late spring while school, as noted, was still in session. By May, most winter visitors have typically returned to their permanent homes and agricultural production may yet be in full operation or nearly so; thus, in the analysis it may be prudent to consider the application of some level of adjustment to the recorded volumes. This is addressed here.

CivTech reviewed historical traffic volume data available from the Yuma Metropolitan Planning Organization (YMPO) to estimate an appropriate adjustment factor to be applied to the existing traffic counts in order to have the capacity analysis better approximate conditions in the busier winter months. YMPO records traffic counts twice each year: in February and the following July. CivTech reviewed recent historical vehicular traffic volumes on Juan Sanchez Boulevard east of US 95/Main Street. A summary of the data compiled is found at the end of **Appendix B**.

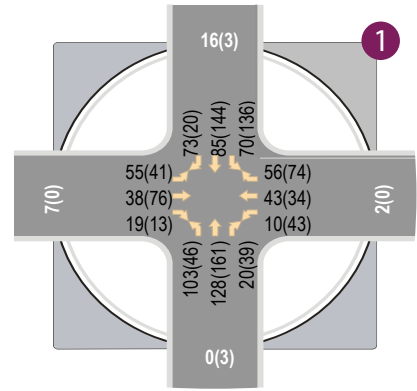
YMPO includes the San Luis area in its "South Valley Subarea". The data shows that the traffic volumes recorded in the South Valley Subarea increased about six and one-half percent per year from 2011 to 2012 and from 2013 to 2014 with only a minor increase (about one-half percent) from 2012 to 2013. However, on Juan Sanchez Boulevard there was actually a drop of more than eight percent from 2012 to 2013 before a rebound of about one-third from 2013 to 2014.

The summer-to-winter variations for the subarea averaged 29.31% in 2012, 19.24% in 2013, and 30.02% in 2014. For Juan Sanchez Boulevard, the average changes were 22.84% in 2012, 34.15 % in 2013, and 29.49% in 2014. The overall average variation on Juan Sanchez Boulevard for the three years was 28.65%. As noted, this overall variation was calculated using February and July data and the counts were recorded in May when most winter visitors have left, some agricultural workers may remain, and many local residents have not left for vacations (since schools are still in session). Therefore, a reduced factor of 20% to account for the seasonal variation between the busy winter season and the late spring counts will be applied to the through volumes on Juan Sanchez Boulevard.

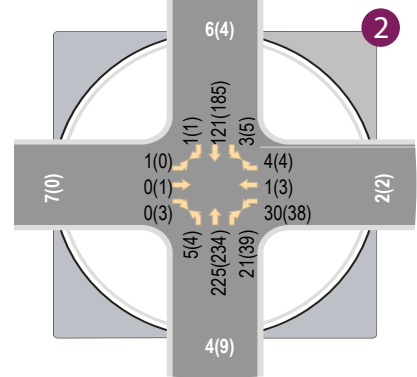


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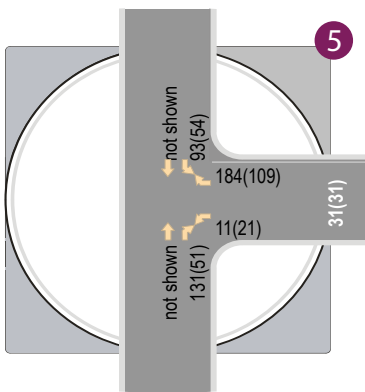
XX(XX) - AM(PM) Peak Hour Traffic Volumes
 XX(XX) - AM(PM) Peak Hour Pedestrian Counts



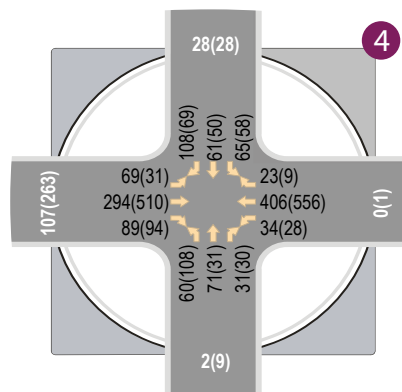
4th Avenue & Union Street



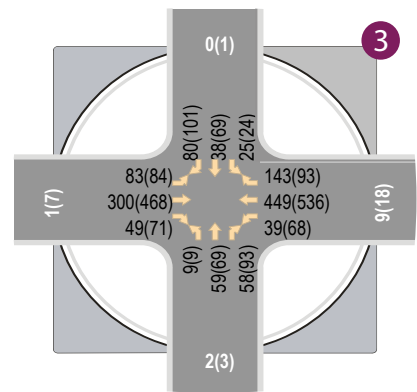
4th Avenue & Arizona Street



Main Street & Main Access



1st Avenue & Juan Sanchez Boulevard



4th Ave/4th St & Juan Sanchez Boulevard

Figure 3: Existing Traffic Volumes

PROPOSED ALTERNATIVES

This study was prompted by the need for the City of San Luis and/or the Gadsden Elementary School District to define the extent of permanent access to the site of three Gadsden Elementary School District schools collocated on a site with a single paved access. Except during inclement weather, in which there could be some minor ponding of storm water on the adjacent undeveloped parcel of State Trust Land to the east, the majority of the vehicular trips and a sizable percentage of the pedestrian trips generated by the schools' exit to the east and/or south via vehicular paths noticeable even in aerial photography.

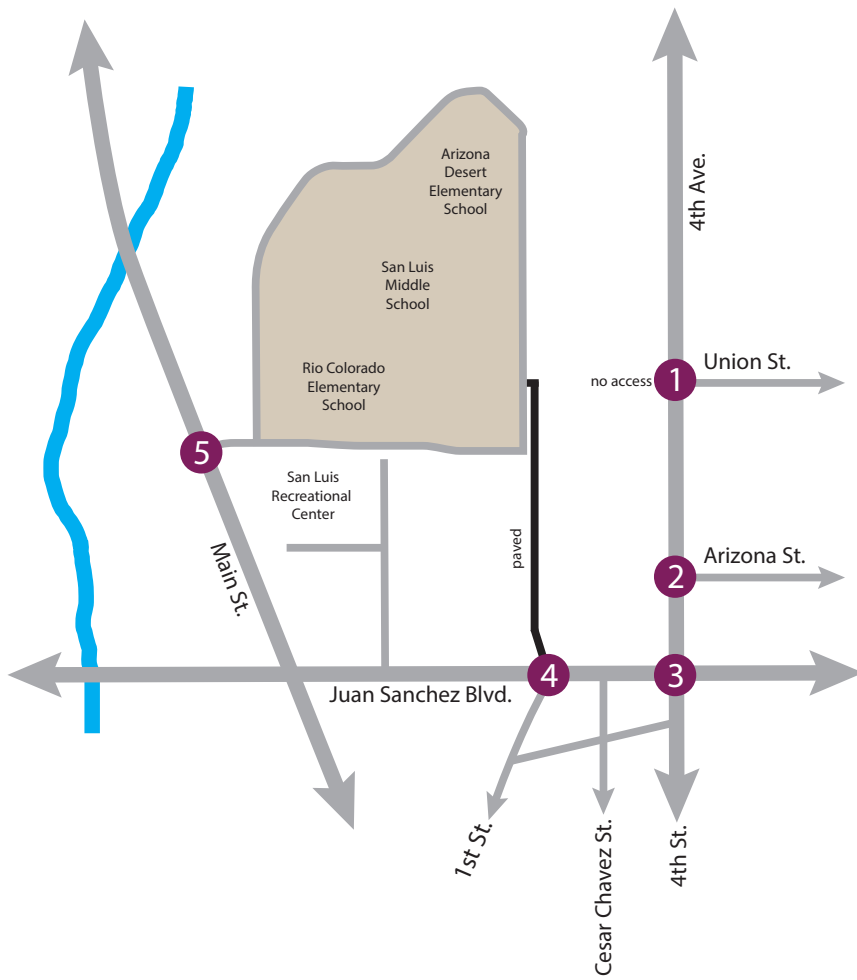
CivTech understands that one or both of two possible vehicular routes were being considered, yielding three options. If, as a result of the analysis herein, a single route is preferred, it is expected that measures would be taken to prohibit the other movement, resulting in all of the vehicular trips recorded to be assigned to one or the other. In all cases, it is expected that some portion of the trips now made by drivers that do not prefer to regularly travel on an unpaved surface and, for that reason, now use the US 95/Main Street driveway, would be redirected to the preferred option. No option assumes additional capacity improvements to existing intersections.

OPTION A (1ST STREET OPTION)

Option A, the 1st Street option, is paving southerly from the southeast corner of the site to intersect Juan Sanchez Boulevard opposite 1st Street. Since this access could either remain as an all-way stop or be signalized, the pedestrian movements recorded in May remain unchanged at the study intersections. **Figure 4** shows the changes in vehicular trips and pedestrian movements as they would be redirected per Option A. **Figure 5** shows the revised trips and pedestrian movements, with a seasonal factor of 1.20 applied to the through traffic volumes on Juan Sanchez Boulevard to better simulate peak winter volumes.

OPTION B (UNION STREET/4TH AVENUE OPTION)

Option B, the Union Street/4th Avenue option, is paving easterly from the southeast corner of the site to intersect 4th Avenue across from Union Street. Most of this traffic would be expected to then access Juan Sanchez Boulevard via 4th Avenue. Thus, the need for a signal at the intersection of 4th Avenue and Juan Sanchez Boulevard will be considered. The high pedestrian counts at 1st Street would likely render unsuccessful any attempt to redirect them from 1st Street to 4th Avenue; the new route would be more inconvenient for them, adding about 1,100 feet (nearly one-quarter mile) to the walk. To possibly eliminate the need for a law enforcement professional at the intersection each school day and allow, instead, a typical school crossing guard, the installation of some type of innovative intersection safety treatment will be required. One such treatment is a pedestrian hybrid beacon (PHB) as found in the *Manual on Uniform Traffic Control Devices*. Another is a Rectangular Rapid Flashing Beacon (RRFB), which is not only effective, but considerably less expensive to install and maintain than a PHB according to a short report included as **Appendix C.** Since either will stop traffic on Juan Sanchez Boulevard only when activated, potential long backups should not occur with any regularity. **Figure 6** shows the changes in vehicular trips and pedestrian movements as they would be redirected per Option B. **Figure 7** shows the revised vehicular trips with the seasonal factor applied to the through traffic volumes on Juan Sanchez Boulevard; the pedestrian movements are as shown in the existing conditions.



LEGEND

XX(X) - AM(PM) Peak Hour Traffic Volumes
 XX(X) - AM(PM) Peak Hour Pedestrian Counts

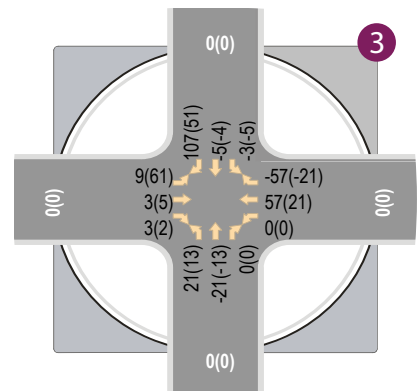
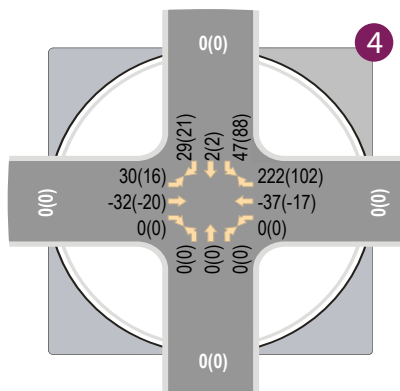
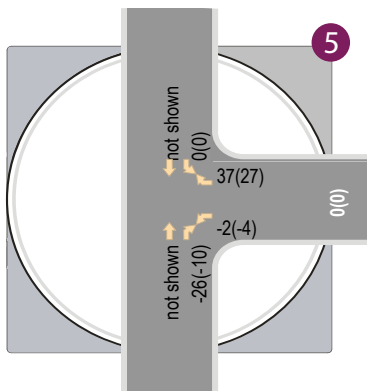
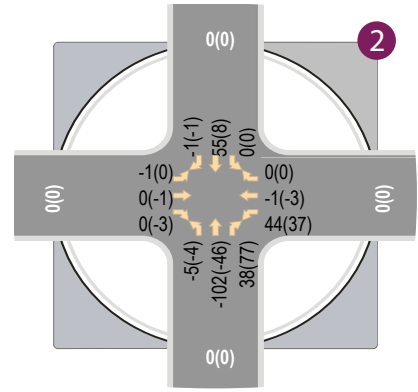
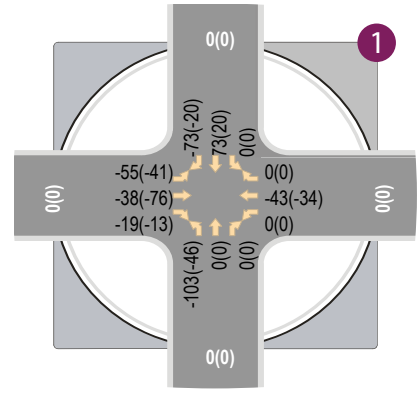
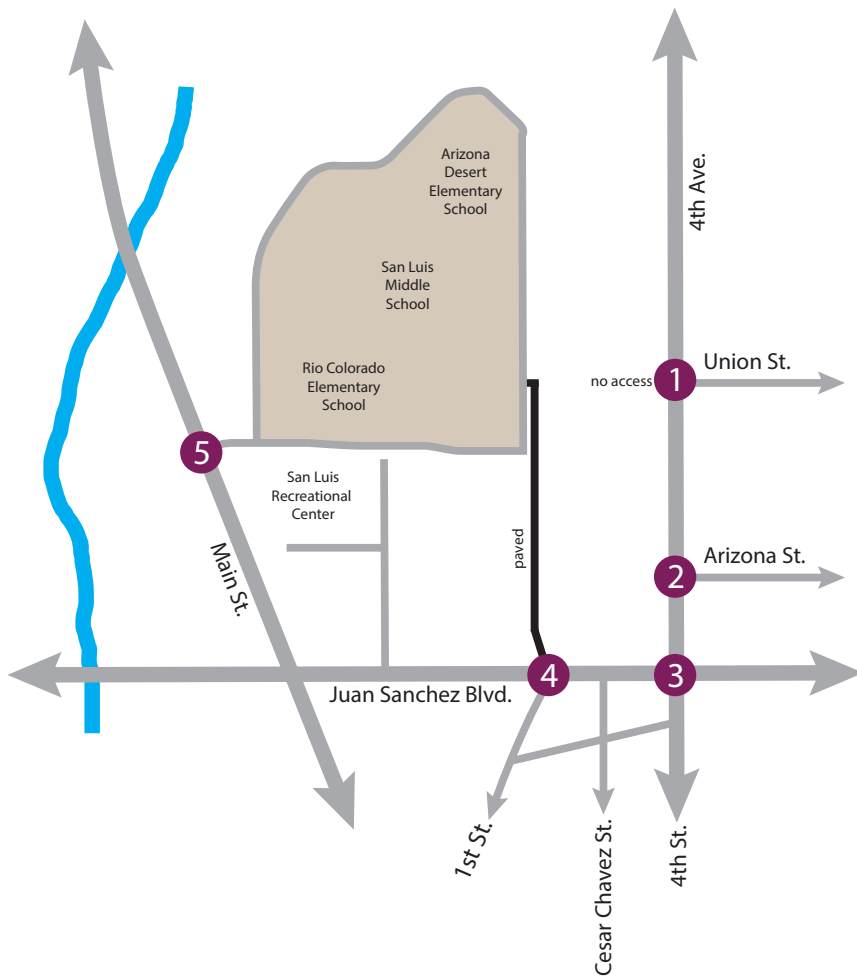
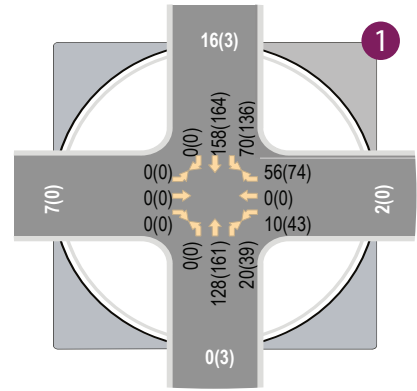


Figure 4: Option A Volume Changes

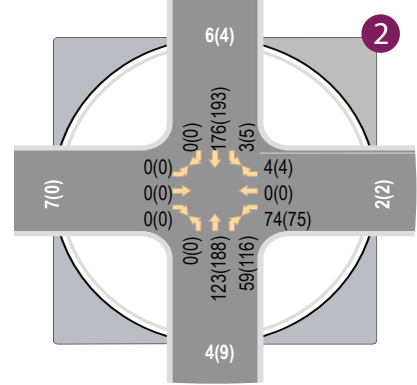


LEGEND

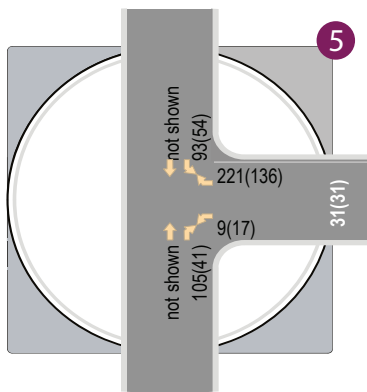
XX(XX) - AM(PM) Peak Hour Traffic Volumes
 XX(XX) - AM(PM) Peak Hour Pedestrian Counts



