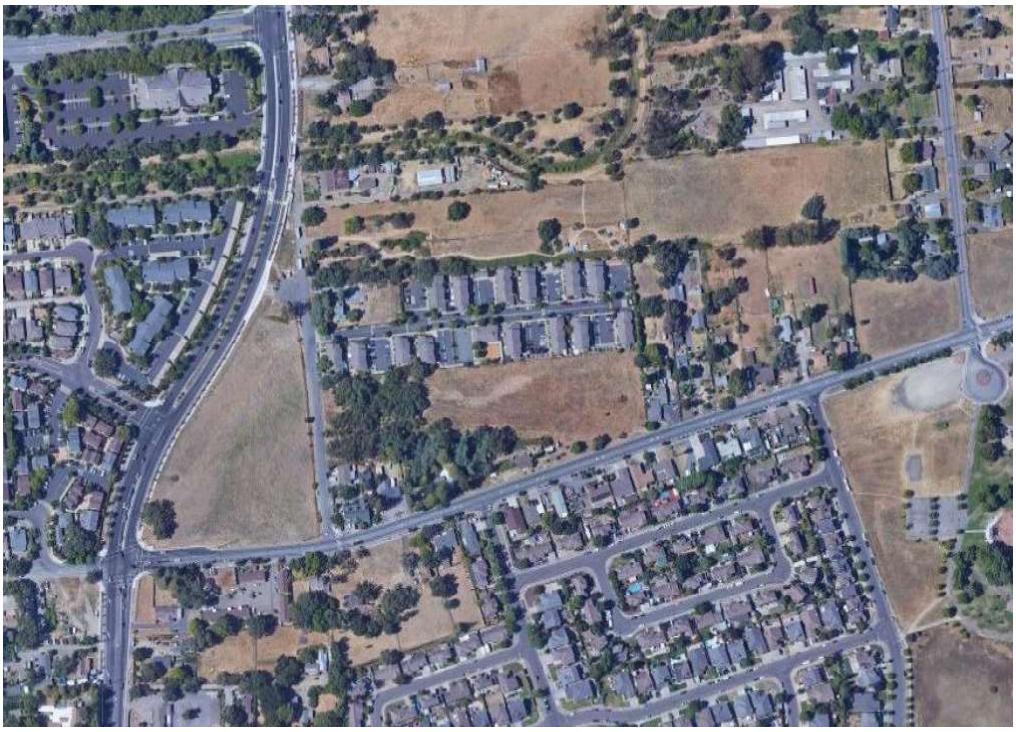
Traffic Impact Study for Stony Oaks Apartments



Prepared for the City of Santa Rosa

Submitted by
W-Trans

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Executive Summary

The proposed Stony Oaks project consists of a 142-unit affordable apartments complex to be located on a currently vacant site at 2542 Old Stony Point Road in the City of Santa Rosa. The project would take access from a driveway on Old Stony Point Road as well as a driveway on Hearn Avenue. The project would be expected to generate 772 trips per day, including 51 trips during the weekday a.m. peak hour and 62 trips during the weekday p.m. peak hour.

Analysis indicates that four of the five study intersections operate acceptably per the applicable City standards under Existing and Baseline Conditions and would continue to do so with the addition of project traffic. The intersection at Hearn Avenue/Burbank Avenue would operate acceptably overall under Existing and Existing plus Project conditions, though would encounter LOS E or F operation on the stop-controlled southbound leg; the peak hour signal warrant would remain unmet. Under Baseline and Baseline plus Project conditions, delays at the intersection would increase, and the peak hour signal warrant would be met both without and with the proposed project. The proposed project would be expected to increase overall delays at the intersection by 1.7 to 2.2 seconds under Baseline conditions, which falls below the City's significance criteria of five seconds. The City of Santa Rosa plans to signalize the intersection as detailed in the 2016 *Roseland Area/Sebastopol Road Specific Plan*. Installation of a signal would be expected improve LOS to acceptable levels under both near-term and long-range conditions. As indicated by the City, the project should contribute its proportionate share of $29,760 toward signalization of the intersection.

The project site is in an area of Santa Rosa that has a baseline residential VMT per capita that is more than 15 percent below the Countywide average, falling below the City's significance thresholds contained in the *Vehicle Miles Traveled (VMT) Guidelines Final Draft*. As a 100 percent affordable residential development, the project also qualifies for VMT screening criteria established by the City of Santa Rosa. Given these conditions, the project may be presumed to have a less than significant VMT impact.

Existing pedestrian and bicycle facilities in the project vicinity, including sidewalks and Class II bike lanes on Hearn Avenue and Stony Point Road, will adequately serve these modes upon completion of the sidewalk frontage improvements to be installed as part of the project. Santa Rosa CityBus transit routes also operate within a walkable distance of the project site and would be accessible via the sidewalk system. Project residents would be able to walk to surrounding areas and transit stops via the project's connection to Old Stony Point Road and existing sidewalk facilities including those on the south side of Hearn Avenue. Additional pedestrian connectivity options would exist in the future once continuous sidewalks are constructed on adjacent properties along the north side of Hearn Avenue.

Sight lines are currently adequate at the project driveways to accommodate all turns into and out of the site. To maintain existing sight lines, it is recommended that any new signage and taller landscaping to be installed along the project frontage be placed outside of the vision triangle of a driver waiting on each driveway. The site would provide effective access and circulation for emergency response vehicles.

The project would qualify for State density bonus provisions that require a minimum of 185 parking spaces, which equals the proposed supply. The project would provide both long-term and short-term bicycle parking in excess of that required by the City's zoning code.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of the proposed Stony Oaks Apartments project to be located at 2542 Old Stony Point Road in the City of Santa Rosa. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa, reflects a scope of work and study area reviewed and approved by City staff, 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 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 to mitigate these impacts to a level of insignificance and reduce adverse effects to an acceptable level as defined by the City's General Plan or other policies. Vehicular traffic operational effects 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 effect the new traffic would be expected to have on critical intersections or roadway segments. While the traffic operational analysis is required by the City and used to confirm consistency with General Plan policies, it is not used for CEQA purposes, consistent with updates to the CEQA guidelines adopted by the State of California. CEQA transportation impacts are assessed through analysis of vehicle miles traveled (VMT), with evaluation of non-auto modes including access for pedestrians, bicyclists, and to transit, and circulation safety.

Project Profile

The proposed project includes the development of 142 affordable apartments on a site that is currently vacant, as shown in Figure 1. The project would include a driveway onto Old Stony Point Road as well as a driveway onto Hearn Avenue near the eastern project boundary.

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Traffic Impact Study for Stony Oaks Apartments

Figure 1 – Study Area and Existing Lane Configurations

W-Trans

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the sections of Hearn Avenue and Old Stony Point Road fronting the project site as well as the following intersections.

1. Stony Point Road/Northpoint Parkway
2. Stony Point Road/Hearn Avenue
3. Hearn Avenue/Old Stony Point Road
4. Hearn Avenue/Burbank Avenue
5. Hearn Avenue/Dutton Meadow

Operating conditions during the a.m. and p.m. 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 morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while 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.

Study Intersections

Stony Point Road/Northpoint Parkway is a signalized tee intersection with protected-permitted left-turn phasing including flashing yellow arrow (FYA) signal heads on the northbound approach. There are crosswalks on the north and west legs of the intersection.

Stony Point Road/Hearn Avenue is a signalized intersection with protected left-turn phasing on all approaches, and a right-turn overlap phase on the westbound approach. Crosswalks are provided on all legs.

Stony Point Road/Old Stony Point Road is a three-legged unsignalized intersection that is stop-controlled on the southbound Old Stony Point Road approach. A left-turn lane is provided on the eastbound Hearn Avenue approach, and the east leg has a two-way left-turn lane. A marked crosswalk with rapid rectangular flashing beacon (RRFB) pedestrian crossing lights is located on the east intersection leg.

Hearn Avenue/Burbank Avenue is an unsignalized intersection that is stop-controlled on the northbound Southwest Community Park access and the southbound Burbank Avenue approach. Left-turn lanes are provided on the eastbound and westbound Hearn Avenue approaches and the east leg has a marked crosswalk.

Hearn Avenue/Dutton Meadow is a three-legged signalized intersection. The westbound left-turn has protected phasing, along with overlap phasing for the northbound right-turn movement. The west leg has a crosswalk and curb ramps.

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

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published

in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is November 1, 2014 through October 31, 2019.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). These average rates statewide are for intersections in the same environment (urban), with the same number of approaches (three or four), and the same controls (two-way stop or signalized). Collision rates for three of the five study intersections were above the statewide average so were further reviewed. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates for the Study Intersections

Study Intersection	Number of Collisions (2014-2019)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Stony Point Rd/Northpoint Pkwy	15	**0.35**	0.28
2. Stony Point Rd/Hearn Ave	15	0.38	0.43
3. Hearn Ave/Old Stony Point Rd	2	0.12	0.14
4. Hearn Ave/Burbank Ave	6	**0.25**	0.23
5. Hearn Ave/Dutton Meadow	9	**0.33**	0.28

Note: c/mve = collisions per million vehicles entering; **Bold** text = higher collision rate than statewide average

The collision rate at Stony Point Road/Northpoint Parkway is higher than the statewide average, with 13 of the 15 reported collisions being either rear-end, hit object or right-angle collisions. Rear-end crashes are common at signalized intersections during congested conditions. Right-angle collisions can result from right-of-way violations. It is noted that this intersection was within a construction zone for a long period during the Stony Point Road widening project; 11 of the 15 crashes occurred prior to completion of the Stony Point Road widening, and collision frequency has decreased since that time.

The predominant crash type at Hearn Avenue/Burbank Avenue was right-angle collisions. Three of the five right-angle crashes involved vehicles entering Hearn Avenue from either Burbank Avenue or the Southwest Community Park and two involved vehicles turning into Burbank Avenue or the Park from Hearn Avenue. It is understood that the City has added signalization of this intersection to the Capital Improvement Program (CIP), and such an installation would reduce the frequency of these types of crashes.

Review of the collisions reported at Hearn Avenue/Dutton Meadow indicates that 7 of the 10 collisions were rear-end collisions, which occurred on the westbound and eastbound approaches to the intersection. The most common primary collision factor cited was unsafe speed. An increased enforcement presence may help to reduce the frequency of these types of collisions.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the proposed project site where property has been developed; however, sidewalk gaps can be found along streets near the project site.

- **Hearn Avenue** – Several sections of sidewalk are provided from Stony Point Road to Dutton Meadow, but there are large gaps in sidewalk coverage on both sides of Hearn Avenue. In these areas with no sidewalk, pedestrians walk on paved shoulders or cross Hearn Avenue to access the segments of Hearn Avenue that include a sidewalk. Lighting is provided by overhead lights, mainly on the north side of the street.

- **Old Stony Point Road** – The east side of this minor street currently has a combination of sidewalks and asphalt paths separated from vehicle lanes by an asphalt berm. The sidewalks and paths connect to existing facilities on Hearn Avenue and Stony Point Road.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, Class II bike lanes exist on Hearn Avenue between Stony Point Road and Dutton Meadow, extending eastward to the SMART multi-use pathway. Continuous bicycle lanes also exist on Stony Point Road within the study area, extending northward over four miles through much of western Santa Rosa. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018.*

Table 2 - Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Hearn Ave	II	1.15	Stony Point Rd	Whitewood Dr
Stony Point Rd-Marlow Rd	II	4.80	Piner Rd	Bellevue Ave
Planned				
Burbank Ave	II	1.00	Roundelay Ln	Hearn Ave
Dutton Meadow	II	0.86	Hearn Ave	Bellevue Ave
Northpoint Pkwy	IV	0.33	Stony Point Rd	Burbank Ave

Source: *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018*, City of Santa Rosa, 2018

Transit Facilities

Santa Rosa CityBus provides fixed route bus service in Santa Rosa. Routes 12 and 15 serve the study area seven days a week. Route 15 stops on Stony Point Road just north of Pearblossom Drive near the northern terminus of Old Stony Point Road; the northbound bus stop is approximately 450 feet from the proposed project's driveway on Old Stony Point Road, and the southbound bus stop is approximately 800 feet from the project driveway. Route 15 also stops at the intersection of Hearn Avenue/Arrowhead Drive, approximately 650 feet southeast of the

project's Old Stony Point Road driveway. Routes 12 and 15 stop at Southwest Community Park, which is approximately 120 feet south of the intersection of Hearn Avenue/ Burbank Avenue, and roughly one-half mile east of the project site. The bus stops on Hearn Avenue and Southwest Community Park are accessible from the project site via Old Stony Point Road and existing sidewalks on the south side of Hearn Avenue.

Route 12 operates Monday through Friday with approximately one-hour headways between 6:15 a.m. and 7:15 p.m. Weekend service operates with approximately one-hour headways between 10:15 a.m. and 4:15 p.m. Route 15 operates Monday through Friday with approximately one-hour headways between 6:20 a.m. and 7:20 p.m. Weekend service operates with approximately one-hour headways between 10:20 a.m. and 4:20 p.m. These schedules are indicative of pre COVID-19 conditions but are anticipated to resume in the future.

Two to three bicycles can be carried on most CityBus buses. Bike rack space is on a first-come, first-served basis.

Paratransit, also known as dial-a-ride, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. CityBus paratransit is contracted out to MV Transportation and is designed to serve the needs of individuals with disabilities within three-quarters (3/4) of a mile from existing CityBus routes. Paratransit service is available seven days a week, but rides must be scheduled one day in advance.

Capacity Analysis

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, 6th Edition, 2018. 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 intersections that are 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 the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from City of Santa Rosa.

The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – Intersection Level of Service Criteria

LOS	Two-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. 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 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 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 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 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 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 6th Edition, 2018

Traffic Operation Standards

The City of Santa Rosa establishes measures of effectiveness for traffic operational analyses in *Guidance for the Preparation of Traffic Operational Analysis*, July 2019. This document refers to and builds upon the following policies included in section 5.8 (Transportation Goals & Policy) of the City of Santa Rosa General Plan.

T-D-1 *Maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting the standard include:*

- *Within downtown;*
- *Where attainment would result in significant degradation;*
- *Where topography or impacts makes the improvement impossible; or*
- *Where attainment would ensure loss of an area's unique character.*

The LOS is to be calculated using the average traffic demand over the highest 60-minute period.

Traffic Engineering Division will require a level of service evaluation of arterial and collector corridors if deemed necessary.

T-D-2 *Monitor level of service at intersections to assure that improvements or alterations to improve corridor level of service do not cause severe impacts at any single intersection.*

General interpretation of Policy T-D-2. The impact to an intersection is considered adverse if the project related and/or future trips result in:

1. The level of service (LOS) at an intersection degrading from LOS D or better to LOS E or F, OR
2. An increase in average vehicle delay of greater than 5 seconds at a signalized intersection where the current LOS is either LOS E or F.
3. Queuing impacts based on a comparative analysis between the design queue length and the available queue storage capacity. Impacts include, but are not limited to, spillback queue at project access locations (both ingress and egress), turn lanes at intersections, lane drops, spill back that impacts upstream intersections or interchange ramps.
4. Exceptions may be granted under the following conditions:
   a. Within downtown,
   b. Where attainment would result in significant degradation,
   c. Where topography or impacts makes the improvement impossible; or
   d. Where attainment would ensure loss of an area's unique character.

T-C-3 *Implement traffic calming techniques on streets subject to high speed and/or cut-through traffic, in order to improve neighborhood livability, Techniques Include:*

- *Narrow Streets*
- *On-street parking*
- *Choker or diverters*
- *Decorative crosswalks*
- *Planted islands*

General interpretation of Policy T-C-3. An impact is considered adverse if the project has the potential to alter community character by significantly increasing cut-through traffic, unexpected vehicle maneuvers or commercial vehicle trips in a residential area.

T-H-3 *Require new development to provide transit improvements, where a rough proportionality to demand from the project is established. Transit improvements may include:*

- *Direct and paved pedestrian access to transit stops*
- *Bus turnouts and shelters*
- *Lane width to accommodate buses.*

General interpretation of Policy T-H-3. An impact is considered adverse if the project has the potential to disrupt existing transit operations or establishes transit facilities and equipment such that it creates a sight distance deficiency or vehicle conflict point.

T-J *Provide attractive and safe streets for pedestrian and bicyclists.*

General interpretation of Policy T-J. An impact is considered adverse if the project generates 20 pedestrians in any single hour at an unsignalized intersection, mid-block crossing or where no crossing has been established.

An impact is further considered significant if the project interrupts existing or proposed pedestrian, bicycle and transit facilities, path or travel, direct access resulting in excessive rerouting or creates a vehicle conflict condition which affects the safety of other roadway users.

Use of LOS E or F at Unsignalized Intersections

On sections of certain arterial streets, it is typical to have all side streets operating at LOS E or F with long traffic delays, even where side street volumes are very low. In fact, it may be operationally, physically, and/or financially infeasible to provide mitigation which would allow LOS D or better operation from all side streets during peak hours. The most typical mitigation measure used to improve operation for the side street is a traffic signal, and it is both operationally and financially undesirable to provide a traffic signal at every intersection along most street segments. For these reasons, mitigation measures were considered when only when LOS F conditions were projected for minor movements at unsignalized intersections.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes.

Because the COVID-19 pandemic has had a substantial effect on traffic patterns, the existing volumes applied in this analysis have been adjusted to reflect non-pandemic conditions using a combination of new and previously obtained counts. Traffic counts at the intersections of Stony Point Road/Northpoint Parkway, Stony Point Road/Hearn Avenue, and Hearn Avenue/Dutton Meadow from 2017 and 2018 were factored by a growth rate of one percent per year to reflect current conditions. Counts obtained in September 2019 at Hearn Avenue/Burbank Avenue were directly applied. New counts were obtained at the Hearn Avenue/Old Stony Point Road intersection in December 2020. Growth factors were applied to these volumes based on a comparison of COVID versus non-COVID volumes on the segment of Hearn Avenue between Stony Point Road and Old Stony Point Road, and in consideration of the traffic volumes that would typically be expected on Old Stony Point Road based on the approximately 70 apartments and five single-family homes that currently rely on the street for access. This approach was discussed with and approved by the City's Traffic Engineer.

Under existing conditions, all study intersections are operating acceptably overall. Although the intersection of Hearn Avenue/Burbank Avenue is operating acceptably at LOS A overall, the City is aware of the high delays experienced on the southbound approach and has plans to signalize the intersection, as detailed in the 2016

Roseland Area/Sebastopol Road Specific Plan. The installation of a signal would be expected to reduce the delays on the southbound approach to an acceptable Level of Service.

