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# ***Traffic Impact Study for Hamilton Fields***

in the

**City of Novato**

**Draft Report**

**February 13, 2015**



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## Executive Summary

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The proposed Hamilton Fields recreational facility includes several sports fields including a 1,000-seat ballpark, a 50,000 square foot training center, a 12-acre community park including several public sports fields, and additional support facilities including concessions and trail systems. The project's anticipated trip generation under typical conditions includes 230 weekday p.m. peak hour trips and 234 weekend midday peak hour trips. During maximum activity periods including events at the 1,000-seat ballpark, the project is estimated to generate approximately 448 trips during the p.m. peak hour and 626 trips during the weekend midday peak hour.

The study area for the traffic analysis includes intersections along North Hamilton Parkway and Nave Drive, as well as U.S. 101 freeway ramp intersections at Ignacio Boulevard-Bel Marin Keys Boulevard and Nave Drive-Alameda del Prado. The ten study intersections are operating at acceptable levels of service under Existing conditions and are projected to continue operating acceptably upon the addition of project traffic. Under the Future and Future plus Project scenarios, which include trips associated with buildout of the City's General Plan and regional growth, the study intersections are projected to continue operating acceptably.

The minor westbound left-turn movement at the unsignalized Nave Drive/Roblar Drive intersection is projected to drop to LOS F under future conditions during maximum activity periods at Hamilton Fields. While this does not violate the City's level of service standard since the intersection is projected to operate acceptably at LOS A overall, drivers exiting Roblar Drive have no option of diverting to a controlled intersection. It may be appropriate for the Novato Police Department to monitor operation of this intersection during major events at Hamilton Fields in the future, implementing manual traffic control if deemed necessary. Further discussion on the potential need for manual traffic control during major events is included below.

A detailed queuing analysis was conducted at the signalized intersection of Nave Drive/North Hamilton Parkway. 95<sup>th</sup> percentile queues are currently accommodated within the available turn pocket lengths during the weekday p.m. and weekend midday peak hours. Upon the addition of project-generated traffic under both existing and future scenarios, queues in the southbound left-turn pocket may exceed available storage. This condition could be alleviated to accommodate typical project traffic by extending the turn pocket so that it connects to the upstream left turn pocket, but during maximum activity periods at Hamilton Fields queues would still exceed storage. During these peak periods (which generally correspond to major games at the ballpark) it is recommended that manual traffic control be implemented as deemed necessary by the Novato Police Department.

In addition to peak hour queues potentially exceeding storage in the intersection's southbound left-turn pocket, queueing on the westbound left-turn movement is projected to exceed storage during both typical and maximum activity periods at Hamilton Fields under Future plus Project conditions. An additional 20 feet of storage in the left-turn bay would alleviate this condition, and is obtainable by reducing the size of an existing planted median near the Marin Airporter terminal. The project applicants should be responsible for funding the turn lane modifications at this intersection, and for contracting with the Novato Police Department to monitor intersections in the area during large events and provide manual traffic control as deemed necessary.

A left-turn lane on eastbound North Hamilton Parkway at the project's main access street would be warranted upon the addition of typical project traffic levels. The project applicants should be responsible for constructing an eastbound left-turn lane that accommodates storage for five vehicles, plus appropriate tapers and transitions.

The City has received public complaints that a Safeway fuel center on Nave Drive just north of North Hamilton Parkway sometimes creates adverse circulation impacts to traffic flow, and anticipates that the public may perceive projects such as Hamilton Fields to further exacerbate this congestion. Based on observations, onsite queues were generally accommodated in the available gas station space, though did occasionally extend into the main shopping center driveway. During these times, drivers can become temporarily unable to enter the shopping center from the Nave Drive/Hamilton Center signal, resulting in queue spillback into Nave Drive's travel lanes. Inefficiencies at the fuel station pumps were also observed, such as fueling positions becoming available but not being used by the next vehicle in the queue, and onsite gas station attendants (when present) not taking an active role in managing queuing issues.

While most of the impacts created by the Safeway fuel station primarily create driver frustration and inconvenience within the shopping center's onsite circulation system and should be dealt with by Safeway and the shopping center owners, it appears that queue spillback onto public streets does occasionally occur. These blockages appear to be relatively short in duration but have the potential to create safety concerns and contribute to congestion. It is recommended that the City coordinate with Safeway to require trained gas station attendants to be present during peak fuel station activity periods, assisting drivers with accessing the gas station more efficiently, and to develop procedures for clearing any queues that extend offsite.

## Introduction

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### Introduction

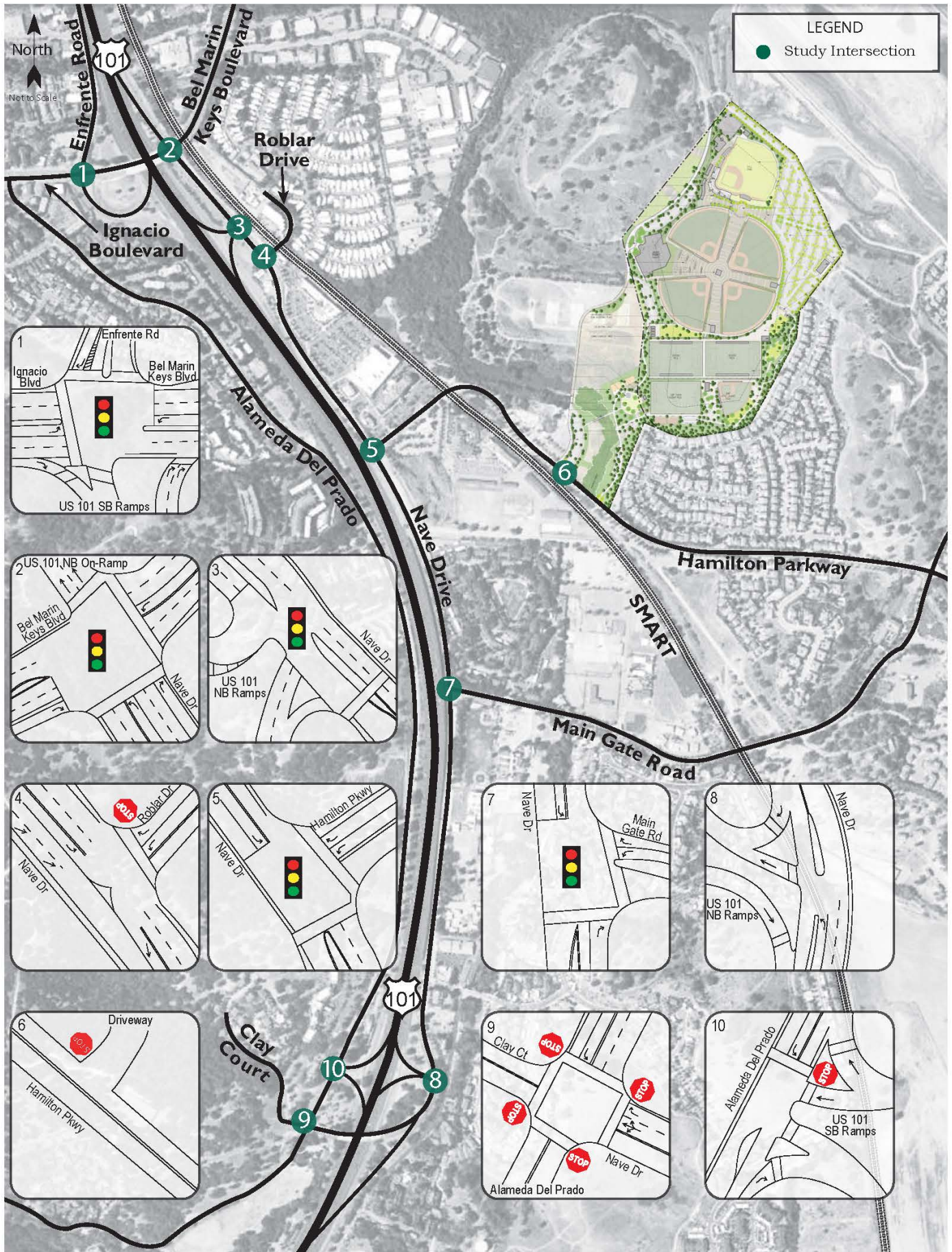
This report presents an analysis of the potential traffic impacts that would be associated with development of the proposed Hamilton Fields sports and recreation facility to be located in the Hamilton area of the City of Novato. The traffic study was completed in accordance with the criteria established by the City of Novato, and is consistent with standard traffic engineering techniques.

### Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies. Vehicular traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections or roadway segments.

### Project Profile

The project is a 55-acre sports complex consisting of five baseball/softball fields including a 1,000 seat ballpark; two multi-sport playing fields; a 50,000 square foot training center; a 12-acre community park including youth baseball field and two multi-sport fields; and additional support facilities including concessions and trail systems. The project site is located between North Hamilton Parkway and the Hamilton wetlands restoration project, with an access roadway intersecting North Hamilton Parkway to the east of the SMART rail corridor at or near the current location of the Hamilton skate park's southerly driveway. The project site and study area are shown in Figure 1.



Traffic Impact Study for Hamilton Fields  
**Figure I – Study Area and Lane Configurations**



## Transportation Setting

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### Study Area and Periods

The study area consists of the following intersections:

1. US 101 South Ramps/Ignacio Boulevard-Enfrente Road
2. US 101 North Ramp/Bel Marin Keys Boulevard-Nave Drive
3. US 101 North Ramps/Nave Drive
4. Nave Drive/Roblar Drive
5. Nave Drive/North Hamilton Parkway
6. North Hamilton Parkway/Project Street
7. Nave Drive/Main Gate Drive
8. Nave Drive/US 101 North Ramps
9. Alameda del Prado/Nave Drive (Overpass)-Clay Court
10. Alameda del Prado/US 101 South Ramps

Operating conditions during the weekday p.m. peak and Saturday midday peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute, while the Saturday midday peak hour typically occurs between noon and 2:00 p.m.

### Study Intersections

*US 101 South Ramps/Ignacio Boulevard-Enfrente Road* is signalized with protected left-turn phasing on Ignacio Boulevard and split phasing on the Enfrente Road-US 101 South Ramps approaches. The southbound Enfrente Road approach includes local traffic as well as traffic exiting southbound US 101. A loop off-ramp serving drivers exiting US 101 southbound and bound for Bel Marin Keys Boulevard (as Ignacio Boulevard is called to the east of the freeway) enters the intersection in the northbound direction and includes a right-turn overlap signal phase. Crosswalks with pedestrian signal heads are located on the north, south, and west intersection legs.

*US 101 North Ramp/Bel Marin Keys Boulevard-Nave Drive* is signalized with protected left-turn phasing on westbound Bel Marin Keys Boulevard and right-turn signal overlap phasing on the northbound and eastbound approaches. The US 101 northbound on-ramp forms the north leg of the intersection. The south leg of Nave Drive includes local traffic as well as traffic oriented to a set of northbound US 101 “hook ramps” to the south. Crosswalks with pedestrian signal heads are located on the north, south, and east intersection legs.

*US 101 North Ramps/Nave Drive* is a signalized “tee” intersection with two-phase signal operation. The US 101 northbound ramps form the western intersection leg, with all traffic destined to the on-ramp arriving from southbound Nave Drive. Northbound left-turns from Nave Drive onto the US 101 northbound on-ramp are prohibited, with this movement instead being accommodated by proceeding straight through the downstream intersection at Bel Marin Keys Boulevard. There are no sidewalks on the west (freeway) side of Nave Drive and as a result no crosswalks exist at the intersection.

*Nave Drive/Roblar Drive* is an unsignalized “tee” intersection with stop controls on the westbound Roblar Drive approach. A southbound merge lane exists in the median of Nave Drive to facilitate two-stage left-turns from Roblar Drive. A bus pullout exists on northbound Nave Drive just to the north of the intersection, and a crosswalk is striped on the Roblar Drive leg.

*Nave Drive/North Hamilton Parkway* is a signalized “tee” intersection with protected left-turn phasing on the southbound approach. A bus pullout is located on southbound Nave Drive just to the south of the intersection, and crosswalks with pedestrian signal phasing exist on the east and south intersection legs.

*North Hamilton Parkway/Project Street* is an unsignalized driveway intersection that currently serves as the southern access to the Hamilton skate park, with stop controls on the southbound project street approach. It is assumed that the project street will be developed as a public street in the future.

*Nave Drive/Main Gate Drive* is a signalized “tee” intersection with protected left-turn phasing on the southbound approach and a right-turn overlap phase on the westbound approach. A bus pullout is located on northbound Nave Drive just to the north of the intersection, and yellow school crosswalks with pedestrian signal phasing exist on the east and south intersection legs. Hamilton Elementary School is located on the southeast intersection corner.

*Nave Drive/US 101 North Ramps* is an unsignalized intersection with no controlled movements. The only movements in which drivers encounter conflicting traffic are the northbound left-turn and southbound right-turns onto the US 101 northbound on-ramp. US 101 northbound drivers destined to the Hamilton area use a separate off-ramp that merges with Nave Drive to the south of this intersection, while northbound US 101 drivers destined to Alameda del Prado pass through the intersection via a loop ramp with free movement onto the westbound Nave Drive overpass. Crosswalks exist on the west leg of the intersection, providing pedestrian access to a bus pad serving northbound US 101.

*Alameda del Prado/Nave Drive-Clay Court* is an all-way stop-controlled intersection. Crosswalks exist on all four legs of the intersection, and a park-and-ride lot is located on the northeast intersection corner.

*Alameda del Prado/US 101 South Ramps* is an unsignalized “tee” intersection with southbound US 101 hook ramps forming the eastern intersection leg. Stop-controls exist on the westbound US 101 south off-ramp. Crosswalks exist on the northern and eastern intersection legs, and a park-and-ride lot is located on the southeast intersection corner.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

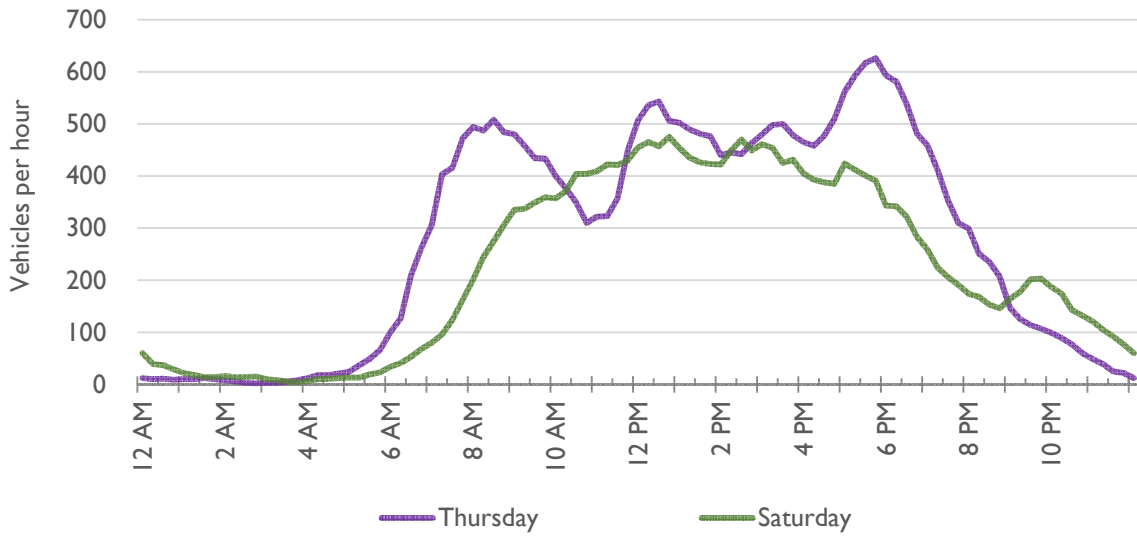
### **North Hamilton Parkway**

All traffic destined to and from the project site would use North Hamilton Parkway, which is one of the primary access points to the Hamilton neighborhood. Near the project site the roadway includes single travel lanes in each direction, striped bicycle lanes, and sidewalks along the northeast side of the street. The SMART rail corridor abuts the southwest side of the street. The posted speed limit is 30 miles per hour.

#### Traffic Volume Patterns

Based on automated traffic count data collection on Thursday, January 22 through Saturday, January 24, 2015, North Hamilton Parkway currently carries approximately 6,800 vehicles per day on weekdays and 5,400 vehicles per day on Saturdays. Hourly traffic volume trends on weekdays and Saturdays, measured in vehicles per hour, are shown graphically in Plate 1.

**Plate I**  
**Hourly Traffic Volumes on North Hamilton Parkway near Project Site**



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## Capacity Analysis

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### Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersections with side-street stop controls, or those which are unsignalized and have one or two approaches stop controlled, were analyzed using the “Two-Way Stop-Controlled” intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersection at Alameda del Prado/Nave Drive, which has stop signs on all approaches, was analyzed using the “All-Way Stop-Controlled” Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole, and is then related to a Level of Service.

The study intersections that are currently controlled by a traffic signal were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology.

The ranges of delay associated with the various levels of service are indicated in Table I.

**Table I  
Intersection Level of Service Criteria**

LOS	Two-Way Stop-Controlled	All-Way Stop-Controlled	Signalized
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Upon stopping, drivers are immediately able to proceed.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach, and wait for vehicle to clear from one or more approaches prior to entering the intersection.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 50 seconds. Drivers enter long queues on all approaches.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual*, Transportation Research Board, 2000

### Traffic Operation Standards

The City of Novato's General Plan includes the following objective, policy and program regarding traffic operation.

**TR Objective 2:** Improve and manage the City's roadway system to accommodate future growth and maintain acceptable levels of service.

**TR Policy 4, Level of Service Standards.** Establish traffic Level of Service (LOS) standards for use in (1) evaluating the impacts of proposed development projects so the project can be redesigned or effective mitigation measures can be implemented, (2) making improvements to the roadway system, and (3) determining appropriate traffic impact fees.

**TR Program 4.1:** Establish traffic Level of Service standards as follows:

- 1) At intersections with signals or four-way stop signs: operation at LOS D
- 2) At intersections with stop signs on side streets only: operation at LOS E

Mitigation measures which reduce side street delay, such as traffic signals, all-way stops and/or center two-way left turn lanes need to be considered when LOS F conditions are projected for side street traffic. The volume of traffic also needs to be considered when evaluating the severity of side street traffic operations.

## Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the weekday p.m. peak and Saturday midday peak periods. This condition does not include project-generated traffic volumes. Volume data was collected on January 22 and 24, 2015, while local schools including the College of Marin Indian Valley campus were in session.

### Intersection Levels of Service

Under existing conditions, all ten study intersections are operating acceptably. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 2, and copies of the Level of Service calculations are provided in Appendix A.

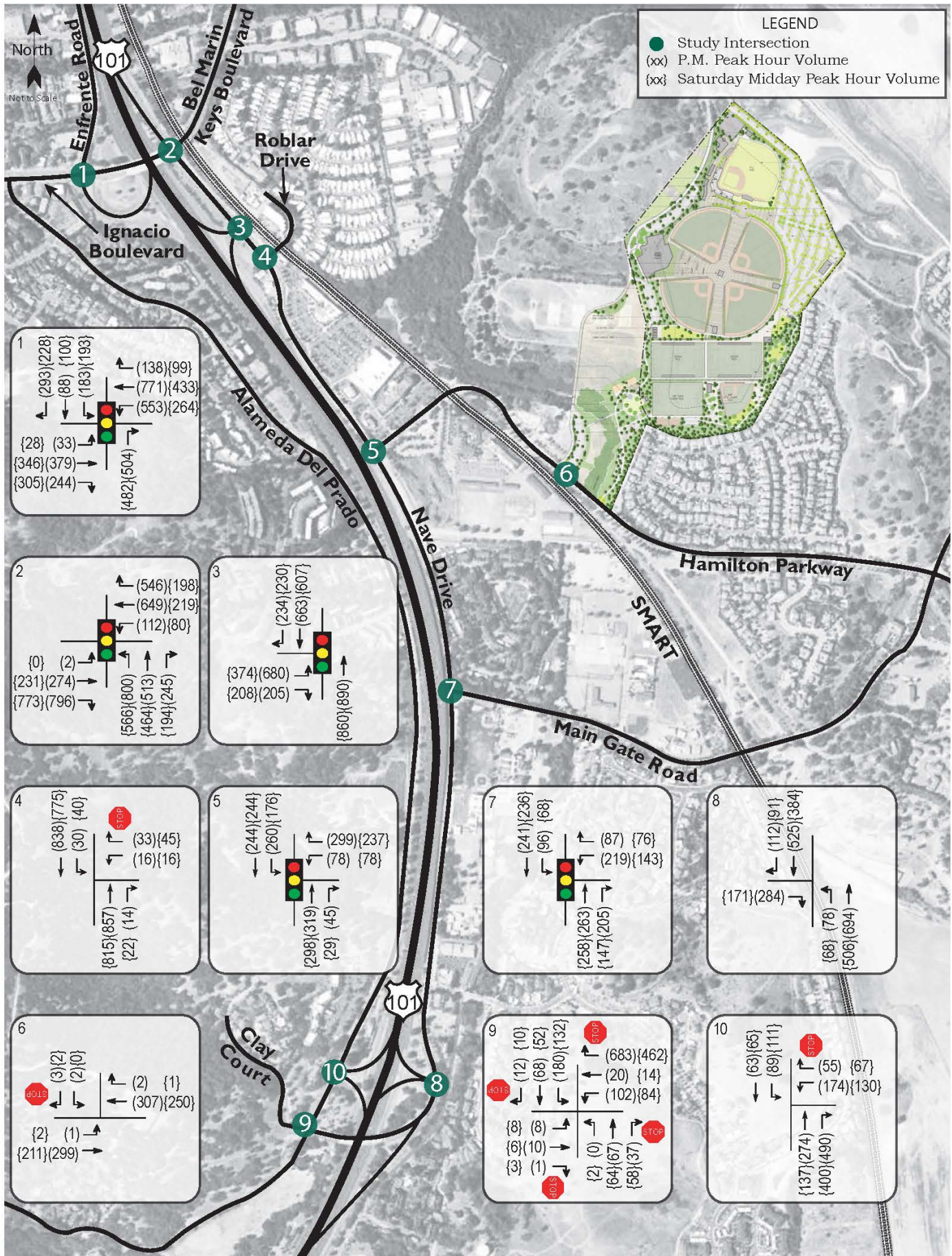
**Table 2**  
**Existing Peak Hour Intersection Levels of Service**

Study Intersection Approach	Existing Conditions			
	Weekday PM Delay	LOS	Saturday Midday Delay	LOS
1. US 101 S Ramp/Ignacio Blvd-Enfrente Rd	24.3	C	21.3	C
2. US 101 N Ramp/Bel Marin Keys Blvd-Nave Dr	21.0	C	16.9	B
3. US 101 N Ramps/Nave Dr	13.8	B	16.3	B
4. Nave Dr/Roblar Dr	0.9	A	1.1	A
<i>Westbound Left-Turn</i>	37.6	E	35.7	E
<i>Westbound Right-Turn</i>	17.1	C	17.2	C
5. Nave Dr/North Hamilton Parkway	13.6	B	8.7	A
6. N Hamilton Parkway/Project St	0.1	A	0.1	A
<i>Southbound Approach</i>	11.4	B	9.7	A
7. Nave Dr/Main Gate Dr	9.7	A	7.7	A
8. Nave Dr/US 101 N Ramps	0.5	A	0.6	A
<i>Northbound Left-Turn</i>	8.9	A	8.4	A
9. Alameda del Prado/Nave Dr (Overpass)	14.8	B	11.7	B
10. Alameda del Prado/US 101 S Ramps	5.9	A	6.3	A
<i>Westbound Left-Turn</i>	14.9	B	13.4	B
<i>Westbound Right-Turn</i>	10.2	B	9.4	A

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

## Future Conditions

Future traffic volumes representing an approximate General Plan buildout year of 2035 were obtained from the City of Novato's TRAFFIX-based travel demand model maintained by W-Trans. The model is based on buildout of the 1996 General Plan, and incorporates parcel-specific land use development assumptions updated by City Staff in May 2014.



Traffic Impact Study for Hamilton Fields  
**Figure 2 – Existing Traffic Volumes**

Under the anticipated Future volumes, the study intersections are expected to operate at acceptable levels of service. Future volumes are shown in Figure 3 and operating conditions are summarized in Table 3.

**Table 3  
Future Peak Hour Levels of Service**

Study Intersection Approach	Future Conditions			
	Weekday PM Delay	LOS	Saturday Midday Delay	LOS
1. US 101 S Ramp/Ignacio Blvd-Enfrente Rd	25.5	C	24.8	C
2. US 101 N Ramp/Bel Marin Keys Blvd-Nave Dr	24.1	C	17.0	B
3. US 101 N Ramps/Nave Dr	15.1	B	17.0	B
4. Nave Dr/Roblar Dr	1.0	A	1.2	A
<i>Westbound Left-Turn</i>	46.2	E	39.2	E
<i>Westbound Right-Turn</i>	18.8	C	18.2	C
5. Nave Dr/N Hamilton Parkway	15.0	B	11.1	B
6. N Hamilton Parkway/Project St	0.1	A	0.1	A
<i>Southbound Approach</i>	13.4	B	10.2	B
7. Nave Dr/Main Gate Dr	19.9	B	9.3	A
8. Nave Dr/US 101 N Ramps	0.5	A	0.6	A
<i>Northbound Left-Turn</i>	9.3	A	8.6	A
9. Alameda del Prado/Nave Dr (Overpass)	21.1	C	12.9	B
10. Alameda del Prado/US 101 S Ramps	6.6	A	6.6	A
<i>Westbound Left-Turn</i>	16.9	C	14.5	B
<i>Westbound Right-Turn</i>	10.5	B	9.5	A

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

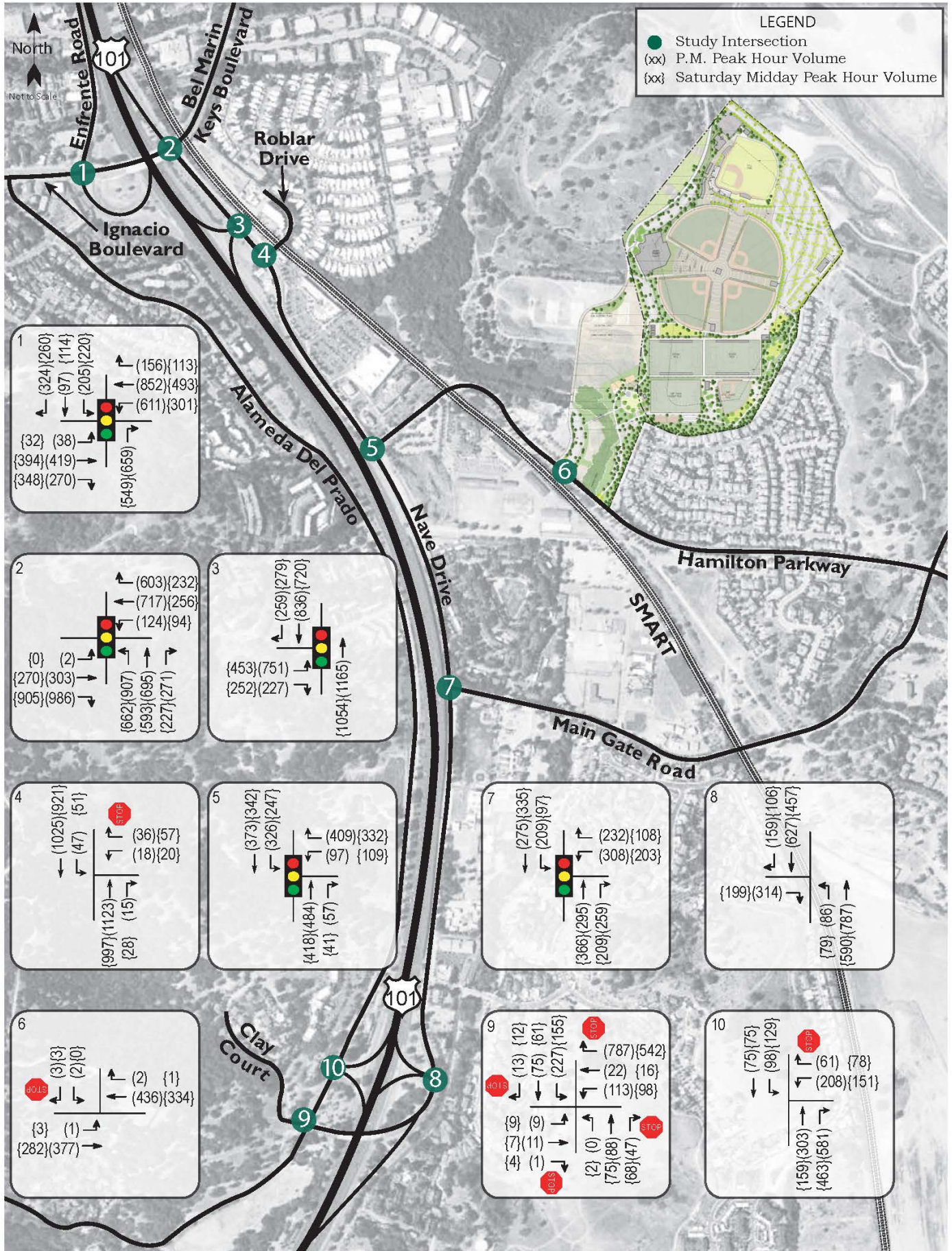
### Project Description

The project is a 55-acre sports complex located in the Hamilton area of Novato, located between North Hamilton Parkway and the Hamilton Wetlands Restoration project. The complex would include five baseball/softball fields including a 1,000 seat ballpark; two multi-sport playing fields; a 50,000 square foot training center; a 12-acre community park including youth baseball field and two multi-sport fields; and additional support facilities including concessions and trail systems (additional details on the anticipated operations are provided below). Access to Hamilton Fields would be provided by a new roadway extending northward from North Hamilton Parkway, at an intersection located at or near the current southern entrance to the Hamilton skate park. The proposed project site plan is shown in Figure 4.

### Trip Generation

The Hamilton Fields project as proposed is not easily classified as a single type of use since it would contain diverse recreational functions that are being used by diverse user groups. As a result it was necessary to develop customized project-specific trip generation estimates. Estimates were derived by breaking down





Traffic Impact Study for Hamilton Fields  
**Figure 3 – Future Traffic Volumes**



Traffic Impact Study for Hamilton Fields  
**Figure 4 – Site Plan**

travel assumptions by individual user groups using information supplied by the applicants, and in tandem with available trip generation research on recreational facilities including that prepared by the Institute of Transportation Engineers (ITE).

### Project Components

The proposed Hamilton Fields project would consist of the following components, each of which would result in distinct travel patterns.

- Leagues – use of facilities by youth and adult leagues on weekdays only
- Tournaments – use of facilities by youth and adult leagues on weekends only
- Camps/Clinics – use of facilities generally by youths on weekdays only
- Lessons – use of facilities generally by youths on weekdays only
- Ballpark – use of facilities by youth, high school-aged persons, college-aged persons and adults during both weekday evenings and weekends
- Park – these facilities will be available to the public during weekdays and weekends, including a dog park and picnic area, playground, two multi-purpose sports fields and one little league baseball field
- Training Center – daily use would include training, practice, physical therapy, and locker room facilities, as well as meeting rooms and administrative space
- Event Staff – provide daily support for the facility, including referees for leagues and tournaments, those running camps, clinics, lessons, staffing the training center and other on-site employees

### User Travel Characteristics

Each project component generates vehicle trips. Travel characteristics vary based on age group, when the use is planned by the applicants to be active, the typical duration that users of each component are onsite, automobile occupancy, turnover during peak hours (for example, how many sports fields have one game end and another begin within a one-hour period), and the amount of drop-off activity (including parents dropping off youth for games and/or practice and returning later to pick up, as well as tournament players who have games that are widespread and may leave and return to play another game later in the day). The applicants supplied estimates of the average and maximum number of users by project component on weekdays and weekends. Using additional information including parking accumulation estimates supplied by the applicants, as well as peak hour traffic characteristics and patterns obtained from ITE and San Diego Association of Governments (SANDAG) trip generation rates, the percent of daily trips occurring during the weekday p.m. and weekend midday peak hours were estimated. The inbound and outbound splits of peak hour traffic were also estimated for each project component.

Following are descriptions of select assumptions made for different components of the project.