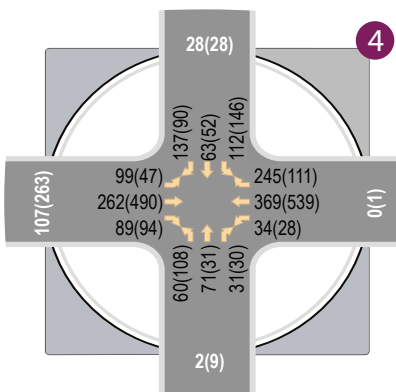
4th Avenue & Union Street



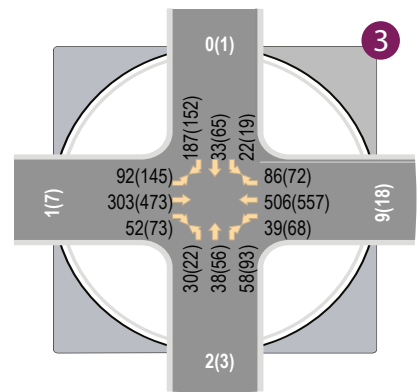
4th Avenue & Arizona Street



Main Street & Main Access

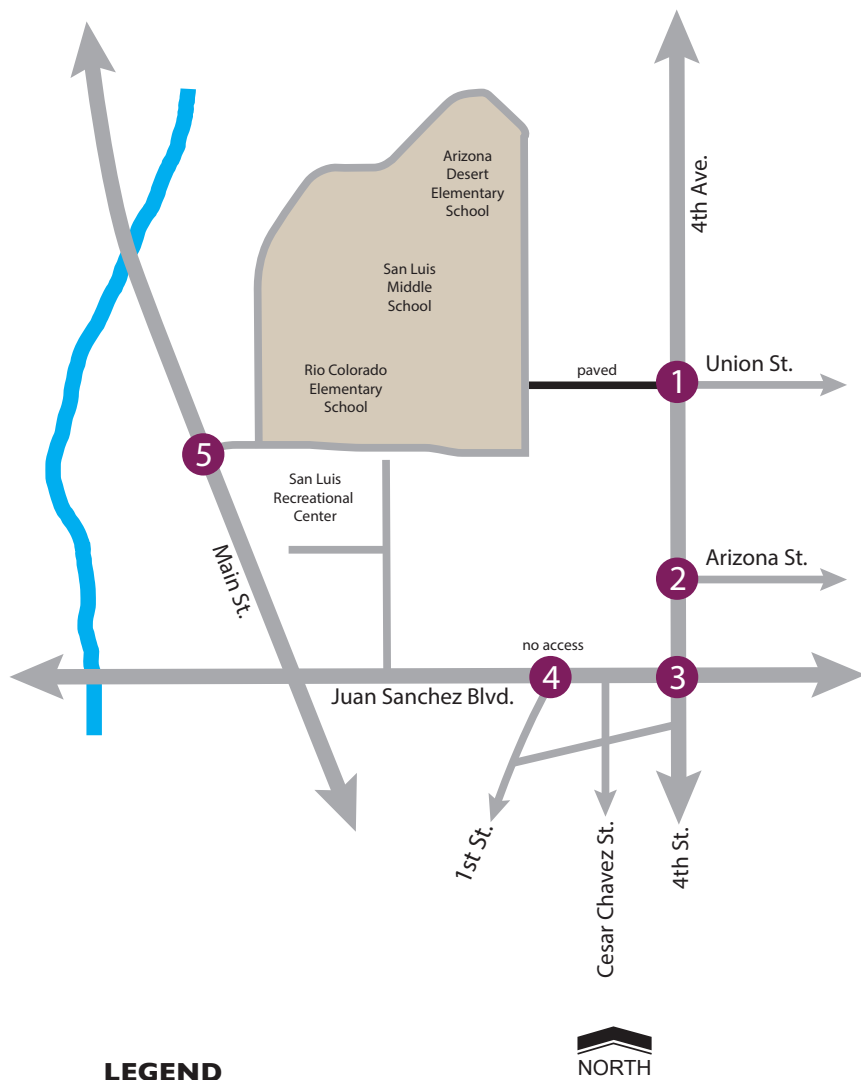


1st Avenue & Juan Sanchez Boulevard



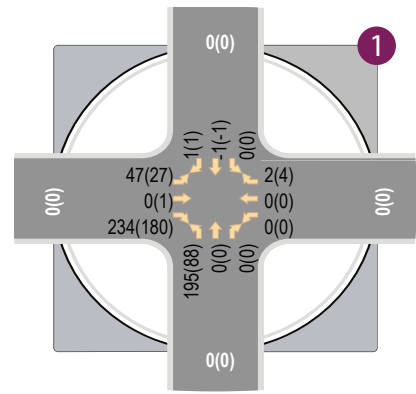
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Figure 5: Option A Final Volumes

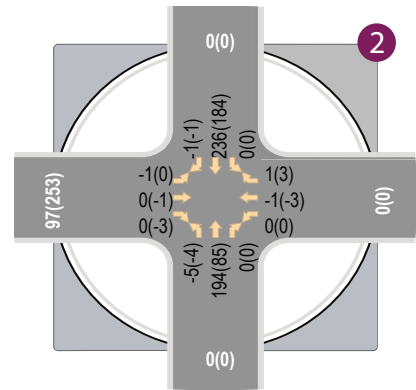


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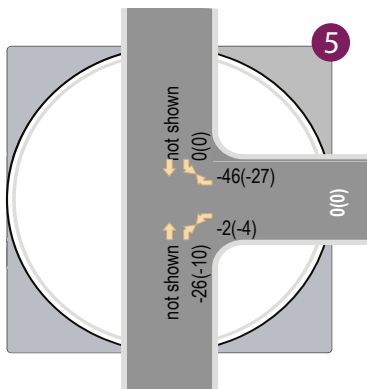
- XX(XX) - AM(PM) Peak Hour Traffic Volumes
- XX(XX) - AM(PM) Peak Hour Pedestrian Counts



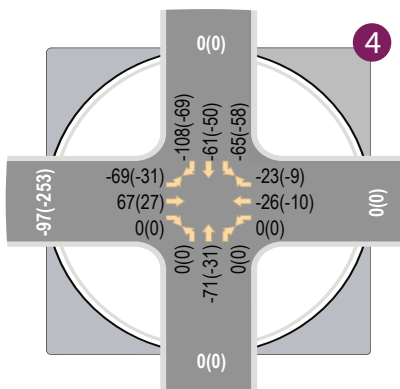
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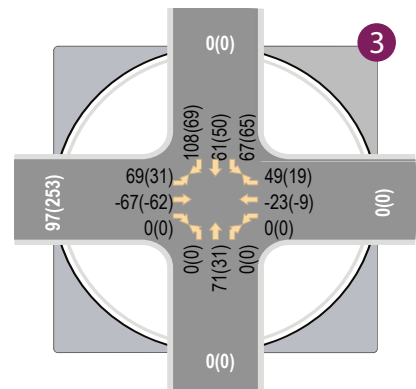
4th Avenue & Arizona Street



Main Street & Main Access

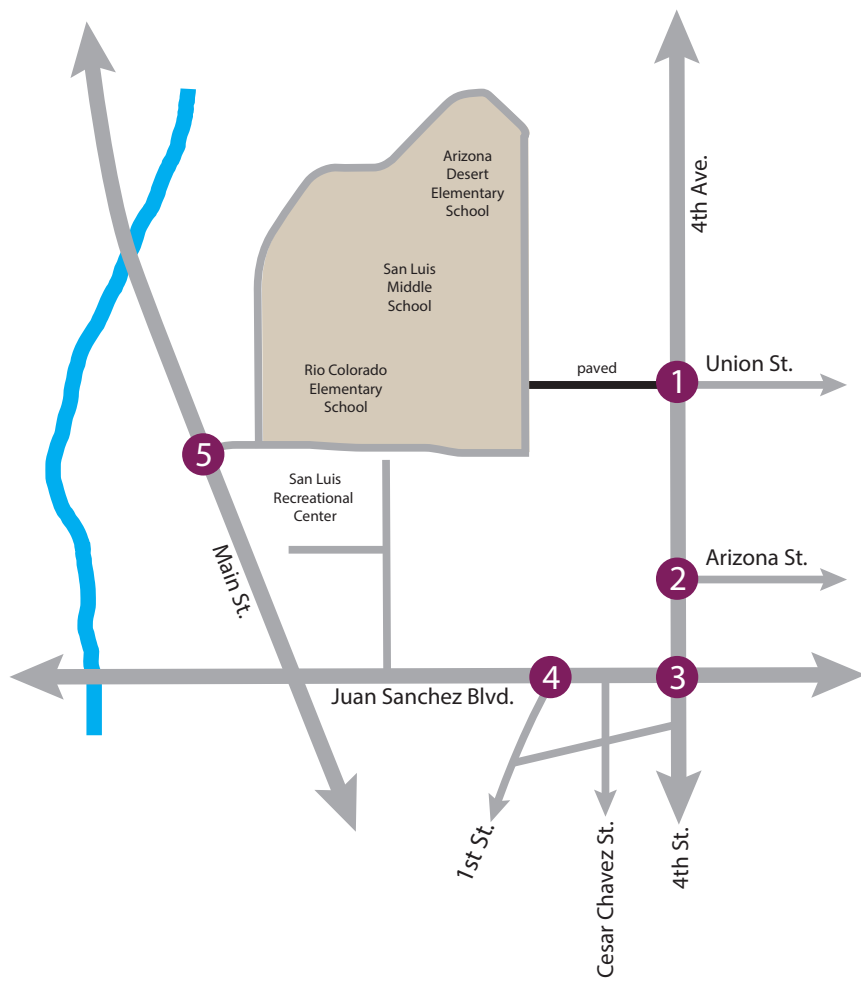


1st Avenue & Juan Sanchez Boulevard



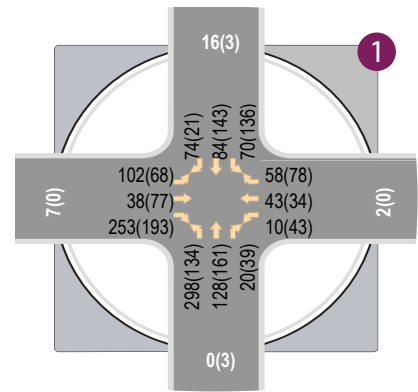
4th Ave/4th St & Juan Sanchez Boulevard

Figure 6: Option B Volume Changes

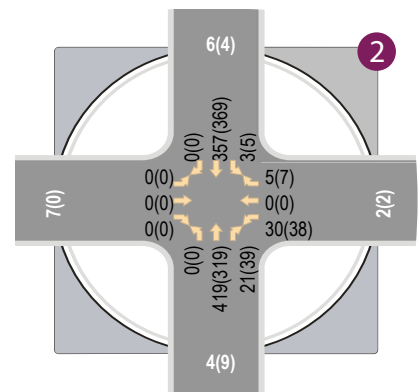


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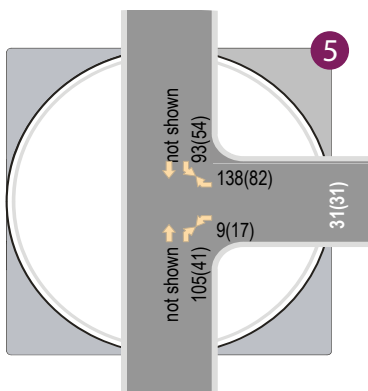
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- XX(XX) - AM(PM) Peak Hour Pedestrian Counts



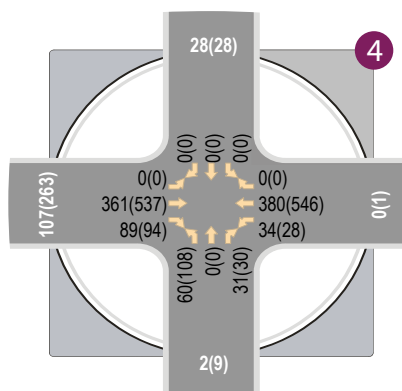
4th Avenue & Union Street



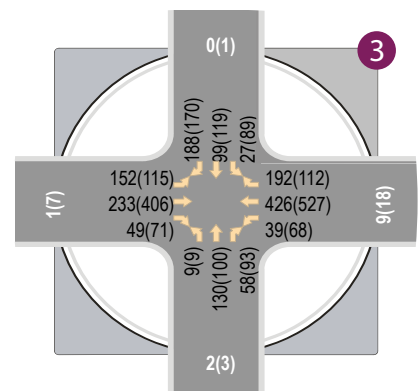
4th Avenue & Arizona Street



Main Street & Main Access



1st Avenue & Juan Sanchez Boulevard



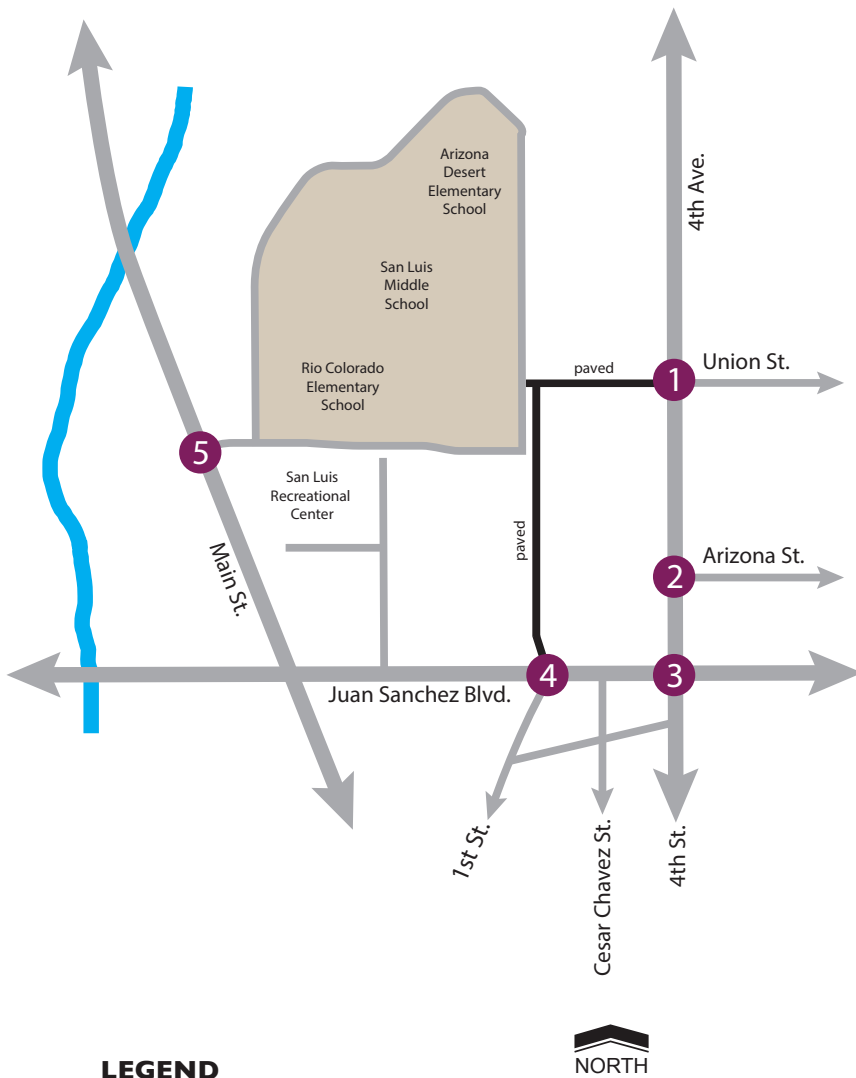
4th Ave/4th St & Juan Sanchez Boulevard

Figure 7: Option B Final Volumes

OPTION C

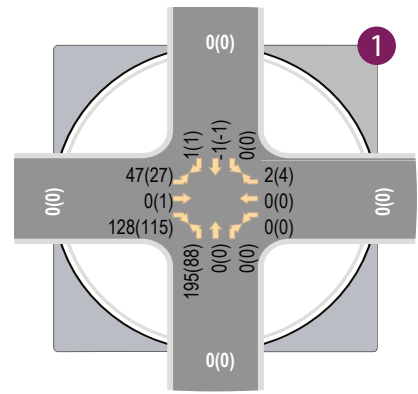
Option C is the third alternative considered herein. Since the pedestrian counts revealed that many more pedestrians cross Juan Sanchez Boulevard at 1st Street than they do at 4th Avenue, in Option C, it is expected that these pedestrians will continue to cross at 1st Street. In addition, both existing paths will be paved, providing two possible routes for vehicular traffic. However, unlike the current condition at 1st Street, movements will be restricted at the new 1st Street access to right-in/right-out movements only. **Figure 8** shows the changes in vehicular trips and pedestrian movements as they would be redirected per Option C, in which the existing left-in/left-out movements at 1st Street are redirected to 4th Avenue. **Figure 9** shows the revised vehicular trips with the seasonal factor applied to the through traffic volumes on Juan Sanchez Boulevard. Also included in Option C is a westbound right turn lane that would be constructed on Juan Sanchez Boulevard approaching 1st Street.

Please note that it is CivTech's understanding that the City intends to widen Juan Sanchez Boulevard to an arterial roadway cross-section. While such a project has not yet been scheduled, CivTech further understands that Juan Sanchez Boulevard would provide five lanes, two lanes in each direction with a continuous two-way left turn lane and exclusive left turn lanes at major intersections, from US 95/Main Street to 9th Avenue, where it would match the cross-section that has been already been completed to the east. Ideally, the proposed right turn lane would be designed and constructed to be consistent with the ultimate improvements to Juan Sanchez Boulevard, eventually becoming part of a new westbound through/right-turn lane. However, CivTech understands that there are other engineering issues that may require major reconstruction of Juan Sanchez Boulevard, which would render any turn lane constructed with this option merely an interim or temporary improvement.

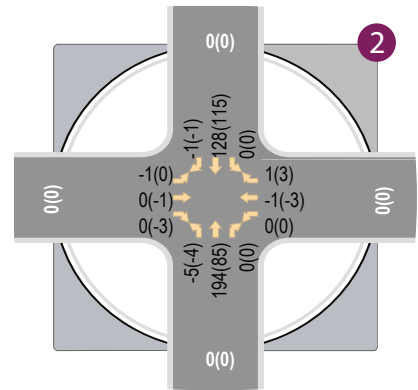


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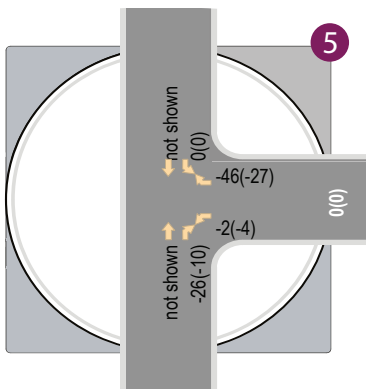
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- XX(XX) - AM(PM) Peak Hour Pedestrian Counts