The existing traffic volumes are shown in Figure 2. A summary of the intersection Level of Service calculations is contained in Table 4, and copies of the calculations are provided in Appendix B.

Table 4 - Existing Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Stony Point Rd/Northpoint Pkwy	8.4	A	18.9	B
2. Stony Point Rd/Hearn Ave	39.7	D	29.1	C
3. Hearn Ave/Old Stony Point Rd	0.4	A	0.9	A
Southbound (Old Stony Point Rd) Approach	*11.6*	*B*	*12.8*	*B*
4. Hearn Ave/Burbank Ave	8.6	A	6.9	A
Southbound (Burbank Ave) Approach	*62.4*	*F*	*49.8*	*E*
5. Hearn Ave/Dutton Meadow	15.8	B	9.1	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*

Baseline Conditions

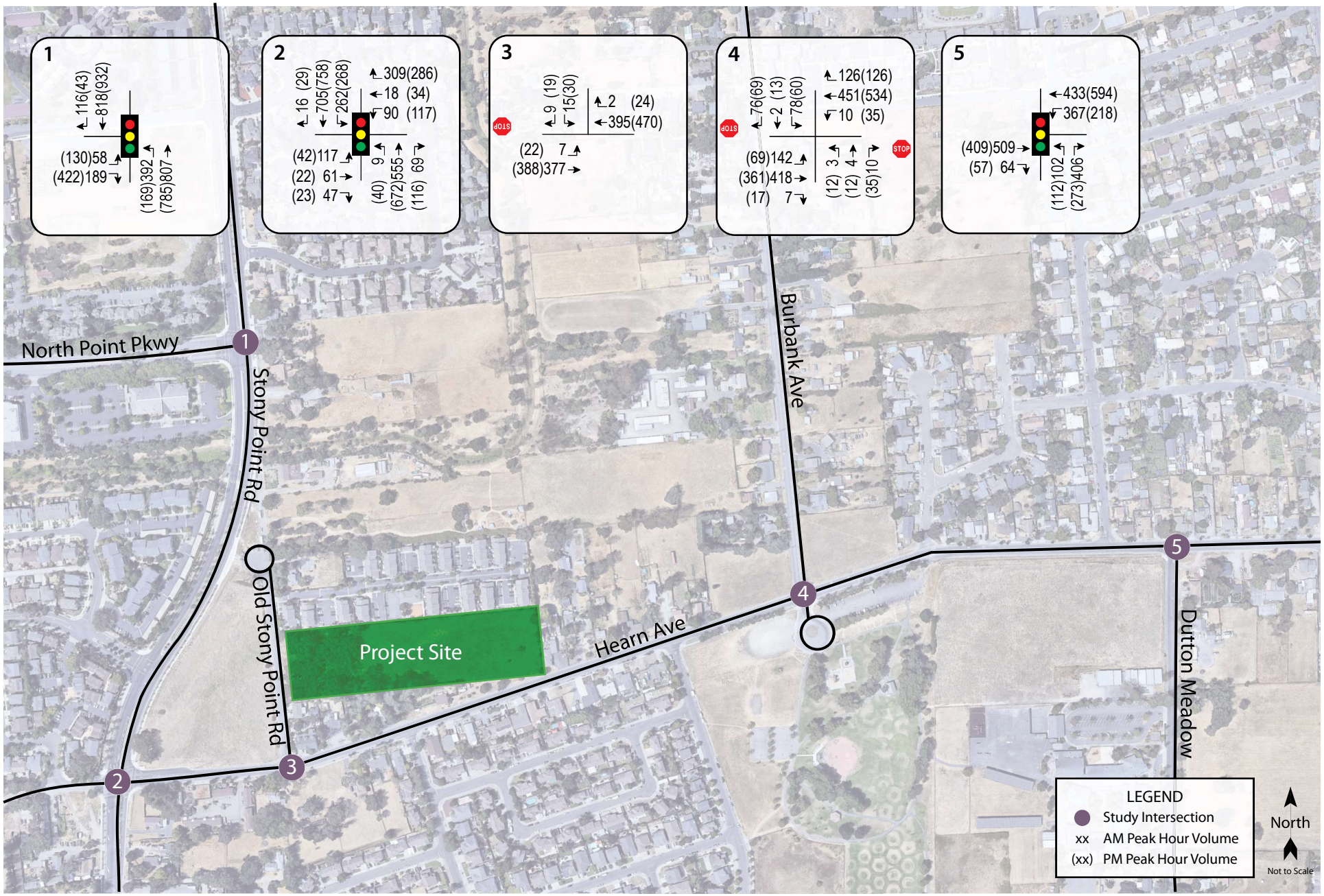
Baseline (Existing plus Approved) operating conditions were assessed with traffic from approved projects in and near the study area added to the Existing volumes. As directed by staff, the following ten projects contained in the *Citywide Summary of Pending Development* report published by the City in May 2020 were included in the evaluation of Baseline Conditions. Unless stated otherwise, the same trip generation and distribution assumptions used in the traffic studies for the various projects, where available, were used in this analysis.

Southwest Estates is an approved 60 single-family residence development at 533 Bellevue Avenue. As contained in the *Traffic Impact Study for the Southwest Estates*, W-Trans, August 2008, the project is expected to generate a total of 566 trips per day, including 44 trips during the a.m. peak hour and 59 trips during the p.m. peak hour.

Burbank Avenue Subdivision includes an approved 64 apartments and 74 single-family dwellings at 1400 Burbank Avenue. As contained in the *Traffic Impact Study for the Burbank Avenue Subdivision*, W-Trans, December 2019, the project is expected to generate a total of 1,158 trips per day, including 83 trips during the a.m. peak hour and 108 trips during the p.m. peak hour.

Somerset Place has been approved with 32 single-family dwelling units at 2786 Dutton Meadow. The trip generation for this project (as well as others with no available traffic studies) was calculated using standard rates published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*, 10th Edition. The project is expected to generate 302 daily trips on average, with 24 trips during the morning peak period and 32 trips during the evening peak period.

Meadowood Ranch is an approved single-family residential development with 78 units at 2853 Dutton Meadow. The project is expected to generate 736 daily trips on average, with 58 trips during the morning peak period and 77 trips during the evening peak period.



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Traffic Impact Study for Stony Oaks Apartments

Figure 2 – Existing Traffic Volumes

Bellevue Ranch 7 is an approved 30-unit development of single-family dwellings at 2903 Dutton Meadow. The project is expected to generate 283 daily trips on average, with 22 trips during the morning peak period and 30 trips during the evening peak period.

Lantana Place is an approved 48 single-family dwelling development at 2979 Dutton Meadow. The project is expected to generate 453 daily trips on average, with 36 trips during the morning peak period and 48 trips during the evening peak period.

Air Center East Phase 2 includes 133 single-family dwellings approved for 1301 Ludwig Avenue. The project is expected to generate 1,256 daily trips on average, with 98 trips during the morning peak period and 132 trips during the evening peak period.

Stony Village North has been approved with 47 single-family dwellings at 2729 Stony Point Road. As contained in the *Traffic Impact Study for the Stony Village North Project*, W-Trans, January 2016, the project is expected to generate a total of 436 trips per day, including 34 trips during the a.m. peak hour and 45 trips during the p.m. peak hour.

Grove Village is an approved 157 single-family dwelling project at 2880 Stony Point Road. The project is expected to generate 1,482 daily trips on average, with 116 trips during the morning peak period and 155 trips during the evening peak period.

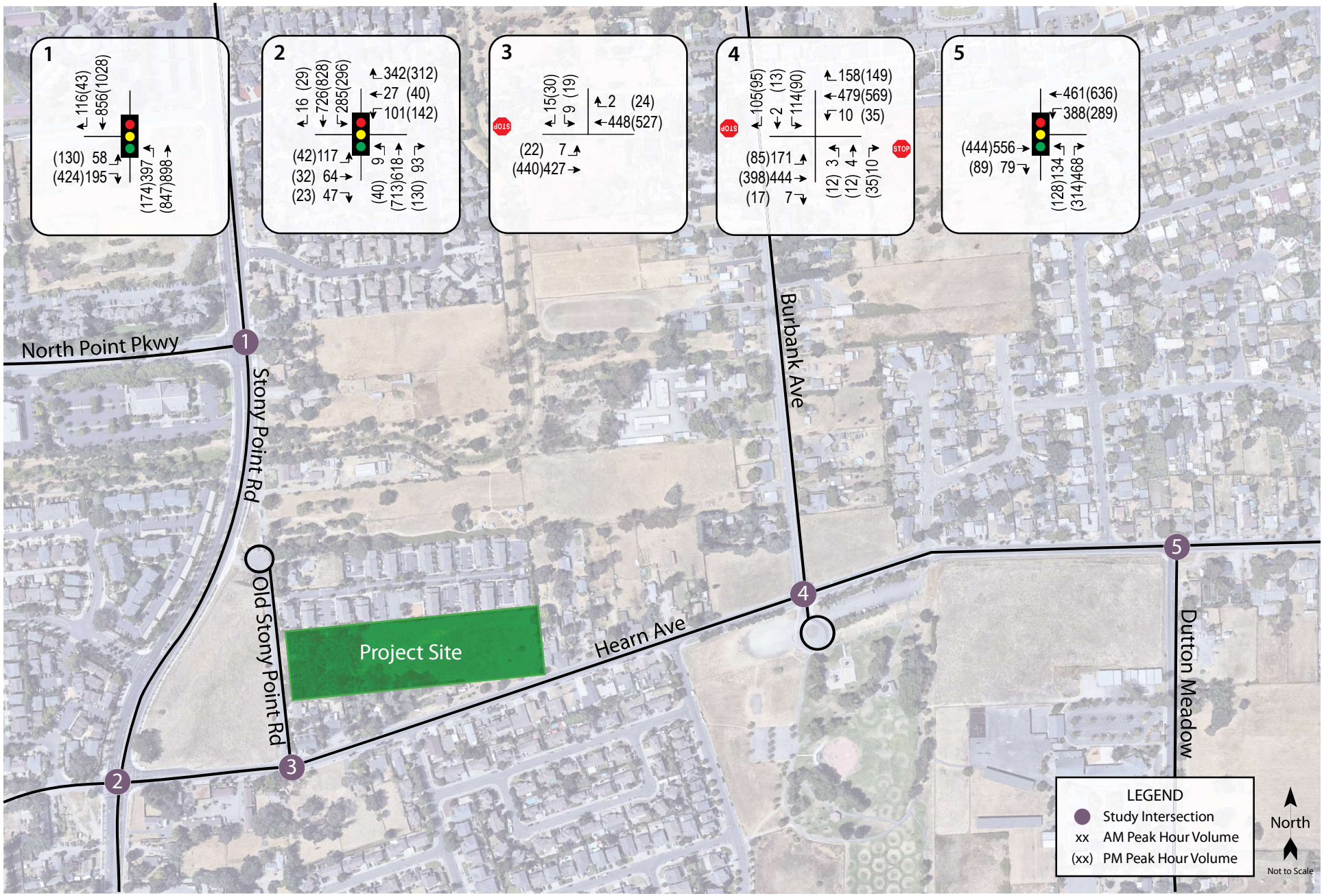
Roseland Accelerated Middle School as proposed would relocate an existing 300-student middle school campus to the Roseland Creek Elementary School site on Burbank Avenue. The project is expected to generate 567 trips per day, including 189 trips during the morning peak hour and 105 trips during the evening peak hour.

Upon adding trips from the approved projects to Existing volumes, the study intersections are expected to continue operating at acceptable service levels overall. The southbound approach at Hearn Avenue/Burbank Avenue would experience increased delays and LOS F operation, and the "peak hour" signal warrant would be met (see additional signal warrant discussion under Access and Circulation). These results are summarized in Table 5 and Baseline volumes are shown in Figure 3.

Table 5 - Baseline Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	AM Peak		PM Peak	
	Delay	**LOS**	**Delay**	**LOS**
1. Stony Point Rd/Northpoint Pkwy	8.4	A	19.7	B
2. Stony Point Rd/Hearn Ave	42.2	D	35.5	D
3. Hearn Ave/Old Stony Point Rd	0.4	A	0.8	A
Southbound (Old Stony Point Rd) Approach	*12.1*	*B*	*13.5*	*B*
4. Hearn Ave/Burbank Ave	37.3	D	23.1	C
Southbound (Burbank Ave) Approach	*244.5*	*F*	*161.7*	*F*
5. Hearn Ave/Dutton Meadow	20.7	C	10.7	B

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*



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Traffic Impact Study for Stony Oaks Apartments

Figure 3 – Baseline Traffic Volumes

Project Description

The proposed project includes the development of 142 affordable apartments on a site that is currently vacant. The project would include driveways onto Old Stony Point Road as well as Hearn Avenue near the eastern project boundary. The proposed project site plan is shown in Figure 4.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for "Multi-Family Housing (Mid-Rise)" (Land Use #221). Based on application of these rates, the proposed project is expected to generate an average of 772 trips per day, including 51 a.m. peak hour trips and 62 trips during the p.m. peak hour. These results are summarized in Table 6.

Table 6 - Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multi-Family Housing (Mid-Rise)	142 du	5.44	772	0.36	51	13	38	0.44	62	38	24

Note: du = dwelling unit

Trip Distribution

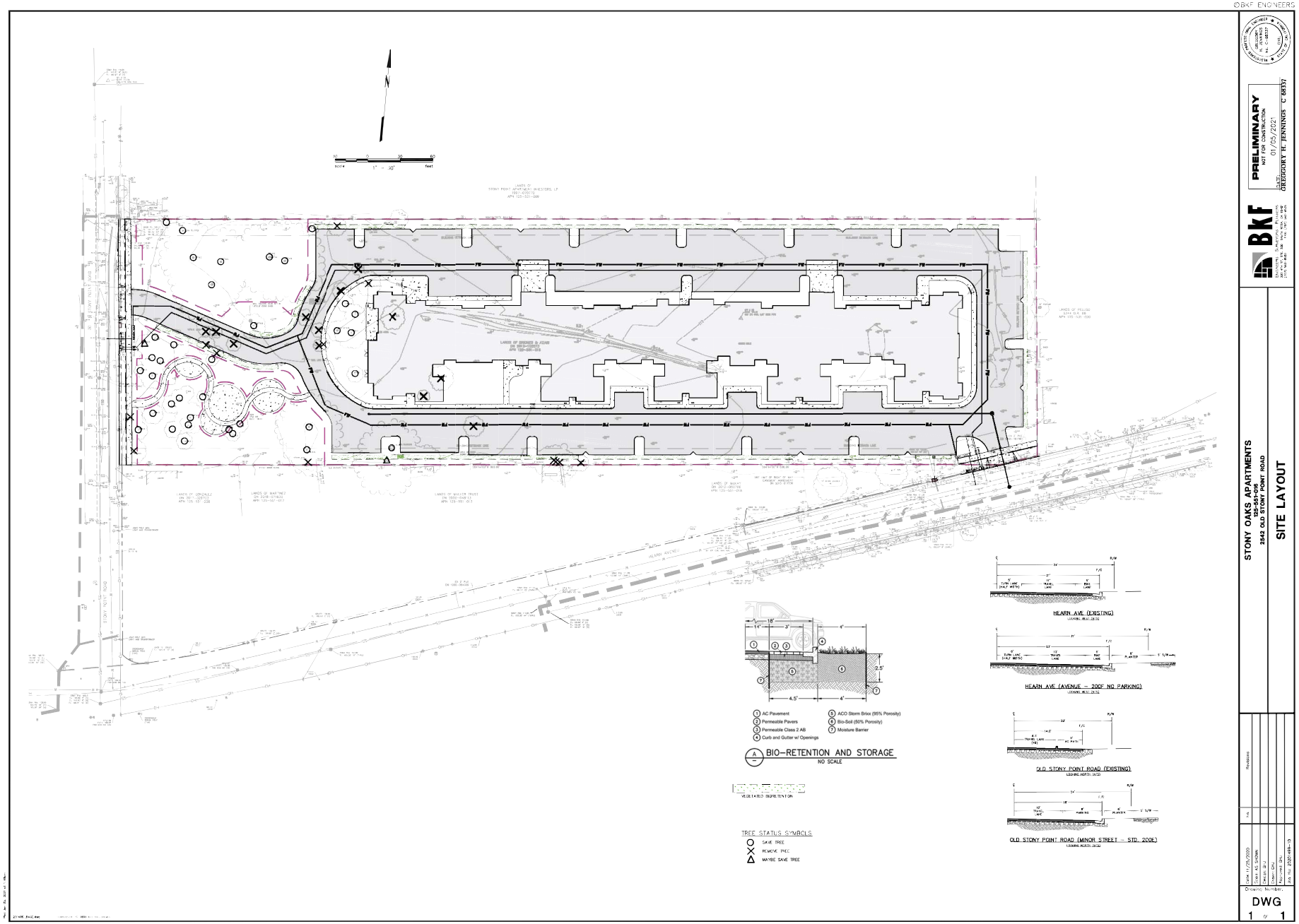
The pattern used to allocate new project trips to the street network was determined by reviewing existing turning movements at the study intersections. Trips routed from and to the west were assumed to be equally split between the project's driveways on Old Stony Point Road and Hearn Avenue. All trips routed from and to the east were assigned to the project's Hearn Avenue driveway. The applied distribution assumptions and resulting trips are shown in Table 7.

Table 7 – Trip Distribution Assumptions

Route	Percent	AM Trips	PM Trips
From/to the north via Stony Point Rd	45%	23	28
From/to the east via Hearn Ave	40%	20	25
From/to the south via Stony Point Rd	15%	8	9
TOTAL	**100%**	**51**	**62**

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably overall. Operation on the southbound approach to Hearn Avenue/Burbank Avenue would deteriorate from LOS E to LOS F, though the increase due to the project would be less than five seconds. The project is anticipated to increase overall average delay at the Hearn Avenue/Burbank Avenue intersection by 0.4 to 0.5 seconds, though the "peak hour" warrant for signalization would be unmet (see additional signal warrant discussion in Access and Circulation). Project traffic volumes are shown in Figure 5. These results are summarized in Table 8.