- Leagues – during the p.m. peak hour, leagues are expected to be comprised mostly of youths, though some adult league players may also occasionally be active; vehicle occupancies are projected to be approximately 2.0 during this period, with drop-off and return rates averaging 20 percent.
- Tournaments – generally have higher vehicle occupancy rates since many teams would be travelling from beyond Novato; higher drop-off and return rate since widespread game times likely lead to players and other attendees leaving and returning.
- Camps/Clinics – day camps and clinics generally serve youth and high school students, with more drop-off/pick-up operations for younger users; mid-to-high auto occupancy rates associated with high school students carpooling with peers and parents coordinating to shuttle two or more players.
- Lessons – similar to camps/clinics, though shorter and more likely that parents will stay during the lessons, resulting in a lower drop-off and return rate.
- Ballpark – used for games with larger attendance and would experience a higher carpooling rate with a low drop-off and return rate.

- Community Park – the park includes a youth baseball field and one multi-sport field, and will be open to the public at all times; it is expected there would be a lower carpooling rate for park facilities other than the fields, and a moderate drop-off/pick-up rate; note that the number of assumed users supplied by the applicants was increased based on trip generation rates published by SANDAG, with the resulting trips for the community park use being within the expected range for a City park containing multiple uses including ball fields, multi-purpose fields, playgrounds, and dog parks.
- Training Center – most users are assumed to be youths, resulting in moderate carpooling and drop-off/return rates (vehicle occupancy of 2.0 and drop-off/return rates of 30 percent).
- Event Staff – drive themselves to work operating the facilities or refereeing; it was assumed conservatively that no event staff would carpool or get dropped off.

### Total Trip Generation

Trip generation during the weekday p.m. and weekend midday peak hours were estimated based on the above assumptions. Two scenarios were developed. The first shows trip generation during typical usage of the proposed facility during warmer-weather months between spring and fall. The second scenario shows the potential trip generation associated with these same activity levels coupled with a major sold-out game at the main ballpark. The total estimated trips generated under the typical use scenario include 230 weekday p.m. peak hour trips and 234 weekend midday peak hour trips, while the maximum use scenario would generate an estimated 448 trips during the p.m. peak hour and 626 trips during the weekend midday peak hour. A summary of the trip generation is shown in Table 4, with detailed information provided in Appendix B.

**Table 4  
Trip Generation Summary**

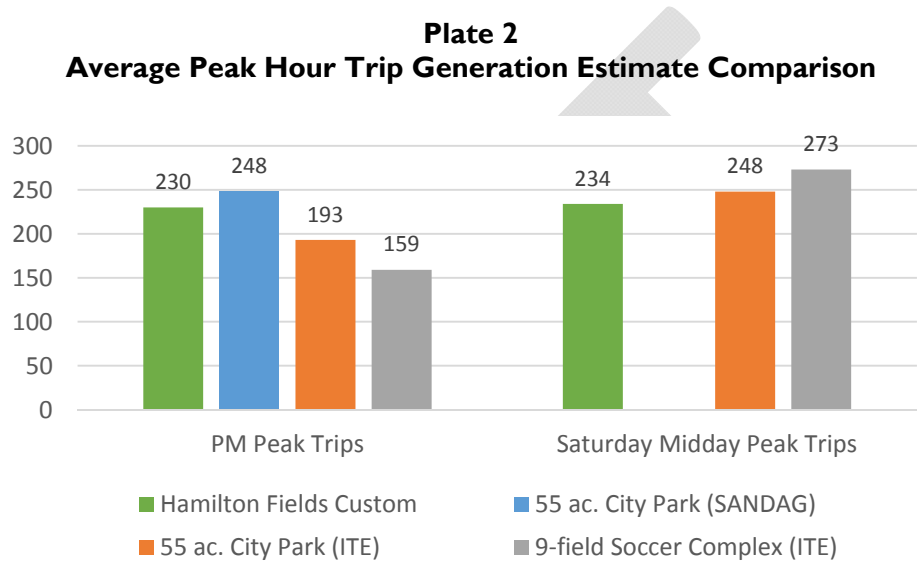
Project Component	Weekday PM Peak Hour		Weekend Midday Peak Hour	
	Average	Maximum	Average	Maximum
Leagues	65	71	0	0
Tournaments	0	0	83	90
Camps/Clinics	11	14	0	0
Lessons	34	42	0	0
Ballpark	18	189	40	385
Community Park	48	61	56	73
Training Center	43	43	43	43
Event Staff	11	28	12	35
<b>Total</b>	<b>230</b>	<b>448</b>	<b>234</b>	<b>626</b>

### Comparison to Standard Trip Generation Rates

In order to ensure that the applied custom trip generation rates are within expected ranges, the custom-derived Hamilton Fields trip generation estimates were compared with those that would result from applying standard rates. The ITE *Trip Generation Manual*, 9<sup>th</sup> Edition, 2012, includes trip generation rates for “City Park” (land use #411) and “Soccer Complex” (land use #488) uses. ITE emphasizes that the surveyed city parks used to develop the trip generation rates vary widely as to the type of facilities present. The ITE land use description for soccer complexes also indicates that ancillary amenities may include stadium seating, fitness trails, picnic grounds, basketball and tennis courts, and playgrounds. A third standard reference is available from SANDAG in their published trip generation rates for City Parks, which

are developed with meeting rooms and sports facilities. While not perfect matches to Hamilton Fields, all three of these standard references do share some similarities to the project, and would be expected to produce trip generation estimates that are within a reasonable range of those resulting from the application of custom rates.

ITE and SANDAG rates for City Parks are based on acreage, while the ITE soccer complex rates are based on the number of fields. For the purposes of this comparison a 55-acre park or 9-field soccer complex was assumed. SANDAG does not include weekend rates so no comparison to the weekend midday peak hour was possible. A chart showing how these standard rates compare to the customized rates developed for Hamilton Fields is shown in Plate 2.



The customized trip generation estimates for Hamilton Fields are within the range of estimates that would be obtained by using standard rates for park or soccer complex uses. This suggests that the customized estimates are reasonable, while also being reflective of Hamilton Fields’ specific mix of uses and project description.

**Trip Distribution**

The applicants have provided estimates of the proportion of users by project component that would be “local,” which refers to those living within Marin County, versus those that would be considered “visitors,” or those from beyond Marin County. Based on the project description and operation of similar facilities, the estimates appear reasonable. Estimates for those traveling to and from Hamilton Fields from within Marin County were further categorized into those oriented to within the City of Novato versus those outside the City. The anticipated breakdown of trips by visitors, locals within Novato, and locals outside Novato is summarized in Table 5.

**Table 5  
Trip Distribution**

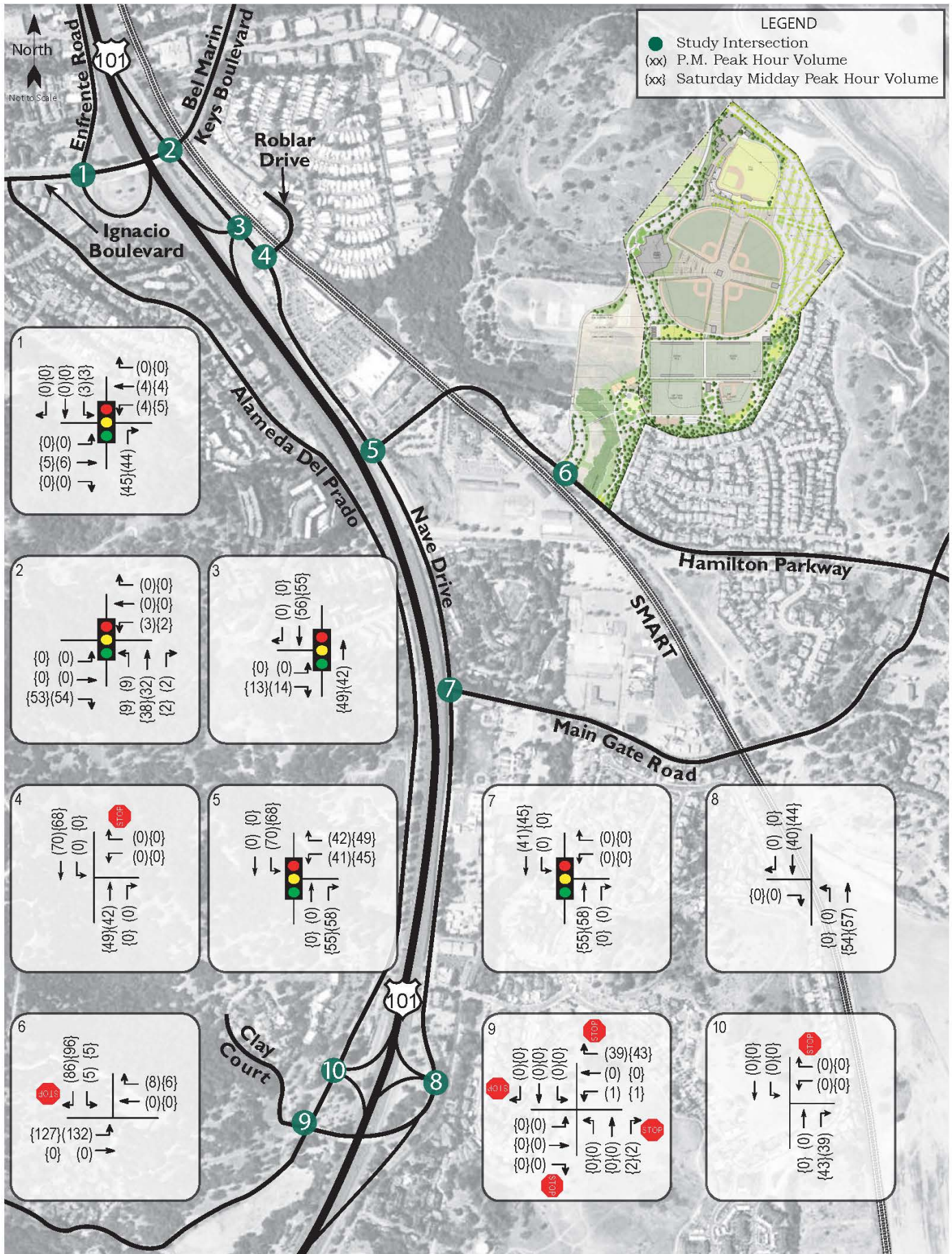
<b>Project Component</b>	<b>Visitors</b>	<b>Local within Novato</b>	<b>Local Outside Novato</b>
Leagues	0%	40%	60%
Tournaments	60%	10%	30%
Camps/Clinics	25%	30%	45%
Lessons	5%	30%	65%
Ballpark	20%	30%	50%
Community Park	0%	90%	10%
Training Center	25%	30%	45%
Event Staff	0%	50%	50%

For trips that are associated with origins and destinations beyond the City of Novato, it is estimated that 20 percent will be oriented to/from US 101 North, 20 percent to/from Highway 37, and 60 percent to/from US 101 South.

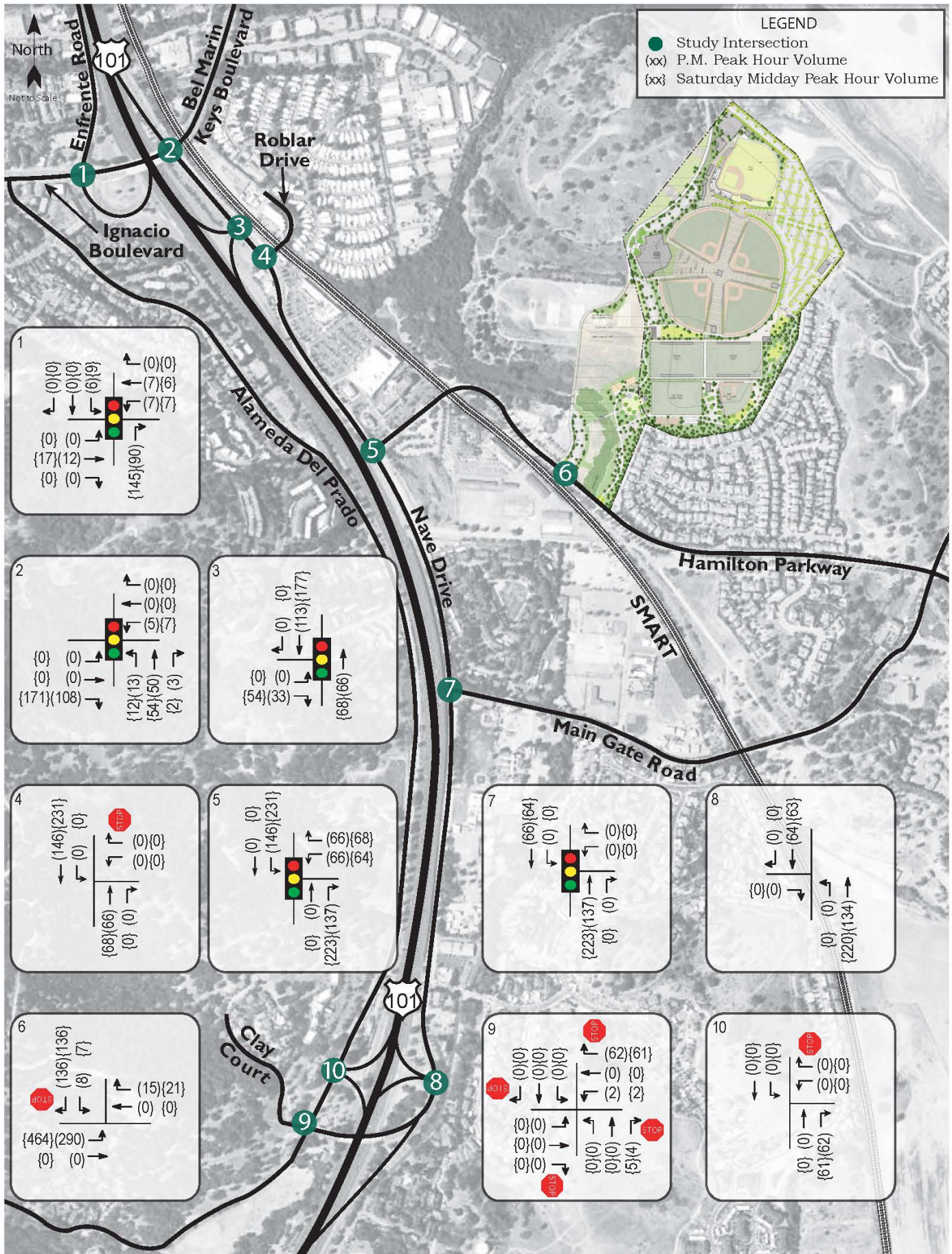
**Intersection Operation**

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably. Project traffic volumes for typical and maximum conditions are shown in Figures 5 and 6, respectively. The Existing and Existing plus Project levels of service are summarized in Table 6.



Traffic Impact Study for Hamilton Fields  
**Figure 5 – Project Traffic Volumes – Typical Traffic**



Traffic Impact Study for Hamilton Fields  
**Figure 6 – Project Traffic Volumes – Maximum Traffic**



**Table 6  
Existing and Existing plus Project Peak Hour Intersection Levels of Service**

Study Intersection <i>Approach</i>	Weekday PM Peak			Saturday Midday Peak		
	Existing	+Project Typical	+Project Max	Existing	+Project Typical	+Project Max
1. US 101 S Ramp/Ignacio-Enfrente	24.3/C	24.4/C	24.6/C	21.3/C	21.3/C	21.6/C
2. US 101 N Ramp/BMK-Nave Dr	21.0/C	21.2/C	21.3/C	16.9/B	17.2/B	17.6/B
3. US 101 N Ramps/Nave Dr	13.8/B	14.1/B	14.5/B	16.3/B	16.9/B	17.4/B
4. Nave Dr/Roblar Dr	0.9/A	0.9/A	0.9/A	1.1/A	1.1/A	1.1/A
<i>Westbound Left-Turn</i>	<i>37.6/E</i>	<i>40.9/E</i>	<i>43.6/E</i>	<i>35.7/E</i>	<i>39.2/E</i>	<i>43.1/E</i>
<i>Westbound Right-Turn</i>	<i>17.1/C</i>	<i>17.7/C</i>	<i>18.1/C</i>	<i>17.2/C</i>	<i>17.9/C</i>	<i>18.2/C</i>
5. Nave Dr/North Hamilton Pkwy	13.6/B	13.3/B	14.6/B	8.7/A	10.1/B	17.5/B
6. N Hamilton Pkwy/Project St	0.1/A	2.7/A	4.4/A	0.1/A	3.1/A	6.0/A
<i>Southbound Approach</i>	<i>11.4/B</i>	<i>11.8/B</i>	<i>14.2/B</i>	<i>9.7/A</i>	<i>10.9/B</i>	<i>14.6/B</i>
7. Nave Dr/Main Gate Dr	9.7/A	9.8/A	11.5/B	7.7/A	8.2/A	9.1/A
8. Nave Dr/US 101 N Ramps	0.5/A	0.5/A	0.5/A	0.6/A	0.5/A	0.4/A
<i>Northbound Left-Turn</i>	<i>8.9/A</i>	<i>9.0/A</i>	<i>9.1/A</i>	<i>8.4/A</i>	<i>8.5/A</i>	<i>8.6/A</i>
9. Alameda del Prado/Nave Dr	14.8/B	15.6/C	16.2/C	11.7/B	12.2/B	12.5/B
10. Alameda del Prado/US 101 S Ramps	5.9/A	5.9/A	5.9/A	6.3/A	6.3/A	6.3/A
<i>Westbound Left-Turn</i>	<i>14.9/B</i>	<i>14.9/B</i>	<i>14.9/B</i>	<i>13.4/B</i>	<i>13.4/B</i>	<i>13.4/B</i>
<i>Westbound Right-Turn</i>	<i>10.2/B</i>	<i>10.2/B</i>	<i>10.2/B</i>	<i>9.4/A</i>	<i>9.4/A</i>	<i>9.4/A</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; BMK = Bel Marin Keys Boulevard; Project Typical = with typical project trip generation; Project Max = with maximum project trip generation

It should be noted that with the addition of typical project-related traffic volumes, average delay at the intersection of Nave Drive/North Hamilton Parkway decreases during the p.m. peak hour. While this is counter-intuitive, this condition occurs when a project adds trips to movements that are currently underutilized or have delays that are below the intersection average, resulting in a better balance between approaches and lower overall average delay. The project adds traffic predominantly to the southbound left-turn and westbound right-turn movements, both of which have an average delay that is lower than the average for the intersection as a whole, resulting in a slight reduction in the overall average delay. The conclusion could incorrectly be drawn that the project actually improves operation based on this data alone; however, it is more appropriate to conclude that the project trips are expected to make use of excess capacity during this particular period.

*Finding:* The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic during both typical and maximum activity levels at Hamilton Fields.

## Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate acceptably. The Future plus Project operating conditions are summarized in Table 7.

**Table 7**  
**Future and Future plus Project Peak Hour Levels of Service**

Study Intersection Approach	Weekday PM Peak			Saturday Midday Peak		
	Future	+Project Typical	+Project Max	Future	+Project Typical	+Project Max
1. US 101 S Ramp/Ignacio-Enfrente	25.5/C	25.5/C	25.6/C	24.8/C	25.1/C	25.8/C
2. US 101 N Ramp/BMK-Nave Dr	24.1/C	24.9/C	25.9/C	17.0/B	17.5/B	19.2/B
3. US 101 N Ramps/Nave Dr	15.1/B	15.2/B	15.6/B	17.0/B	17.4/B	18.1/B
4. Nave Dr/Roblar Dr	1.0/A	1.0/A	1.0/A	1.2/A	1.2/A	1.2/A
<i>Westbound Left-Turn</i>	46.2/E	49.8/E	53.4/F	39.2/E	42.8/E	46.7/E
<i>Westbound Right-Turn</i>	18.8/C	19.4/C	19.8/C	18.2/C	18.9/C	19.2/C
5. Nave Dr/North Hamilton Pkwy	15.0/B	14.6/B	15.2/B	11.1/B	13.0/B	18.9/B
6. N Hamilton Pkwy/Project St	0.1/A	2.4/A	4.3/A	0.1/A	2.7/A	5.9/A
<i>Southbound Approach</i>	13.4/B	13.7/B	18.1/C	10.2/B	11.8/B	17.5/C
7. Nave Dr/Main Gate Dr	19.9/B	19.5/B	19.6/B	9.3/A	9.5/A	13.5/B
8. Nave Dr/US 101 N Ramps	0.5/A	0.5/A	0.5/A	0.6/A	0.6/A	0.6/A
<i>Northbound Left-Turn</i>	9.3/A	9.5/A	9.6/A	8.6/A	8.8/A	8.8/A
9. Alameda del Prado/Nave Dr	21.1/C	23.2/C	24.6/C	12.9/B	13.5/B	13.8/B
10. Alameda del Prado/US 101 S Ramps	6.6/A	6.6/A	6.6/A	6.6/A	6.6/A	6.6/A
<i>Westbound Left-Turn</i>	16.9/C	16.9/C	16.9/C	14.5/B	14.5/B	14.5/B
<i>Westbound Right-Turn</i>	10.5/B	10.5/B	10.5/B	9.5/A	9.5/A	9.5/A

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; BMK = Bel Marin Keys Boulevard; Project Typical = with typical project trip generation; Project Max = with maximum project trip generation

Under the Future plus Project Maximum scenario during the p.m. peak hour, the delay encountered by drivers making a westbound left-turn movement at the Nave Drive/Roblar Drive intersection are projected to drop to LOS F levels, though the intersection would continue to meet the City's level of service standard since it would operate acceptably at LOS A overall. The LOS F delays are projected to affect approximately 16 drivers during the p.m. peak hour. Such delays are not uncommon for minor streets entering major corridors. Because drivers exiting Roblar Drive have no option of diverting to a controlled intersection, it is recommended that the Novato Police Department monitor operation of this intersection during major events at Hamilton Fields (further discussion regarding the need for Police Department monitoring and potential manual traffic control appears below in the queuing analysis).

As noted under the Existing plus Project discussion above, average intersection delay decreases slightly at the intersection of Nave Drive/North Hamilton Parkway during the p.m. peak hour with typical project

traffic, and in the future under scenario also decreases slightly at Nave Drive/Main Gate Drive. This is due to the project adding traffic to movements which have an average delay that is lower than the average for the intersection as a whole.

*Finding:* The study intersections will continue operating acceptably with project traffic added during both typical and maximum activity levels at Hamilton Fields.

*Recommendation:* The Novato Police Department should monitor operation of Nave Drive/North Hamilton Parkway and adjacent intersections during major events at Hamilton Fields.

## Queuing

Queuing was qualitatively assessed at all ten study intersections through review of Synchro calculations and observation of traffic simulations conducted using the Simtraffic application (which is an extension of Synchro). Based on this review, no significant adverse queuing impacts such as queues extending onto mainline US 101 or through adjacent signalized intersections are anticipated to occur under any of the analysis scenarios.

A more detailed queuing analysis was conducted for the intersection of Nave Drive/North Hamilton Parkway due to the potential for project-related traffic to impact queuing specifically at this signalized intersection. The 95<sup>th</sup> percentile queues that are projected to occur at each of the intersection's four turn pockets were calculated using Synchro. The resulting predicted queue lengths are summarized in Table 8. Copies of the queuing projections are contained in Appendix C.

**Table 8**  
**Nave Drive/North Hamilton Parkway 95<sup>th</sup> Percentile Queues**

Approach	Avail. Storage	PM Peak Hour						Saturday Peak Hour					
		E	E+P Typ	E+P Max	F	F+P Typ	F+P Max	E	E+P Typ	E+P Max	F	F+P Typ	F+P Max
<b>Westbound</b>													
Left Turn	115	68	93	107	91	<b>118</b>	<b>134</b>	59	85	96	87	<b>117</b>	<b>130</b>
Right Turn	565	37	40	48	147	154	169	34	36	37	77	102	110
<b>Northbound</b>													
Right Turn	50	21	38	45	17	24	26	13	27	<b>56</b>	23	43	<b>103</b>
<b>Southbound</b>													
Left Turn	190	116	126	<b>320</b>	157	<b>226</b>	<b>405</b>	114	<b>201</b>	<b>374</b>	162	<b>253</b>	<b>450</b>

Notes: All distances are measured in feet; E = existing conditions; E+P = existing plus project conditions; F = future conditions; F+P = future plus project conditions; Typ = typical project traffic; Max = peak day project traffic; **Bold** text = queue length exceeds available storage

## No-Project Queuing

The analysis indicates that 95<sup>th</sup> percentile queues are currently accommodated within available storage, and would continue to be adequate under Future Conditions.

### Existing plus Project Queuing

Upon the addition of both typical and maximum project-generated traffic, queues in the southbound left-turn pocket may exceed available storage during one or both peak hours. This condition could be alleviated to accommodate typical project traffic by extending the turn pocket so that it connects to the upstream left turn pocket, resulting in 365 feet of storage. This modification would require installation of a ribbon median through the current upstream driveway (located between the Safeway gas station and McDonald's), eliminating the currently-allowed southbound left-turn movement at this driveway. The southbound left-turns at this driveway would be displaced to the Nave Drive/North Hamilton Parkway intersection and accommodated by the extended turn pocket serving that intersection. With this modification, queuing during typical Hamilton Fields activity would be accommodated, though it would remain inadequate during periods when maximum use of Hamilton Fields is occurring. During these maximum activity periods (which generally correspond to major games at the 1,000 seat ballpark) it is recommended that intersection operation be monitored by the Novato Police Department and manual traffic control be implemented as deemed necessary by public safety officers.

Queuing in the northbound right-turn pocket may also slightly exceed storage during the Saturday midday peak hour under maximum project activity levels. Queuing on this movement could also be managed through manual traffic control by the Novato Police Department.

### Future plus Project Queuing

Queuing in the southbound left-turn and northbound right-turn pockets would continue to exceed available storage, as identified above under Existing plus Project conditions. Extension of the southbound left-turn pocket as described would alleviate this condition during typical operations at Hamilton Fields, and implementation of manual traffic control would alleviate the condition during maximum activity periods.

Peak hour queuing in the westbound left-turn pocket is projected to exceed storage during both typical and maximum activity periods at Hamilton Fields under Future plus Project conditions. An additional 20 feet of storage in the left-turn bay would alleviate this condition during both typical and maximum activity periods. This additional storage could be obtained by reducing the size of an existing planted median near the Marin Airporter terminal. Because queuing on this movement is only projected to exceed storage with the addition of Hamilton Fields traffic, the project applicants should be responsible for funding the modifications to the median. The City may wish to require the modification as a near-term offsite improvement, or alternatively, collect funds for the improvement from the applicant and implement the median modifications when determined to be necessary in the future.

*Finding:* Under Existing plus Project conditions, the project is expected to cause 95<sup>th</sup> percentile queues to exceed available storage in the southbound left-turn and northbound right-turn pockets at Nave Drive/North Hamilton Parkway.

*Finding:* Under Future plus Project conditions, the project is projected to cause 95<sup>th</sup> percentile queues to exceed available storage in the westbound left-turn pocket at Nave Drive/North Hamilton Parkway.

*Recommendation:* The project applicants should be responsible for increasing storage at Nave Drive/ North Hamilton Parkway by connecting the existing southbound left-turn pocket to the upstream left-turn pocket, including installation of a raised ribbon median to prohibit left-turns into and out of the minor driveway.

*Recommendation:* The project applicants should be responsible for contracting with the Novato Police Department to monitor Nave Drive/North Hamilton Parkway and nearby intersections during major

activity periods (i.e., large games at the 1,000 seat ballpark), allowing officers to implement manual traffic control as deemed necessary to alleviate queuing and traffic safety issues should they occur.

*Recommendation:* The project applicants should be responsible for extending the westbound left-turn pocket at Nave Drive/North Hamilton Parkway by approximately 20 feet. The City may wish to require the applicants to construct this improvement as part of their offsite improvements, or alternatively submit funds to the City to complete the modification when determined to be necessary in the future.

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## Access and Circulation

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### Site Access

The new street providing access to Hamilton Fields would intersect North Hamilton Parkway at or near the current southern entrance to the Hamilton Skate Park. The posted speed limit on North Hamilton Parkway is 30 mph.

### Sight Distance

At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the crossroad and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed. Sight distance along North Hamilton Parkway was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at intersections of public streets is based on corner sight distances. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street. For the posted 30 mph speed limit on North Hamilton Parkway, 220 feet of corner sight distance and 200 feet of stopping sight distance is required.

Sight distance at the project intersection was measured on aerial photographs. Sight distance to and from the north is approximately 450 feet while sight distance to and from the south is approximately 750 feet. Both of these exceed minimum requirements, and therefore both corner and stopping sight distance availability are considered to be adequate.

### Access Analysis

#### *Left-Turn Lane Warrants*

The need for a left-turn lane on eastbound North Hamilton Parkway at the project street was evaluated based on criteria contained in the *Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985, as well as a more recent update of the methodology developed by the Washington State Department of Transportation. The NCHRP report references a methodology developed by M. D. Harmelink that includes equations that can be applied to expected or actual traffic volumes in order to determine the need for a left-turn pocket based on safety issues.

It was determined that a left-turn lane would be warranted under Existing plus Project conditions during the p.m. peak hour with typical operation at Hamilton Fields. The warrant would also be met under Existing plus Project conditions on Saturdays during maximum activity periods.

#### *Left-turn Lane Design Requirements*

Preliminary guidance on the necessary configuration of the new left-turn pocket on North Hamilton Parkway at the project street was developed using the *Highway Design Manual*, Caltrans, 2012 (HDM). Based on the anticipated project volumes during typical operation, the turn pocket should include storage for five vehicles. Assuming that the widening would occur on one side of the street and after accounting for tapers and transitions, the area of widening is anticipated to total approximately 4,450 square feet. Widening to the east would extend approximately 165 feet (note that a culvert and creek undercrossing exist approximately 250 feet to the east of the southern skate park driveway). Widening to the west would extend approximately 380 feet.

*Finding:* An eastbound left-turn lane would be warranted at the project intersection on North Hamilton Parkway under Existing plus Project conditions during typical Hamilton Fields activity levels.

*Recommendation:* The project applicants should be responsible for constructing an eastbound left-turn lane on North Hamilton Parkway that accommodates storage for five vehicles, plus appropriate tapers and transitions.

### **Safeway Fuel Station Circulation Effects**

A Safeway fuel station is located on the east side of Nave Drive between North Hamilton Parkway and the Hamilton Center shopping center traffic signals. The City of Novato has received complaints from the public that vehicular circulation associated with this station sometimes creates adverse impacts to traffic flow on public streets including Nave Drive and nearby intersections, and is aware that projects such as Hamilton Fields that increase traffic volumes in the area may be considered by these concerned members of the public to further exacerbate real and perceived fuel station congestion. Safeway is known by the community for having competitive fuel pricing, often being the lowest-priced gas station in Novato and surrounding areas. As a result it is theorized that some drivers make dedicated trips to the gas station rather than fueling their vehicles at stations that may be more convenient to them, and may be willing to wait in line for longer durations than they might at other gas stations.

#### Fuel Station Circulation

Drivers enter the gas station in a one-way southbound direction entering from the shopping center parking lot near the Nave Drive/Hamilton Center traffic signal. After fueling, most drivers exit the gas station via a driveway on Nave Drive located between the gas station and neighboring McDonald's, while some drivers continue to a driveway on North Hamilton Parkway. It is also possible for drivers to make a u-turn exiting the gas station and return to the shopping center parking lot via a drive aisle along the eastern boundary of the station.

#### Observations

Observations of gas station operation were conducted during several weekend and weekday peak periods. Gas station queues were generally accommodated in the available space between the pumps and the main shopping center driveway. During the busiest periods, gas station queues were observed to occasionally extend into the main shopping center driveway. During these times, drivers attempting to enter the shopping center from the Nave Drive/Hamilton Center signal were blocked from continuing into the parking lot, and queues subsequently extend onto Nave Drive itself. While such blockages affect the ability for drivers to use the southbound left-turn lane into the shopping center, most drivers making this movement do not complete the left turn if the parking lot is blocked and they would end up blocking northbound Nave Drive traffic flow. Based on observations, the potentially more disruptive blockage was due to northbound drivers on Nave Drive waiting to turn right into Hamilton Center due to the onsite gas station queuing/blockages, thereby blocking northbound Nave Drive drivers from continuing straight. During one observation period queues on northbound Nave Drive were seen extending to the North Hamilton Parkway intersection. Blockages extending onto Nave Drive appear to clear within a short period but are disruptive to traffic flow nonetheless.

Some inefficiencies at the fuel station pumps were observed, such as fueling positions becoming available but for unknown reasons not being used by the next vehicle in the queue. During one of the observation periods a gas station attendant appeared to be on duty in the outdoor area near the fuel pumps, though did not take an active role in assisting with traffic flow or alerting queued drivers to the availability of fueling positions. It appears that, most of the time, no fuel station attendants are present outside near the pumps.