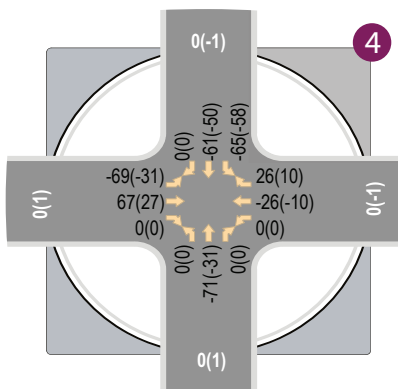
4th Avenue & Union Street



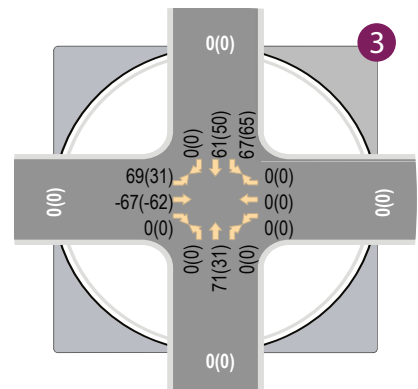
4th Avenue & Arizona Street



Main Street & Main Access

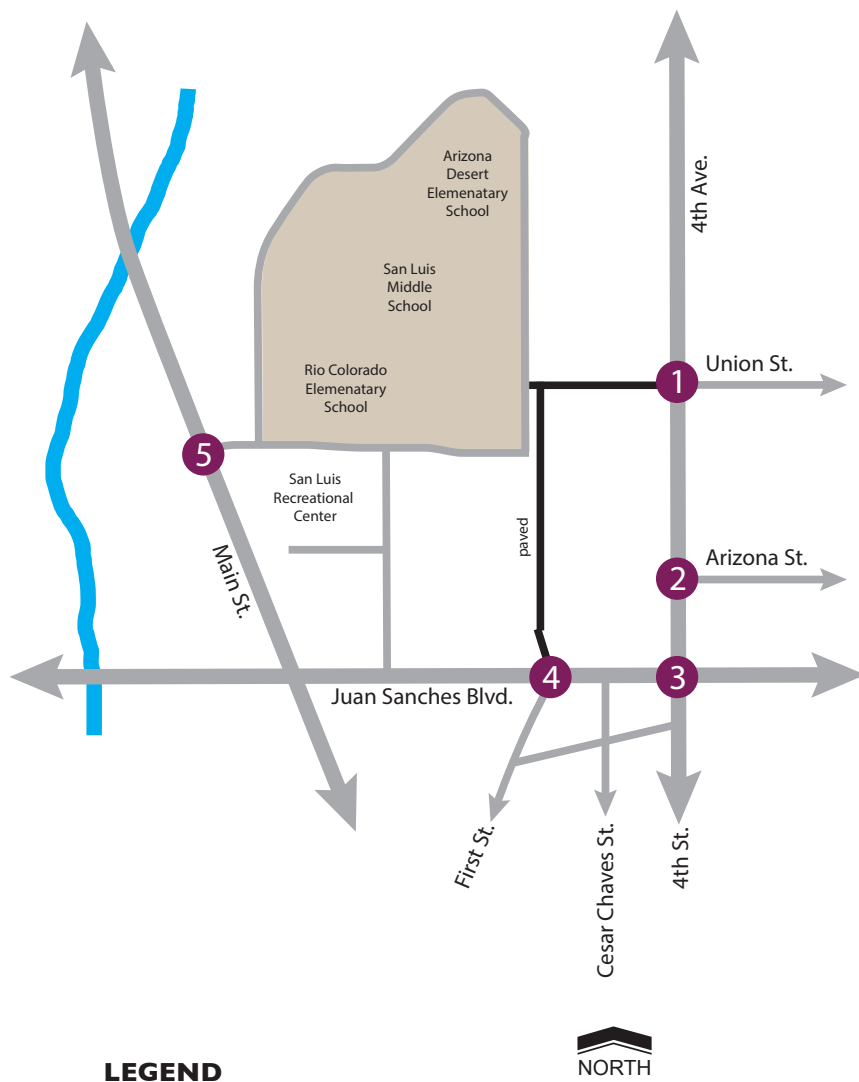


1st Avenue & Juan Sanchez Boulevard



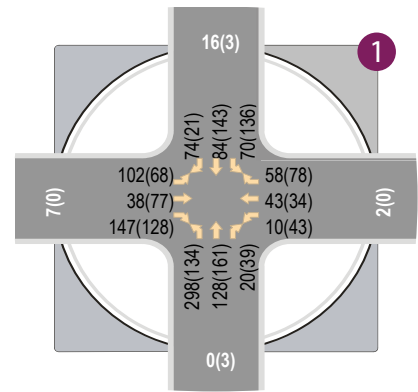
4th Ave/4th St & Juan Sanchez Boulevard

Figure 8: Option C Volume Changes

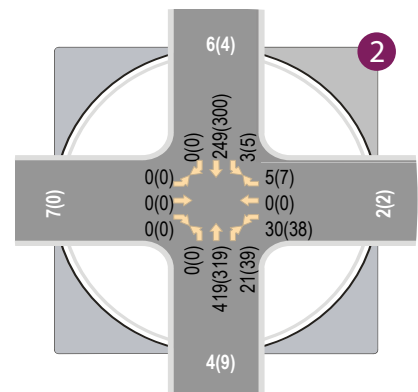


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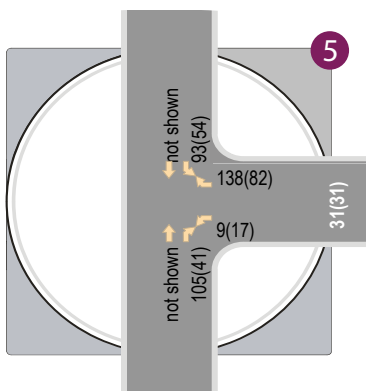
XX(X) - AM(PM) Peak Hour Traffic Volumes



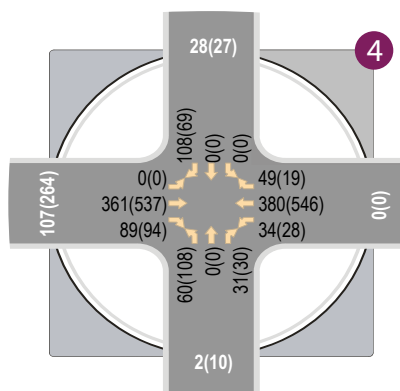
4th Avenue & Union Street



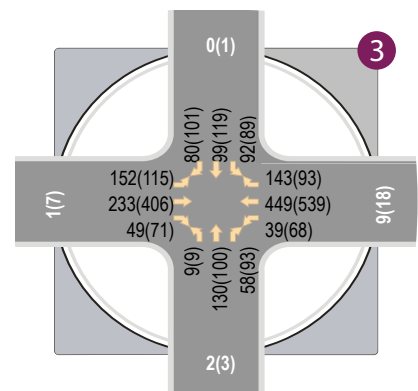
4th Avenue & Arizona Street



Main Street & Main Access



1st Avenue & Juan Sanchez Boulevard



4th Ave/4th St & Juan Sanchez Boulevard

Figure 9: Option C Final Volumes

LEVEL OF SERVICE ANALYSIS

The concept of level-of-service (LOS) uses qualitative measures that characterize operational conditions within roadway facilities. The individual levels of service are described by factors that include speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations A through F, with LOS A representing the best operating conditions and LOS F the worst. Each level-of-service represents a range of operating conditions. Levels of service for intersections are defined in terms of average delay ranges for vehicles. **Table 1** lists the level-of-service criteria for signalized and unsignalized intersections. *Please note that the actual average delays that determine the levels of service are very different for signalized and unsignalized intersections. A driver waiting an average of 55 seconds to enter an unsignalized intersection from a stop sign is considered to be encountering a LOS F, whereas the same average wait at a traffic signal is LOS D. This is noted here because there may be consideration of an all-way stop-controlled (AWSC) intersection as a potential low-cost alternative to a traffic signal at either 1st Avenue or 4th Avenue at Juan Sanchez Boulevard and, if such an AWSC operates at LOS D or LOS E, the average driver may still experience less of a delay than if a [costly] signal were provided.*

Table 1: Level-of-Service Criteria

Level of Service	Control Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Source: Exhibit 18-4 and Exhibit 19-1, Highway Capacity Manual 2010

AM and PM peak hour capacity analyses were conducted for the four study intersections using the methodologies presented in the *Highway Capacity Manual 2010* (HCM 2010) using Synchro traffic analysis software. For Option A, with some trips diverted away from 4th Avenue to 1st Street, it was decided to analyze the intersection of 4th Avenue at Juan Sanchez Boulevard in its current configuration with the existing two-way stop control. For Option B, since school traffic will be diverted to 4th Avenue and, as will be seen, the intersection of 4th Avenue at Juan Sanchez Boulevard already operates at poor or failing levels of service, a traffic signal is assumed.

The resulting LOS for the existing conditions and for each of the three options are summarized in **Table 2**. The worksheets for these analyses are included in **Appendix D** for the existing conditions, **Appendix E** for Option A, **Appendix F** for Option B, and **Appendix G** for Option C. The table also includes the volume-to-capacity (V/C) ratio for the lane or approach with the highest V/C ratio. A V/C ratio greater than 1.0 indicates the traffic volumes are more than a lane or approach can theoretically accommodate.

Table 2: Peak Hour Levels of Service

ID	Intersection	Traffic Control	Movement	Existing LOS(Delay)		Option A LOS(Delay)		Option B LOS(Delay)		Option C LOS(Delay)	
				AM	PM	AM	PM	AM	PM	AM	PM
1	4 th Ave & Union St	Existing & Options B;&C All-Way Stop	NB shared	B	B	A	A	E(43.7)	C	D	C
			SB shared	B	B	A	A	C	C	B	C
			EB shared	A	B	n/a	n/a	D	C	C	C
			WB shared	A	B	B	B	B	B	B	B
		Option A: One-Way Stop (WB)	Worst Case	B	B	B	B	E	C	D	C
		Hi Lane V/C	0.386	0.492	0.098	0.232	0.902	0.654	0.827	0.582	
2	4 th Ave & Arizona St	Existing 2-Way Stop (EB/WB)	SB shared	A	A	A	A	A	A	A	A
			EB Shared	B	B	n/a	n/a	n/a	n/a	n/a	n/a
			WB shared	B	B	B	B	C	C	C	C
		Future 1-Way Stop (WB)	Worst Case	B	B	B	B	C	C	C	C
		Hi Lane V/C	0.072	0.108	0.139	0.169	0.117	0.136	0.101	0.123	
3	4 th Ave & Juan Sanchez Blvd	Existing & Option A: Two-Way Stop (NB/SB)	NB shared	E(38.5)	F(424+)	F(107+)	F(999+)	C	C	C	C
			SB thru/left	F(66.3)	F(869+)	F(68.3)	F(999+)	C	C	C	C
			SB right	B	C	C	C	C	C	C	C
			EB left	A	A	A	A	B	B	B	B
			EB thru/right	n/c	n/c	n/c	n/c	B	B	B	A
			WB left	A	A	A	A	B	C	B	B
			WB thru	n/c	n/c	n/c	n/c	C	C	B	C
			WB right	n/c	n/c	n/c	n/c	B	B	B	B
		Options B;&C Signal	Worst Case	F	F	F	F	C	C	C	C
			Hi Lane V/C	0.579	2.46	0.909	3.733	0.600	0.690	0.640	0.600
4	1 st St & Juan Sanchez Blvd	Existing & Options A&C All-Way Stop	NB shared	C	C	C	C	C	D	B	B
			SB shared	C	C	D	D	n/a	n/a	n/a	n/a
			SB right	n/a	n/a	n/a	n/a	n/a	n/a	B	B
			EB left	B	B	B	B	n/a	n/a	n/a	n/a
		Option B: One-Way Stop (NB)	EB thru/right	E(42.6)	F(66.4)	E(39.2)	F(70.1)	n/a	n/a	D	F(62.0)
			WB left	B	B	B	B	A	A	A	A
			WB thru	F(64.0)	F(66.9)	F(69.2)	F(70.1)	n/a	n/a	C	E(37.3)
			WB right	F(64.0)	F(66.9)	F(69.2)	F(70.1)	n/a	n/a	A	A
			Worst Case	F	F	F	F	C	D	D	F
			Hi Lane V/C	0.981	1.298	1.427	1.539	0.226	0.496	0.820	1.190

A review of the AM and PM peak hour intersection level of service analyses summarized in **Table 2** reveals the following on an intersection-by-intersection basis:

1. 4th Avenue & Union Street – The analyses revealed that implementation of Option A and the closure of the de facto west leg of the intersection, should improve existing good levels of service to better levels of service north- and southbound. Bringing traffic across from the schools to 4th Avenue under Option B increases the inbound trips in the morning, specifically the site-bound, northbound left turns, which is expected to cause average delays of 43.7 seconds (nearly ¾ of a minute) for the northbound movement. While such delays are considered LOS E at the unsignalized intersection, with reference to **Table 1** and as noted above, similar waits would be LOS D if this were a signalized intersection. Under Option C, in which some of the trips would not be redirected from 1st Street, the inbound volumes are lower in the morning than with Option B and no movements operate at poor or unacceptable levels of service. Not documented is a trial run with the intersection converted to two-way stop control with the north- and southbound movements free. This trial showed very poor to failing levels of service for the eastbound/outbound site vehicles at the intersection and is not considered further here.
2. 4th Avenue & Arizona Street – The analyses revealed that this intersection would be little affected by either option. All movements would continue to operate at LOS C or better under any of the options.

3. *4th Avenue & Juan Sanchez Boulevard* – The analyses revealed that, under Option A, without installation of a traffic signal (or conversion to an all-way stop, which would spread the delays around), the north- and southbound movements are expected to operate at poor to failing levels of service. With the installation of a traffic signal, as is assumed under Options B and C, it is expected that the all movements approaching the intersection would operate at not less than LOS C or with an average delay of more than 35 seconds.
4. *1st Street & Juan Sanchez Boulevard* – Under Option A, with the intersection remaining as-is and only the existing 4th Avenue traffic redirected to 1st Street, there is little change from the existing condition with east- and westbound Juan Sanchez Boulevard operating at similar levels of service with delays of similar magnitude and a law enforcement officer still required each school day. Under Option B, the existing southbound approach would be effectively closed, the existing crosswalk would be left in place and upgraded to a PHB or RRFB (the effect of which, unfortunately, cannot be analyzed using HCM 2010 methods), and, with removal of the stop signs on Juan Sanchez Boulevard, the intersection would be converted from an all-way to a one-way stop (northbound approach only). The analyses revealed that the levels of service should be improved on Juan Sanchez Boulevard during the AM peak hour and should operate at about the same LOS during the PM peak hour and the stop-controlled northbound approach would operate at LOS D. Under Option C, with all-way stop control, both accesses paved, a new westbound right turn lane into 1st Street, and the conversion of the pedestrian crossing to a PHB or RRFB, the only average delays expected to operate at poor levels of service are the east- and westbound through movements during the PM peak hour. The eastbound through movement is expected to operate at LOS F with an average delay of 62.0 seconds, just over a minute. The westbound through movement is expected to operate at LOS E with an average delay of 37.3 seconds, less than $\frac{2}{3}$ of a minute. Again with reference to **Table 1**, the eastbound delay of 62.0 seconds would be considered a “high” LOS E at a signalized intersection (55 seconds is the break point between LOS D and LOS E) and the westbound delay of 37.3 seconds would be a high LOS D at a signalized intersection (35 seconds is the break point between LOS C and LOS D). *[Another undocumented trial run that assumed the ultimate five-lane cross-section on Juan Sanchez Boulevard and all-way stop control revealed acceptable levels of service for all movements. With 1st Street just 550 feet west of 4th Avenue, this intersection may not be a viable location for another traffic signal, at least not until the all-way stop is beyond its capacity. However, it would be prudent for the City to install underground conduit and pull boxes for a future traffic signal when reconstructing Juan Sanchez Boulevard; to do so before risks these features being adversely affected by the reconstruction project.]*

Analysis: Based on the levels of service and V/C ratios on the intersection approaches, Option C, consisting of two paved accesses with access restricted to right-in/right-out only at 1st Street, a westbound right turn lane approaching 1st Street, the existing pedestrian crossing upgraded to a PHB or RRFB, and a traffic signal installed at 4th Avenue and Juan Sanchez Boulevard, offers the best comprehensive approach without having to construct capacity improvements (additional lanes, etc.) at any of the intersections.

MITIGATION AND IMPROVEMENT ANALYSIS

TRAFFIC SIGNAL NEEDS ASSESSMENT

With respect to traffic signals needs, it is suggested that the study author assumes the reader/reviewer is familiar with the requirements of the *Manual on Uniform Traffic Control Devices* (MUTCD) and simply repeat verbatim the descriptions of the warrants, etc., which is often found in a full traffic control signal warrant study. This being the case, this section will consider three of the nine warrants found in the MUTCD, Warrant 3, based on peak hour volumes; Warrant 4, based on pedestrian volumes; and Warrant 5, which is considered when there is a school crossing.

Warrant 3, Peak Hour. With three schools in the Gadsden Elementary School complex north of Joe Orduño Memorial Park, it is likely that there is a surge of southbound traffic during either the AM or school PM peak hour as parents leave the schools after having dropped off or picked up their children. Typically applied in special circumstances (such as an office or factory where outbound trips peak during a very short period of time at the end of a shift or work day), if the number of vehicles on a minor street approach exceeds a certain number determined in part on the volume on the major street, a signal is warranted. In this case, with a northbound approach volume of 202 vehicles per hour (vph) sharing a single lane during the PM peak hour and a seasonally-adjusted 1,300 vph on Juan Sanchez Boulevard, the peak hour signal warranting criterion of 75 approaching vph is satisfied. As a point of information, it is noted here that under either Option B or C, the AM and PM peak hour average control delays on Juan Sanchez Boulevard are expected to be essentially the same as those being experienced on Juan Sanchez Boulevard presently at 1st Street. With volumes expected to greater than capacity on Juan Sanchez Boulevard approaching 4th Avenue in both directions, either Juan Sanchez Boulevard should be widened to provide additional capacity or a signal should be installed to give priority to the through traffic on Juan Sanchez Boulevard while assuring that adequate time is given to the traffic approaching from the side streets.

Warrant 4, Pedestrian Volume. Depending on the volume on Juan Sanchez Boulevard, a signal may be warranted for reasons of as few as 93 pedestrians crossing during a peak hour. The pedestrian counts recorded in May 2015 show a maximum of 263 pedestrian per hour crossing Juan Sanchez Boulevard at 1st Street; therefore, the pedestrian peak hour warrant is met. Of the four hours of pedestrian counts recorded in May, there are just three one-hour periods in which 75 crossings per hour were exceeded; thus, it cannot be determined for certain if the four-hour pedestrian warrant is met since it requires four hours of 75 or more pedestrians.

Warrant 5, School Crossing. This warrant is met when there are a minimum of 20 schoolchildren crossing during the peak hour and the number of adequate gaps in the traffic stream during the period when the schoolchildren are using the crossing is less than the number of minutes in the same period. CivTech did not conduct a study of the frequency and adequacy of gaps in the traffic stream along Juan Sanchez Boulevard. Such a study was not considered necessary because the intersection is all-way stop-controlled, creating gaps in the traffic and allowing schoolchildren and others to cross. The traffic counts recorded for CivTech did not distinguish between schoolchildren and other pedestrians; however, with a maximum pedestrian crossing volume of 263 pedestrians per hour and three nearby schools, it could be assumed that the minimum peak hour volume of 20 crossing schoolchildren is very likely met.

Analysis. To summarize the above assessments, a traffic signal at the intersection of 4th Avenue and Juan Sanchez Boulevard may currently be warranted. However, it must be cautioned that satisfying a warrant does not require that a traffic signal be installed. If the City determines that the anticipated delays at the intersection in an all-way stop condition are acceptable for the foreseeable future, then a signal does not have to be provided. This may be part of a “wait-and-see” approach to see if the predicted delays actually occur. With the existing all-way stop at 1st Street, traffic may be metered such that the anticipated delays do not materialize.

ALTERNATIVES MODES

The Safe Routes to School program was a federally-funded program that ended in 2012 that would reimburse entities that implemented programs and strategies that promoted elementary and middle school children to walk and bicycle to school in part by identifying or providing alternative routes and/or making existing routes safer and more convenient. Although the program as it was known has ended, the aims of the original program are still being furthered under the broader funding category of Transportation Alternatives.

This is of note only as a way to introduce the subject of this brief section, which is the availability of facilities that could encourage the use of alternative modes of travel to and from the schools, that is, modes other than motorized vehicles (passenger vehicles and school buses). Two of the obvious facilities that could be provided are sidewalks and bicycle lanes.