Source: BKF Engineers/Surveyors/Planners 2/10

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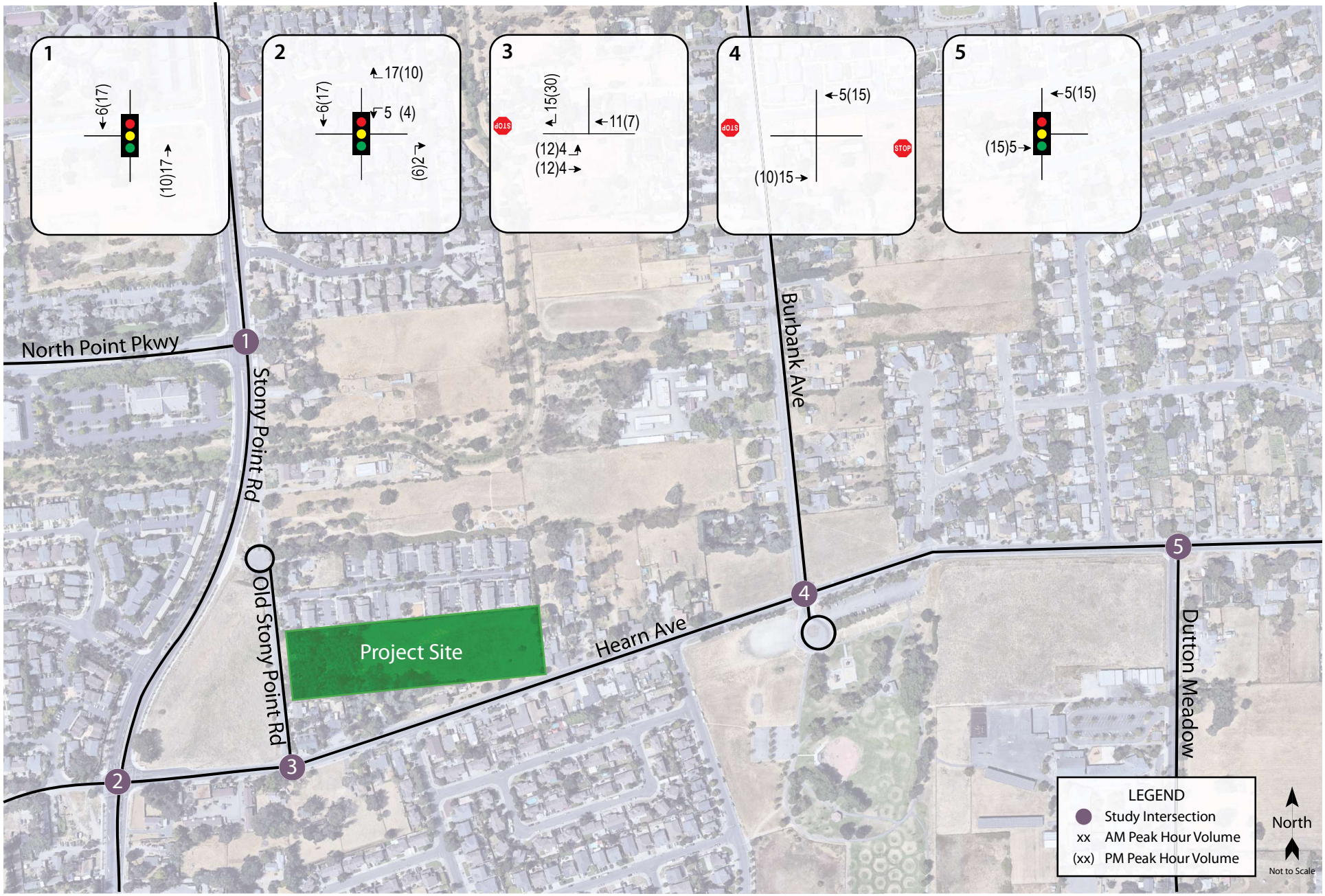
Traffic Impact Study for Stony Oaks Apartments

Figure 4 – Site Plan



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Traffic Impact Study for Stony Oaks Apartments

Figure 5 – Project Traffic Volumes

W-Trans

Table 8 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*		Existing Conditions				Existing plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.	Stony Point Rd/Northpoint Pkwy	8.4	A	18.9	B	8.4	A	19.0	B
2.	Stony Point Rd/Hearn Ave	39.7	D	29.1	C	39.8	D	29.3	C
3.	Hearn Ave/Old Stony Point Rd	0.4	A	0.9	A	0.6	A	1.0	A
	SB (Old Stony Point Rd) Approach	11.6	B	12.8	B	*11.5*	*B*	*13.0*	*B*
4.	Hearn Ave/Burbank Ave	8.6	A	6.9	A	*9.1*	*B*	*7.3*	*A*
	SB (Burbank Ave) Approach	*62.4*	*F*	*49.8*	*E*	*67.1*	*F*	*54.1*	*F*
5.	Hearn Ave/Dutton Meadow	15.8	B	9.1	A	16.2	B	9.2	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*; SB = Southbound

Finding – The study intersections are expected to continue operating acceptably overall at the same levels of service upon the addition of project-generated traffic. Although the southbound approach to Hearn Avenue/Burbank Avenue is expected to operate at LOS F, the project's impact would be considered less-than-significant as the intersection would be expected to continue operating acceptably overall and the peak hour signalization warrant would be unmet.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, the study intersections are expected to continue operating acceptably and the southbound approach at Hearn Avenue/Burbank Avenue would continue to operate at LOS F until the planned traffic signal is installed. Under Baseline plus Project conditions, the project is anticipated to increase overall delay at the Hearn Avenue/Burbank Avenue intersection by 1.7 to 2.2 seconds as compared to Baseline conditions without the project. Under both Baseline and Baseline plus Project conditions, the "peak hour" signal warrant would be met. These results are summarized in Table 9.

Table 9 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*		Baseline Conditions				Baseline plus Project			
		AM Peak		PM Peak		AM Peak		PM Peak	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.	Stony Point Rd/Northpoint Pkwy	8.4	A	19.7	B	8.4	A	19.9	B
2.	Stony Point Rd/Hearn Ave	42.2	D	35.5	D	42.4	D	35.8	D
3.	Hearn Ave/Old Stony Point Rd	0.4	A	0.8	A	0.6	A	1.0	A
	SB (Old Stony Point Rd) Approach	*12.1*	*B*	*13.5*	*B*	*12.1*	*B*	*13.8*	*B*
4.	Hearn Ave/Burbank Ave	37.3	D	23.1	C	*39.5*	*D*	*24.8*	*C*
	SB (Burbank Ave) Approach	*244.5*	*F*	*161.7*	*F*	*263.2*	*F*	*177.7*	*F*
5.	Hearn Ave/Dutton Meadow	20.7	C	10.7	B	21.5	C	10.8	B

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*; SB = Southbound

Finding – The study intersections are expected to continue operating acceptably overall at the same Levels of Service upon the addition of project-generated traffic to Baseline conditions as without it. Although the southbound approach to Hearn Avenue/Burbank Avenue is expected to operate at LOS F, the project's impact would be considered acceptable as the intersection would be expected to continue operating acceptably overall, the peak hour signal warrant would be met both without and with the project, and the project would be expected to increase overall delays by less than five seconds.

Vehicle Miles Traveled

Background and Applied Thresholds

Senate Bill (SB) 743 established a change in the metric to be applied for determining traffic impacts associated with development projects. Rather than the delay-based criteria associated with a Level of Service analysis, the increase in Vehicle Miles Traveled (VMT) as a result of a project is now the basis for determining transportation impacts. The City of Santa Rosa has established parameters for VMT analyses in the *Vehicles Miles Traveled Guidelines Final Draft*, June 2020. The City's parameters are consistent with guidance provided in the publication *Transportation Impacts (SB 743) CEQA Guidelines Update and Technical Advisory*, California Governor's Office of Planning and Research (OPR), 2018. Both documents indicate that a residential project generating vehicle travel that is 15 or more percent below the existing countywide residential VMT per capita may indicate a less than significant VMT impact.

VMT Analysis

Based on data from the version of the Sonoma County Transportation Authority (SCTA) travel demand model released in October 2020, the County of Sonoma has a baseline average residential VMT of 16.53 miles per capita. A residential project generating a VMT that is 15 percent or more below this value, or 14.05 miles per capita or less, would have a less-than-significant VMT impact. The SCTA model includes traffic analysis zones (TAZ) covering geographic areas throughout Sonoma County. The project site is located within TAZ 500, which has a baseline VMT per capita of 13.01 miles. Because this per capita VMT ratio is below the significance threshold of 14.05 miles, the project would be considered to have a less-than-significant VMT impact. A map excerpt from the SCTA travel demand model showing the residential VMT per capita for TAZs in the project vicinity is included in Appendix C.

The City's VMT guidelines and OPR Technical Advisory also include screening criteria which identify certain types of projects that may be presumed to have a less than significant VMT impact, including developments comprised of 100 percent affordable housing. The proposed Stony Oaks project would qualify for this screening criteria in addition to falling below the VMT per capita significance threshold.

Finding – The project would have a less-than-significant impact on vehicle miles traveled.

Alternative Modes

Pedestrian Facilities

The site would include an onsite network of pedestrian sidewalks and paths. Given that the site is an infill location within existing neighborhoods and near school, recreation, and employment uses, it is reasonable to assume that some project residents would want to walk and/or use transit to reach destinations beyond the site. As proposed, the project would include a sidewalk along its entire frontage of Old Stony Point Road, replacing the current asphalt path and dike and connecting to the existing pedestrian network to the north and south. From this pedestrian connection on Old Stony Point Road, residents would be able to access nearby bus stops on Stony Point Road, Hearn Avenue, and at Southwest Community Park. Enhanced pedestrian crossings including RRFB warning devices are already in place near the transit stops on both Stony Point Road and Hearn Avenue.

The project would also provide a short segment of sidewalk on its limited Hearn Avenue frontage. Currently, the north side of Hearn Avenue to the east and west has sidewalk gaps that are anticipated to be filled over time as adjacent properties develop or redevelop. Until such time as those sidewalks are constructed in the future, residents of the proposed project would still have continuous access to the surrounding pedestrian network and transit facilities via existing sidewalks on Old Stony Point Road and the south side of Hearn Avenue. The City has indicated that pedestrian access at the site's Hearn Avenue driveway will need to be restricted until sidewalk gaps are filled in the future.

Finding – Pedestrian facilities serving the project site would be adequate upon the completion of the proposed frontage improvements.

Bicycle Facilities

The existing Class II bike lanes on Hearn Avenue along with planned future bicycle facilities in the vicinity would provide adequate access for bicyclists. Residents of the proposed development would be able to use the existing bike lanes on Hearn Avenue to connect to many of the primary bicycle facilities in the City.

Finding – Bicycle facilities serving the project site are adequate.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Bus stops serving two CityBus routes are within a convenient walking distance of the site and accessible by the existing pedestrian network.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

The project would include two driveways providing primary access to the proposed apartments, one on Old Stony Point Road at the site's western property boundary and one on Hearn Avenue near the site's eastern property boundary. Old Stony Point Road is a low-volume local street that terminates 300 feet north of the project site; given the nature of the street no potential conflicts would be created by the proposed driveway. The project driveway on Hearn Avenue would be located on a segment of the corridor that has existing two-way left-turn lanes, and the south side of Hearn Avenue near the project site includes single-family homes that generate very low volumes of turning traffic. The two-way left-turn lane will provide space for eastbound drivers to turn left into the site, and for outbound drivers to make left-turns in two separate movements during busier periods. The driveway is anticipated to function acceptably.

Sight Distance

Sight distances along Old Stony Point Road and Hearn Avenue at the project driveways were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance and uses the approach travel speed as the basis for determining the recommended sight distance.

For Old Stony Point Road, which has a speed of 25 mph, the minimum stopping sight distance is 150 feet. The minimum stopping sight distance for Hearn Avenue, which has a posted speed limit of 30 mph, is 200 feet. Available sight lines were field measured and exceed 200 feet at both driveways, which meets the sight distance requirements.

Finding – Based on field observations and review of the project site plan, the project's proposed driveways are anticipated to operate acceptably, with adequate sight distances along Old Stony Point Road and Hearn Avenue.

Recommendation – To maintain clear lines of sight from the project driveways it is recommended that any landscaping be low-profile and that trees be set back outside the vision triangle.

Emergency Access

Emergency response vehicles could access the site via the main access point on Old Stony Point Road as well as the Hearn Avenue driveway. The AutoTURN application of AutoCAD was used to evaluate the adequacy of access for emergency vehicles based on the project site plan. As designed, there would be no anticipated issues with fire truck access. An exhibit showing the expected travel paths on the site plan is provided in Appendix D.

Finding – Emergency access is expected to function acceptably.

Onsite Circulation

The site consists of a group of apartment buildings surrounded by drive aisles that loop around the buildings and include perpendicular parking spaces. All drive aisles connect internally, allowing access to both Old Stony Point Road and Hearn Avenue.

Finding – Onsite circulation is anticipated to function acceptably.

Traffic Signal Warrants

Because the intersection of Hearn Avenue/Burbank Avenue has LOS F operation on the minor stop-controlled approach in all project scenarios, a signal warrants analysis was performed. Chapter 4C of the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD) provides guidance on when a traffic signal should be considered. There are nine different warrants, or criteria, but for the purposes of this study, Warrant 3 (the peak hour warrant) was evaluated. Warrant 3 determines the need for traffic control based on the highest volume hour of the day and was used as an initial indication of traffic control needs. The use of this signal warrant is common practice for planning studies.

Warrant 3: Under the Peak Hour Warrant the need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same one hour (any four consecutive 15-minute periods) of an average day:

    1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: four vehicle-hours for a one-lane approach; or five vehicle-hours for a two-lane approach, and
    2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
    3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Despite LOS F operation on the southbound approach of Hearn Avenue/Burbank Avenue, the signal warrant would be unmet under both Existing and Existing plus Project conditions. Under Baseline volumes both without and with the project, the signal warrant would be met. Copies of the Signal Warrant Spreadsheets are provided in Appendix E.

As noted in the operational analysis, signalization of the Hearn Avenue/Burbank Avenue intersection was identified as a planned future improvement in the *Roseland Area/Sebastopol Road Specific Plan* and its EIR and has since been added to the City's Capital Improvement Program. The signal is to be funded by development projects in the area. Because the project would contribute to the need for these improvements, the City has indicated that the project should pay a proportional share fee toward the cost of construction, with the share determined by the project's contribution to added delays on the critical southbound approach during the worst-case a.m. peak hour.

Based on the operational analysis, the project would be responsible for 9.3 percent of the projected increases in delay occurring between Existing and Baseline plus Project conditions. As contained in the *Infrastructure Report for Roseland Area/Sebastopol Road Specific Plan and Roseland Area Annexation*, Michael Baker International, 2016, signalization of the Hearn Avenue/Burbank Avenue intersection is estimated to have a total cost of $320,000 ($200,000 for construction and $120,000 for soft costs). The applicant's proportionate share of this fee would therefore be $29,760. A summary of the proportionate share calculation is provided in Appendix F.

Finding – The Peak Hour Volume warrant would be met at the intersection of Hearn Avenue/Burbank Avenue under both Baseline and Baseline plus Project Conditions. The need for signalization was identified in the *Roseland Area/Sebastopol Road Specific Plan* and the project has been added to the City's Capital Improvement Program.

Recommendation – As directed by the City, the applicant should contribute a proportional share of funds for the signalization of the intersection of Hearn Avenue/Burbank Avenue. The project would be responsible for 9.3 percent of the cost, or $29,760.

Parking

Parking was evaluated to determine if the proposed parking supply would be adequate to satisfy City and State requirements. Per the project site plan, a total of 185 parking spaces will be provided on-site, including 13 ADA-accessible spaces. Section 20-36.040 of the *Santa Rosa City Code* requires multifamily affordable housing projects to provide one parking space per one-bedroom unit and two parking spaces per unit with two or more bedrooms. Based on these rates, the project would need to provide a total of 228 parking spaces and would fall short of this by 30 spaces.

The project would qualify for State density bonus provisions as outlined in Government Code Section 65915, which requires one parking space for one-bedroom units and one and one-half parking spaces for two- and three-bedroom units. Based on the unit mix for this project, 185 parking spaces are required, which equals the proposed supply. The proposed supply of 185 parking spaces is compliant with applicable State and local density bonus provisions.

The proposed parking supply's consistency with State density bonus provisions is shown in Table 10.

Table 10 – Parking Supply Consistency with State Density Bonus Provisions

Land Use	Units	Rate	Parking Spaces
Multifamily Affordable Housing	142 du		
1 bedroom	56 du	1.0 space/du	56
2+ bedrooms	86 du	1.5 spaces/du	129
State Required Parking Total			*185*
Proposed Parking Supply			**185**

Notes: du=dwelling unit

It should be noted that the site is located within one-quarter mile of transit stops for Santa Rosa CityBus and would be connected to surrounding pedestrian and bicycle facilities, supporting travel by non-auto modes and reducing reliance on vehicle ownership, which thereby helps to reduce demand for parking.

Finding – The proposed project would satisfy applicable parking requirements established in State Density Bonus provisions.

Bicycle Parking

The required bicycle parking supply was calculated to ensure adequacy under City requirements. Santa Rosa City Code Section 20-36.040 requires multifamily dwellings to provide bicycle parking at the rate of one space per four units if the units do not have a private garage or private storage space. The proposed project provides 41 long-term and 18 short-term bike spaces and would meet bike parking requirements.

Finding – The project's proposed bicycle parking would be adequate.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 772 trips per day, including 51 a.m. peak hour trips and 62 trips during the p.m. peak hour.
- The study intersections are expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic. Although the southbound approach to Hearn Avenue/ Burbank Avenue is expected to operate at LOS F, the project's effect would be considered acceptable as the intersection would be expected to continue operating acceptably overall and the peak hour signalization warrant would be unmet.
- Under Baseline plus Project conditions the study intersections are expected to continue operating acceptably overall. Although the southbound approach at Hearn Avenue/Burbank Avenue is expected to operate at LOS F, the project's effect would be considered acceptable as the intersection would be expected to continue operating acceptably overall, the peak hour signal warrant would be met both without and with the project, and the project would be expected to increase overall delays by less than five seconds.
- The project would have a less-than-significant impact on vehicle miles traveled.
- Pedestrian facilities serving the project site would be adequate upon the completion of the proposed frontage improvements.
- Bicycle facilities serving the project site are adequate.
- Transit facilities serving the project site are adequate.
- Based on field observations and review of the project site plan, the project's proposed driveways are anticipated to operate acceptably, with adequate sight distances existing along Old Stony Point Road and Hearn Avenue.
- Emergency access is expected to function acceptably.
- Onsite circulation is anticipated to function acceptably.
- The Peak Hour Volume warrant would be met at the intersection of Hearn Avenue/Burbank Avenue under Baseline and Baseline plus Project volumes. The need for signalization was identified in the *Roseland Area/Sebastopol Road Specific Plan*, and the project has been added to the City's Capital Improvement Program.
- The proposed project would satisfy applicable parking requirements established in State Density Bonus provisions.
- The project's proposed bicycle parking would be adequate.