## Preliminary Recommendations

The impacts to *onsite* shopping center circulation that are created by the Safeway fuel station primarily cause driver frustration and inconvenience rather than adverse safety conditions, and should be dealt with by Safeway and the shopping center owners. Once circulation impacts extend onto the public street system, however, safety becomes a greater concern, as does the adverse impacts to traffic flow. If possible, it is recommended that the City coordinate with Safeway to require trained gas station attendants to be present during peak fuel station activity periods, assisting drivers with accessing the pumps more efficiently, and to develop procedures for clearing any queues that extend offsite. Such procedures could entail prohibiting drivers from queuing into the main shopping center driveway, and instead directing them to queue within the parking lot drive aisle to the north of the main driveway that aligns with the gas station. The attendant could allow drivers to cross the main shopping center driveway from this parking aisle queue, one at a time as space in the gas station queue becomes available, when it is safe to do so and traffic is not entering the shopping center in a platoon created by the Nave Drive signal. Safeway has implemented similar techniques using trained gas station attendants to manage queues at their fuel station in Santa Rosa on the corner of Mendocino Avenue and Steele Lane.

*Finding:* Queuing at the Safeway fuel center has been observed to occasionally result in temporary blockages to through traffic on Nave Drive, creating potential safety concerns and congestion.

*Recommendation:* The City should coordinate with Safeway and owners of the Hamilton Center shopping center to require the use of trained gas station attendants during typically-busy periods, to better manage onsite queuing, including use of parking lot drive aisles for queue storage when necessary to preclude queuing from extending onto Nave Drive.



## Conclusions and Recommendations

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### Conclusions

- During typical operations, the proposed Hamilton Fields project is anticipated to generate an average of approximately 230 trips during the weekday p.m. peak hour and 234 trips during the Saturday midday peak hour.
- During periods of maximum activity at Hamilton Fields including a major game at the 1,000 seat ballpark, the project is anticipated to generate approximately 448 trips during the weekday p.m. peak hour and 626 trips during the weekend midday peak hour.
- The study intersections are expected to continue operating acceptably both under Existing plus Project and Future plus Project conditions upon the addition of project-generated traffic during both typical and maximum activity levels at Hamilton Fields.
- Under Existing plus Project conditions, the project is projected to cause 95<sup>th</sup> percentile queues to exceed available storage on the southbound left-turn and northbound right-turn pockets at Nave Drive/North Hamilton Parkway.
- Under Future plus Project conditions, the project is projected to cause 95<sup>th</sup> percentile queues to exceed available storage on the westbound left-turn pocket at Nave Drive/North Hamilton Parkway.
- An eastbound left-turn lane would be warranted at the project intersection on North Hamilton Parkway under Existing plus Project conditions during typical Hamilton Fields activity levels.
- Queuing at the Safeway fuel center has been observed to occasionally result in temporary blockages to through traffic on Nave Drive, creating potential safety concerns and congestion.

### Recommendations

- The project applicants should be responsible for increasing storage at Nave Drive/North Hamilton Parkway by connecting the existing southbound left-turn pocket to the upstream left-turn pocket, including installation of a raised ribbon median to prohibit left-turns into and out of the minor driveway between Safeway and McDonald's.
- The project applicants should be responsible for contracting with the Novato Police Department to monitor Nave Drive/North Hamilton Parkway and nearby intersections during major activity periods (i.e., large games at the 1,000 seat ballpark), allowing officers to implement manual traffic control as deemed necessary to alleviate queuing and traffic safety issues should they occur.
- The project applicants should be responsible for extending the westbound left-turn pocket at Nave Drive/North Hamilton Parkway by approximately 20 feet. The City may wish to require the applicants to construct this improvement as part of their offsite improvements, or alternatively submit funds to the City to complete the modification when determined to be necessary in the future.
- The project applicants should be responsible for constructing an eastbound left-turn lane on North Hamilton Parkway that accommodates storage for five vehicles, plus appropriate tapers and transitions.
- The City should coordinate with Safeway and owners of the Hamilton Center shopping center to require the use of trained gas station attendants during typically-busy periods, to better manage onsite queuing, including use of parking lot drive aisles for queue storage when necessary to preclude queuing from extending onto Nave Drive.

## Study Participants and References

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### Study Participants

Principal in Charge:	Dalene J. Whitlock, PE, PTOE
Associate Principal:	Zachary Matley, AICP
Assistant Engineer:	Smadar Boardman, EIT
Technician/Graphics:	Deborah J. Mizell
Editing/Formatting:	Angela McCoy

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*City of Novato General Plan*, City of Novato, 2014  
*Highway Capacity Manual*, Transportation Research Board, 2000  
*Highway Design Manual*, 6<sup>th</sup> Edition, California Department of Transportation, 2012  
*Intersection Channelization Design Guide*, National Cooperative Highway Research Program (NCHRP) Report No. 279, Transportation Research Board, 1985  
*(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, San Diego Association of Governments (SANDAG), 2002  
*Trip Generation Manual*, 9<sup>th</sup> Edition, Institute of Transportation Engineers, 2012

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## Appendix A

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### Intersection Level of Service Calculations

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HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	680	205	0	890	663	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0.95
Lane Util. Factor	0.97	1.00	0.99	1.00	1.00	1.00
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96
Frt	1.00	0.85	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	3574	3443	
Satd. Flow (prot)	3467	1563		3574	3443	
Flt Permitted	0.95	1.00	1.00	3574	3443	
Satd. Flow (perm)	3467	1563		3574	3443	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	694	209	0	908	677	239
RTOR Reduction (vph)	0	81	0	0	51	0
Lane Group Flow (vph)	694	128	0	908	865	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	
Protected Phases	4		2	6		
Permitted Phases	4					
Actuated Green, G (s)	31.0	31.0	31.0	31.0	31.0	
Effective Green, g (s)	31.0	31.0	31.0	31.0	31.0	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	1535	692	1582	1524		
v/s Ratio Prot	c0.20		c0.25	0.25		
v/s Ratio Perm	0.45	0.18	0.57	0.57		
Uniform Delay, d1	13.6	11.8	14.6	14.5		
Progression Factor	1.00	1.00	0.67	1.00		
Incremental Delay, d2	1.0	0.6	1.5	1.5		
Delay (s)	14.5	12.4	11.1	16.1		
Level of Service	B	B	B	B		
Approach Delay (s)	14.1		11.1	16.1		
Approach LOS	B		B	B		

Intersection Summary	EBL	EBR	NBL	NBT	SBR	SBR
HCM 2000 Control Delay	13.8					B
HCM 2000 Volume to Capacity ratio	0.51					8.0
Actuated Cycle Length (s)	70.0					
Intersection Capacity Utilization	55.8%					B
Analysis Period (min)	15					

c. Critical Lane Group

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBR	SBR
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	33	857	14	30	838
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	40	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	35	902	15	32	882
Major/Minor	Minor1	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1413	458	0	0	917	0
Stage 1	909	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Critical Hwy	9.1	9.2	-	-	5.5	-
Critical Hwy Sig 1	7.7	-	-	-	-	-
Critical Hwy Sig 2	7.7	-	-	-	-	-
Follow-up Hwy	4.7	4.4	-	-	2.9	-
Plat Cap-1 Maneuver	47	331	-	-	433	-
Stage 1	187	-	-	-	-	-
Stage 2	356	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	44	331	-	-	433	-
Mov Cap-2 Maneuver	127	-	-	-	-	-
Stage 1	187	-	-	-	-	-
Stage 2	330	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	
HCM Control Delay, s	23.8		0		0.5	
HCM LOS	C					
Minor Lane/Minor Mvmt	NBT	NBR	NBL	NBR	SBL	SBT
Capacity (veh/h)	-	-	127	331	433	-
HCM Lane V/C Ratio	-	-	0.133	0.105	0.073	-
HCM Control Delay (s)	-	-	37.6	17.1	14	-
HCM Lane LOS	-	-	E	C	B	-
HCM 95th %ile Q(veh)	-	-	0.4	0.3	0.2	-

HCM Signalized Intersection Capacity Analysis  
5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	
Volume (vph)	78	299	319	45	260	244	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	10	12	12	
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.85	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1599	1900	1473	1787	1850	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1599	1900	1473	1787	1900	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	81	311	332	47	271	254	
RTOR Reduction (vph)	0	206	0	17	0	0	
Lane Group Flow (vph)	81	105	332	30	271	254	
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%	
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA	
Turn Type	1	2	2	1	1	6	
Protected Phases	8	8	2	2	2	2	
Permitted Phases	6.7	23.6	35.8	35.8	16.9	55.7	
Actuated Green, G (s)	6.7	23.6	35.8	35.8	16.9	55.7	
Effective Green, g (s)	0.10	0.34	0.51	0.51	0.24	0.80	
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4	
Clearance Time (s)	2.0	2.0	3.0	3.0	2.0	3.0	
Vehicle Extension (s)	1.69	539	971	753	431	1472	
Lane Grp Cap (vph)	c0.05	0.02	c0.17	c0.15	0.14		
v/s Ratio Prot	0.48	0.19	0.34	0.04	0.63	0.17	
v/s Ratio Perm	30.0	16.5	10.1	8.5	23.7	1.7	
Uniform Delay, d1	1.00	1.00	1.00	1.00	0.81	0.40	
Progression Factor	0.8	0.1	1.0	0.1	2.0	0.2	
Incremental Delay, d2	30.8	16.5	11.1	8.6	21.2	0.9	
Delay (s)	C	B	B	A	C	A	
Level of Service	19.5	10.8	10.8	11.4	11.4	B	
Approach Delay (s)	B	B	B	B	B	B	
Approach LOS	B	B	B	B	B	B	
Intersection Summary							
HCM 2000 Control Delay	13.6					HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44						
Actuated Cycle Length (s)	70.0					Sum of lost time (s)	10.6
Intersection Capacity Utilization	50.6%					ICU Level of Service	A
Analysis Period (min)	15						
c Critical Lane Group							

Hamilton Fields Traffic Impact Study  
PM Peak Hour Existing Conditions

Synchro 8 Report

HCM 2010 TWSC  
6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	0.1					
Ini Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	299	307	2	2	3
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	315	323	2	2	3
Major/Minor	Major1	Major2	Major2	Minor2	Minor2	Minor2
Conflicting Flow All	325	0	-	0	641	324
Stage 1	-	-	-	-	324	-
Stage 2	-	-	-	-	317	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Sig 1	-	-	-	-	5.42	-
Critical Hdwy Sig 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1235	-	-	-	439	717
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	738	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1235	-	-	-	439	717
Mov Cap-2 Maneuver	-	-	-	-	439	-
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	737	-
Approach	EB	WB	WB	SB	SB	
HCM Control Delay, s	0	0	0	11.4	11.4	
HCM LOS				B	B	
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1235	-	-	-	572	-
HCM Lane V/C Ratio	0.001	-	-	-	0.009	-
HCM Control Delay (s)	7.9	0	-	-	11.4	-
HCM Lane LOS	A	A	-	-	B	-
HCM 95th %ile Q(veh)	0	-	-	-	0	-

Hamilton Fields Traffic Impact Study  
PM Peak Hour Existing Conditions

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	219	87	263	205	96	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	241	96	289	225	105	265
RTOR Reduction (vph)	0	75	0	143	0	0
Lane Group Flow (vph)	241	21	289	82	105	265
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	8.2	8.2	13.8	13.8	5.6	22.1
Effective Green, g (s)	8.2	8.2	13.8	13.8	5.6	22.1
Actuated g/C Ratio	0.22	0.22	0.37	0.37	0.15	0.59
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	392	351	695	591	268	1102
v/s Ratio Prot			c0.15		c0.06	0.14
v/s Ratio Perm	c0.13	0.01		0.05		
v/c Ratio	0.61	0.06	0.42	0.14	0.39	0.24
Uniform Delay, d1	13.3	11.7	8.9	8.0	14.5	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.0	0.1	0.0	0.3	0.0
Delay (s)	15.3	11.7	9.1	8.0	14.9	3.8
Level of Service	B	B	A	A	B	A
Approach Delay (s)	14.3		8.6		6.9	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay			9.7	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio	0.47					
Actuated Cycle Length (s)			37.7	Sum of lost time (s)		10.1
Intersection Capacity Utilization			46.1%	ICU Level of Service		A
Analysis Period (min)	15					
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	In/Delay, s/veh					
	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	284	78	694	525	112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	302	83	738	559	119
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	559	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1012	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1012	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		0.9			0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1012	-	-	-	-	-
HCM Lane V/C Ratio	0.082	-	-	-	-	-
HCM Control Delay (s)	8.9	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-



Intersection												
Intersection Delay, s/veh											14.8	
Intersection LOS											B	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	10	1	0	102	20	683	0	0	67	37
Peak Hour Factor	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	8	10	1	0	105	21	704	0	0	69	38
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	WB	NB	NB
Opposing Approach	WB	WB	WB	WB	WB	WB	WB
Opposing Lanes	2	1	1	1	1	2	2
Conflicting Approach Left	SB	NB	NB	NB	NB	EB	EB
Conflicting Lanes Left	2	1	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	SB	SB	WB	WB
Conflicting Lanes Right	1	2	2	2	2	2	2
HCM Control Delay	10.1	15.9	15.9	15.9	15.9	11.2	11.2
HCM LOS	B	B	C	C	C	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	42%	25%	0%	100%	0%
Vol Thru, %	64%	53%	5%	0%	0%	85%
Vol Right, %	36%	5%	70%	100%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	104	19	409	396	180	80
LT Vol	0	8	102	0	180	0
Through Vol	67	10	20	0	0	68
RT Vol	37	1	287	396	0	12
Lane Flow Rate	107	20	422	408	186	82
Geometry Grp	6	6	7	7	7	7
Degree of Utl (X)	0.196	0.037	0.636	0.578	0.37	0.15
Departure Headway (Hd)	6.579	6.806	5.434	5.098	7.183	6.569
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	546	526	666	707	501	546
Service Time	4.615	4.854	3.164	2.827	4.919	4.305
HCM Lane V/C Ratio	0.196	0.038	0.634	0.577	0.371	0.15
HCM Control Delay	11.2	10.1	17.2	14.6	14.1	10.5
HCM Lane LOS	B	B	C	B	B	B
HCM 95th-ile Q	0.7	0.1	4.6	3.7	1.7	0.5

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	180	68	12		
Peak Hour Factor	0.95	0.97	0.97	0.97		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	186	70	12		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	13	13
HCM LOS	B	B

Lane

Intersection						
Int Delay, s/veh	5.9					
<b>Movement</b>						
Vol, veh/h	WBL	WBR	NBT	NBR	SBL	SBT
	174	55	274	490	89	63
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	0	-	0
Grade, %	0	-	0	0	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	185	59	291	521	95	67
<b>Major/Minor</b>						
	Minor1	Major1	Major2			
Conflicting Flow All	547	291	0	291	0	0
Stage 1	291	-	-	-	-	-
Stage 2	256	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	498	748	-	0	1271	-
Stage 1	759	-	-	0	-	-
Stage 2	787	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	461	748	-	-	1271	-
Mov Cap-2 Maneuver	549	-	-	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	728	-	-	-	-	-
<b>Approach</b>						
	WB	NB	SB			
HCM Control Delay, s	13.8	0	4.7			
HCM LOS	B					
<b>Minor Lane/Major/Mvmt</b>						
	NBT/WB/L1/WBLn2	SBL	SBT			
Capacity (veh/h)	- 549	748	1271			
HCM Lane V/C Ratio	- 0.337	0.078	0.074			
HCM Control Delay (s)	- 14.9	10.2	8.1			
HCM Lane LOS	- B	B	A			
HCM 95th %tile Q(veh)	- 1.5	0.3	0.2			



HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔	↔	↔↔	↔↔	↔↔
Volume (vph)	680	219	0	928	718	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0.95
Lane Util. Factor	0.97	1.00	0.99	1.00	1.00	1.00
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96
Frt	1.00	0.85	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3451		
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3451		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	694	223	0	947	733	239
RTOR Reduction (vph)	0	68	0	0	45	0
Lane Group Flow (vph)	694	155	0	947	927	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	NA
Protected Phases	4		2	6		
Permitted Phases	4					
Actuated Green, G (s)	31.0	31.0	31.0	31.0	31.0	
Effective Green, g (s)	31.0	31.0	31.0	31.0	31.0	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	1535	692	1582	1528		
v/s Ratio Prot	c0.20		0.26	c0.27		
v/s Ratio Perm	0.10		0.60	0.61		
v/c Ratio	0.45	0.22	14.8	14.9		
Uniform Delay, d1	13.6	12.1	1.00	0.66	1.00	
Progression Factor	1.00	1.00	1.6	1.8		
Incremental Delay, d2	1.0	0.7	11.4	16.7		
Delay (s)	14.5	12.8	B	B	B	
Level of Service	B	B	B	B	B	
Approach Delay (s)	14.1		11.4	16.7		
Approach LOS	B		B	B		

Intersection Summary	EBL	EBR	NBL	NBT	SBT	SBR
HCM 2000 Control Delay	14.1		11.4	16.7		
HCM 2000 Level of Service	B		B	B		
HCM 2000 Volume to Capacity ratio	0.53		70.0	Sum of lost time (s)	8.0	
Actuated Cycle Length (s)	70.0		57.3%	ICU Level of Service	B	
Intersection Capacity Utilization	57.3%		15			
Analysis Period (min)	15					

c. Critical Lane Group

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBT	SBR
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	33	899	14	30	908
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	40	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	35	946	15	32	956
Major/Minor	Minor1	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1495	481	0	0	961	0
Stage 1	954	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Critical Hwy	9.1	9.2	-	-	5.5	-
Critical Hwy Sig 1	7.7	-	-	-	-	-
Critical Hwy Sig 2	7.7	-	-	-	-	-
Follow-up Hwy	4.7	4.4	-	-	2.9	-
Plat Cap-1 Maneuver	40	317	-	-	411	-
Stage 1	174	-	-	-	-	-
Stage 2	336	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	37	317	-	-	411	-
Mov Cap-2 Maneuver	117	-	-	-	-	-
Stage 1	174	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	
HCM Control Delay, s	25.3		0		0.5	
HCM LOS	D					
Minor Lane/Minor Mvmt	NBT	NBR/WBL/NWBLh2	SBL	SBT		
Capacity (veh/h)	-	-	117	317	411	
HCM Lane V/C Ratio	-	-	0.144	0.11	0.077	
HCM Control Delay (s)	-	-	40.9	17.7	14.5	
HCM Lane LOS	-	-	E	C	B	
HCM 95th %ile Q(veh)	-	-	0.5	0.4	0.2	

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↔	↔	↔	↔	
Volume (vph)	119	341	319	103	330	244	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	10	12	12	
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.85	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1599	1900	1473	1787	1850	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1599	1900	1473	1787	1900	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	124	355	332	107	344	254	
RTOR Reduction (vph)	0	182	0	47	0	0	
Lane Group Flow (vph)	124	173	332	60	344	254	
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%	
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA	
Turn Type	1	2	2	1	1	6	
Protected Phases	8	8	2	2	2	2	
Permitted Phases	8.2	31.2	28.2	28.2	23.0	54.2	
Actuated Green, G (s)	8.2	31.2	28.2	28.2	23.0	54.2	
Effective Green, g (s)	0.12	0.45	0.40	0.40	0.33	0.77	
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4	
Clearance Time (s)	2.0	2.0	3.0	3.0	2.0	3.0	
Vehicle Extension (s)	207	712	765	593	587	1432	
Lane Grp Cap (vph)	0.08	c0.17	c0.19	0.14			
v/s Ratio Prot	0.07	0.03	0.04	0.04			
v/s Ratio Perm	0.60	0.24	0.43	0.10	0.59	0.18	
Uniform Delay, d1	29.3	12.1	15.1	13.0	19.5	2.1	
Progression Factor	1.00	1.00	1.00	1.00	0.61	0.45	
Incremental Delay, d2	3.1	0.1	1.8	0.3	0.9	0.3	
Delay (s)	32.4	12.1	16.9	13.4	12.9	1.2	
Level of Service	C	B	B	B	B	A	
Approach Delay (s)	17.4	16.0			7.9		
Approach LOS	B	B			A		
<b>Intersection Summary</b>							
HCM 2000 Control Delay	13.3					HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52						
Actuated Cycle Length (s)	70.0					Sum of lost time (s)	10.6
Intersection Capacity Utilization	56.0%					ICU Level of Service	B
Analysis Period (min)	15						
c Critical Lane Group							

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Average

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	Init Delay, s/veh						2.7						
Movement	EBL	EBT	WBT	WBR	SBL	SBR	EBL	EBT	WBT	WBR	SBL	SBR	
Vol, veh/h	133	299	307	10	7	89							
Conflicting Peds. #/hr	0	0	0	0	0	0							
Sign Control	Free	Free	Free	Free	Stop	Stop							
RT Channelized	-	None	-	None	-	None							
Storage Length	-	-	-	-	-	-							
Veh in Median Storage, #	-	0	0	-	0	-							
Grade, %	-	0	0	-	0	-							
Peak Hour Factor	95	95	95	95	95	95							
Heavy Vehicles, %	2	2	2	2	2	2							
Mvmt Flow	140	315	323	11	7	94							
<b>Major/Minor</b>													
Major1	334			0			Major2	0			Minor2		
Conflicting Flow All	328			-			Major2	-			Minor2		
Stage 1	-			-			Major2	-			Minor2		
Stage 2	-			-			Major2	-			Minor2		
Critical Hwy	4.12			-			Major2	-			Minor2		
Critical Hwy Sig 1	-			-			Major2	-			Minor2		
Critical Hwy Sig 2	-			-			Major2	-			Minor2		
Follow-up Hwy	2.218			-			Major2	-			Minor2		
Pot Cap-1 Maneuver	1225			-			Major2	-			Minor2		
Stage 1	-			-			Major2	-			Minor2		
Stage 2	-			-			Major2	-			Minor2		
Platoon blocked, %	-			-			Major2	-			Minor2		
Mov Cap-1 Maneuver	1225			-			Major2	-			Minor2		
Mov Cap-2 Maneuver	-			-			Major2	-			Minor2		
Stage 1	-			-			Major2	-			Minor2		
Stage 2	-			-			Major2	-			Minor2		
<b>Approach</b>													
HCM Control Delay, s	2.6			0			WB	0			SB		
HCM LOS	-			-			WB	-			SB		
<b>Minor Lane/Minor Mvmt</b>													
Capacity (veh/h)	1225			-			WB	-			SB		
HCM Lane V/C Ratio	0.114			-			WB	-			SB		
HCM Control Delay (s)	8.3			0			WB	-			SB		
HCM Lane LOS	A			A			WB	-			SB		
HCM 95th %tile Q(veh)	0.4			-			WB	-			SB		

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Average

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	219	87	321	205	96	282
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	241	96	353	225	105	310
RTOR Reduction (vph)	0	75	0	137	0	0
Lane Group Flow (vph)	241	21	353	88	105	310
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	8.6	8.6	15.5	15.5	5.5	23.7
Effective Green, g (s)	8.6	8.6	15.5	15.5	5.5	23.7
Actuated g/C Ratio	0.22	0.22	0.39	0.39	0.14	0.60
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	391	349	741	630	250	1122
v/s Ratio Prot			c0.19		c0.06	0.16
v/s Ratio Perm	c0.13	0.01		0.05		
v/c Ratio	0.62	0.06	0.48	0.14	0.42	0.28
Uniform Delay, d1	14.1	12.3	9.1	7.8	15.6	3.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.0	0.2	0.0	0.4	0.0
Delay (s)	16.1	12.4	9.2	7.8	16.1	3.9
Level of Service	B	B	A	A	B	A
Approach Delay (s)	15.0		8.7		7.0	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay	9.8		HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.51					
Actuated Cycle Length (s)	39.7					
Intersection Capacity Utilization	49.1%		Sum of lost time (s)		10.1	
Analysis Period (min)	15					
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh					
	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	284	78	751	565	112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	-	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	302	83	799	601	119
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	601	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	976	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	976	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0	0.8	0.8	0	0	0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	976	-	-	-	-	-
HCM Lane V/C Ratio	0.085	-	-	-	-	-
HCM Control Delay (s)	9	0	0	-	-	-
HCM Lane LOS	A	A	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

Intersection												
Intersection Delay, s/veh											15.6	
Intersection LOS											C	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	10	1	0	103	20	722	0	0	0	67
Peak Hour Factor	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	8	10	1	0	106	21	744	0	0	0	69
Number of Lanes	0	0	1	0	0	0	1	1	0	0	0	1

Approach												
	EB			WB			WB			NB		
Opposing Approach	WB			EB			WB			NB		
Opposing Lanes	2			1			1			2		
Conflicting Approach Left	SB			NB			EB			EB		
Conflicting Lanes Left	2			1			1			1		
Conflicting Approach Right	NB			SB			WB			WB		
Conflicting Lanes Right	1			2			2			2		
HCM Control Delay	10.2			17			11.3			11.3		
HCM LOS	B			C			C			B		

Lane												
	NBLn1		EBLn1		WBLn1		WBLn2		SBLn1		SBLn2	
Vol Left, %	0%		42%		24%		0%		100%		0%	
Vol Thru, %	63%		53%		0%		0%		85%		85%	
Vol Right, %	37%		5%		71%		100%		0%		15%	
Sign Control	Stop		Stop		Stop		Stop		Stop		Stop	
Traffic Vol by Lane	106		19		426		419		180		80	
LT Vol	0		8		103		0		180		0	
Through Vol	67		10		20		0		0		68	
RT Vol	39		1		303		419		0		12	
Lane Flow Rate	109		20		439		432		186		82	
Geometry Grp	6		6		7		7		7		7	
Degree of Util (X)	0.201		0.037		0.664		0.613		0.374		0.152	
Departure Headway (Hd)	6.629		6.888		5.441		5.115		7.263		6.649	
Convergence, Y/N	Yes		Yes		Yes		Yes		Yes		Yes	
Cap	542		522		664		708		495		539	
Service Time	4.664		4.906		3.171		2.845		4.999		4.385	
HCM Lane V/C Ratio	0.201		0.038		0.661		0.61		0.376		0.152	
HCM Control Delay	11.3		10.2		18.3		15.6		14.3		10.6	
HCM Lane LOS	B		B		C		C		B		B	
HCM 95th-ile Q	0.7		0.1		5		4.2		1.7		0.5	

Intersection												
Intersection Delay, s/veh												
Intersection LOS												
Movement	SBU	SBL	SBT	SBR	SBU	SBL	SBT	SBR	SBU	SBL	SBT	SBR
Vol, veh/h	0	180	68	12	0	180	68	12	0	180	68	12
Peak Hour Factor	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	186	70	12	0	186	70	12	0	186	70	12
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach												
	SB			SB			SB			B		
Opposing Approach	NB			NB			NB			B		
Opposing Lanes	1			1			1			2		
Conflicting Approach Left	WB			WB			WB			EB		
Conflicting Lanes Left	2			2			2			1		
Conflicting Approach Right	EB			EB			EB			B		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay	13.2			13.2			13.2			13.2		
HCM LOS	B			B			B			B		

Lane												
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Intersection									
Int Delay, s/veh	5.9								
<b>Movement</b>									
Vol, veh/h	WBL	WBR	NBT	NBR	SBL	SBT			
	174	55	274	529	89	63			
Conflicting Peds. #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	Stop	-	Free	-	None			
Storage Length	0	0	-	0	100	-			
Veh in Median Storage, #	0	-	0	-	-	0			
Grade, %	0	-	0	-	-	0			
Peak Hour Factor	94	94	94	94	94	94			
Heavy Vehicles, %	2	2	2	2	2	2			
Mvmt Flow	185	59	291	563	95	67			
<b>Major/Minor</b>									
	Minor1	Major1			Major2				
Conflicting Flow All	547	291	0	-	291	0			
Stage 1	291	-	-	-	-	-			
Stage 2	256	-	-	-	-	-			
Critical Hwy	6.42	6.22	-	-	4.12	-			
Critical Hwy Stg 1	5.42	-	-	-	-	-			
Critical Hwy Stg 2	5.42	-	-	-	-	-			
Follow-up Hwy	3.518	3.318	-	-	2.218	-			
Pot Cap-1 Maneuver	498	748	-	0	1271	-			
Stage 1	759	-	-	0	-	-			
Stage 2	787	-	-	0	-	-			
Platoon blocked, %	-	-	-	-	-	-			
Mov Cap-1 Maneuver	461	748	-	-	1271	-			
Mov Cap-2 Maneuver	549	-	-	-	-	-			
Stage 1	759	-	-	-	-	-			
Stage 2	728	-	-	-	-	-			
<b>Approach</b>									
	WB	NB			SB				
HCM Control Delay, s	13.8	0			4.7				
HCM LOS	B	-			-				
<b>Minor Lane/Major/Mvmt</b>									
	NBT/WBL1/WBLn2	SBL	SBT						
Capacity (veh/h)	-	549	748	1271					
HCM Lane V/C Ratio	-	0.337	0.078	0.074					
HCM Control Delay (s)	-	14.9	10.2	8.1					
HCM Lane LOS	-	B	B	A					
HCM 95th %tile Q(veh)	-	1.5	0.3	0.2					





HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR
Lane Configurations	↔↔	↔	↔	↔↔	↔↔
Volume (vph)	680	238	0	952	775
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	1.00	0.97
Flt Protected	0.95	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3458	3458
Flt Permitted	0.95	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3458	3458
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	694	243	0	971	791
RTOR Reduction (vph)	0	57	0	0	41
Lane Group Flow (vph)	694	186	0	971	989
Conf. Peds. (#/hr)	1				
Heavy Vehicles (%)	1%	2%	0%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA
Protected Phases	4		2	6	
Permitted Phases	4				
Actuated Green, G (s)	31.0	31.0	31.0	31.0	31.0
Effective Green, g (s)	31.0	31.0	31.0	31.0	31.0
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1535	692	1582	1531	
v/s Ratio Prot	c0.20		0.27	c0.29	
v/s Ratio Perm	0.45	0.27	0.61	0.65	
Uniform Delay, d1	13.6	12.3	14.9	15.2	
Progression Factor	1.00	1.00	0.67	1.00	
Incremental Delay, d2	1.0	1.0	1.7	2.1	
Delay (s)	14.5	13.3	11.7	17.3	
Level of Service	B	B	B	B	B
Approach Delay (s)	14.2		11.7	17.3	
Approach LOS	B		B	B	

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	14.5		11.7	17.3	
HCM 2000 Level of Service	B		B	B	
HCM 2000 Volume to Capacity ratio	0.55		0.55	0.55	
Actuated Cycle Length (s)	70.0		70.0	70.0	
Intersection Capacity Utilization	58.9%		58.9%	58.9%	
Analysis Period (min)	15		15	15	

c. Critical Lane Group

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Maximum

Synchro 8 Report

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBR
Int Delay, s/veh	0.8				
Movement	WBL	WBR	NBT	NBR	SBL
Vol, veh/h	16	33	923	14	30
Conflicting Peds. #/hr	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free
RT Channelized	-	None	-	None	-
Storage Length	0	40	-	-	100
Veh in Median Storage, #	0	-	0	-	0
Grade, %	0	-	0	-	0
Peak Hour Factor	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2
Mvmt Flow	17	35	972	15	32

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1560	493	986
Stage 1	979	-	-
Stage 2	581	-	-
Critical Hwy	9.1	9.2	5.5
Critical Hwy Sig 1	7.7	-	-
Critical Hwy Sig 2	7.7	-	-
Follow-up Hwy	4.7	4.4	2.9
Plat Cap-1 Maneuver	35	309	399
Stage 1	167	-	-
Stage 2	315	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	32	309	399
Mov Cap-2 Maneuver	110	-	-
Stage 1	167	-	-
Stage 2	290	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.4	0	0.4
HCM LOS	D		

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Maximum

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	144	365	319	182	406	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1473	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1473	1787	1900
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	150	380	332	190	423	254
RTOR Reduction (vph)	0	165	0	90	0	0
Lane Group Flow (vph)	150	215	332	100	423	254
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	8	1	2	2	1	6
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	9.2	34.7	24.7	24.7	25.5	53.2
Effective Green, g (s)	9.2	34.7	24.7	24.7	25.5	53.2
Actuated g/C Ratio	0.13	0.50	0.35	0.35	0.36	0.76
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	232	792	670	519	650	1406
v/s Ratio Prot	0.10	c0.17		c0.24	0.14	
v/s Ratio Perm	c0.08	0.04		0.07		
v/c Ratio	0.65	0.27	0.50	0.19	0.65	0.18
Uniform Delay, d1	28.9	10.3	17.8	15.7	18.5	2.3
Progression Factor	1.00	1.00	1.00	1.00	0.67	0.53
Incremental Delay, d2	4.6	0.1	2.6	0.8	1.7	0.3
Delay (s)	33.4	10.3	20.4	16.6	14.1	1.5
Level of Service	C	B	C	B	B	A
Approach Delay (s)	16.9		19.0		9.4	
Approach LOS	B		B		A	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			14.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			70.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			61.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Maximum  
 Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	4.4					
Int Delay, s/veh	4.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	291	299	307	17	10	139
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	306	315	323	18	11	146
<b>Major/Minor</b>						
Major/Minor	Major1	Major2	Major2	Minor2	Minor2	Minor2
Conflicting Flow All	341	0	0	1259	332	-
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	6.42	6.22
Critical Hwy	4.12	-	-	-	5.42	-
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1218	-	-	-	188	710
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	385	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1218	-	-	-	131	710
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	268	-
<b>Approach</b>						
Approach	EB	WB	WB	SB	SB	
HCM Control Delay, s	4.4		0	14.2	B	
HCM LOS						
<b>Minor Lane/Minor Intmt</b>						
Capacity (veh/h)	1218	-	-	548	-	-
HCM Lane V/C Ratio	0.251	-	-	0.286	-	-
HCM Control Delay (s)	8.9	0	-	14.2	-	-
HCM Lane LOS	A	A	-	B	-	-
HCM 95th %ile Q(veh)	1	-	-	1.2	-	-