The CivTech engineer who documented and photographed the area during a field review, noted that there was a lack of sidewalk along the east side of 4th Avenue. The photos and a review of aerial photography reveal the absence of sidewalk elsewhere where student travel on foot or by bicycle. Also, there are no bicycle lanes on Juan Sanchez Boulevard, 1st Street, or 4th Avenue. The heavy pedestrian volumes at 1st Street revealed that pedestrians do not require sidewalks; however, separate facilities for motorized and non-motorized travel are desirable if such can be provided. The following is a summary of areas where sidewalk is not currently provided along the routes to the schools:

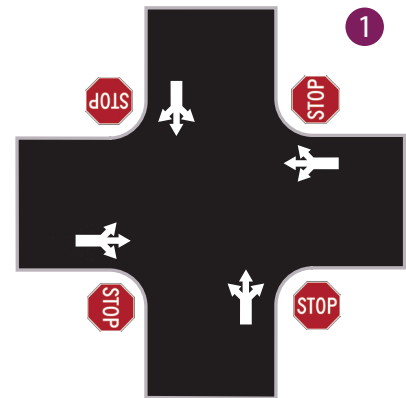
- 1st Street – east and west sides, Juan Sanchez Boulevard south to E Street
- 4th Avenue – west side, Juan Sanchez Boulevard south to E Street
- 4th Avenue – east side, Juan Sanchez Boulevard south to south of E Street
- 4th Avenue – east side, Juan Sanchez Boulevard north to Arizona Street
- 4th Avenue – west side, Juan Sanchez Boulevard north to Union Street
- Juan Sanchez Boulevard – north and south sides, 1st Street to 4th Avenue

PREFERRED ALTERNATIVE

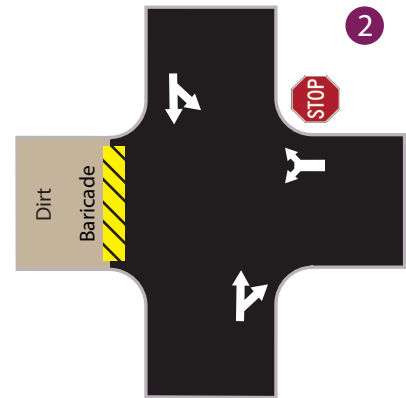
Based on the foregoing, CivTech recommends Option C as the preferred alternative. Under Option C, with two paved accesses and the access to Juan Sanchez Boulevard at 1st Street restricted to right-in/right-out movements only, some portion of the vehicular trips will be directed from the school site east to 4th Avenue and the majority of the schoolchildren will be allowed to cross at 1st Street as they currently do. The operation of the existing crosswalk would be enhanced by upgrading to a PHB or RRFB crossing and a school crossing guard could be used instead of a law enforcement officer as is now needed. The operation of the intersection of 4th Avenue and Juan Sanchez Boulevard would also be enhanced by the installation of a traffic signal, warrants for which are already satisfied by existing traffic volumes. The recommended lane configurations and traffic controls for Option C, the preferred option, are illustrated in **Figure 10**.

LEGEND

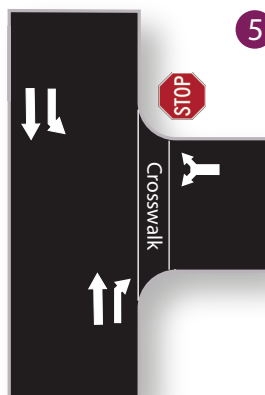
	Traffic Signal
	Stop Sign
	Speed Limit



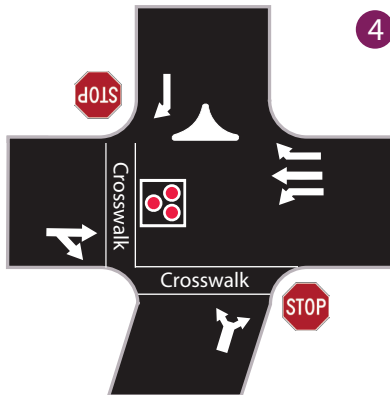
4th Avenue & Union Street



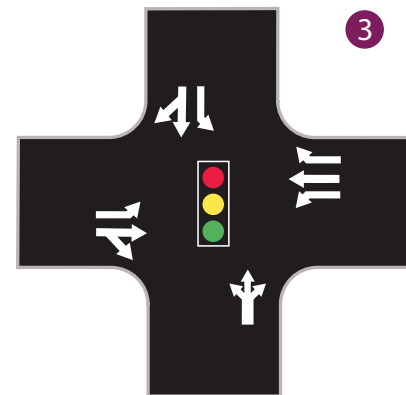
4th Avenue & Arizona Street



Main Street & Main Access



1st Avenue & Juan Sanchez Boulevard



4th Ave/4th St & Juan Sanchez Boulevard

Figure 10: Recommended Lane Configurations and Traffic Controls

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations have been documented in this study:

- ◆ The AM and PM peak hour intersection level of service analyses for the existing conditions and the conditions expected under each option revealed the following on an intersection-by-intersection basis:
 - 4th Avenue & Union Street – The analyses revealed that implementation of Option A and the closure of the de facto west leg of the intersection, should improve existing good levels of service to better levels of service north- and southbound. Bringing traffic across from the schools to 4th Avenue under Option B or C increases the inbound trips in the morning, specifically the site-bound, northbound left turns, which is expected to cause average delays of 43.7 seconds (nearly $\frac{3}{4}$ of a minute) for the northbound movement. While such delays are considered LOS E at the unsignalized intersection, as noted above, similar waits would be LOS D if this were a signalized intersection. Under Option C, in which some of the trips would not be redirected from 1st Street, the inbound volumes are lower in the morning than with Option B and no movements operate at poor or unacceptable levels of service.
 - 4th Avenue & Arizona Street – The analyses revealed that this intersection would be little affected by either option. All movements would continue to operate at LOS C or better under any of the options.
 - 4th Avenue & Juan Sanchez Boulevard – The analyses revealed that, under Option A, without installation of a traffic signal (or conversion to an all-way stop, which would spread the delays around), the north- and southbound movements are expected to operate at poor to failing levels of service. With the installation of a traffic signal, as is assumed under Options B and C, it is expected that the all movements approaching the intersection would operate at not less than LOS C or with an average delay of more than 35 seconds.
 - 1st Street & Juan Sanchez Boulevard – Under Option A, with the intersection remaining as-is and only the existing 4th Avenue traffic redirected to 1st Street, there is little change from the existing condition with east- and westbound Juan Sanchez Boulevard operating at similar levels of service with delays of similar magnitude and a law enforcement officer still required each school day. Under Option B, the existing southbound approach would be effectively closed, the existing crosswalk would be left in place and upgraded to a PHB or RRFB (the effect of which, unfortunately, cannot be analyzed using HCM 2010 methods), and, with removal of the stop signs on Juan Sanchez Boulevard, the intersection would be converted from an all-way to a one-way stop (northbound approach only). The analyses revealed that the levels of service should be improved on Juan Sanchez Boulevard during the AM peak hour and should operate at about the same LOS during the PM peak hour and the stop-controlled northbound approach would operate at LOS D. Under Option C, with all-way stop control, both accesses paved, a new westbound right turn lane into 1st Street, and the conversion of the pedestrian crossing to a PHB or RRFB, the only average delays expected to operate at poor levels of service are the east- and westbound through movements during the PM peak hour. The

- eastbound through movement is expected to operate at LOS F with an average delay of 62.0 seconds, just over a minute. The westbound through movement is expected to operate at LOS E with an average delay of 37.3 seconds, less than $\frac{2}{3}$ of a minute. The eastbound delay of 62.0 seconds would be considered a “high” LOS E at a signalized intersection (55 seconds is the break point between LOS D and LOS E) and the westbound delay of 37.3 seconds would be a high LOS D at a signalized intersection (35 seconds is the break point between LOS C and LOS D).
- *Analysis:* Based on the levels of service and V/C ratios on the intersection approaches, Option C, consisting of two paved accesses with access restricted to right-in/right-out only at 1st Street, a westbound right turn lane approaching 1st Street, the existing pedestrian crossing upgraded to a PHB or RRFB, and a traffic signal installed at 4th Avenue and Juan Sanchez Boulevard, offers the best comprehensive approach without having to construct capacity improvements (additional lanes, etc.) at any of the intersections.
 - ◆ To summarize the traffic signal needs assessment, a traffic signal at the intersection of 4th Avenue and Juan Sanchez Boulevard may currently be warranted. However, it must be cautioned that satisfying a warrant does not dictate that a traffic signal must be installed. If the City determines that the anticipated delays at the intersection in an all-way stop condition are acceptable for the foreseeable future, then a signal does not have to be provided. This may be part of a “wait-and-see” approach to see if the predicted delays actually occur. With the existing all-way stop at 1st Street, traffic may be metered such that the anticipated delays do not materialize.
 - ◆ The heavy pedestrian volumes at 1st Street revealed that pedestrians do not require sidewalks; however, separate facilities for motorized and non-motorized travel are desirable if such can be provided. The following is a summary of areas where sidewalk is not currently provided along the routes to the schools:
 - 1st Street – east and west sides, Juan Sanchez Boulevard south to E Street
 - 4th Avenue – west side, Juan Sanchez Boulevard south to E Street
 - 4th Avenue – east side, Juan Sanchez Boulevard south to south of E Street
 - 4th Avenue – east side, Juan Sanchez Boulevard north to Arizona Street
 - 4th Avenue – west side, Juan Sanchez Boulevard north to Union Street
 - Juan Sanchez Boulevard – north and south sides, 1st Street to 4th Avenue
 - ◆ CivTech recommends Option C as the preferred alternative. Under Option C, with two paved accesses and the access to Juan Sanchez Boulevard at 1st Street restricted to right-in/right-out movements only, some portion of the vehicular trips will be directed from the school site to the east to 4th Avenue and the majority of the schoolchildren will be allowed to cross at 1st Street as they currently do. The operation of the existing crosswalk would be enhanced by upgrading to a PHB or RRFB crossing and a school crossing guard could be used instead of a law enforcement officer as is now needed. The operation of the intersection of 4th Avenue and Juan Sanchez Boulevard would also be enhanced by the installation of a traffic signal, warrants for which are already satisfied by existing traffic volumes.

LIST OF REFERENCES

A Policy on Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials, Washington, D.C., 2011.

Highway Capacity Manual. Transportation Research Board, Washington, D.C., 2010.

Manual on Uniform Traffic Control Devices. U.S. Department of Transportation, Federal Highways Administration, Washington, D.C., 2009.

NPTS Urban Travel Patterns Report. December 1999.

Trip Generation Manual, 9th Edition. Institute of Transportation Engineers, Washington, D.C, 2012.

Trip Generation Handbook, 2nd Edition, Institute of Transportation Engineers, Washington, D.C., 2004.

TECHNICAL APPENDIX

APPENDIX A	CITY COMMENTS ON DRAFT STUDY
APPENDIX B	PHOTOGRAPHS AND TRAFFIC COUNTS
APPENDIX C	RECTANGULAR RAPID FLASHING BEACON INFORMATION
APPENDIX D	EXISTING PEAK HOUR CAPACITY ANALYSIS
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APPENDIX F	OPTION B PEAK HOUR CAPACITY ANALYSIS
APPENDIX G	OPTION C PEAK HOUR CAPACITY ANALYSIS

APPENDIX A

CITY COMMENTS ON DRAFT STUDY

From: Eulogio Vera [<mailto:evera@cityofsanluis.org>]
Sent: Monday, August 10, 2015 4:47 PM
To: Douglas Nicholls <dnicholls@core-e-g.com>
Cc: Kevin Burge <kburge@core-e-g.com>; Manuel Rojas <MRojas@cityofsanluis.org>
Subject: RE: Traffic Study - 4th Av/1st Draft

Doug-

I got them started and since you were out put them aside but here they are.

Gadsden School District Schools

Page 1

- Exec. Summary - The City is not dictating that a single access is necessary. Intent of study is to recommend what is best and sufficient for the needs. Maybe a right in and right out at 1st and JSB is good and does not greatly impact traffic on JSB but provides another place for traffic to leave the schools and not necessarily have to impact the other two intersections (Union and 4th and JSB and 4th).
- Option C is mentioned but not provided in report.

Page 3

- A crossing guard may always be necessary at 1st and JSB due to the flow of school pedestrians.
- Right in and right out at 1st and JSB may provide additional support for access and for exiting the school zone.

Page 4

- Intro. Paragraph - Study to determine how many accesses. It could be one or two.

Page 6

- Ex. Cond. Second Paragraph - number of paved access roads to be determined by study. State Land just waiting for School Dist. to ask for the land that is needed.

Page 11

- Proposed Alt. - First paragraph. Not sure muddy would be the correct word but maybe some minor ponding.
- The City does not have much experience with HAWK crossings but the one on Main will probably not function in the winter due to the high pedestrian volume.

Page 18

- If capacity improvements (additional lanes or tapers) are needed and will make the road infrastructure function at a good level of service, now is the time to implement them.

Page 22

- Mentioning of option C, not included.
- Final level of service seem fairly low.

In general I think we need to look further into the using both First Avenue as well as Union to dissipate traffic from the schools. Looks like one access would not improve too much and would probably make at least one intersection worse. Please review and let me know if you have any questions.

Thanks
Eulogio

APPENDIX B

PHOTOGRAPHS AND TRAFFIC COUNTS



1. 1st looking south from NS access



2. 4 way stop JSB-1st NS Access



3. Left in, right in access 90 feet west of NS Access



4. NEC 4th looking west



5. NEC 4th sign



6. NEC 4th Street



7. North south access along school to JSB



8. NWC 4th looking north



9. NWC 4th looking south



10. NWC 4th looking west



11. NWC bollards



12. NWC NS access at JSB



13. NWC Utility Vault by NS Access



14. NWC 4th looking NW at school



15. Ped ramp, crosswalk west of 1st close-up looking south



16. Ped ramp, crosswalk west of 1st close-up



17. Ped ramp, crosswalk west of 1st



18. SEC 4th looking north



19. SEC Utilities



20. Signing NS access 2



21. Signing NS access 3



22. Signing on dirt NS access



23. SWC 1st crosswalk to north Access



24. SWC 1st utility, crossing signs



25. SWC 4th looking east



26. SWC 4th Utility bollards



27. SWC looking east at crosswalk across 1st



28. SWC looking south



29. Union Access looking east



30. Union looking west at school dirt road access



31. WB approach east of 4th

APPENDIX C

RECTANGULAR RAPID FLASHING BEACON INFORMATION



Rectangular Rapid Flash Beacon (RRFB)

Purpose

According to the National Highway Traffic Safety Administration, there were a total of 14,340 pedestrian fatalities and 193,000 pedestrian injuries resulting from pedestrian-vehicle crashes nationwide during the 2004-2006 period. Rectangular Rapid Flash Beacons (RRFB) can enhance safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts.

Alternative Names

Light Emitting Diode (LED) Rapid-Flash System, Stutter Flash or LED Beacons.

Operation

- RRFBs are user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system.
- RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles.
- RRFBs may be installed on either two-lane or multi-lane roadways.

Potential Benefits

- RRFBs are a lower cost alternative to traffic signals and hybrid signals that are shown to increase driver yielding behavior at crosswalks significantly when supplementing standard pedestrian crossing warning signs and markings.
- An official FHWA-sponsored experimental implementation and evaluation conducted in St. Petersburg, Florida found that RRFBs at pedestrian crosswalks are dramatically more effective at increasing driver yielding rates to pedestrians than traditional overhead beacons.
- The novelty and unique nature of the stutter flash may elicit a greater response from drivers than traditional methods.
- The addition of RRFB may also increase the safety effectiveness of other treatments, such as the use of advance yield markings with YIELD (or STOP) HERE FOR PEDESTRIANS signs. These signs and markings are used to reduce the incidence of multiple-threat crashes at crosswalks on multi-lane roads (i.e., crashes where a vehicle in one lane stops to allow a pedestrian to cross the street while a vehicle in an adjacent lane, traveling in the same direction, strikes the pedestrian), but alone they only have a small effect on overall driver yielding rates.



This summary is one in a series describing Innovative Intersection Safety Treatments. The summaries identify new technologies and techniques to improve intersection safety developed since NCHRP Report 500, Volumes 5 and 12, were published in 2003 and 2004, respectively. These treatments show promise for improving safety but comprehensive effectiveness evaluations are not yet available.

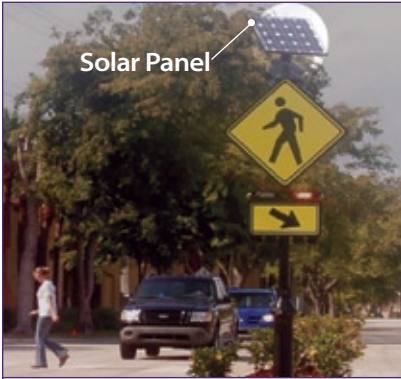


Figure 1: Activated, solar-powered RRFB on a center island at an unsignalized intersection—beacons flash using an irregular flash pattern that is similar to emergency flashers on police vehicles



Figure 2: Activated, solar-powered, roadside RRFB at a mid-block crosswalk



Figure 3: Combined roadside and median system of solar-powered RRFB

Learn More

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See Also:

http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/stpetersburgprpt/intro.htm
http://www.stpete.org/pdf/ite_paper_07.pdf

Agency Experience

“An Analysis of the Effects of Stutter Flash LED Beacons to Increase Yielding to Pedestrians Using Multilane Crosswalks,” along with “The Use of Stutter Flash LED Beacons to Increase Yielding to Pedestrians at Crosswalks,” presented at the Transportation Research Board Annual Meeting in 2008, summarized the results of two studies on the effects of RRFBs when used to supplement standard pedestrian crossing warning signs at crosswalks¹.

The former found that going from a no-beacon arrangement to a two-beacon system, mounted on the supplementary warning sign on the right side of the crossing, increased yielding from 18 percent to 81 percent. There was a further increase in yielding behavior, with a four-beacon system (with two beacons on both the right and left side of the crossing) to 88 percent. “An Analysis of the Effects of Stutter Flash LED Beacons to Increase Yielding to Pedestrians Using Multilane Crosswalks” also evaluated the sites over a 1-year period, and found that there was little to no decrease in yielding behavior over time.

Implementation Considerations

- Including RRFBs on the roadside increases driver yielding behavior significantly. Including RRFBs on a center island or median as well can further increase driver yielding behavior, although with a lower marginal benefit than roadside beacons.
- RRFBs can use manual push-buttons or automated passive (e.g., video or infrared) pedestrian detection, and should be unlit when not activated.
- RRFBs typically receive power by standalone solar panel units, but may also be wired to a traditional power source.

Manual on Uniform Traffic Control Devices (MUTCD) Specifications

- The MUTCD gave interim approval to RRFBs for optional use in limited circumstances in July 2008. The interim approval allows for usage as a warning beacon to supplement standard pedestrian crossing warning signs and markings at either a pedestrian or school crossing; where the crosswalk approach is not controlled by a yield sign, stop sign, or traffic-control signal; or at a crosswalk at a roundabout.
- The MUTCD interim approval memo also contains other provisions for the implementation of the device and should be reviewed (http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm).

Costs

- Cost is approximately \$10,000 to \$15,000 for purchase and installation of two units (one on either side of a street). This includes solar panels for powering the units, pad lighting, indication units (for both sides of street) with RRFBs in the back and front of each unit, signage on both approaches, all posts, and either passive infrared detection or push buttons with audio instructions.
- Costs would be proportionately higher for additional units placed on a median island, etc.

¹The two known studies of stutter flash were both conducted in Florida—one in Miami Beach and one in St. Petersburg. They are:

Sherbutt, J., R. Van Houten, and S. Turner. “An Analysis of the Effects of Stutter Flash LED Beacons to Increase Yielding to Pedestrians Using Multilane Crosswalks.” Presented at the Transportation Research Board Annual Meeting, Washington, DC, 2008.

Van Houten, R., R. Ellis, and E. Marmolejo. “The Use of Stutter Flash LED Beacons to Increase Yielding to Pedestrians at Crosswalks.” Presented at the Transportation Research Board Annual Meeting, Washington, DC, 2008.