Recommendations

- To maintain a clear line of sight from the project driveways, it is recommended that any landscaping be low-profile, and that trees be set back outside the vision triangle.

- As directed by the City, the applicant should contribute a proportional share of funds for the signalization of the intersection of Hearn Avenue/Burbank Avenue. The project would be responsible for 9.3 percent of the cost, or $29,760.

Study Participants and References

Study Participants

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Editing/Formatting	Cameron Wong
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Appendix A

Collision Rate Calculations

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Intersection Collision Rate Worksheet

Stony Oaks TIS

Intersection # 1: Stony Point Rd & Northpoint Pkwy
Date of Count: Tuesday, September 25, 2018

Number of Collisions: 15
Number of Injuries: 6
Number of Fatalities: 0
Average Daily Traffic (ADT): 23700
Start Date: November 1, 2014
End Date: October 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{15 \times 1{,}000{,}000}{23{,}700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.35 c/mve**	**0.0%**	**40.0%**
Statewide Average*	**0.28 c/mve**	**0.4%**	**37.2%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 2: Stony Point Rd & Hearn Ave
Date of Count: Wednesday, March 1, 2017

Number of Collisions: 15
Number of Injuries: 8
Number of Fatalities: 0
Average Daily Traffic (ADT): 21900
Start Date: November 1, 2014
End Date: October 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{15 \times 1{,}000{,}000}{21{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.38 c/mve**	**0.0%**	**53.3%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**36.1%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

Stony Oaks TIS

Intersection # 3: Hearn Ave & Old Stony Point Rd
Date of Count: Saturday, January 0, 1900

Number of Collisions: 2
Number of Injuries: 1
Number of Fatalities: 0
Average Daily Traffic (ADT): 9000
Start Date: November 1, 2014
End Date: October 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{2 \times 1{,}000{,}000}{9{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.12 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.14 c/mve**	**1.2%**	**38.2%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection # 4: Hearn Ave & Burbank Ave
Date of Count: Saturday, January 0, 1900

Number of Collisions: 6
Number of Injuries: 5
Number of Fatalities: 0
Average Daily Traffic (ADT): 13400
Start Date: November 1, 2014
End Date: October 31, 2019
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{6 \times 1{,}000{,}000}{13{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.25 c/mve**	**0.0%**	**83.3%**
Statewide Average*	**0.23 c/mve**	**1.9%**	**39.0%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Worksheet

Stony Oaks TIS

Intersection # 5: Hearn Ave & Dutton Meadow
Date of Count: Saturday, January 0, 1900

Number of Collisions: 9
Number of Injuries: 6
Number of Fatalities: 0
Average Daily Traffic (ADT): 15100
Start Date: November 1, 2014
End Date: October 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Suburban

$$\text{Collision Rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x Days per Year x Number of Years}}$$

$$\text{Collision Rate} = \frac{9 \times 1{,}000{,}000}{15{,}100 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.33 c/mve**	**0.0%**	**66.7%**
Statewide Average*	**0.28 c/mve**	**0.4%**	**37.2%**

Notes
ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2016 Collision Data on California State Highways, Caltrans

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Appendix B

Intersection Level of Service Calculations

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HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	0	189	0	0	0	392	807	0	0	818	116
Future Volume (veh/h)	58	0	189	0	0	0	392	807	0	0	818	116
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	0	189				392	807	0	0	818	116
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	228	0	341				563	2830	0	67	2128	302
Arrive On Green	0.13	0.00	0.13				0.12	1.00	0.00	0.00	0.68	0.68
Sat Flow, veh/h	1781	0	1585				1781	3647	0	675	3124	443
Grp Volume(v), veh/h	58	0	189				392	807	0	0	465	469
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	675	1777	1791
Q Serve(g_s), s	3.2	0.0	11.5				6.9	0.0	0.0	0.0	12.2	12.2
Cycle Q Clear(g_c), s	3.2	0.0	11.5				6.9	0.0	0.0	0.0	12.2	12.2
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.25
Lane Grp Cap(c), veh/h	228	0	341				563	2830	0	67	1210	1219
V/C Ratio(X)	0.25	0.00	0.55				0.70	0.29	0.00	0.00	0.38	0.38
Avail Cap(c_a), veh/h	463	0	551				885	2830	0	67	1210	1219
HCM Platoon Ratio	1.00	1.00	1.00				1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.79	0.79	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	0.0	37.7				5.6	0.0	0.0	0.0	7.4	7.4
Incr Delay (d2), s/veh	0.2	0.0	0.5				0.5	0.2	0.0	0.0	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	10.2				1.5	0.1	0.0	0.0	4.2	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.7	0.0	38.3				6.0	0.2	0.0	0.0	8.4	8.4
LnGrp LOS	D	A	D				A	A	A	A	A	A
Approach Vol, veh/h		247						1199			934	
Approach Delay, s/veh		39.3						2.1			8.4	
Approach LOS		D						A			A	

Timer - Assigned Phs	2	4	5	6
Phs Duration (G+Y+Rc), s	89.9	18.1	12.5	77.4
Change Period (Y+Rc), s	3.9	4.3	3.0	3.9
Max Green Setting (Gmax), s	71.7	28.1	29.0	39.7
Max Q Clear Time (g_c+I1), s	2.0	13.5	8.9	14.2
Green Ext Time (p_c), s	6.3	0.3	0.5	6.1

Intersection Summary	
HCM 6th Ctrl Delay	8.4
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	61	47	90	18	309	9	555	69	262	705	16
Future Volume (veh/h)	117	61	47	90	18	309	9	555	69	262	705	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	117	61	47	90	18	309	9	555	69	262	705	16
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	158	121	114	284	501	329	905	767	293	1526	35
Arrive On Green	0.07	0.16	0.16	0.06	0.15	0.15	0.18	0.47	0.47	0.05	0.14	0.14
Sat Flow, veh/h	1781	980	755	1781	1870	1585	1781	1945	1648	1781	3552	81
Grp Volume(v), veh/h	117	0	108	90	18	309	9	555	69	262	353	368
Grp Sat Flow(s),veh/h/ln	1781	0	1734	1781	1870	1585	1781	1945	1648	1781	1777	1856
Q Serve(g_s), s	7.0	0.0	6.0	5.4	0.9	13.3	0.4	23.1	2.5	15.8	19.7	19.7
Cycle Q Clear(g_c), s	7.0	0.0	6.0	5.4	0.9	13.3	0.4	23.1	2.5	15.8	19.7	19.7
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	132	0	279	114	284	501	329	905	767	293	763	797
V/C Ratio(X)	0.89	0.00	0.39	0.79	0.06	0.62	0.03	0.61	0.09	0.89	0.46	0.46
Avail Cap(c_a), veh/h	132	0	514	148	571	745	329	905	767	297	763	797
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92	0.92
Uniform Delay (d), s/veh	49.6	0.0	40.6	49.8	39.2	18.2	36.1	21.6	16.1	50.1	34.9	34.9
Incr Delay (d2), s/veh	46.1	0.0	0.9	18.9	0.1	1.2	0.0	3.1	0.2	24.5	1.8	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	2.6	3.0	0.4	4.9	0.2	10.6	1.0	9.5	9.7	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	0.0	41.4	68.8	39.3	19.4	36.1	24.7	16.4	74.6	36.7	36.7
LnGrp LOS	F	A	D	E	D	B	D	C	B	E	D	D
Approach Vol, veh/h		225			417			633			983	
Approach Delay, s/veh		69.6			30.9			24.0			46.8	
Approach LOS		E			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.8	54.9	10.9	21.4	24.6	51.1	12.0	20.3
Change Period (Y+Rc), s	3.0	4.7	4.0	* 4	4.7	* 4.7	4.0	3.9
Max Green Setting (Gmax), s	13.3	33.4	9.0	* 32	5.0	* 46	8.0	33.0
Max Q Clear Time (g_c+I1), s	17.3	25.1	7.4	8.0	2.4	21.7	9.0	15.3
Green Ext Time (p_c), s	0.0	2.3	0.0	0.5	0.0	4.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	39.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	377	0	0	395	2	0	0	0	9	0	15
Future Vol, veh/h	7	377	0	0	395	2	0	0	0	9	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082339328		-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	377	0	0	395	2	0	0	0	9	0	15

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	397	0	-	-	-	0			787	787	396
Stage 1	-	-	-	-	-	-			396	396	-
Stage 2	-	-	-	-	-	-			391	391	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1162	-	0	0	-	-			360	324	653
Stage 1	-	-	0	0	-	-			680	604	-
Stage 2	-	-	0	0	-	-			683	607	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1162	-	-	-	-	-			358	0	653
Mov Cap-2 Maneuver	-	-	-	-	-	-			473	0	-
Stage 1	-	-	-	-	-	-			676	0	-
Stage 2	-	-	-	-	-	-			683	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1162	-	-	-	571
HCM Lane V/C Ratio	0.006	-	-	-	0.042
HCM Control Delay (s)	8.1	-	-	-	11.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	8.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	142	418	7	10	451	126	3	4	10	78	2	76
Future Vol, veh/h	142	418	7	10	451	126	3	4	10	78	2	76
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	142	418	7	10	451	126	3	4	10	78	2	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	577	0	0	425	0	0	1279	1303	422	1247	1243	514
Stage 1	-	-	-	-	-	-	706	706	-	534	534	-
Stage 2	-	-	-	-	-	-	573	597	-	713	709	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	996	-	-	1134	-	-	143	161	632	150	174	560
Stage 1	-	-	-	-	-	-	427	439	-	530	524	-
Stage 2	-	-	-	-	-	-	505	491	-	423	437	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	996	-	-	1134	-	-	108	137	632	128	148	560
Mov Cap-2 Maneuver	-	-	-	-	-	-	108	137	-	128	148	-
Stage 1	-	-	-	-	-	-	366	376	-	454	519	-
Stage 2	-	-	-	-	-	-	431	487	-	353	375	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0.1	21.6	62.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	234	996	-	-	1134	-	-	206
HCM Lane V/C Ratio	0.073	0.143	-	-	0.009	-	-	0.757
HCM Control Delay (s)	21.6	9.2	-	-	8.2	-	-	62.4
HCM Lane LOS	C	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.2	0.5	-	-	0	-	-	5.1

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	509	64	367	433	0	102	0	406	0	0	0
Future Volume (veh/h)	0	509	64	367	433	0	102	0	406	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	509	64	367	433	0	102	0	406			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	612	77	427	1302	0	279	0	628			
Arrive On Green	0.00	0.38	0.38	0.24	0.70	0.00	0.16	0.00	0.16			
Sat Flow, veh/h	0	1629	205	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	573	367	433	0	102	0	406			
Grp Sat Flow(s),veh/h/ln	0	0	1833	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	12.7	8.8	4.1	0.0	2.3	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	12.7	8.8	4.1	0.0	2.3	0.0	0.0			
Prop In Lane	0.00		0.11	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	688	427	1302	0	279	0	628			
V/C Ratio(X)	0.00	0.00	0.83	0.86	0.33	0.00	0.37	0.00	0.65			
Avail Cap(c_a), veh/h	0	0	878	439	1482	0	718	0	1019			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	12.7	16.3	2.7	0.0	16.9	0.0	10.9			
Incr Delay (d2), s/veh	0.0	0.0	5.5	14.6	0.1	0.0	0.8	0.0	1.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	5.1	4.8	0.5	0.0	0.9	0.0	2.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	18.2	30.9	2.8	0.0	17.7	0.0	12.1			
LnGrp LOS	A	A	B	C	A	A	B	A	B			
Approach Vol, veh/h		573			800			508				
Approach Delay, s/veh		18.2			15.7			13.2				
Approach LOS		B			B			B				

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	14.3	20.4				34.7		10.0				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	11.0	* 21				35.4		18.0				
Max Q Clear Time (g_c+I1), s	10.8	14.7				6.1		4.3				
Green Ext Time (p_c), s	0.0	2.1				2.9		1.7				

Intersection Summary			
HCM 6th Ctrl Delay		15.8	
HCM 6th LOS		B	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	0	422	0	0	0	169	785	0	0	932	43
Future Volume (veh/h)	130	0	422	0	0	0	169	785	0	0	932	43
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	0	422				169	785	0	0	932	43
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	171	0	736				837	2966	0	61	1498	69
Arrive On Green	0.10	0.00	0.10				0.74	1.00	0.00	0.00	0.43	0.43
Sat Flow, veh/h	1781	0	1585				1781	3647	0	689	3459	160
Grp Volume(v), veh/h	130	0	422				169	785	0	0	479	496
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	689	1777	1842
Q Serve(g_s), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	24.7	24.7
Cycle Q Clear(g_c), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	24.7	24.7
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.09
Lane Grp Cap(c), veh/h	171	0	736				837	2966	0	61	769	798
V/C Ratio(X)	0.76	0.00	0.57				0.20	0.26	0.00	0.00	0.62	0.62
Avail Cap(c_a), veh/h	433	0	970				837	2966	0	61	769	798
HCM Platoon Ratio	1.00	1.00	1.00				2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.79	0.79	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	23.1				5.0	0.0	0.0	0.0	26.0	26.0
Incr Delay (d2), s/veh	2.6	0.0	0.3				0.0	0.2	0.0	0.0	3.8	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	13.9				0.9	0.1	0.0	0.0	10.8	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	23.3				5.1	0.2	0.0	0.0	29.7	29.6
LnGrp LOS	D	A	C				A	A	A	A	C	C
Approach Vol, veh/h		552						954			975	
Approach Delay, s/veh		30.7						1.0			29.7	
Approach LOS		C						A			C	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		102.4		15.6	47.4	55.0						
Change Period (Y+Rc), s		3.9		4.3	3.9	* 3.9						
Max Green Setting (Gmax), s		81.1		28.7	27.0	* 51						
Max Q Clear Time (g_c+I1), s		2.0		10.4	2.0	26.7						
Green Ext Time (p_c), s		6.1		0.9	0.2	6.3						

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	22	23	117	34	286	40	672	116	268	758	29
Future Volume (veh/h)	42	22	23	117	34	286	40	672	116	268	758	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	42	22	23	117	34	286	40	672	116	268	758	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	37	39	136	167	720	55	715	606	650	2500	96
Arrive On Green	0.03	0.04	0.04	0.08	0.09	0.09	0.03	0.37	0.37	0.73	1.00	1.00
Sat Flow, veh/h	1781	837	875	1781	1870	1585	1781	1945	1648	1781	3490	133
Grp Volume(v), veh/h	42	0	45	117	34	286	40	672	116	268	386	401
Grp Sat Flow(s),veh/h/ln	1781	0	1713	1781	1870	1585	1781	1945	1648	1781	1777	1846
Q Serve(g_s), s	2.8	0.0	3.0	7.7	2.0	1.7	2.6	39.4	5.6	6.9	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	3.0	7.7	2.0	1.7	2.6	39.4	5.6	6.9	0.0	0.0
Prop In Lane	1.00		0.51	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	54	0	76	136	167	720	55	715	606	650	1273	1323
V/C Ratio(X)	0.78	0.00	0.59	0.86	0.20	0.40	0.73	0.94	0.19	0.41	0.30	0.30
Avail Cap(c_a), veh/h	106	0	450	136	523	1022	106	715	606	650	1273	1323
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	56.8	0.0	55.4	53.9	49.8	12.3	56.7	36.0	25.4	11.0	0.0	0.0
Incr Delay (d2), s/veh	21.1	0.0	7.2	39.4	0.6	0.4	6.6	21.7	0.7	0.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.5	4.9	1.0	3.7	1.3	22.2	2.3	2.1	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	0.0	62.6	93.3	50.4	12.6	63.3	57.7	26.1	11.2	0.5	0.5
LnGrp LOS	E	A	E	F	D	B	E	E	C	B	A	A
Approach Vol, veh/h		87			437			828			1055	
Approach Delay, s/veh		70.0			37.2			53.6			3.2	
Approach LOS		E			D			D			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.8	48.1	13.0	9.1	6.7	89.2	7.6	14.6				
Change Period (Y+Rc), s	4.7	* 4.7	4.0	3.9	3.0	4.7	4.0	* 4				
Max Green Setting (Gmax), s	3.3	* 43	9.0	31.0	7.0	55.4	7.0	* 33				
Max Q Clear Time (g_c+I1), s	3.8	41.4	9.7	5.0	4.6	2.0	4.8	4.0				
Green Ext Time (p_c), s	0.3	1.0	0.0	0.2	0.0	5.3	0.0	1.2				

Intersection Summary	
HCM 6th Ctrl Delay	29.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	388	0	0	470	24	0	0	0	19	0	30
Future Vol, veh/h	22	388	0	0	470	24	0	0	0	19	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082494976		-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	388	0	0	470	24	0	0	0	19	0	30

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	494	0	-	-	-	0			914	914	482
Stage 1	-	-	-	-	-	-			482	482	-
Stage 2	-	-	-	-	-	-			432	432	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1070	-	0	0	-	-			303	273	584
Stage 1	-	-	0	0	-	-			621	553	-
Stage 2	-	-	0	0	-	-			655	582	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1070	-	-	-	-	-			297	0	584
Mov Cap-2 Maneuver	-	-	-	-	-	-			423	0	-
Stage 1	-	-	-	-	-	-			608	0	-
Stage 2	-	-	-	-	-	-			655	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1070	-	-	-	509
HCM Lane V/C Ratio	0.021	-	-	-	0.096
HCM Control Delay (s)	8.4	-	-	-	12.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	361	17	35	534	126	12	12	35	60	13	69
Future Vol, veh/h	69	361	17	35	534	126	12	12	35	60	13	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	69	361	17	35	534	126	12	12	35	60	13	69