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Existing + Project Maximum  
 Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	219	87	400	205	96	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	241	96	440	225	105	337
RTOR Reduction (vph)	0	78	0	135	0	0
Lane Group Flow (vph)	241	18	440	90	105	337
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	8.7	8.7	18.3	18.3	8.4	29.4
Effective Green, g (s)	8.7	8.7	18.3	8.4	29.4	
Actuated g/C Ratio	0.19	0.19	0.40	0.40	0.18	0.65
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	345	308	764	649	333	1215
v/s Ratio Prot			c0.23		c0.06	0.18
v/s Ratio Perm	c0.13	0.01		0.06		
v/c Ratio	0.70	0.06	0.58	0.14	0.32	0.28
Uniform Delay, d1	17.2	15.1	10.6	8.6	16.1	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.9	0.0	0.7	0.0	0.2	0.0
Delay (s)	22.1	15.1	11.2	8.6	16.3	3.5
Level of Service	C	B	B	A	B	A
Approach Delay (s)	20.1		10.4		6.5	
Approach LOS	C		B		A	
Intersection Summary						
HCM 2000 Control Delay	11.5		HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.54					
Actuated Cycle Length (s)	45.5		Sum of lost time (s)		10.1	
Intersection Capacity Utilization	53.3%		ICU Level of Service		A	
Analysis Period (min)	15					
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh					
	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	284	78	828	589	112
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	-	0
Grade, %	0	-	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	302	83	881	627	119
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	627	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	955	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	955	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0	0.8	0.8	0	0	0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	955	-	-	-	-	-
HCM Lane V/C Ratio	0.087	-	-	-	-	-
HCM Control Delay (s)	9.1	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

Intersection												
Intersection Delay, s/veh												
Intersection LOS												
	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	10	1	0	104	20	745	0	0	0	67
Peak Hour Factor	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97	0.95	0.97	0.97	0.97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	8	10	1	0	107	21	768	0	0	0	69
Number of Lanes	0	0	1	0	0	0	1	1	0	0	0	1

Approach												
Opposing Approach												
Opposing Lanes												
Conflicting Approach Left												
Conflicting Lanes Left												
Conflicting Approach Right												
Conflicting Lanes Right												
HCM Control Delay												
HCM LOS												
Approach	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
Opposing Approach	2	1	1	1	2	1	1	1	2	1	1	1
Opposing Lanes	SB	SB	NB	NB	EB	EB	EB	EB	WB	WB	WB	WB
Conflicting Approach Left	2	1	1	1	2	1	1	1	2	1	1	1
Conflicting Lanes Left	NB	NB	SB	SB	WB	WB	WB	WB	EB	EB	EB	EB
Conflicting Approach Right	1	1	1	1	2	1	1	1	2	1	1	1
Conflicting Lanes Right	10.2	17.8	17.8	17.8	11.4	11.4	11.4	11.4	13.3	13.3	13.3	13.3
HCM Control Delay	B	B	C	C	B	B	B	B	C	C	C	C
HCM LOS												

Lane												
Vol Left, %												
Vol Thru, %												
Vol Right, %												
Sign Control												
Traffic Vol by Lane												
LT Vol												
Through Vol												
RT Vol												
Lane Flow Rate												
Geometry Grp												
Degree of Util (X)												
Departure Headway (Hd)												
Convergence, Y/N												
Cap												
Service Time												
HCM Lane V/C Ratio												
HCM Control Delay												
HCM Lane LOS												
HCM 95th-ile Q												
NBLn1	0%	42%	23%	0%	100%	0%	0%	85%	0%	0%	0%	0%
EBLn1	62%	53%	5%	0%	0%	15%	38%	5%	72%	100%	0%	15%
WBLn1	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
EBLn2	108	19	444	425	180	80	108	19	444	425	180	80
WBLn2	0	8	104	0	180	0	67	10	20	0	0	68
EBLn2	41	1	320	425	0	12	111	20	458	438	186	82
WBLn2	6	6	7	7	7	7	0.206	0.038	0.693	0.624	0.377	0.153
EBLn2	6.656	6.893	5.444	5.128	7.313	6.698	Yes	Yes	Yes	Yes	Yes	Yes
WBLn2	539	519	664	705	492	535	4.695	4.944	3.176	2.86	5.053	4.438
EBLn2	0.206	0.039	0.69	0.621	0.378	0.153	11.4	10.2	19.6	16	14.4	10.7
WBLn2	B	B	C	C	B	B	0.8	0.1	5.6	4.4	1.7	0.5

Intersection												
Intersection Delay, s/veh												
Intersection LOS												
	SBU	SBL	SBT	SBR								
Vol, veh/h	0	180	68	12								
Peak Hour Factor	0.95	0.97	0.97	0.97								
Heavy Vehicles, %	2	2	2	2								
Mvmt Flow	0	186	70	12								
Number of Lanes	0	1	1	0								

Approach												
Opposing Approach												
Opposing Lanes												
Conflicting Approach Left												
Conflicting Lanes Left												
Conflicting Approach Right												
Conflicting Lanes Right												
HCM Control Delay												
HCM LOS												
Approach	SB	SB	SB	SB								
Opposing Approach	NB	NB	NB	NB								
Opposing Lanes	WB	WB	WB	WB								
Conflicting Approach Left	2	2	2	2								
Conflicting Lanes Left	EB	EB	EB	EB								
Conflicting Approach Right	1	1	1	1								
Conflicting Lanes Right	13.3	13.3	13.3	13.3								
HCM Control Delay	B	B	B	B								
HCM LOS												

Lane												
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Intersection						
Int Delay, s/veh	5.9					
<b>Movement</b>						
Vol, veh/h	WBL	WBR	NBT	NBR	SBL	SBT
174	55	274	552	89	63	
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	185	59	291	587	95	67
<b>Major/Minor</b>						
	Minor1	Major1	Major2			
Conflicting Flow All	547	291	0	291	0	0
Stage 1	291	-	-	-	-	-
Stage 2	256	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	498	748	-	0	1271	-
Stage 1	759	-	-	0	-	-
Stage 2	787	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	461	748	-	-	1271	-
Mov Cap-2 Maneuver	549	-	-	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	728	-	-	-	-	-
<b>Approach</b>						
	WB	NB	NB	SB	SB	
HCM Control Delay, s	13.8	0	0	4.7	4.7	
HCM LOS	B					
<b>Minor Lane/Major/Mvmt</b>						
	NBT/WB/L1/WBLn2	SBL	SBT			
Capacity (veh/h)	- 549	748	1271	-	-	-
HCM Lane V/C Ratio	- 0.337	0.078	0.074	-	-	-
HCM Control Delay (s)	- 14.9	10.2	8.1	-	-	-
HCM Lane LOS	- B	B	A	-	-	-
HCM 95th %tile Q(veh)	- 1.5	0.3	0.2	-	-	-



HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR
Lane Configurations	↔	↔	↔	↔	↔
Volume (vph)	374	208	0	860	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.96	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3436	3436
Flt Permitted	0.95	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3436	3436
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	386	214	0	887	237
RTOR Reduction (vph)	0	79	0	0	68
Lane Group Flow (vph)	386	135	0	887	795
Conf. Peds. (#/hr)	1				
Heavy Vehicles (%)	1%	2%	0%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA
Protected Phases	4		2	6	
Permitted Phases	4				
Actuated Green, G (s)	31.1	31.1	19.0	19.0	19.0
Effective Green, g (s)	31.1	31.1	19.0	19.0	19.0
Actuated g/C Ratio	0.54	0.54	0.33	0.33	0.33
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1855	836	1168	1123	
v/s Ratio Prot	c0.11		c0.25	0.23	
v/s Ratio Perm	0.21	0.16	0.76	0.71	
Uniform Delay, d1	7.1	6.9	17.5	17.1	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.4	2.6	1.7	
Delay (s)	7.3	7.3	20.1	18.8	
Level of Service	A	A	C	B	
Approach Delay (s)	7.3		20.1	18.8	
Approach LOS	A		C	B	

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	16.3				8.0
HCM 2000 Level of Service	B				A
HCM 2000 Volume to Capacity ratio	0.42				0.80
Actuated Cycle Length (s)	58.1				8.0
Intersection Capacity Utilization	54.1%				A
Analysis Period (min)	15				
c. Critical Lane Group					

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBR
Int Delay, s/vch	1.1				
Movement	WBL	WBR	NBT	NBR	SBL
Vol, veh/h	16	45	815	22	40
Conflicting Peds. #/hr	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free
RT Channelized	-	None	-	None	-
Storage Length	0	40	-	-	100
Veh in Median Storage, #	0	-	0	-	0
Grade, %	0	-	0	-	0
Peak Hour Factor	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2
Mvmt Flow	17	47	858	23	42
Major/Minor	Minor1	Major1	Major1	Major2	
Conflicting Flow All	1361	441	0	0	881
Stage 1	869	-	-	-	-
Stage 2	492	-	-	-	-
Critical Hwy	9.1	9.2	-	-	5.5
Critical Hwy Sig 1	7.7	-	-	-	-
Critical Hwy Sig 2	7.7	-	-	-	-
Follow-up Hwy	4.7	4.4	-	-	2.9
Plat Cap-1 Maneuver	53	343	-	-	451
Stage 1	200	-	-	-	-
Stage 2	362	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	48	343	-	-	451
Mov Cap-2 Maneuver	134	-	-	-	-
Stage 1	200	-	-	-	-
Stage 2	328	-	-	-	-
Approach	WB	NB	SB	SB	
HCM Control Delay, s	22.1	0	0	0.7	
HCM LOS	C				

Minor Lane/Minor	NBT	NBR	WBL	WBR	SBL	SBT
Capacity (veh/h)	-	-	134	343	451	-
HCM Lane V/C Ratio	-	-	0.126	0.138	0.093	-
HCM Control Delay (s)	-	-	35.7	17.2	13.8	-
HCM Lane LOS	-	-	E	C	B	-
HCM 95th %ile Q(veh)	-	-	0.4	0.5	0.3	-



HCM Signalized Intersection Capacity Analysis  
5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	78	237	298	29	176	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1475	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1475	1787	1900
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	86	260	327	32	193	268
RTOR Reduction (vph)	0	160	0	16	0	0
Lane Group Flow (vph)	86	100	327	16	193	268
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	1	2			1	6
Protected Phases	8	8			2	
Permitted Phases	3.9	15.1	13.7	13.7	11.2	27.9
Actuated Green, G (s)	3.9	15.1	13.7	13.7	11.2	27.9
Effective Green, g (s)	0.10	0.38	0.35	0.35	0.28	0.71
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4
Clearance Time (s)	2.0	3.0	3.0	2.0	3.0	3.0
Vehicle Extension (s)	175	612	660	512	507	1310
Lane Grp Cap (vph)	0.05	0.05	c0.17		c0.11	0.14
v/s Ratio Prot	0.49	0.16	0.50	0.03	0.38	0.20
v/s Ratio Perm	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay, d1	0.8	0.0	0.6	0.0	0.2	0.1
Progression Factor	17.6	8.0	10.7	8.5	11.5	2.0
Incremental Delay, d2	10.4	B	A	B	A	B
Delay (s)	10.4	B	A	B	A	B
Level of Service	B	A	B	A	B	A
Approach Delay (s)	10.4	10.5			6.0	
Approach LOS	B	B			A	
Intersection Summary						
HCM 2000 Control Delay	8.7		HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.45					
Actuated Cycle Length (s)	39.4					
Intersection Capacity Utilization	41.1%		ICU Level of Service		A	
Analysis Period (min)	15					
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
Saturday Midday Peak Existing Conditions

Synchro 8 Report

HCM 2010 TWSC  
6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	EBL	EBT	EB	WBR	WBT	WB	SBL	SBT
Int Delay, s/veh	0.1							
Movement	EBL	EBT	EB	WBR	WBT	WB	SBL	SBT
Vol. veh/h	2	211	0	250	1	0	0	2
Conflicting Peds. #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	0	0	0	0	0
Grade, %	-	0	0	0	0	0	0	0
Peak Hour Factor	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	2	224	0	266	1	0	0	2
Major/Minor	Major1	Major2	Minor2	Major2	Major2	Minor2	Major2	Minor2
Conflicting Flow All	267	0	0	0	495	266	0	266
Stage 1	-	-	-	-	266	-	-	-
Stage 2	-	-	-	-	229	-	-	-
Critical Hwy	4.12	-	-	-	6.42	-	-	6.22
Critical Hwy Sig 1	-	-	-	-	5.42	-	-	5.42
Critical Hwy Sig 2	-	-	-	-	5.42	-	-	5.42
Follow-up Hwy	2.218	-	-	-	3.518	-	-	3.318
Pot Cap-1 Maneuver	1297	-	-	-	534	-	-	773
Stage 1	-	-	-	-	779	-	-	809
Stage 2	-	-	-	-	809	-	-	809
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1297	-	-	-	533	-	-	773
Mov Cap-2 Maneuver	-	-	-	-	533	-	-	779
Stage 1	-	-	-	-	779	-	-	807
Stage 2	-	-	-	-	807	-	-	807
Approach	EB	WB	WB	WB	SB	SB	WB	SB
HCM Control Delay, s	0.1	0	0	0	9.7	9.7	0	A
HCM LOS	A	A	A	A	A	A	A	A
Minor Lane/Minor Int	EBL	EBT	WB	WBR	SBL	SBL	WB	SBL
Capacity (veh/h)	1297	-	-	-	773	-	-	773
HCM Lane V/C Ratio	0.002	-	-	-	0.003	-	-	0.003
HCM Control Delay (s)	7.8	0	-	-	9.7	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %ile Q(veh)	0	-	-	-	0	-	-	0

Hamilton Fields Traffic Impact Study  
Saturday Midday Peak Existing Conditions

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↔	↔	↔	↔	
Volume (vph)	143	76	258	147	68	236	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.85	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	157	84	284	162	75	259	
RTOR Reduction (vph)	0	67	0	99	0	0	
Lane Group Flow (vph)	157	17	284	63	75	259	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	
Turn Type	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases			2		1	6	
Permitted Phases	8	8		2			
Actuated Green, G (s)	6.6	6.6	12.6	12.6	3.3	18.6	
Effective Green, g (s)	6.6	6.6	12.6	12.6	3.3	18.6	
Actuated g/C Ratio	0.20	0.20	0.39	0.39	0.10	0.57	
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4	
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)	365	326	734	624	182	1073	
v/s Ratio Prot			c0.15		c0.04	0.14	
v/s Ratio Perm	c0.09	0.01		0.04			
v/c Ratio	0.43	0.05	0.39	0.10	0.41	0.24	
Uniform Delay, d1	11.4	10.5	7.2	6.4	13.7	3.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.0	0.1	0.0	0.6	0.0	
Delay (s)	11.7	10.5	7.3	6.4	14.3	3.5	
Level of Service	B	B	A	A	B	A	
Approach Delay (s)	11.3		7.0		5.9		
Approach LOS	B		A		A		
Intersection Summary							
HCM 2000 Control Delay	7.7					HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40						
Actuated Cycle Length (s)	32.6					Sum of lost time (s)	10.1
Intersection Capacity Utilization	41.6%					ICU Level of Service	A
Analysis Period (min)	15						
c Critical Lane Group							

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh					
	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	171	68	506	384	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	-	-
Grade, %	0	-	-	0	-	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	188	75	556	422	100
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	422	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1137	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1137	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		1		0	
HCM LOS	A		A		A	
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1137	-	-	-	-	-
HCM Lane V/C Ratio	0.066	-	-	-	-	-
HCM Control Delay (s)	8.4	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.2	-	-	-	-	-

Intersection												
Intersection Delay, s/veh											11.7	
Intersection LOS											B	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	6	3	0	84	14	462	0	2	64	58
Peak Hour Factor	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	3	0	94	16	519	0	2	72	65
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	NB	NB
Opposing Approach	WB	EB	WB	WB	NB	SB
Opposing Lanes	2	1	1	1	2	2
Conflicting Approach Left	SB	NB	NB	EB	EB	EB
Conflicting Lanes Left	2	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	WB	WB	WB
Conflicting Lanes Right	1	2	2	2	2	2
HCM Control Delay	9.7	11	12	11	11	11
HCM LOS	A	B	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	47%	29%	0%	100%	0%
Vol Thru, %	52%	35%	5%	0%	0%	84%
Vol Right, %	47%	18%	66%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	124	17	287	273	132	62
LT Vol	2	8	84	0	132	0
Through Vol	64	6	14	0	0	52
RT Vol	58	3	189	273	0	10
Lane Flow Rate	139	19	323	306	148	70
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.235	0.034	0.473	0.416	0.281	0.12
Departure Headway (Hd)	6.084	6.439	5.386	4.998	6.813	6.192
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	592	557	672	726	529	582
Service Time	4.095	4.467	3.086	2.698	4.52	3.899
HCM Lane V/C Ratio	0.235	0.034	0.481	0.421	0.28	0.12
HCM Control Delay	11	9.7	12.8	11.2	12.2	9.7
HCM Lane LOS	B	A	B	B	B	A
HCM 95th-ile Q	0.9	0.1	2.5	2.1	1.1	0.4

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	132	52	10		
Peak Hour Factor	0.95	0.89	0.89	0.89		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	148	58	11		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	11.4	11.4
HCM LOS	B	B

Lane

Intersection		6.3		
Int Delay, s/veh				
Movement	WBL	WBR	NBT NBR	SBL SBT
Vol, veh/h	130	67	137 400	111 65
Conflicting Peds. #/hr	0	0	0 0	0 0
Sign/Control	Stop	Stop	Free Free	Free Free
RT Channelized	-	Stop	- Free	- None
Storage Length	0	0	0 0	100 -
Veh in Median Storage, #	0	-	0 -	- 0
Grade, %	0	-	0 -	- 0
Peak Hour Factor	91	91	91 91	91 91
Heavy Vehicles, %	2	2	2 2	2 2
Mvmt Flow	143	74	151 440	122 71
Major/Minor	Minor1	Major1	Major1	Major2
Conflicting Flow All	466	151	0 -	151 0
Stage 1	151	-	- -	- -
Stage 2	315	-	- -	- -
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	555	895	- 0	1430 -
Stage 1	877	-	- 0	- -
Stage 2	740	-	- 0	- -
Platoon blocked, %	-	-	- -	- -
Mov Cap-1 Maneuver	508	895	- -	1430 -
Mov Cap-2 Maneuver	570	-	- -	- -
Stage 1	877	-	- -	- -
Stage 2	677	-	- -	- -
Approach	WB	NB	SB	SB
HCM Control Delay, s	12	0	4.9	4.9
HCM LOS	B	B	B	B
Minor Lane/Major/Mvmt	NBT/WBL1/WBLn2	SBL SBT		
Capacity (veh/h)	- 570 895 1430	-		
HCM Lane V/C Ratio	- 0.251 0.082 0.085	-		
HCM Control Delay (s)	- 13.4 9.4 7.8	-		
HCM Lane LOS	- B A A	-		
HCM 95th %tile Q(veh)	- 1 0.3 0.3	-		



HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔	↔	↔↔	↔↔	↔↔
Volume (vph)	374	221	0	909	662	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.96	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3445	3445	3445
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3445	3445	3445
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	386	228	0	937	682	237
RTOR Reduction (vph)	0	68	0	0	59	0
Lane Group Flow (vph)	386	160	0	937	860	0
Confli. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	NA
Protected Phases	4		2	6		
Permitted Phases	4					
Actuated Green, G (s)	31.2	31.2	20.1	20.1	20.1	20.1
Effective Green, g (s)	31.2	31.2	20.1	20.1	20.1	20.1
Actuated g/C Ratio	0.53	0.53	0.34	0.34	0.34	0.34
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1824	822	1211	1167		
v/s Ratio Prot	c0.11		c0.26	0.25		
v/s Ratio Perm	0.10		0.77	0.74		
v/c Ratio	0.21	0.19	17.6	17.3		
Uniform Delay, d1	7.5	7.4	1.00	1.00		
Progression Factor	1.00	1.00	2.9	2.1		
Incremental Delay, d2	0.3	0.5	20.4	19.4		
Delay (s)	7.8	7.9	C	B		
Level of Service	A	A	C	B		
Approach Delay (s)	7.8		20.4	19.4		
Approach LOS	A		C	B		
Intersection Summary						
HCM 2000 Control Delay	16.9 HCM 2000 Level of Service B					
HCM 2000 Volume to Capacity ratio	0.43					
Actuated Cycle Length (s)	59.3					
Intersection Capacity Utilization	55.6%					
Analysis Period (min)	15					
c. Critical Lane Group						

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	1, 1					
Ini Delay, s/vch	WBL	WBR	NBT	NBR	SBL	SBT
Movement	16	45	864	22	40	843
Vol, veh/h	0	0	0	0	0	0
Conflicting Peds. #/hr	Stop	Stop	Free	Free	Free	Free
Sign Control	-	None	-	None	-	None
RT Channelized	0	40	-	-	100	-
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	0	-	-	-
Grade, %	0	-	0	-	-	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	47	909	23	42	887
Major/Minor	Minor1	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	1449	466	0	0	933	0
Stage 1	921	-	-	-	-	-
Stage 2	528	-	-	-	-	-
Critical Hwy	9.1	9.2	-	-	5.5	-
Critical Hwy Sig 1	7.7	-	-	-	-	-
Critical Hwy Sig 2	7.7	-	-	-	-	-
Follow-up Hwy	4.7	4.4	-	-	2.9	-
Pot Cap-1 Maneuver	44	326	-	-	425	-
Stage 1	184	-	-	-	-	-
Stage 2	343	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	40	326	-	-	425	-
Mov Cap-2 Maneuver	122	-	-	-	-	-
Stage 1	184	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Approach	WB	NB	SB	SB	SB	SB
HCM Control Delay, s	23.5	0	0	0.7		
HCM LOS	C					
Minor Lane/Minor Intvl	NBT	NBR/WBL/NWBln2	SBL	SBT		
Capacity (veh/h)	-	122	326	425		
HCM Lane V/C Ratio	-	0.138	0.145	0.099		
HCM Control Delay (s)	-	39.2	17.9	14.4		
HCM Lane LOS	-	E	C	B		
HCM 95th %ile Q(veh)	-	0.5	0.5	0.3		

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Volume (vph)	123	286	298	84	244	244	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	10	12	12	
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.85	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1599	1900	1475	1787	1850	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1599	1900	1475	1787	1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	135	314	327	92	268	268	
RTOR Reduction (vph)	0	182	0	46	0	0	
Lane Group Flow (vph)	135	132	327	46	268	268	
Confl. Peds. (#/hr)				2			
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%	
Turn Type	Perm	pm+ov	NA	Perm	Prot	NA	
Protected Phases	8	1	2	2	1	6	
Permitted Phases							
Actuated Green, G (s)	6.4	17.9	14.0	14.0	11.5	28.5	
Effective Green, g (s)	6.4	17.9	14.0	14.0	11.5	28.5	
Actuated g/C Ratio	0.15	0.42	0.33	0.33	0.27	0.67	
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	266	673	625	485	483	1240	
v/s Ratio Prot	0.05	c0.17		c0.15		0.14	
v/s Ratio Perm	c0.08	0.03		0.03		0.03	
v/c Ratio	0.51	0.20	0.52	0.10	0.55	0.22	
Uniform Delay, d1	16.6	7.8	11.5	9.9	13.3	2.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.1	0.8	0.1	0.8	0.1	
Delay (s)	17.2	7.8	12.3	10.0	14.1	2.8	
Level of Service	B	A	B	A	B	A	
Approach Delay (s)	10.6		11.8		8.4		
Approach LOS	B		B		A		
<b>Intersection Summary</b>							
HCM 2000 Control Delay						HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	10.1						
Actuated Cycle Length (s)	0.53						
Intersection Capacity Utilization	46.7%					Sum of lost time (s)	10.6
Analysis Period (min)	15					ICU Level of Service	A
c Critical Lane Group							

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Existing + Project Average  
 Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	3.1					
Int Delay, s/veh	3.1					
Movement	EBL	EBT	EBT	WBT	WBR	SBR
Vol, veh/h	129	211	0	250	7	98
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	0	-	0
Grade, %	-	0	-	0	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	137	224		266	7	104
Major/Minor	Major1	Major2	Major2	Minor2		
Conflicting Flow All	273	0	-	0	769	270
Stage 1	-	-	-	-	-	270
Stage 2	-	-	-	-	-	499
Critical Hwy	4.12	-	-	-	-	6.42
Critical Hwy Sig 1	-	-	-	-	-	5.42
Critical Hwy Sig 2	-	-	-	-	-	5.42
Follow-up Hwy	2.218	-	-	-	-	3.518
Pot Cap-1 Maneuver	1290	-	-	-	-	369
Stage 1	-	-	-	-	-	775
Stage 2	-	-	-	-	-	610
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1290	-	-	-	-	324
Mov Cap-2 Maneuver	-	-	-	-	-	324
Stage 1	-	-	-	-	-	775
Stage 2	-	-	-	-	-	536
Approach	EB	WB	SB			
HCM Control Delay, s	3.1	0	10.9			
HCM LOS	B	B	B			
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1290	-	-	-	721	-
HCM Lane V/C Ratio	0.106	-	-	-	0.152	-
HCM Control Delay (s)	8.1	0	-	-	10.9	-
HCM Lane LOS	A	A	-	-	B	-
HCM 95th %ile Q(veh)	0.4	-	-	-	0.5	-

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Existing + Project Average  
 Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	143	76	313	147	68	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	157	84	344	162	75	309
RTOR Reduction (vph)	0	69	0	99	0	0
Lane Group Flow (vph)	157	15	344	63	75	309
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	6.6	6.6	14.2	14.2	5.6	22.5
Effective Green, g (s)	6.6	6.6	14.2	14.2	5.6	22.5
Actuated g/C Ratio	0.18	0.18	0.39	0.39	0.15	0.62
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	326	292	739	628	276	1159
v/s Ratio Prot			c0.18		0.04	c0.16
v/s Ratio Perm	c0.09	0.01		0.04		
v/c Ratio	0.48	0.05	0.47	0.10	0.27	0.27
Uniform Delay, d1	13.4	12.4	8.3	7.1	13.6	3.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.0	0.2	0.0	0.2	0.0
Delay (s)	13.8	12.4	8.5	7.1	13.8	3.3
Level of Service	B	B	A	A	B	A
Approach Delay (s)	13.3		8.0		5.3	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay			8.2	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio	0.44					
Actuated Cycle Length (s)			36.5	Sum of lost time (s)		10.1
Intersection Capacity Utilization			44.5%	ICU Level of Service		A
Analysis Period (min)	15					
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	0.5					
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	171	68	560	428	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	-	-
Grade, %	0	-	-	0	-	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	188	75	615	470	100
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	470	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1092	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1092	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	0
HCM Control Delay, s	0		0.9			
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1092	-	-	-	-	-
HCM Lane V/C Ratio	0.068	-	-	-	-	-
HCM Control Delay (s)	8.5	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.2	-	-	-	-	-



Intersection												
Intersection Delay, s/veh												12.2
Intersection LOS												B
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	6	3	0	85	14	505	0	2	64	60
Peak Hour Factor	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	3	0	96	16	567	0	2	72	67
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	NB	NB
Opposing Approach	WB	WB	EB	WB	SB	SB
Opposing Lanes	2	2	1	1	2	2
Conflicting Approach Left	SB	SB	NB	NB	EB	EB
Conflicting Lanes Left	2	2	1	1	1	1
Conflicting Approach Right	NB	NB	SB	SB	WB	WB
Conflicting Lanes Right	1	1	2	2	2	2
HCM Control Delay	9.8		12.7		11.1	
HCM LOS	A		B		B	

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	47%	28%	0%	100%	0%
Vol Thru, %	51%	35%	5%	0%	0%	84%
Vol Right, %	48%	18%	68%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	126	17	306	298	132	62
LT Vol	2	8	85	0	132	0
Through Vol	64	6	14	0	0	52
RT Vol	60	3	207	298	0	10
Lane Flow Rate	142	19	344	335	148	70
Geometry Grp	6	6	7	7	7	7
Degree of Utl (X)	0.243	0.035	0.504	0.456	0.285	0.122
Departure Headway (Hd)	6.167	6.511	5.391	5.022	6.923	6.302
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	585	550	674	723	522	572
Service Time	4.178	4.542	3.091	2.722	4.631	4.009
HCM Lane V/C Ratio	0.243	0.035	0.51	0.463	0.284	0.122
HCM Control Delay	11.1	9.8	13.4	11.9	12.4	9.9
HCM Lane LOS	B	A	B	B	B	A
HCM 95th-ile Q	0.9	0.1	2.9	2.4	1.2	0.4

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	132	52	10		
Peak Hour Factor	0.95	0.89	0.89	0.89		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	148	58	11		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	11.6	
HCM LOS	B	

Lane

Intersection		WBR		NBR		SBL		SBT	
Int Delay, s/veh		6.3							
<b>Movement</b>									
Vol, veh/h	130	67	137	443	111	65			
Conflicting Peds. #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	Stop	-	Free	-	None			
Storage Length	0	0	-	0	100	-			
Veh in Median Storage, #	0	-	0	0	-	0			
Grade, %	0	-	0	0	-	0			
Peak Hour Factor	91	91	91	91	91	91			
Heavy Vehicles, %	2	2	2	2	2	2			
Mvmt Flow	143	74	151	487	122	71			
<b>Major/Minor</b>									
	Minor1	Major1	Minor2	Major2					
Conflicting Flow All	466	151	0	151	0				
Stage 1	151	-	-	-	-				
Stage 2	315	-	-	-	-				
Critical Hwy	6.42	6.22	-	-	4.12				
Critical Hwy Stg 1	5.42	-	-	-	-				
Critical Hwy Stg 2	5.42	-	-	-	-				
Follow-up Hwy	3.518	3.318	-	-	2.218				
Plat Cap-1 Maneuver	555	895	-	0	1430				
Stage 1	877	-	-	0	-				
Stage 2	740	-	-	0	-				
Platoon blocked, %									
Mov Cap-1 Maneuver	508	895	-	-	1430				
Mov Cap-2 Maneuver	570	-	-	-	-				
Stage 1	877	-	-	-	-				
Stage 2	677	-	-	-	-				
<b>Approach</b>									
HCM Control Delay, s	WB	NB	NB	SB	SB				
HCM LOS	12	0	0	4.9	4.9				
<b>Minor Lane/Major/Mvmt</b>									
Capacity (veh/h)	NBT/WB1/WBLn2	SBL	SBT						
HCM Lane V/C Ratio	- 570	895	1430	-					
HCM Control Delay (s)	- 0.251	0.082	0.085	-					
HCM Lane LOS	- B	A	A	-					
HCM 95th %ile Q(veh)	- 1	0.3	0.3	-					

