



# Traffic Impact Study for the Dutton Meadows Phase II Project



Prepared for the City of Santa Rosa

Submitted by  
**W-Trans**

November 13, 2018



**TRAFFIC ENGINEERING  
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# Executive Summary

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The proposed Dutton Meadows Phase II project would include the construction of 130 single-family dwelling units, of which 81 would have accessory dwelling units on-site. The project site is in the primarily vacant 18.4-acre site located east of Dutton Meadow and south of Hearn Avenue. The project would generate an average of 1,801 net new daily trips; of which 132 would occur during the morning peak hour and 172 during the evening peak hour. The project differs from the project previously approved for the site which included 191 single family dwelling units. The anticipated peak hour trip generation for the project as currently proposed is lower than that of the approved project. The project would have access points at Dutton Meadows and Hearn Avenue via Aloise Avenue and the future planned extension of Dutton Avenue.

The project's proposed configuration for the future intersection of Dutton Meadow/Northpoint Parkway differs from the City's planned configuration wherein the Northpoint Parkway extension would be a northwest-southeast street. South of Meadowview Elementary, Dutton Meadow would curve towards the east, intersect with Northpoint Parkway, and traverse the project site. As proposed, Dutton Meadow would continue to be a north-south street with Northpoint Parkway intersecting across from the outbound driveway of Meadowview Elementary School. The "New Street" that would traverse the site would be accessed via a tee intersection approximately 450 feet east of the proposed Northpoint Parkway/Dutton Meadow intersection.

Under existing conditions, the study intersections operate at acceptable service levels. With the proposed project, including the proposed configuration of the Northpoint Parkway/Dutton Meadow intersection, the service levels would continue to be acceptable.

Under future conditions, the intersection of Dutton Meadows/Northpoint Parkway was reviewed with both the planned and proposed configuration. Under the future scenario, without and with the project, with the planned or proposed configuration of Northpoint Parkway, all study intersections would operate at acceptable service levels.

The planned Northpoint Parkway and Dutton Meadow intersection was intended to provide a northwest-southeast arterial where most streets in the area are north-south or east-west. As proposed, the intersection does not preclude this. The roadway would maintain the desired number of lanes on Northpoint Parkway. With signal timing that favors the Northpoint Parkway movements, the southbound left-turn and the westbound right-turn, it would result in the desired effect of keeping vehicles on the Parkway and not pushing them to Dutton Meadow. Similarly, the vehicles that were intended to travel on Dutton Meadow through the project site would continue to do so with the proposed configuration.

Sight lines along Northpoint Parkway from the "New Street" would be adequate for speeds of up to 40 mph.

Since the proposed configuration would result in a signalized intersection at the Meadowview Elementary outbound driveway, it is recommended that this approach be striped with a left-turn lane and a through/right-turn lane as part of the project.

Per the *Dutton Meadows Project Draft Subsequent Environmental Impact Report*, CH2M Hill, 2004, the need for connected sidewalks as well as bike lanes on Northpoint Parkway was identified. The proposed project would provide continuous pedestrian facilities on-site as well as bike lanes along Northpoint Parkway.

# Introduction

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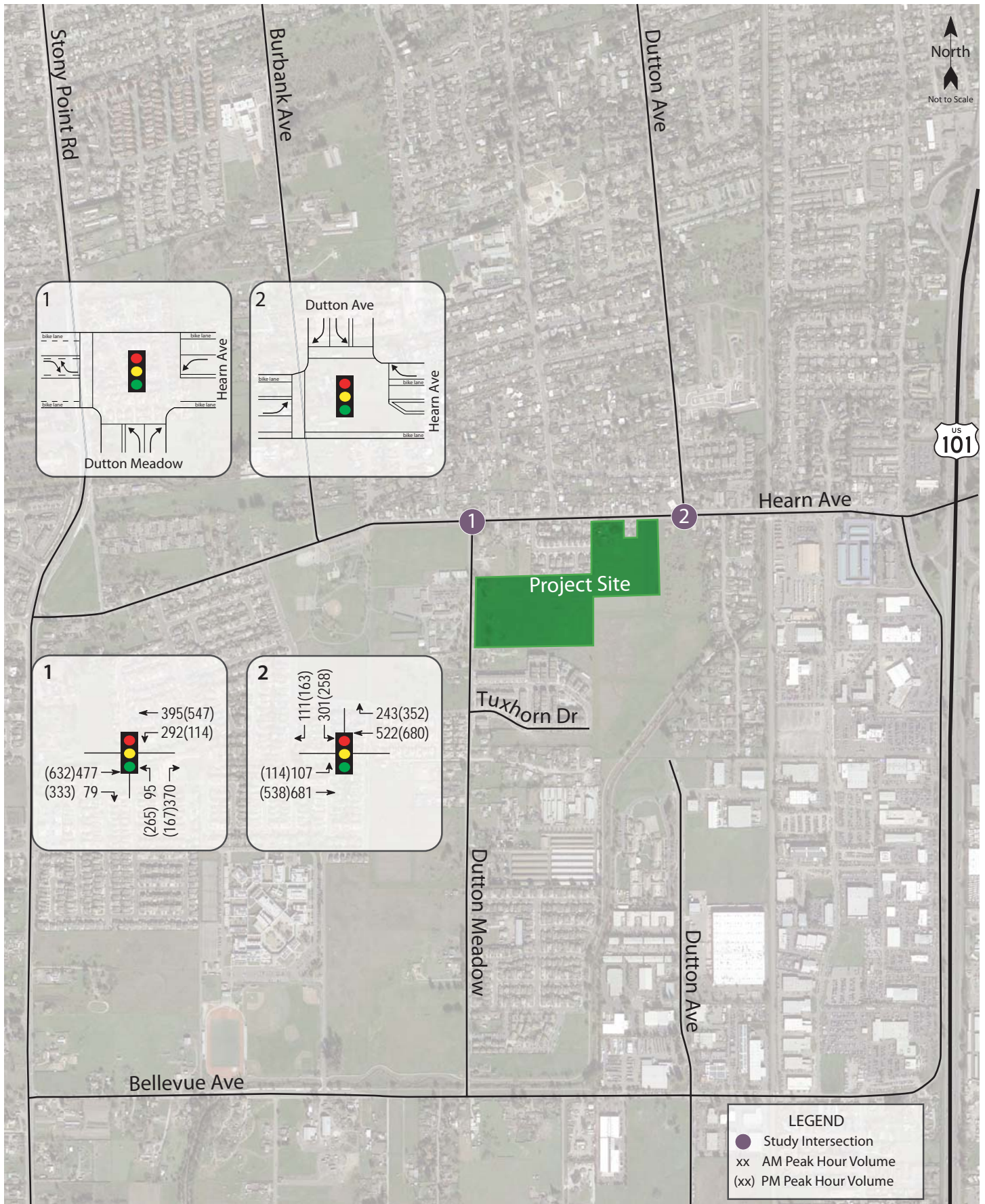
This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed 211-unit residential development, including 130 single family dwellings and 81 accessory dwelling units, to be located east of Dutton Meadow and south of Hearn Avenue in the City of Santa Rosa. The project as proposed differs from what was approved by the City and incorporated in the General Plan in terms of the proposed geometry for the street system connecting through the site. This report provides the project's impact based on both the proposed circulation system as well as what was included in the City's plans. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa and is consistent with standard traffic engineering techniques. The scope of work was reviewed and approved by City staff.

## Prelude

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

## Project Profile

The project consists of 130 single-family houses; up to 81 could have accessory dwelling units on-site. Currently, there are two single-family houses on the proposed project site; most of the project site is open field. The Dutton Meadows Phase II project previously approved by the City for this site included 191 single family dwelling units and this land use is reflected in the General Plan. The project site is located east of Dutton Meadow and south of Hearn Avenue, as shown in Figure 1.



**Traffic Impact Study for the Dutton Meadows Phase II Project**  
**Figure 1 – Study Area, Existing Lane Configurations and Existing Traffic Volumes**



# Transportation Setting

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## Operational Analysis

### Study Area and Periods

The study area consists of the following intersections:

1. Hearn Avenue/Dutton Meadow
2. Hearn Avenue/Dutton Avenue
3. Northpoint Parkway/Dutton Meadow (new intersection created by project)
4. Northpoint Parkway/"New Street" (new intersection created by the project with proposed improvements)

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

**Hearn Avenue/Dutton Meadow** is a three-legged signalized intersection with two lanes on the northbound and westbound approaches, and one lane on the eastbound approach. 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. Hearn Avenue has bike lanes in both directions.

**Hearn Avenue/Dutton Avenue** is a four-legged signalized intersection with two lanes on all approaches except the northbound approach. This northbound approach is a placeholder for a future road connection, with some facilities already in place; however, the intersection essentially operates as a three-legged intersection without the south leg. There are right-turn overlap phases for the westbound and southbound approaches which operate concurrently with the southbound and eastbound left-turns, respectively. The west and north legs have crosswalks and curb ramps, and Hearn Avenue has bike lanes.

**Northpoint Parkway/Dutton Meadow** is a planned intersection that would be constructed as part of the proposed project. According to the City of Santa Rosa General Plan and the *Roseland Area/Sebastopol Road Specific Plan*, City of Santa Rosa, 2016, the intersection would be a four-legged intersection with Northpoint Parkway in the northwest-southeast direction and Dutton Meadow as the minor cross-street. Per the General Plan, Northpoint Parkway would be a four-lane arterial, though the *Roseland Area/Sebastopol Road Specific Plan* indicates that one lane in each direction with a two-way left-turn lane or median would be adequate given the decrease in anticipated demand. The intersection would be signalized. As proposed by the project, the signalized intersection would also be a four-legged signalized intersection; however, it would maintain Dutton Meadow as the north-south street with the west leg as the existing outbound driveway for the Meadow View Elementary School, and the east leg as the new section of Northpoint Parkway.

**Northpoint Parkway/"New Street"** is a proposed tee-intersection that would be constructed as part of the proposed project. The intersection would be stop controlled on the north "New Street" leg and Northpoint Parkway would be free.

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

# 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, 2010. 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 study intersections are all currently controlled by a traffic signal, or are expected to be in the future, and 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, the signal timing for the existing intersections, under the existing and future scenarios, provided by the City for the *Roseland Area/Sebastopol Road Specific Plan*, were applied for the analysis.

The ranges of delay associated with the various levels of service are indicated in Table 1.

**Table 1 – 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, 2010

## Traffic Operation Standards

The City of Santa Rosa's adopted Level of Service (LOS) Standard is contained in *Santa Rosa General Plan 2035*. Standard TD-1 states that the City will try to maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting this standard are allowed where attainment would result in significant environmental degradation; where topography or environmental impacts make the improvement impossible; or where attainment would ensure loss of an area's unique character.

While a corridor level of service is applied by the City in its analysis of the entire City as part of the environmental documentation supporting the General Plan, this type of analysis only provides relevant data when performed on a much longer segment than the one included as the study area for the project. Therefore, although the City's standard does not specify criteria for intersections, for the purposes of this study, as is standard practice for such studies, a minimum operation of LOS D for the overall operation of signalized intersections was applied.

It was further assumed that where operation without the project is at LOS E or F, the project's impact would be considered significant if a) the project caused deterioration from LOS E to LOS F or b) the project caused average delay for the intersection to increase by five seconds or more.

## 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. Volume data was collected April 17, 2018 when while local schools, specifically Meadow View Elementary School, were in session.

## Intersection Levels of Service

Under these conditions, the two existing study intersections are operating acceptably at LOS C or better during both peak hours. Since the intersection of Northpoint Parkway/Dutton Meadow would either be completed under the future scenario or with the project, no service level was determined for this location under existing conditions. The existing traffic volumes are shown in Figure 1. A summary of the intersection level of service calculations is contained in Table 2, and copies of the Level of Service calculations are provided in Appendix A.

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

| Study Intersection               | AM Peak |     | PM Peak |     |
|----------------------------------|---------|-----|---------|-----|
|                                  | Delay   | LOS | Delay   | LOS |
| 1. Hearn Ave/Dutton Meadow       | 12.3    | B   | 33.6    | C   |
| 2. Hearn Ave/Dutton Ave          | 21.4    | C   | 19.3    | B   |
| 3. Northpoint Pkwy/Dutton Meadow | -       | -   | -       | -   |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

## Future Conditions

### Future Volumes

Future peak hour volume projections were taken from a build out analysis which is contained in the *Roseland Area/Sebastopol Road Specific Plan*, City of Santa Rosa, 2016; this scenario represents cumulative traffic conditions that would be expected upon build out of the land uses identified in the City's General Plan.

It should be noted that some of the projected future volumes from the *Roseland Area/Sebastopol Road Specific Plan* are less than existing volumes. This can be attributed to the planned improvements in the area that would result in changes to the circulation system. However, to be consistent with the Specific Plan, the volumes from the Plan were applied. Further, though development of the project site was assumed and trips included in the SCTA model volumes applied in the Specific Plan analysis, these trips were not subtracted out of the future volumes for the “without project” scenario, resulting in a more conservative analysis.

## Future Infrastructure

As mentioned, there are network improvements within the study area that were applied to the analysis based on the *Roseland Area/Sebastopol Road Specific Plan*. Improvements include extending the Dutton Avenue from its current terminus near Duke Court to a planned roundabout where drivers would turn right to continue to the existing Dutton Avenue/Hearn Avenue intersection resulting in the planned four-legged intersection. Other improvements at that intersection would be a new westbound left turn lane, a new eastbound through lane, and reassigning the southbound right-turn lane into a southbound through/right-turn lane.

As planned, Northpoint Parkway would begin where Dutton Avenue turns right at the roundabout, continuing north to intersect with Hearn Avenue, replacing part of Dutton Meadow, which would curve northeast beginning near Meadowview Elementary School, extend through the project site, and end at the Dutton Avenue extension south of Hearn Avenue. Per the Specific Plan, the roadway would have three lanes, with one lane in each direction and either a two-way left-turn lane or median. The plan notes that the City’s General Plan indicates that Northpoint Parkway would be a four-lane street but based on the planned decrease in demand, three lanes would be sufficient.

Additionally, the Plan suggests adding an eastbound right-turn pocket at Hearn Avenue and Northpoint Parkway, previously Dutton Meadow. The planned circulation and intersection configurations are shown in Figure 2.

Under the anticipated Future volumes, with the planned improvements, the study intersections are expected to operate acceptably at LOS D or better. At the Hearn Avenue/Dutton Meadow intersection, with the addition of the eastbound right-turn lane, the delay is expected to significantly decrease during the p.m. peak hour. Future volumes, planned intersection geometries, and the planned circulation network are shown in Figure 2; operating conditions are summarized in Table 3.

**Table 3 – Planned Future Peak Hour Intersection Levels of Service**

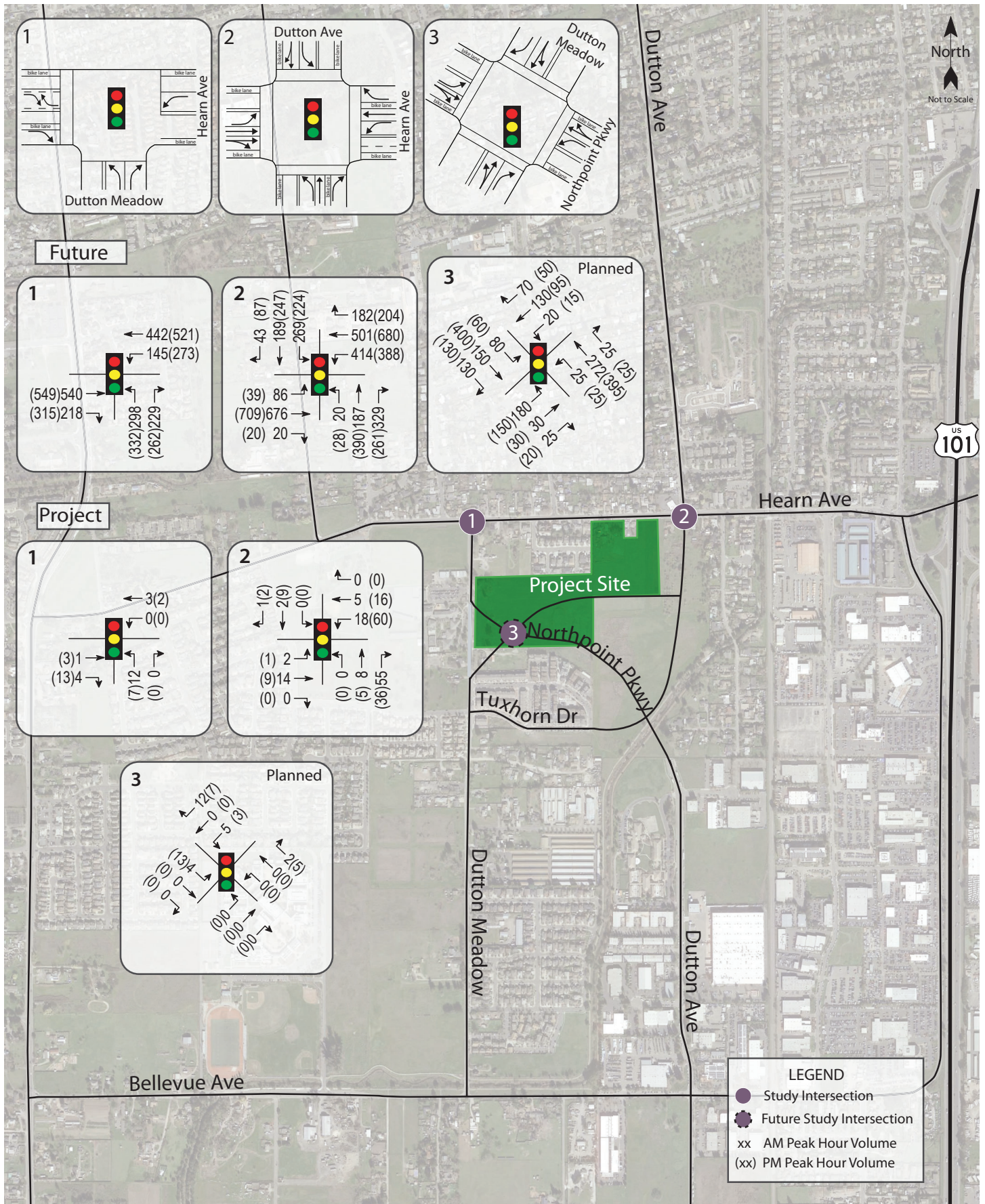
| Study Intersection               | AM Peak |     | PM Peak |     |
|----------------------------------|---------|-----|---------|-----|
|                                  | Delay   | LOS | Delay   | LOS |
| 1. Hearn Ave/Dutton Meadow       | 11.3    | B   | 14.4    | B   |
| 2. Hearn Ave/Dutton Ave          | 47.1    | D   | 46.6    | D   |
| <b>Planned</b>                   |         |     |         |     |
| 3. Northpoint Pkwy/Dutton Meadow | 16.7    | B   | 17.3    | B   |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

## Project Description

The project consists of 130 single-family houses; up to 81 could have accessory dwellings on-site. The 18.4-acre project site is located along the east side of Dutton Meadow and south side of Hearn Avenue. There would be several access points to the site. Under the existing conditions, access to the site would be from a newly constructed intersection on Dutton Meadow and connection to Hearn Avenue via Aloise Avenue. Under the future scenario, with further circulation improvements to be constructed with development of other parcels in the





Traffic Impact Study for the Dutton Meadows Phase II Project

Figure 2 – Future Lane Configurations, Traffic Volumes and Project Volumes





area, there would be an additional connection to the Dutton Avenue extension east of the project site. With the proposed project, two single-family dwellings would be eliminated, though most of the land is open field.