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	660	0	0	378	0	0	1216	1238	370	1198	1183	597
Stage 1	-	-	-	-	-	-	508	508	-	667	667	-
Stage 2	-	-	-	-	-	-	708	730	-	531	516	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	928	-	-	1180	-	-	158	176	676	162	189	503
Stage 1	-	-	-	-	-	-	547	539	-	448	457	-
Stage 2	-	-	-	-	-	-	426	428	-	532	534	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	928	-	-	1180	-	-	119	158	676	133	170	503
Mov Cap-2 Maneuver	-	-	-	-	-	-	119	158	-	133	170	-
Stage 1	-	-	-	-	-	-	507	499	-	415	443	-
Stage 2	-	-	-	-	-	-	346	415	-	456	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.4	23	49.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	258	928	-	-	1180	-	-	214
HCM Lane V/C Ratio	0.229	0.074	-	-	0.03	-	-	0.664
HCM Control Delay (s)	23	9.2	-	-	8.1	-	-	49.8
HCM Lane LOS	C	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.9	0.2	-	-	0.1	-	-	4.1

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	409	57	218	594	0	112	0	273	0	0	0
Future Volume (veh/h)	0	409	57	218	594	0	112	0	273	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	409	57	218	594	0	112	0	273			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	560	78	309	1165	0	342	0	579			
Arrive On Green	0.00	0.35	0.35	0.17	0.62	0.00	0.19	0.00	0.19			
Sat Flow, veh/h	0	1606	224	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	466	218	594	0	112	0	273			
Grp Sat Flow(s),veh/h/ln	0	0	1830	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	7.9	4.1	6.3	0.0	1.9	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	7.9	4.1	6.3	0.0	1.9	0.0	0.0			
Prop In Lane	0.00		0.12	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	638	309	1165	0	342	0	579			
V/C Ratio(X)	0.00	0.00	0.73	0.70	0.51	0.00	0.33	0.00	0.47			
Avail Cap(c_a), veh/h	0	0	1201	599	2014	0	899	0	1075			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	10.2	13.9	3.7	0.0	12.4	0.0	8.7			
Incr Delay (d2), s/veh	0.0	0.0	1.6	1.1	0.3	0.0	0.6	0.0	0.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	2.5	1.4	0.9	0.0	0.6	0.0	1.1			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	11.8	15.0	4.1	0.0	13.0	0.0	9.3			
LnGrp LOS	A	A	B	B	A	A	B	A	A			
Approach Vol, veh/h		466			812			385				
Approach Delay, s/veh		11.8			7.0			10.3				
Approach LOS		B			A			B				
Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	9.8	16.0				25.8		9.8				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	12.0	* 23				38.4		18.0				
Max Q Clear Time (g_c+I1), s	6.1	9.9				8.3		3.9				
Green Ext Time (p_c), s	0.2	2.5				4.4		1.3				

Intersection Summary	
HCM 6th Ctrl Delay	9.1
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	0	195	0	0	0	397	898	0	0	856	116
Future Volume (veh/h)	58	0	195	0	0	0	397	898	0	0	856	116
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	0	195				397	898	0	0	856	116
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	233	0	350				547	2818	0	67	2124	288
Arrive On Green	0.13	0.00	0.13				0.12	1.00	0.00	0.00	0.68	0.68
Sat Flow, veh/h	1781	0	1585				1781	3647	0	620	3144	426
Grp Volume(v), veh/h	58	0	195				397	898	0	0	484	488
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	620	1777	1794
Q Serve(g_s), s	3.2	0.0	11.8				7.2	0.0	0.0	0.0	13.1	13.1
Cycle Q Clear(g_c), s	3.2	0.0	11.8				7.2	0.0	0.0	0.0	13.1	13.1
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.24
Lane Grp Cap(c), veh/h	233	0	350				547	2818	0	67	1200	1212
V/C Ratio(X)	0.25	0.00	0.56				0.73	0.32	0.00	0.00	0.40	0.40
Avail Cap(c_a), veh/h	463	0	555				866	2818	0	67	1200	1212
HCM Platoon Ratio	1.00	1.00	1.00				1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.72	0.72	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	42.2	0.0	37.4				6.2	0.0	0.0	0.0	7.8	7.8
Incr Delay (d2), s/veh	0.2	0.0	0.5				0.5	0.2	0.0	0.0	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	10.5				1.6	0.1	0.0	0.0	4.6	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	0.0	37.9				6.7	0.2	0.0	0.0	8.8	8.8
LnGrp LOS	D	A	D				A	A	A	A	A	A
Approach Vol, veh/h		253						1295			972	
Approach Delay, s/veh		38.9						2.2			8.8	
Approach LOS		D						A			A	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		89.6		18.4	12.7	76.9						
Change Period (Y+Rc), s		3.9		4.3	3.0	3.9						
Max Green Setting (Gmax), s		71.7		28.1	29.0	39.7						
Max Q Clear Time (g_c+I1), s		2.0		13.8	9.2	15.1						
Green Ext Time (p_c), s		7.3		0.3	0.5	6.4						

Intersection Summary	
HCM 6th Ctrl Delay	8.4
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	64	47	101	27	342	9	618	93	285	726	16
Future Volume (veh/h)	117	64	47	101	27	342	9	618	93	285	726	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	117	64	47	101	27	342	9	618	93	285	726	16
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	168	123	126	309	526	304	874	741	297	1527	34
Arrive On Green	0.07	0.17	0.17	0.07	0.17	0.17	0.17	0.45	0.45	0.06	0.14	0.14
Sat Flow, veh/h	1781	1002	736	1781	1870	1585	1781	1945	1648	1781	3555	78
Grp Volume(v), veh/h	117	0	111	101	27	342	9	618	93	285	363	379
Grp Sat Flow(s),veh/h/ln	1781	0	1738	1781	1870	1585	1781	1945	1648	1781	1777	1856
Q Serve(g_s), s	7.0	0.0	6.1	6.0	1.3	14.6	0.5	27.7	3.6	17.2	20.3	20.3
Cycle Q Clear(g_c), s	7.0	0.0	6.1	6.0	1.3	14.6	0.5	27.7	3.6	17.2	20.3	20.3
Prop In Lane	1.00		0.42	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	132	0	291	126	309	526	304	874	741	297	763	798
V/C Ratio(X)	0.89	0.00	0.38	0.80	0.09	0.65	0.03	0.71	0.13	0.96	0.48	0.48
Avail Cap(c_a), veh/h	132	0	515	148	571	748	304	874	741	297	763	798
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	49.6	0.0	40.0	49.4	38.2	17.6	37.3	24.0	17.4	50.7	35.1	35.1
Incr Delay (d2), s/veh	46.1	0.0	0.8	22.6	0.1	1.4	0.0	4.8	0.3	38.6	1.9	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	2.7	3.5	0.6	5.4	0.2	13.1	1.4	11.4	10.0	10.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	0.0	40.8	72.0	38.3	18.9	37.3	28.8	17.7	89.3	37.0	37.0
LnGrp LOS	F	A	D	E	D	B	D	C	B	F	D	D
Approach Vol, veh/h		228			470			720			1027	
Approach Delay, s/veh		68.9			31.5			27.5			51.5	
Approach LOS		E			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.0	53.2	11.7	22.1	23.1	51.1	12.0	21.8				
Change Period (Y+Rc), s	3.0	4.7	4.0	* 4	4.7	* 4.7	4.0	3.9				
Max Green Setting (Gmax), s	18.0	33.4	9.0	* 32	5.0	* 46	8.0	33.0				
Max Q Clear Time (g_c+I1), s	9.2	29.7	8.0	8.1	2.5	22.3	9.0	16.6				
Green Ext Time (p_c), s	0.0	1.5	0.0	0.6	0.0	4.4	0.0	1.2				

Intersection Summary	
HCM 6th Ctrl Delay	42.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	427	0	0	448	2	0	0	0	9	0	15
Future Vol, veh/h	7	427	0	0	448	2	0	0	0	9	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082339328		-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	427	0	0	448	2	0	0	0	9	0	15

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	450	0	-	-	-	0			890	890	449
Stage 1	-	-	-	-	-	-			449	449	-
Stage 2	-	-	-	-	-	-			441	441	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1110	-	0	0	-	-			313	282	610
Stage 1	-	-	0	0	-	-			643	572	-
Stage 2	-	-	0	0	-	-			648	577	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1110	-	-	-	-	-			311	0	610
Mov Cap-2 Maneuver	-	-	-	-	-	-			436	0	-
Stage 1	-	-	-	-	-	-			639	0	-
Stage 2	-	-	-	-	-	-			648	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1110	-	-	-	531
HCM Lane V/C Ratio	0.006	-	-	-	0.045
HCM Control Delay (s)	8.3	-	-	-	12.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	37.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	171	444	7	10	479	158	3	4	10	114	2	105
Future Vol, veh/h	171	444	7	10	479	158	3	4	10	114	2	105
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	171	444	7	10	479	158	3	4	10	114	2	105

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	637	0	0	451	0	0	1422	1447	448	1375	1371	558
Stage 1	-	-	-	-	-	-	790	790	-	578	578	-
Stage 2	-	-	-	-	-	-	632	657	-	797	793	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	947	-	-	1109	-	-	114	131	611	123	146	529
Stage 1	-	-	-	-	-	-	383	402	-	501	501	-
Stage 2	-	-	-	-	-	-	468	462	-	380	400	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	947	-	-	1109	-	-	77	106	611	~ 101	119	529
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	106	-	~ 101	119	-
Stage 1	-	-	-	-	-	-	314	329	-	410	496	-
Stage 2	-	-	-	-	-	-	370	458	-	303	328	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0.1	26.7	244.5
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	183	947	-	-	1109	-	-	164
HCM Lane V/C Ratio	0.093	0.181	-	-	0.009	-	-	1.348
HCM Control Delay (s)	26.7	9.6	-	-	8.3	-	-	244.5
HCM Lane LOS	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.3	0.7	-	-	0	-	-	13.3

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

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	556	79	388	461	0	134	0	468	0	0	0
Future Volume (veh/h)	0	556	79	388	461	0	134	0	468	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	556	79	388	461	0	134	0	468			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	637	90	414	1320	0	276	0	614			
Arrive On Green	0.00	0.40	0.40	0.23	0.71	0.00	0.16	0.00	0.16			
Sat Flow, veh/h	0	1602	228	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	635	388	461	0	134	0	468			
Grp Sat Flow(s),veh/h/ln	0	0	1829	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	15.2	10.1	4.6	0.0	3.3	0.0	1.2			
Cycle Q Clear(g_c), s	0.0	0.0	15.2	10.1	4.6	0.0	3.3	0.0	1.2			
Prop In Lane	0.00		0.12	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	727	414	1320	0	276	0	614			
V/C Ratio(X)	0.00	0.00	0.87	0.94	0.35	0.00	0.49	0.00	0.76			
Avail Cap(c_a), veh/h	0	0	826	414	1398	0	677	0	970			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	13.2	17.8	2.7	0.0	18.3	0.0	12.6			
Incr Delay (d2), s/veh	0.0	0.0	9.3	28.7	0.2	0.0	1.3	0.0	2.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	6.8	6.9	0.7	0.0	1.3	0.0	3.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	22.5	46.6	2.9	0.0	19.6	0.0	14.6			
LnGrp LOS	A	A	C	D	A	A	B	A	B			
Approach Vol, veh/h		635			849			602				
Approach Delay, s/veh		22.5			22.9			15.7				
Approach LOS		C			C			B				
Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	14.6	22.4				37.0		10.3				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	11.0	* 21				35.4		18.0				
Max Q Clear Time (g_c+I1), s	12.1	17.2				6.6		5.3				
Green Ext Time (p_c), s	0.0	1.6				3.1		2.1				

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	0	424	0	0	0	174	847	0	0	1028	43
Future Volume (veh/h)	130	0	424	0	0	0	174	847	0	0	1028	43
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	0	424				174	847	0	0	1028	43
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	171	0	736				811	2966	0	61	1505	63
Arrive On Green	0.10	0.00	0.10				0.74	1.00	0.00	0.00	0.43	0.43
Sat Flow, veh/h	1781	0	1585				1781	3647	0	650	3476	145
Grp Volume(v), veh/h	130	0	424				174	847	0	0	526	545
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	650	1777	1844
Q Serve(g_s), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	28.1	28.1
Cycle Q Clear(g_c), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	28.1	28.1
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	171	0	736				811	2966	0	61	769	799
V/C Ratio(X)	0.76	0.00	0.58				0.21	0.29	0.00	0.00	0.68	0.68
Avail Cap(c_a), veh/h	433	0	970				811	2966	0	61	769	799
HCM Platoon Ratio	1.00	1.00	1.00				2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.76	0.76	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	23.1				5.9	0.0	0.0	0.0	26.9	26.9
Incr Delay (d2), s/veh	2.6	0.0	0.3				0.0	0.2	0.0	0.0	4.9	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	13.9				1.0	0.1	0.0	0.0	12.4	12.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	23.4				5.9	0.2	0.0	0.0	31.8	31.6
LnGrp LOS	D	A	C				A	A	A	A	C	C
Approach Vol, veh/h		554						1021			1071	
Approach Delay, s/veh		30.7						1.2			31.7	
Approach LOS		C						A			C	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		102.4		15.6	47.4	55.0						
Change Period (Y+Rc), s		3.9		4.3	3.9	* 3.9						
Max Green Setting (Gmax), s		81.1		28.7	27.0	* 51						
Max Q Clear Time (g_c+I1), s		2.0		10.4	2.0	30.1						
Green Ext Time (p_c), s		6.8		0.9	0.2	6.8						

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	32	23	142	40	312	40	713	130	296	828	29
Future Volume (veh/h)	42	32	23	142	40	312	40	713	130	296	828	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	42	32	23	142	40	312	40	713	130	296	828	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	51	36	136	178	720	55	715	606	640	2489	87
Arrive On Green	0.03	0.05	0.05	0.08	0.10	0.10	0.03	0.37	0.37	0.72	1.00	1.00
Sat Flow, veh/h	1781	1012	727	1781	1870	1585	1781	1945	1648	1781	3502	123
Grp Volume(v), veh/h	42	0	55	142	40	312	40	713	130	296	420	437
Grp Sat Flow(s),veh/h/ln	1781	0	1739	1781	1870	1585	1781	1945	1648	1781	1777	1848
Q Serve(g_s), s	2.8	0.0	3.7	9.0	2.3	1.9	2.6	43.2	6.4	8.3	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	3.7	9.0	2.3	1.9	2.6	43.2	6.4	8.3	0.0	0.0
Prop In Lane	1.00		0.42	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	54	0	87	136	178	720	55	715	606	640	1263	1314
V/C Ratio(X)	0.78	0.00	0.63	1.05	0.22	0.43	0.73	1.00	0.21	0.46	0.33	0.33
Avail Cap(c_a), veh/h	106	0	457	136	523	1013	106	715	606	640	1263	1314
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.79	0.79
Uniform Delay (d), s/veh	56.8	0.0	55.0	54.5	49.4	12.5	56.7	37.2	25.6	11.8	0.0	0.0
Incr Delay (d2), s/veh	21.1	0.0	7.4	89.8	0.6	0.4	6.6	32.8	0.8	0.2	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.8	7.4	1.1	4.1	1.3	26.1	2.6	2.5	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	0.0	62.4	144.3	50.0	12.9	63.3	70.1	26.4	11.9	0.6	0.5
LnGrp LOS	E	A	E	F	D	B	E	E	C	B	A	A
Approach Vol, veh/h		97			494			883			1153	
Approach Delay, s/veh		69.1			53.7			63.3			3.5	
Approach LOS		E			D			E			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.1	48.1	13.0	9.8	6.7	88.6	7.6	15.2				
Change Period (Y+Rc), s	4.7	* 4.7	4.0	3.9	3.0	4.7	4.0	* 4				
Max Green Setting (Gmax), s	9.3	* 43	9.0	31.0	7.0	55.4	7.0	* 33				
Max Q Clear Time (g_c+I1), s	10.3	45.2	11.0	5.7	4.6	2.0	4.8	4.3				
Green Ext Time (p_c), s	0.3	0.0	0.0	0.2	0.0	5.9	0.0	1.3				

Intersection Summary	
HCM 6th Ctrl Delay	35.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	440	0	0	527	24	0	0	0	19	0	30
Future Vol, veh/h	22	440	0	0	527	24	0	0	0	19	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082494976		-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	440	0	0	527	24	0	0	0	19	0	30

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	551	0	-	-	-	0			1023	1023	539
Stage 1	-	-	-	-	-	-			539	539	-
Stage 2	-	-	-	-	-	-			484	484	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1019	-	0	0	-	-			261	236	542
Stage 1	-	-	0	0	-	-			585	522	-
Stage 2	-	-	0	0	-	-			620	552	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1019	-	-	-	-	-			255	0	542
Mov Cap-2 Maneuver	-	-	-	-	-	-			388	0	-
Stage 1	-	-	-	-	-	-			572	0	-
Stage 2	-	-	-	-	-	-			620	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	13.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1019	-	-	-	470
HCM Lane V/C Ratio	0.022	-	-	-	0.104
HCM Control Delay (s)	8.6	-	-	-	13.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	23.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	398	17	35	569	149	12	12	35	90	13	95
Future Vol, veh/h	85	398	17	35	569	149	12	12	35	90	13	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	85	398	17	35	569	149	12	12	35	90	13	95

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	718	0	0	415	0	0	1345	1365	407	1314	1299	644
Stage 1	-	-	-	-	-	-	577	577	-	714	714	-
Stage 2	-	-	-	-	-	-	768	788	-	600	585	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	883	-	-	1144	-	-	129	147	644	135	161	473
Stage 1	-	-	-	-	-	-	502	502	-	422	435	-
Stage 2	-	-	-	-	-	-	394	402	-	488	498	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	883	-	-	1144	-	-	87	129	644	107	141	473
Mov Cap-2 Maneuver	-	-	-	-	-	-	87	129	-	107	141	-
Stage 1	-	-	-	-	-	-	454	454	-	381	422	-
Stage 2	-	-	-	-	-	-	296	390	-	406	450	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	0.4	29.2	161.7
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	207	883	-	-	1144	-	-	175
HCM Lane V/C Ratio	0.285	0.096	-	-	0.031	-	-	1.131
HCM Control Delay (s)	29.2	9.5	-	-	8.2	-	-	161.7
HCM Lane LOS	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	1.1	0.3	-	-	0.1	-	-	10.2