HCM Signalized Intersection Capacity Analysis

2: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↙	↕	↕	↘	↗	↖	↕	↕	↕
Volume (vph)	0	231	944	87	219	198	578	518	196	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.6	3.0	4.0	4.0	4.6	4.6	3.0			
Lane Util. Factor		0.95	1.00	1.00	0.95	0.95	0.91	0.91	1.00			
Flpb. ped/bikes		1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99			
Frt		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Flt Protected		1.00	1.00	0.85	1.00	0.93	1.00	1.00	0.85			
Satd. Flow (prot)		3610	1604	1805	3301	1643	3384	1601				
Flt Permitted		1.00	1.00	0.95	1.00	0.95	0.99	1.00				
Satd. Flow (perm)		3610	1604	1805	3301	1643	3384	1601				
Peak-hour factor, PHF		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)		0	241	983	91	228	206	602	540	204	0	0
RTOR Reduction (vph)		0	0	128	0	84	0	0	0	108	0	0
Lane Group Flow (vph)		0	241	855	91	350	0	373	769	96	0	0
Confl. Peds. (#/hr)			1			1						
Heavy Vehicles (%)		0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%
Turn Type		NA	ptm+ov	Prot	NA	NA	Split	NA	ptm+ov			
Protected Phases		2	3	1	6		3	3	1			
Permitted Phases			2						3			
Actuated Green, G (s)		35.1	64.0	12.3	50.4		28.9	28.9	41.2			
Effective Green, g (s)		35.1	64.0	12.3	50.4		28.9	28.9	41.2			
Actuated g/C Ratio		0.40	0.73	0.14	0.57		0.33	0.33	0.47			
Clearance Time (s)		4.0	4.6	3.0	4.0		4.6	4.6	3.0			
Vehicle Extension (s)		4.0	2.0	2.0	4.0		2.0	2.0	2.0			
Lane Grp Cap (vph)		1441	1167	252	1892		540	1112	750			
v/s Ratio Prot		0.07	c0.24	c0.05	0.11		0.23	0.23	0.02			
v/s Ratio Perm			0.29						0.04			
v/c Ratio		0.17	0.73	0.36	0.18		0.69	0.69	0.13			
Uniform Delay, d1		17.0	7.0	34.2	8.9		25.6	25.6	13.2			
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00			
Incremental Delay, d2		0.3	2.1	0.3	0.2		3.1	1.5	0.0			
Delay (s)		17.2	9.0	34.6	9.2		28.7	27.1	13.2			
Level of Service		B	A	C	A		C	C	B			
Approach Delay (s)												
Approach LOS		B		B			B		A			
<b>Intersection Summary</b>												
HCM 2000 Control Delay									17.6	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio									0.67			
Actuated Cycle Length (s)									87.9	Sum of lost time (s)		11.6
Intersection Capacity Utilization									75.7%	ICU Level of Service		D
Analysis Period (min)									15			
c. Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↙	↕	↕	↘	↗	↖	↕	↕	↕
Volume (vph)	28	363	305	271	439	99	0	0	627	202	100	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	8.0	8.0	3.0	4.0			3.0		3.5	3.5
Lane Util. Factor		1.00	0.95	1.00	1.00	0.95			0.88		1.00	1.00
Flpb. ped/bikes		1.00	1.00	0.96	1.00	0.99			1.00		1.00	0.99
Frt		1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00
Flt Protected		0.95	1.00	0.85	1.00	0.97			0.85		1.00	0.85
Satd. Flow (prot)		1805	3610	1556	1787	3480			2842		1809	1579
Flt Permitted		0.95	1.00	1.00	0.95	1.00			1.00		0.97	1.00
Satd. Flow (perm)		1805	3610	1556	1787	3480			2842		1809	1579
Peak-hour factor, PHF		0.95	0.95	0.95	0.95	0.95			0.95	0.95	0.95	0.95
Adj. Flow (vph)		29	382	321	285	462	104	0	660	213	105	240
RTOR Reduction (vph)		0	0	249	0	15	0	0	393	0	0	182
Lane Group Flow (vph)		29	382	72	285	551	0	0	267	0	318	58
Confl. Peds. (#/hr)			7			20						
Confl. Bikes (#/hr)						3						
Heavy Vehicles (%)		0%	0%	0%	1%	0%	0%	0%	0%	0%	5%	1%
Turn Type		Prot	NA	Perm	Prot	NA	Over	Split	NA	Perm		
Protected Phases		5	2		1	6			1	7		7
Permitted Phases			2									
Actuated Green, G (s)		3.7	18.0	28.5	46.8				28.5		19.5	19.5
Effective Green, g (s)		3.7	18.0	28.5	46.8				28.5		19.5	19.5
Actuated g/C Ratio		0.05	0.22	0.22	0.35	0.58			0.35		0.24	0.24
Clearance Time (s)		3.0	8.0	8.0	3.0	4.0			3.0		3.5	3.5
Vehicle Extension (s)		2.0	2.5	2.5	3.0	4.0			3.0		2.5	2.5
Lane Grp Cap (vph)		82	807	347	632	2023			1006		438	382
v/s Ratio Prot		0.02	c0.11		c0.16	0.16			0.09		c0.18	
v/s Ratio Perm			0.35	0.47	0.21	0.45	0.27		0.27		0.73	0.15
Uniform Delay, d1		37.2	27.1	25.4	20.0	8.4			18.5		28.0	24.0
Progression Factor		1.00	1.00	1.00	1.00	1.00			1.00		1.00	1.00
Incremental Delay, d2		1.0	2.0	1.3	0.5	0.3			0.1		5.5	0.1
Delay (s)		38.2	29.1	26.8	20.5	8.7			18.7		33.6	24.1
Level of Service		D	C	C	C	A			B		C	C
Approach Delay (s)												
Approach LOS		C	C	C	B				B		C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay									21.6	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio									0.54			
Actuated Cycle Length (s)									80.5	Sum of lost time (s)		14.5
Intersection Capacity Utilization									66.2%	ICU Level of Service		C
Analysis Period (min)									15			
c. Critical Lane Group												

Hamilton Fields Traffic Impact Study  
Saturday Midday Peak Existing + Project Maximum

Hamilton Fields Traffic Impact Study  
Saturday Midday Peak Existing + Project Maximum

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔	↔	↔↔	↔↔	↔↔
Volume (vph)	374	262	0	928	784	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.97	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3460	3460	3460
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3460	3460	3460
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	386	270	0	957	808	237
RTOR Reduction (vph)	0	48	0	0	45	0
Lane Group Flow (vph)	386	222	0	957	1000	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	NA
Protected Phases	4		2	6		
Permitted Phases		4				
Actuated Green, G (s)	31.2	31.2	22.2	22.2	22.2	22.2
Effective Green, g (s)	31.2	31.2	22.2	22.2	22.2	22.2
Actuated g/C Ratio	0.51	0.51	0.36	0.36	0.36	0.36
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1761	794	1292	1251		
v/s Ratio Prot	0.11		0.27	c0.29		
v/s Ratio Perm		c0.14				
v/c Ratio	0.22	0.28	0.74	0.80	0.80	0.80
Uniform Delay, d1	8.4	8.7	17.1	17.6	17.6	17.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.9	2.0	3.4	3.4	3.4
Delay (s)	8.6	9.5	19.1	21.0	21.0	21.0
Level of Service	A	A	B	C	C	C
Approach Delay (s)	9.0		19.1	21.0		
Approach LOS	A		B	C		

Intersection Summary	
HCM 2000 Control Delay	17.4
HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50
Actuated Cycle Length (s)	61.4
Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.0%
ICU Level of Service	B
Analysis Period (min)	15
c. Critical Lane Group	

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	1,1	
Ini Delay, s/veh	1,1	
Movement	WBL	WBR
Vol, veh/h	16	45
Conflicting Peds. #/hr	0	0
Sign Control	Stop	Stop
RT Channelized	-	None
Storage Length	0	40
Veh in Median Storage, #	0	0
Grade, %	0	0
Peak Hour Factor	95	95
Heavy Vehicles, %	2	2
Mvmt Flow	17	47
Major/Minor	Minor1	Major1
Conflicting Flow All	1555	476
Stage 1	941	-
Stage 2	614	-
Critical Hwy	9.1	9.2
Critical Hwy Sig 1	7.7	-
Critical Hwy Sig 2	7.7	-
Follow-up Hwy	4.7	4.4
Plat Cap-1 Maneuver	35	320
Stage 1	178	-
Stage 2	299	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	31	320
Mov Cap-2 Maneuver	111	-
Stage 1	178	-
Stage 2	269	-
Approach	WB	NB
HCM Control Delay, s	24.7	0
HCM LOS	C	0.6
Minor Lane/Minor Mvmt	NBT	NBR/WBL/NWB/Ln2
Capacity (veh/h)	-	111 320 415
HCM Lane V/C Ratio	-	0.152 0.148 0.101
HCM Control Delay (s)	-	43.1 18.2 14.7
HCM Lane LOS	-	E C B
HCM 95th %ile Q(veh)	-	0.5 0.5 0.3

Intersection Summary	
HCM 2000 Control Delay	24.7
HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.152
Actuated Cycle Length (s)	61.4
Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.0%
ICU Level of Service	B
Analysis Period (min)	15
c. Critical Lane Group	

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR	
Lane Configurations							
Volume (vph)	142	305	298	252	407	244	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	10	12	12	
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Flt	1.00	0.85	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1599	1900	1475	1787	1850	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1599	1900	1475	1787	1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	156	335	327	277	447	268	
RTOR Reduction (vph)	0	192	0	137	0	0	
Lane Group Flow (vph)	156	143	327	140	447	268	
Confl. Peds. (#/hr)					2		
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%	
Turn Type	Perm	pm+ov	NA	Perm	Prot	NA	
Protected Phases	8	1	2	2	1	6	
Permitted Phases							
Actuated Green, G (s)	6.9	18.6	14.4	14.4	11.7	29.1	
Effective Green, g (s)	6.9	18.6	14.4	14.4	11.7	29.1	
Actuated g/C Ratio	0.16	0.43	0.33	0.33	0.27	0.67	
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4	
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	280	682	627	487	479	1234	
v/s Ratio Prot	0.06	c0.17			c0.25	0.14	
v/s Ratio Perm	c0.09	0.03	0.09	0.09	0.93	0.22	
v/c Ratio	0.56	0.21	0.52	0.29	0.93	0.22	
Uniform Delay, d1	16.9	7.9	11.8	10.8	15.6	2.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.8	0.3	25.0	0.1	
Delay (s)	18.3	7.9	12.6	11.1	40.6	2.9	
Level of Service	B	A	B	B	D	A	
Approach Delay (s)	11.2		11.9			26.5	
Approach LOS	B		B			C	
<b>Intersection Summary</b>							
HCM 2000 Control Delay						HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67						
Actuated Cycle Length (s)	43.6					Sum of lost time (s)	10.6
Intersection Capacity Utilization	56.8%					ICU Level of Service	B
Analysis Period (min)	15						
c Critical Lane Group							

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Existing + Project Maximum

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	6					
Ini Delay, s/veh	6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	466	211	250	22	7	138
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	496	224	266	23	7	147
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	289	0	-	0	1494	278
Stage 1	-	-	-	-	278	-
Stage 2	-	-	-	-	1216	-
Critical Hwy	4.12	-	-	-	6.42	6.22
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1273	-	-	-	136	761
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	280	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1273	-	-	-	75	761
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	155	-
Approach	EB		WB		SB	
HCM Control Delay, s	6.6		0		14.6	
HCM LOS					B	
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBLr1	
Capacity (veh/h)	1273	-	-	-	528	
HCM Lane V/C Ratio	0.389	-	-	-	0.292	
HCM Control Delay (s)	9.6	0	-	-	14.6	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %ile Q(veh)	1.9	-	-	-	1.2	

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Existing + Project Maximum

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	143	76	481	147	68	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	3.0	4.4	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	157	84	529	162	75	330
RTOR Reduction (vph)	0	70	0	87	0	0
Lane Group Flow (vph)	157	14	529	75	75	330
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	7.3	7.3	19.8	19.8	5.5	28.0
Effective Green, g (s)	7.3	7.3	19.8	19.8	5.5	28.0
Actuated g/C Ratio	0.17	0.17	0.46	0.46	0.13	0.66
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	308	276	881	748	232	1233
v/s Ratio Prot			c0.28		c0.04	0.18
v/s Ratio Perm	c0.09	0.01		0.05		
v/c Ratio	0.51	0.05	0.60	0.10	0.32	0.27
Uniform Delay, d1	16.1	14.8	8.5	6.4	16.9	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.0	0.8	0.0	0.3	0.0
Level of Service	B	B	A	A	B	A
Approach Delay (s)	16.0		8.6		5.7	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay			9.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			42.7		Sum of lost time (s)	10.1
Intersection Capacity Utilization			53.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	0.4					
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	171	68	726	447	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	188	75	798	491	100
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	491	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1072	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1072	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		0.7			0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1072	-	-	-	-	-
HCM Lane V/C Ratio	0.07	-	-	-	-	-
HCM Control Delay (s)	8.6	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.2	-	-	-	-	-

Intersection												
Intersection Delay, s/veh												12.5
Intersection LOS												B
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	6	3	0	86	14	523	0	2	64	63
Peak Hour Factor	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89	0.95	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	3	0	97	16	588	0	2	72	71
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	NB	NB
Opposing Approach	WB	EB	WB	WB	NB	SB
Opposing Lanes	2	1	1	1	2	2
Conflicting Approach Left	SB	NB	NB	EB	EB	EB
Conflicting Lanes Left	2	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	WB	WB	WB
Conflicting Lanes Right	1	2	2	2	2	2
HCM Control Delay	9.8	11.3	13	11.3	11.3	11.3
HCM LOS	A	B	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	47%	27%	0%	100%	0%
Vol Thru, %	50%	35%	4%	0%	0%	84%
Vol Right, %	49%	18%	68%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	129	17	314	309	132	62
LT Vol	2	8	86	0	132	0
Through Vol	64	6	14	0	0	52
RT Vol	63	3	214	309	0	10
Lane Flow Rate	145	19	353	347	148	70
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.25	0.035	0.518	0.474	0.287	0.123
Departure Headway (Hd)	6.197	6.553	5.402	5.039	6.975	6.353
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	583	547	671	721	518	567
Service Time	4.208	4.584	3.102	2.739	4.682	4.06
HCM Lane V/C Ratio	0.249	0.035	0.526	0.481	0.286	0.123
HCM Control Delay	11.3	9.8	13.8	12.2	12.5	9.9
HCM Lane LOS	B	A	B	B	B	A
HCM 95th-ile Q	1	0.1	3	2.6	1.2	0.4

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	132	52	10		
Peak Hour Factor	0.95	0.89	0.89	0.89		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	148	58	11		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	11.7	11.7
HCM LOS	B	B

Lane

Intersection		6.3				
Int Delay, s/veh						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	130	67	137	461	111	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign/Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	0	-	0
Grade, %	0	-	0	0	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	143	74	151	507	122	71
Major/Minor	Minor1	Major1	Major1	Major2		
Conflicting Flow All	466	151	0	-	151	0
Stage 1	151	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	555	895	-	0	1430	-
Stage 1	877	-	-	0	-	-
Stage 2	740	-	-	0	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	508	895	-	-	1430	-
Mov Cap-2 Maneuver	570	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	677	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	
HCM Control Delay, s	12		0		4.9	
HCM LOS	B				B	
Minor Lane/Major/Mvmt	NBT/WBL1/WBLn2	SBL	SBT			
Capacity (veh/h)	-	570	895	1430	-	-
HCM Lane V/C Ratio	-	0.251	0.082	0.085	-	-
HCM Control Delay (s)	-	13.4	9.4	7.8	-	-
HCM Lane LOS	-	B	A	A	-	-
HCM 95th %ile Q(veh)	-	1	0.3	0.3	-	-



2/3/2015  
 HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	38	419	270	611	852	156	0	0	659	205	97
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	3.0	8.0	8.0	3.0	4.0	4.0	3.0	3.0	3.0	3.5	3.5
Total Lost time (s)	1.00	0.95	1.00	1.00	0.99	0.95	0.88	1.00	1.00	0.99	1.00
Lane Util. Factor	1.00	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.95	1.00	1.00	0.85	1.00	0.98	1.00	0.85	1.00	0.97	1.00
Flt Protected	1805	3610	1549	1787	3497	3497	2842	2842	1809	1578	1809
Satd. Flow (prot)	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.97	1.00
Flt Permitted	1805	3610	1549	1787	3497	3497	2842	2842	1809	1578	1809
Satd. Flow (perm)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Peak-hour factor, PHF	40	441	284	643	897	164	0	0	694	216	102
Adj. Flow (vph)	0	0	222	0	11	0	0	0	323	0	0
RTOR Reduction (vph)	40	441	62	643	1050	0	0	0	371	0	318
Lane Group Flow (vph)	7	20	7	20	7	20	7	20	7	20	7
Confl. Peds. (#/hr)											
Confl. Bikes (#/hr)											
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA	Split	NA
Protected Phases	5	2		1	6			1	7		7
Permitted Phases			2								
Actuated Green, G (s)	6.6	22.1	22.1	42.0	61.5	42.0	42.0	23.4	23.4	23.4	23.4
Effective Green, g (s)	6.6	22.1	22.1	42.0	61.5	42.0	42.0	23.4	23.4	23.4	23.4
Actuated g/C Ratio	0.06	0.22	0.22	0.41	0.60	0.41	0.41	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0	3.0	3.0	3.5	3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0	3.0	3.0	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	116	782	335	735	2108	1170	1170	415	362	415	362
v/s Ratio Prot	0.02	0.12		0.36	0.30			0.13		0.18	
v/s Ratio Perm			0.04								
v/c Ratio	0.34	0.56	0.18	0.87	0.50	0.32	0.32	0.77	0.32	0.77	0.32
Uniform Delay, d1	45.6	35.7	32.6	27.6	11.5	20.3	36.7	32.7	32.7	32.7	32.7
Progression Factor	1.00	1.00	1.00	0.74	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	2.9	1.2	7.0	0.5	0.2	0.2	7.9	0.4	7.9	0.4
Delay (s)	46.3	38.6	33.8	27.5	10.8	20.5	38.6	44.6	33.1	44.6	33.1
Level of Service	D	D	C	C	B	C	C	D	D	D	C
Approach Delay (s)	37.2			17.1		20.5		38.6			
Approach LOS	D			B		C		D			
Intersection Summary											
HCM 2000 Control Delay	25.5 HCM 2000 Level of Service C										
HCM 2000 Volume to Capacity ratio	0.79										
Actuated Cycle Length (s)	102.0 Sum of lost time (s)										
Intersection Capacity Utilization	81.4% ICU Level of Service D										
Analysis Period (min)	15										
c. Critical Lane Group											

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future Conditions  
 Synchro 8 Report

2/3/2015  
 HCM Signalized Intersection Capacity Analysis  
 2: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	2	303	986	124	717	603	907	695	271	0	0
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.0	4.6	3.0	4.0	4.0	4.6	4.6	4.6	3.0		
Total Lost time (s)	0.95	1.00	1.00	0.95	1.00	0.99	1.00	1.00	0.99	1.00	1.00
Lane Util. Factor	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	1.00	0.95	0.98	1.00	0.85	1.00
Flt Protected	3609	1605	1805	3312	1643	3376	1599	1599	3609	1605	1805
Satd. Flow (prot)	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.98	1.00	0.95	1.00
Flt Permitted	3609	1605	1805	3312	1643	3376	1599	1599	3609	1605	1805
Satd. Flow (perm)	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Peak-hour factor, PHF	2	319	1038	131	755	635	955	732	285	0	0
Adj. Flow (vph)	0	0	68	0	54	0	0	0	135	0	0
RTOR Reduction (vph)	0	321	970	131	1336	0	554	1133	150	0	0
Lane Group Flow (vph)	1	1	1	1	1	1	1	1	1	1	1
Confl. Peds. (#/hr)											
Confl. Bikes (#/hr)											
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type	Perm	NA	pm+ov	Prot	NA	Split	NA	pm+ov	3	3	1
Protected Phases	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases											
Actuated Green, G (s)	36.7	78.0	12.4	52.1	41.3	41.3	41.3	53.7	53.7	53.7	53.7
Effective Green, g (s)	36.7	78.0	12.4	52.1	41.3	41.3	41.3	53.7	53.7	53.7	53.7
Actuated g/C Ratio	0.36	0.76	0.12	0.51	0.40	0.40	0.40	0.53	0.53	0.53	0.53
Clearance Time (s)	4.0	4.6	3.0	4.0	4.6	4.6	4.6	3.0	3.0	3.0	3.0
Vehicle Extension (s)	4.0	2.0	2.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1232	1227	219	1691	665	1366	841	841	1232	1227	219
v/s Ratio Prot	0.32	0.07	c0.40		c0.34			0.02			
v/s Ratio Perm	0.09	0.28									
v/c Ratio	0.26	0.79	0.60	0.79	0.83	0.83	0.18	0.18	0.18	0.18	0.18
Uniform Delay, d1	23.1	7.1	42.4	20.5	27.3	27.2	12.6	12.6	12.6	12.6	12.6
Progression Factor	0.86	1.16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.9	2.9	3.8	8.4	4.1	4.1	4.1	4.1	4.1	4.1
Delay (s)	20.2	11.2	45.4	24.3	35.7	31.3	12.7	12.7	12.7	12.7	12.7
Level of Service	C	B	D	C	D	C	B	B	B	B	B
Approach Delay (s)	13.3		26.1		29.8		0.0				
Approach LOS	B		C		C		A				
Intersection Summary											
HCM 2000 Control Delay	24.1 HCM 2000 Level of Service C										
HCM 2000 Volume to Capacity ratio	0.84										
Actuated Cycle Length (s)	102.0 Sum of lost time (s)										
Intersection Capacity Utilization	107.6% ICU Level of Service G										
Analysis Period (min)	15										
c. Critical Lane Group											

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future Conditions  
 Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	751	227	0	1165	836	259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0.95
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	1.00
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96
Frt	1.00	0.85	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3455		
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3455		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	791	239	0	1226	880	273
RTOR Reduction (vph)	0	74	0	0	37	0
Lane Group Flow (vph)	791	165	0	1226	1116	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	NA
Protected Phases	4		2	6		
Permitted Phases	4					
Actuated Green, G (s)	30.0	30.0	42.0	42.0	42.0	
Effective Green, g (s)	30.0	30.0	42.0	42.0	42.0	
Actuated g/C Ratio	0.38	0.38	0.52	0.52	0.52	
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	1300	586	1876	1813		
v/s Ratio Prot	c0.23		c0.34	0.32		
v/s Ratio Perm	0.61	0.28	0.65	0.62		
Uniform Delay, d1	20.2	17.5	13.7	13.3		
Progression Factor	1.00	1.00	0.60	1.00		
Incremental Delay, d2	2.1	1.2	1.6	1.6		
Delay (s)	22.4	18.7	9.8	14.9		
Level of Service	C	B	A	B		
Approach Delay (s)	21.5		9.8	14.9		
Approach LOS	C		A	B		

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	15.1				
HCM 2000 Level of Service	B				
HCM 2000 Volume to Capacity ratio	0.63				
Actuated Cycle Length (s)	80.0				
Sum of lost time (s)	8.0				
Intersection Capacity Utilization	62.2%				
ICU Level of Service	B				
Analysis Period (min)	15				
c. Critical Lane Group					

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	1					
Ini Delay, s/vch	WBL	WBR	NBT	NBR	SBL	SBT
Movement	18	36	1123	15	47	1025
Vol, veh/h	0	0	0	0	0	0
Conflicting Peds. #/hr	Stop	Stop	Free	Free	Free	Free
Sign Control	-	None	-	None	-	None
RT Channelized	0	40	-	-	100	-
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	95	95	95	95	95	95
Peak Hour Factor	2	2	2	2	2	2
Heavy Vehicles, %	19	38	1182	16	49	1079
Mvmt Flow						
Major/Minor	Minor1	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1828	599	0	0	1198	0
Stage 1	1190	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Critical Hwy	8.2	8.3	-	-	4.9	-
Critical Hwy Sig 1	7	-	-	-	-	-
Critical Hwy Sig 2	7	-	-	-	-	-
Follow-up Hwy	4.2	4.2	-	-	2.6	-
Plat Cap-1 Maneuver	32	299	-	-	405	-
Stage 1	157	-	-	-	-	-
Stage 2	352	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	28	299	-	-	405	-
Mov Cap-2 Maneuver	106	-	-	-	-	-
Stage 1	157	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	SB
HCM Control Delay, s	27.9	0	0	0.7		
HCM LOS	D					

Minor Lane/Minor	NBT	NBR	WBL	WBR	SBL	SBT
Capacity (veh/h)	-	-	106	299	405	-
HCM Lane V/C Ratio	-	-	0.179	0.127	0.122	-
HCM Control Delay (s)	-	-	46.2	18.8	15.1	-
HCM Lane LOS	-	-	E	C	C	-
HCM 95th %ile Q(veh)	-	-	0.6	0.4	0.4	-

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	97	409	484	57	326	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1472	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1472	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	102	431	509	60	343	393
RTOR Reduction (vph)	0	99	0	12	0	0
Lane Group Flow (vph)	102	332	509	48	343	393
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	1	2			1	6
Protected Phases	8	8			2	
Permitted Phases	8.0	28.0	41.4	41.4	20.0	64.4
Actuated Green, G (s)	8.0	28.0	41.4	41.4	20.0	64.4
Effective Green, g (s)	0.10	0.35	0.52	0.52	0.25	0.81
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4
Clearance Time (s)	2.0	2.0	3.0	3.0	2.0	3.0
Vehicle Extension (s)	177	559	983	761	446	1489
Lane Grp Cap (vph)	c0.15	c0.27			c0.19	0.21
v/s Ratio Prot	0.06	0.06			0.03	
v/s Ratio Perm	0.58	0.59	0.52	0.06	0.77	0.26
v/c Ratio	34.4	21.3	12.7	9.6	27.9	1.9
Uniform Delay, d1	1.00	1.00	0.55	0.41	0.68	0.56
Progression Factor	2.8	1.1	1.9	0.2	6.5	0.4
Incremental Delay, d2	37.2	22.5	8.9	4.1	25.4	1.5
Delay (s)	D	C	A	A	C	A
Level of Service	25.3	8.4			12.6	
Approach Delay (s)	C	A			B	
Approach LOS						
Intersection Summary						
HCM 2000 Control Delay			15.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			59.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future Conditions

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	EBL	EBT	WBT	WBR	SBL	SBR
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	377	436	2	2	3
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	397	459	2	2	3
Major/Minor	Major1	Major2	Major2	Minor2	Minor2	Minor2
Conflicting Flow All	461	0	-	0	859	460
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	399	-
Critical Hwy	4.12	-	-	-	6.42	6.22
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1100	-	-	-	327	601
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	678	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1100	-	-	-	327	601
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	677	-
Approach	EB	WB	WB	SB	SB	SB
HCM Control Delay, s	0	0	0	13.1	B	B
HCM LOS						
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1100	-	-	-	450	-
HCM Lane V/C Ratio	0.001	-	-	-	0.012	-
HCM Control Delay (s)	8.3	0	-	-	13.1	-
HCM Lane LOS	A	A	-	-	B	-
HCM 95th %ile Q(veh)	0	-	-	-	0	-

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future Conditions

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	308	232	295	259	209	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	324	244	311	273	220	289
RTOR Reduction (vph)	0	187	0	146	0	0
Lane Group Flow (vph)	324	57	311	127	220	289
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	18.6	18.6	37.3	37.3	14.0	54.0
Effective Green, g (s)	18.6	18.6	37.3	37.3	14.0	54.0
Actuated g/C Ratio	0.23	0.23	0.47	0.47	0.18	0.68
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	419	375	885	752	315	1269
v/s Ratio Prot			c0.16		c0.12	0.15
v/s Ratio Perm	c0.18	0.04		0.08		
v/c Ratio	0.77	0.15	0.35	0.17	0.70	0.23
Uniform Delay, d1	28.7	24.4	13.6	12.4	31.0	5.0
Progression Factor	1.00	1.00	1.00	1.00	0.73	0.58
Incremental Delay, d2	7.9	0.1	1.1	0.5	5.3	0.4
Delay (s)	36.6	24.5	14.7	12.9	27.8	3.3
Level of Service	D	C	B	B	C	A
Approach Delay (s)	31.4		13.9			13.9
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			19.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.1
Intersection Capacity Utilization			54.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh					
	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	314	86	787	627	159
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	331	91	828	660	167
Major/Minor	Minor2	Major1	Major2	Minor1	Major2	Minor2
Conflicting Flow All	-	-	660	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	928	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	928	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	SB	EB	NB	SB
HCM Control Delay, s	0		0.9			0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT	NBL	NBT
Capacity (veh/h)	928	-	-	-	-	-
HCM Lane V/C Ratio	0.098	-	-	-	-	-
HCM Control Delay (s)	9.3	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

Intersection												
Intersection Delay, s/veh												21.1
Intersection LOS												C
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	11	1	0	113	22	787	0	0	88	47
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	12	1	0	119	23	828	0	0	93	49
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	EB	NB	NB
Opposing Approach	WB	WB	WB	EB	NB	SB
Opposing Lanes	2	2	1	1	2	2
Conflicting Approach Left	SB	SB	NB	NB	EB	EB
Conflicting Lanes Left	2	2	1	1	1	1
Conflicting Approach Right	NB	NB	SB	SB	WB	WB
Conflicting Lanes Right	1	1	2	2	2	2
HCM Control Delay	10.9	10.9	24.3	24.3	12.7	12.7
HCM LOS	B	B	C	C	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	43%	24%	0%	100%	0%
Vol Thru, %	65%	52%	5%	0%	0%	85%
Vol Right, %	35%	5%	71%	100%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	135	21	466	456	227	88
LT Vol	0	9	113	0	227	0
Through Vol	88	11	22	0	0	75
RT Vol	47	1	331	456	0	13
Lane Flow Rate	142	22	490	480	239	93
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.275	0.046	0.789	0.73	0.504	0.18
Departure Headway (Hd)	6.969	7.418	5.798	5.47	7.596	6.982
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	516	481	622	658	476	513
Service Time	5.017	5.493	3.547	3.219	5.346	4.732
HCM Lane V/C Ratio	0.275	0.046	0.788	0.729	0.502	0.181
HCM Control Delay	12.7	10.9	26.9	21.7	17.9	11.3
HCM Lane LOS	B	B	D	C	C	B
HCM 95th-ile Q	1.1	0.1	7.6	6.3	2.8	0.7

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	227	75	13		
Peak Hour Factor	0.95	0.95	0.95	0.95		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	239	79	14		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	16.1	16.1
HCM LOS	C	C

Lane

Intersection	6.6		
Int Delay, s/veh	6.6		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	208	61	303	581	98	75
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	219	64	319	612	103	79

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	604	319	0
Stage 1	319	-	319
Stage 2	285	-	-
Critical Hwy	6.42	6.22	4.12
Critical Hwy Stg 1	5.42	-	-
Critical Hwy Stg 2	5.42	-	-
Follow-up Hwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	461	722	0
Stage 1	737	-	1241
Stage 2	763	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	423	722	1241
Mov Cap-2 Maneuver	520	-	-
Stage 1	737	-	-
Stage 2	700	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	4.6
HCM LOS	C		

Minor Lane	Major	Minor1	NBT	WBL	NBT	WBR	SBL	SBT
Capacity (veh/h)	-	520	722	1241	-	-	-	-
HCM Lane V/C Ratio	-	0.421	0.089	0.083	-	-	-	-
HCM Control Delay (s)	-	16.9	10.5	8.2	-	-	-	-
HCM Lane LOS	-	C	B	A	-	-	-	-
HCM 95th %ile Q(veh)	-	2.1	0.3	0.3	-	-	-	-

HCM Signalized Intersection Capacity Analysis

1.: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	38	425	270	615	856	156	0	0	703	208	97	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.0	3.5	3.5	3.5
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.95	0.88	1.00	1.00	0.99	1.00	0.99
Flpb. ped/bikes	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98	1.00	0.85	1.00	0.85	1.00	0.97	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	0.97	1.00
Satd. Flow (prot)	1805	3610	1549	1787	3497	3497	2842	2842	2842	1809	1578	1809
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	1.00	0.97	1.00
Satd. Flow (perm)	1805	3610	1549	1787	3497	3497	2842	2842	1809	1578	1809	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	40	447	284	647	901	164	0	0	740	219	102	341
RTOR Reduction (vph)	0	0	224	0	11	0	0	0	317	0	0	224
Lane Group Flow (vph)	40	447	60	647	1054	0	0	0	423	0	321	117
Confl. Peds. (#/hr)			7			20						1
Confl. Bikes (#/hr)						3						
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%	1%
Turn Type	Prot	NA	Permt	Prot	NA	Prot	NA	Over	Split	NA	Permt	NA
Protected Phases	5	2		1	6			1	7		7	
Permitted Phases			2									7
Actuated Green, G (s)	6.6	21.5	21.5	42.4	61.3	42.4	61.3	42.4	23.6	23.6	23.6	23.6
Effective Green, g (s)	6.6	21.5	21.5	42.4	61.3	42.4	61.3	42.4	23.6	23.6	23.6	23.6
Actuated g/C Ratio	0.06	0.21	0.21	0.42	0.60	0.42	0.60	0.42	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.5	3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0	3.0	4.0	3.0	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	116	760	326	742	2101	1181	418	365	418	365	418	365
v/s Ratio Prot	0.02	0.12		0.36	0.30	0.15					c0.18	
v/c Ratio Perm	0.34	0.59	0.18	0.87	0.50	0.36	0.36	0.36	0.77	0.32	0.77	0.32
Uniform Delay, d1	45.6	36.3	33.0	27.3	11.6	20.5	36.6	32.6	36.6	32.6	36.6	32.6
Progression Factor	1.00	1.00	1.00	0.74	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	3.3	1.2	6.6	0.5	0.2	6.6	0.4	7.9	0.4	7.9	0.4
Delay (s)	46.3	39.6	34.3	26.9	10.9	20.6	44.5	32.9	44.5	32.9	44.5	32.9
Level of Service	D	D	C	C	B	C	D	C	D	D	C	C
Approach Delay (s)		38.0		16.9		20.6			38.6			
Approach LOS		D		B		C			C		D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay	25.5											
HCM 2000 Level of Service	C											
HCM 2000 Volume to Capacity ratio	0.79											
Actuated Cycle Length (s)	102.0											
Sum of lost time (s)	14.5											
Intersection Capacity Utilization	81.8%											
ICU Level of Service	D											
Analysis Period (min)	15											
c. Critical Lane Group	15											