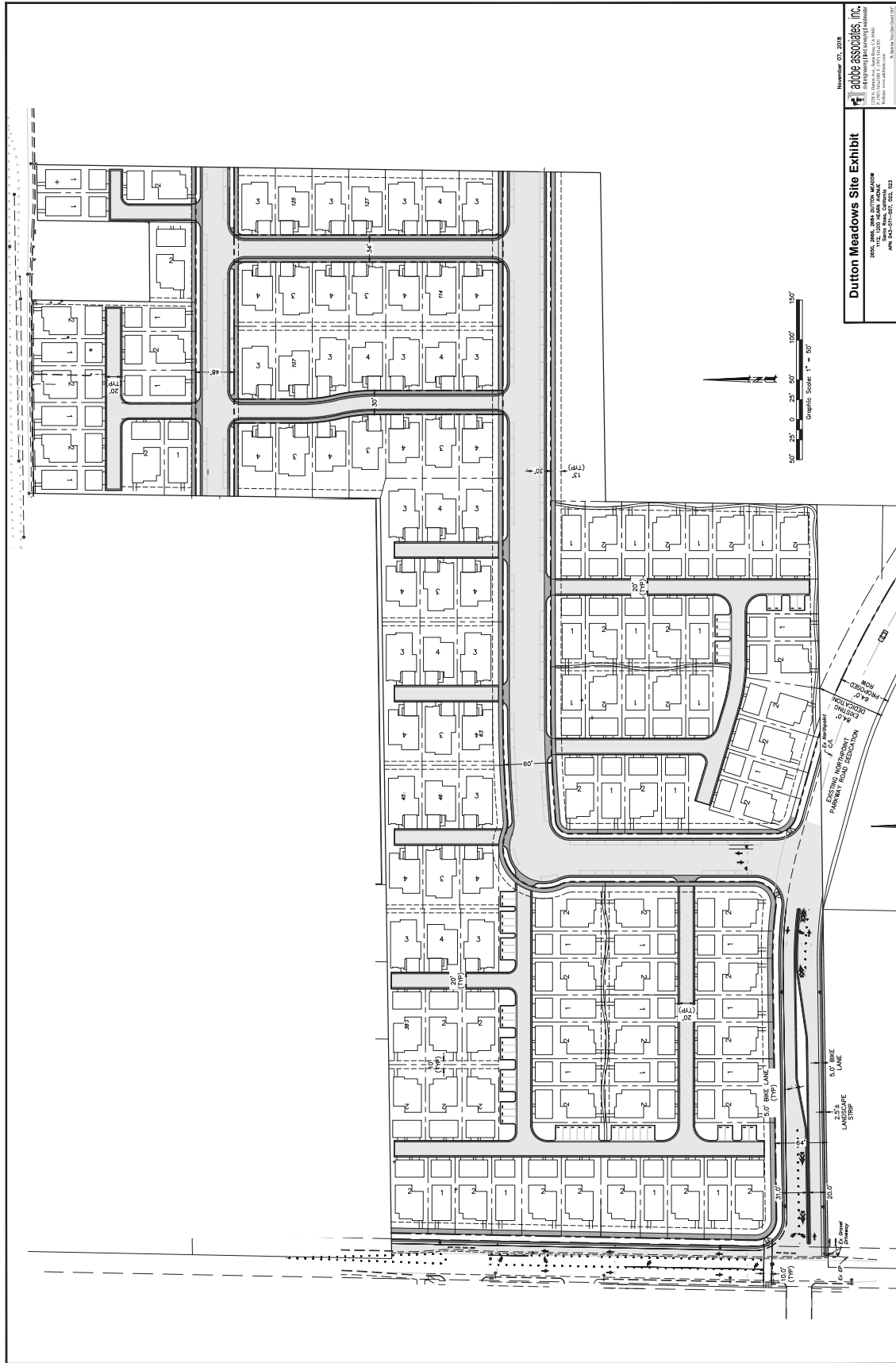
The project, as previously approved and incorporated in the General Plan, included a total of 191 single-family dwellings.

### **Proposed Roadway Geometry**

The proposed project differs from the future planned improvements in the study area in terms of the future intersection of Northpoint Parkway/Dutton Meadow and the circulation within the project site. As proposed, Dutton Meadow would remain a north-south street and Northpoint Parkway would form the east leg where it intersects Dutton Meadow at the exiting Meadowview Elementary School outbound driveway, resulting in a four-legged intersection. The planned street, "New Street", that would traverse the project site, terminating at the Dutton Avenue extension, would still do so but access to the street would be via a tee intersection about 450 feet east of the proposed Dutton Meadow/Northpoint Parkway intersection, as opposed to one of the legs at the planned intersection as shown under the Future Conditions scenario. The proposed project site plan is shown in Figure 3 and the existing study area with the proposed project is shown in Figure 4.

### **Trip Generation**

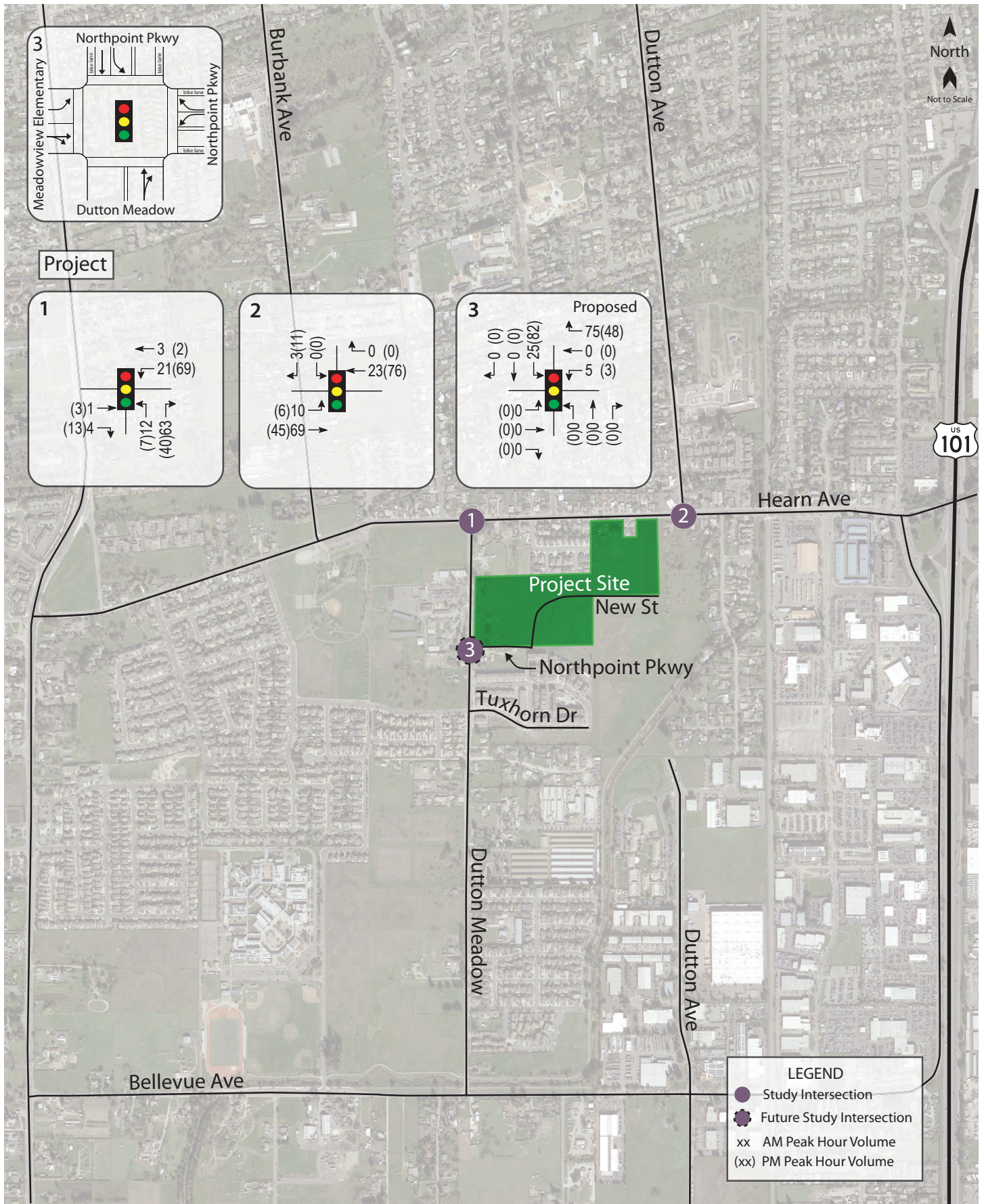
The anticipated trip generations for the proposed project as well as the approved uses were estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10<sup>th</sup> Edition, 2017 for single-family detached housing (Land Use #210), and for apartments (Land Use #220) for the auxiliary dwelling units. As shown in Table 4, the proposed project is expected to generate an average of 1,820 trips per day, including 133 trips during the a.m. peak hour and 174 during the p.m. peak hour. After applying deductions for the two existing single-family homes that will be eliminated, the project would be expected to generate 1,801 new trips daily, including 132 during the morning peak hour and 172 during the evening peak hour; these new trips represent the increase in traffic associated with the project compared to existing volumes. The project as approved and incorporated in the General Plan, for a comparison, is summarized in the table as well. As shown, the proposed project will generate fewer trips than would have been anticipated for the approved land use for the site.



Traffic Impact Study for the Dutton Meadows Phase II Project  
 Figure 3 – Site Plan







Traffic Impact Study for the Dutton Meadows Phase II Project  
**Figure 4 – Existing Study Area with Project, Proposed Lane Configuration and Project Volumes**



**Table 4 – Trip Generation Summary**

| Land Use                                 | Units  | Daily |              | AM Peak Hour |            |           |            | PM Peak Hour |            |            |           |
|--|--------|-------|--------------|--------------|------------|-----------|------------|--------------|------------|------------|-----------|
|  |        | Rate  | Trips        | Rate         | Trips      | In        | Out        | Rate         | Trips      | In         | Out       |
| <b>Existing</b>                          |        |       |              |              |            |           |            |              |            |            |           |
| Single-Family Homes                      | -2 du  | 9.44  | -19          | 0.74         | -1         | 0         | -1         | 0.99         | -2         | -1         | -1        |
| <b>Proposed</b>                          |        |       |              |              |            |           |            |              |            |            |           |
| Single-Family Homes                      | 130 du | 9.44  | 1,227        | 0.74         | 96         | 24        | 72         | 0.99         | 129        | 81         | 48        |
| Apartment (ADU)                          | 81 du  | 7.32  | 593          | 0.46         | 37         | 9         | 28         | 0.56         | 45         | 29         | 16        |
| <b>Total</b>                             |        |       | <b>1,820</b> |              | <b>133</b> | <b>33</b> | <b>100</b> |              | <b>174</b> | <b>110</b> | <b>64</b> |
| <b>Net Increase (Proposed-Existing)</b>  |        |       | <b>1,801</b> |              | <b>132</b> | <b>33</b> | <b>99</b>  |              | <b>172</b> | <b>109</b> | <b>63</b> |
| <b>Approved</b>                          |        |       |              |              |            |           |            |              |            |            |           |
| Single-Family Homes                      | 191 du | 9.44  | 1,803        | 0.74         | 141        | 35        | 106        | 0.99         | 189        | 119        | 70        |
| <b>Net Difference (Approved – Total)</b> |        |       | <b>-17</b>   |              | <b>8</b>   | <b>2</b>  | <b>6</b>   |              | <b>15</b>  | <b>9</b>   | <b>6</b>  |

Note: du = dwelling unit

## Trip Distribution

### Existing Conditions

The pattern used to allocate new project trips to the street network under existing conditions was determined by assessing employment patterns for residents in the southwest quadrant of Santa Rosa as indicated by the U.S. Census Bureau using data from 2015. The applied assumptions are shown in Table 5.

**Table 5 – Existing with Project Trip Distribution Assumptions**

| Route   | Percent    |
|---|------------|
| To/From Hearn Ave east of Dutton Ave via Dutton Meadow    | 55         |
| To/From Hearn Ave east of Dutton Ave via Aloise Ave       | 15         |
| To/From Hearn Ave west of Dutton Meadow via Dutton Meadow | 12         |
| To/From Hearn Ave west of Dutton Meadow via Aloise Ave    | 3          |
| To/From Dutton Ave north of Hearn Ave via Dutton Meadow   | 8          |
| To/From Dutton Ave north of Hearn Ave via Aloise Ave      | 2          |
| To/From Dutton Meadow south of Hearn Ave                  | 5          |
| <b>TOTAL</b>  | <b>100</b> |

### Future Conditions

Planned improvements including the Northpoint Parkway connection as well as the Dutton Avenue Extension were taken into consideration to determine the distribution and routing of new project trips to the planned and proposed street network under future conditions. The distribution assumptions used for evaluating future conditions are shown in Table 6.



**Table 6 – Future Trip Distribution Assumptions**

| Route  | Percent    |
|--|------------|
| To/From Hearn Ave east of Dutton Ave via Dutton Ave Extension  | 55         |
| To/From Hearn Ave east of Dutton Ave via Aloise Ave            | 15         |
| To/From Hearn Ave west of Dutton Meadow via Northpoint Pkwy    | 12         |
| To/From Hearn Ave west of Dutton Meadow via Aloise Ave         | 3          |
| To/From Dutton Ave north of Hearn Ave via Dutton Ave Extension | 8          |
| To/From Dutton Ave north of Hearn Ave via Aloise Ave           | 2          |
| To/From Dutton Ave south of Hearn Ave via Northpoint Pkwy      | 5          |
| <b>TOTAL</b>   | <b>100</b> |

## Intersection Operation

### Existing plus Project Conditions

Upon adding project trips to existing volumes, with the proposed configuration of the new intersection of Northpoint Parkway/Dutton Meadow and Northpoint Parkway/“New Street”, the study intersections are expected to continue operating acceptably. Under the existing conditions the intersection of Northpoint Parkway/“New Street” would be constructed with the project but no other planned improvements would be completed, so the intersection would be a partial intersection with only eastbound left-turn and southbound right-turn maneuvers. As such, delay at this location could not be estimated as both those maneuvers would be “free movements” with essentially no delay. These results are summarized in Table 7. Project traffic volumes, along with the roadway network used for the Existing plus Project analysis, are shown in Figure 4.

**Table 7 – Existing and Existing plus Project Peak Hour Intersection Levels of Service**

| Study Intersection               | Existing Conditions |     |         |     | Existing plus Project |     |         |     |  |
|----------------------------------|---------------------|-----|---------|-----|-----------------------|-----|---------|-----|--|
|                                  | AM Peak             |     | PM Peak |     | AM Peak               |     | PM Peak |     |  |
|                                  | Delay               | LOS | Delay   | LOS | Delay                 | LOS | Delay   | LOS |  |
| 1. Hearn Ave/Dutton Meadow       | 12.3                | B   | 33.6    | C   | 13.2                  | B   | 49.9    | D   |  |
| 2. Hearn Ave/Dutton Ave          | 21.4                | C   | 19.3    | B   | 19.6                  | B   | 19.6    | B   |  |
| <b>Proposed</b>                  |                     |     |         |     |                       |     |         |     |  |
| 3. Northpoint Pkwy/Dutton Meadow | -                   | -   | -       | -   | 11.1                  | B   | 7.9     | A   |  |
| 4. Northpoint Pkwy/“New Street”  | -                   | -   | -       | -   | -                     | -   | -       | -   |  |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

With the addition of project-related traffic volumes, average delay at the intersection of Hearn Avenue/Dutton Avenue is projected to decrease during the a.m. peak hour. While this is counter-intuitive, this condition occurs when a project adds trips to movements that are currently underutilized or have delays that are below the intersection average, resulting in a better balance between approaches and lower overall average delay. The project adds traffic predominantly to the eastbound and westbound through movements, which have average delays lower than the average for the intersection, resulting in a slight reduction in the overall average delay. The conclusion could incorrectly be drawn that the project improves operation based on this data alone; however, it is more appropriate to conclude that the project trips are expected to make use of excess capacity, so drivers will experience little, if any, change in conditions because of the project.