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	444	89	289	636	0	128	0	314	0	0	0
Future Volume (veh/h)	0	444	89	289	636	0	128	0	314	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	444	89	289	636	0	128	0	314			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	567	114	357	1243	0	307	0	591			
Arrive On Green	0.00	0.37	0.37	0.20	0.66	0.00	0.17	0.00	0.17			
Sat Flow, veh/h	0	1513	303	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	533	289	636	0	128	0	314			
Grp Sat Flow(s),veh/h/ln	0	0	1816	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	10.5	6.3	7.0	0.0	2.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	10.5	6.3	7.0	0.0	2.6	0.0	0.0			
Prop In Lane	0.00		0.17	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	681	357	1243	0	307	0	591			
V/C Ratio(X)	0.00	0.00	0.78	0.81	0.51	0.00	0.42	0.00	0.53			
Avail Cap(c_a), veh/h	0	0	1052	529	1779	0	794	0	1024			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	11.2	15.4	3.4	0.0	14.9	0.0	9.9			
Incr Delay (d2), s/veh	0.0	0.0	2.1	3.4	0.3	0.0	0.9	0.0	0.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	3.5	2.4	1.0	0.0	0.9	0.0	1.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	13.3	18.8	3.8	0.0	15.8	0.0	10.7			
LnGrp LOS	A	A	B	B	A	A	B	A	B			
Approach Vol, veh/h		533			925			442				
Approach Delay, s/veh		13.3			8.5			12.1				
Approach LOS		B			A			B				
Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	11.7	18.7				30.4		10.0				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	12.0	* 23				38.4		18.0				
Max Q Clear Time (g_c+I1), s	8.3	12.5				9.0		4.6				
Green Ext Time (p_c), s	0.2	2.6				4.8		1.5				

Intersection Summary	
HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	0	189	0	0	0	392	824	0	0	824	116
Future Volume (veh/h)	58	0	189	0	0	0	392	824	0	0	824	116
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	0	189				392	824	0	0	824	116
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	228	0	341				561	2830	0	67	2130	300
Arrive On Green	0.13	0.00	0.13				0.12	1.00	0.00	0.00	0.68	0.68
Sat Flow, veh/h	1781	0	1585				1781	3647	0	665	3128	440
Grp Volume(v), veh/h	58	0	189				392	824	0	0	468	472
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	665	1777	1791
Q Serve(g_s), s	3.2	0.0	11.5				6.9	0.0	0.0	0.0	12.3	12.3
Cycle Q Clear(g_c), s	3.2	0.0	11.5				6.9	0.0	0.0	0.0	12.3	12.3
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.25
Lane Grp Cap(c), veh/h	228	0	341				561	2830	0	67	1210	1220
V/C Ratio(X)	0.25	0.00	0.55				0.70	0.29	0.00	0.00	0.39	0.39
Avail Cap(c_a), veh/h	463	0	551				883	2830	0	67	1210	1220
HCM Platoon Ratio	1.00	1.00	1.00				1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.77	0.77	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	0.0	37.7				5.6	0.0	0.0	0.0	7.5	7.5
Incr Delay (d2), s/veh	0.2	0.0	0.5				0.5	0.2	0.0	0.0	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	10.2				1.5	0.1	0.0	0.0	4.3	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.7	0.0	38.3				6.1	0.2	0.0	0.0	8.4	8.4
LnGrp LOS	D	A	D				A	A	A	A	A	A
Approach Vol, veh/h		247						1216			940	
Approach Delay, s/veh		39.3						2.1			8.4	
Approach LOS		D						A			A	

Timer - Assigned Phs	2		4	5	6
Phs Duration (G+Y+Rc), s	89.9		18.1	12.5	77.4
Change Period (Y+Rc), s	3.9		4.3	3.0	3.9
Max Green Setting (Gmax), s	71.7		28.1	29.0	39.7
Max Q Clear Time (g_c+I1), s	2.0		13.5	8.9	14.3
Green Ext Time (p_c), s	6.5		0.3	0.5	6.2

Intersection Summary	
HCM 6th Ctrl Delay	8.4
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	61	47	95	18	326	9	555	71	262	711	16
Future Volume (veh/h)	117	61	47	95	18	326	9	555	71	262	711	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	117	61	47	95	18	326	9	555	71	262	711	16
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	161	124	120	297	513	316	891	755	293	1526	34
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.18	0.46	0.46	0.05	0.14	0.14
Sat Flow, veh/h	1781	980	755	1781	1870	1585	1781	1945	1648	1781	3553	80
Grp Volume(v), veh/h	117	0	108	95	18	326	9	555	71	262	355	372
Grp Sat Flow(s),veh/h/ln	1781	0	1734	1781	1870	1585	1781	1945	1648	1781	1777	1856
Q Serve(g_s), s	7.0	0.0	6.0	5.7	0.9	14.0	0.5	23.4	2.6	15.8	19.9	19.9
Cycle Q Clear(g_c), s	7.0	0.0	6.0	5.7	0.9	14.0	0.5	23.4	2.6	15.8	19.9	19.9
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	132	0	286	120	297	513	316	891	755	293	763	797
V/C Ratio(X)	0.89	0.00	0.38	0.79	0.06	0.64	0.03	0.62	0.09	0.89	0.47	0.47
Avail Cap(c_a), veh/h	132	0	514	148	571	745	316	891	755	297	763	797
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	49.6	0.0	40.2	49.6	38.6	17.9	36.7	22.2	16.6	50.1	35.0	35.0
Incr Delay (d2), s/veh	46.1	0.0	0.8	20.7	0.1	1.3	0.0	3.3	0.2	24.3	1.9	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	2.6	3.2	0.4	5.2	0.2	10.9	1.0	9.5	9.8	10.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	0.0	41.0	70.3	38.7	19.2	36.7	25.5	16.8	74.4	36.8	36.7
LnGrp LOS	F	A	D	E	D	B	D	C	B	E	D	D
Approach Vol, veh/h		225			439			635			989	
Approach Delay, s/veh		69.4			31.1			24.7			46.7	
Approach LOS		E			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.8	54.2	11.3	21.8	23.9	51.1	12.0	21.0
Change Period (Y+Rc), s	3.0	4.7	4.0	* 4	4.7	* 4.7	4.0	3.9
Max Green Setting (Gmax), s	13.3	33.4	9.0	* 32	5.0	* 46	8.0	33.0
Max Q Clear Time (g_c+I1), s	11.7	25.4	7.7	8.0	2.5	21.9	9.0	16.0
Green Ext Time (p_c), s	0.0	2.3	0.0	0.5	0.0	4.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	39.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	381	0	0	406	2	0	0	0	9	0	27
Future Vol, veh/h	11	381	0	0	406	2	0	0	0	9	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082339328		-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	381	0	0	406	2	0	0	0	9	0	27

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	408	0	-	-	-	0			810	810	407
Stage 1	-	-	-	-	-	-			407	407	-
Stage 2	-	-	-	-	-	-			403	403	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1151	-	0	0	-	-			349	314	644
Stage 1	-	-	0	0	-	-			672	597	-
Stage 2	-	-	0	0	-	-			675	600	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1151	-	-	-	-	-			346	0	644
Mov Cap-2 Maneuver	-	-	-	-	-	-			464	0	-
Stage 1	-	-	-	-	-	-			665	0	-
Stage 2	-	-	-	-	-	-			675	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1151	-	-	-	587
HCM Lane V/C Ratio	0.01	-	-	-	0.061
HCM Control Delay (s)	8.2	-	-	-	11.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	142	433	7	10	456	126	3	4	10	78	2	76
Future Vol, veh/h	142	433	7	10	456	126	3	4	10	78	2	76
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	142	433	7	10	456	126	3	4	10	78	2	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	582	0	0	440	0	0	1299	1323	437	1267	1263	519
Stage 1	-	-	-	-	-	-	721	721	-	539	539	-
Stage 2	-	-	-	-	-	-	578	602	-	728	724	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	992	-	-	1120	-	-	138	156	620	146	170	557
Stage 1	-	-	-	-	-	-	419	432	-	527	522	-
Stage 2	-	-	-	-	-	-	501	489	-	415	430	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	1120	-	-	104	132	620	124	144	557
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	132	-	124	144	-
Stage 1	-	-	-	-	-	-	359	370	-	452	517	-
Stage 2	-	-	-	-	-	-	427	485	-	346	369	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0.1	22.2	67.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	226	992	-	-	1120	-	-	200
HCM Lane V/C Ratio	0.075	0.143	-	-	0.009	-	-	0.78
HCM Control Delay (s)	22.2	9.2	-	-	8.2	-	-	67.1
HCM Lane LOS	C	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.2	0.5	-	-	0	-	-	5.4

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	524	64	367	438	0	102	0	406	0	0	0
Future Volume (veh/h)	0	524	64	367	438	0	102	0	406	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	524	64	367	438	0	102	0	406			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	623	76	426	1309	0	275	0	624			
Arrive On Green	0.00	0.38	0.38	0.24	0.70	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	0	1635	200	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	588	367	438	0	102	0	406			
Grp Sat Flow(s),veh/h/ln	0	0	1834	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	13.2	8.9	4.2	0.0	2.3	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	13.2	8.9	4.2	0.0	2.3	0.0	0.0			
Prop In Lane	0.00		0.11	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	699	426	1309	0	275	0	624			
V/C Ratio(X)	0.00	0.00	0.84	0.86	0.33	0.00	0.37	0.00	0.65			
Avail Cap(c_a), veh/h	0	0	867	433	1463	0	708	0	1010			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	12.8	16.5	2.7	0.0	17.2	0.0	11.2			
Incr Delay (d2), s/veh	0.0	0.0	6.2	15.2	0.1	0.0	0.8	0.0	1.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	5.5	4.9	0.6	0.0	0.9	0.0	2.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	19.0	31.7	2.8	0.0	18.0	0.0	12.3			
LnGrp LOS	A	A	B	C	A	A	B	A	B			
Approach Vol, veh/h		588			805			508				
Approach Delay, s/veh		19.0			16.0			13.5				
Approach LOS		B			B			B				
Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	14.4	20.8				35.3		10.0				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	11.0	* 21				35.4		18.0				
Max Q Clear Time (g_c+I1), s	10.9	15.2				6.2		4.3				
Green Ext Time (p_c), s	0.0	2.0				2.9		1.7				

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	0	422	0	0	0	169	795	0	0	949	43
Future Volume (veh/h)	130	0	422	0	0	0	169	795	0	0	949	43
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	0	422				169	795	0	0	949	43
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	171	0	736				832	2966	0	61	1499	68
Arrive On Green	0.10	0.00	0.10				0.74	1.00	0.00	0.00	0.43	0.43
Sat Flow, veh/h	1781	0	1585				1781	3647	0	683	3462	157
Grp Volume(v), veh/h	130	0	422				169	795	0	0	487	505
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	683	1777	1842
Q Serve(g_s), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	25.3	25.3
Cycle Q Clear(g_c), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	25.3	25.3
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.09
Lane Grp Cap(c), veh/h	171	0	736				832	2966	0	61	769	798
V/C Ratio(X)	0.76	0.00	0.57				0.20	0.27	0.00	0.00	0.63	0.63
Avail Cap(c_a), veh/h	433	0	970				832	2966	0	61	769	798
HCM Platoon Ratio	1.00	1.00	1.00				2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.79	0.79	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	23.1				5.2	0.0	0.0	0.0	26.1	26.1
Incr Delay (d2), s/veh	2.6	0.0	0.3				0.0	0.2	0.0	0.0	3.9	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	13.9				0.9	0.1	0.0	0.0	11.1	11.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	23.3				5.2	0.2	0.0	0.0	30.1	29.9
LnGrp LOS	D	A	C				A	A	A	A	C	C
Approach Vol, veh/h		552						964			992	
Approach Delay, s/veh		30.7						1.1			30.0	
Approach LOS		C						A			C	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		102.4		15.6	47.4	55.0						
Change Period (Y+Rc), s		3.9		4.3	3.9	* 3.9						
Max Green Setting (Gmax), s		81.1		28.7	27.0	* 51						
Max Q Clear Time (g_c+I1), s		2.0		10.4	2.0	27.3						
Green Ext Time (p_c), s		6.2		0.9	0.2	6.4						

Intersection Summary	
HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	22	23	121	34	296	40	672	122	268	775	29
Future Volume (veh/h)	42	22	23	121	34	296	40	672	122	268	775	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	42	22	23	121	34	296	40	672	122	268	775	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	37	39	136	167	720	55	715	606	650	2502	94
Arrive On Green	0.03	0.04	0.04	0.08	0.09	0.09	0.03	0.37	0.37	0.73	1.00	1.00
Sat Flow, veh/h	1781	837	875	1781	1870	1585	1781	1945	1648	1781	3493	131
Grp Volume(v), veh/h	42	0	45	121	34	296	40	672	122	268	394	410
Grp Sat Flow(s),veh/h/ln	1781	0	1713	1781	1870	1585	1781	1945	1648	1781	1777	1847
Q Serve(g_s), s	2.8	0.0	3.0	7.9	2.0	1.7	2.6	39.4	6.0	6.9	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	3.0	7.9	2.0	1.7	2.6	39.4	6.0	6.9	0.0	0.0
Prop In Lane	1.00		0.51	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	54	0	76	136	167	720	55	715	606	650	1273	1323
V/C Ratio(X)	0.78	0.00	0.59	0.89	0.20	0.41	0.73	0.94	0.20	0.41	0.31	0.31
Avail Cap(c_a), veh/h	106	0	450	136	523	1022	106	715	606	650	1273	1323
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.81	0.81	0.81
Uniform Delay (d), s/veh	56.8	0.0	55.4	54.0	49.8	12.4	56.7	36.0	25.5	11.0	0.0	0.0
Incr Delay (d2), s/veh	21.1	0.0	7.2	46.1	0.6	0.4	6.6	21.7	0.7	0.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.5	5.3	1.0	3.9	1.3	22.2	2.5	2.1	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	0.0	62.6	100.1	50.4	12.7	63.3	57.7	26.2	11.2	0.5	0.5
LnGrp LOS	E	A	E	F	D	B	E	E	C	B	A	A
Approach Vol, veh/h		87			451			834			1072	
Approach Delay, s/veh		70.0			39.0			53.4			3.2	
Approach LOS		E			D			D			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.8	48.1	13.0	9.1	6.7	89.2	7.6	14.6				
Change Period (Y+Rc), s	4.7	* 4.7	4.0	3.9	3.0	4.7	4.0	* 4				
Max Green Setting (Gmax), s	3.3	* 43	9.0	31.0	7.0	55.4	7.0	* 33				
Max Q Clear Time (g_c+I1), s	3.9	41.4	9.9	5.0	4.6	2.0	4.8	4.0				
Green Ext Time (p_c), s	0.3	1.0	0.0	0.2	0.0	5.4	0.0	1.2				

Intersection Summary	
HCM 6th Ctrl Delay	29.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	400	0	0	477	24	0	0	0	19	0	37
Future Vol, veh/h	34	400	0	0	477	24	0	0	0	19	0	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082494976		-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	400	0	0	477	24	0	0	0	19	0	37

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	501	0	-	-	-	0			957	957	489
Stage 1	-	-	-	-	-	-			489	489	-
Stage 2	-	-	-	-	-	-			468	468	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1063	-	0	0	-	-			286	258	579
Stage 1	-	-	0	0	-	-			616	549	-
Stage 2	-	-	0	0	-	-			630	561	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1063	-	-	-	-	-			277	0	579
Mov Cap-2 Maneuver	-	-	-	-	-	-			406	0	-
Stage 1	-	-	-	-	-	-			596	0	-
Stage 2	-	-	-	-	-	-			630	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1063	-	-	-	506
HCM Lane V/C Ratio	0.032	-	-	-	0.111
HCM Control Delay (s)	8.5	-	-	-	13
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	371	17	35	549	126	12	12	35	60	13	69
Future Vol, veh/h	69	371	17	35	549	126	12	12	35	60	13	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	69	371	17	35	549	126	12	12	35	60	13	69

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	675	0	0	388	0	0	1241	1263	380	1223	1208	612
Stage 1	-	-	-	-	-	-	518	518	-	682	682	-
Stage 2	-	-	-	-	-	-	723	745	-	541	526	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	916	-	-	1170	-	-	152	170	667	156	183	493
Stage 1	-	-	-	-	-	-	541	533	-	440	450	-
Stage 2	-	-	-	-	-	-	417	421	-	525	529	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	916	-	-	1170	-	-	113	152	667	128	164	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	152	-	128	164	-
Stage 1	-	-	-	-	-	-	500	493	-	407	437	-
Stage 2	-	-	-	-	-	-	338	408	-	449	489	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.4	24	54.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	248	916	-	-	1170	-	-	206
HCM Lane V/C Ratio	0.238	0.075	-	-	0.03	-	-	0.689
HCM Control Delay (s)	24	9.2	-	-	8.2	-	-	54.1
HCM Lane LOS	C	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.9	0.2	-	-	0.1	-	-	4.3

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	419	57	218	609	0	112	0	273	0	0	0
Future Volume (veh/h)	0	419	57	218	609	0	112	0	273	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	419	57	218	609	0	112	0	273			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	569	77	307	1171	0	339	0	576			
Arrive On Green	0.00	0.35	0.35	0.17	0.63	0.00	0.19	0.00	0.19			
Sat Flow, veh/h	0	1612	219	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	476	218	609	0	112	0	273			
Grp Sat Flow(s),veh/h/ln	0	0	1831	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	8.2	4.1	6.5	0.0	2.0	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	8.2	4.1	6.5	0.0	2.0	0.0	0.0			
Prop In Lane	0.00		0.12	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	647	307	1171	0	339	0	576			
V/C Ratio(X)	0.00	0.00	0.74	0.71	0.52	0.00	0.33	0.00	0.47			
Avail Cap(c_a), veh/h	0	0	1191	594	1997	0	892	0	1067			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	10.2	14.0	3.7	0.0	12.6	0.0	8.8			
Incr Delay (d2), s/veh	0.0	0.0	1.7	1.1	0.4	0.0	0.6	0.0	0.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	2.6	1.4	0.9	0.0	0.7	0.0	1.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	11.8	15.2	4.1	0.0	13.1	0.0	9.4			
LnGrp LOS	A	A	B	B	A	A	B	A	A			
Approach Vol, veh/h		476			827			385				
Approach Delay, s/veh		11.8			7.0			10.5				
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	9.8	16.3				26.1		9.9				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	12.0	* 23				38.4		18.0				
Max Q Clear Time (g_c+I1), s	6.1	10.2				8.5		4.0				
Green Ext Time (p_c), s	0.2	2.5				4.6		1.3				