HCM Signalized Intersection Capacity Analysis

2.: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	2	303	1039	126	717	603	915	727	273	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6	4.6	3.0	4.0	4.0	4.6	4.6	4.6	3.0	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	1.00	0.95	0.95	0.91	0.91	0.91	1.00	1.00	0.99
Flpb. ped/bikes	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	1.00	0.95	0.98	1.00	0.85	1.00	0.85
Flt Protected	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.98	1.00	0.98	1.00
Satd. Flow (prot)	3609	1605	1805	1805	3312	3312	1643	3378	1599	1643	3378	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.98	1.00	0.98	1.00
Satd. Flow (perm)	3425	1605	1805	1805	3312	3312	1643	3378	1599	1643	3378	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	319	1094	133	755	635	963	765	287	0	0	0
RTOR Reduction (vph)	0	0	66	0	49	0	0	0	135	0	0	0
Lane Group Flow (vph)	0	321	1028	133	1341	0	568	1160	152	0	0	0
Confl. Peds. (#/hr)			1			1						1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Permt	NA	Permt	Prot	NA	Prot	NA	Split	NA	Permt+ov	Permt	Permt
Protected Phases	2	2	3	1	6			3	3	1		
Permitted Phases			2									3
Actuated Green, G (s)	36.3	78.0	78.0	12.4	51.7	41.7	41.7	41.7	54.1	41.7	54.1	54.1
Effective Green, g (s)	36.3	78.0	78.0	12.4	51.7	41.7	41.7	41.7	54.1	41.7	54.1	54.1
Actuated g/C Ratio	0.36	0.76	0.76	0.12	0.51	0.41	0.41	0.41	0.53	0.41	0.53	0.53
Clearance Time (s)	4.0	4.6	4.6	3.0	4.0	4.0	4.6	4.6	4.6	3.0	3.0	3.0
Vehicle Extension (s)	4.0	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1218	1227	219	1678	671	1381	848	848	848	671	1381	848
v/s Ratio Prot	0.09	0.34		0.07	c0.40	c0.35	0.34	0.02	0.02			
v/c Ratio Perm	0.26	0.84	0.61	0.80	0.85	0.84	0.18	0.18	0.18	0.18	0.18	0.18
Uniform Delay, d1	23.3	7.9	42.5	20.8	27.3	27.1	12.4	12.4	12.4	12.4	12.4	12.4
Progression Factor	0.87	1.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	4.3	3.2	4.1	9.3	4.5	0.0	0.0	0.0	0.0	0.0	0.0
Delay (s)	20.8	13.7	45.7	24.9	36.5	31.6	12.5	12.5	12.5	12.5	12.5	12.5
Level of Service	C	B	D	C	D	C	B	B	B	C	B	B
Approach Delay (s)		15.3		26.7		30.3			30.3			0.0
Approach LOS		B		C		C			C		A	A
<b>Intersection Summary</b>												
HCM 2000 Control Delay	24.9											
HCM 2000 Level of Service	C											
HCM 2000 Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	102.0											
Sum of lost time (s)	11.6											
Intersection Capacity Utilization	110.8%											
ICU Level of Service	H											
Analysis Period (min)	15											
c. Critical Lane Group	15											

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR
Lane Configurations	↔	↔	↔	↔	↔
Volume (vph)	751	241	0	1207	892
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.97
Flt Protected	0.95	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3461	3461
Flt Permitted	0.95	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3461	3461
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	791	254	0	1271	939
RTOR Reduction (vph)	0	64	0	34	0
Lane Group Flow (vph)	791	190	0	1271	1178
Confl. Peds. (#/hr)	1				
Heavy Vehicles (%)	1%	2%	0%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA
Protected Phases	4		2	6	
Permitted Phases	4				
Actuated Green, G (s)	30.0	30.0	42.0	42.0	42.0
Effective Green, g (s)	30.0	30.0	42.0	42.0	42.0
Actuated g/C Ratio	0.38	0.38	0.52	0.52	0.52
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1300	586	1876	1817	1817
v/s Ratio Prot	c0.23		c0.36	0.34	
v/s Ratio Perm	0.12				
v/c Ratio	0.61	0.32	0.68	0.65	0.65
Uniform Delay, d1	20.2	17.8	14.0	13.7	13.7
Progression Factor	1.00	1.00	0.57	1.00	1.00
Incremental Delay, d2	2.1	1.5	1.8	1.8	1.8
Delay (s)	22.4	19.3	9.8	15.5	15.5
Level of Service	C	B	A	A	B
Approach Delay (s)	21.6		9.8	15.5	
Approach LOS	C		A	B	

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	15.2				
HCM 2000 Level of Service	B				
HCM 2000 Volume to Capacity ratio	0.65				
Actuated Cycle Length (s)	80.0				
Sum of lost time (s)	8.0				
Intersection Capacity Utilization	63.4%				
ICU Level of Service	B				
Analysis Period (min)	15				

c. Critical Lane Group

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBR
Int Delay, s/veh	1				
Movement	WBL	WBR	NBT	NBR	SBL
Vol, veh/h	18	36	1165	15	47
Conflicting Peds. #/hr	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free
RT Channelized	-	None	-	None	-
Storage Length	0	40	-	-	100
Veh in Median Storage, #	0	-	0	-	0
Grade, %	0	-	0	-	0
Peak Hour Factor	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2
Mvmt Flow	19	38	1226	16	49
					1153
Major/Minor	Minor1	Major1	Major1	Major2	
Conflicting Flow All	1909	621	0	0	1242
Stage 1	1234	-	-	-	-
Stage 2	675	-	-	-	-
Critical Hwy	8.2	8.3	-	-	4.9
Critical Hwy Sig 1	7	-	-	-	-
Critical Hwy Sig 2	7	-	-	-	-
Follow-up Hwy	4.2	4.2	-	-	2.6
Prot Cap-1 Maneuver	28	288	-	-	387
Stage 1	147	-	-	-	-
Stage 2	333	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	24	288	-	-	387
Mov Cap-2 Maneuver	99	-	-	-	-
Stage 1	147	-	-	-	-
Stage 2	291	-	-	-	-
Approach	WB	NB	SB	SB	
HCM Control Delay, s	29.5	0	0.6		
HCM LOS	D				
Minor Lane/Minor Int	NBT	NBR	NBT	NBR	SBL
Capacity (veh/h)	-	-	99	288	387
HCM Lane V/C Ratio	-	-	0.191	0.132	0.128
HCM Control Delay (s)	-	-	49.8	19.4	15.7
HCM Lane LOS	-	-	E	C	C
HCM 95th %ile Q(veh)	-	-	0.7	0.4	0.4



HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	138	451	484	115	396	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1472	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1472	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	145	475	509	121	417	393
RTOR Reduction (vph)	0	84	0	29	0	0
Lane Group Flow (vph)	145	391	509	92	417	393
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	8	1	2	2	1	6
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	10.9	36.0	33.4	33.4	25.1	61.5
Effective Green, g (s)	10.9	36.0	33.4	33.4	25.1	61.5
Actuated g/C Ratio	0.14	0.45	0.42	0.42	0.31	0.77
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	241	719	793	614	560	1422
v/s Ratio Prot	0.17	c0.27		c0.23		0.21
v/s Ratio Perm	0.60	0.54	0.64	0.15	0.74	0.28
v/c Ratio	32.5	16.0	18.5	14.5	24.6	2.7
Uniform Delay, d1	1.00	1.00	0.57	0.30	0.64	0.58
Progression Factor	2.9	0.5	3.7	0.5	4.2	0.4
Incremental Delay, d2	35.4	16.5	14.3	4.9	20.0	2.0
Delay (s)	D	B	B	A	C	A
Level of Service	D	B	B	A	C	A
Approach Delay (s)	20.9	12.5			11.3	
Approach LOS	C	B	B	B	B	B
Intersection Summary						
HCM 2000 Control Delay			14.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			65.4%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future + Project Average

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	2.4					
Int Delay, s/veh						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	133	377	436	10	7	89
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	140	397	459	11	7	94
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	469	0	-	0	1141	464
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	677	-
Critical Hwy	4.12	-	-	-	6.42	6.22
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1093	-	-	-	222	598
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	505	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1093	-	-	-	186	598
Mov Cap-2 Maneuver	-	-	-	-	186	-
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	422	-
Approach	EB	WB	WB	SB	SB	
HCM Control Delay, s	2.3		0		13.7	
HCM LOS					B	
Minor Lane/Minor Int	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1093	-	-	-	515	-
HCM Lane V/C Ratio	0.128	-	-	-	0.196	-
HCM Control Delay (s)	8.8	0	-	-	13.7	-
HCM Lane LOS	A	A	-	-	B	-
HCM 95th %ile Q(veh)	0.4	-	-	-	0.7	-

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future + Project Average

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	308	232	353	259	209	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	324	244	372	273	220	334
RTOR Reduction (vph)	0	187	0	146	0	0
Lane Group Flow (vph)	324	57	372	127	220	334
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	18.6	18.6	37.3	37.3	14.0	54.0
Effective Green, g (s)	18.6	18.6	37.3	37.3	14.0	54.0
Actuated g/C Ratio	0.23	0.23	0.47	0.47	0.18	0.68
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	419	375	885	752	315	1269
v/s Ratio Prot			c0.20		c0.12	0.18
v/s Ratio Perm	c0.18	0.04		0.08		
v/c Ratio	0.77	0.15	0.42	0.17	0.70	0.26
Uniform Delay, d1	28.7	24.4	14.2	12.4	31.0	5.1
Progression Factor	1.00	1.00	1.00	1.00	0.74	0.58
Incremental Delay, d2	7.9	0.1	1.5	0.5	5.3	0.5
Delay (s)	36.6	24.5	15.6	12.9	28.1	3.5
Level of Service	D	C	B	B	C	A
Approach Delay (s)	31.4		14.5			13.2
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.1
Intersection Capacity Utilization			57.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh 0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	314	86	844	667	159
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	331	91	888	702	167
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	702	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	895	-	0	0
Stage 1	0	0	0	-	0	0
Stage 2	0	0	0	-	0	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	895	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	EB	NB	NB	SB	SB
HCM Control Delay, s	0	0	0.9	0.9	0	0
HCM LOS	A	A				
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	895	-	-	-	-	-
HCM Lane V/C Ratio	0.101	-	-	-	-	-
HCM Control Delay (s)	9.5	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

Intersection												
Intersection Delay, s/veh												23.2
Intersection LOS												C
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	11	1	0	114	22	826	0	0	88	48
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	12	1	0	120	23	869	0	0	93	51
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	WB	NB
Opposing Approach	WB	WB	EB	WB	WB	NB
Opposing Lanes	2	1	1	1	1	2
Conflicting Approach Left	SB	NB	NB	NB	EB	EB
Conflicting Lanes Left	2	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	SB	WB	WB
Conflicting Lanes Right	1	2	2	2	2	2
HCM Control Delay	10.9		27.2			12.8
HCM LOS	B	B	D	D	D	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	43%	23%	0%	100%	0%
Vol Thru, %	65%	52%	4%	0%	0%	85%
Vol Right, %	35%	5%	72%	100%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	136	21	491	471	227	88
LT Vol	0	9	114	0	227	0
Through Vol	88	11	22	0	0	75
RT Vol	48	1	355	471	0	13
Lane Flow Rate	143	22	517	496	239	93
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.279	0.046	0.833	0.755	0.509	0.181
Departure Headway (Hd)	7.008	7.462	5.799	5.485	7.666	7.052
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	513	478	626	659	471	509
Service Time	5.056	5.537	3.548	3.234	5.417	4.802
HCM Lane V/C Ratio	0.279	0.046	0.826	0.753	0.507	0.183
HCM Control Delay	12.8	10.9	31	23.2	18.1	11.4
HCM Lane LOS	B	B	D	C	C	B
HCM 95th-ile Q	1.1	0.1	8.9	6.9	2.8	0.7

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	227	75	13		
Peak Hour Factor	0.95	0.95	0.95	0.95		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	239	79	14		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	16.2	
HCM LOS	C	C

Lane

Intersection		6.6				
Int Delay, s/veh		6.6				
<b>Movement</b>	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	208	61	303	620	98	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	0	-	0
Grade, %	0	-	0	0	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	219	64	319	653	103	79
<b>Major/Minor</b>	Minor1	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	604	319	0	-	319	0
Stage 1	319	-	-	-	-	-
Stage 2	285	-	285	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	461	722	-	0	1241	-
Stage 1	737	-	-	0	-	-
Stage 2	763	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	423	722	-	-	1241	-
Mov Cap-2 Maneuver	520	-	-	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	700	-	-	-	-	-
<b>Approach</b>	WB	NB	NB	SB	SB	SB
HCM Control Delay, s	15.4	0	0	4.6	4.6	4.6
HCM LOS	C					
<b>Minor Lane/Major/Mvmt</b>	NBT/WBL1/WBLn2	SBL	SBT			
Capacity (veh/h)	- 520	722	1241	-		
HCM Lane V/C Ratio	- 0.421	0.089	0.083	-		
HCM Control Delay (s)	- 16.9	10.5	8.2	-		
HCM Lane LOS	- C	B	A	-		
HCM 95th %tile Q(veh)	- 2.1	0.3	0.3	-		

HCM Signalized Intersection Capacity Analysis

1.: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	431	270	618	858	156	0	0	749	211	97	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.0	3.5	3.5	3.5
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.95	0.88	1.00	1.00	1.00	0.99	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FIL Protected	0.95	1.00	1.00	0.85	1.00	0.98	1.00	0.95	1.00	0.97	1.00	0.85
Satd. Flow (prot)	1805	3610	1549	1787	3497	3497	2842	2842	1809	1578	1809	1578
FIL Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.95	1.00	0.97	1.00	0.95
Satd. Flow (perm)	1805	3610	1549	1787	3497	3497	2842	2842	1809	1578	1809	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	40	454	284	651	903	164	0	0	788	222	102	341
RTOR Reduction (vph)	0	0	225	0	11	0	0	0	311	0	0	223
Lane Group Flow (vph)	40	454	59	651	1056	0	0	0	477	0	324	118
Confl. Peds. (#/hr)			7			20						
Confl. Bikes (#/hr)				3								
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA	Prot	NA	Perm
Protected Phases	5	2		1	6			1	7			7
Permitted Phases			2									
Actuated Green, G (s)	6.6	21.1	21.1	42.7	61.2	42.7	61.2	42.7	23.7	23.7	23.7	23.7
Effective Green, g (s)	6.6	21.1	21.1	42.7	61.2	42.7	61.2	42.7	23.7	23.7	23.7	23.7
Actuated g/C Ratio	0.06	0.21	0.21	0.42	0.60	0.42	0.60	0.42	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.5	3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0	3.0	4.0	3.0	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	116	746	320	748	2098	1189	420	366	420	366	420	366
v/s Ratio Prot	0.02	0.13		0.36	0.30			0.17				0.18
v/s Ratio Perm			0.04									
v/c Ratio	0.34	0.61	0.18	0.87	0.50	0.40	0.40	0.77	0.32	0.32	0.32	0.32
Uniform Delay, d1	45.6	36.7	33.3	27.1	11.7	20.7	45.6	36.6	32.5	32.5	32.5	32.5
Progression Factor	1.00	1.00	1.00	0.75	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	3.7	1.3	6.3	0.5	0.2	0.2	0.2	8.2	0.4	0.4	0.4
Delay (s)	46.3	40.4	34.6	26.6	11.0	20.9	46.3	34.6	44.8	32.9	32.9	32.9
Level of Service	D	D	C	C	B	C	B	C	D	D	C	C
Approach Delay (s)		38.6			16.9			20.9			38.7	
Approach LOS		D			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	102.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		
c. Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2.: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

2/3/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	303	1094	129	717	603	920	746	274	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6	3.0	4.0	4.0	4.6	4.6	4.6	3.0			
Lane Util. Factor	0.95	1.00	1.00	1.00	0.95	0.91	0.91	0.91	1.00			
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99			
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
FIL Protected	1.00	1.00	0.85	1.00	0.93	1.00	1.00	0.85	1.00			
Satd. Flow (prot)	3609	1605	1805	3312	3312	1643	3378	1599	1599			
FIL Permitted	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.98	1.00			
Satd. Flow (perm)	3425	1605	1805	3312	3312	1643	3378	1599	1599			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	319	1152	136	755	635	968	785	288	0	0	0
RTOR Reduction (vph)	0	0	64	0	47	0	0	0	134	0	0	0
Lane Group Flow (vph)	0	321	1088	136	1343	0	571	1182	154	0	0	0
Confl. Peds. (#/hr)			1			1						
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%
Turn Type	Perm	NA	pm+ov	Prot	NA	Split	NA	pm+ov				
Protected Phases	2	2	3	1	6			3	3			1
Permitted Phases			2									3
Actuated Green, G (s)	36.0	78.0	12.4	51.4	42.0	42.0	42.0	54.4	54.4			
Effective Green, g (s)	36.0	78.0	12.4	51.4	42.0	42.0	42.0	54.4	54.4			
Actuated g/C Ratio	0.35	0.76	0.12	0.50	0.41	0.41	0.41	0.53	0.53			
Clearance Time (s)	4.0	4.6	3.0	4.0	4.6	4.6	4.6	3.0	3.0			
Vehicle Extension (s)	4.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0			
Lane Grp Cap (vph)	1208	1227	219	1668	676	1390	852	852	852			
v/s Ratio Prot	0.09	0.31		0.81	0.81	0.81	0.81	0.81	0.81			
v/s Ratio Perm			0.27	0.89	0.62	0.81	0.81	0.81	0.81			
v/c Ratio	23.6	8.8	42.6	21.1	21.1	21.1	21.1	21.1	21.1			
Uniform Delay, d1	0.88	1.21	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Progression Factor	0.5	6.7	3.9	4.3	9.1	5.0	5.0	5.0	5.0			
Incremental Delay, d2	21.3	17.3	46.5	25.4	36.2	32.2	32.2	32.2	32.2			
Delay (s)												
Level of Service	C	B	D	C	D	C	D	C	B			
Approach Delay (s)		18.2			27.3			30.5			0.0	
Approach LOS		B			C			A				

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	102.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	114.2%	ICU Level of Service	H
Analysis Period (min)	15		
c. Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR
Lane Configurations	↔	↔	↔	↔	↔
Volume (vph)	751	260	0	1231	259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.97	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3467	3467
Flt Permitted	0.95	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3467	3467
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	791	274	0	1296	273
RTOR Reduction (vph)	0	54	0	31	0
Lane Group Flow (vph)	791	220	0	1296	1241
Confl. Peds. (#/hr)	1				
Heavy Vehicles (%)	1%	2%	0%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA
Protected Phases	4		2	6	
Permitted Phases	4				
Actuated Green, G (s)	30.0	30.0	42.0	42.0	42.0
Effective Green, g (s)	30.0	30.0	42.0	42.0	42.0
Actuated g/C Ratio	0.38	0.38	0.52	0.52	0.52
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1300	586	1876	1820	586
v/s Ratio Prot	c0.23		c0.36	0.36	
v/s Ratio Perm	0.61	0.37	0.69	0.68	0.68
Uniform Delay, d1	20.2	18.2	14.2	14.1	14.1
Progression Factor	1.00	1.00	0.57	1.00	1.00
Incremental Delay, d2	2.1	1.8	1.8	2.1	2.1
Delay (s)	22.4	20.0	9.9	16.1	16.1
Level of Service	C	C	A	B	B
Approach Delay (s)	21.8		9.9	16.1	
Approach LOS	C		A	B	

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	15.6				15.6
HCM 2000 Level of Service	B				B
HCM 2000 Volume to Capacity ratio	0.66				0.66
Actuated Cycle Length (s)	80.0				80.0
Intersection Capacity Utilization	64.5%				64.5%
Analysis Period (min)	15				15
c. Critical Lane Group					

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	EBL	EBR	NBL	NBT	SBR
Int Delay, s/vch					1
Movement	WBL	WBR	NBT	NBR	SBL SBT
Vol, veh/h	18	36	1189	15	47 1171
Conflicting Peds. #/hr	0	0	0	0	0 0
Sign Control	Stop	Stop	Free	Free	Free Free
RT Channelized	-	None	-	None	- None
Storage Length	0	40	-	-	100 -
Veh in Median Storage, #	0	-	0	-	0 -
Grade, %	0	-	0	-	0 -
Peak Hour Factor	95	95	95	95	95 95
Heavy Vehicles, %	2	2	2	2	2 2
Mvmt Flow	19	38	1252	16	49 1233
Major/Minor	Minor1		Major1	Major2	
Conflicting Flow All	1974	634	0	0	1267 0
Stage 1	1259	-	-	-	- -
Stage 2	715	-	-	-	- -
Critical Hwy	8.2	8.3	-	-	4.9 -
Critical Hwy Sig 1	7	-	-	-	- -
Critical Hwy Sig 2	7	-	-	-	- -
Follow-up Hwy	4.2	4.2	-	-	2.6 -
Plat Cap-1 Maneuver	24	281	-	-	377 -
Stage 1	141	-	-	-	- -
Stage 2	315	-	-	-	- -
Platoon blocked, %	-	-	-	-	- -
Mov Cap-1 Maneuver	21	281	-	-	377 -
Mov Cap-2 Maneuver	93	-	-	-	- -
Stage 1	141	-	-	-	- -
Stage 2	274	-	-	-	- -
Approach	WB		NB	SB	
HCM Control Delay, s	31		0	0.6	
HCM LOS	D				
Minor Lane/Minor Int	NBT	NBR/WBL/NWBLh2	SBL	SBT	
Capacity (veh/h)	-	- 93 281 377	-	-	
HCM Lane V/C Ratio	-	- 0.204 0.135 0.131	-	-	
HCM Control Delay (s)	-	- 53.4 19.8 16	-	-	
HCM Lane LOS	-	- F C C	-	-	
HCM 95th %ile Q(veh)	-	- 0.7 0.5 0.4	-	-	

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	162	475	484	194	471	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp_psd/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frlb_psd/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1472	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1472	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	171	500	509	204	496	393
RTOR Reduction (vph)	0	72	0	54	0	0
Lane Group Flow (vph)	171	428	509	150	496	393
Confl. Peds. (#/hr)						
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%
Turn Type	Perm	pm+ov	NA	Perm	Prot	NA
Protected Phases	8	1	2	2	1	6
Permitted Phases						
Actuated Green, G (s)	12.1	42.0	27.4	27.4	29.9	60.3
Effective Green, g (s)	12.1	42.0	27.4	27.4	29.9	60.3
Actuated g/C Ratio	0.15	0.52	0.34	0.34	0.37	0.75
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	267	839	650	504	667	1394
v/s Ratio Prot	0.19	c0.27		c0.28	0.21	
v/s Ratio Perm	c0.10	0.08		0.10		0.28
v/c Ratio	0.64	0.51	0.78	0.30	0.74	0.28
Uniform Delay, d1	31.9	12.3	23.6	19.3	21.7	3.1
Progression Factor	1.00	1.00	0.58	0.26	0.65	0.56
Incremental Delay, d2	3.9	0.2	8.4	1.4	3.5	0.4
Delay (s)	35.8	12.5	22.0	6.4	17.7	2.2
Level of Service	D	B	C	A	B	A
Approach Delay (s)	18.4		17.6		10.8	
Approach LOS	B		B		B	
Intersection Summary						
HCM 2000 Control Delay			15.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			70.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future + Project Maximum

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	4.3					
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	291	377	436	17	10	139
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	306	397	459	18	11	146
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	477	0	-	0	1477	468
Stage 1	-	-	-	-	468	-
Stage 2	-	-	-	-	1009	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Sig 1	-	-	-	-	5.42	-
Critical Hdwy Sig 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1085	-	-	-	139	595
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	352	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1085	-	-	-	89	595
Mov Cap-2 Maneuver	-	-	-	-	89	-
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	225	-
Approach	EB	WB	WB	SB	SB	
HCM Control Delay, s	4.2		0		18.1	
HCM LOS					C	
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1085	-	-	-	431	-
HCM Lane V/C Ratio	0.282	-	-	-	0.364	-
HCM Control Delay (s)	9.6	0	-	-	18.1	-
HCM Lane LOS	A	A	-	-	C	-
HCM 95th %ile Q(veh)	1.2	-	-	-	1.6	-

Hamilton Fields Traffic Impact Study  
 PM Peak Hour Future + Project Maximum

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	308	232	432	259	209	341
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	324	244	455	273	220	359
RTOR Reduction (vph)	0	187	0	146	0	0
Lane Group Flow (vph)	324	57	455	127	220	359
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases						
Permitted Phases	8	8	2	2	1	6
Actuated Green, G (s)	18.6	18.6	37.3	37.3	14.0	54.0
Effective Green, g (s)	18.6	18.6	37.3	37.3	14.0	54.0
Actuated g/C Ratio	0.23	0.23	0.47	0.47	0.18	0.68
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	419	375	885	752	315	1269
v/s Ratio Prot			c0.24		c0.12	0.19
v/s Ratio Perm	c0.18	0.04		0.08		
v/c Ratio	0.77	0.15	0.51	0.17	0.70	0.28
Uniform Delay, d1	28.7	24.4	15.0	12.4	31.0	5.2
Progression Factor	1.00	1.00	1.00	1.00	0.76	0.62
Incremental Delay, d2	7.9	0.1	2.1	0.5	5.2	0.5
Delay (s)	36.6	24.5	17.1	12.9	28.7	3.8
Level of Service	D	C	B	B	C	A
Approach Delay (s)	31.4		15.5			13.3
Approach LOS	C		B			B
Intersection Summary						
HCM 2000 Control Delay			19.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	10.1
Intersection Capacity Utilization			61.5%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	Init Delay, s/veh					
	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	314	86	922	691	159
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	331	91	971	727	167
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	727	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	876	-	0	0
Stage 1	0	0	-	-	-	-
Stage 2	0	0	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	876	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		0.8			0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	876	-	-	-	-	-
HCM Lane V/C Ratio	0.103	-	-	-	-	-
HCM Control Delay (s)	9.6	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-



HCM 2010 AWSC  
9: Alameda Del Prado & Clay Ct/Nave Dr

2/3/2015

Intersection												
Intersection Delay, s/veh											24.6	
Intersection LOS											C	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	11	1	0	115	22	850	0	0	88	50
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	12	1	0	121	23	895	0	0	93	53
Number of Lanes	0	0	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	WB	EB	NB	SB
Opposing Approach	WB	EB	WB	EB	NB	SB
Opposing Lanes	2	1	1	2	2	2
Conflicting Approach Left	SB	NB	NB	EB	EB	EB
Conflicting Lanes Left	2	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	WB	WB	WB
Conflicting Lanes Right	1	2	2	2	2	2
HCM Control Delay	10.9	29.2	29.2	12.9	12.9	12.9
HCM LOS	B	D	D	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	0%	43%	23%	0%	100%	0%
Vol Thru, %	64%	52%	4%	0%	0%	85%
Vol Right, %	36%	5%	73%	100%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	21	503	484	227	88
LT Vol	0	9	115	0	227	0
Through Vol	88	11	22	0	0	75
RT Vol	50	1	366	484	0	13
Lane Flow Rate	145	22	529	510	239	93
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.284	0.046	0.853	0.779	0.512	0.183
Departure Headway (Hd)	7.027	7.494	5.808	5.499	7.71	7.096
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	511	476	624	658	468	505
Service Time	5.074	5.57	3.558	3.248	5.461	4.847
HCM Lane V/C Ratio	0.284	0.046	0.848	0.775	0.511	0.184
HCM Control Delay	12.9	10.9	33.3	25	18.3	11.4
HCM Lane LOS	B	B	D	C	C	B
HCM 95th-ile Q	1.2	0.1	9.5	7.5	2.9	0.7

HCM 2010 AWSC  
9: Alameda Del Prado & Clay Ct/Nave Dr

2/3/2015

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	227	75	13		
Peak Hour Factor	0.95	0.95	0.95	0.95		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	239	79	14		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	16.4	16.4
HCM LOS	C	C

Lane

Intersection		6.6				
Int Delay, s/veh						
<b>Movement</b>	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	208	61	303	643	98	75
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	219	64	319	677	103	79
<b>Major/Minor</b>	Minor1	Major1	Major1	Major2		
Conflicting Flow All	604	319	0	-	319	0
Stage 1	319	-	-	-	-	-
Stage 2	285	-	285	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	461	722	-	0	1241	-
Stage 1	737	-	-	0	-	-
Stage 2	763	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	423	722	-	-	1241	-
Mov Cap-2 Maneuver	520	-	-	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	700	-	-	-	-	-
<b>Approach</b>	WB	NB	NB	SB	SB	
HCM Control Delay, s	15.4		0		4.6	
HCM LOS	C					
<b>Minor Lane/Major/Mvmt</b>	NBT/WBL1/WBLn2	SBL	SBT			
Capacity (veh/h)	- 520	722	1241	-	-	-
HCM Lane V/C Ratio	- 0.421	0.089	0.083	-	-	-
HCM Control Delay (s)	- 16.9	10.5	8.2	-	-	-
HCM Lane LOS	- C	B	A	-	-	-
HCM 95th %ile Q(veh)	- 2.1	0.3	0.3	-	-	-

2/3/2015  
 HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	32	394	348	301	493	113	0	0	549	220	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.0	3.5	3.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.88	1.00	1.00	0.99
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.97	1.00
Satd. Flow (prot)	1805	3610	1554	1787	3477	2842	2842	2842	1809	1579	1809
Flt Permitted	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Satd. Flow (perm)	1805	3610	1554	1787	3477	2842	2842	2842	1809	1579	1809
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	415	366	317	519	119	0	0	578	232	120
RTOR Reduction (vph)	0	0	237	0	16	0	0	0	405	0	0
Lane Group Flow (vph)	34	415	129	317	622	0	0	0	173	0	352
Conf. Peds. (#/hr)	7	7	7	7	7	20	20	20	7	7	7
Conf. Bikes (#/hr)	7	7	7	7	7	20	20	20	7	7	7
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA	Split	NA
Protected Phases	5	2		1	6			1	7		7
Permitted Phases		2									
Actuated Green, G (s)	5.9	30.6	30.6	20.0	48.7	20.0	20.0	21.9	21.9	21.9	21.9
Effective Green, g (s)	5.9	30.6	30.6	20.0	48.7	20.0	20.0	21.9	21.9	21.9	21.9
Actuated g/C Ratio	0.07	0.35	0.35	0.23	0.56	0.23	0.23	0.25	0.25	0.25	0.25
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0	3.0	3.0	3.5	3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0	2.0	2.0	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	122	1269	546	410	1946	653	653	455	397	325	397
v/s Ratio Prot	0.02	0.11	0.08	c0.18	c0.18	0.06	0.06	c0.19			
v/s Ratio Perm	0.28	0.33	0.24	0.77	0.32	0.26	0.26	0.77	0.17	0.17	0.17
Uniform Delay, d1	38.5	20.7	19.9	31.4	10.3	27.5	27.5	30.2	25.5	25.5	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.7	1.0	8.8	0.4	0.2	0.2	7.7	0.2	0.2	0.2
Delay (s)	39.0	21.3	20.9	40.2	10.7	27.7	27.7	37.9	25.6	25.6	25.6
Level of Service	D	C	C	D	B	C	C	D	D	D	C
Approach Delay (s)	21.9	21.9	21.9	20.5	20.5	27.7	27.7	32.5	32.5	32.5	32.5
Approach LOS	C	C	C	C	C	C	C	C	C	C	C
<b>Intersection Summary</b>											
HCM 2000 Control Delay	24.8 HCM 2000 Level of Service C										
HCM 2000 Volume to Capacity ratio	0.61										
Actuated Cycle Length (s)	87.0 Sum of lost time (s)										
Intersection Capacity Utilization	70.7% ICU Level of Service C										
Analysis Period (min)	15										
c. Critical Lane Group											