APPENDIX D

EXISTING PEAK HOUR CAPACITY ANALYSIS

Lanes and Geometrics
1: 4th Avenue & Union Street

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↕		↕		↕		↕		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	0		0		0		0		0		0	
Storage Lanes	0		0		0		0		0		0	
Taper Length (ft)	25		25		25		25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.977			0.931			0.989			0.957		
Flt Protected	0.976			0.995			0.980			0.985		
Satd. Flow (prot)	0	1776	0	0	1726	0	0	1805	0	0	1756	0
Flt Permitted	0.976			0.995			0.980			0.985		
Satd. Flow (perm)	0	1776	0	0	1726	0	0	1805	0	0	1756	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	300		300		300		300		300		300	
Travel Time (s)	8.2		8.2		8.2		8.2		8.2		8.2	

Intersection Summary

Area Type: Other

Lanes and Geometrics
1: 4th Avenue & Union Street

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↕		↕		↕		↕		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	0		0		0		0		0		0	
Storage Lanes	0		0		0		0		0		0	
Taper Length (ft)	25		25		25		25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.987			0.934			0.979			0.991		
Flt Protected	0.984			0.986			0.991			0.978		
Satd. Flow (prot)	0	1809	0	0	1715	0	0	1807	0	0	1805	0
Flt Permitted	0.984			0.986			0.991			0.978		
Satd. Flow (perm)	0	1809	0	0	1715	0	0	1807	0	0	1805	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	300		300		300		300		300		300	
Travel Time (s)	8.2		8.2		8.2		8.2		8.2		8.2	

Intersection Summary

Area Type: Other

HCM 2010 AWSC
1: 4th Avenue & Union Street

6/25/2015

Intersection												
Intersection Delay, s/veh	10.3											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	55	38	19	0	10	43	56	0	103	128	20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	61	42	21	0	11	48	62	0	114	142	22
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.7	9.3	11
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	41%	49%	9%	31%
Vol Thru, %	51%	34%	39%	37%
Vol Right, %	8%	17%	51%	32%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	251	112	109	228
LT Vol	128	38	43	85
Through Vol	20	19	56	73
RT Vol	103	55	10	70
Lane Flow Rate	279	124	121	253
Geometry Grp	1	1	1	1
Degree of Util (X)	0.38	0.189	0.175	0.337
Departure Headway (Hd)	4.908	5.465	5.192	4.783
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	722	660	694	742
Service Time	3.004	3.47	3.197	2.882
HCM Lane V/C Ratio	0.386	0.188	0.174	0.341
HCM Control Delay	11	9.7	9.3	10.3
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.8	0.7	0.6	1.5

HCM 2010 AWSC
1: 4th Avenue & Union Street

6/25/2015

Intersection												
Intersection Delay, s/veh	12											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	41	76	13	0	43	34	74	0	46	161	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	46	84	14	0	48	38	82	0	51	179	43
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	10.7	10.6	11.9
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	32%	28%	45%
Vol Thru, %	65%	58%	23%	48%
Vol Right, %	16%	10%	49%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	246	130	151	300
LT Vol	161	76	34	144
Through Vol	39	13	74	20
RT Vol	46	41	43	136
Lane Flow Rate	273	144	168	333
Geometry Grp	1	1	1	1
Degree of Util (X)	0.403	0.235	0.26	0.492
Departure Headway (Hd)	5.305	5.868	5.588	5.319
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	678	610	641	677
Service Time	3.349	3.923	3.643	3.36
HCM Lane V/C Ratio	0.403	0.236	0.262	0.492
HCM Control Delay	11.9	10.7	10.6	13.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	0.9	1	2.7

HCM 2010 AWSC
1: 4th Avenue & Union Street

6/25/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	70	85	73
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	78	94	81
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		10.3		
HCM LOS		B		
Lane				

HCM 2010 AWSC
1: 4th Avenue & Union Street

6/25/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	136	144	20
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	151	160	22
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		13.4		
HCM LOS		B		
Lane				

Lanes and Geometrics
2: 4th Avenue & Arizona Street

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations	↕		↕		↕		↕		↕		↕				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12			
Grade (%)	0%		0%		0%		0%		0%		0%				
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0			
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0			
Taper Length (ft)	25	25	25	25	25	25	25	25	25	25	25	25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped Bike Factor															
Frt					0.986					0.989					0.999
Flt Protected	0.950				0.958			0.999			0.999				
Satd. Flow (prot)	0	1770	0	0	1760	0	0	1840	0	0	1859	0			
Flt Permitted	0.950				0.958			0.999			0.999				
Satd. Flow (perm)	0	1770	0	0	1760	0	0	1840	0	0	1859	0			
Link Speed (mph)	25				25			25			25				
Link Distance (ft)	200				300			420			880				
Travel Time (s)	5.5				8.2			11.5			24.0				

Intersection Summary

Area Type: Other

Lanes and Geometrics
2: 4th Avenue & Arizona Street

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↕		↕		↕		↕		↕		↕		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	
Grade (%)	0%		0%		0%		0%		0%		0%		
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0	
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0	
Taper Length (ft)	25	25	25	25	25	25	25	25	25	25	25	25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor													
Frt	0.899				0.989				0.981				0.999
Flt Protected					0.959			0.999			0.999		
Satd. Flow (prot)	0	1675	0	0	1767	0	0	1826	0	0	1859	0	
Flt Permitted					0.959			0.999			0.999		
Satd. Flow (perm)	0	1675	0	0	1767	0	0	1826	0	0	1859	0	
Link Speed (mph)	25				25			25			25		
Link Distance (ft)	200				300			420			880		
Travel Time (s)	5.5				8.2			11.5			24.0		

Intersection Summary

Area Type: Other

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/25/2015

Intersection										
Int Delay, s/veh	1.2									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	1	0	0	30	1	4	5	225	21	
Conflicting Peds, #/hr	13	0	11	6	0	8	11	0	6	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	1	0	0	33	1	4	6	250	23	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	439	447	159	436	436	283	149	0	0	
Stage 1	155	155	-	281	281	-	-	-	-	
Stage 2	284	292	-	155	155	-	-	-	-	
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	
Pot Cap-1 Maneuver	528	506	886	531	514	756	1432	-	-	
Stage 1	847	769	-	726	678	-	-	-	-	
Stage 2	723	671	-	847	769	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	510	493	868	519	501	743	1419	-	-	
Mov Cap-2 Maneuver	510	493	-	519	501	-	-	-	-	
Stage 1	834	758	-	718	670	-	-	-	-	
Stage 2	706	663	-	837	758	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	12.1			12.2			0.2			
HCM LOS	B			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	1419	-	-	510	537	1268	-	-		
HCM Lane V/C Ratio	0.004	-	-	0.002	0.072	0.003	-	-		
HCM Control Delay (s)	7.5	0	-	12.1	12.2	7.8	0	-		
HCM Lane LOS	A	A	-	B	B	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0	-	-		

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/25/2015

Intersection										
Int Delay, s/veh	1.4									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	0	1	3	38	3	4	4	234	39	
Conflicting Peds, #/hr	4	0	9	11	0	6	9	0	11	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	0	1	3	42	3	4	4	260	43	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	531	549	226	530	529	299	216	0	0	
Stage 1	226	226	-	302	302	-	-	-	-	
Stage 2	305	323	-	228	227	-	-	-	-	
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	
Pot Cap-1 Maneuver	459	443	813	460	455	741	1354	-	-	
Stage 1	777	717	-	707	664	-	-	-	-	
Stage 2	705	650	-	775	716	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	445	432	800	446	443	731	1342	-	-	
Mov Cap-2 Maneuver	445	432	-	446	443	-	-	-	-	
Stage 1	768	708	-	698	655	-	-	-	-	
Stage 2	691	641	-	760	707	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	10.5			13.7			0.1			
HCM LOS	B			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	1342	-	-	660	462	1240	-	-		
HCM Lane V/C Ratio	0.003	-	-	0.007	0.108	0.004	-	-		
HCM Control Delay (s)	7.7	0	-	10.5	13.7	7.9	0	-		
HCM Lane LOS	A	A	-	B	B	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	0	0.4	0	-	-		

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/25/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	3	121	1
Conflicting Peds, #/hr	8	0	13
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	3	134	1
Major/Minor	Major2		
Conflicting Flow All	281	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1282	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1268	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/25/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	5	185	1
Conflicting Peds, #/hr	4	0	6
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	6	206	1
Major/Minor	Major2		
Conflicting Flow All	314	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1246	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1240	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

Lanes and Geometrics
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖		↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.979			0.850			0.938			0.850		
Flt Protected	0.950			0.950			0.996			0.980		
Satd. Flow (prot)	1770	1824	0	1770	1863	1583	0	1740	0	0	1825	1583
Flt Permitted	0.950			0.950			0.996			0.980		
Satd. Flow (perm)	1770	1824	0	1770	1863	1583	0	1740	0	0	1825	1583
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		550			1000			300			420	
Travel Time (s)		15.0			27.3			8.2			11.5	

Intersection Summary

Area Type: Other

Lanes and Geometrics
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖		↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.980			0.850			0.927			0.850		
Flt Protected	0.950			0.950			0.997			0.987		
Satd. Flow (prot)	1770	1825	0	1770	1863	1583	0	1722	0	0	1839	1583
Flt Permitted	0.950			0.950			0.997			0.987		
Satd. Flow (perm)	1770	1825	0	1770	1863	1583	0	1722	0	0	1839	1583
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		550			1000			300			420	
Travel Time (s)		15.0			27.3			8.2			11.5	

Intersection Summary

Area Type: Other

HCM 2010 TWSC
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

Intersection										
Int Delay, s/veh	8.3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	83	300	49	39	449	143	9	59	58	
Conflicting Peds, #/hr	1	0	3	11	0	9	3	0	11	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	100	-	-	75	-	75	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	92	333	54	43	499	159	10	66	64	
Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	508	0	0	399	0	0	1172	1151	383	
Stage 1	-	-	-	-	-	-	556	556	-	
Stage 2	-	-	-	-	-	-	616	595	-	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1057	-	-	1160	-	-	169	198	664	
Stage 1	-	-	-	-	-	-	515	513	-	
Stage 2	-	-	-	-	-	-	478	492	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	1054	-	-	1149	-	-	103	171	652	
Mov Cap-2 Maneuver	-	-	-	-	-	-	103	171	-	
Stage 1	-	-	-	-	-	-	466	464	-	
Stage 2	-	-	-	-	-	-	351	470	-	
Approach	EB			WB			NB			
HCM Control Delay, s	1.7			0.5			38.5			
HCM LOS	E			E			E			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	
Capacity (veh/h)	242	1054	-	-	1149	-	-	124	557	
HCM Lane V/C Ratio	0.579	0.087	-	-	0.038	-	-	0.565	0.16	
HCM Control Delay (s)	38.5	8.7	-	-	8.3	-	-	66.3	12.7	
HCM Lane LOS	E	A	-	-	A	-	-	F	B	
HCM 95th %tile Q(veh)	3.3	0.3	-	-	0.1	-	-	2.8	0.6	

HCM 2010 TWSC
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

Intersection										
Int Delay, s/veh	92.6									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	84	468	71	68	536	93	9	69	93	
Conflicting Peds, #/hr	8	0	10	21	0	19	10	0	21	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	100	-	-	75	-	75	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	93	520	79	76	596	103	10	77	103	
Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	615	0	0	620	0	0	1571	1533	601	
Stage 1	-	-	-	-	-	-	767	767	-	
Stage 2	-	-	-	-	-	-	804	766	-	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	
Pot Cap-1 Maneuver	965	-	-	960	-	-	90	116	500	
Stage 1	-	-	-	-	-	-	395	411	-	
Stage 2	-	-	-	-	-	-	377	412	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	957	-	-	943	-	-	15	93	483	
Mov Cap-2 Maneuver	-	-	-	-	-	-	15	93	-	
Stage 1	-	-	-	-	-	-	350	365	-	
Stage 2	-	-	-	-	-	-	208	373	-	
Approach	EB			WB			NB			
HCM Control Delay, s	1.2			0.9			\$ 422.6			
HCM LOS	E			E			F			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	
Capacity (veh/h)	111	957	-	-	943	-	-	42	473	
HCM Lane V/C Ratio	1.712	0.098	-	-	0.08	-	-	2.46	0.237	
HCM Control Delay (s)	\$ 422.6	9.2	-	-	9.2	-	-	\$ 869.7	15	
HCM Lane LOS	F	A	-	-	A	-	-	F	C	
HCM 95th %tile Q(veh)	14.7	0.3	-	-	0.3	-	-	11.1	0.9	

Notes

-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	25	38	80
Conflicting Peds, #/hr	9	0	1
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	40
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	28	42	89
Major/Minor	Minor2		
Conflicting Flow All	1216	1178	511
Stage 1	595	595	-
Stage 2	621	583	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	158	191	563
Stage 1	491	492	-
Stage 2	475	499	-
Platoon blocked, %			
Mov Cap-1 Maneuver	90	165	557
Mov Cap-2 Maneuver	90	165	-
Stage 1	445	470	-
Stage 2	332	451	-
Approach	SB		
HCM Control Delay, s	36.3		
HCM LOS	E		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
3: 4th Avenue & Juan Sanchez Boulevard

6/25/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	24	69	101
Conflicting Peds, #/hr	19	0	8
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	40
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	27	77	112
Major/Minor	Minor2		
Conflicting Flow All	1623	1573	625
Stage 1	766	766	-
Stage 2	857	807	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	82	110	485
Stage 1	395	412	-
Stage 2	352	394	-
Platoon blocked, %			
Mov Cap-1 Maneuver	- 17	88	473
Mov Cap-2 Maneuver	- 17	88	-
Stage 1	351	373	-
Stage 2	194	349	-
Approach	SB		
HCM Control Delay, s	\$ 424.7		
HCM LOS	F		
Minor Lane/Major Mvmt			

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	0	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.965			0.992			0.974			0.938		
Flt Protected	0.950	0	0	0.950	0	0	0.982	0	0	0.986	0	0
Satd. Flow (prot)	1770	1798	0	1770	1848	0	0	1782	0	0	1723	0
Flt Permitted	0.950	0	0	0.950	0	0	0.982	0	0	0.986	0	0
Satd. Flow (perm)	1770	1798	0	1770	1848	0	0	1782	0	0	1723	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		316		316	
Travel Time (s)	31.4		15.0		8.6		8.6		8.6		8.6	

Intersection Summary

Area Type: Other

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

6/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	0	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.977			0.998			0.976			0.947		
Flt Protected	0.950	0	0	0.950	0	0	0.969	0	0	0.984	0	0
Satd. Flow (prot)	1770	1820	0	1770	1859	0	0	1762	0	0	1736	0
Flt Permitted	0.950	0	0	0.950	0	0	0.969	0	0	0.984	0	0
Satd. Flow (perm)	1770	1820	0	1770	1859	0	0	1762	0	0	1736	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		316		316	
Travel Time (s)	31.4		15.0		8.6		8.6		8.6		8.6	

Intersection Summary

Area Type: Other

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

6/25/2015

Intersection												
Intersection Delay, s/veh	40											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	69	294	89	0	34	406	23	0	60	71	31
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	77	327	99	0	38	451	26	0	67	79	34
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	38	60.1	17.1
HCM LOS	E	F	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	37%	100%	0%	100%	0%	28%
Vol Thru, %	44%	0%	77%	0%	95%	26%
Vol Right, %	19%	0%	23%	0%	5%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	69	383	34	429	234
LT Vol	71	0	294	0	406	61
Through Vol	31	0	89	0	23	108
RT Vol	60	69	0	34	0	65
Lane Flow Rate	180	77	426	38	477	260
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.414	0.172	0.872	0.084	0.983	0.558
Departure Headway (Hd)	8.274	8.063	7.379	7.977	7.423	7.731
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	434	444	489	448	486	465
Service Time	6.356	5.83	5.145	5.739	5.185	5.805
HCM Lane V/C Ratio	0.415	0.173	0.871	0.085	0.981	0.559
HCM Control Delay	17.1	12.5	42.6	11.5	64	20.2
HCM Lane LOS	C	B	E	B	F	C
HCM 95th-tile Q	2	0.6	9.3	0.3	12.8	3.3

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

6/25/2015

Intersection												
Intersection Delay, s/veh	53.7											
Intersection LOS	F											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	31	510	94	0	28	556	9	0	108	31	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	34	567	104	0	31	618	10	0	120	34	33
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	63.7	64.3	17.1
HCM LOS	F	F	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	64%	100%	0%	100%	0%	33%
Vol Thru, %	18%	0%	84%	0%	98%	28%
Vol Right, %	18%	0%	16%	0%	2%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	169	31	604	28	565	177
LT Vol	31	0	510	0	556	50
Through Vol	30	0	94	0	9	69
RT Vol	108	31	0	28	0	58
Lane Flow Rate	188	34	671	31	628	197
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.424	0.073	1	0.066	1	0.433
Departure Headway (Hd)	8.137	7.656	7.045	7.659	7.147	7.926
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	443	467	517	467	508	456
Service Time	6.171	5.417	4.806	5.42	4.908	5.958
HCM Lane V/C Ratio	0.424	0.073	1.298	0.066	1.236	0.432
HCM Control Delay	17.1	11	66.4	11	66.9	16.9
HCM Lane LOS	C	B	F	B	F	C
HCM 95th-tile Q	2.1	0.2	13.8	0.2	13.7	2.1

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

6/25/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	65	61	108
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	72	68	120
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		2		
Conflicting Approach Right		EB		
Conflicting Lanes Right		2		
HCM Control Delay		20.2		
HCM LOS		C		
Lane				

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

6/25/2015






Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	58	50	69
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	64	56	77
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		2		
Conflicting Approach Right		EB		
Conflicting Lanes Right		2		
HCM Control Delay		16.9		
HCM LOS		C		
Lane				

APPENDIX E

OPTION A PEAK HOUR CAPACITY ANALYSIS

Lanes and Geometrics
1: 4th Avenue & Union Street

6/26/2015






						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.885		0.982			
Flt Protected	0.993					0.985
Satd. Flow (prot)	1637	0	1829	0	0	1835
Flt Permitted	0.993					0.985
Satd. Flow (perm)	1637	0	1829	0	0	1835
Link Speed (mph)	25		25			25
Link Distance (ft)	300		880			300
Travel Time (s)	8.2		24.0			8.2

Intersection Summary

Area Type: Other

Lanes and Geometrics
1: 4th Avenue & Union Street

6/26/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.915		0.974			
Flt Protected	0.982					0.978
Satd. Flow (prot)	1674	0	1814	0	0	1822
Flt Permitted	0.982					0.978
Satd. Flow (perm)	1674	0	1814	0	0	1822
Link Speed (mph)	25		25			25
Link Distance (ft)	300		880			300
Travel Time (s)	8.2		24.0			8.2

Intersection Summary

Area Type: Other

HCM 2010 TWSC
1: 4th Avenue & Union Street

6/26/2015

Intersection						
Int Delay, s/veh	2.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	56	128	20	70	158
Conflicting Peds, #/hr	0	16	0	2	18	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	62	142	22	78	176
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	500	187	0	0	180	0
Stage 1	169	-	-	-	-	-
Stage 2	331	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	530	855	-	-	1396	-
Stage 1	861	-	-	-	-	-
Stage 2	728	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	489	831	-	-	1375	-
Mov Cap-2 Maneuver	489	-	-	-	-	-
Stage 1	850	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	10.3		0		2.4	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	751	1375	-	
HCM Lane V/C Ratio	-	-	0.098	0.057	-	
HCM Control Delay (s)	-	-	10.3	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-	



HCM 2010 TWSC
1: 4th Avenue & Union Street

6/26/2015

Intersection						
Int Delay, s/veh	4.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	43	74	161	39	136	164
Conflicting Peds, #/hr	3	3	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	82	179	43	151	182
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	688	207	0	0	225	0
Stage 1	204	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	412	833	-	-	1344	-
Stage 1	830	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	359	829	-	-	1341	-
Mov Cap-2 Maneuver	359	-	-	-	-	-
Stage 1	828	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	13.4		0		3.6	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	560	1341	-	
HCM Lane V/C Ratio	-	-	0.232	0.113	-	
HCM Control Delay (s)	-	-	13.4	8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.9	0.4	-	