**Finding** – The study intersections are expected to continue operating acceptably at the same or better service levels with project traffic added to existing volumes.

## Future plus Project Conditions

Operation under Future plus Project volumes was reviewed with both the planned and proposed configuration for the future study intersection of Northpoint Parkway/Dutton Meadow. The volumes for the proposed configuration were based on the same projected movements for the planned configuration, with several movements combined to reflect the change in configuration with the configuration proposed with the project. The future traffic volumes are shown in Figure 2 and the future traffic volumes with the proposed configuration are shown in Figure 5.

Upon the addition of project-generated traffic to the anticipated Future volumes, and with either the planned or proposed intersection configuration, the study intersections are expected to operate acceptably. The Future plus Project operating conditions are summarized in Table 8.

**Table 8 – Planned Future and Future plus Project Peak Hour Intersection Levels of Service**

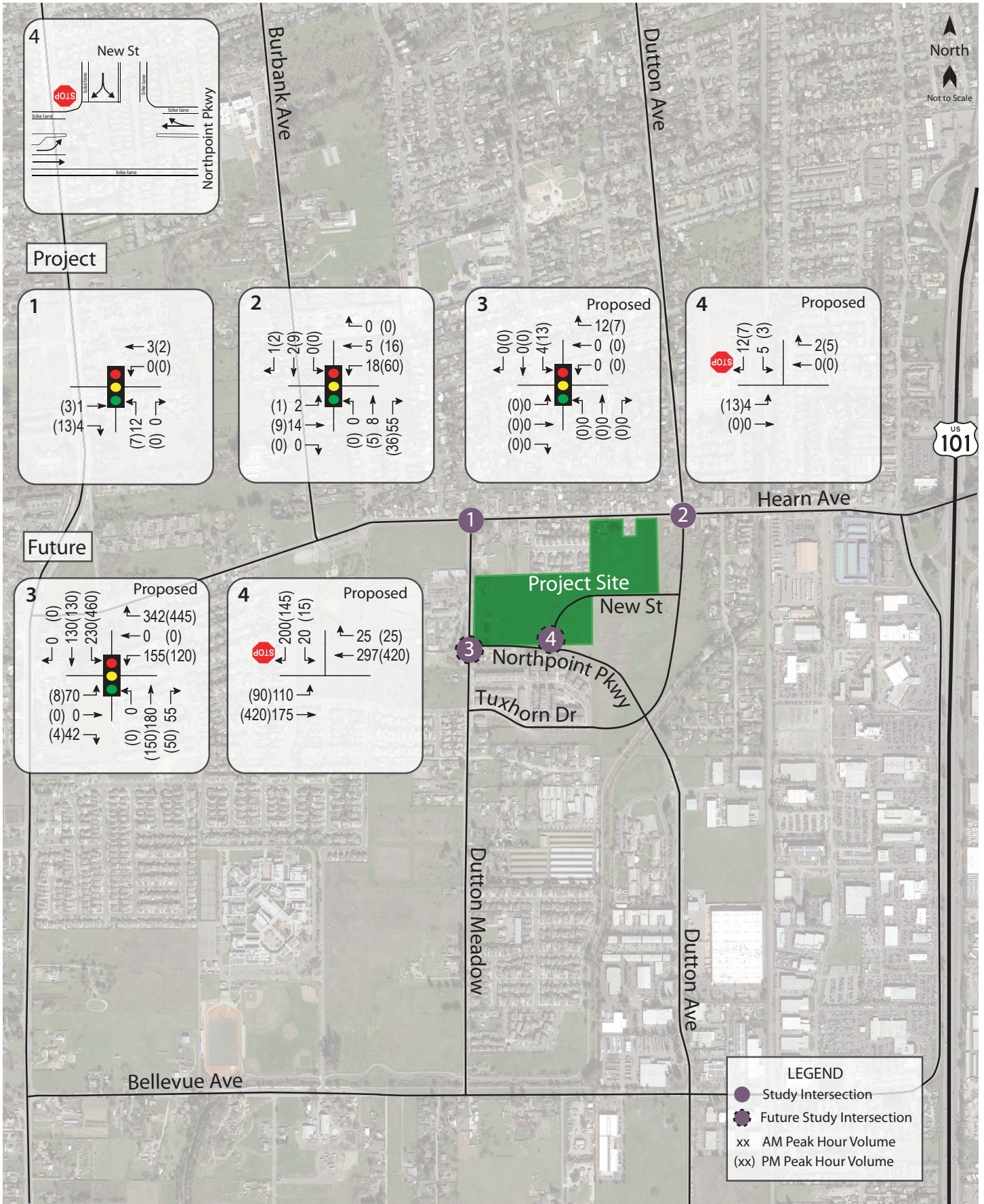
| Study Intersection<br>Approach             | Future Conditions |     |         |     | Future plus Project |     |         |     |  |
|--|-------------------|-----|---------|-----|---------------------|-----|---------|-----|--|
|  | AM Peak           |     | PM Peak |     | AM Peak             |     | PM Peak |     |  |
|  | Delay             | LOS | Delay   | LOS | Delay               | LOS | Delay   | LOS |  |
| 1. Hearn Ave/Dutton Meadow                 | 11.3              | B   | 14.4    | B   | 11.6                | B   | 14.8    | B   |  |
| 2. Hearn Ave/Dutton Ave                    | 47.1              | D   | 46.6    | D   | 49.5                | D   | 51.3    | D   |  |
| <b>Planned</b>                             |                   |     |         |     |                     |     |         |     |  |
| 3. Northpoint Pkwy/Dutton Meadow           | 16.7              | B   | 17.3    | B   | 16.9                | B   | 16.2    | B   |  |
| <b>Proposed</b>                            |                   |     |         |     |                     |     |         |     |  |
| 3. Northpoint Pkwy/Dutton Meadow-School DW | 16.9              | B   | 12.4    | B   | 17.1                | B   | 12.5    | B   |  |
| 4. Northpoint Pkwy/"New Street"            | 4.7               | A   | 2.9     | A   | 5.1                 | A   | 3.2     | A   |  |
| Southbound "New Street"                    | 13.5              | B   | 15.2    | C   | 14.2                | B   | 16.1    | B   |  |

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

It should be noted that under the Future and Future plus Project scenarios the delay at the intersection of Hearn Avenue/Dutton Meadow is less than under existing conditions. This can be attributed to the planned future improvements at the intersection including the addition of an eastbound right-turn pocket. With the change in roadway geometry in addition to the projected growth, it would be reasonable to assume the signal timing would be updated and as such, result in reduced delays.

**Finding** – The study intersections will continue operating acceptably with project traffic added to future volumes. The intersection of Northpoint Parkway/Dutton Meadow, with either the planned or proposed configuration, would be expected to operate at an acceptable service level.





Traffic Impact Study for the Dutton Meadows Phase II Project  
**Figure 5 – Future Study Area with Project, Traffic Volumes and Project Traffic Volumes**





# Access and Circulation

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## Planned Improvements Compared to Proposed

As discussed, the proposed project does not conform to the planned roadway configurations for Northpoint Parkway and the minor street through the site. While it is noted that the proposed circulation system may require changes to the General Plan, it is understood that the project applicant acknowledges this and would request such changes to proceed with the project as proposed. The planned roadway alignment would bisect the site in such a way as to create a large, triangular-shaped parcel that would accommodate fewer units, making it infeasible to achieve the density desired by the City. With the planned configuration, the future roadway would instead be located along the southern perimeter of the site, allowing a more standard lot pattern.

As planned, Northpoint Parkway would be a regional arterial street and would act as an alternate route for traffic in the Southwest quadrant of Santa Rosa. Where the existing surrounding street network is predominantly north-south and east-west streets, Northpoint Parkway would be a northwest-southeast street. In general, the proposed configuration of the study intersection does not preclude this. The proposed roadway would maintain the three lanes on Northpoint Parkway, one in each direction with either a median or two-way left-turn lane. While the planned configuration could result in traffic traveling straight through the intersection on the parkway, the planned configuration would require a southbound left-turn or westbound right-turn to continue along this route. As analyzed, the intersection timing used prioritized these movements. The westbound right-turn and southbound left-turn would operate concurrently with a programmed overlap phase. It was also assumed that these movements would be on recall so that absent a call on any other approach or movement, the southbound left-turn and westbound right-turn would rest in green. This type of timing would result in the desired effect of maintaining the flow of traffic on Northpoint Parkway and not pushing traffic to Dutton Meadow. As noted in the operational analysis, the difference in delay between the two alignments would be minimal.

Given that there are no plans to widen Hearn Avenue between the Dutton Meadow and Dutton Avenue intersections due to the right-of-way constraints, any increase in volumes may cause that segment of Hearn Avenue to become oversaturated. It should be noted that in the analysis with the proposed configuration, the only volumes routed northbound through the intersection of Northpoint Parkway/Dutton Meadow were those movements that were previously projected to route through that intersection to the Hearn Avenue/Dutton Meadow-Northpoint Parkway intersection to the north. With the potential for that section of Hearn Avenue to become oversaturated, drivers naturally find other routes through a street network. Therefore, even with the proposed configuration which includes the "New Street," drivers may naturally reroute to that street if they experience delays on Hearn Avenue.

## Alternative Modes

The potential impacts to pedestrians and bicyclists were also reviewed in the context of the proposed and planned intersection configurations.

### ***Pedestrians***

The planned configuration of Northpoint Parkway/Dutton Meadow would include pedestrian crossings on each leg of the intersection as well as a path from the school's frontage to the intersection. With the configuration as proposed with the project there would be crosswalks on the north and west legs. Since the property southeast of the intersection is not part of the project and is privately owned with no known plans to develop, there would be no need for a crosswalk on the south or east legs of the intersection. Under both configurations, most of the crossings would be east-west on Northpoint Parkway. While it is noted that the signal timing for the proposed



intersection configuration would favor vehicles on Northpoint Parkway, the delay for vehicles associated with pedestrians crossing the intersection would occur with either configuration.

A roundabout was considered instead of the proposed intersection configuration to improve pedestrian access; however, considering the right-of-way limitations to the southeast on the undeveloped parcel as well as to the west with the school's property, a roundabout would not be feasible. With an outside diameter of about 130 feet, solely on the proposed project's property, along with the amount of land that would need to be dedicated to properly position the entrance lanes, the roundabout was not further reviewed though preliminary service level calculations indicated that it would operate acceptably.

### **Bicyclists**

As currently proposed, Northpoint Parkway and Dutton Meadows would both have bike lanes. Additionally, bike lanes would be included on the "New Street" created by the subdivision. With the planned configuration a northbound bicyclist would travel through the intersection, while with the proposed signalized intersection configuration, a northbound cyclist would turn right from Dutton Meadow to Northpoint Parkway and left from at the Northpoint Parkway to the "New Street". While the maneuver required under the proposed configuration is not ideal, a striping plan has been developed that would improve access for cyclists. As shown in the site plan, "sharrows" are recommended where the bicyclist would need to leave their dedicated bike lane and enter the flow of motor vehicle traffic. It is, however, noted that the connectivity as proposed is consistent with that shown between Dutton Meadow and the extension of Dutton Avenue in the *Santa Rosa Bicycle and Pedestrian Master Plan 2010*.

### **Sight Distance**

At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the crossroad and the driver of an approaching vehicle. Adequate time should be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed.

Sight distance was considered for both a southbound vehicle on the "New Street" as well as the sight distance for an eastbound left-turning vehicle. Sight distance was evaluated based on the criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at intersections of public streets is based on corner sight distances which uses the approach travel speeds as the basis for determining the recommended sight distance. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street.

Sight distance for a southbound vehicle on the "New Street" as well as an eastbound left-turn on Northpoint Parkway were reviewed based on the plans. As measured, there would be a clear line of sight from the "New Street" for more than 450 feet to the west of the "New Street" and about 500 feet to the east. For eastbound left-turning vehicles, there would be an expected clear line of site for more than 500 feet. Based on these values, there is a clear line for a posted speed of at most 40 mph.

However, since there is a median planned for Northpoint Parkway, as well as a public space between the roadway and the sidewalk, it is recommended that any landscaping in these areas be low-lying vegetation no more than three feet above the elevation of the roadway, and any tree canopies be trimmed and maintained to be no less than seven feet above the roadway elevation.

Sight Distance exhibits are included in Appendix B.

## Proposed School Frontage Improvements on Northpoint Parkway

The queues with the proposed intersection configuration were reviewed to determine any potential impacts to Meadowview Elementary School's access points. Of the three driveways, the school's two southerly driveways operate as a one-way loop with the northerly of the two for inbound vehicles and the southernmost for outbound traffic. This drop-off loop is intended for school buses only, daily from 7:00 a.m. to 3:00 p.m., as indicated by the sign posted at the inbound driveway. Additionally, it was observed that cones were placed at the entrance driveway to deter other vehicles from entering. The northern most driveway provides full access to the parking lot as well as an additional drop-off area.

Queues in the southbound left-turn pocket on Northpoint Parkway at Dutton Meadow were reviewed under the Future plus Project volumes during the a.m. and p.m. peak hours. During the critical a.m. peak hour, which is concurrent with the drop-off period at school, the queue length is expected to be 155 feet, requiring a turn pocket of at least 175 feet in length. At the northernmost driveway, a 50-foot left-turn lane is proposed. Given the distance between the proposed intersection and the northern most full access driveway, there would be sufficient length to accommodate the projected queues as well as the necessary transition lengths between the storage lanes. During the p.m. peak hour under Future plus Project volumes the expected southbound left-turn queue would be 159 feet, which would be accommodated within the 175-foot available storage. It should be noted that while the expected southbound left-turn queue would extend past the inbound loop, the loop is intended for buses only and though it may change, the current bus route results in all buses coming from the north and turning right into the driveway. Any future bus routes could be routed to result in a right-turn into the driveway.

The queuing results as well as the proposed frontage improvements detailed above are included in Appendix C.

## Meadowview Elementary School

It is noted that the proposed intersection configuration would retain vehicular traffic fronting the school while the planned configuration would not. Though this is not necessarily desirable, it can be beneficial to the circulation. While the circulation within the school could change, and the existing driveway may not always be exclusively outbound, it is beneficial having a signalized driveway for the exiting traffic to regulate the high volumes that can be expected during the morning and afternoon dismissal periods. As part of the project, with the proposed configuration, it is recommended that the school's driveway approach to the new signalized intersection be striped for with a left-turn lane and a through/right-turn lane.

Also, it is reasonable to assume that some residents of the proposed project would have children that attend the Meadowview Elementary school and would want to walk to the school. Crosswalks with pedestrian crossing time were assumed for each approach and would provide adequate access to the school site.

## Identified Mitigation

Based on the *Dutton Meadows Project Draft Subsequent Environmental Impact Report*, CH2M Hill, 2004, the need for a connected sidewalk system and implementation of planned bicycle facilities were identified. The proposed project would provide continuous pedestrian facilities in the site as well as bike lanes along Northpoint Parkway.

# Conclusions and Recommendations

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## Conclusions

- The project is expected to generate 1,801 net new trips daily, including 132 during the morning peak hour and 172 during the evening peak hour. The peak trip generation for the proposed project would be less than that associated with what was previously approved for the site.
- The study intersections are expected to operate acceptably under both Existing and Existing plus Project conditions, with the proposed configuration at Dutton Meadow/Northpoint Parkway.
- Under the future scenario, without and with the project, the intersections are expected to operate acceptably. At the intersection of Dutton Meadow/Northpoint Parkway, with either the proposed or the planned configuration, the intersection is expected to operate at LOS B or better with little difference in delay between the two.
- The proposed project would provide continuous pedestrian facilities as well as bike lanes along Northpoint Parkway and “sharrows” in the left-turn lanes to indicate to drivers that cyclists would be sharing the lanes with them.
- There would be sufficient line of sight for vehicles at the Northpoint Parkway/“New Street” intersection for speeds up to 40 mph.

## Recommendations

- If the proposed configuration for Dutton Meadow/Northpoint Parkway is accepted by the City, the school’s driveway at the new signal should be striped to include a left-turn lane and through/right-turn lane.
- Any landscaping in the median on Northpoint Parkway or in the public space between the sidewalk and the roadway, should be low lying vegetation and maintained to be no more than three feet above the elevation of the roadway. Any trees should have their canopies trimmed to be no less than seven feet above the elevation of the roadway.