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Hour Future Conditions

Synchro 8 Report

2/3/2015  
 HCM Signalized Intersection Capacity Analysis  
 2: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	0	270	905	94	256	232	662	593	227	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6	3.0	4.0	4.0	4.6	4.6	4.6	4.6	3.0	3.0
Lane Util. Factor	0.95	1.00	1.00	1.00	0.95	0.91	0.91	0.91	0.91	1.00	1.00
Frbp, ped/bikes	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	0.99
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.85	1.00	0.93	1.00	1.00	1.00	0.85	1.00	0.85
Satd. Flow (prot)	3610	1605	1805	1805	3300	1643	3383	1600	1600	3383	1600
Flt Permitted	1.00	1.00	0.95	1.00	0.95	0.95	0.95	0.95	0.95	1.00	1.00
Satd. Flow (perm)	3610	1605	1805	1805	3300	1643	3383	1600	1600	3383	1600
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	284	953	99	269	244	697	624	239	0	0
RTOR Reduction (vph)	0	0	104	0	99	0	0	0	115	0	0
Lane Group Flow (vph)	0	284	849	99	414	414	432	889	124	0	0
Conf. Peds. (#/hr)	1	1	1	1	1	1	1	1	1	1	1
Conf. Bikes (#/hr)	1	1	1	1	1	1	1	1	1	1	1
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA	Split	NA	pm+ov			
Protected Phases	2	3	1	6			3	3	1		
Permitted Phases		2							3		
Actuated Green, G (s)	28.4	59.6	12.1	43.5	31.2	31.2	31.2	43.3	43.3	31.2	43.3
Effective Green, g (s)	28.4	59.6	12.1	43.5	31.2	31.2	31.2	43.3	43.3	31.2	43.3
Actuated g/C Ratio	0.34	0.72	0.15	0.52	0.37	0.37	0.37	0.52	0.52	0.37	0.52
Clearance Time (s)	4.0	4.6	3.0	4.0	4.6	4.6	4.6	4.6	4.6	3.0	3.0
Vehicle Extension (s)	4.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1230	1148	262	1723	615	1267	831	831	831	1267	831
v/s Ratio Prot	0.08	c0.28	c0.05	0.13	0.26	0.26	0.26	0.26	0.26	0.02	0.02
v/s Ratio Perm	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.23	0.74	0.38	0.24	0.70	0.70	0.70	0.70	0.15	0.15	0.15
Uniform Delay, d1	19.6	7.2	32.2	10.9	22.1	22.1	22.1	10.4	10.4	22.1	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.2	0.3	0.3	3.0	3.0	3.0	1.5	1.5	3.0	1.5
Delay (s)	20.1	9.3	32.5	11.2	25.1	23.6	23.6	10.4	10.4	25.1	10.4
Level of Service	C	A	C	B	C	C	C	B	B	C	B
Approach Delay (s)	11.8	11.8	14.7	14.7	22.0	22.0	22.0	14.7	14.7	22.0	14.7
Approach LOS	B	B	C	C	B	B	B	C	C	B	A
<b>Intersection Summary</b>											
HCM 2000 Control Delay	17.0 HCM 2000 Level of Service B										
HCM 2000 Volume to Capacity ratio	0.68										
Actuated Cycle Length (s)	83.3 Sum of lost time (s)										
Intersection Capacity Utilization	73.3% ICU Level of Service D										
Analysis Period (min)	15										
c. Critical Lane Group											

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Hour Future Conditions

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/3/2015

Movement	EBL	EBR	NBL	NBT	SBR	SBR
Lane Configurations	↔↔	↔	↔	↔↔	↔↔	↔↔
Volume (vph)	453	252	0	1054	720	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0.95
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	1.00
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.96	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3434	3434	3434
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3434	3434	3434
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	477	265	0	1109	758	294
RTOR Reduction (vph)	0	84	0	0	66	0
Lane Group Flow (vph)	477	181	0	1109	986	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	NA	NA	NA	NA
Protected Phases	4		2	6		
Permitted Phases	4					
Actuated Green, G (s)	30.2	30.2	24.0	24.0	24.0	24.0
Effective Green, g (s)	30.2	30.2	24.0	24.0	24.0	24.0
Actuated g/C Ratio	0.49	0.49	0.39	0.39	0.39	0.39
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1683	758	1379	1325	1325	1325
v/s Ratio Prot	c0.14		c0.31	0.29		
v/s Ratio Perm	0.12		0.80	0.74		
Uniform Delay, d1	9.5	9.3	17.0	16.5		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.7	3.3	2.0		
Delay (s)	10.0	10.0	20.3	18.5		
Level of Service	A	B	C	B		
Approach Delay (s)	10.0		20.3	18.5		
Approach LOS	A		C	B		

Intersection Summary	EBL	EBR	NBL	NBT	SBR	SBR
HCM 2000 Control Delay						
HCM 2000 Volume to Capacity ratio	17.0					
Actuated Cycle Length (s)	0.51					
Intersection Capacity Utilization	59.1%					
Analysis Period (min)	15					

c. Critical Lane Group

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/3/2015

Intersection	1 2					
Ini Delay, s/vch	WBL	WBR	NBT	NBR	SBL	SBT
Movement	20	57	997	28	51	921
Vol, veh/h	0	0	0	0	0	0
Conflicting Peds. #/hr	Stop	Stop	Free	Free	Free	Free
Sign Control	-	None	-	None	-	None
RT Channelized	0	40	-	-	100	-
Storage Length	0	-	0	-	-	0
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	60	1049	29	54	969
Major/Minor	Minor1	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	1656	539	0	0	1079	0
Stage 1	1064	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Critical Hwy	8.2	8.3	-	-	4.9	-
Critical Hwy Sig 1	7	-	-	-	-	-
Critical Hwy Sig 2	7	-	-	-	-	-
Follow-up Hwy	4.2	4.2	-	-	2.6	-
Pot Cap-1 Maneuver	45	333	-	-	459	-
Stage 1	189	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	40	333	-	-	459	-
Mov Cap-2 Maneuver	126	-	-	-	-	-
Stage 1	189	-	-	-	-	-
Stage 2	331	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	SB
HCM Control Delay, s	23.7	0	0	0.7	0.7	0.7
HCM LOS	C					
Minor Lane/Minor Intvl	NBT	NBR/WBL/NWBLh2	SBL	SBT	SBT	SBT
Capacity (veh/h)	-	126	333	459	-	-
HCM Lane V/C Ratio	-	0.167	0.18	0.117	-	-
HCM Control Delay (s)	-	39.2	18.2	13.9	-	-
HCM Lane LOS	-	E	C	B	-	-
HCM 95th %ile Q(veh)	-	0.6	0.6	0.4	-	-

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	109	332	418	41	247	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frlb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1474	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1474	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	115	349	440	43	260	360
RTOR Reduction (vph)	0	124	0	13	0	0
Lane Group Flow (vph)	115	225	440	30	260	360
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	1	2	2	1	1	6
Protected Phases	8	8	2	2	1	6
Permitted Phases	6.5	19.9	17.5	17.5	13.4	33.9
Actuated Green, G (s)	6.5	19.9	17.5	17.5	13.4	33.9
Effective Green, g (s)	0.14	0.41	0.36	0.36	0.28	0.71
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4
Clearance Time (s)	2.0	2.0	3.0	3.0	2.0	3.0
Vehicle Extension (s)	239	662	692	537	498	1306
Lane Grp Cap (vph)	0.09	c0.23	c0.15	0.19		
v/s Ratio Prot	0.06	0.05	0.02	0.02	0.52	0.28
v/s Ratio Perm	0.48	0.34	0.64	0.06	0.52	0.28
v/c Ratio	19.2	9.6	12.6	9.9	14.6	2.6
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	0.6	0.1	1.9	0.0	0.5	0.1
Incremental Delay, d2	19.7	9.7	14.5	9.9	15.1	2.7
Delay (s)	B	A	B	A	B	A
Level of Service	12.2	14.1	B	A	B	A
Approach Delay (s)						
Approach LOS	B	B	B	A	A	A
Intersection Summary						
HCM 2000 Control Delay			11.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			48.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			52.1%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Hour Future Conditions

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/3/2015

Intersection	Init Delay, s/veh 0.1					
Movement	EBL	EBT	EBT	WBT	WBR	SBR
Vol, veh/h	3	282	334	1	0	3
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	297	352	1	0	3
Major/Minor	Major1	Major2	Major2	Minor2		
Conflicting Flow All	353	0	0	655	352	-
Stage 1	-	-	-	-	303	-
Stage 2	-	-	-	-	6.42	6.22
Critical Hwy	4.12	-	-	-	5.42	-
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1206	-	-	-	431	692
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	749	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1206	-	-	-	430	692
Mov Cap-2 Maneuver	-	-	-	-	430	-
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	747	-
Approach	EB	WB	WB	SB		
HCM Control Delay, s	0.1	0	0	10.2		
HCM LOS				B		
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1206	-	-	-	692	-
HCM Lane V/C Ratio	0.003	-	-	-	0.005	-
HCM Control Delay (s)	8	0	-	-	10.2	-
HCM Lane LOS	A	A	-	-	B	-
HCM 95th %ile Q(veh)	0	-	-	-	0	-

Hamilton Fields Traffic Impact Study  
 Saturday Midday Peak Hour Future Conditions

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/3/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	203	108	366	209	97	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	214	114	385	220	102	353
RTOR Reduction (vph)	0	91	0	131	0	0
Lane Group Flow (vph)	214	23	385	89	102	353
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	8.1	8.1	16.0	16.0	5.5	24.2
Effective Green, g (s)	8.1	8.1	16.0	16.0	5.5	24.2
Actuated g/C Ratio	0.20	0.20	0.40	0.40	0.14	0.61
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	368	329	765	650	250	1146
v/s Ratio Prot			c0.20		c0.06	0.19
v/s Ratio Perm	c0.12	0.01		0.05		
v/c Ratio	0.58	0.07	0.50	0.14	0.41	0.31
Uniform Delay, d1	14.3	12.8	8.9	7.5	15.6	3.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.0	0.2	0.0	0.4	0.1
Delay (s)	15.8	12.8	9.1	7.5	16.0	3.8
Level of Service	B	B	A	A	B	A
Approach Delay (s)	14.7		8.5		6.5	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay	9.3		HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.51					
Actuated Cycle Length (s)	39.7					
Intersection Capacity Utilization	50.6%		Sum of lost time (s)		10.1	
Analysis Period (min)	15					
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/3/2015

Intersection	0.6					
Int Delay, s/veh						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	199	79	590	457	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	209	83	621	481	112
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	481	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1082	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1082	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0	1	1	0	0	0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1082	-	-	-	-	-
HCM Lane V/C Ratio	0.077	-	-	-	-	-
HCM Control Delay (s)	8.6	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.2	-	-	-	-	-

Intersection												
Intersection Delay, s/veh											12.9	
Intersection LOS											B	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	7	4	0	98	16	542	0	2	75	68
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	4	0	103	17	571	0	2	79	72
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	WB	WB	NB	NB
Opposing Approach	WB	WB	EB	WB	SB	SB
Opposing Lanes	2	2	1	2	2	2
Conflicting Approach Left	SB	SB	NB	EB	EB	EB
Conflicting Lanes Left	2	2	1	2	1	1
Conflicting Approach Right	NB	NB	SB	WB	WB	WB
Conflicting Lanes Right	1	1	2	2	2	2
HCM Control Delay	10	10	13.5	13.5	11.6	11.6
HCM LOS	A	A	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	45%	29%	0%	100%	0%
Vol Thru, %	52%	35%	5%	0%	0%	84%
Vol Right, %	47%	20%	66%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	145	20	336	320	155	73
LT Vol	2	9	98	0	155	0
Through Vol	75	7	16	0	0	61
RT Vol	68	4	222	320	0	12
Lane Flow Rate	153	21	354	337	163	77
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.266	0.039	0.54	0.478	0.317	0.136
Departure Headway (Hd)	6.265	6.663	5.496	5.11	7.005	6.381
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	574	537	658	707	514	562
Service Time	4.298	4.701	3.225	2.838	4.741	4.117
HCM Lane V/C Ratio	0.267	0.039	0.538	0.477	0.317	0.137
HCM Control Delay	11.6	10	14.5	12.5	13	10.1
HCM Lane LOS	B	A	B	B	B	B
HCM 95th-ile Q	1.1	0.1	3.2	2.6	1.4	0.5

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	155	61	12	12	12
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	163	64	13	13	13
Number of Lanes	0	1	1	1	0	0

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	12.1	12.1
HCM LOS	B	B

Lane

Intersection		6.6				
Int Delay, s/veh						
<b>Movement</b>	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	151	78	159	463	129	75
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	0	0	100	-
Veh in Median Storage, #	0	-	0	0	-	0
Grade, %	0	-	0	0	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	159	82	167	487	136	79
<b>Major/Minor</b>	Minor1	Major1	Major1	Major2		
Conflicting Flow All	518	167	0	-	167	0
Stage 1	167	-	-	-	-	-
Stage 2	351	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	518	877	-	0	1411	-
Stage 1	863	-	-	0	-	-
Stage 2	713	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	468	877	-	-	1411	-
Mov Cap-2 Maneuver	538	-	-	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	644	-	-	-	-	-
<b>Approach</b>	WB	NB	NB	SB	SB	
HCM Control Delay, s	12.8		0		4.9	
HCM LOS	B					
<b>Minor Lane/Major/Mvmt</b>	NBT/WBL1/WBLn2	SBL	SBT			
Capacity (veh/h)	-	538	877	1411	-	-
HCM Lane V/C Ratio	-	0.295	0.094	0.096	-	-
HCM Control Delay (s)	-	14.5	9.5	7.8	-	-
HCM Lane LOS	-	B	A	A	-	-
HCM 95th %tile Q(veh)	-	1.2	0.3	0.3	-	-



## HCM Signalized Intersection Capacity Analysis 1: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

2/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	399	348	306	497	113	0	0	594	223	114	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0	8.0	3.0	4.0	4.0	3.0	3.0	3.0	3.5	3.5	3.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	1.00	0.99	1.00	0.99	1.00
Flpb. ped/bikes	1.00	1.00	0.96	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97	1.00	1.00	1.00	0.85	1.00	0.85	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.97	1.00
Satd. Flow (prot)	1805	3610	1554	1787	3477	2842	2842	2842	1809	1578	1809	1578
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.97	1.00
Satd. Flow (perm)	1805	3610	1554	1787	3477	2842	2842	2842	1809	1578	1809	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	420	366	322	523	119	0	0	625	235	120	274
RTOR Reduction (vph)	0	0	238	0	16	0	0	0	398	0	0	205
Lane Group Flow (vph)	34	420	128	322	626	0	0	0	227	0	355	69
Confl. Peds. (#/hr)			7			20						1
Confl. Bikes (#/hr)						3						
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA	Prot	NA	Perm
Protected Phases	5	2		1	6			1	7		7	
Permitted Phases			2									7
Actuated Green, G (s)	5.9	30.5	30.5	20.2	48.8			20.2	22.1		22.1	22.1
Effective Green, g (s)	5.9	30.5	30.5	20.2	48.8			20.2	22.1		22.1	22.1
Actuated g/C Ratio	0.07	0.35	0.35	0.23	0.56			0.23	0.25		0.25	0.25
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0			3.0	3.5		3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0			3.0	2.5		2.5	2.5
Lane Grp Cap (vph)	121	1261	542	413	1943			657	457		399	399
v/s Ratio Prot	0.02	0.12		c0.18				0.08			c0.20	
v/s Ratio Perm			0.08									0.04
v/c Ratio	0.28	0.33	0.24	0.78	0.32			0.35	0.78		0.78	0.17
Uniform Delay, d1	38.7	20.9	20.1	31.5	10.4			28.0	30.3		25.5	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	0.7	1.0	9.0	0.4			0.3	7.8		0.2	0.2
Delay (s)	39.1	21.6	21.2	40.5	10.8			28.3	38.1		25.6	25.6
Level of Service	D	C	C	D	B			C	D		D	C
Approach Delay (s)	22.1			20.7			28.3				32.7	
Approach LOS	C			C			C		C		C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	14.5
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c. Critical Lane Group			

## HCM Signalized Intersection Capacity Analysis 2: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

2/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	270	958	96	256	232	671	631	229	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.6	3.0	4.0	4.0	4.6	4.6	3.0			
Lane Util. Factor		0.95	1.00	1.00	0.95	0.91	0.91	0.91	1.00			
Flpb. ped/bikes		1.00	0.99	1.00	0.99	1.00	1.00	1.00	0.99			
Frt		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Flt Protected		1.00	1.00	0.85	1.00	0.93	1.00	1.00	0.85			
Satd. Flow (prot)		3610	1605	1805	3300	1643	3386	1600	1600			
Flt Permitted		1.00	1.00	0.95	1.00	0.95	0.99	1.00	0.95			
Satd. Flow (perm)		3610	1605	1805	3300	1643	3386	1600	1600			
Peak-hour factor, PHF		0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Adj. Flow (vph)		0	284	1008	101	269	244	706	664	241	0	0
RTOR Reduction (vph)		0	0	100	0	91	0	0	113	0	0	0
Lane Group Flow (vph)		0	284	908	101	422	0	445	925	128	0	0
Confl. Peds. (#/hr)			1			1						1
Heavy Vehicles (%)		0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%
Turn Type		NA	pm+ov	Prot	NA	Prot	NA	Split	NA	pm+ov		
Protected Phases		2	3	1	6			3	3	1		
Permitted Phases				2								3
Actuated Green, G (s)		28.4	61.7	12.1	43.5			33.3	33.3	45.4		
Effective Green, g (s)		28.4	61.7	12.1	43.5			33.3	33.3	45.4		
Actuated g/C Ratio		0.33	0.72	0.14	0.51			0.39	0.39	0.53		
Clearance Time (s)		4.0	4.6	3.0	4.0			4.6	4.6	3.0		
Vehicle Extension (s)		4.0	2.0	2.0	4.0			2.0	2.0	2.0		
Lane Grp Cap (vph)		1200	1159	255	1680			640	1320	850		
v/s Ratio Prot		0.08	c0.31	c0.06	0.13			0.27	0.27	0.02		
v/s Ratio Perm			0.26							0.06		
v/c Ratio		0.24	0.78	0.40	0.25			0.70	0.70	0.15		
Uniform Delay, d1		20.6	7.6	33.3	11.8			21.8	21.9	10.2		
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00	1.00		
Incremental Delay, d2		0.5	3.3	0.4	0.4			2.7	1.4	0.0		
Delay (s)		21.1	10.8	33.7	12.1			24.5	23.3	10.2		
Level of Service		C	B	C	B			C	C	B		
Approach Delay (s)		13.1		15.7			21.6			0.0		
Approach LOS		B		B			C			A		

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	11.6
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c. Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/4/2015

Movement	EBL	EBR	NBL	NBT	SBR	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	453	265	0	1103	775	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.96	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3441	3441	3441
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3441	3441	3441
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	477	279	0	1161	816	294
RTOR Reduction (vph)	0	74	0	0	58	0
Lane Group Flow (vph)	477	205	0	1161	1052	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	Prot	Perm	Prot	Perm
Protected Phases	4		2	6		
Permitted Phases	4		2	6		
Actuated Green, G (s)	30.2	30.2	25.5	25.5	25.5	25.5
Effective Green, g (s)	30.2	30.2	25.5	25.5	25.5	25.5
Actuated g/C Ratio	0.47	0.47	0.40	0.40	0.40	0.40
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1643	741	1430	1377		
v/s Ratio Prot	c0.14		c0.32	0.31		
v/s Ratio Perm	0.13		0.81	0.76		
v/c Ratio	0.29	0.28	17.0	16.5		
Uniform Delay, d1	10.2	10.1	1.00	1.00		
Progression Factor	1.00	1.00	3.4	2.3		
Incremental Delay, d2	0.4	0.9	20.4	18.8		
Delay (s)	10.7	11.1	C	B		
Level of Service	B	B	C	B		
Approach Delay (s)	10.8		20.4	18.8		
Approach LOS	B		C	B		

Intersection Summary	EBL	EBR	NBL	NBT	SBR
HCM 2000 Control Delay	17.4				
HCM 2000 Level of Service	B				
HCM 2000 Volume to Capacity ratio	0.53				
Actuated Cycle Length (s)	63.7				
Sum of lost time (s)	8.0				
Intersection Capacity Utilization	60.5%				
ICU Level of Service	B				
Analysis Period (min)	15				
c. Critical Lane Group					

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/4/2015

Intersection	EBL	EBR	NBL	NBT	SBR
Int Delay, s/vch	1.2				
Movement	WBL	WBR	NBT	NBR	SBL
Vol, veh/h	20	57	1046	28	51
Conflicting Peds. #/hr	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free
RT Channelized	-	None	-	None	-
Storage Length	0	40	-	-	100
Veh in Median Storage, #	0	-	0	-	0
Grade, %	0	-	0	-	0
Peak Hour Factor	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2
Mvmt Flow	21	60	1101	29	54
Major/Minor	Minor1	Minor1	Major1	Major2	Major2
Conflicting Flow All	1744	565	0	0	1131
Stage 1	1116	-	-	-	-
Stage 2	628	-	-	-	-
Critical Hwy	8.2	8.3	-	-	4.9
Critical Hwy Sig 1	7	-	-	-	-
Critical Hwy Sig 2	7	-	-	-	-
Follow-up Hwy	4.2	4.2	-	-	2.6
Pot Cap-1 Maneuver	38	318	-	-	435
Stage 1	175	-	-	-	-
Stage 2	357	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	33	318	-	-	435
Mov Cap-2 Maneuver	116	-	-	-	-
Stage 1	175	-	-	-	-
Stage 2	313	-	-	-	-
Approach	WB	NB	SB	SB	SB
HCM Control Delay, s	25.1	0	0	0.7	0.7
HCM LOS	D				
Minor Lane/Minor Mvmt	NBT	NBR	WBL	WBR	SBL
Capacity (veh/h)	-	-	116	318	435
HCM Lane V/C Ratio	-	-	0.181	0.189	0.123
HCM Control Delay (s)	-	-	42.8	18.9	14.4
HCM Lane LOS	-	-	E	C	B
HCM 95th %ile Q(veh)	-	-	0.6	0.7	0.4

HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/4/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	154	381	418	96	315	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp_psd/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frlb_psd/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1474	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1474	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	162	401	440	101	332	360
RTOR Reduction (vph)	0	118	0	31	0	0
Lane Group Flow (vph)	162	283	440	70	332	360
Confl. Peds. (#/hr)				2		
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%
Turn Type	Perm	pm+ov	NA	Perm	Prot	NA
Protected Phases	8	1	2	2	1	6
Permitted Phases						
Actuated Green, G (s)	7.9	23.4	19.0	19.0	15.5	37.5
Effective Green, g (s)	7.9	23.4	19.0	19.0	15.5	37.5
Actuated g/C Ratio	0.15	0.44	0.36	0.36	0.29	0.71
Clearance Time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Vehicle Extension (s)	2.0	2.0	3.0	3.0	2.0	3.0
Lane Grp Cap (vph)	263	705	681	528	522	1308
v/s Ratio Prot	0.12	c0.23		c0.19		0.19
v/s Ratio Perm	c0.09	0.06		0.05		
v/c Ratio	0.62	0.40	0.65	0.13	0.64	0.28
Uniform Delay, d1	21.1	10.0	14.2	11.5	16.3	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.1	2.1	0.1	1.9	0.1
Delay (s)	24.1	10.2	16.3	11.6	18.2	2.9
Level of Service	C	B	B	B	B	A
Approach Delay (s)	14.2	15.4			10.2	
Approach LOS	B	B			B	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			13.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			53.0		Sum of lost time (s)	10.6
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/4/2015

Intersection	2.7					
Ini Delay, s/veh						
Movement	EBL	EBT	EBT	WBT	WBR	SBR
Vol, veh/h	130	282		334	7	99
Conflicting Peds. #/hr	0	0		0	0	0
Sign Control	Free	Free		Free	Free	Stop
RT Channelized	-	None		-	None	None
Storage Length	-	-		-	-	0
Veh in Median Storage, #	-	0		0	-	0
Grade, %	-	0		0	-	0
Peak Hour Factor	95	95		95	95	95
Heavy Vehicles, %	2	2		2	2	2
Mvmt Flow	137	297		352	7	104
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	359	0		0	926	355
Stage 1	-	-		-	355	-
Stage 2	-	-		-	571	-
Critical Hwy	4.12	-		-	6.42	6.22
Critical Hwy Sig 1	-	-		-	5.42	-
Critical Hwy Sig 2	-	-		-	5.42	-
Follow-up Hwy	2.218	-		-	3.518	3.318
Pot Cap-1 Maneuver	1200	-		-	298	689
Stage 1	-	-		-	710	-
Stage 2	-	-		-	565	-
Platoon blocked, %	-	-		-	-	-
Mov Cap-1 Maneuver	1200	-		-	257	689
Mov Cap-2 Maneuver	-	-		-	257	-
Stage 1	-	-		-	710	-
Stage 2	-	-		-	488	-
Approach	EB		WB		SB	
HCM Control Delay, s	2.6		0		11.8	
HCM LOS					B	
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBLr1	
Capacity (veh/h)	1200	-	-	-	637	
HCM Lane V/C Ratio	0.114	-	-	-	0.172	
HCM Control Delay (s)	8.4	0	-	-	11.8	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %ile Q(veh)	0.4	-	-	-	0.6	

HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

2/4/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	203	108	421	209	97	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.85	1.00	0.85	1.00	1.00
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	214	114	443	220	102	400
RTOR Reduction (vph)	0	91	0	126	0	0
Lane Group Flow (vph)	214	23	443	94	102	400
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	8.4	8.4	17.9	17.9	5.5	26.1
Effective Green, g (s)	8.4	8.4	17.9	17.9	5.5	26.1
Actuated g/C Ratio	0.20	0.20	0.43	0.43	0.13	0.62
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	361	323	811	689	236	1171
v/s Ratio Prot			c0.23		c0.06	0.21
v/s Ratio Perm	c0.12	0.01		0.06		
v/c Ratio	0.59	0.07	0.55	0.14	0.43	0.34
Uniform Delay, d1	15.2	13.6	9.0	7.3	16.8	3.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	0.0	0.4	0.0	0.5	0.1
Delay (s)	16.9	13.6	9.4	7.3	17.2	3.8
Level of Service	B	B	A	A	B	A
Approach Delay (s)	15.8		8.7		6.6	
Approach LOS	B		A		A	
Intersection Summary						
HCM 2000 Control Delay			9.5	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			41.9	Sum of lost time (s)		10.1
Intersection Capacity Utilization			53.5%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

2/4/2015

Intersection	0.6					
Int Delay, s/veh						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	199	79	644	501	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	-	0	-	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	209	83	678	527	112
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	527	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwly	-	-	4.12	-	-	-
Critical Hwly Sig 1	-	-	-	-	-	-
Critical Hwly Sig 2	-	-	-	-	-	-
Follow-up Hwly	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1040	-	0	0
Stage 1	0	0	-	-	-	-
Stage 2	0	0	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1040	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		1		0	
HCM LOS	A				A	
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1040	-	-	-	-	-
HCM Lane V/C Ratio	0.08	-	-	-	-	-
HCM Control Delay (s)	8.8	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

HCM 2010 AWSC  
9: Alameda Del Prado & Clay Ct/Nave Dr

2/4/2015

Intersection												
Intersection Delay, s/veh											13.5	
Intersection LOS											B	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	7	4	0	99	16	585	0	2	75	70
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	4	0	104	17	616	0	2	79	74
Number of Lanes	0	0	1	0	0	1	1	1	0	0	1	0
Approach	EB		WB		WB		NB		SB		NB	
Opposing Approach	WB		EB		WB		SB		NB		SB	
Opposing Lanes	2		1		1		2		1		2	
Conflicting Approach Left	SB		NB		NB		EB		EB		EB	
Conflicting Lanes Left	2		1		1		1		1		1	
Conflicting Approach Right	NB		SB		SB		WB		WB		WB	
Conflicting Lanes Right	1		2		2		2		2		2	
HCM Control Delay	10		14.3		14.3		11.7		11.7		11.7	
HCM LOS	A		B		B		B		B		B	

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	45%	28%	0%	100%	0%
Vol Thru, %	51%	35%	5%	0%	0%	84%
Vol Right, %	48%	20%	68%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	147	20	355	345	155	73
LT Vol	2	9	99	0	155	0
Through Vol	75	7	16	0	0	61
RT Vol	70	4	240	345	0	12
Lane Flow Rate	155	21	374	363	163	77
Geometry Grp	6	6	7	7	7	7
Degree of Utl (X)	0.272	0.039	0.57	0.518	0.322	0.138
Departure Headway (Hd)	6.335	6.717	5.498	5.128	7.103	6.478
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	568	532	657	705	507	554
Service Time	4.371	4.769	3.229	2.859	4.84	4.215
HCM Lane V/C Ratio	0.273	0.039	0.569	0.515	0.321	0.139
HCM Control Delay	11.7	10	15.3	13.3	13.2	10.3
HCM Lane LOS	B	A	C	B	B	B
HCM 95th-ile Q	1.1	0.1	3.6	3	1.4	0.5

HCM 2010 AWSC  
9: Alameda Del Prado & Clay Ct/Nave Dr

2/4/2015

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	155	61	12		
Peak Hour Factor	0.95	0.95	0.95	0.95		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	163	64	13		
Number of Lanes	0	1	1	0		
Approach	SB			SB		
Opposing Approach	NB			NB		
Opposing Lanes	1			1		
Conflicting Approach Left	WB			WB		
Conflicting Lanes Left	2			2		
Conflicting Approach Right	EB			EB		
Conflicting Lanes Right	1			1		
HCM Control Delay	12.3			12.3		
HCM LOS	B			B		

Lane

Intersection		6.6				
Int Delay, s/veh						
<b>Movement</b>	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	151	78	159	506	129	75
Conflicting Pcts, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	Free	-	None
Storage Length	0	0	-	0	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	159	82	167	533	136	79
<b>Major/Minor</b>	Minor1	Major1	Major2			
Conflicting Flow All	518	167	0	-	167	0
Stage 1	167	-	-	-	-	-
Stage 2	351	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	518	877	-	0	1411	-
Stage 1	863	-	-	0	-	-
Stage 2	713	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	468	877	-	-	1411	-
Mov Cap-2 Maneuver	538	-	-	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	644	-	-	-	-	-
<b>Approach</b>	WB	NB	SB			
HCM Control Delay, s	12.8	0	4.9			
HCM LOS	B					
<b>Minor Lane/Major/Mvmt</b>	NBT/WBL1/WBLn2	SBL	SBT			
Capacity (veh/h)	-	538	877	1411	-	-
HCM Lane V/C Ratio	-	0.295	0.094	0.096	-	-
HCM Control Delay (s)	-	14.5	9.5	7.8	-	-
HCM Lane LOS	-	B	A	A	-	-
HCM 95th %tile Q(veh)	-	1.2	0.3	0.3	-	-

HCM Signalized Intersection Capacity Analysis  
 1.: US 101 SB Off Ramp/Enfrente Rd & Ignacio Blvd

2/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	
Lane Configurations												
Volume (vph)	32	411	348	308	499	113	0	0	694	229	114	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0	8.0	3.0	4.0	3.0	4.0	3.0	3.0	3.5	3.5	3.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.88	1.00	0.99	1.00	1.00	0.99	1.00
Flpb. ped/bikes	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85
Frt	1.00	1.00	0.85	1.00	0.97	1.00	1.00	0.97	1.00	0.97	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.97	1.00	0.85
Satd. Flow (prot)	1805	3610	1554	1787	3478	2842	2842	2842	1809	1578	1809	1578
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.97	1.00	0.97	1.00	0.85
Satd. Flow (perm)	1805	3610	1554	1787	3478	2842	2842	2842	1809	1578	1809	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	433	366	324	525	119	0	0	731	241	120	274
RTOR Reduction (vph)	0	0	240	0	15	0	0	0	384	0	0	204
Lane Group Flow (vph)	34	433	126	324	629	0	0	0	347	0	361	70
Confl. Peds. (#/hr)	7					20						
Confl. Bikes (#/hr)						3						
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	5%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Over	Split	NA	Perm	1%
Protected Phases	5	2		1	6			1	7		7	
Permitted Phases			2									
Actuated Green, G (s)	5.9	30.2	30.2	20.5	48.8			20.5	22.3	22.3	22.3	22.3
Effective Green, g (s)	5.9	30.2	30.2	20.5	48.8			20.5	22.3	22.3	22.3	22.3
Actuated g/C Ratio	0.07	0.35	0.35	0.23	0.56			0.23	0.25	0.25	0.25	0.25
Clearance Time (s)	3.0	8.0	8.0	3.0	4.0			3.0	3.5	3.5	3.5	3.5
Vehicle Extension (s)	2.0	2.5	2.5	3.0	4.0			3.0	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	121	1245	536	418	1939			665	461	402	402	402
v/s Ratio Prot	0.02	0.12		c0.18	c0.18			0.12	c0.20			
v/s Ratio Perm			0.08									
v/c Ratio	0.28	0.35	0.24	0.78	0.32			0.52	0.78	0.17	0.17	0.17
Uniform Delay, d1	38.8	21.3	20.4	31.3	10.4			29.2	30.3	25.4	25.4	25.4
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.8	1.0	8.7	0.4			0.7	8.2	0.2	0.2	0.2
Delay (s)	39.2	22.1	21.5	40.1	10.9			30.0	38.5	25.6	25.6	25.6
Level of Service	D	C	C	D	B			C	D	D	C	C
Approach Delay (s)	22.5			20.7				30.0			32.9	
Approach LOS	C			C				C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay	25.8		HCM 2000 Level of Service			C						
HCM 2000 Volume to Capacity ratio	0.62											
Actuated Cycle Length (s)	87.5		Sum of lost time (s)			14.5						
Intersection Capacity Utilization	71.6%		ICU Level of Service			C						
Analysis Period (min)	15											
c. Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 2.: Nave Dr/US 101 NB On Ramp & Ignacio Blvd/Bel Marin Keys Blvd