Lanes and Geometrics
2: 4th Avenue & Arizona Street

6/26/2015


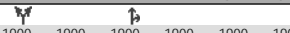
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994		0.956			
Flt Protected	0.954					0.999
Satd. Flow (prot)	1766	0	1781	0	0	1861
Flt Permitted	0.954					0.999
Satd. Flow (perm)	1766	0	1781	0	0	1861
Link Speed (mph)	25		25			25
Link Distance (ft)	300		420			880
Travel Time (s)	8.2		11.5			24.0

Intersection Summary

Area Type: Other

Lanes and Geometrics
2: 4th Avenue & Arizona Street

6/26/2015

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.994		0.948			
Flt Protected	0.954					0.999
Satd. Flow (prot)	1766	0	1766	0	0	1861
Flt Permitted	0.954					0.999
Satd. Flow (perm)	1766	0	1766	0	0	1861
Link Speed (mph)	25		25			25
Link Distance (ft)	300		420			880
Travel Time (s)	8.2		11.5			24.0

Intersection Summary

Area Type: Other

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/26/2015

Intersection						
Int Delay, s/veh	2.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	74	4	123	59	3	176
Conflicting Peds, #/hr	6	8	0	6	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	4	137	66	3	196

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	379	185	0	0	210	0
Stage 1	177	-	-	-	-	-
Stage 2	202	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	623	857	-	-	1361	-
Stage 1	854	-	-	-	-	-
Stage 2	832	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	615	846	-	-	1352	-
Mov Cap-2 Maneuver	615	-	-	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	826	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	624	1352	-
HCM Lane V/C Ratio	-	-	0.139	0.002	-
HCM Control Delay (s)	-	-	11.7	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

6/26/2015

Intersection						
Int Delay, s/veh	1.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	75	4	188	116	5	193
Conflicting Peds, #/hr	11	6	0	11	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	83	4	209	129	6	214

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	510	288	0	0	349	0
Stage 1	284	-	-	-	-	-
Stage 2	226	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	523	751	-	-	1210	-
Stage 1	764	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	510	742	-	-	1206	-
Mov Cap-2 Maneuver	510	-	-	-	-	-
Stage 1	757	-	-	-	-	-
Stage 2	800	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	518	1206	-
HCM Lane V/C Ratio	-	-	0.169	0.005	-
HCM Control Delay (s)	-	-	13.4	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

	↖	→	↗	↖	←	↖	↖	↑	↗	↗	↓	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖		↖	↖		↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978				0.850		0.938				0.850
Flt Protected	0.950			0.950				0.988				0.981
Satd. Flow (prot)	1770	1822	0	1770	1863	1583	0	1726	0	0	1827	1583
Flt Permitted	0.950			0.950				0.988				0.981
Satd. Flow (perm)	1770	1822	0	1770	1863	1583	0	1726	0	0	1827	1583
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		550			1000			300			420	
Travel Time (s)		15.0			27.3			8.2			11.5	

Intersection Summary

Area Type: Other

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

	↖	→	↗	↖	←	↖	↖	↑	↗	↗	↓	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖		↖	↖		↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980				0.850		0.926				0.850
Flt Protected	0.950			0.950				0.994				0.989
Satd. Flow (prot)	1770	1825	0	1770	1863	1583	0	1715	0	0	1842	1583
Flt Permitted	0.950			0.950				0.994				0.989
Satd. Flow (perm)	1770	1825	0	1770	1863	1583	0	1715	0	0	1842	1583
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		550			1000			300			420	
Travel Time (s)		15.0			27.3			8.2			11.5	

Intersection Summary

Area Type: Other

HCM 2010 TWSC
3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

Intersection										
Int Delay, s/veh	15									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	92	303	52	39	506	86	30	38	58	
Conflicting Peds, #/hr	1	0	3	11	0	9	3	0	11	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	100	-	-	75	-	75	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	102	337	58	43	562	96	33	42	64	
Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	571	0	0	405	0	0	1257	1239	388	
Stage 1	-	-	-	-	-	-	581	581	-	
Stage 2	-	-	-	-	-	-	676	658	-	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1002	-	-	1154	-	-	148	175	660	
Stage 1	-	-	-	-	-	-	499	500	-	
Stage 2	-	-	-	-	-	-	443	461	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	999	-	-	1143	-	-	63	149	648	
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	149	-	
Stage 1	-	-	-	-	-	-	444	445	-	
Stage 2	-	-	-	-	-	-	232	440	-	
Approach	EB			WB			NB			
HCM Control Delay, s	1.9			0.5			107.8			
HCM LOS	F									
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	
Capacity (veh/h)	154	999	-	-	1143	-	-	114	513	
HCM Lane V/C Ratio	0.909	0.102	-	-	0.038	-	-	0.536	0.405	
HCM Control Delay (s)	107.8	9	-	-	8.3	-	-	68.3	16.7	
HCM Lane LOS	F	A	-	-	A	-	-	F	C	
HCM 95th %tile Q(veh)	6.4	0.3	-	-	0.1	-	-	2.5	1.9	

HCM 2010 TWSC
3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

Intersection										
Int Delay, s/veh	75.2									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	145	473	73	68	557	72	22	56	93	
Conflicting Peds, #/hr	8	0	10	21	0	19	10	0	21	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	100	-	-	75	-	75	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	161	526	81	76	619	80	24	62	103	
Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	638	0	0	628	0	0	1734	1698	608	
Stage 1	-	-	-	-	-	-	909	909	-	
Stage 2	-	-	-	-	-	-	825	789	-	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	
Pot Cap-1 Maneuver	946	-	-	954	-	-	69	92	496	
Stage 1	-	-	-	-	-	-	329	354	-	
Stage 2	-	-	-	-	-	-	367	402	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	938	-	-	937	-	-	-	68	479	
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	68	-	
Stage 1	-	-	-	-	-	-	268	288	-	
Stage 2	-	-	-	-	-	-	169	364	-	
Approach	EB			WB			NB			
HCM Control Delay, s	2			0.9			-			
HCM LOS	-									
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	
Capacity (veh/h)	-	938	-	-	937	-	-	25	459	
HCM Lane V/C Ratio	-	0.172	-	-	0.081	-	-	3.733	0.368	
HCM Control Delay (s)	-	9.6	-	-	9.2	-	-	\$ 1551.5	17.3	
HCM Lane LOS	-	A	-	-	A	-	-	F	C	
HCM 95th %tile Q(veh)	-	0.6	-	-	0.3	-	-	11.6	1.7	

Notes

--: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	22	33	187
Conflicting Peds, #/hr	9	0	1
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	40
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	24	37	208
Major/Minor			
	Minor2		
Conflicting Flow All	1292	1268	574
Stage 1	658	658	-
Stage 2	634	610	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	140	168	518
Stage 1	453	461	-
Stage 2	467	485	-
Platoon blocked, %			
Mov Cap-1 Maneuver	87	143	513
Mov Cap-2 Maneuver	87	143	-
Stage 1	404	440	-
Stage 2	339	431	-
Approach			
	SB		
HCM Control Delay, s	28.4		
HCM LOS	D		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
3: 4th Street/4th Avenue & Juan Sanches Boulevard

6/26/2015

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	19	65	152
Conflicting Peds, #/hr	19	0	8
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	40
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	90	90	90
Heavy Vehicles, %	2	2	2
Mvmt Flow	21	72	169
Major/Minor			
	Minor2		
Conflicting Flow All	1781	1739	648
Stage 1	789	789	-
Stage 2	992	950	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	64	87	470
Stage 1	384	402	-
Stage 2	296	339	-
Platoon blocked, %			
Mov Cap-1 Maneuver	- 8	- 64	459
Mov Cap-2 Maneuver	- 8	- 64	-
Stage 1	313	364	-
Stage 2	148	276	-
Approach			
	SB		
HCM Control Delay, s	\$ 563.4		
HCM LOS	F		
Minor Lane/Major Mvmt			

Lanes and Geometrics
4: 1st Street & Juan Sanches Boulevard

6/26/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	0	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.962			0.940			0.974			0.941		
Flt Protected	0.950	0	0	0.950	0	0	0.982	0	0	0.982	0	0
Satd. Flow (prot)	1770	1792	0	1770	1751	0	0	1782	0	0	1721	0
Flt Permitted	0.950	0	0	0.950	0	0	0.982	0	0	0.982	0	0
Satd. Flow (perm)	1770	1792	0	1770	1751	0	0	1782	0	0	1721	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		316		316	
Travel Time (s)	31.4		15.0		8.6		8.6		8.6		8.6	

Intersection Summary

Area Type: Other

Lanes and Geometrics
4: 1st Street & Juan Sanches Boulevard

6/26/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	0	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.976			0.974			0.976			0.958		
Flt Protected	0.950	0	0	0.950	0	0	0.969	0	0	0.969	0	0
Satd. Flow (prot)	1770	1818	0	1770	1814	0	0	1762	0	0	1740	0
Flt Permitted	0.950	0	0	0.950	0	0	0.969	0	0	0.969	0	0
Satd. Flow (perm)	1770	1818	0	1770	1814	0	0	1762	0	0	1740	0
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		316		316	
Travel Time (s)	31.4		15.0		8.6		8.6		8.6		8.6	

Intersection Summary

Area Type: Other

HCM 2010 AWSC
4: 1st Street & Juan Sanches Boulevard

6/26/2015

Intersection												
Intersection Delay, s/veh	44.7											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	99	262	89	0	34	369	245	0	60	71	31
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	110	291	99	0	38	410	272	0	67	79	34
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	33.7	66.2	18
HCM LOS	D	F	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	37%	100%	0%	100%	0%	36%
Vol Thru, %	44%	0%	75%	0%	60%	20%
Vol Right, %	19%	0%	25%	0%	40%	44%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	99	351	34	614	312
LT Vol	71	0	262	0	369	63
Through Vol	31	0	89	0	245	137
RT Vol	60	99	0	34	0	112
Lane Flow Rate	180	110	390	38	682	347
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.429	0.257	0.837	0.088	1	0.74
Departure Headway (Hd)	8.581	8.41	7.73	8.423	7.616	7.686
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	419	427	468	424	478	471
Service Time	6.643	6.164	5.484	6.195	5.388	5.731
HCM Lane V/C Ratio	0.43	0.258	0.833	0.09	1.427	0.737
HCM Control Delay	18	14.1	39.2	12	69.2	29.7
HCM Lane LOS	C	B	E	B	F	D
HCM 95th-tile Q	2.1	1	8.2	0.3	13.3	6.1

HCM 2010 AWSC
4: 1st Street & Juan Sanches Boulevard

6/26/2015

Intersection												
Intersection Delay, s/veh	56.1											
Intersection LOS	F											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	47	490	94	0	28	539	111	0	108	31	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	52	544	104	0	31	599	123	0	120	34	33
Number of Lanes	0	1	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	65.8	67.7	19.3
HCM LOS	F	F	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	64%	100%	0%	100%	0%	51%
Vol Thru, %	18%	0%	84%	0%	83%	18%
Vol Right, %	18%	0%	16%	0%	17%	31%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	169	47	584	28	650	288
LT Vol	31	0	490	0	539	52
Through Vol	30	0	94	0	111	90
RT Vol	108	47	0	28	0	146
Lane Flow Rate	188	52	649	31	722	320
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.462	0.122	1	0.073	1	0.719
Departure Headway (Hd)	8.855	8.386	7.77	8.4	7.778	8.089
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	407	425	467	424	469	448
Service Time	6.915	6.184	5.569	6.198	5.576	6.139
HCM Lane V/C Ratio	0.462	0.122	1.39	0.073	1.539	0.714
HCM Control Delay	19.3	12.4	70.1	11.9	70.1	29.3
HCM Lane LOS	C	B	F	B	F	D
HCM 95th-tile Q	2.4	0.4	13.1	0.2	13.1	5.6

HCM 2010 AWSC
4: 1st Street & Juan Sanches Boulevard

6/26/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	112	63	137
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	124	70	152
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	29.7
HCM LOS	D

Lane

HCM 2010 AWSC
4: 1st Street & Juan Sanches Boulevard

6/26/2015


Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	146	52	90
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	162	58	100
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	29.3
HCM LOS	D

Lane

Lanes and Geometrics
4: 1st Street & Juan Sanchez Boulevard

7/13/2015




Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	1	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.92		1.00		0.96		0.92		0.95		0.73	
Frt	0.962		0.940		0.974		0.897		0.974		0.897	
Flt Protected	0.950	0.950		0.982		0.950		0.950		0.950		0
Satd. Flow (prot)	1770	1646	0	1770	1683	0	0	1773	0	1770	1222	0
Flt Permitted	0.266	0.495		0.816		0.682		0.216		0.669		0
Satd. Flow (perm)	495	1646	0	920	1683	0	0	1364	0	1205	1222	0
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	28		54		16		145		16		100	
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		1150		316	
Travel Time (s)	31.4		15.0		8.6		8.6		31.4		8.6	

Intersection Summary

Area Type: Other

Lanes and Geometrics
4: 1st Street & Juan Sanchez Boulevard

7/13/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	90	0	0	85	0	0	0	0	0	0	0	0
Storage Lanes	1	0	0	1	0	0	0	0	0	1	0	0
Taper Length (ft)	25	0	0	25	0	0	25	0	0	25	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.91		0.98		0.72		0.95		0.64		0.905	
Frt	0.976		0.974		0.969		0.950		0.976		0.905	
Flt Protected	0.950	0.950		0.969		0.950		0.950		0.950		0
Satd. Flow (prot)	1770	1654	0	1770	1783	0	0	1747	0	1770	1072	0
Flt Permitted	0.216	0.271		0.729		0.669		0.216		0.669		0
Satd. Flow (perm)	402	1654	0	505	1783	0	0	954	0	1181	1072	0
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	16		17		14		100		16		100	
Link Speed (mph)	25		25		25		25		25		25	
Link Distance (ft)	1150		550		316		316		1150		316	
Travel Time (s)	31.4		15.0		8.6		8.6		31.4		8.6	

Intersection Summary

Area Type: Other

HCM 2010 Signalized Intersection Summary
 4: 1st Street & Juan Sanchez Boulevard

7/13/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	→	↘	↖	→	↘	↖	→	↘	↖	→	↘
Volume (veh/h)	99	262	89	34	369	245	60	71	31	112	63	137
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	0.97		0.97	0.93		0.84	0.96		0.80
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	110	291	99	38	410	272	67	79	34	124	70	152
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	294	705	240	504	570	378	178	195	71	300	150	325
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	756	1279	435	963	1034	686	324	577	210	1227	444	965
Grp Volume(v), veh/h	110	0	390	38	0	682	180	0	0	124	0	222
Grp Sat Flow(s),veh/h/ln	756	0	1715	963	0	1721	1111	0	0	1227	0	1409
Q Serve(g_s), s	9.1	0.0	9.5	1.7	0.0	21.2	3.6	0.0	0.0	6.8	0.0	8.9
Cycle Q Clear(g_c), s	30.3	0.0	9.5	11.2	0.0	21.2	12.6	0.0	0.0	19.3	0.0	8.9
Prop In Lane	1.00		0.25	1.00		0.40	0.37		0.19	1.00		0.68
Lane Grp Cap(c), veh/h	294	0	945	504	0	949	444	0	0	300	0	475
V/C Ratio(X)	0.37	0.00	0.41	0.08	0.00	0.72	0.41	0.00	0.00	0.41	0.00	0.47
Avail Cap(c_a), veh/h	361	0	1097	589	0	1101	668	0	0	500	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.2	0.0	9.4	12.6	0.0	12.0	19.6	0.0	0.0	28.0	0.0	18.7
Incr Delay (d2), s/veh	0.8	0.0	0.3	0.1	0.0	1.9	0.6	0.0	0.0	0.9	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	4.5	0.5	0.0	10.4	3.1	0.0	0.0	2.3	0.0	3.5
LnGrp Delay(d),s/veh	24.0	0.0	9.7	12.7	0.0	13.9	20.2	0.0	0.0	28.9	0.0	19.5
LnGrp LOS	C		A	B		B	C			C		B
Approach Vol, veh/h	500			720				180			346	
Approach Delay, s/veh	12.8			13.9				20.2			22.9	
Approach LOS	B			B				C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.3		43.6		28.3		43.6				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		36.0		46.0		36.0		46.0				
Max Q Clear Time (g_c+I1), s		14.6		32.3		21.3		23.2				
Green Ext Time (p_c), s		3.4		7.4		2.9		9.9				
Intersection Summary												
HCM 2010 Ctrl Delay	16.0											
HCM 2010 LOS	B											

HCM 2010 Signalized Intersection Summary
 4: 1st Street & Juan Sanchez Boulevard

7/13/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	→	↘	↖	→	↘	↖	→	↘	↖	→	↘
Volume (veh/h)	47	490	94	28	539	111	108	31	30	146	52	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.79	1.00		0.97	0.85		0.70	0.99		0.70
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	52	544	104	31	599	123	120	34	33	162	58	100
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	243	760	145	279	782	161	287	79	62	318	177	305
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	728	1448	277	780	1492	306	565	213	167	1316	476	821
Grp Volume(v), veh/h	52	0	648	31	0	722	187	0	0	162	0	158
Grp Sat Flow(s),veh/h/ln	728	0	1725	780	0	1798	945	0	0	1316	0	1298
Q Serve(g_s), s	4.7	0.0	22.1	2.4	0.0	24.6	8.8	0.0	0.0	9.0	0.0	6.7
Cycle Q Clear(g_c), s	29.3	0.0	22.1	24.5	0.0	24.6	15.5	0.0	0.0	24.5	0.0	6.7
Prop In Lane	1.00		0.16	1.00		0.17	0.64		0.18	1.00		0.63
Lane Grp Cap(c), veh/h	243	0	905	279	0	943	428	0	0	318	0	483
V/C Ratio(X)	0.21	0.00	0.72	0.11	0.00	0.77	0.44	0.00	0.00	0.51	0.00	0.33
Avail Cap(c_a), veh/h	295	0	1029	335	0	1072	537	0	0	443	0	606
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.2	0.0	14.0	23.3	0.0	14.6	21.5	0.0	0.0	30.2	0.0	17.3
Incr Delay (d2), s/veh	0.4	0.0	2.1	0.2	0.0	3.0	0.7	0.0	0.0	1.3	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	11.0	0.5	0.0	12.8	3.4	0.0	0.0	3.4	0.0	2.5
LnGrp Delay(d),s/veh	26.7	0.0	16.0	23.5	0.0	17.5	22.2	0.0	0.0	31.5	0.0	17.7
LnGrp LOS	C		B	C		B	C			C		B
Approach Vol, veh/h	700			753				187			320	
Approach Delay, s/veh	16.8			17.8				22.2			24.7	
Approach LOS	B			B				C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		32.7		44.5		32.7		44.5				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		36.0		46.0		36.0		46.0				
Max Q Clear Time (g_c+I1), s		17.5		31.3		26.5		26.6				
Green Ext Time (p_c), s		3.1		9.1		2.2		11.0				
Intersection Summary												
HCM 2010 Ctrl Delay	19.0											
HCM 2010 LOS	B											

Timing Report, Sorted By Phase
4: 1st Street & Juan Sanchez Boulevard

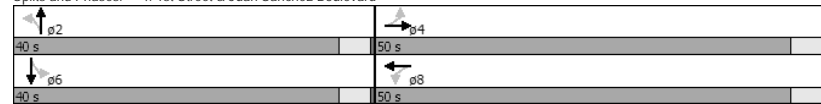
7/13/2015



Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Min	None	Min	None
Maximum Split (s)	40	50	40	50
Maximum Split (%)	44.4%	55.6%	44.4%	55.6%
Minimum Split (s)	20	20	20	20
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5	5	5
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	40	0	40
End Time (s)	40	0	40	0
Yield/Force Off (s)	36	86	36	86
Yield/Force Off 170(s)	36	75	36	75
Local Start Time (s)	0	40	0	40
Local Yield (s)	36	86	36	86
Local Yield 170(s)	36	75	36	75