# Study Participants and References

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## Study Participants

|                                    |  |
|------------------------------------|--|
| <b>Principal in Charge</b>         | Dalene J. Whitlock, PE, PTOE           |
| <b>Assistant Engineers</b>         | Briana Byrne, EIT, Kevin Carstens, EIT |
| <b>Graphics/Editing/Formatting</b> | Alex Scrobonia, Katia Wolfe            |
| <b>Report Review</b>               | Dalene J. Whitlock, PE, PTOE           |

## References

*Dutton Meadows Project Draft Subsequent Environmental Impact Report*, CH2M Hill, 2004  
*Highway Capacity Manual*, Transportation Research Board, 2010  
*Highway Design Manual*, 6<sup>th</sup> Edition, California Department of Transportation, 2017  
*Roseland Area/Sebastopol Road Specific Plan*, City of Santa Rosa, 2016  
*Santa Rosa General Plan 2035*, City of Santa Rosa, 2014  
*Santa Rosa Bicycle and Pedestrian Master Plan*, City of Santa Rosa, 2010  
*Trip Generation Manual*, 10<sup>th</sup> Edition, Institute of Transportation Engineers, 2017  
U.S. Census Bureau, OnTheMap Application, <http://onthemap.ces.census.gov>

SRO461

# Appendix A

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## Intersection Level of Service Calculations

PRELIMINARY



10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 1.: Dutton Meadow & Hearn Ave

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  | Diagram |      |
|-----------------------------|------|-------|------|------|------|------|---------|------|
| Lane Configurations         | 477  | 79    | 292  | 395  | 95   | 370  | ↖ ↗ ↘ ↙ |      |
| Traffic Volume (veh/h)      | 477  | 79    | 292  | 395  | 95   | 370  |         |      |
| Future Volume (veh/h)       | 477  | 79    | 292  | 395  | 95   | 370  |         |      |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |         |      |
| Initial Q (Cb), veh         | 0    | 0     | 0    | 0    | 0    | 0    |         |      |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |         |      |
| Adj Sat Flow, veh/h/m       | 1863 | 1900  | 1863 | 1863 | 1863 | 1863 |         |      |
| Adj Flow Rate, veh/h        | 518  | 77    | 317  | 429  | 103  | 380  |         |      |
| Adj No. of Lanes            | 1    | 0     | 1    | 1    | 1    | 1    |         |      |
| Peak Hour Factor            | 0.92 | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 |         |      |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |         |      |
| Cap. veh/h                  | 646  | 96    | 386  | 1313 | 269  | 585  |         |      |
| Arrive On Green             | 0.41 | 0.41  | 0.22 | 0.70 | 0.15 | 0.15 |         |      |
| Sat Flow, veh/h             | 1580 | 235   | 1774 | 1863 | 1774 | 1583 |         |      |
| Grp Volume(v), veh/h        | 0    | 595   | 317  | 429  | 103  | 380  |         |      |
| Grp Sat Flow(s), veh/h/m    | 0    | 1815  | 1774 | 1863 | 1774 | 1583 |         |      |
| Q_Serve(g.s), s             | 0.0  | 13.3  | 7.8  | 4.1  | 2.4  | 0.0  |         |      |
| Cycle Q Clear(g.c), s       | 0.0  | 13.3  | 7.8  | 4.1  | 2.4  | 0.0  |         |      |
| Prop In Lane                | 0    | 0.13  | 1.00 | 1.00 | 1.00 | 1.00 |         |      |
| Lane Grp Cap(c), veh/h      | 0    | 742   | 386  | 1313 | 269  | 585  |         |      |
| V/C Ratio(X)                | 0.00 | 0.80  | 0.82 | 0.33 | 0.38 | 0.65 |         |      |
| Avail Cap(c.a), veh/h       | 0    | 1183  | 771  | 1313 | 964  | 1205 |         |      |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |         |      |
| Upstream Filter(i)          | 0.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |         |      |
| Uniform Delay (d), s/veh    | 0.0  | 12.0  | 17.1 | 2.6  | 17.6 | 12.0 |         |      |
| Incr Delay (d2), s/veh      | 0.0  | 2.1   | 1.7  | 0.1  | 0.9  | 1.2  |         |      |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |         |      |
| %ile BackOf(50%) veh/h      | 0.0  | 7.0   | 4.0  | 2.1  | 1.2  | 4.1  |         |      |
| LnGrp Delay(d), s/veh       | 0.0  | 14.1  | 18.8 | 2.7  | 18.5 | 13.3 |         |      |
| LnGrp LOS                   | B    | B     | A    | A    | B    | B    |         |      |
| Approach Vol, veh/h         | 595  |       | 746  | 483  |      |      |         |      |
| Approach Delay, s/veh       | 14.1 |       | 9.6  | 14.4 |      |      |         |      |
| Approach LOS                | B    |       | A    | B    |      |      |         |      |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    | 7       | 8    |
| Assigned Phs                | 1    | 2     |      |      |      | 6    |         | 8    |
| Phs Duration (G+Y+Rc), s    | 13.6 | 22.4  |      |      |      | 36.0 |         | 10.0 |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      | 3.6  |         | 3.0  |
| Max Green Setting (Gmax), s | 20.0 | * 30  |      |      |      | 30.0 |         | 25.0 |
| Max Q Clear Time (g_c+H), s | 9.8  | 15.3  |      |      |      | 6.1  |         | 4.4  |
| Green Ext Time (p_c), s     | 0.4  | 3.6   |      |      |      | 2.7  |         | 1.6  |
| Intersection Summary        |      |       |      |      |      |      |         |      |
| HCM 2010 Ctrl Delay         | 12.3 |       |      |      |      |      |         |      |
| HCM 2010 LOS                | B    |       |      |      |      |      |         |      |
| Notes                       |      |       |      |      |      |      |         |      |

Dutton Meadow Phase 2  
 AM Existing  
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10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 2.: Hearn Ave & Dutton Ave

| Movement                    | EBT  | EBT  | EBR  | WBL  | WBT  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  | Diagram |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|---------|
| Lane Configurations         | ↖    | ↗    | ↘    | ↙    | ↖    | ↗    | ↘    | ↙    | ↖    | ↗    | ↘    | ↙       |
| Traffic Volume (veh/h)      | 107  | 681  | 0    | 522  | 243  | 0    | 0    | 0    | 301  | 0    | 111  |         |
| Future Volume (veh/h)       | 107  | 681  | 0    | 522  | 243  | 0    | 0    | 0    | 301  | 0    | 111  |         |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   | 7    | 4    | 14      |
| Initial Q (Cb), veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |         |
| Ped-Bike Adj(A_pbT)         | 1.00 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 |         |
| 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 |         |
| Adj Sat Flow, veh/h/m       | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 | 1863 |         |
| Adj Flow Rate, veh/h        | 114  | 724  | 0    | 555  | 250  | 0    | 0    | 0    | 320  | 0    | 73   |         |
| Adj No. of Lanes            | 1    | 1    | 0    | 0    | 1    | 1    | 1    | 0    | 0    | 1    | 1    |         |
| Peak Hour Factor            | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |         |
| Percent Heavy Veh, %        | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |         |
| Cap. veh/h                  | 139  | 1388 | 0    | 1186 | 1285 | 0    | 2    | 0    | 356  | 0    | 426  |         |
| Arrive On Green             | 0.08 | 0.74 | 0.00 | 0.64 | 0.64 | 0.00 | 0.00 | 0.00 | 0.20 | 0.00 | 0.20 |         |
| Sat Flow, veh/h             | 1774 | 1863 | 0    | 1863 | 1520 | 0    | 1863 | 0    | 1774 | 0    | 1503 |         |
| Grp Volume(v), veh/h        | 114  | 724  | 0    | 555  | 250  | 0    | 0    | 0    | 320  | 0    | 73   |         |
| Grp Sat Flow(s), veh/h/m    | 1774 | 1863 | 0    | 1863 | 1520 | 0    | 1863 | 0    | 1774 | 0    | 1503 |         |
| Q_Serve(g.s), s             | 7.7  | 19.6 | 0.0  | 18.7 | 3.9  | 0.0  | 0.0  | 0.0  | 21.3 | 0.0  | 4.5  |         |
| Cycle Q Clear(g.c), s       | 7.7  | 19.6 | 0.0  | 18.7 | 3.9  | 0.0  | 0.0  | 0.0  | 21.3 | 0.0  | 4.5  |         |
| Prop In Lane                | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 |         |
| Lane Grp Cap(c), veh/h      | 139  | 1388 | 0    | 1186 | 1285 | 0    | 2    | 0    | 356  | 0    | 426  |         |
| V/C Ratio(X)                | 0.82 | 0.52 | 0.00 | 0.47 | 0.19 | 0.00 | 0.00 | 0.00 | 0.90 | 0.00 | 0.17 |         |
| Avail Cap(c.a), veh/h       | 235  | 1388 | 0    | 1186 | 1285 | 0    | 246  | 0    | 411  | 0    | 472  |         |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |         |
| Upstream Filter(i)          | 0.69 | 0.69 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 |         |
| Uniform Delay (d), s/veh    | 54.9 | 6.4  | 0.0  | 0.0  | 11.4 | 1.9  | 0.0  | 0.0  | 47.2 | 0.0  | 33.0 |         |
| Incr Delay (d2), s/veh      | 3.1  | 1.0  | 0.0  | 0.0  | 1.3  | 0.3  | 0.0  | 0.0  | 20.5 | 0.0  | 0.2  |         |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |         |
| %ile BackOf(50%) veh/h      | 10.2 | 0.0  | 0.0  | 10.0 | 3.7  | 0.0  | 0.0  | 0.0  | 12.4 | 0.0  | 1.9  |         |
| LnGrp Delay(d), s/veh       | 58.0 | 7.4  | 0.0  | 0.0  | 12.7 | 2.3  | 0.0  | 0.0  | 67.6 | 0.0  | 33.2 |         |
| LnGrp LOS                   | E    | A    |      | B    | A    |      |      |      | E    |      | C    |         |
| Approach Vol, veh/h         | 838  |      | 805  |      |      | 0    |      |      | 393  |      |      |         |
| Approach Delay, s/veh       | 14.3 |      | 9.5  |      |      | 61.2 |      |      |      |      |      |         |
| Approach LOS                | B    |      | A    |      |      | E    |      |      |      |      |      |         |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |         |
| Assigned Phs                | 2    |      |      | 4    | 5    | 6    |      | 8    |      |      |      |         |
| Phs Duration (G+Y+Rc), s    | 93.7 |      |      | 27.3 | 13.1 | 80.6 |      | 0.0  |      |      |      |         |
| Change Period (Y+Rc), s     | 3.6  |      |      | 3.0  | 3.6  | 3.6  |      | 4.0  |      |      |      |         |
| Max Green Setting (Gmax), s | 66.4 |      |      | 28.0 | 16.0 | 46.8 |      | 16.0 |      |      |      |         |
| Max Q Clear Time (g_c+H), s | 23.3 |      |      | 9.7  | 20.7 | 0.0  |      | 0.0  |      |      |      |         |
| Green Ext Time (p_c), s     | 6.2  |      |      | 1.0  | 0.1  | 4.9  |      | 0.0  |      |      |      |         |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |         |
| HCM 2010 Ctrl Delay         | 21.4 |      |      |      |      |      |      |      |      |      |      |         |
| HCM 2010 LOS                | C    |      |      |      |      |      |      |      |      |      |      |         |
| Notes                       |      |      |      |      |      |      |      |      |      |      |      |         |

Dutton Meadow Phase 2  
 AM Existing  
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HCM 2010 TWSC  
3: Dutton Meadow & Elem School DW

10/18/2018

| Intersection                 | 1.9           |               |               |               |      |      |
|------------------------------|---------------|---------------|---------------|---------------|------|------|
| Init Delay, s/veh            | EBL           | EBR           | NBL           | SBT           | SBR  |      |
| Lane Configurations          | 70            | 42            | 0             | 438           | 301  | 0    |
| Traffic Vol, veh/h           | 70            | 42            | 0             | 438           | 301  | 0    |
| Future Vol, veh/h            | 70            | 42            | 0             | 438           | 301  | 0    |
| Conflicting Peds, #/hr       | 0             | 0             | 0             | 0             | 0    | 0    |
| Sign Control                 | Stop          | Stop          | Free          | Free          | Free | Free |
| RT Channelized               | -             | None          | -             | None          | -    | None |
| Storage Length               | 0             | 0             | -             | 0             | 0    | -    |
| Veh in Median Storage, #     | 0             | -             | -             | 0             | 0    | -    |
| Grade, %                     | 0             | -             | -             | 0             | 0    | -    |
| Peak Hour Factor             | 100           | 100           | 100           | 100           | 100  | 100  |
| Heavy Vehicles, %            | 2             | 2             | 2             | 2             | 2    | 2    |
| Mvmt Flow                    | 70            | 42            | 0             | 438           | 301  | 0    |
| <b>Major/Minor</b>           | <b>Minor2</b> | <b>Major1</b> | <b>Major1</b> | <b>Major2</b> |      |      |
| Conflicting Flow All         | 739           | 301           | -             | 0             | -    | 0    |
| Stage 1                      | 301           | -             | -             | -             | -    | -    |
| Stage 2                      | 438           | -             | -             | -             | -    | -    |
| Critical Hdwy                | 6.42          | 6.22          | -             | -             | -    | -    |
| Critical Hdwy Stg 1          | 5.42          | -             | -             | -             | -    | -    |
| Critical Hdwy Stg 2          | 5.42          | -             | -             | -             | -    | -    |
| Follow-up Hdwy               | 3.518         | 3.318         | -             | -             | -    | -    |
| Pol Cap-1 Maneuver           | 385           | 739           | 0             | -             | -    | 0    |
| Stage 1                      | 751           | -             | -             | -             | -    | -    |
| Stage 2                      | 651           | -             | -             | -             | -    | -    |
| Platoon blocked, %           |               |               |               |               |      |      |
| Mov Cap-1 Maneuver           | 385           | 739           | -             | -             | -    | -    |
| Mov Cap-2 Maneuver           | 385           | -             | -             | -             | -    | -    |
| Stage 1                      | 751           | -             | -             | -             | -    | -    |
| Stage 2                      | 651           | -             | -             | -             | -    | -    |
| Approach                     | EB            | NB            | SB            | SB            |      |      |
| HCM Control Delay, s         | 14.1          | 0             | 0             | 0             |      |      |
| HCM LOS                      | B             |               |               |               |      |      |
| <b>Minor Lane/Major Mvmt</b> | <b>NBT</b>    | <b>EBLn2</b>  | <b>SBT</b>    |               |      |      |
| Capacity (veh/h)             | -             | 385           | 739           | -             |      |      |
| HCM Lane V/C Ratio           | -             | 0.182         | 0.057         | -             |      |      |
| HCM Control Delay (s)        | -             | 16.4          | 10.2          | -             |      |      |
| HCM Lane LOS                 | -             | C             | B             | -             |      |      |
| HCM 95th %ile Q(veh)         | -             | 0.7           | 0.2           | -             |      |      |

Dutton Meadow Phase 2  
AM Existing

Synchro 10 Report

HCM 2010 Signalized Intersection Summary  
1: Dutton Meadow & Hearn Ave

10/18/2018

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|-------|------|------|------|------|
| Lane Configurations         | 1    | 1     | 1    | 1    | 1    | 1    |
| Traffic Volume (veh/h)      | 632  | 333   | 114  | 547  | 265  | 167  |
| Future Volume (veh/h)       | 632  | 333   | 114  | 547  | 265  | 167  |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |
| Initial Q (Ob), veh         | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |
| Adj Sat Flow, veh/hln       | 1863 | 1900  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 672  | 340   | 121  | 582  | 282  | 146  |
| Adj No. of Lanes            | 1    | 0     | 1    | 1    | 1    | 1    |
| Peak Hour Factor            | 0.94 | 0.94  | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap, veh/h                  | 649  | 328   | 163  | 1313 | 353  | 460  |
| Arrive On Green             | 0.56 | 0.56  | 0.09 | 0.70 | 0.20 | 0.20 |
| Sat Flow, veh/h             | 1158 | 586   | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(v), veh/h        | 0    | 1012  | 121  | 582  | 282  | 146  |
| Grp Sat Flow(s),veh/hln     | 0    | 1744  | 1774 | 1863 | 1774 | 1583 |
| Q_Serv(g_s), s              | 0.0  | 38.4  | 4.6  | 9.2  | 10.4 | 0.0  |
| Cycle Q Clear(g_c), s       | 0.0  | 38.4  | 4.6  | 9.2  | 10.4 | 0.0  |
| Prop In Lane                | 0    | 0.34  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 0    | 977   | 163  | 1313 | 353  | 460  |
| V/C Ratio(X)                | 0.00 | 1.04  | 0.74 | 0.44 | 0.80 | 0.32 |
| Avail Cap(c_a), veh/h       | 0    | 977   | 699  | 1313 | 828  | 885  |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 0.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 0.0  | 15.1  | 30.3 | 4.3  | 26.1 | 19.0 |
| Incr Delay (d2), s/veh      | 0.0  | 38.3  | 2.5  | 0.2  | 4.2  | 0.4  |
| Initial Q Delay(i3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackQ(50%) veh/ln      | 0.0  | 28.6  | 2.3  | 4.8  | 5.5  | 2.2  |
| LnGrp Delay(d)s/veh         | 0.0  | 53.4  | 32.8 | 4.6  | 30.3 | 19.4 |
| LnGrp LOS                   | F    | C     | A    | C    | C    | B    |
| Approach Vol, veh/h         | 1012 |       | 703  | 428  |      |      |
| Approach Delay, s/veh       | 53.4 |       | 9.4  | 26.6 |      |      |
| Approach LOS                | D    |       | A    | C    |      |      |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2     |      |      |      | 8    |
| Phs Duration (G+Y+Rc), s    | 9.9  | 42.0  |      |      |      | 16.6 |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      | 3.0  |
| Max Green Setting (Gmax), s | 27.0 | * 38  |      |      |      | 32.0 |
| Max Q Clear Time (g_c+H), s | 6.6  | 40.4  |      |      |      | 12.4 |
| Green Ext Time (g_e), s     | 0.1  | 0.0   |      |      |      | 1.3  |
| Intersection Summary        |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay         |      |       |      | 33.6 |      |      |
| HCM 2010 LOS                |      |       |      | C    |      |      |
| Notes                       |      |       |      |      |      |      |