Intersection Summary			
HCM 6th Ctrl Delay		9.2	
HCM 6th LOS		A	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	0	195	0	0	0	397	915	0	0	862	116
Future Volume (veh/h)	58	0	195	0	0	0	397	915	0	0	862	116
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	0	195				397	915	0	0	862	116
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	233	0	350				545	2818	0	67	2126	286
Arrive On Green	0.13	0.00	0.13				0.12	1.00	0.00	0.00	0.68	0.68
Sat Flow, veh/h	1781	0	1585				1781	3647	0	610	3147	424
Grp Volume(v), veh/h	58	0	195				397	915	0	0	487	491
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	610	1777	1794
Q Serve(g_s), s	3.2	0.0	11.8				7.2	0.0	0.0	0.0	13.2	13.2
Cycle Q Clear(g_c), s	3.2	0.0	11.8				7.2	0.0	0.0	0.0	13.2	13.2
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.24
Lane Grp Cap(c), veh/h	233	0	350				545	2818	0	67	1200	1212
V/C Ratio(X)	0.25	0.00	0.56				0.73	0.32	0.00	0.00	0.41	0.41
Avail Cap(c_a), veh/h	463	0	555				863	2818	0	67	1200	1212
HCM Platoon Ratio	1.00	1.00	1.00				1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.70	0.70	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	42.2	0.0	37.4				6.3	0.0	0.0	0.0	7.8	7.8
Incr Delay (d2), s/veh	0.2	0.0	0.5				0.5	0.2	0.0	0.0	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	10.5				1.6	0.1	0.0	0.0	4.6	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	0.0	37.9				6.8	0.2	0.0	0.0	8.8	8.8
LnGrp LOS	D	A	D				A	A	A	A	A	A
Approach Vol, veh/h		253						1312			978	
Approach Delay, s/veh		38.9						2.2			8.8	
Approach LOS		D						A			A	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		89.6		18.4	12.7	76.9						
Change Period (Y+Rc), s		3.9		4.3	3.0	3.9						
Max Green Setting (Gmax), s		71.7		28.1	29.0	39.7						
Max Q Clear Time (g_c+I1), s		2.0		13.8	9.2	15.2						
Green Ext Time (p_c), s		7.5		0.3	0.5	6.4						

Intersection Summary												
HCM 6th Ctrl Delay			8.4									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	64	47	106	27	359	9	618	95	285	732	16
Future Volume (veh/h)	117	64	47	106	27	359	9	618	95	285	732	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	117	64	47	106	27	359	9	618	95	285	732	16
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	172	126	132	323	538	291	860	729	297	1528	33
Arrive On Green	0.07	0.17	0.17	0.07	0.17	0.17	0.16	0.44	0.44	0.06	0.14	0.14
Sat Flow, veh/h	1781	1002	736	1781	1870	1585	1781	1945	1648	1781	3556	78
Grp Volume(v), veh/h	117	0	111	106	27	359	9	618	95	285	366	382
Grp Sat Flow(s),veh/h/ln	1781	0	1738	1781	1870	1585	1781	1945	1648	1781	1777	1856
Q Serve(g_s), s	7.0	0.0	6.1	6.3	1.3	15.4	0.5	28.0	3.7	17.2	20.5	20.5
Cycle Q Clear(g_c), s	7.0	0.0	6.1	6.3	1.3	15.4	0.5	28.0	3.7	17.2	20.5	20.5
Prop In Lane	1.00		0.42	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	132	0	298	132	323	538	291	860	729	297	763	798
V/C Ratio(X)	0.89	0.00	0.37	0.80	0.08	0.67	0.03	0.72	0.13	0.96	0.48	0.48
Avail Cap(c_a), veh/h	132	0	515	148	571	748	291	860	729	297	763	798
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	49.6	0.0	39.6	49.2	37.5	17.3	38.0	24.6	17.8	50.7	35.2	35.2
Incr Delay (d2), s/veh	46.1	0.0	0.8	24.2	0.1	1.4	0.0	5.1	0.4	38.6	1.9	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	2.7	3.7	0.6	5.6	0.2	13.4	1.5	11.4	10.1	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	0.0	40.4	73.4	37.6	18.8	38.0	29.7	18.2	89.3	37.2	37.1
LnGrp LOS	F	A	D	E	D	B	D	C	B	F	D	D
Approach Vol, veh/h		228			492			722			1033	
Approach Delay, s/veh		68.7			31.6			28.3			51.5	
Approach LOS		E			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.0	52.5	12.0	22.5	22.4	51.1	12.0	22.5				
Change Period (Y+Rc), s	3.0	4.7	4.0	* 4	4.7	* 4.7	4.0	3.9				
Max Green Setting (Gmax), s	18.0	33.4	9.0	* 32	5.0	* 46	8.0	33.0				
Max Q Clear Time (g_c+I1), s	9.2	30.0	8.3	8.1	2.5	22.5	9.0	17.4				
Green Ext Time (p_c), s	0.0	1.3	0.0	0.6	0.0	4.5	0.0	1.3				

Intersection Summary												
HCM 6th Ctrl Delay			42.4									
HCM 6th LOS			D									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	431	0	0	459	2	0	0	0	9	0	27
Future Vol, veh/h	11	431	0	0	459	2	0	0	0	9	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082339328		-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	431	0	0	459	2	0	0	0	9	0	27

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	461	0	-	-	-	0			913	913	460
Stage 1	-	-	-	-	-	-			460	460	-
Stage 2	-	-	-	-	-	-			453	453	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1100	-	0	0	-	-			304	273	601
Stage 1	-	-	0	0	-	-			636	566	-
Stage 2	-	-	0	0	-	-			640	570	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1100	-	-	-	-	-			301	0	601
Mov Cap-2 Maneuver	-	-	-	-	-	-			427	0	-
Stage 1	-	-	-	-	-	-			630	0	-
Stage 2	-	-	-	-	-	-			640	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1100	-	-	-	545
HCM Lane V/C Ratio	0.01	-	-	-	0.066
HCM Control Delay (s)	8.3	-	-	-	12.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	39.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	171	459	7	10	484	158	3	4	10	114	2	105
Future Vol, veh/h	171	459	7	10	484	158	3	4	10	114	2	105
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	171	459	7	10	484	158	3	4	10	114	2	105

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	642	0	0	466	0	0	1442	1467	463	1395	1391	563
Stage 1	-	-	-	-	-	-	805	805	-	583	583	-
Stage 2	-	-	-	-	-	-	637	662	-	812	808	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	943	-	-	1095	-	-	110	128	599	119	142	526
Stage 1	-	-	-	-	-	-	376	395	-	498	499	-
Stage 2	-	-	-	-	-	-	465	459	-	373	394	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	943	-	-	1095	-	-	74	104	599	~ 97	115	526
Mov Cap-2 Maneuver	-	-	-	-	-	-	74	104	-	~ 97	115	-
Stage 1	-	-	-	-	-	-	308	324	-	408	495	-
Stage 2	-	-	-	-	-	-	367	455	-	297	323	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0.1	27.3	263.2
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	178	943	-	-	1095	-	-	159
HCM Lane V/C Ratio	0.096	0.181	-	-	0.009	-	-	1.39
HCM Control Delay (s)	27.3	9.7	-	-	8.3	-	-	263.2
HCM Lane LOS	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.3	0.7	-	-	0	-	-	13.8

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

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	571	79	388	466	0	134	0	468	0	0	0
Future Volume (veh/h)	0	571	79	388	466	0	134	0	468	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	571	79	388	466	0	134	0	468			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	647	90	410	1324	0	275	0	609			
Arrive On Green	0.00	0.40	0.40	0.23	0.71	0.00	0.15	0.00	0.15			
Sat Flow, veh/h	0	1608	222	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	650	388	466	0	134	0	468			
Grp Sat Flow(s),veh/h/ln	0	0	1830	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	15.7	10.3	4.6	0.0	3.3	0.0	1.3			
Cycle Q Clear(g_c), s	0.0	0.0	15.7	10.3	4.6	0.0	3.3	0.0	1.3			
Prop In Lane	0.00		0.12	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	736	410	1324	0	275	0	609			
V/C Ratio(X)	0.00	0.00	0.88	0.95	0.35	0.00	0.49	0.00	0.77			
Avail Cap(c_a), veh/h	0	0	819	410	1385	0	671	0	961			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	13.2	18.1	2.7	0.0	18.5	0.0	12.9			
Incr Delay (d2), s/veh	0.0	0.0	10.4	30.8	0.2	0.0	1.3	0.0	2.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	7.2	7.2	0.7	0.0	1.3	0.0	3.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	23.6	49.0	2.9	0.0	19.8	0.0	14.9			
LnGrp LOS	A	A	C	D	A	A	B	A	B			
Approach Vol, veh/h		650			854			602				
Approach Delay, s/veh		23.6			23.8			16.0				
Approach LOS		C			C			B				

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	14.6	22.8				37.4		10.4				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	11.0	* 21				35.4		18.0				
Max Q Clear Time (g_c+I1), s	12.3	17.7				6.6		5.3				
Green Ext Time (p_c), s	0.0	1.5				3.2		2.1				

Intersection Summary			
HCM 6th Ctrl Delay		21.5	
HCM 6th LOS		C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Stony Point Rd & Northpoint Pkwy

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	0	424	0	0	0	174	857	0	0	1045	43
Future Volume (veh/h)	130	0	424	0	0	0	174	857	0	0	1045	43
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	0	1870				1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	0	424				174	857	0	0	1045	43
Peak Hour Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	0	2				2	2	2	2	2	2
Cap, veh/h	171	0	736				807	2966	0	61	1506	62
Arrive On Green	0.10	0.00	0.10				0.74	1.00	0.00	0.00	0.43	0.43
Sat Flow, veh/h	1781	0	1585				1781	3647	0	644	3478	143
Grp Volume(v), veh/h	130	0	424				174	857	0	0	534	554
Grp Sat Flow(s),veh/h/ln	1781	0	1585				1781	1777	0	644	1777	1845
Q Serve(g_s), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	28.7	28.7
Cycle Q Clear(g_c), s	8.4	0.0	0.0				0.0	0.0	0.0	0.0	28.7	28.7
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	171	0	736				807	2966	0	61	769	799
V/C Ratio(X)	0.76	0.00	0.58				0.22	0.29	0.00	0.00	0.69	0.69
Avail Cap(c_a), veh/h	433	0	970				807	2966	0	61	769	799
HCM Platoon Ratio	1.00	1.00	1.00				2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.75	0.75	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	23.1				6.0	0.0	0.0	0.0	27.1	27.1
Incr Delay (d2), s/veh	2.6	0.0	0.3				0.0	0.2	0.0	0.0	5.1	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	13.9				1.0	0.1	0.0	0.0	12.7	13.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	23.4				6.1	0.2	0.0	0.0	32.2	32.0
LnGrp LOS	D	A	C				A	A	A	A	C	C
Approach Vol, veh/h		554						1031			1088	
Approach Delay, s/veh		30.7						1.2			32.1	
Approach LOS		C						A			C	

Timer - Assigned Phs		2		4	5	6						
Phs Duration (G+Y+Rc), s		102.4		15.6	47.4	55.0						
Change Period (Y+Rc), s		3.9		4.3	3.9	* 3.9						
Max Green Setting (Gmax), s		81.1		28.7	27.0	* 51						
Max Q Clear Time (g_c+I1), s		2.0		10.4	2.0	30.7						
Green Ext Time (p_c), s		6.9		0.9	0.2	6.8						

Intersection Summary	
HCM 6th Ctrl Delay	19.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
2: Stony Point Rd & Hearn Ave

02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	32	23	146	40	322	40	713	136	296	845	29
Future Volume (veh/h)	42	32	23	146	40	322	40	713	136	296	845	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	42	32	23	146	40	322	40	713	136	296	845	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	51	36	136	178	720	55	715	606	640	2491	85
Arrive On Green	0.03	0.05	0.05	0.08	0.10	0.10	0.03	0.37	0.37	0.72	1.00	1.00
Sat Flow, veh/h	1781	1012	727	1781	1870	1585	1781	1945	1648	1781	3505	120
Grp Volume(v), veh/h	42	0	55	146	40	322	40	713	136	296	428	446
Grp Sat Flow(s),veh/h/ln	1781	0	1739	1781	1870	1585	1781	1945	1648	1781	1777	1849
Q Serve(g_s), s	2.8	0.0	3.7	9.0	2.3	1.9	2.6	43.2	6.7	8.3	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	3.7	9.0	2.3	1.9	2.6	43.2	6.7	8.3	0.0	0.0
Prop In Lane	1.00		0.42	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	54	0	87	136	178	720	55	715	606	640	1263	1314
V/C Ratio(X)	0.78	0.00	0.63	1.07	0.22	0.45	0.73	1.00	0.22	0.46	0.34	0.34
Avail Cap(c_a), veh/h	106	0	457	136	523	1013	106	715	606	640	1263	1314
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.78	0.78
Uniform Delay (d), s/veh	56.8	0.0	55.0	54.5	49.4	12.6	56.7	37.2	25.7	11.8	0.0	0.0
Incr Delay (d2), s/veh	21.1	0.0	7.4	98.6	0.6	0.4	6.6	32.8	0.9	0.2	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.8	7.7	1.1	4.3	1.3	26.1	2.8	2.5	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	0.0	62.4	153.1	50.0	13.0	63.3	70.1	26.6	11.9	0.6	0.5
LnGrp LOS	E	A	E	F	D	B	E	E	C	B	A	A
Approach Vol, veh/h		97			508			889			1170	
Approach Delay, s/veh		69.1			56.2			63.1			3.4	
Approach LOS		E			E			E			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.1	48.1	13.0	9.8	6.7	88.6	7.6	15.2				
Change Period (Y+Rc), s	4.7	* 4.7	4.0	3.9	3.0	4.7	4.0	* 4				
Max Green Setting (Gmax), s	9.3	* 43	9.0	31.0	7.0	55.4	7.0	* 33				
Max Q Clear Time (g_c+I1), s	10.3	45.2	11.0	5.7	4.6	2.0	4.8	4.3				
Green Ext Time (p_c), s	0.3	0.0	0.0	0.2	0.0	6.1	0.0	1.4				

Intersection Summary	
HCM 6th Ctrl Delay	35.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	452	0	0	534	24	0	0	0	19	0	37
Future Vol, veh/h	34	452	0	0	534	24	0	0	0	19	0	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	1082494976		-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	452	0	0	534	24	0	0	0	19	0	37

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	558	0	-	-	-	0			1066	1066	546
Stage 1	-	-	-	-	-	-			546	546	-
Stage 2	-	-	-	-	-	-			520	520	-
Critical Hdwy	4.12	-	-	-	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1013	-	0	0	-	-			246	222	538
Stage 1	-	-	0	0	-	-			580	518	-
Stage 2	-	-	0	0	-	-			597	532	-
Platoon blocked, %		-			-	-					
Mov Cap-1 Maneuver	1013	-	-	-	-	-			238	0	538
Mov Cap-2 Maneuver	-	-	-	-	-	-			372	0	-
Stage 1	-	-	-	-	-	-			560	0	-
Stage 2	-	-	-	-	-	-			597	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1013	-	-	-	467
HCM Lane V/C Ratio	0.034	-	-	-	0.12
HCM Control Delay (s)	8.7	-	-	-	13.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	24.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	408	17	35	584	149	12	12	35	90	13	95
Future Vol, veh/h	85	408	17	35	584	149	12	12	35	90	13	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	65	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	85	408	17	35	584	149	12	12	35	90	13	95

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	733	0	0	425	0	0	1370	1390	417	1339	1324	659
Stage 1	-	-	-	-	-	-	587	587	-	729	729	-
Stage 2	-	-	-	-	-	-	783	803	-	610	595	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	872	-	-	1134	-	-	124	142	636	130	156	464
Stage 1	-	-	-	-	-	-	496	497	-	414	428	-
Stage 2	-	-	-	-	-	-	387	396	-	482	492	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	872	-	-	1134	-	-	83	124	636	103	137	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	124	-	103	137	-
Stage 1	-	-	-	-	-	-	448	449	-	374	415	-
Stage 2	-	-	-	-	-	-	289	384	-	400	444	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	0.4	30.5	177.7
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	199	872	-	-	1134	-	-	169
HCM Lane V/C Ratio	0.296	0.097	-	-	0.031	-	-	1.172
HCM Control Delay (s)	30.5	9.6	-	-	8.3	-	-	177.7
HCM Lane LOS	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	1.2	0.3	-	-	0.1	-	-	10.6

HCM 6th Signalized Intersection Summary
5: Hearn Ave & Dutton Meadow 02/11/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	454	89	289	651	0	128	0	314	0	0	0
Future Volume (veh/h)	0	454	89	289	651	0	128	0	314	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0	1870	1870	1870			
Adj Flow Rate, veh/h	0	454	89	289	651	0	128	0	314			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Percent Heavy Veh, %	0	2	2	2	2	0	2	2	2			
Cap, veh/h	0	576	113	357	1249	0	304	0	588			
Arrive On Green	0.00	0.38	0.38	0.20	0.67	0.00	0.17	0.00	0.17			
Sat Flow, veh/h	0	1519	298	1781	1870	0	1781	0	1585			
Grp Volume(v), veh/h	0	0	543	289	651	0	128	0	314			
Grp Sat Flow(s),veh/h/ln	0	0	1817	1781	1870	0	1781	0	1585			
Q Serve(g_s), s	0.0	0.0	10.8	6.3	7.2	0.0	2.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	0.0	10.8	6.3	7.2	0.0	2.6	0.0	0.0			
Prop In Lane	0.00		0.16	1.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	0	0	689	357	1249	0	304	0	588			
V/C Ratio(X)	0.00	0.00	0.79	0.81	0.52	0.00	0.42	0.00	0.53			
Avail Cap(c_a), veh/h	0	0	1043	524	1762	0	786	0	1017			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	0.0	0.0	11.2	15.6	3.5	0.0	15.1	0.0	10.1			
Incr Delay (d2), s/veh	0.0	0.0	2.4	3.6	0.3	0.0	0.9	0.0	0.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	0.0	3.7	2.5	1.0	0.0	0.9	0.0	1.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	13.6	19.2	3.8	0.0	16.0	0.0	10.8			
LnGrp LOS	A	A	B	B	A	A	B	A	B			
Approach Vol, veh/h		543			940			442				
Approach Delay, s/veh		13.6			8.5			12.3				
Approach LOS		B			A			B				

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	11.8	19.1				30.8		10.0				
Change Period (Y+Rc), s	3.6	* 3.6				3.6		3.0				
Max Green Setting (Gmax), s	12.0	* 23				38.4		18.0				
Max Q Clear Time (g_c+I1), s	8.3	12.8				9.2		4.6				
Green Ext Time (p_c), s	0.2	2.7				5.0		1.5				

Intersection Summary												
HCM 6th Ctrl Delay			10.8									
HCM 6th LOS			B									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Appendix C