2/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	
Lane Configurations												
Volume (vph)	0	270	1076	101	256	232	674	647	229	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.6	3.0	4.0	4.0	4.6	4.6	4.6	3.0			
Lane Util. Factor	0.95	1.00	1.00	1.00	0.95	0.91	0.91	0.91	1.00			
Flpb. ped/bikes	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	0.99			
Frt	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Flt Protected	1.00	1.00	0.85	1.00	0.93	1.00	1.00	0.85	1.00			
Satd. Flow (prot)	3610	1606	1805	3300	1643	3387	1600	1600	3387			
Flt Permitted	1.00	1.00	0.95	1.00	0.95	0.95	0.99	1.00	0.95			
Satd. Flow (perm)	3610	1606	1805	3300	1643	3387	1600	1600	3387			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Adj. Flow (vph)	0	284	1133	106	269	244	709	681	241			
RTOR Reduction (vph)	0	0	91	0	90	0	0	0	109			
Lane Group Flow (vph)	0	284	1042	106	423	0	454	936	132			
Confl. Peds. (#/hr)	1					1						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%
Turn Type	NA	pm+ov	Prot	NA	Split	NA	pm+ov					
Protected Phases	2	3	1	6	3	3	1					
Permitted Phases			2									
Actuated Green, G (s)	28.5	64.9	12.2	43.7	36.4	36.4	48.6					
Effective Green, g (s)	28.5	64.9	12.2	43.7	36.4	36.4	48.6					
Actuated g/C Ratio	0.32	0.73	0.14	0.49	0.41	0.41	0.55					
Clearance Time (s)	4.0	4.6	3.0	4.0	4.6	4.6	3.0					
Vehicle Extension (s)	4.0	2.0	2.0	4.0	2.0	2.0	2.0					
Lane Grp Cap (vph)	1159	1175	248	1625	674	1389	876					
v/s Ratio Prot	0.08	c0.36	c0.06	0.13	0.28	0.28	0.02					
v/s Ratio Perm			0.28				0.06					
v/c Ratio	0.25	0.89	0.43	0.26	0.67	0.67	0.15					
Uniform Delay, d1	22.2	9.1	35.0	13.1	21.3	21.3	9.9					
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
Incremental Delay, d2	0.5	8.1	0.4	0.4	2.1	1.0	0.0					
Delay (s)	22.7	17.2	35.5	13.5	23.4	22.3	9.9					
Level of Service	C	B	D	B	C	C	A					
Approach Delay (s)	18.3			17.2			20.8					
Approach LOS	B			B			A					
<b>Intersection Summary</b>												
HCM 2000 Control Delay	19.2		HCM 2000 Level of Service			B						
HCM 2000 Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	88.7		Sum of lost time (s)			11.6						
Intersection Capacity Utilization	83.9%		ICU Level of Service			E						
Analysis Period (min)	15											
c. Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 3: Nave Dr & US 101 NB Off Ramp

2/4/2015

Movement	EBL	EBR	NBL	NBT	SBR	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	453	306	0	1122	897	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	5.0	5.0	0
Lane Util. Factor	0.97	1.00	0.95	0.95	0.95	0.95
Flpb. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.96	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	3467	1563	3574	3455	3455	3455
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	3467	1563	3574	3455	3455	3455
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	477	322	0	1181	944	294
RTOR Reduction (vph)	0	55	0	0	45	0
Lane Group Flow (vph)	477	267	0	1181	1193	0
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%
Turn Type	Prot	Perm	Prot	Perm	Prot	Perm
Protected Phases	4		2	6	NA	NA
Permitted Phases	4		2	6		
Actuated Green, G (s)	30.3	30.3	27.6	27.6	27.6	27.6
Effective Green, g (s)	30.3	30.3	27.6	27.6	27.6	27.6
Actuated g/C Ratio	0.46	0.46	0.42	0.42	0.42	0.42
Clearance Time (s)	3.0	3.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	1594	718	1496	1447	1447	1447
v/s Ratio Prot	0.14		0.33	c0.35		
v/s Ratio Perm	c0.17					
v/c Ratio	0.30	0.37	0.79	0.82	0.82	0.82
Uniform Delay, d1	11.1	11.6	16.6	17.0	17.0	17.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	1.5	2.6	3.8	3.8	3.8
Delay (s)	11.6	13.1	19.3	20.8	20.8	20.8
Level of Service	B	B	B	C	C	C
Approach Delay (s)	12.2		19.3	20.8		
Approach LOS	B		B	C		

Intersection Summary	EBL	EBR	NBL	NBT	SBR	SBR
HCM 2000 Control Delay	18.1					
HCM 2000 Level of Service	B					
HCM 2000 Volume to Capacity ratio	0.59					
Actuated Cycle Length (s)	65.9					
Sum of lost time (s)	8.0					
Intersection Capacity Utilization	63.7%					
ICU Level of Service	B					
Analysis Period (min)	15					

c. Critical Lane Group

HCM 2010 TWSC  
 4: Nave Dr & Roblar Dr

2/4/2015

Intersection	EBL	EBR	NBL	NBT	SBR	SBR
Int Delay, s/vch	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	20	57	1065	28	51	1152
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	40	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	60	1121	29	54	1213
Major/Minor	Minor1	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1850	575	0	0	1151	0
Stage 1	1136	-	-	-	-	-
Stage 2	714	-	-	-	-	-
Critical Hwy	8.2	8.3	-	-	4.9	-
Critical Hwy Sig 1	7	-	-	-	-	-
Critical Hwy Sig 2	7	-	-	-	-	-
Follow-up Hwy	4.2	4.2	-	-	2.6	-
Plat Cap-1 Maneuver	31	313	-	-	426	-
Stage 1	170	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	27	313	-	-	426	-
Mov Cap-2 Maneuver	107	-	-	-	-	-
Stage 1	170	-	-	-	-	-
Stage 2	275	-	-	-	-	-
Approach	WB	NB	NB	SB	SB	SB
HCM Control Delay, s	26.3		0			0.6
HCM LOS	D					
Minor Lane/Minor Mvmt	NBT	NBR/WBL/NWBLh2	SBL	SBT	SBT	SBT
Capacity (veh/h)	-	107	313	426	-	-
HCM Lane V/C Ratio	-	0.197	0.192	0.126	-	-
HCM Control Delay (s)	-	46.7	19.2	14.7	-	-
HCM Lane LOS	-	E	C	B	-	-
HCM 95th %ile Q(veh)	-	0.7	0.7	0.4	-	-



HCM Signalized Intersection Capacity Analysis  
 5: Nave Dr & Hamilton Pkwy

2/4/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBR
Lane Configurations						
Volume (vph)	173	400	418	264	478	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	12
Total Lost time (s)	3.2	3.0	4.4	4.4	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Frbp. ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	1900	1474	1787	1850
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1599	1900	1474	1787	1900
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	182	421	440	278	503	360
RTOR Reduction (vph)	0	107	0	89	0	0
Lane Group Flow (vph)	182	314	440	189	503	360
Confl. Peds. (#/hr)	2%	1%	0%	0%	1%	0%
Heavy Vehicles (%)	Perm	pm+ov	NA	Perm	Prot	NA
Turn Type	1	2			1	6
Protected Phases	8	8			2	
Permitted Phases	10.7	29.2	19.0	19.0	18.5	40.5
Actuated Green, G (s)	10.7	29.2	19.0	19.0	18.5	40.5
Effective Green, g (s)	0.18	0.50	0.32	0.32	0.31	0.69
Actuated g/C Ratio	3.2	3.0	4.4	4.4	3.0	4.4
Clearance Time (s)	2.0	2.0	3.0	3.0	2.0	3.0
Vehicle Extension (s)	322	794	613	476	562	1274
Lane Grp Cap (vph)	0.12	c0.23			c0.28	0.19
v/s Ratio Prot	0.10	0.07			0.13	
v/s Ratio Perm	0.57	0.40	0.72	0.40	0.90	0.28
v/c Ratio	21.9	9.3	17.5	15.4	19.2	3.5
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	1.4	0.1	4.0	0.5	16.3	0.1
Incremental Delay, d2	23.3	9.4	21.5	16.0	35.5	3.7
Delay (s)	C	A	C	B	D	A
Level of Service	13.6	19.4			22.2	
Approach Delay (s)	B		B		C	
Approach LOS						
Intersection Summary						
HCM 2000 Control Delay	18.9				HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75					
Actuated Cycle Length (s)	58.8				Sum of lost time (s)	10.6
Intersection Capacity Utilization	68.4%				ICU Level of Service	C
Analysis Period (min)	15					
c Critical Lane Group						

Hamilton Fields Traffic Impact Study  
 Saturday Midday Future + Project Maximum

Synchro 8 Report

HCM 2010 TWSC  
 6: Hamilton Pkwy & Project Access

2/4/2015

Intersection	5.9					
Ini Delay, s/veh	5.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	467	282	334	22	7	139
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	492	297	352	23	7	146
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	375	0	-	0	1643	363
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	1280	-
Critical Hwy	4.12	-	-	-	6.42	6.22
Critical Hwy Sig 1	-	-	-	-	5.42	-
Critical Hwy Sig 2	-	-	-	-	5.42	-
Follow-up Hwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1183	-	-	-	110	682
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	261	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1183	-	-	-	55	682
Mov Cap-2 Maneuver	-	-	-	-	55	-
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	131	-
Approach	EB		WB		SB	
HCM Control Delay, s	6.4		0		17.5	
HCM LOS					C	
Minor Lane/Minor Mvmt	EBL	EBT	WBT	WBR	SBL	SBR
Capacity (veh/h)	1183	-	-	-	441	-
HCM Lane V/C Ratio	0.416	-	-	-	0.348	-
HCM Control Delay (s)	10.2	0	-	-	17.5	-
HCM Lane LOS	B	A	-	-	C	-
HCM 95th %ile Q(veh)	2.1	-	-	-	1.5	-

Hamilton Fields Traffic Impact Study  
 Saturday Midday Future + Project Maximum

Synchro 8 Report

2/4/2015  
 HCM Signalized Intersection Capacity Analysis  
 7: Nave Dr & Main Gate Dr

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (vph)	203	108	589	209	97	399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1615	1900	1615	1805	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1805	1615	1900	1615	1805	1881
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	214	114	620	220	102	420
RTOR Reduction (vph)	0	88	0	128	0	0
Lane Group Flow (vph)	214	26	620	92	102	420
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%
Turn Type	Perm	Perm	NA	Perm	Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2		
Actuated Green, G (s)	11.9	11.9	22.1	22.1	8.6	33.4
Effective Green, g (s)	11.9	11.9	22.1	22.1	8.6	33.4
Actuated g/C Ratio	0.23	0.23	0.42	0.42	0.16	0.63
Clearance Time (s)	3.0	3.0	4.1	4.1	3.0	4.4
Vehicle Extension (s)	2.0	2.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	407	364	796	677	294	1192
v/s Ratio Prot			c0.33		0.06	c0.22
v/s Ratio Perm	c0.12	0.02		0.06		
v/c Ratio	0.53	0.07	0.78	0.14	0.35	0.35
Uniform Delay, d1	17.9	16.0	13.2	9.4	19.6	4.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.0	4.4	0.0	0.3	0.1
Delay (s)	18.5	16.1	17.6	9.5	19.8	4.6
Level of Service	B	B	A	B	A	A
Approach Delay (s)	17.7		15.5		7.6	
Approach LOS	B		B		A	
Intersection Summary						
HCM 2000 Control Delay	13.5		HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.63					
Actuated Cycle Length (s)	52.7		Sum of lost time (s)		10.1	
Intersection Capacity Utilization	62.3%		ICU Level of Service		B	
Analysis Period (min)	15					
c Critical Lane Group						

2/4/2015  
 HCM 2010 TWSC  
 8: Nave Dr & US 101 NB Ramps

Intersection	0.5					
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	199	79	810	520	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	-	-	120	-	-	70
Veh in Median Storage, #	0	-	-	0	-	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	209	83	853	547	112
Major/Minor	Minor2	Major1	Major1	Major2	Major2	Major2
Conflicting Flow All	-	-	547	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hwy	-	-	4.12	-	-	-
Critical Hwy Sig 1	-	-	-	-	-	-
Critical Hwy Sig 2	-	-	-	-	-	-
Follow-up Hwy	-	-	2.218	-	-	-
Pot Cap-1 Maneuver	0	0	1022	-	-	0
Stage 1	0	0	-	-	-	0
Stage 2	0	0	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1022	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB	NB	SB	SB	SB
HCM Control Delay, s	0		0.8			0
HCM LOS	A					
Minor Lane/Minor Mvmt	NBL	NBT	EBLn1	SBT		
Capacity (veh/h)	1022	-	-	-	-	-
HCM Lane V/C Ratio	0.081	-	-	-	-	-
HCM Control Delay (s)	8.8	-	0	-	-	-
HCM Lane LOS	A	-	A	-	-	-
HCM 95th %ile Q(veh)	0.3	-	-	-	-	-

Intersection												
Intersection Delay, s/veh											13.8	
Intersection LOS											B	
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	9	7	4	0	100	16	603	0	2	75	73
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	7	4	0	105	17	635	0	2	79	77
Number of Lanes	0	0	1	0	0	1	1	1	0	0	1	0

Approach	EB	WB	WB	EB	NB	SB
Opposing Approach	WB	WB	WB	EB	NB	SB
Opposing Lanes	2	2	1	1	2	2
Conflicting Approach Left	SB	SB	NB	NB	EB	EB
Conflicting Lanes Left	2	2	1	1	1	1
Conflicting Approach Right	NB	NB	SB	SB	WB	WB
Conflicting Lanes Right	1	1	2	2	2	2
HCM Control Delay	10.1	14.8	14.8	14.8	11.9	11.9
HCM LOS	B	B	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	1%	45%	28%	0%	100%	0%
Vol Thru, %	50%	35%	4%	0%	0%	84%
Vol Right, %	49%	20%	68%	100%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	20	363	356	155	73
LT Vol	2	9	100	0	155	0
Through Vol	75	7	16	0	0	61
RT Vol	73	4	247	356	0	12
Lane Flow Rate	158	21	382	374	163	77
Geometry Grp	6	6	7	7	7	7
Degree of Util (X)	0.279	0.04	0.585	0.535	0.324	0.139
Departure Headway (Hd)	6.361	6.757	5.509	5.144	7.149	6.524
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	565	529	654	700	503	549
Service Time	4.4	4.81	3.242	2.877	4.89	4.265
HCM Lane V/C Ratio	0.28	0.04	0.584	0.534	0.324	0.14
HCM Control Delay	11.9	10.1	15.8	13.7	13.3	10.3
HCM Lane LOS	B	B	C	B	B	B
HCM 95th-ile Q	1.1	0.1	3.8	3.2	1.4	0.5

Intersection						
Intersection Delay, s/veh						
Intersection LOS						
Movement	SBU	SBL	SBT	SBR	SBR	SBR
Vol, veh/h	0	155	61	12		
Peak Hour Factor	0.95	0.95	0.95	0.95		
Heavy Vehicles, %	2	2	2	2		
Mvmt Flow	0	163	64	13		
Number of Lanes	0	1	1	0		

Approach	SB	SB
Opposing Approach	NB	NB
Opposing Lanes	1	1
Conflicting Approach Left	WB	WB
Conflicting Lanes Left	2	2
Conflicting Approach Right	EB	EB
Conflicting Lanes Right	1	1
HCM Control Delay	12.3	12.3
HCM LOS	B	B

Lane

Intersection									
Int Delay, s/veh		6.6							
<b>Movement</b>									
Vol, veh/h	WBL	WBR	NBT	NBR	SBL	SBT			
151	78	159	524	129	75				
Conflicting Peds. #/hr	0	0	0	0	0				
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	Stop	-	Free	-	None			
Storage Length	0	0	0	0	100	-			
Veh in Median Storage, #	0	-	0	0	-	0			
Grade, %	0	-	0	0	-	0			
Peak Hour Factor	95	95	95	95	95	95			
Heavy Vehicles, %	2	2	2	2	2	2			
Mvmt Flow	159	82	167	552	136	79			
<b>Major/Minor</b>									
	Minor1	Major1	Major2						
Conflicting Flow All	518	167	0	167	0				
Stage 1	167	-	-	-	-				
Stage 2	351	-	-	-	-				
Critical Hwy	6.42	6.22	-	-	4.12	-			
Critical Hwy Stg 1	5.42	-	-	-	-	-			
Critical Hwy Stg 2	5.42	-	-	-	-	-			
Follow-up Hwy	3.518	3.318	-	-	2.218	-			
Pot Cap-1 Maneuver	518	877	-	0	1411	-			
Stage 1	863	-	-	0	-	-			
Stage 2	713	-	-	0	-	-			
Platoon blocked, %	-	-	-	-	-	-			
Mov Cap-1 Maneuver	468	877	-	-	1411	-			
Mov Cap-2 Maneuver	538	-	-	-	-	-			
Stage 1	863	-	-	-	-	-			
Stage 2	644	-	-	-	-	-			
<b>Approach</b>									
	WB	NB	SB						
HCM Control Delay, s	12.8	0	4.9						
HCM LOS	B								
<b>Minor Lane/Major Mvmt</b>									
	NBT/WBL1/WBLn2	SBL	SBT						
Capacity (veh/h)	-	538	877	1411					
HCM Lane V/C Ratio	-	0.295	0.094	0.096					
HCM Control Delay (s)	-	14.5	9.5	7.8					
HCM Lane LOS	-	B	A	A					
HCM 95th %tile Q(veh)	-	1.2	0.3	0.3					

## Appendix B

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### Trip Generation Analysis Details

DRAFT



## Hamilton Fields Trip Generation Analysis Average Summer-Fall Day

### Hamilton Fields User Group Driving Characteristics and Trip Generation Estimates - Final (1/16/2015)

Program Component	Leagues	Tournaments	Camps/Clinics	Lessons	Ballpark	Park	Training Center	Event Staff	TOTALS
<b>User Assumptions</b>									
Weekday PM activity?	yes	no	yes	yes	yes	yes	yes	yes	-
Weekend midday activity?	no	yes	no	no	yes	yes	yes	yes	-
Average weekday users	430	0	35	95	400	350	332	56	1698
Average weekend users	0	1229	0	0	600	525	332	62	2748
Percent users during weekday p.m. peak	20%	0%	60%	50%	10%	15%	20%	20%	195%
Average p.m. peak users	86	0	21	48	40	53	66	11	325
Percent users during weekend midday peak	0%	13%	0%	0%	15%	12%	20%	20%	
Average weekend peak users	0	160	0	0	90	63	66	12	391
Users per car	2.0	3.5	2.5	2.0	2.5	2.0	2.0	1.0	-
Overlapping games within hour?	yes	yes	no	no	no	yes	no	no	-
Hourly field turnover rate	25%	50%	0%	0%	0%	50%	0%	0%	-
drop-off and return rate	20%	20%	40%	40%	10%	20%	30%	0%	-
<b>Vehicle Trip Generation</b>									
<u>Single Round Trip Vehicles</u>									
average p.m. peak	54	0	8	24	16	40	33	11	186
average weekend peak	0	69	0	0	36	47	33	12	197
<u>2nd Round Trip Vehicles (dropoffs-pickups)</u>									
average p.m. peak	11	0	3	10	2	8	10	0	44
average weekend peak	0	14	0	0	4	9	10	0	37
<u>In/Out Peak Hour Split</u>									
p.m. peak inbound	75%	0%	30%	50%	80%	50%	50%	80%	
p.m. peak outbound	25%	0%	70%	50%	20%	50%	50%	20%	
weekend peak inbound	0%	50%	0%	0%	80%	50%	50%	70%	
weekend peak outbound	0%	50%	0%	0%	20%	50%	50%	30%	
<b>Total Peak Hour Trips</b>									
average p.m. peak	65	0	11	34	18	48	43	11	230
inbound	49	0	3	17	14	24	22	9	138
outbound	16	0	8	17	4	24	21	2	92
average weekend peak	0	83	0	0	40	56	43	12	234
inbound	0	42	0	0	32	28	22	8	132
outbound	0	41	0	0	8	28	21	4	102

### Trip Origins/Destinations (beyond Marin, within Novato, and beyond Novato but within Marin)

User Origin	Leagues	Tournaments	Camps/Clinics	Lessons	Ballpark	Park	Training Center	Event Staff	TOTALS
<b>Visitors (Beyond Marin)</b>									
weekday p.m. peak	0	0	3	2	4	0	11	0	20
inbound	0	0	1	1	3	0	6	0	11
outbound	0	0	2	1	1	0	5	0	9
weekend midday peak	0	50	0	0	8	0	11	0	69
inbound	0	25	0	0	6	0	6	0	37
outbound	0	25	0	0	2	0	5	0	32
<b>Local (Within Novato)</b>									
Novato	40%	10%	30%	30%	30%	90%	30%	50%	
weekday p.m. peak	26	0	3	10	5	43	13	6	106
inbound	20	0	1	5	4	22	7	5	64
outbound	6	0	2	5	1	21	6	1	42
weekend midday peak	0	8	0	0	12	50	13	6	89
inbound	0	4	0	0	10	25	7	4	50
outbound	0	4	0	0	2	25	6	2	39
<b>Beyond Novato Within Marin</b>									
weekday p.m. peak	39	0	5	22	9	5	19	6	105
inbound	29	0	1	11	7	2	10	5	65
outbound	10	0	4	11	2	3	9	1	40
weekend midday peak	0	25	0	0	20	6	19	6	76
inbound	0	13	0	0	16	3	10	4	46
outbound	0	12	0	0	4	3	9	2	30

## Hamilton Fields Trip Generation Analysis Maximum Use with Major Ballpark Event

### Hamilton Fields User Group Driving Characteristics and Trip Generation Estimates - Final (1/16/2015)

Program Component	Leagues	Tournaments	Camps/Clinics	Lessons	Ballpark	Park	Training Center	Event Staff	TOTALS
<b>User Assumptions</b>									
Weekday PM activity?	yes	no	yes	yes	yes	yes	yes	yes	-
Weekend midday activity?	no	yes	no	no	yes	yes	yes	yes	-
Maximum weekday users	473	0	44	118	500	450	332	56	1973
Maximum weekend users	0	1352	0	0	1020	675	332	70	3449
Percent users during weekday p.m. peak	20%	0%	60%	50%	90%	15%	20%	50%	305%
Maximum p.m. peak users	95	0	26	59	450	68	66	28	792
Percent users during weekend midday peak	0%	13%	0%	0%	90%	12%	20%	50%	
Maximum weekend peak users	0	176	0	0	918	81	66	35	1276
Users per car	2.0	3.5	2.5	2.0	2.5	2.0	2.0	1.0	-
Overlapping games within hour?	yes	yes	no	no	no	yes	no	no	-
Hourly field turnover rate	25%	50%	0%	0%	0%	50%	0%	0%	-
drop-off and return rate	20%	20%	40%	40%	5%	20%	30%	0%	-
<b>Vehicle Trip Generation</b>									
<u>Single Round Trip Vehicles</u>									
maximum p.m. peak	59	0	10	30	180	51	33	28	391
maximum weekend peak	0	75	0	0	367	61	33	35	571
<u>2nd Round Trip Vehicles (dropoffs-pickups)</u>									
maximum p.m. peak	12	0	4	12	9	10	10	0	57
maximum weekend peak	0	15	0	0	18	12	10	0	55
<u>In/Out Peak Hour Split</u>									
p.m. peak inbound	75%	0%	30%	50%	80%	50%	50%	80%	
p.m. peak outbound	25%	0%	70%	50%	20%	50%	50%	20%	
weekend peak inbound	0%	50%	0%	0%	90%	50%	50%	90%	
weekend peak outbound	0%	50%	0%	0%	10%	50%	50%	10%	
<b>Total Peak Hour Trips</b>									
maximum p.m. peak	71	0	14	42	189	61	43	28	448
inbound	53	0	4	21	151	31	22	22	304
outbound	18	0	10	21	38	30	21	6	144
maximum weekend peak	0	90	0	0	385	73	43	35	626
inbound	0	45	0	0	347	37	22	32	483
outbound	0	45	0	0	38	36	21	3	143

### Trip Origins/Destinations (beyond Marin, within Novato, and beyond Novato but within Marin)

User Origin	Leagues	Tournaments	Camps/Clinics	Lessons	Ballpark	Park	Training Center	Event Staff	TOTALS
<b>Visitors (Beyond Marin)</b>									
weekday p.m. peak	0	0	4	2	38	0	11	0	55
inbound	0	0	1	1	30	0	6	0	38
outbound	0	0	3	1	8	0	5	0	17
weekend midday peak	0	54	0	0	77	0	11	0	142
inbound	0	27	0	0	69	0	6	0	102
outbound	0	27	0	0	8	0	5	0	40
<b>Local (Within Novato)</b>									
<u>Novato</u>	40%	10%	30%	30%	30%	90%	30%	50%	
weekday p.m. peak	28	0	4	13	57	55	13	14	184
inbound	21	0	1	6	45	28	7	11	119
outbound	7	0	3	7	12	27	6	3	65
weekend midday peak	0	9	0	0	116	66	13	18	222
inbound	0	5	0	0	104	33	7	16	165
outbound	0	4	0	0	12	33	6	2	57
<b>Beyond Novato Within Marin</b>									
weekday p.m. peak	43	0	6	27	95	6	19	14	210
inbound	32	0	2	14	76	3	10	11	148
outbound	11	0	4	13	19	3	9	3	62
weekend midday peak	0	27	0	0	193	7	19	18	264
inbound	0	14	0	0	174	4	10	16	218
outbound	0	13	0	0	19	3	9	2	46

Note: blue cells reflect values that differ from average day



## Appendix C

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Queuing Calculations

DRAFT



Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	81	311	332	47	271	254
Lane Group Flow (vph)	0.41	0.39	0.34	0.06	0.63	0.17
v/c Ratio	34.3	3.1	12.8	6.1	25.7	1.1
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	34.3	3.1	12.8	6.1	25.7	1.1
Total Delay	33	0	82	3	72	5
Queue Length 50th (ft)	68	37	162	21	116	9
Queue Length 95th (ft)	528	1636				
Internal Link Dist (ft)	115			50	190	481
Turn Bay Length (ft)	581	792	989	783	430	1511
Base Capacity (vph)	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.39	0.34	0.06	0.63	0.17
<b>Intersection Summary</b>						

Hamilton Fields Traffic Impact Study  
PM Peak Hour Existing Conditions

Synchro 8 Report

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	124	355	332	107	344	254
Lane Group Flow (vph)	0.52	0.38	0.42	0.16	0.59	0.17
v/c Ratio	35.4	2.8	17.8	6.6	17.0	1.5
Control Delay	0.0	0.0	0.0	0.0	0.0	0.0
Queue Delay	35.4	2.8	17.8	6.6	17.0	1.5
Total Delay	51	6	100	7	82	5
Queue Length 50th (ft)	93	40	178	38	126	27
Queue Length 95th (ft)	528	1636				
Internal Link Dist (ft)	115			50	190	481
Turn Bay Length (ft)	581	941	782	652	586	1471
Base Capacity (vph)	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.38	0.42	0.16	0.59	0.17
<b>Intersection Summary</b>						

Hamilton Fields Traffic Impact Study  
PM Peak Hour Existing + Project Average

Synchro 8 Report

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	150	380	332	190	423	254
v/c Ratio	0.57	0.38	0.48	0.30	0.65	0.18
Control Delay	35.8	3.0	20.1	6.8	21.1	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	3.0	20.1	6.8	21.1	1.9
Queue Length 50th (ft)	61	10	108	14	102	7
Queue Length 95th (ft)	107	48	178	55	#320	39
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	581	1003	689	623	650	1447
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.38	0.48	0.30	0.65	0.18

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	102	431	509	60	343	393
v/c Ratio	0.50	0.61	0.51	0.08	0.77	0.26
Control Delay	41.3	14.8	10.4	4.1	29.6	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	14.8	10.4	4.1	29.6	1.8
Queue Length 50th (ft)	49	101	71	2	102	13
Queue Length 95th (ft)	91	147	283	17	157	56
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	508	729	999	785	477	1525
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.59	0.51	0.08	0.72	0.26

Intersection Summary

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	145	475	509	121	417	393
v/c Ratio	0.60	0.55	0.64	0.19	0.75	0.28
Control Delay	42.3	11.2	16.4	3.9	24.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	11.2	16.4	3.9	24.0	2.3
Queue Length 50th (ft)	69	101	76	2	106	34
Queue Length 95th (ft)	118	154	#380	24	226	51
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	508	860	793	643	559	1421
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	11	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.56	0.64	0.19	0.75	0.28

**Intersection Summary**  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	171	500	509	204	496	393
v/c Ratio	0.64	0.52	0.78	0.37	0.74	0.28
Control Delay	42.3	9.3	23.2	4.8	23.6	2.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	42.3	9.4	23.2	4.8	23.6	2.5
Queue Length 50th (ft)	81	92	225	0	118	33
Queue Length 95th (ft)	134	169	#367	26	#405	54
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	508	969	650	558	667	1394
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	34	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.53	0.78	0.37	0.74	0.28

**Intersection Summary**  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	86	260	327	32	193	268
v/c Ratio	0.25	0.31	0.49	0.06	0.37	0.18
Control Delay	18.9	2.7	13.4	5.8	17.2	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	2.7	13.4	5.8	17.2	2.9
Queue Length 50th (ft)	17	0	58	1	35	18
Queue Length 95th (ft)	59	34	122	13	114	45
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	1159	873	1374	1072	560	1708
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.30	0.24	0.03	0.34	0.16

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	135	314	327	92	268	268
v/c Ratio	0.38	0.34	0.52	0.17	0.55	0.20
Control Delay	20.8	2.5	15.5	5.7	23.9	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	2.5	15.5	5.7	23.9	3.9
Queue Length 50th (ft)	28	0	64	4	54	20
Queue Length 95th (ft)	85	36	133	27	201	54
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	1033	942	1225	973	498	1661
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.33	0.27	0.09	0.54	0.16

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	156	335	327	277	447	268
v/c Ratio	0.43	0.35	0.53	0.45	0.92	0.21
Control Delay	21.4	2.5	15.9	6.4	50.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	2.5	15.9	6.4	50.3	4.1
Queue Length 50th (ft)	33	0	65	13	104	21
Queue Length 95th (ft)	96	37	137	56	#374	58
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	1007	952	1194	1001	486	1637
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.35	0.27	0.28	0.92	0.16
<b>Intersection Summary</b>						
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.						

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	115	349	440	43	260	360
v/c Ratio	0.36	0.40	0.65	0.08	0.52	0.26
Control Delay	24.6	5.3	19.0	8.6	21.9	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	5.3	19.0	8.6	21.9	3.7
Queue Length 50th (ft)	28	19	97	4	62	30
Queue Length 95th (ft)	87	77	224	23	162	71
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	947	1052	1226	957	748	1703
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.33	0.36	0.04	0.35	0.21
<b>Intersection Summary</b>						

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	162	401	440	101	332	360
v/c Ratio	0.47	0.45	0.66	0.18	0.63	0.26
Control Delay	27.4	6.1	21.3	9.3	26.3	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	6.1	21.3	9.3	26.3	4.2
Queue Length 50th (ft)	48	29	122	12	92	36
Queue Length 95th (ft)	117	102	240	43	#253	85
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	859	1009	1134	898	679	1622
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.40	0.39	0.11	0.49	0.22

**Intersection Summary**  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Queues  
5: Nave Dr & Hamilton Pkwy

2/4/2015

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	182	421	440	278	503	360
v/c Ratio	0.57	0.43	0.72	0.49	0.90	0.28
Control Delay	30.7	6.0	25.3	11.9	46.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	6.0	25.3	11.9	46.0	4.7
Queue Length 50th (ft)	59	34	132	37	168	38
Queue Length 95th (ft)	130	110	246	103	#450	91
Internal Link Dist (ft)	528		1636			481
Turn Bay Length (ft)	115			50	190	
Base Capacity (vph)	708	974	938	793	559	1564
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.43	0.47	0.35	0.90	0.23

**Intersection Summary**  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.