Dutton Meadows Phase II  
PM Existing

Synchro 10 Report



HCM 2010 Signalized Intersection Summary  
 2: Hearn Ave & Dutton Ave

10/18/2018

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| Traffic Volume (veh/h)      | 114  | 538  | 0    | 0    | 680  | 352  | 0    | 0    | 0    | 258  | 0    | 163  |
| Future Volume (veh/h)       | 114  | 538  | 0    | 0    | 680  | 352  | 0    | 0    | 0    | 258  | 0    | 163  |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   | 7    | 4    | 14   |
| Initial Q (Cb), 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 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.94 | 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 |
| Adj Sat Flow, veh/h/ln      | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 118  | 555  | 0    | 0    | 701  | 351  | 0    | 0    | 0    | 266  | 0    | 125  |
| Adj No. of Lanes            | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 0    | 1    | 0    | 0    | 1    |
| Peak Hour Factor            | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, %        | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                  | 143  | 1435 | 0    | 0    | 1229 | 1281 | 0    | 2    | 0    | 311  | 0    | 390  |
| Arrive On Green             | 0.08 | 0.77 | 0.00 | 0.00 | 0.66 | 0.66 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.18 |
| Sat Flow, veh/h             | 1774 | 1863 | 0    | 0    | 1863 | 1521 | 0    | 1863 | 0    | 1774 | 0    | 1496 |
| Grp Volume(v), veh/h        | 118  | 555  | 0    | 0    | 701  | 351  | 0    | 0    | 0    | 266  | 0    | 125  |
| Grp Sat Flow(s), veh/h/ln   | 1774 | 1863 | 0    | 0    | 1863 | 1521 | 0    | 1863 | 0    | 1774 | 0    | 1496 |
| Q_Serve(g_s), s             | 7.9  | 11.8 | 0.0  | 0.0  | 24.8 | 6.0  | 0.0  | 0.0  | 0.0  | 17.6 | 0.0  | 8.2  |
| Cycle Q Clear(g_c), s       | 7.9  | 11.8 | 0.0  | 0.0  | 24.8 | 6.0  | 0.0  | 0.0  | 0.0  | 17.6 | 0.0  | 8.2  |
| Prop In Lane                | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 143  | 1435 | 0    | 0    | 1229 | 1281 | 0    | 2    | 0    | 311  | 0    | 390  |
| V/C Ratio(X)                | 0.82 | 0.39 | 0.00 | 0.00 | 0.57 | 0.27 | 0.00 | 0.00 | 0.00 | 0.86 | 0.00 | 0.32 |
| Avail Cap(c), veh/h         | 182  | 1435 | 0    | 0    | 1229 | 1281 | 0    | 246  | 0    | 381  | 0    | 449  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 0.10 | 0.10 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh    | 54.8 | 4.5  | 0.0  | 0.0  | 11.2 | 2.1  | 0.0  | 0.0  | 0.0  | 48.4 | 0.0  | 36.5 |
| Incr Delay (d2), s/veh      | 2.0  | 0.1  | 0.0  | 0.0  | 1.9  | 0.5  | 0.0  | 0.0  | 0.0  | 14.7 | 0.0  | 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     | 6.0  | 0.0  | 0.0  | 0.0  | 13.3 | 5.4  | 0.0  | 0.0  | 0.0  | 9.9  | 0.0  | 3.5  |
| LnGrp Delay(d), s/veh       | 56.7 | 4.6  | 0.0  | 0.0  | 13.2 | 2.7  | 0.0  | 0.0  | 0.0  | 63.1 | 0.0  | 37.0 |
| LnGrp LOS                   | E    | A    |      |      | B    | A    |      |      |      | E    |      | D    |
| Approach Vol, veh/h         | 673  | 1062 | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 391  | 0    | 0    |
| Approach Delay, s/veh       | 13.8 | 9.7  |      |      | A    |      |      |      |      | 54.8 |      | D    |
| Approach LOS                | B    | A    |      |      | A    |      |      |      |      | D    |      | D    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 2    | 4    | 5    | 6    |      |      |      |      |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 96.8 | 24.2 | 13.4 | 83.4 | 0.0  |      |      |      |      |      |      |      |
| Change Period (Y+Rc), s     | 3.6  | 3.0  | 3.6  | 3.6  | 4.0  |      |      |      |      |      |      |      |
| Max Green Setting (Gmax), s | 68.4 | 26.0 | 12.4 | 52.4 | 16.0 |      |      |      |      |      |      |      |
| Max Q Clear Time (g_c+H), s | 13.8 | 19.6 | 9.9  | 26.8 | 0.0  |      |      |      |      |      |      |      |
| Green Ext Time (g_e), s     | 4.3  | 1.1  | 0.0  | 6.9  | 0.0  |      |      |      |      |      |      |      |
| Intersection Summary        | 19.3 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | B    |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |
| Notes                       |      |      |      |      |      |      |      |      |      |      |      |      |

HCM 2010 TWSC  
 3: Dutton Meadow & Eiern School DW

10/18/2018

| Intersection             | In Delay, s/veh | 0.2    |        |        |      |      |
|--------------------------|-----------------|--------|--------|--------|------|------|
| Movement                 | EBL             | EBR    | NBL    | NBT    | SBL  | SBR  |
| Lane Configurations      | 1               | 1      | 1      | 1      | 1    | 1    |
| Traffic Vol, veh/h       | 8               | 4      | 0      | 429    | 440  | 0    |
| Future Vol, veh/h        | 8               | 4      | 0      | 429    | 440  | 0    |
| Conflicting Peds, #/hr   | 0               | 0      | 0      | 0      | 0    | 0    |
| Sign Control             | Stop            | Stop   | Free   | Free   | Free | Free |
| RT Channelized           | -               | None   | -      | None   | -    | None |
| Storage Length           | 0               | 0      | -      | -      | -    | -    |
| Veh in Median Storage, # | 0               | 0      | -      | -      | -    | -    |
| Grade, %                 | 0               | 0      | -      | -      | -    | -    |
| Peak Hour Factor         | 95              | 95     | 95     | 95     | 95   | 95   |
| Heavy Vehicles, %        | 2               | 2      | 2      | 2      | 2    | 2    |
| Mvmt Flow                | 8               | 4      | 0      | 452    | 463  | 0    |
| Major/Minor              | Minor2          | Major1 | Major1 | Major2 |      |      |
| Conflicting Flow All     | 915             | 463    | -      | 0      | -    | 0    |
| Stage 1                  | 463             | -      | -      | -      | -    | -    |
| Stage 2                  | 452             | -      | -      | -      | -    | -    |
| Critical Hdwy            | 6.42            | 6.22   | -      | -      | -    | -    |
| Critical Hdwy Stg 1      | 5.42            | -      | -      | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.42            | -      | -      | -      | -    | -    |
| Follow-up Hdwy           | 3,518           | 3,318  | -      | -      | -    | -    |
| Pl Cap-1 Maneuver        | 303             | 599    | 0      | -      | -    | 0    |
| Stage 1                  | 634             | -      | -      | -      | -    | -    |
| Stage 2                  | 641             | -      | -      | -      | -    | -    |
| Platoon blocked, %       |                 |        |        |        |      |      |
| Mov Cap-1 Maneuver       | 303             | 599    | -      | -      | -    | -    |
| Mov Cap-2 Maneuver       | 303             | -      | -      | -      | -    | -    |
| Stage 1                  | 634             | -      | -      | -      | -    | -    |
| Stage 2                  | 641             | -      | -      | -      | -    | -    |
| Approach                 | EB              | NB     | SB     |        |      |      |
| HCM Control Delay, s     | 15.2            | 0      | 0      |        |      |      |
| HCM LOS                  | C               |        |        |        |      |      |
| Minor Lane/Major Mvmt    | NBT             | EBLn1  | EBLn2  | SBT    |      |      |
| Capacity (veh/h)         | -               | 303    | 599    | -      | -    | -    |
| HCM Lane V/C Ratio       | -               | 0.028  | 0.007  | -      | -    | -    |
| HCM Control Delay (s)    | -               | 17.2   | 11.1   | -      | -    | -    |
| HCM Lane LOS             | -               | C      | B      | -      | -    | -    |
| HCM 95th %ile Q(veh)     | -               | 0.1    | 0      | -      | -    | -    |

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  | Icons |
|-----------------------------|------|-------|------|------|------|------|-------|
| Lane Configurations         | ↑    | ↑     | ↑    | ↑    | ↑    | ↑    | ↔     |
| Traffic Volume (veh/h)      | 540  | 218   | 145  | 442  | 298  | 229  |       |
| Future Volume (veh/h)       | 540  | 218   | 145  | 442  | 298  | 229  |       |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |       |
| Initial Q (Cb), veh         | 0    | 0     | 0    | 0    | 0    | 0    |       |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |       |
| Adj Sat Flow, veh/hln       | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |       |
| Adj Flow Rate, veh/h        | 540  | 210   | 145  | 442  | 298  | 209  |       |
| Adj No. of Lanes            | 1    | 1     | 1    | 1    | 1    | 1    |       |
| Peak Hour Factor            | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |       |
| Cap. veh/h                  | 745  | 620   | 235  | 1145 | 416  | 581  |       |
| Arrive On Green             | 0.40 | 0.40  | 0.13 | 0.61 | 0.23 | 0.23 |       |
| Sat Flow, veh/h             | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |       |
| Grp Volume(v), veh/h        | 540  | 210   | 145  | 442  | 298  | 209  |       |
| Grp Sat Flow(s), veh/hln    | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |       |
| Q_Serve(g.s), s             | 10.7 | 4.1   | 3.4  | 5.3  | 6.8  | 0.0  |       |
| Cycle Q Clear(g.c.), s      | 10.7 | 4.1   | 3.4  | 5.3  | 6.8  | 0.0  |       |
| Prop In Lane                | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Lane Grp Cap(c), veh/h      | 745  | 620   | 235  | 1145 | 416  | 581  |       |
| V/C Ratio(X)                | 0.72 | 0.34  | 0.62 | 0.39 | 0.72 | 0.36 |       |
| Avail Cap(c.a), veh/h       | 2076 | 1676  | 607  | 2781 | 1134 | 1222 |       |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Upstream Filter(i)          | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Uniform Delay (d), s/veh    | 11.1 | 9.1   | 18.0 | 4.3  | 15.4 | 10.1 |       |
| Incr Delay (d2), s/veh      | 1.4  | 0.3   | 1.0  | 0.2  | 2.3  | 0.4  |       |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |       |
| %ile BackOfQ(50%), veh/ln   | 5.7  | 1.8   | 1.7  | 2.6  | 3.6  | 1.9  |       |
| LnGrp Delay(d), s/veh       | 12.5 | 9.4   | 18.9 | 4.5  | 17.7 | 10.5 |       |
| LnGrp LOS                   | B    | A     | B    | A    | B    | B    |       |
| Approach Vol, veh/h         | 750  |       | 587  | 507  |      |      |       |
| Approach Delay, s/veh       | 11.6 |       | 8.0  | 14.7 |      |      |       |
| Approach LOS                | B    |       | A    | B    |      |      |       |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    | 7     |
| Assigned Phs                | 1    | 2     | 3    | 4    | 5    | 6    | 7     |
| Phs Duration (G+Y+Rc), s    | 9.4  | 21.1  |      |      |      | 30.5 | 13.3  |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      | 3.6  | 3.0   |
| Max Green Setting (Gmax), s | 15.0 | * 4.7 |      |      |      | 65.4 | 28.0  |
| Max Q Clear Time (g.c+H), s | 5.4  | 12.7  |      |      |      | 7.3  | 8.8   |
| Green Ext Time (p.c.), s    | 0.1  | 4.8   |      |      |      | 3.2  | 1.5   |
| Intersection Summary        |      |       |      |      |      |      |       |
| HCM 2010 Ctrl Delay         | 11.3 |       |      |      |      |      |       |
| HCM 2010 LOS                | B    |       |      |      |      |      |       |
| Notes                       |      |       |      |      |      |      |       |

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 2. Dutton Ave & Hearn Ave

| Movement                    | EBT  | EBR  | WBL  | WBT  | NBL  | NBR  | Icons |
|-----------------------------|------|------|------|------|------|------|-------|
| Lane Configurations         | ↑    | ↑    | ↑    | ↑    | ↑    | ↑    | ↔     |
| Traffic Volume (veh/h)      | 86   | 676  | 20   | 414  | 501  | 182  |       |
| Future Volume (veh/h)       | 86   | 676  | 20   | 414  | 501  | 182  |       |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   |       |
| Initial Q (Cb), veh         | 0    | 0    | 0    | 0    | 0    | 0    |       |
| Ped-Bike Adj(A_pbT)         | 1.00 | 0.96 | 1.00 | 1.00 | 0.95 | 1.00 |       |
| Parking Bus, Adj            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Adj Sat Flow, veh/hln       | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 |       |
| Adj Flow Rate, veh/h        | 86   | 676  | 20   | 414  | 501  | 174  |       |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    |       |
| Peak Hour Factor            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Percent Heavy Veh, %        | 2    | 2    | 2    | 2    | 2    | 2    |       |
| Cap. veh/h                  | 108  | 1028 | 30   | 436  | 890  | 722  |       |
| Arrive On Green             | 0.06 | 0.29 | 0.29 | 0.25 | 0.48 | 0.48 |       |
| Sat Flow, veh/h             | 1774 | 3506 | 104  | 1774 | 1863 | 1510 |       |
| Grp Volume(v), veh/h        | 86   | 341  | 355  | 414  | 501  | 174  |       |
| Grp Sat Flow(s), veh/hln    | 1774 | 1770 | 1840 | 1774 | 1863 | 1510 |       |
| Q_Serve(g.s), s             | 5.5  | 19.2 | 19.3 | 26.2 | 21.9 | 7.8  |       |
| Cycle Q Clear(g.c.), s      | 5.5  | 19.2 | 19.3 | 26.2 | 21.9 | 7.8  |       |
| Prop In Lane                | 1.00 | 1.00 | 0.06 | 1.00 | 1.00 | 1.00 |       |
| Lane Grp Cap(c), veh/h      | 108  | 519  | 540  | 436  | 890  | 722  |       |
| V/C Ratio(X)                | 0.79 | 0.66 | 0.66 | 0.95 | 0.86 | 0.24 |       |
| Avail Cap(c.a), veh/h       | 110  | 519  | 540  | 436  | 890  | 722  |       |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |       |
| Upstream Filter(i)          | 0.79 | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 |       |
| Uniform Delay (d), s/veh    | 52.8 | 35.3 | 35.3 | 42.3 | 21.3 | 17.6 |       |
| Incr Delay (d2), s/veh      | 25.7 | 5.1  | 4.9  | 30.7 | 2.6  | 0.8  |       |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |       |
| %ile BackOfQ(50%), veh/ln   | 3.4  | 10.1 | 10.5 | 16.5 | 11.9 | 3.4  |       |
| LnGrp Delay(d), s/veh       | 78.5 | 40.3 | 40.2 | 73.0 | 23.8 | 18.4 |       |
| LnGrp LOS                   | E    | D    | D    | E    | C    | B    |       |
| Approach Vol, veh/h         | 782  |      | 1089 | 536  |      |      |       |
| Approach Delay, s/veh       | 44.4 |      | 41.6 | 32.0 |      |      |       |
| Approach LOS                | D    |      | D    | C    |      |      |       |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7     |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7     |
| Phs Duration (G+Y+Rc), s    | 32.0 | 37.4 | 6.8  | 37.8 | 11.0 | 58.5 | 20.0  |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 3.5  | 3.5  | 4.0  | 4.0  | 3.5   |
| Max Green Setting (Gmax), s | 28.0 | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5  |
| Max Q Clear Time (g.c+H), s | 28.2 | 21.3 | 3.3  | 11.1 | 7.5  | 23.9 | 18.5  |
| Green Ext Time (p.c.), s    | 0.0  | 2.4  | 0.0  | 1.1  | 0.0  | 4.1  | 0.0   |
| Intersection Summary        |      |      |      |      |      |      |       |
| HCM 2010 Ctrl Delay         | 47.1 |      |      |      |      |      |       |
| HCM 2010 LOS                | D    |      |      |      |      |      |       |

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 3. Northpoint Parkway & Dutton Meadow