SCTA Model VMT per Capita Map

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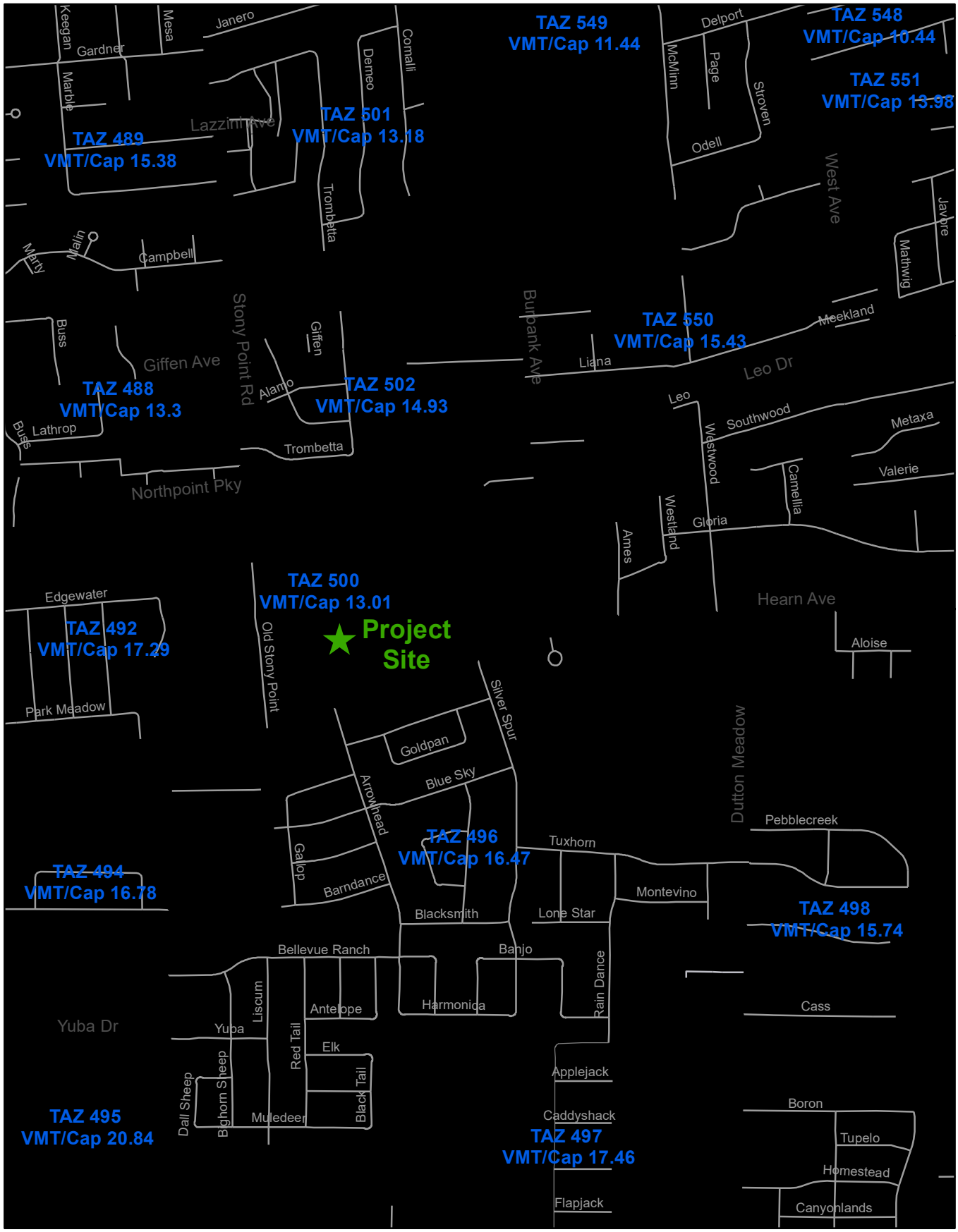
SCTA Regional Model (Fall 2020)
VMT per Capita by Traffic Analysis Zone



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Appendix D

Emergency Vehicle Access Exhibits

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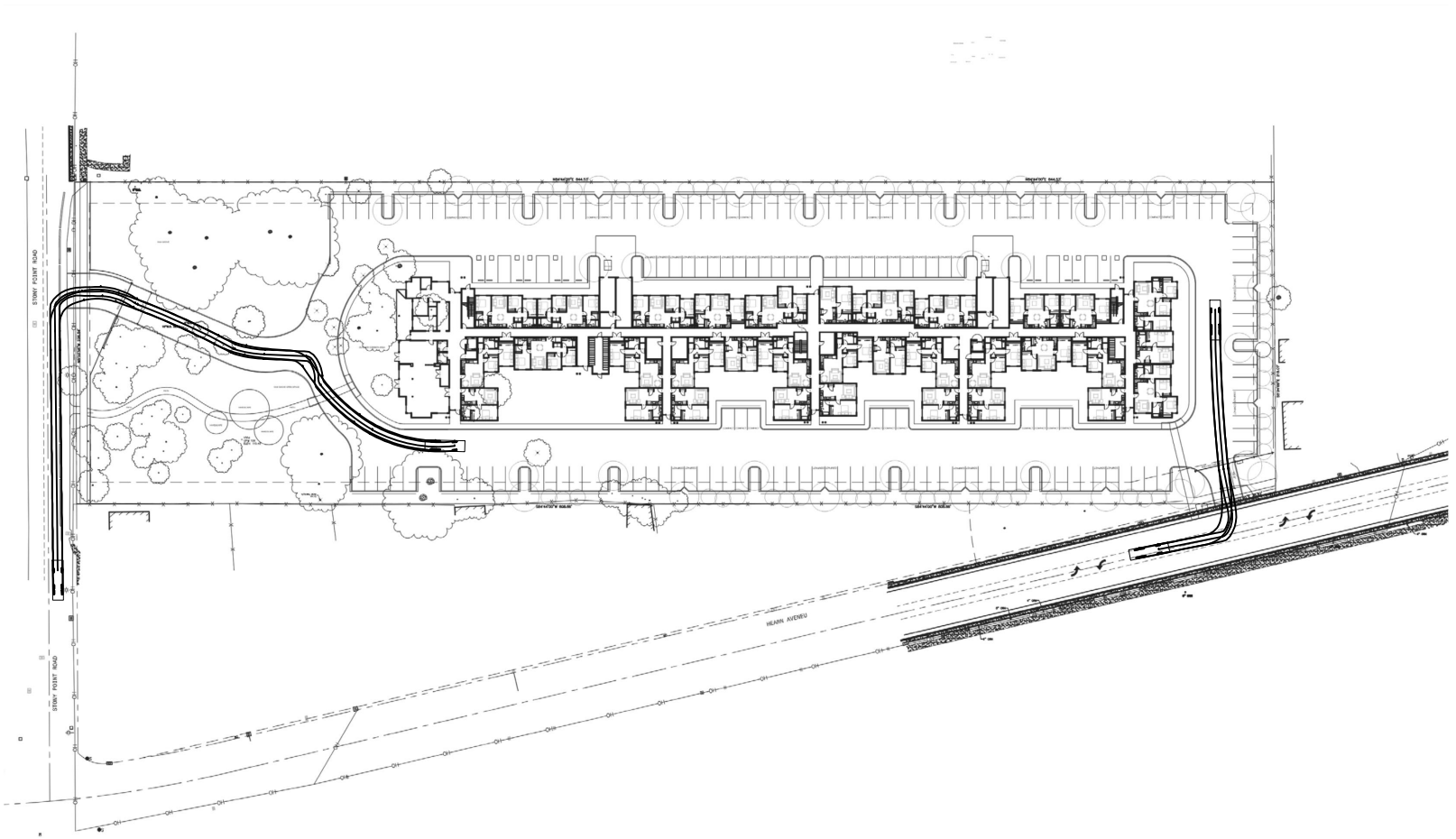

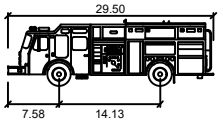

Sonoma County Fire Truck Feet

Width	: 8.00
Track	: 6.91
Lock to Lock Time	: 6.0
Steering Angle	: 38.8

2542 Old Stony Point Road

Fire Truck Access

SRO411

January 2021

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Appendix E

Signal Warrant Spreadsheets

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Warrant 3: Peak-Hour Volumes and Delay

Hearn Avenue & Burbank Avenue
Santa Rosa

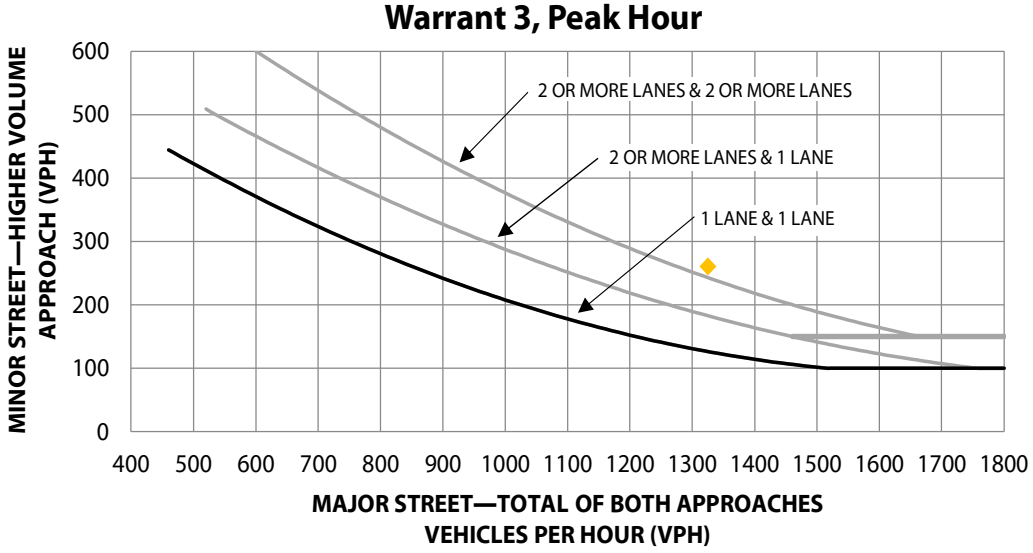
Project Name: Stony Oaks TIS

Intersection: 4

	Major Street	Minor Street
Street Name	Hearn Avenue	Burbank Avenue
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	30	25

Population less than 10,000? No
Date of Count: Wednesday, September 11, 2019
Scenario: AM Baseline

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Met
Condition A1	Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 29.81 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 261 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1603 vph	
Condition B	Met
The plotted point falls above the curve	



Warrant 3: Peak-Hour Volumes and Delay

Hearn Avenue & Burbank Avenue
Santa Rosa

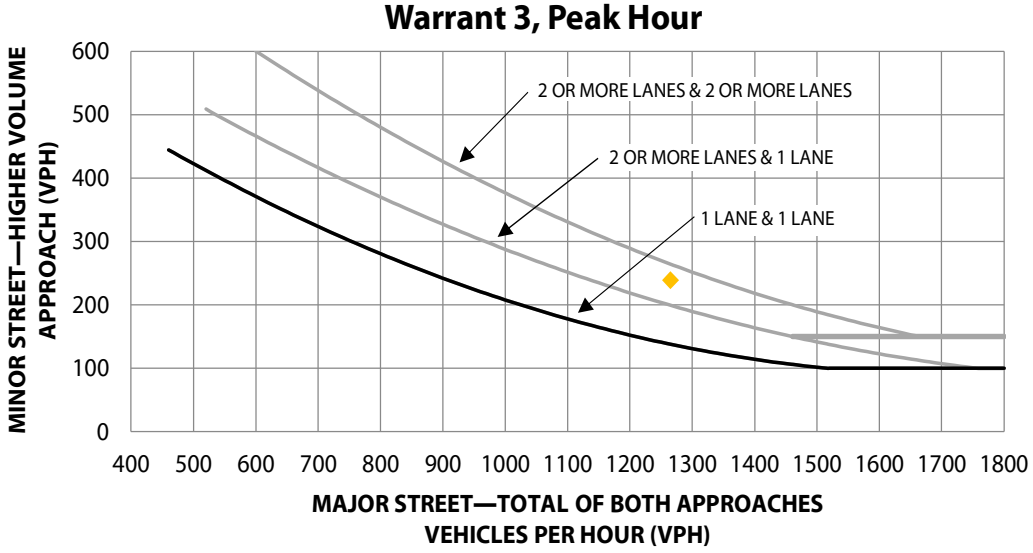
Project Name: Stony Oaks TIS

Intersection: 4

	Major Street	Minor Street
Street Name	Hearn Avenue	Burbank Avenue
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	30	25

Population less than 10,000? No
Date of Count: Wednesday, September 11, 2019
Scenario: PM Baseline

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Met
Condition A1	Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 13.51 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 239 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1563 vph	
Condition B	Met
The plotted point falls above the curve	



Warrant 3: Peak-Hour Volumes and Delay

Hearn Avenue & Burbank Avenue
Santa Rosa

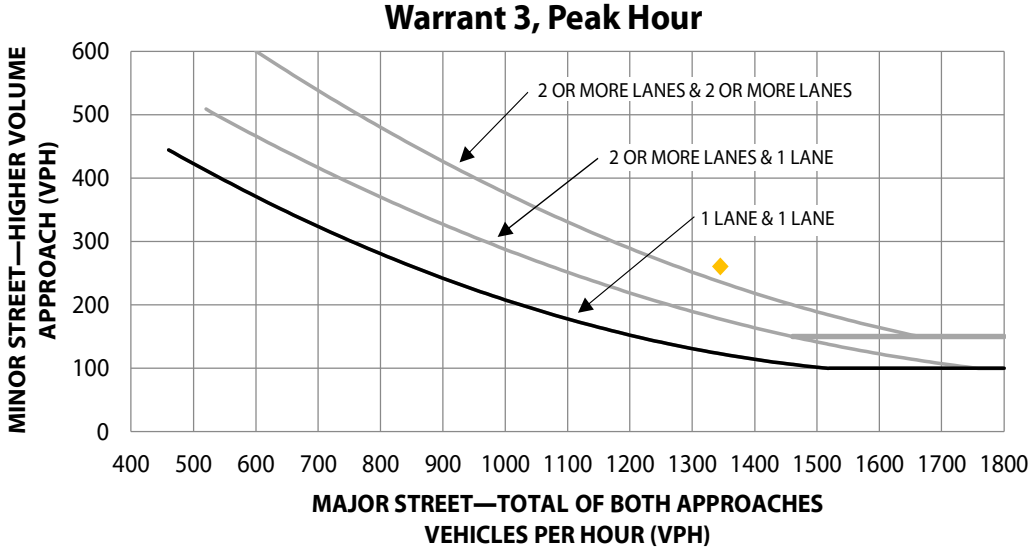
Project Name: Stony Oaks TIS

Intersection: 4

	Major Street	Minor Street
Street Name	Hearn Avenue	Burbank Avenue
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	30	25

Population less than 10,000? No
Date of Count: Wednesday, September 11, 2019
Scenario: AM Baseline Plus Project

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Met
Condition A1	Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 31.83 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 261 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1623 vph	
Condition B	Met
The plotted point falls above the curve	



Warrant 3: Peak-Hour Volumes and Delay

Hearn Avenue & Burbank Avenue
Santa Rosa

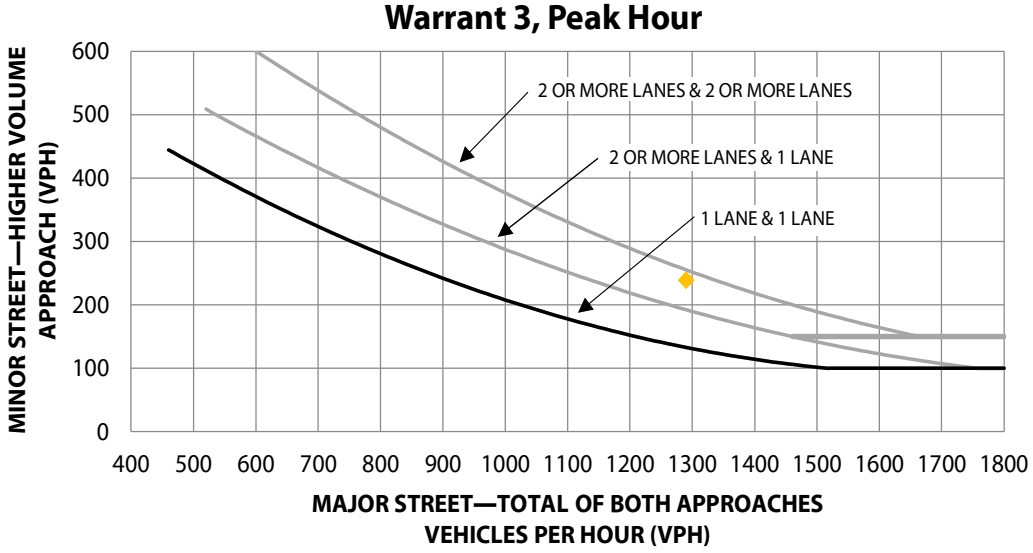
Project Name: Stony Oaks TIS

Intersection: 4

	Major Street	Minor Street
Street Name	Hearn Avenue	Burbank Avenue
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	30	25

Population less than 10,000? No
Date of Count: Wednesday, September 11, 2019
Scenario: PM Baseline Plus Project

Warrant 3 Met?: Met when either Condition A or B is met	**Yes**
Condition A: Met when conditions A1, A2, and A3 are met	Met
Condition A1	Met
The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach	
Minor Approach Delay: 14.89 vehicle-hours	
Condition A2	Met
The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes	
Minor Approach Volume: 239 vph	
Condition A3	Met
The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches	
Total Entering Volume: 1588 vph	
Condition B	Met
The plotted point falls above the curve	



Appendix F

Proportionate Share Calculations

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Equitable Share Calculations
Hearn Avenue/Burbank Avenue

AM Peak Hour Southbound Approach Delay (seconds)

Existing	62.4
Baseline (no project)	244.5
Baseline + Project	263.2
Project Delay (D)	18.7

Description of Project Improvement:

Install traffic signal

Calculation of Project Share

P = D / (DB - DE)
where:
P = Equitable Share
D = Project added delay during the affected peak hour
DB = Baseline plus Project Delay
DE = Existing Delay

D	18.7
DB	263.2
DE	62.4
P	**9.3%**

Total Estimated Cost of Improvements	$320,000
Equitable Share Contribution	**$29,760**

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