Intersection Summary	
Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	55

Splits and Phases: 4: 1st Street & Juan Sanchez Boulevard



Timing Report, Sorted By Phase
4: 1st Street & Juan Sanchez Boulevard

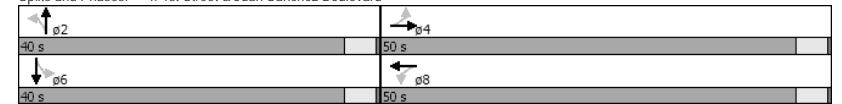
7/13/2015



Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Min	None	Min	None
Maximum Split (s)	40	50	40	50
Maximum Split (%)	44.4%	55.6%	44.4%	55.6%
Minimum Split (s)	20	20	20	20
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	5	5	5	5
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	40	0	40
End Time (s)	40	0	40	0
Yield/Force Off (s)	36	86	36	86
Yield/Force Off 170(s)	36	75	36	75
Local Start Time (s)	0	40	0	40
Local Yield (s)	36	86	36	86
Local Yield 170(s)	36	75	36	75

Intersection Summary	
Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 4: 1st Street & Juan Sanchez Boulevard



APPENDIX F

OPTION B PEAK HOUR CAPACITY ANALYSIS

Lanes and Geometrics
1: 4th Avenue & Union Street

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.913			0.930			0.994			0.956		
Flt Protected	0.987			0.996			0.968			0.985		
Satd. Flow (prot)	0	1679	0	0	1725	0	0	1792	0	0	1754	0
Flt Permitted	0.987			0.996			0.968			0.985		
Satd. Flow (perm)	0	1679	0	0	1725	0	0	1792	0	0	1754	0
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	300			300			880			300		
Travel Time (s)	8.2			8.2			24.0			8.2		

Intersection Summary

Area Type: Other

Lanes and Geometrics
1: 4th Avenue & Union Street

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.923			0.932			0.983			0.991		
Flt Protected	0.990			0.986			0.978			0.978		
Satd. Flow (prot)	0	1702	0	0	1712	0	0	1791	0	0	1805	0
Flt Permitted	0.990			0.986			0.978			0.978		
Satd. Flow (perm)	0	1702	0	0	1712	0	0	1791	0	0	1805	0
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	300			300			880			300		
Travel Time (s)	8.2			8.2			24.0			8.2		

Intersection Summary

Area Type: Other

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection												
Intersection Delay, s/veh	30.4											
Intersection LOS	D											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	102	38	253	0	10	43	58	0	298	128	20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	113	42	281	0	11	48	64	0	331	142	22
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	28.3	13.1	43.7
HCM LOS	D	B	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	67%	26%	9%	31%
Vol Thru, %	29%	10%	39%	37%
Vol Right, %	4%	64%	52%	32%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	446	393	111	228
LT Vol	128	38	43	84
Through Vol	20	253	58	74
RT Vol	298	102	10	70
Lane Flow Rate	496	437	123	253
Geometry Grp	1	1	1	1
Degree of Util (X)	0.9	0.774	0.256	0.492
Departure Headway (Hd)	6.651	6.491	7.476	6.995
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	550	563	482	517
Service Time	4.651	4.491	5.495	5.005
HCM Lane V/C Ratio	0.902	0.776	0.255	0.489
HCM Control Delay	43.7	28.3	13.1	16.6
HCM Lane LOS	E	D	B	C
HCM 95th-tile Q	10.5	7.1	1	2.7

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection												
Intersection Delay, s/veh	18.8											
Intersection LOS	C											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	68	77	193	0	43	34	78	0	134	131	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	76	86	214	0	48	38	87	0	149	146	43
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	20.3	13.3	19.5
HCM LOS	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	44%	20%	28%	45%
Vol Thru, %	43%	23%	22%	48%
Vol Right, %	13%	57%	50%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	304	338	155	300
LT Vol	131	77	34	143
Through Vol	39	193	78	21
RT Vol	134	68	43	136
Lane Flow Rate	338	376	172	333
Geometry Grp	1	1	1	1
Degree of Util (X)	0.612	0.651	0.327	0.608
Departure Headway (Hd)	6.524	6.245	6.837	6.568
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	551	575	522	547
Service Time	4.606	4.322	4.936	4.65
HCM Lane V/C Ratio	0.613	0.654	0.33	0.609
HCM Control Delay	19.5	20.3	13.3	19.4
HCM Lane LOS	C	C	B	C
HCM 95th-tile Q	4.1	4.7	1.4	4

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	70	84	74
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	78	93	82
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		16.6		
HCM LOS		C		
Lane				

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	136	143	21
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	151	159	23
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		19.4		
HCM LOS		C		
Lane				

Lanes and Geometrics
2: 4th Avenue & Arizona Street

8/24/2015

	↙ ↘		↑		↗ ↖		↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↕		↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)	0%		0%			0%	
Storage Length (ft)	0	0		0	0		
Storage Lanes	1	0		0	0		
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Frt	0.979		0.994				
Flt Protected	0.959						
Satd. Flow (prot)	1749	0	1852	0	0	1863	
Flt Permitted	0.959						
Satd. Flow (perm)	1749	0	1852	0	0	1863	
Link Speed (mph)	25		25		25		
Link Distance (ft)	300		420		880		
Travel Time (s)	8.2		11.5		24.0		

Intersection Summary

Area Type: Other

Lanes and Geometrics
2: 4th Avenue & Arizona Street

8/24/2015

	↙ ↘		↑		↗ ↖		↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↕		↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)	0%		0%			0%	
Storage Length (ft)	0	0		0	0		
Storage Lanes	1	0		0	0		
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Frt	0.978		0.985				
Flt Protected	0.960					0.999	
Satd. Flow (prot)	1749	0	1835	0	0	1861	
Flt Permitted	0.960					0.999	
Satd. Flow (perm)	1749	0	1835	0	0	1861	
Link Speed (mph)	25		25		25		
Link Distance (ft)	300		420		880		
Travel Time (s)	8.2		11.5		24.0		

Intersection Summary

Area Type: Other

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

8/24/2015

Intersection						
Int Delay, s/veh	0.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	5	419	21	3	357
Conflicting Peds, #/hr	6	8	0	6	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	6	466	23	3	397
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	888	493	0	0	497	0
Stage 1	485	-	-	-	-	-
Stage 2	403	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	314	576	-	-	1067	-
Stage 1	619	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	309	568	-	-	1060	-
Mov Cap-2 Maneuver	309	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	17.3		0		0.1	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	331	1060	-	
HCM Lane V/C Ratio	-	-	0.117	0.003	-	
HCM Control Delay (s)	-	-	17.3	8.4	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.4	0	-	

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

8/24/2015

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	38	7	319	39	5	369
Conflicting Peds, #/hr	11	6	0	11	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	8	354	43	6	410
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	808	391	0	0	409	0
Stage 1	387	-	-	-	-	-
Stage 2	421	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	350	658	-	-	1150	-
Stage 1	686	-	-	-	-	-
Stage 2	662	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	341	650	-	-	1146	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	16.3		0		0.1	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	368	1146	-	
HCM Lane V/C Ratio	-	-	0.136	0.005	-	
HCM Control Delay (s)	-	-	16.3	8.2	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.5	0	-	

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.974			0.850			0.960			0.850		
Flt Protected	0.950			0.950				0.998			0.977	
Satd. Flow (prot)	1770	1814	0	1770	1863	1583	0	1785	0	0	1820	1583
Flt Permitted	0.950			0.950				0.998			0.977	
Satd. Flow (perm)	1770	1814	0	1770	1863	1583	0	1785	0	0	1820	1583
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	550			1000			300			420		
Travel Time (s)	15.0			27.3			8.2			11.5		

Intersection Summary

Area Type: Other

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.978			0.850			0.938			0.850		
Flt Protected	0.950			0.950				0.998			0.979	
Satd. Flow (prot)	1770	1822	0	1770	1863	1583	0	1744	0	0	1824	1583
Flt Permitted	0.950			0.950				0.998			0.979	
Satd. Flow (perm)	1770	1822	0	1770	1863	1583	0	1744	0	0	1824	1583
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	550			1000			300			420		
Travel Time (s)	15.0			27.3			8.2			11.5		

Intersection Summary

Area Type: Other

HCM 2010 Signalized Intersection Summary
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	[Diagrammatic Lane Configurations]											
Volume (veh/h)	152	233	49	39	426	192	9	130	58	92	99	188
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.91	0.92		0.99	0.98		0.85	0.95		0.86
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	169	259	54	43	473	213	10	144	64	102	110	209
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	427	832	173	494	786	660	51	394	168	257	258	468
Arrive On Green	0.10	0.57	0.57	0.42	0.42	0.42	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1774	1468	306	981	1863	1563	27	1144	487	575	750	1358
Grp Volume(v), veh/h	169	0	313	43	473	213	218	0	0	212	0	209
Grp Sat Flow(s), veh/h/ln	1774	0	1774	981	1863	1563	1658	0	0	1325	0	1358
Q Serve(g_s), s	4.3	0.0	8.4	2.4	17.7	8.2	0.0	0.0	0.0	3.8	0.0	10.7
Cycle Q Clear(g_c), s	4.3	0.0	8.4	2.4	17.7	8.2	8.8	0.0	0.0	12.6	0.0	10.7
Prop In Lane	1.00		0.17	1.00		1.00	0.05		0.29	0.48		1.00
Lane Grp Cap(c), veh/h	427	0	1005	494	786	660	613	0	0	515	0	468
V/C Ratio(X)	0.40	0.00	0.31	0.09	0.60	0.32	0.36	0.00	0.00	0.41	0.00	0.45
Avail Cap(c_a), veh/h	427	0	1005	494	786	660	613	0	0	515	0	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.1	0.0	10.3	15.7	20.1	17.4	22.2	0.0	0.0	23.3	0.0	22.9
Incr Delay (d2), s/veh	2.7	0.0	0.8	0.3	3.4	1.3	1.6	0.0	0.0	2.4	0.0	3.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	2.4	0.0	4.3	0.7	9.8	3.8	4.3	0.0	0.0	4.5	0.0	4.4
LnGrp Delay(d), s/veh	15.8	0.0	11.1	16.1	23.5	18.7	23.8	0.0	0.0	25.8	0.0	25.9
LnGrp LOS	B		B	B	C	B	C			C		C
Approach Vol, veh/h	482			729				218			421	
Approach Delay, s/veh	12.7			21.7				23.8			25.8	
Approach LOS	B			C				C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	35.0		55.0		35.0		13.0		42.0			
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0		4.0			
Max Green Setting (Gmax), s	31.0		51.0		31.0		9.0		38.0			
Max Q Clear Time (g_c+I1), s	10.8		10.4		14.6		6.3		19.7			
Green Ext Time (p_c), s	3.8		7.6		3.5		0.1		6.1			
Intersection Summary												
HCM 2010 Ctrl Delay	20.5											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	[Diagrammatic Lane Configurations]											
Volume (veh/h)	115	406	71	68	527	112	9	100	93	89	119	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.83	0.95		0.98	0.99		0.72	0.93		0.72
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	128	451	79	76	586	124	10	111	103	99	132	189
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	0	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	350	845	148	391	849	705	50	257	226	225	279	391
Arrive On Green	0.07	0.57	0.57	0.46	0.46	0.46	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1774	1492	261	822	1863	1547	23	747	655	487	809	1136
Grp Volume(v), veh/h	128	0	530	76	586	124	224	0	0	231	0	189
Grp Sat Flow(s), veh/h/ln	1774	0	1753	822	1863	1547	1425	0	0	1296	0	1136
Q Serve(g_s), s	3.2	0.0	16.9	5.7	22.5	4.3	0.0	0.0	0.0	3.9	0.0	11.8
Cycle Q Clear(g_c), s	3.2	0.0	16.9	12.6	22.5	4.3	10.9	0.0	0.0	14.8	0.0	11.8
Prop In Lane	1.00		0.15	1.00		1.00	0.04		0.46	0.43		1.00
Lane Grp Cap(c), veh/h	350	0	993	391	849	705	533	0	0	503	0	391
V/C Ratio(X)	0.37	0.00	0.53	0.19	0.69	0.18	0.42	0.00	0.00	0.46	0.00	0.48
Avail Cap(c_a), veh/h	350	0	993	391	849	705	533	0	0	503	0	391
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.1	0.0	12.1	19.1	19.5	14.5	22.9	0.0	0.0	24.0	0.0	23.2
Incr Delay (d2), s/veh	2.9	0.0	2.1	1.1	4.6	0.5	2.4	0.0	0.0	3.0	0.0	4.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	1.8	0.0	8.7	1.4	12.6	1.9	4.7	0.0	0.0	5.1	0.0	4.1
LnGrp Delay(d), s/veh	17.0	0.0	14.2	20.2	24.0	15.0	25.3	0.0	0.0	27.0	0.0	27.4
LnGrp LOS	B		B	C	C	B	C			C		C
Approach Vol, veh/h	658			786				224			420	
Approach Delay, s/veh	14.7			22.3				25.3			27.2	
Approach LOS	B			C				C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	35.0		55.0		35.0		10.0		45.0			
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0		4.0			
Max Green Setting (Gmax), s	31.0		51.0		31.0		6.0		41.0			
Max Q Clear Time (g_c+I1), s	12.9		18.9		16.8		5.2		24.5			
Green Ext Time (p_c), s	4.1		11.2		3.7		0.0		8.2			
Intersection Summary												
HCM 2010 Ctrl Delay	21.2											
HCM 2010 LOS	C											

Timing Report, Sorted By Phase
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015



Phase Number	2	4	6	7	8
Movement	NBTL	EBTL	SBTL	EBL	WBTL
Lead/Lag				Lead	Lag
Lead-Lag Optimize				Yes	Yes
Recall Mode	Max	Max	Max	Max	Max
Maximum Split (s)	35	55	35	13	42
Maximum Split (%)	38.9%	61.1%	38.9%	14.4%	46.7%
Minimum Split (s)	20	20	20	8	20
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	5	5	5	5	5
Flash Dont Walk (s)	11	11	11		11
Dual Entry	Yes	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35	48
End Time (s)	35	0	35	48	0
Yield/Force Off (s)	31	86	31	44	86
Yield/Force Off 170(s)	20	75	20	44	75
Local Start Time (s)	0	35	0	35	48
Local Yield (s)	31	86	31	44	86
Local Yield 170(s)	20	75	20	44	75

Intersection Summary

Cycle Length	90
Control Type	Pretimed
Natural Cycle	50
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

ϕ2 (R)	ϕ4
35 s	55 s
ϕ6 (R)	ϕ8
35 s	42 s

Timing Report, Sorted By Phase
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015



Phase Number	2	4	6	7	8
Movement	NBTL	EBTL	SBTL	EBL	WBTL
Lead/Lag				Lead	Lag
Lead-Lag Optimize				Yes	Yes
Recall Mode	Max	Max	Max	Max	Max
Maximum Split (s)	35	55	35	10	45
Maximum Split (%)	38.9%	61.1%	38.9%	11.1%	50.0%
Minimum Split (s)	20	20	20	8	20
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	5	5	5	5	5
Flash Dont Walk (s)	11	11	11		11
Dual Entry	Yes	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	35	0	35	45
End Time (s)	35	0	35	45	0
Yield/Force Off (s)	31	86	31	41	86
Yield/Force Off 170(s)	20	75	20	41	75
Local Start Time (s)	0	35	0	35	45
Local Yield (s)	31	86	31	41	86
Local Yield 170(s)	20	75	20	41	75

Intersection Summary

Cycle Length	90
Control Type	Pretimed
Natural Cycle	60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

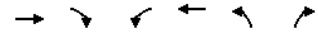
Splits and Phases: 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

ϕ2 (R)	ϕ4
35 s	55 s
ϕ6 (R)	ϕ8
35 s	45 s

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

8/24/2015



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	85		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.973				0.955	
Flt Protected			0.950		0.968	
Satd. Flow (prot)	1812	0	1770	1863	1722	0
Flt Permitted			0.950		0.968	
Satd. Flow (perm)	1812	0	1770	1863	1722	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	1150			550	316	
Travel Time (s)	31.4			15.0	8.6	

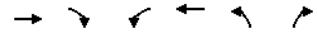
Intersection Summary

Area Type: Other

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

8/24/2015



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	85		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.980				0.971	
Flt Protected			0.950		0.962	
Satd. Flow (prot)	1825	0	1770	1863	1740	0
Flt Permitted			0.950		0.962	
Satd. Flow (perm)	1825	0	1770	1863	1740	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	1150			550	316	
Travel Time (s)	31.4			15.0	8.6	

Intersection Summary

Area Type: Other

HCM 2010 TWSC
4: 1st Street & Juan Sanchez Boulevard

8/24/2015

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	361	89	34	380	60	31
Conflicting Peds, #/hr	0	12	2	0	12	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	85	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	401	99	38	422	67	34
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	512	0	961	465
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	498	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1053	-	284	597
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	611	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1051	-	268	590
Mov Cap-2 Maneuver	-	-	-	-	398	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	583	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		15.4	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	448	-	-	1051	-	
HCM Lane V/C Ratio	0.226	-	-	0.036	-	
HCM Control Delay (s)	15.4	-	-	8.6	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-	

HCM 2010 TWSC
4: 1st Street & Juan Sanchez Boulevard

8/24/2015

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	537	94	28	546	108	30
Conflicting Peds, #/hr	0	38	10	0	38	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	85	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	597	104	31	607	120	33
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	739	0	1356	697
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	669	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	867	-	165	441
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	860	-	149	423
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	475	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		27.6	
HCM LOS					D	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	309	-	-	860	-	
HCM Lane V/C Ratio	0.496	-	-	0.036	-	
HCM Control Delay (s)	27.6	-	-	9.3	-	
HCM Lane LOS	D	-	-	A	-	
HCM 95th %tile Q(veh)	2.6	-	-	0.1	-	

APPENDIX G

OPTION C PEAK HOUR CAPACITY ANALYSIS

Lanes and Geometrics
1: 4th Avenue & Union Street

8/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↕		↕		↕		↕		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Taper Length (ft)	25	25	25	25	25	25	25	25	25	25	25	25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.931		0.930		0.994		0.956					
Flt Protected	0.983		0.996		0.968		0.985					
Satd. Flow (prot)	0	1705	0	0	1725	0	0	1792	0	0	1754	0
Flt Permitted	0.983		0.996		0.968		0.985					
Satd. Flow (perm)	0	1705	0	0	1725	0	0	1792	0	0	1754	0
Link Speed (mph)	25		25		25		25					
Link Distance (ft)	300		300		880		300					
Travel Time (s)	8.2		8.2		24.0		8.2					

Intersection Summary

Area Type: Other

Lanes and Geometrics
1: 4th Avenue & Union Street

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↕		↕		↕		↕		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Storage Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Taper Length (ft)	25	25	25	25	25	25	25	25	25	25	25	25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.937		0.932		0.983		0.991					
Flt Protected	0.988		0.986		0.978		0.978					
Satd. Flow (prot)	0	1724	0	0	1712	0	0	1791	0	0	1805	0
Flt Permitted	0.988		0.986		0.978		0.978					
Satd. Flow (perm)	0	1724	0	0	1712	0	0	1791	0	0	1805	0
Link Speed (mph)	25		25		25		25					
Link Distance (ft)	300		300		880		300					
Travel Time (s)	8.2		8.2		24.0		8.2					