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)      | 180  | 30   | 25   | 20   | 130  | 70   | 25   | 272  | 25   | 80   | 150  | 130  |
| Future Volume (veh/h)       | 180  | 30   | 25   | 20   | 130  | 70   | 25   | 272  | 25   | 80   | 150  | 130  |
| Number                      | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial Q (Ob.) veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/hln       | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 180  | 30   | 25   | 20   | 130  | 70   | 25   | 272  | 25   | 80   | 150  | 130  |
| Adj No. of Lanes            | 0    | 1    | 1    | 0    | 1    | 1    | 1    | 1    | 1    | 0    | 1    | 1    |
| 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                  | 256  | 43   | 264  | 32   | 210  | 299  | 420  | 436  | 40   | 401  | 205  | 177  |
| Arrive On Green             | 0.17 | 0.17 | 0.17 | 0.13 | 0.13 | 0.13 | 0.10 | 0.26 | 0.26 | 0.06 | 0.22 | 0.22 |
| Sat Flow, veh/h             | 1531 | 255  | 1583 | 247  | 1604 | 1583 | 1774 | 1681 | 155  | 1774 | 922  | 799  |
| Grp Volume(V), veh/h        | 210  | 0    | 25   | 150  | 0    | 70   | 25   | 0    | 297  | 80   | 0    | 280  |
| Grp Sat Flow(s), veh/hln    | 1786 | 0    | 1583 | 1850 | 0    | 1583 | 1774 | 0    | 1835 | 1774 | 0    | 1722 |
| Q_Serve(g.s), s             | 4.6  | 0.0  | 0.6  | 3.2  | 0.0  | 1.6  | 0.4  | 0.0  | 5.9  | 1.4  | 0.0  | 6.3  |
| Cycle Q Clear(g.q), s       | 4.6  | 0.0  | 0.6  | 3.2  | 0.0  | 1.6  | 0.4  | 0.0  | 5.9  | 1.4  | 0.0  | 6.3  |
| Prop In Lane                | 0.86 | 1.00 | 1.00 | 0.13 | 1.00 | 1.00 | 1.00 | 0.08 | 1.00 | 0.46 | 1.00 | 0.46 |
| Lane Grp Cap(c), veh/h      | 298  | 0    | 264  | 242  | 0    | 299  | 420  | 0    | 476  | 401  | 0    | 382  |
| V/C Ratio(X)                | 0.70 | 0.00 | 0.09 | 0.62 | 0.00 | 0.23 | 0.06 | 0.00 | 0.62 | 0.20 | 0.00 | 0.73 |
| Avail Cap(c.a), veh/h       | 688  | 0    | 610  | 713  | 0    | 702  | 934  | 0    | 1193 | 512  | 0    | 663  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh    | 16.3 | 0.0  | 14.7 | 17.1 | 0.0  | 14.3 | 10.3 | 0.0  | 13.6 | 11.5 | 0.0  | 15.0 |
| Incr Delay (d2), s/veh      | 3.0  | 0.0  | 0.2  | 2.6  | 0.0  | 0.4  | 0.1  | 0.0  | 1.3  | 0.2  | 0.0  | 2.7  |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 2.5  | 0.0  | 0.3  | 1.8  | 0.0  | 0.7  | 0.2  | 0.0  | 3.1  | 0.7  | 0.0  | 3.2  |
| LnGrp Delay(d), s/veh       | 19.4 | 0.0  | 14.8 | 19.7 | 0.0  | 14.7 | 10.4 | 0.0  | 15.0 | 11.8 | 0.0  | 17.8 |
| LnGrp LOS                   | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Approach Vol, veh/h         | 235  | 18.9 | 18.1 | 220  | 18.1 | 14.6 | 322  | 14.6 | 360  | 16.4 | 360  | 16.4 |
| Approach Delay, s/veh       | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Approach LOS                | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 8    | 8    | 8    | 8    |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 8    | 8    | 8    | 8    |
| Phs Duration (G+Y+Rc), s    | 6.4  | 14.8 | 10.9 | 8.0  | 13.2 | 9.4  | 9.4  | 9.4  | 9.4  | 9.4  | 9.4  | 9.4  |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  |
| Max Green Setting (Gmax), s | 5.0  | 27.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| Max Q Clear Time (g.c+H), s | 3.4  | 7.9  | 6.6  | 2.4  | 8.3  | 5.2  | 5.2  | 5.2  | 5.2  | 5.2  | 5.2  | 5.2  |
| Green Ext Time (p.c), s     | 0.0  | 1.6  | 0.8  | 0.0  | 0.9  | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 16.7 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 AM Future - Planned

Synchro 10 Report

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement  | EBT  | EBR  | WBL  | WBT  | NBL  | NBR  |
|---|------|------|------|------|------|------|
| Lane Configurations   | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)  | 549  | 315  | 273  | 521  | 332  | 262  |
| Future Volume (veh/h)   | 549  | 315  | 273  | 521  | 332  | 262  |
| Number  | 2    | 12   | 1    | 6    | 3    | 18   |
| Initial Q (Ob.) veh   | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)   | 0.98 | 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 |
| Adj Sat Flow, veh/hln   | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h  | 549  | 307  | 273  | 521  | 332  | 242  |
| Adj No. of Lanes  | 1    | 1    | 1    | 1    | 1    | 1    |
| Peak Hour Factor  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh, %  | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h  | 717  | 596  | 332  | 1189 | 429  | 679  |
| Arrive On Green   | 0.39 | 0.39 | 0.19 | 0.64 | 0.24 | 0.24 |
| Sat Flow, veh/h   | 1863 | 1549 | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(V), veh/h  | 549  | 307  | 273  | 521  | 332  | 242  |
| Grp Sat Flow(s), veh/hln  | 1863 | 1549 | 1774 | 1863 | 1774 | 1583 |
| Q_Serve(g.s), s   | 14.1 | 8.3  | 8.1  | 7.7  | 9.6  | 0.0  |
| Cycle Q Clear(g.q), s   | 14.1 | 8.3  | 8.1  | 7.7  | 9.6  | 0.0  |
| Prop In Lane  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h  | 717  | 596  | 332  | 1189 | 429  | 679  |
| V/C Ratio(X)  | 0.77 | 0.51 | 0.82 | 0.44 | 0.77 | 0.36 |
| Avail Cap(c.a), veh/h   | 1372 | 1141 | 744  | 2255 | 873  | 1076 |
| HCM Platoon Ratio   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh  | 14.7 | 12.9 | 21.4 | 5.0  | 19.4 | 10.6 |
| Incr Delay (d2), s/veh  | 1.7  | 0.7  | 2.0  | 0.3  | 3.0  | 0.3  |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 7.5  | 3.6  | 4.1  | 4.0  | 5.0  | 2.5  |
| LnGrp Delay(d), s/veh   | 16.4 | 13.6 | 23.4 | 5.2  | 22.4 | 10.9 |
| LnGrp LOS   | B    | B    | C    | A    | C    | B    |
| Approach Vol, veh/h   | 856  | 794  | 574  | 11.5 | 17.6 | 11.5 |
| Approach Delay, s/veh   | 15.4 | B    | B    | B    | B    | B    |
| Approach LOS  | B    | B    | B    | B    | B    | B    |
| Timer   | 1    | 2    | 3    | 4    | 5    | 6    |
| Assigned Phs  | 1    | 2    | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s  | 13.9 | 24.7 | 38.6 | 16.2 | 38.6 | 16.2 |
| Change Period (Y+Rc), s   | 3.6  | 3.6  | 3.6  | 3.6  | 3.6  | 3.6  |
| Max Green Setting (Gmax), s   | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| Max Q Clear Time (g.c+H), s   | 10.1 | 16.1 | 9.7  | 11.6 | 9.7  | 11.6 |
| Green Ext Time (p.c), s   | 0.3  | 5.0  | 3.9  | 1.7  | 3.9  | 1.7  |
| Intersection Summary  |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay   | 14.6 |      |      |      |      |      |
| HCM 2010 LOS  | B    |      |      |      |      |      |
| Notes   |      |      |      |      |      |      |
| * HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier. |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 PM Future - Planned

Synchro 10 Report

2: Dutton Ave & Hearn Ave

10/22/2018

3: Dutton Meadow & Northpoint Parkway

10/22/2018

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         |      |      |      |      |      |      |      |      |      |      |      |      |
| Traffic Volume (veh/h)      | 39   | 709  | 20   | 388  | 680  | 204  | 28   | 390  | 261  | 224  | 247  | 87   |
| Future Volume (veh/h)       | 5    | 709  | 20   | 388  | 680  | 204  | 28   | 390  | 261  | 224  | 247  | 87   |
| Number                      | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Initial O (Ob.) veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 0.96 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.96 |
| Parking Bus, Adj            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h         | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 39   | 709  | 20   | 388  | 680  | 196  | 28   | 390  | 261  | 224  | 247  | 45   |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| 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                  | 77   | 936  | 26   | 415  | 851  | 689  | 64   | 421  | 729  | 251  | 505  | 92   |
| Arrive On Green             | 0.04 | 0.27 | 0.27 | 0.23 | 0.46 | 0.46 | 0.04 | 0.23 | 0.23 | 0.14 | 0.33 | 0.33 |
| Sat Flow, veh/h             | 1774 | 3511 | 99   | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774 | 1523 | 277  |
| Grp Volume(V), veh/h        | 39   | 357  | 372  | 388  | 680  | 196  | 28   | 390  | 261  | 224  | 0    | 292  |
| Grp Sat Flow(s), veh/h      | 1774 | 1770 | 1840 | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774 | 0    | 1801 |
| O.Saves(g.s.) s             | 2.5  | 21.1 | 21.2 | 24.4 | 35.6 | 9.2  | 1.8  | 23.4 | 12.1 | 14.1 | 0.0  | 14.7 |
| Cycle O Clear(g.o.) s       | 2.5  | 21.1 | 21.2 | 24.4 | 35.6 | 9.2  | 1.8  | 23.4 | 12.1 | 14.1 | 0.0  | 14.7 |
| Prop In Lane                | 1.00 | 0.05 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.15 | 0.15 |
| Lane Grp Cap(c), veh/h      | 77   | 472  | 491  | 415  | 851  | 689  | 64   | 421  | 729  | 251  | 0    | 597  |
| V/C Ratio(X)                | 0.50 | 0.76 | 0.76 | 0.93 | 0.80 | 0.28 | 0.44 | 0.93 | 0.36 | 0.89 | 0.00 | 0.49 |
| Avail Cap(c.a), veh/h       | 110  | 472  | 491  | 436  | 851  | 689  | 109  | 433  | 739  | 257  | 0    | 597  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 0.75 | 0.75 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh    | 53.3 | 38.4 | 38.4 | 42.8 | 26.5 | 19.3 | 53.8 | 43.2 | 19.9 | 48.1 | 0.0  | 30.4 |
| Incr Delay (d2), s/veh      | 3.8  | 8.3  | 8.0  | 26.9 | 7.7  | 1.0  | 4.6  | 25.5 | 0.3  | 29.3 | 0.0  | 0.6  |
| Initial O 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 BackOf(50%),veh/h      | 1.3  | 11.4 | 11.8 | 15.1 | 20.2 | 4.1  | 0.9  | 15.0 | 5.3  | 9.0  | 0.0  | 7.4  |
| LnGrp Delay(d),s/veh        | 57.1 | 46.7 | 46.5 | 69.7 | 34.2 | 20.4 | 58.4 | 68.6 | 20.2 | 77.4 | 0.0  | 31.0 |
| LnGrp LOS                   | E    | D    | D    | E    | C    | C    | E    | E    | C    | C    | E    | C    |
| Approach Vol, veh/h         | 768  |      |      | 1264 |      |      | 679  |      |      |      | 516  |      |
| Approach Delay, s/veh       | 47.1 |      |      | 43.0 |      |      | 49.6 |      |      |      | 51.1 |      |
| Approach LOS                | D    |      |      | D    |      |      | D    |      |      |      | D    |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 30.7 | 34.4 | 7.6  | 41.3 | 9.0  | 56.1 | 19.7 | 29.3 |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 3.5  | 3.5  | 4.0  | 4.0  | 3.5  | 3.5  |      |      |      |      |
| Max Green Setting (Gmax), s | 28.0 | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 | 26.5 |      |      |      |      |
| Max O Clear Time (g.c+1), s | 26.4 | 23.2 | 3.8  | 16.7 | 4.5  | 37.6 | 16.1 | 25.4 |      |      |      |      |
| Green Ext Time (p.c.), s    | 0.2  | 1.9  | 0.0  | 1.7  | 0.0  | 4.2  | 0.0  | 0.4  |      |      |      |      |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 46.7 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | D    |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
PM Future - Planned

Synchro 10 Report

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         |      |      |      |      |      |      |      |      |      |      |      |      |
| Traffic Volume (veh/h)      | 150  | 30   | 20   | 15   | 95   | 50   | 25   | 395  | 25   | 60   | 400  | 130  |
| Future Volume (veh/h)       | 150  | 30   | 20   | 15   | 95   | 50   | 25   | 395  | 25   | 60   | 400  | 130  |
| Number                      | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial O (Ob.) veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/h         | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 150  | 30   | 20   | 15   | 95   | 50   | 25   | 395  | 25   | 60   | 400  | 130  |
| Adj No. of Lanes            | 0    | 1    | 1    | 0    | 1    | 1    | 1    | 1    | 1    | 0    | 1    | 1    |
| 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                  | 214  | 43   | 227  | 25   | 156  | 230  | 43   | 595  | 38   | 84   | 494  | 161  |
| Arrive On Green             | 0.14 | 0.14 | 0.14 | 0.10 | 0.10 | 0.10 | 0.02 | 0.34 | 0.34 | 0.05 | 0.37 | 0.37 |
| Sat Flow, veh/h             | 1490 | 298  | 1583 | 252  | 1598 | 1583 | 1774 | 1734 | 110  | 1774 | 1348 | 438  |
| Grp Volume(V), veh/h        | 180  | 0    | 20   | 110  | 0    | 50   | 25   | 0    | 420  | 60   | 0    | 530  |
| Grp Sat Flow(s), veh/h      | 1788 | 0    | 1583 | 1850 | 0    | 1583 | 1774 | 0    | 1843 | 1774 | 0    | 1785 |
| O.Saves(g.s.) s             | 4.2  | 0.0  | 0.5  | 2.5  | 0.0  | 1.2  | 0.6  | 0.0  | 8.4  | 1.4  | 0.0  | 11.6 |
| Cycle O Clear(g.o.) s       | 4.2  | 0.0  | 0.5  | 2.5  | 0.0  | 1.2  | 0.6  | 0.0  | 8.4  | 1.4  | 0.0  | 11.6 |
| Prop In Lane                | 0.83 | 1.00 | 0.14 | 1.00 | 1.00 | 1.00 | 1.00 | 0.06 | 1.00 | 0.25 | 1.00 | 0.25 |
| Lane Grp Cap(c), veh/h      | 257  | 0    | 227  | 181  | 0    | 230  | 43   | 0    | 633  | 84   | 0    | 655  |
| V/C Ratio(X)                | 0.70 | 0.00 | 0.09 | 0.61 | 0.00 | 0.22 | 0.59 | 0.00 | 0.66 | 0.71 | 0.00 | 0.81 |
| Avail Cap(c.a), veh/h       | 658  | 0    | 583  | 681  | 0    | 658  | 163  | 0    | 890  | 245  | 0    | 944  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh    | 17.7 | 0.0  | 16.2 | 18.8 | 0.0  | 16.4 | 21.0 | 0.0  | 12.1 | 20.4 | 0.0  | 12.4 |
| Incr Delay (d2), s/veh      | 3.5  | 0.0  | 0.2  | 3.3  | 0.0  | 0.5  | 12.2 | 0.0  | 1.2  | 10.6 | 0.0  | 3.5  |
| Initial O 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 BackOf(50%),veh/h      | 2.3  | 0.0  | 0.2  | 1.4  | 0.0  | 0.6  | 0.4  | 0.0  | 4.4  | 0.9  | 0.0  | 6.2  |
| LnGrp Delay(d),s/veh        | 21.2 | 0.0  | 16.3 | 22.1 | 0.0  | 16.9 | 33.2 | 0.0  | 13.3 | 31.0 | 0.0  | 15.9 |
| LnGrp LOS                   | C    | B    | C    | C    | B    | C    | B    | C    | B    | C    | B    | C    |
| Approach Vol, veh/h         | 200  |      |      | 160  |      |      | 445  |      |      |      | 590  |      |
| Approach Delay, s/veh       | 20.7 |      |      | 20.5 |      |      | 14.5 |      |      |      | 17.4 |      |
| Approach LOS                | C    |      |      | C    |      |      | B    |      |      |      | B    |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 6.1  | 18.9 | 10.2 | 5.0  | 19.9 | 8.3  |      |      |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  |      |      |      |      |      |      |
| Max Green Setting (Gmax), s | 6.0  | 21.0 | 16.0 | 4.0  | 23.0 | 16.0 |      |      |      |      |      |      |
| Max O Clear Time (g.c+1), s | 3.4  | 10.4 | 6.2  | 2.6  | 13.6 | 4.5  |      |      |      |      |      |      |
| Green Ext Time (p.c.), s    | 0.0  | 1.8  | 0.7  | 0.0  | 2.3  | 0.5  |      |      |      |      |      |      |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 17.3 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
PM Future - Planned

Synchro 10 Report

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement  | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|---|------|-------|------|------|------|------|
| Lane Configurations   | ←    | ←     | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)  | 540  | 218   | 145  | 442  | 298  | 229  |
| Future Volume (veh/h)   | 540  | 218   | 145  | 442  | 298  | 229  |
| Number  | 5    | 2     | 12   | 1    | 6    | 3    |
| Initial O (Ob.) veh   | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)   | 0.98 | 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 |
| Adj Sat Flow, veh/h   | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h  | 540  | 210   | 145  | 442  | 298  | 209  |
| Adj No. of Lanes  | 1    | 1     | 1    | 1    | 1    | 1    |
| Peak Hour Factor  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %  | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap. veh/h  | 745  | 620   | 235  | 1145 | 416  | 581  |
| Arrive On Green   | 0.40 | 0.40  | 0.13 | 0.61 | 0.23 | 0.23 |
| Sat Flow, veh/h   | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(V), veh/h  | 540  | 210   | 145  | 442  | 298  | 209  |
| Grp Sat Flow(s), veh/h  | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| O.SatVeh(g.s.)  | 10.7 | 4.1   | 3.4  | 5.3  | 6.8  | 0.0  |
| Cycle O Clear(g.c.) s   | 10.7 | 4.1   | 3.4  | 5.3  | 6.8  | 0.0  |
| Prop In Lane  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h  | 745  | 620   | 235  | 1145 | 416  | 581  |
| V/C Ratio(X)  | 0.72 | 0.34  | 0.62 | 0.39 | 0.72 | 0.36 |
| Avail Cap(c.a), veh/h   | 2016 | 1676  | 607  | 2781 | 1134 | 1222 |
| HCM Platoon Ratio   | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh  | 11.1 | 9.1   | 18.0 | 4.3  | 15.4 | 10.1 |
| Incr Delay (d2), s/veh  | 1.4  | 0.3   | 1.0  | 0.2  | 2.3  | 0.4  |
| Initial O Delay(i3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%), veh/h   | 5.7  | 1.8   | 1.7  | 2.6  | 3.6  | 1.9  |
| LnGrp Delay(d), s/veh   | 12.5 | 9.4   | 18.9 | 4.5  | 17.7 | 10.5 |
| LnGrp LOS   | B    | A     | B    | A    | B    | B    |
| Approach Vol, veh/h   | 750  |       |      | 587  |      | 507  |
| Approach Delay, s/veh   | 11.6 |       |      | 8.0  |      | 14.7 |
| Approach LOS  | B    |       |      | A    |      | B    |
| Timer   | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs  | 1    | 2     |      |      |      | 6    |
| Phs Duration (G+Y+Rc), s  | 9.4  | 21.1  |      |      |      | 30.5 |
| Change Period (Y+Rc), s   | 3.6  | * 3.6 |      |      |      | 3.0  |
| Max Green Setting (Gmax), s   | 15.0 | * 4.7 |      |      |      | 65.4 |
| Max O Clear Time (g.c.+1), s  | 5.4  | 12.7  |      |      |      | 7.3  |
| Green Ext Time (p.c.), s  | 0.1  | 4.8   |      |      |      | 3.2  |
| Green Ext Time (p.c.), s  | 0.0  | 2.4   | 0.0  | 1.1  | 0.0  | 4.1  |
| Green Ext Time (p.c.), s  | 0.0  | 2.4   | 0.0  | 1.1  | 0.0  | 4.1  |
| Intersection Summary  |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay   | 11.3 |       |      |      |      |      |
| HCM 2010 LOS  | B    |       |      |      |      |      |
| Notes   |      |       |      |      |      |      |
| * HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier. |      |       |      |      |      |      |

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 2. Dutton Ave & Hearn Ave

| Movement                     | EBT  | EBR  | WBL  | WBR  | NBL  | NBR  |
|------------------------------|------|------|------|------|------|------|
| Lane Configurations          | ←    | ←    | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)       | 86   | 676  | 20   | 414  | 501  | 182  |
| Future Volume (veh/h)        | 86   | 676  | 20   | 414  | 501  | 182  |
| Number                       | 5    | 2    | 12   | 1    | 6    | 3    |
| Initial O (Ob.) veh          | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)          | 1.00 | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 |
| Parking Bus, Adj             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h          | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h         | 86   | 676  | 20   | 414  | 501  | 174  |
| Adj No. of Lanes             | 1    | 2    | 0    | 1    | 1    | 1    |
| Peak Hour Factor             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %         | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                   | 108  | 1028 | 30   | 436  | 890  | 722  |
| Arrive On Green              | 0.06 | 0.29 | 0.29 | 0.48 | 0.03 | 0.18 |
| Sat Flow, veh/h              | 1774 | 3506 | 104  | 1774 | 1863 | 1510 |
| Grp Volume(V), veh/h         | 86   | 341  | 355  | 414  | 501  | 174  |
| Grp Sat Flow(s), veh/h       | 1774 | 1840 | 1774 | 1863 | 1510 | 1774 |
| O.SatVeh(g.s.)               | 5.5  | 19.2 | 19.3 | 26.2 | 21.9 | 7.8  |
| Cycle O Clear(g.c.) s        | 5.5  | 19.2 | 19.3 | 26.2 | 21.9 | 7.8  |
| Prop In Lane                 | 1.00 | 0.06 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h       | 108  | 519  | 540  | 436  | 890  | 722  |
| V/C Ratio(X)                 | 0.79 | 0.66 | 0.66 | 0.95 | 0.56 | 0.24 |
| Avail Cap(c.a), veh/h        | 110  | 519  | 540  | 436  | 890  | 722  |
| HCM Platoon Ratio            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)           | 0.79 | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh     | 52.8 | 35.3 | 42.3 | 21.3 | 17.6 | 54.4 |
| Incr Delay (d2), s/veh       | 25.7 | 5.1  | 4.9  | 30.7 | 2.6  | 0.8  |
| Initial O Delay(i3), s/veh   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%), veh/h      | 10.1 | 10.5 | 16.5 | 11.9 | 3.4  | 0.7  |
| LnGrp Delay(d), s/veh        | 78.5 | 40.3 | 40.2 | 73.0 | 23.8 | 18.4 |
| LnGrp LOS                    | E    | D    | D    | E    | C    | B    |
| Approach Vol, veh/h          | 782  |      |      | 1089 |      | 536  |
| Approach Delay, s/veh        | 44.4 |      |      | 41.6 |      | 32.0 |
| Approach LOS                 | D    |      |      | D    |      | C    |
| Timer                        | 1    | 2    | 3    | 4    | 5    | 6    |
| Assigned Phs                 | 1    | 2    | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s     | 32.0 | 37.4 | 6.8  | 37.8 | 11.0 | 58.5 |
| Change Period (Y+Rc), s      | 4.0  | 4.0  | 3.5  | 4.0  | 4.0  | 3.5  |
| Max Green Setting (Gmax), s  | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 |
| Max O Clear Time (g.c.+1), s | 21.3 | 3.3  | 11.1 | 7.5  | 23.9 | 18.5 |
| Green Ext Time (p.c.), s     | 0.0  | 2.4  | 0.0  | 1.1  | 0.0  | 4.1  |
| Green Ext Time (p.c.), s     | 0.0  | 2.4  | 0.0  | 1.1  | 0.0  | 4.1  |
| Intersection Summary         |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay          | 47.1 |      |      |      |      |      |
| HCM 2010 LOS                 | D    |      |      |      |      |      |

HCM 2010 Signalized Intersection Summary  
 3. Northpoint Parkway & Elem School D/W

10/22/2018

| Movement                      | EBL  | EBT  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations           | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Volume (veh/h)        | 70   | 0    | 42   | 155  | 0    | 342  | 0    | 180  | 55   | 230  | 130  |
| Future Volume (veh/h)         | 70   | 0    | 42   | 155  | 0    | 342  | 0    | 180  | 55   | 230  | 130  |
| Number                        | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    |
| Initial Q (Ob.) veh           | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pb1)           | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/h           | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h          | 70   | 0    | 42   | 155  | 0    | 342  | 0    | 180  | 55   | 230  | 130  |
| Adj No. of Lanes              | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    | 1    | 0    |
| 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 |
| Percnt Heavy Veh, %           | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                    | 117  | 0    | 104  | 426  | 0    | 657  | 0    | 239  | 73   | 310  | 811  |
| Arrive On Green               | 0.07 | 0.00 | 0.07 | 0.24 | 0.00 | 0.24 | 0.00 | 0.17 | 0.17 | 0.17 | 0.44 |
| Sat Flow, veh/h               | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1370 | 419  | 1774 | 1863 |
| Grp Volume(V), veh/h          | 70   | 0    | 42   | 155  | 0    | 342  | 0    | 0    | 235  | 230  | 130  |
| Grp Sat Flow(s), veh/h/m/1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 0    | 1789 | 1774 | 1863 | 0    |
| Q Serve(g.s)                  | 1.8  | 0.0  | 1.2  | 3.4  | 0.0  | 7.5  | 0.0  | 0.0  | 5.8  | 5.7  | 2.0  |
| Cycle Q Clear(g.c), s         | 1.8  | 0.0  | 1.2  | 3.4  | 0.0  | 7.5  | 0.0  | 0.0  | 5.8  | 5.7  | 2.0  |
| Prop In Lane                  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.23 | 1.00 | 1.00 | 0.00 |
| Lane Grp Cap(c), veh/h        | 117  | 0    | 104  | 426  | 0    | 657  | 0    | 0    | 312  | 310  | 811  |
| W/C Ratio(X)                  | 0.60 | 0.00 | 0.40 | 0.36 | 0.00 | 0.52 | 0.00 | 0.00 | 0.75 | 0.74 | 0.16 |
| Avail Cap(c.a), veh/h         | 421  | 0    | 375  | 803  | 0    | 993  | 0    | 0    | 424  | 612  | 1245 |
| HCM Platoon Ratio             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)            | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh      | 21.1 | 0.0  | 20.8 | 14.7 | 0.0  | 10.1 | 0.0  | 0.0  | 18.2 | 18.2 | 8.0  |
| Incr Delay (d2), s/veh        | 4.8  | 0.0  | 2.5  | 0.5  | 0.0  | 0.6  | 0.0  | 0.0  | 5.1  | 3.5  | 0.1  |
| Initial Q Delay(d3), s/veh    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/m/0    | 0.0  | 0.0  | 0.6  | 1.7  | 0.0  | 3.4  | 0.0  | 0.0  | 3.3  | 3.0  | 1.0  |
| LnGrp Delay(d), s/veh         | 25.9 | 0.0  | 23.3 | 15.2 | 0.0  | 10.8 | 0.0  | 0.0  | 23.3 | 21.7 | 8.0  |
| LnGrp LOS                     | C    | C    | C    | B    | B    | C    | C    | C    | C    | C    | A    |
| Approach Vol, veh/h           | 112  | 249  | 497  | 235  | 360  |      |      |      |      |      |      |
| Approach Delay, s/veh         | C    | C    | B    | C    | B    |      |      |      |      |      |      |
| Approach LOS                  | C    | C    | B    | C    | B    |      |      |      |      |      |      |
| Assigned Phs                  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |
| Phs Duration (G+Y+Rc), s      | 12.1 | 7.1  | 24.2 | 15.1 |      |      |      |      |      |      |      |
| Change Period (Y+Rc), s       | 4.0  | 4.0  | 4.0  | 4.0  |      |      |      |      |      |      |      |
| Max Green Setting (Gmax) s    | 11.0 | 11.0 | 31.0 | 21.0 |      |      |      |      |      |      |      |
| Max O Clear Time (g.c+17A), s | 7.8  | 3.8  | 4.0  | 9.5  |      |      |      |      |      |      |      |
| Green Ext Time (p.c), s       | 0.4  | 0.2  | 0.6  | 1.7  |      |      |      |      |      |      |      |

Intersection Summary  
 HCM 2010 Ctrl Delay 16.9  
 HCM 2010 LOS B  
 Notes  
 User approved pedestrian interval to be less than phase max green.

HCM 2010 TWSC  
 4. Northpoint Parkway & New Street

10/22/2018

| Intersection             | EBL    | EBT    | WBL    | WBT    | WBR   | NBL   | NBT | NBR | SBL | SBT | SBR |
|--------------------------|--------|--------|--------|--------|-------|-------|-----|-----|-----|-----|-----|
| Int Delay, s/veh         | 4.7    |        |        |        |       |       |     |     |     |     |     |
| Movement                 | ↔      | ↔      | ↔      | ↔      | ↔     | ↔     | ↔   | ↔   | ↔   | ↔   | ↔   |
| Lane Configurations      | ↔      | ↔      | ↔      | ↔      | ↔     | ↔     | ↔   | ↔   | ↔   | ↔   | ↔   |
| Traffic Vol, veh/h       | 110    | 175    | 297    | 25     | 20    | 200   |     |     |     |     |     |
| Future Vol, veh/h        | 110    | 175    | 297    | 25     | 20    | 200   |     |     |     |     |     |
| Conflicting Peds, #/hr   | 0      | 0      | 0      | 0      | 0     | 0     |     |     |     |     |     |
| Sign Control             | Free   | Free   | Free   | Free   | Free  | Free  |     |     |     |     |     |
| RT Channelized           | -      | None   | -      | None   | -     | None  |     |     |     |     |     |
| Storage Length           | 100    | -      | -      | -      | -     | -     |     |     |     |     |     |
| Veh in Median Storage, # | -      | 0      | -      | 0      | -     | 0     |     |     |     |     |     |
| Grade, %                 | -      | 0      | -      | 0      | -     | 0     |     |     |     |     |     |
| Peak Hour Factor         | 95     | 95     | 95     | 95     | 95    | 95    |     |     |     |     |     |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2      | 2     | 2     |     |     |     |     |     |
| Mvmt Flow                | 116    | 184    | 313    | 26     | 21    | 211   |     |     |     |     |     |
| Major/Minor              | Major1 | Major2 | Major2 | Minor2 |       |       |     |     |     |     |     |
| Conflicting Flow All     | 339    | 0      | -      | 0      | 742   | 326   |     |     |     |     |     |
| Stage 1                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Stage 2                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Critical Hdwy            | 4.12   | -      | -      | -      | 6.42  | 6.22  |     |     |     |     |     |
| Critical Hdwy Stg 1      | -      | -      | -      | -      | 5.42  | -     |     |     |     |     |     |
| Critical Hdwy Stg 2      | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Follow-up Hdwy           | 2.218  | -      | -      | -      | 3.518 | 3.318 |     |     |     |     |     |
| Pl Cap-1 Maneuver        | 1220   | -      | -      | -      | 383   | 715   |     |     |     |     |     |
| Stage 1                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Stage 2                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Platoon blocked, %       | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Mov Cap-1 Maneuver       | 1220   | -      | -      | -      | 347   | 715   |     |     |     |     |     |
| Mov Cap-2 Maneuver       | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Stage 1                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Stage 2                  | -      | -      | -      | -      | -     | -     |     |     |     |     |     |
| Approach                 | EB     | WB     | WB     | SB     |       |       |     |     |     |     |     |
| HCM Control Delay, s     | 3.2    | 0      | 0      | 13.5   |       |       |     |     |     |     |     |
| HCM LOS                  | B      |        |        | B      |       |       |     |     |     |     |     |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBL    | WBR    | SBL   | SBT   |     |     |     |     |     |
| Capacity (veh/h)         | 1220   | -      | -      | -      | 652   |       |     |     |     |     |     |
| HCM Lane V/C Ratio       | 0.095  | -      | -      | -      | 0.355 |       |     |     |     |     |     |
| HCM Control Delay (s)    | 8.3    | -      | -      | -      | 13.5  |       |     |     |     |     |     |
| HCM Lane LOS             | A      | -      | -      | -      | B     |       |     |     |     |     |     |
| HCM 95th %ile Q(veh)     | 0.3    | -      | -      | -      | 1.6   |       |     |     |     |     |     |

Dutton Meadows Phase 2  
 AM Future - Proposed  
 Synchro 10 Report  
 W-Trans

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|-------|------|------|------|------|
| Lane Configurations         | ←    | ←     | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)      | 549  | 315   | 273  | 521  | 332  | 262  |
| Future Volume (veh/h)       | 549  | 315   | 273  | 521  | 332  | 262  |
| Number                      | 5    | 2     | 12   | 1    | 6    | 3    |
| Initial O (Ob.) veh         | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |
| Adj Sat Flow, veh/h/ln      | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 549  | 307   | 273  | 521  | 332  | 242  |
| Adj No. of Lanes            | 1    | 1     | 1    | 1    | 1    | 1    |
| Peak Hour Factor            | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %        | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap. veh/h                  | 717  | 596   | 332  | 1189 | 429  | 679  |
| Arrive On Green             | 0.39 | 0.39  | 0.19 | 0.64 | 0.24 | 0.24 |
| Sat Flow, veh/h             | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(V), veh/h        | 549  | 307   | 273  | 521  | 332  | 242  |
| Grp Sat Flow(s), veh/h/ln   | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| O.Saves(g.s) s              | 14.1 | 8.3   | 8.1  | 7.7  | 9.6  | 0.0  |
| Cycle O Clear(g.o.) s       | 14.1 | 8.3   | 8.1  | 7.7  | 9.6  | 0.0  |
| Prop In Lane                | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 717  | 596   | 332  | 1189 | 429  | 679  |
| V/C Ratio(X)                | 0.77 | 0.51  | 0.82 | 0.44 | 0.77 | 0.36 |
| Avail Cap(c.a), veh/h       | 1372 | 1141  | 744  | 2255 | 873  | 1076 |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 14.7 | 12.9  | 21.4 | 5.0  | 19.4 | 10.6 |
| Incr Delay (d2), s/veh      | 1.7  | 0.7   | 2.0  | 0.3  | 3.0  | 0.3  |
| Initial O Delay(i3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 7.5  | 3.6   | 4.1  | 4.0  | 5.0  | 2.5  |
| LnGrp Delay(d), s/veh       | 16.4 | 13.6  | 23.4 | 5.2  | 22.4 | 10.9 |
| LnGrp LOS                   | B    | B     | C    | A    | C    | B    |
| Approach Vol, veh/h         | 856  |       |      | 794  |      | 574  |
| Approach Delay, s/veh       | 15.4 |       |      | 11.5 |      | 17.6 |
| Approach LOS                | B    |       |      | B    |      | B    |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2     | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s    | 13.9 | 24.7  |      |      |      | 38.6 |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      | 3.0  |
| Max Green Setting (Gmax), s | 23.0 | * 4.0 |      |      |      | 66.4 |
| Max O Clear Time (g.c+1), s | 10.1 | 16.1  |      |      |      | 9.7  |
| Green Ext Time (p.c), s     | 0.3  | 5.0   |      |      |      | 3.9  |
| Intersection Summary        |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay         | 14.6 |       |      |      |      |      |
| HCM 2010 LOS                | B    |       |      |      |      |      |