Intersection Summary

Area Type: Other

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/25/2015

Intersection												
Intersection Delay, s/veh	22											
Intersection LOS	C											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	102	38	147	0	10	43	58	0	298	128	20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	113	42	163	0	11	48	64	0	331	142	22
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	17	11.9	31.8
HCM LOS	C	B	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	67%	36%	9%	31%
Vol Thru, %	29%	13%	39%	37%
Vol Right, %	4%	51%	52%	32%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	446	287	111	228
LT Vol	128	38	43	84
Through Vol	20	147	58	74
RT Vol	298	102	10	70
Lane Flow Rate	496	319	123	253
Geometry Grp	1	1	1	1
Degree of Util (X)	0.829	0.556	0.232	0.441
Departure Headway (Hd)	6.022	6.276	6.758	6.269
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	600	574	529	573
Service Time	4.072	4.333	4.833	4.332
HCM Lane V/C Ratio	0.827	0.556	0.233	0.442
HCM Control Delay	31.8	17	11.9	14.2
HCM Lane LOS	D	C	B	B
HCM 95th-tile Q	8.6	3.4	0.9	2.2

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection												
Intersection Delay, s/veh	16.3											
Intersection LOS	C											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	68	77	128	0	43	34	78	0	134	131	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	76	86	142	0	48	38	87	0	149	146	43
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	15.9	12.5	17.5
HCM LOS	C	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	44%	25%	28%	45%
Vol Thru, %	43%	28%	22%	48%
Vol Right, %	13%	47%	50%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	304	273	155	300
LT Vol	131	77	34	143
Through Vol	39	128	78	21
RT Vol	134	68	43	136
Lane Flow Rate	338	303	172	333
Geometry Grp	1	1	1	1
Degree of Util (X)	0.581	0.522	0.312	0.577
Departure Headway (Hd)	6.192	6.196	6.518	6.236
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	581	579	549	577
Service Time	4.249	4.254	4.586	4.293
HCM Lane V/C Ratio	0.582	0.523	0.313	0.577
HCM Control Delay	17.5	15.9	12.5	17.5
HCM Lane LOS	C	C	B	C
HCM 95th-tile Q	3.7	3	1.3	3.7

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/25/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	70	84	74
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	78	93	82
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		14.2		
HCM LOS		B		
Lane				

HCM 2010 AWSC
1: 4th Avenue & Union Street

8/24/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	136	143	21
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	151	159	23
Number of Lanes	0	0	1	0
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		1		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		17.5		
HCM LOS		C		
Lane				

Lanes and Geometrics
2: 4th Avenue & Arizona Street

8/25/2015

	↙ ↘		↑		↗ ↖		↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↕		↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)	0%		0%			0%	
Storage Length (ft)	0	0		0	0		
Storage Lanes	1	0		0	0		
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Frt	0.979		0.994				
Flt Protected	0.959					0.999	
Satd. Flow (prot)	1749	0	1852	0	0	1861	
Flt Permitted	0.959					0.999	
Satd. Flow (perm)	1749	0	1852	0	0	1861	
Link Speed (mph)	25		25			25	
Link Distance (ft)	300		420			880	
Travel Time (s)	8.2		11.5			24.0	

Intersection Summary

Area Type: Other

Lanes and Geometrics
2: 4th Avenue & Arizona Street

8/24/2015

	↙ ↘		↑		↗ ↖		↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↕		↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	
Grade (%)	0%		0%			0%	
Storage Length (ft)	0	0		0	0		
Storage Lanes	1	0		0	0		
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							
Frt	0.978		0.985				
Flt Protected	0.960					0.999	
Satd. Flow (prot)	1749	0	1835	0	0	1861	
Flt Permitted	0.960					0.999	
Satd. Flow (perm)	1749	0	1835	0	0	1861	
Link Speed (mph)	25		25			25	
Link Distance (ft)	300		420			880	
Travel Time (s)	8.2		11.5			24.0	

Intersection Summary

Area Type: Other

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

8/25/2015

Intersection						
Int Delay, s/veh	0.8					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	5	419	21	3	249
Conflicting Peds, #/hr	6	8	0	6	8	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	6	466	23	3	277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	768	493	0	0	497	0
Stage 1	485	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	370	576	-	-	1067	-
Stage 1	619	-	-	-	-	-
Stage 2	765	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	365	568	-	-	1060	-
Mov Cap-2 Maneuver	365	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	759	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	385	1060	-
HCM Lane V/C Ratio	-	-	0.101	0.003	-
HCM Control Delay (s)	-	-	15.4	8.4	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
2: 4th Avenue & Arizona Street

8/24/2015

Intersection						
Int Delay, s/veh	1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	38	7	319	39	5	300
Conflicting Peds, #/hr	11	6	0	11	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	8	354	43	6	333

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	731	391	0	0	409	0
Stage 1	387	-	-	-	-	-
Stage 2	344	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	389	658	-	-	1150	-
Stage 1	686	-	-	-	-	-
Stage 2	718	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	380	650	-	-	1146	-
Mov Cap-2 Maneuver	380	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	406	1146	-
HCM Lane V/C Ratio	-	-	0.123	0.005	-
HCM Control Delay (s)	-	-	15.1	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0	-

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.974			0.850			0.960			0.850		
Flt Protected	0.950			0.950				0.998			0.978	
Satd. Flow (prot)	1770	1814	0	1770	1863	1583	0	1785	0	0	1822	1583
Flt Permitted	0.950			0.950				0.998			0.978	
Satd. Flow (perm)	1770	1814	0	1770	1863	1583	0	1785	0	0	1822	1583
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	550			1000			300			420		
Travel Time (s)	15.0			27.3			8.2			11.5		

Intersection Summary

Area Type: Other

Lanes and Geometrics

3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	75		75	0		0	0		40
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25		25			25			25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.978			0.978			0.938			0.850		
Flt Protected	0.950			0.950				0.998			0.979	
Satd. Flow (prot)	1770	1822	0	1770	1822	0	0	1744	0	0	1824	1583
Flt Permitted	0.950			0.950				0.998			0.979	
Satd. Flow (perm)	1770	1822	0	1770	1822	0	0	1744	0	0	1824	1583
Link Speed (mph)	25			25			25			25		
Link Distance (ft)	550			1000			300			420		
Travel Time (s)	15.0			27.3			8.2			11.5		

Intersection Summary

Area Type: Other

HCM 2010 Signalized Intersection Summary
 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/25/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (veh/h)	115	406	71	68	539	93	9	100	93	89	119	101	
Number	7	4	14	3	8	18	5	2	12	1	6	16	
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.96	0.99		0.97	
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1863	
Adj Flow Rate, veh/h	128	451	79	76	599	103	10	111	103	99	132	112	
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	0	1	1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Percent Heavy Veh. %	2	2	2	2	2	2	2	2	2	2	2	2	
Cap, veh/h	393	943	165	471	931	775	50	263	231	210	259	460	
Arrive On Green	0.07	0.61	0.61	0.50	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30	
Sat Flow, veh/h	1774	1542	270	867	1863	1550	28	878	771	509	863	1533	
Grp Volume(v), veh/h	128	0	530	76	599	103	224	0	0	231	0	112	
Grp Sat Flow(s),veh/h/ln	1774	0	1812	867	1863	1550	1676	0	0	1372	0	1533	
Q Serve(g_s), s	2.9	0.0	14.5	4.8	21.3	3.2	0.0	0.0	0.0	4.3	0.0	5.0	
Cycle Q Clear(g_c), s	2.9	0.0	14.5	9.2	21.3	3.2	9.6	0.0	0.0	13.9	0.0	5.0	
Prop In Lane	1.00		0.15	1.00		1.00	0.04		0.46	0.43		1.00	
Lane Grp Cap(c), veh/h	393	0	1108	471	931	775	545	0	0	469	0	460	
V/C Ratio(X)	0.33	0.00	0.48	0.16	0.64	0.13	0.41	0.00	0.00	0.49	0.00	0.24	
Avail Cap(c_a), veh/h	393	0	1108	471	931	775	545	0	0	469	0	460	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	
Uniform Delay (d), s/veh	11.9	0.0	9.6	14.9	16.6	12.1	25.4	0.0	0.0	26.8	0.0	23.8	
Incr Delay (d2), s/veh	2.2	0.0	1.5	0.7	3.4	0.4	2.3	0.0	0.0	3.7	0.0	1.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	1.6	0.0	7.7	1.2	11.7	1.4	4.8	0.0	0.0	5.4	0.0	2.2	
LnGrp Delay(d),s/veh	14.0	0.0	11.1	15.6	20.0	12.4	27.7	0.0	0.0	30.5	0.0	25.0	
LnGrp LOS	B		B	B	B	B	C			C		C	
Approach Vol, veh/h	658			778				224			343		
Approach Delay, s/veh	11.7			18.6				27.7			28.7		
Approach LOS	B			B				C			C		
Timer	1	2	3	4	5	6	7	8					
Assigned Phs	2		4		6		8						
Phs Duration (G+Y+Rc), s	31.0		59.0		31.0		10.0		49.0				
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	27.0		55.0		27.0		6.0		45.0				
Max Q Clear Time (g_c+I1), s	11.6		16.5		15.9		4.9		23.3				
Green Ext Time (p_c), s	3.1		11.7		2.6		0.0		9.4				
Intersection Summary													
HCM 2010 Ctrl Delay	19.1												
HCM 2010 LOS	B												

HCM 2010 Signalized Intersection Summary
 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (veh/h)	152	233	49	39	449	143	9	130	58	80	99	188	
Number	7	4	14	3	8	18	5	2	12	1	6	16	
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.98	0.99		0.99	
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1863	
Adj Flow Rate, veh/h	169	259	54	43	499	159	10	144	64	89	110	209	
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	0	1	1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Percent Heavy Veh. %	2	2	2	2	2	2	2	2	2	2	2	2	
Cap, veh/h	463	897	187	551	828	695	51	373	159	229	262	485	
Arrive On Green	0.11	0.60	0.60	0.44	0.44	0.44	0.31	0.31	0.31	0.31	0.31	0.31	
Sat Flow, veh/h	1774	1495	312	1060	1863	1564	29	1200	511	549	843	1560	
Grp Volume(v), veh/h	169	0	313	43	499	159	218	0	0	199	0	209	
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1060	1863	1564	1739	0	0	1392	0	1560	
Q Serve(g_s), s	4.0	0.0	7.5	2.1	18.3	5.7	0.0	0.0	0.0	2.6	0.0	9.6	
Cycle Q Clear(g_c), s	4.0	0.0	7.5	2.1	18.3	5.7	8.8	0.0	0.0	11.4	0.0	9.6	
Prop In Lane	1.00		0.17	1.00		1.00	0.05		0.29	0.45		1.00	
Lane Grp Cap(c), veh/h	463	0	1084	551	828	695	583	0	0	491	0	485	
V/C Ratio(X)	0.36	0.00	0.29	0.08	0.60	0.23	0.37	0.00	0.00	0.41	0.00	0.43	
Avail Cap(c_a), veh/h	463	0	1084	551	828	695	583	0	0	491	0	485	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	
Uniform Delay (d), s/veh	11.8	0.0	8.7	14.5	19.0	15.5	24.4	0.0	0.0	25.0	0.0	24.7	
Incr Delay (d2), s/veh	2.2	0.0	0.7	0.3	3.2	0.8	1.8	0.0	0.0	2.5	0.0	2.8	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	2.2	0.0	3.9	0.7	10.0	2.6	4.5	0.0	0.0	4.4	0.0	4.5	
LnGrp Delay(d),s/veh	14.0	0.0	9.4	14.8	22.2	16.2	26.2	0.0	0.0	27.5	0.0	27.4	
LnGrp LOS	B		A	B	C	B	C			C		C	
Approach Vol, veh/h	482			701				218			408		
Approach Delay, s/veh	11.0			20.4				26.2			27.5		
Approach LOS	B			C				C			C		
Timer	1	2	3	4	5	6	7	8					
Assigned Phs	2		4		6		8						
Phs Duration (G+Y+Rc), s	32.0		58.0		32.0		14.0		44.0				
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s	28.0		54.0		28.0		10.0		40.0				
Max Q Clear Time (g_c+I1), s	10.8		9.5		13.4		6.0		20.3				
Green Ext Time (p_c), s	3.3		7.6		3.1		0.2		6.3				
Intersection Summary													
HCM 2010 Ctrl Delay	20.2												
HCM 2010 LOS	C												

Timing Report, Sorted By Phase
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/25/2015



Phase Number	2	4	6	7	8
Movement	NBTL	EBTL	SBTL	EBL	WBTL
Lead/Lag				Lead	Lag
Lead-Lag Optimize				Yes	Yes
Recall Mode	Max	Max	Max	Max	Max
Maximum Split (s)	31	59	31	10	49
Maximum Split (%)	34.4%	65.6%	34.4%	11.1%	54.4%
Minimum Split (s)	20	20	20	8	20
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	5	5	5	5	5
Flash Dont Walk (s)	11	11	11		11
Dual Entry	Yes	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	31	0	31	41
End Time (s)	31	0	31	41	0
Yield/Force Off (s)	27	86	27	37	86
Yield/Force Off 170(s)	16	75	16	37	75
Local Start Time (s)	0	31	0	31	41
Local Yield (s)	27	86	27	37	86
Local Yield 170(s)	16	75	16	37	75

Intersection Summary

Cycle Length	90
Control Type	Pretimed
Natural Cycle	60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

ø2 (R)	ø4
31 s	59 s
ø6 (R)	ø8
31 s	49 s

Timing Report, Sorted By Phase
3: 4th Street/4th Avenue & Juan Sanchez Boulevard

8/24/2015



Phase Number	2	4	6	7	8
Movement	NBTL	EBTL	SBTL	EBL	WBTL
Lead/Lag				Lead	Lag
Lead-Lag Optimize				Yes	Yes
Recall Mode	Max	Max	Max	Max	Max
Maximum Split (s)	32	58	32	14	44
Maximum Split (%)	35.6%	64.4%	35.6%	15.6%	48.9%
Minimum Split (s)	20	20	20	8	20
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Minimum Initial (s)	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	5	5	5	5	5
Flash Dont Walk (s)	11	11	11		11
Dual Entry	Yes	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes
Start Time (s)	0	32	0	32	46
End Time (s)	32	0	32	46	0
Yield/Force Off (s)	28	86	28	42	86
Yield/Force Off 170(s)	17	75	17	42	75
Local Start Time (s)	0	32	0	32	46
Local Yield (s)	28	86	28	42	86
Local Yield 170(s)	17	75	17	42	75

Intersection Summary

Cycle Length	90
Control Type	Pretimed
Natural Cycle	55
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 3: 4th Street/4th Avenue & Juan Sanchez Boulevard

ø2 (R)	ø4
32 s	58 s
ø6 (R)	ø8
32 s	44 s

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

8/25/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	90	0	85	150	0	0	0	0	0	0	0	0
Storage Lanes	0	0	1	1	0	0	0	0	0	0	0	1
Taper Length (ft)	25	0	25	25	0	0	0	0	0	0	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.973			0.850			0.955			0.865		
Flt Protected				0.950			0.968					
Satd. Flow (prot)	0	1812	0	1770	1863	1583	0	1722	0	0	0	1611
Flt Permitted				0.950			0.968					
Satd. Flow (perm)	0	1812	0	1770	1863	1583	0	1722	0	0	0	1611
Link Speed (mph)	25			25			25			30		
Link Distance (ft)	1150			550			316			400		
Travel Time (s)	31.4			15.0			8.6			9.1		

Intersection Summary

Area Type: Other

Lanes and Geometrics

4: 1st Street & Juan Sanchez Boulevard

8/24/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	90	0	85	150	0	0	0	0	0	0	0	0
Storage Lanes	0	0	1	1	0	0	0	0	0	0	0	1
Taper Length (ft)	25	0	25	25	0	0	0	0	0	0	0	0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.980			0.850			0.971			0.865		
Flt Protected				0.950			0.962					
Satd. Flow (prot)	0	1825	0	1770	1863	1583	0	1740	0	0	0	1611
Flt Permitted				0.950			0.962					
Satd. Flow (perm)	0	1825	0	1770	1863	1583	0	1740	0	0	0	1611
Link Speed (mph)	25			25			25			30		
Link Distance (ft)	1150			550			316			400		
Travel Time (s)	31.4			15.0			8.6			9.1		

Intersection Summary

Area Type: Other

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

8/25/2015

Intersection												
Intersection Delay, s/veh	22.5											
Intersection LOS	C											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	0	361	89	0	34	380	49	0	60	0	31
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	401	99	0	38	422	54	0	67	0	34
Number of Lanes	0	0	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	30.1	19.7	12.5
HCM LOS	D	C	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	66%	0%	100%	0%	0%	0%
Vol Thru, %	0%	80%	0%	100%	0%	0%
Vol Right, %	34%	20%	0%	0%	100%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	91	450	34	380	49	108
LT Vol	0	361	0	380	0	0
Through Vol	31	89	0	0	49	108
RT Vol	60	0	34	0	0	0
Lane Flow Rate	101	500	38	422	54	120
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.216	0.819	0.068	0.705	0.08	0.229
Departure Headway (Hd)	7.7	5.894	6.517	6.009	5.298	6.866
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	468	610	546	595	670	526
Service Time	5.408	3.676	4.302	3.794	3.082	4.572
HCM Lane V/C Ratio	0.216	0.82	0.07	0.709	0.081	0.228
HCM Control Delay	12.5	30.1	9.8	22	8.5	11.6
HCM Lane LOS	B	D	A	C	A	B
HCM 95th-tile Q	0.8	8.4	0.2	5.7	0.3	0.9

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

8/24/2015

Intersection												
Intersection Delay, s/veh	44.4											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	0	537	94	0	28	449	19	0	108	0	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	597	104	0	31	499	21	0	120	0	33
Number of Lanes	0	0	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	3	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	3
HCM Control Delay	62	34.7	14.8
HCM LOS	F	D	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	78%	0%	100%	0%	0%	0%
Vol Thru, %	0%	85%	0%	100%	0%	0%
Vol Right, %	22%	15%	0%	0%	100%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	631	28	449	19	69
LT Vol	0	537	0	449	0	0
Through Vol	30	94	0	0	19	69
RT Vol	108	0	28	0	0	0
Lane Flow Rate	153	701	31	499	21	77
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.341	1	0.059	0.869	0.033	0.158
Departure Headway (Hd)	8	6.19	6.772	6.272	5.572	7.417
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	449	589	530	579	643	483
Service Time	5.741	3.946	4.505	4.005	3.305	5.167
HCM Lane V/C Ratio	0.341	1.19	0.058	0.862	0.033	0.159
HCM Control Delay	14.8	62	9.9	37.3	8.5	11.6
HCM Lane LOS	B	F	A	E	A	B
HCM 95th-tile Q	1.5	14.7	0.2	9.7	0.1	0.6

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

8/25/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	0	108
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	0	0	120
Number of Lanes	0	0	0	1
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		3		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		11.6		
HCM LOS		B		
Lane				

HCM 2010 AWSC
4: 1st Street & Juan Sanchez Boulevard

8/24/2015

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	0	69
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	0	0	77
Number of Lanes	0	0	0	1
Approach		SB		
Opposing Approach		NB		
Opposing Lanes		1		
Conflicting Approach Left		WB		
Conflicting Lanes Left		3		
Conflicting Approach Right		EB		
Conflicting Lanes Right		1		
HCM Control Delay		11.6		
HCM LOS		B		
Lane				