Notes  
 \* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 2. Dutton Ave & Hearn Ave

| Movement                    | EBL  | EBT  | WBL  | WBR  | NBL  | NBR  |
|-----------------------------|------|------|------|------|------|------|
| Lane Configurations         | ←    | ←    | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)      | 39   | 709  | 20   | 388  | 680  | 204  |
| Future Volume (veh/h)       | 39   | 709  | 20   | 388  | 680  | 204  |
| Number                      | 5    | 2    | 12   | 1    | 6    | 3    |
| Initial O (Ob.) veh         | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 |
| Parking Bus, Adj            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln      | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 39   | 709  | 20   | 388  | 680  | 196  |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    |
| Peak Hour Factor            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %        | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                  | 77   | 936  | 26   | 415  | 851  | 689  |
| Arrive On Green             | 0.04 | 0.27 | 0.23 | 0.46 | 0.04 | 0.23 |
| Sat Flow, veh/h             | 1774 | 3511 | 99   | 1774 | 1863 | 1508 |
| Grp Volume(V), veh/h        | 39   | 357  | 372  | 388  | 680  | 196  |
| Grp Sat Flow(s), veh/h/ln   | 1774 | 1770 | 1840 | 1774 | 1863 | 1508 |
| O.Saves(g.s) s              | 2.5  | 21.1 | 21.2 | 24.4 | 35.6 | 9.2  |
| Cycle O Clear(g.o.) s       | 2.5  | 21.1 | 21.2 | 24.4 | 35.6 | 9.2  |
| Prop In Lane                | 1.00 | 0.05 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 77   | 472  | 491  | 415  | 851  | 689  |
| V/C Ratio(X)                | 0.50 | 0.76 | 0.76 | 0.93 | 0.80 | 0.28 |
| Avail Cap(c.a), veh/h       | 110  | 472  | 491  | 436  | 851  | 689  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 38.4 | 38.4 | 42.8 | 26.5 | 19.3 | 53.8 |
| Incr Delay (d2), s/veh      | 3.8  | 8.3  | 8.0  | 26.9 | 7.7  | 1.0  |
| Initial O Delay(i3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 11.4 | 11.8 | 15.1 | 20.2 | 4.1  | 0.9  |
| LnGrp Delay(d), s/veh       | 57.1 | 46.7 | 46.5 | 69.7 | 34.2 | 58.4 |
| LnGrp LOS                   | E    | D    | D    | E    | C    | C    |
| Approach Vol, veh/h         | 768  |      |      | 1264 |      | 679  |
| Approach Delay, s/veh       | 47.1 |      |      | 43.0 |      | 51.1 |
| Approach LOS                | D    |      |      | D    |      | D    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s    | 30.7 | 34.4 | 7.6  | 41.3 | 9.0  | 56.1 |
| Change Period (Y+Rc), s     | 4.0  | 3.5  | 3.5  | 4.0  | 4.0  | 3.5  |
| Max Green Setting (Gmax), s | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 |
| Max O Clear Time (g.c+1), s | 23.2 | 3.8  | 16.7 | 4.5  | 37.6 | 16.1 |
| Green Ext Time (p.c), s     | 0.2  | 1.9  | 0.0  | 1.7  | 0.0  | 4.2  |
| Intersection Summary        |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 46.7 |      |      |      |      |      |
| HCM 2010 LOS                | D    |      |      |      |      |      |

Notes  
 \* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.



| Movement                      | EBL  | EBT  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations           | 8    | 0    | 4    | 120  | 0    | 445  | 0    | 150  | 50   | 460  | 130  |
| Traffic Volume (veh/h)        | 8    | 0    | 4    | 120  | 0    | 445  | 0    | 150  | 50   | 460  | 130  |
| Future Volume (veh/h)         | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    |
| Number                        | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Initial Q (Obs.) veh          | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Peak-Bike Adj(A_pb1)          | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/h           | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h          | 8    | 0    | 4    | 120  | 0    | 445  | 0    | 150  | 50   | 460  | 130  |
| Adj No. of Lanes              | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    | 1    | 0    |
| 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 |
| Percent Heavy Veh. %          | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                    | 22   | 0    | 20   | 411  | 0    | 780  | 0    | 211  | 70   | 675  | 937  |
| Arrive On Green               | 0.01 | 0.00 | 0.01 | 0.23 | 0.00 | 0.23 | 0.00 | 0.16 | 0.16 | 0.26 | 0.50 |
| Sat Flow, veh/h               | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1338 | 446  | 1774 | 1863 |
| Grp Volume(V), veh/h          | 8    | 0    | 4    | 120  | 0    | 445  | 0    | 200  | 460  | 130  | 0    |
| Grp Sat Flow(s), veh/h/m/1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 0    | 1784 | 1774 | 1863 | 0    |
| Q Serve(g.s)                  | 0.2  | 0.0  | 0.1  | 2.6  | 0.0  | 9.4  | 0.0  | 0.0  | 5.0  | 9.0  | 1.8  |
| Cycle Q Clear(g.c), s         | 0.2  | 0.0  | 0.1  | 2.6  | 0.0  | 9.4  | 0.0  | 0.0  | 5.0  | 9.0  | 1.8  |
| Prop In Lane                  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.25 | 1.00 | 0.00 | 0.00 |
| Lane Grp Cap(c), veh/h        | 22   | 0    | 20   | 411  | 0    | 780  | 0    | 282  | 675  | 937  | 0    |
| V/C Ratio(X)                  | 0.37 | 0.00 | 0.20 | 0.29 | 0.00 | 0.57 | 0.00 | 0.71 | 0.68 | 0.14 | 0.00 |
| Avail Cap(c), veh/h           | 187  | 0    | 167  | 411  | 0    | 780  | 0    | 526  | 1483 | 2041 | 0    |
| HCM Platoon Ratio             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)            | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh      | 23.3 | 0.0  | 23.2 | 15.0 | 0.0  | 8.5  | 0.0  | 19.0 | 10.1 | 6.3  | 0.0  |
| Incr Delay (d2), s/veh        | 9.9  | 0.0  | 5.1  | 0.4  | 0.0  | 1.0  | 0.0  | 0.0  | 3.3  | 1.2  | 0.1  |
| Initial Q Delay(d3), s/veh    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%),veh/m/2      | 0.0  | 0.1  | 1.3  | 0.0  | 4.3  | 0.0  | 0.0  | 2.7  | 4.4  | 0.9  | 0.0  |
| LnGrp Delay(d),s/veh          | 33.2 | 0.0  | 28.3 | 15.4 | 0.0  | 9.5  | 0.0  | 22.3 | 11.3 | 6.4  | 0.0  |
| LnGrp LOS                     | C    | C    | C    | B    | A    | A    | C    | C    | B    | A    | A    |
| Approach Vol, veh/h           | 12   |      |      | 565  |      |      | 200  |      |      | 590  |      |
| Approach Delay, s/veh         | 31.5 |      |      | 10.7 |      |      | 22.3 |      |      | 10.2 |      |
| Approach LOS                  | C    |      |      | B    |      |      | C    |      |      | B    |      |
| Timer                         | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |
| Assigned Phs                  | 1    | 2    |      | 4    |      | 6    |      | 8    |      |      |      |
| Phs Duration (G+Y+R), s       | 11.5 |      |      | 4.6  |      | 27.9 |      | 15.0 |      |      |      |
| Change Period (Y+R), s        | 4.0  |      |      | 4.0  |      | 4.0  |      | 4.0  |      |      |      |
| Max Green Setting (Gmax), s   | 14.0 |      |      | 5.0  |      | 52.0 |      | 11.0 |      |      |      |
| Max O Clear Time (g.c+III), s | 7.0  |      |      | 2.2  |      | 3.8  |      | 11.4 |      |      |      |
| Green Ext Time (g.c), s       | 1.4  |      |      | 0.0  |      | 0.7  |      | 0.0  |      |      |      |

| Intersection Summary   | EBL | EBT | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| HCM 2010 Ctrl Delay  |     |     |     |     |     |     |     |     |     |     |     |
| HCM 2010 LOS   |     |     |     |     |     |     |     |     |     |     |     |
| Notes  |     |     |     |     |     |     |     |     |     |     |     |
| User approved pedestrian interval to be less than phase max green. |     |     |     |     |     |     |     |     |     |     |     |

| Intersection             | EBL    | EBT    | WBL    | WBT    | WBR    | NBL    | NBT    | NBR    | SBL    | SBT    | SBR    |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Int Delay, s/veh         | 2.9    |        |        |        |        |        |        |        |        |        |        |
| Movement                 | EBL    | EBT    | WBL    | WBT    | WBR    | NBL    | NBT    | NBR    | SBL    | SBT    | SBR    |
| Lane Configurations      | 8      | 0      | 4      | 120    | 0      | 445    | 0      | 150    | 50     | 460    | 130    |
| Traffic Vol, veh/h       | 90     | 420    | 420    | 420    | 25     | 15     | 145    |        |        |        |        |
| Future Vol, veh/h        | 90     | 420    | 420    | 420    | 25     | 15     | 145    |        |        |        |        |
| Conflicting Peds, #/hr   | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Sign Control             | Free   | Free   | Free   | Free   | Free   | Free   | Free   | Free   | Free   | Free   | Free   |
| RT Channelized           | -      | None   | -      | None   | -      | None   | -      | None   | -      | None   | -      |
| Storage Length           | 100    | -      | 0      | -      | 0      | -      | 0      | -      | 0      | -      | 0      |
| Veh in Median Storage, # | -      | 0      | -      | 0      | -      | 0      | -      | 0      | -      | 0      | -      |
| Grade, %                 | -      | 0      | -      | 0      | -      | 0      | -      | 0      | -      | 0      | -      |
| Peak Hour Factor         | 95     | 95     | 95     | 95     | 95     | 95     | 95     | 95     | 95     | 95     | 95     |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      |
| Mvmt Flow                | 95     | 442    | 442    | 442    | 26     | 16     | 153    |        |        |        |        |
| Major/Minor              | Major1 | Major2 | Major2 | Major2 | Minor2 | Minor2 | Minor2 | Minor2 | Minor2 | Minor2 | Minor2 |
| Conflicting Flow All     | 468    | 0      | -      | 0      | 1087   | 455    |        |        |        |        |        |
| Stage 1                  | -      | -      | -      | -      | 455    | -      |        |        |        |        |        |
| Stage 2                  | -      | -      | -      | -      | 632    | -      |        |        |        |        |        |
| Critical Hdwy            | 4.12   | -      | -      | -      | 6.42   | 6.22   |        |        |        |        |        |
| Critical Hdwy Stg 1      | -      | -      | -      | -      | 5.42   | -      |        |        |        |        |        |
| Critical Hdwy Stg 2      | -      | -      | -      | -      | 3.518  | 3.318  |        |        |        |        |        |
| Follow-up Hdwy           | 2.218  | -      | -      | -      | 239    | 605    |        |        |        |        |        |
| Pl Cap-1 Maneuver        | 1094   | -      | -      | -      | 639    | -      |        |        |        |        |        |
| Stage 1                  | -      | -      | -      | -      | 530    | -      |        |        |        |        |        |
| Stage 2                  | -      | -      | -      | -      | 218    | 605    |        |        |        |        |        |
| Platoon blocked, %       | -      | -      | -      | -      | 218    | 605    |        |        |        |        |        |
| Mov Cap-1 Maneuver       | 1094   | -      | -      | -      | 218    | 605    |        |        |        |        |        |
| Mov Cap-2 Maneuver       | -      | -      | -      | -      | 583    | -      |        |        |        |        |        |
| Stage 1                  | -      | -      | -      | -      | 530    | -      |        |        |        |        |        |
| Stage 2                  | -      | -      | -      | -      | 15.2   | C      |        |        |        |        |        |
| Approach                 | EB     | WB     | WB     | SB     |        |        |        |        |        |        |        |
| HCM Control Delay, s     | 1.5    | 0      | 0      | 15.2   |        |        |        |        |        |        |        |
| HCM LOS                  |        |        |        | C      |        |        |        |        |        |        |        |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBL    | WBR    | SBLn1  |        |        |        |        |        |        |
| Capacity (veh/h)         | 1094   | -      | -      | -      | 519    |        |        |        |        |        |        |
| HCM Lane V/C Ratio       | 0.087  | -      | -      | -      | 0.325  |        |        |        |        |        |        |
| HCM Control Delay (s)    | 8.6    | -      | -      | -      | 15.2   |        |        |        |        |        |        |
| HCM Lane LOS             | A      | -      | -      | -      | C      |        |        |        |        |        |        |
| HCM 95th %tile Q(veh)    | 0.3    | -      | -      | -      | 1.4    |        |        |        |        |        |        |



10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 1.: Dutton Meadow & Hearn Ave

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|-------|------|------|------|------|
| Lane Configurations         | 478  | 83    | 313  | 398  | 107  | 433  |
| Traffic Volume (veh/h)      | 478  | 83    | 313  | 398  | 107  | 433  |
| Future Volume (veh/h)       | 2    | 12    | 1    | 6    | 3    | 18   |
| Number                      | 0    | 0     | 0    | 0    | 0    | 0    |
| Initial Q (Ob), veh         | 0.98 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped-Bike Adj(A_pbT)         | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj            | 1863 | 1900  | 1863 | 1863 | 1863 | 1863 |
| Adj Sat Flow, veh/hln       | 520  | 81    | 340  | 433  | 116  | 449  |
| Adj Flow Rate, veh/h        | 1    | 0     | 1    | 1    | 1    | 1    |
| Adj No. of Lanes            | 0.92 | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 |
| Peak Hour Factor            | 642  | 100   | 408  | 1331 | 261  | 597  |
| Cap. veh/h                  | 0.41 | 0.41  | 0.23 | 0.71 | 0.15 | 0.15 |
| Arrive On Green             | 1569 | 244   | 1774 | 1863 | 1774 | 1583 |
| Sat Flow, veh/h             | 0    | 601   | 340  | 433  | 116  | 449  |
| Grp Volume(v), veh/h        | 0    | 1813  | 1774 | 1863 | 1774 | 1583 |
| Grp Sat Flow(s), veh/hln    | 0.0  | 14.0  | 8.7  | 4.1  | 2.8  | 0.8  |
| Q_Serv(g.s), s              | 0.0  | 14.0  | 8.7  | 4.1  | 2.8  | 0.8  |
| Cycle Q Clear(g.c), s       | 0.13 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Prop In Lane                | 0    | 741   | 408  | 1331 | 261  | 597  |
| Lane Grp Cap(c), veh/h      | 0.00 | 0.81  | 0.83 | 0.33 | 0.45 | 0.75 |
| V/C Ratio(X)                | 0    | 1142  | 745  | 1331 | 931  | 1195 |
| Avail Cap(c.a), veh/h       | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| HCM Platoon Ratio           | 0.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 0.0  | 12.4  | 17.5 | 2.5  | 18.5 | 12.9 |
| Uniform Delay (d), s/veh    | 0.0  | 2.6   | 1.7  | 0.1  | 1.2  | 1.9  |
| Incr Delay (d2), s/veh      | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Initial Q Delay(d3), s/veh  | 0.0  | 7.4   | 4.4  | 2.1  | 1.5  | 5.3  |
| %ile Back(Q)(50%), veh/hln  | 0.0  | 15.0  | 19.2 | 2.7  | 19.7 | 14.9 |
| LnGrp Delay(d), s/veh       | 601  | 773   | 565  |      |      |      |
| LnGrp LOS                   | B    | A     | B    | A    | B    | B    |
| Approach Vol, veh/h         | 15.0 | 9.9   | 15.9 |      |      |      |
| Approach Delay, s/veh       |      |       |      |      |      |      |
| Approach LOS                |      |       |      |      |      |      |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2     | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s    | 14.6 | 23.1  |      |      | 37.6 | 10.0 |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      | 3.6  | 3.0  |
| Max Green Setting (Gmax), s | 20.0 | * 30  |      |      | 30.0 | 25.0 |
| Max Q Clear Time (g.c+H), s | 107  | 160   |      |      | 4.8  | 1.9  |
| Green Ext Time (p.c), s     | 0.4  | 3.5   |      |      | 2.8  | 1.9  |
| Intersection Summary        |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay         |      |       |      |      |      |      |
| HCM 2010 LOS                |      |       |      |      |      |      |
| Notes                       |      |       |      |      |      |      |

Dutton Meadows Phase 2  
 AM Existing plus Project - Proposed  
 Synchro 10 Report

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 2.: Hearn Ave & Dutton Ave

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 117  | 750  | 0    | 0    | 545  | 243  | 0    | 0    | 301  | 0    | 114  |
| Traffic Volume (veh/h)      | 117  | 750  | 0    | 0    | 545  | 243  | 0    | 0    | 301  | 0    | 114  |
| Future Volume (veh/h)       | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   | 7    | 4    |
| Number                      | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Initial Q (Ob), veh         | 1.00 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 |
| Ped-Bike Adj(A_pbT)         | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Parking Bus, Adj            | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1900 | 1863 | 1863 |
| Adj Sat Flow, veh/hln       | 121  | 773  | 0    | 0    | 562  | 243  | 0    | 0    | 310  | 0    | 75   |
| Adj Flow Rate, veh/h        | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 0    | 1    | 0    | 1    |
| Adj No. of Lanes            | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Peak Hour Factor            | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Percent Heavy Veh, %        | 148  | 1379 | 0    | 0    | 1162 | 1265 | 0    | 2    | 0    | 354  | 0    |
| Cap. veh/h                  | 0.08 | 0.74 | 0.00 | 0.62 | 0.62 | 0.62 | 0.00 | 0.00 | 0.00 | 0.20 | 0.20 |
| Arrive On Green             | 1774 | 1863 | 0    | 0    | 1863 | 1520 | 0    | 1863 | 0    | 1774 | 0    |
| Sat Flow, veh/h             | 121  | 773  | 0    | 0    | 562  | 243  | 0    | 0    | 310  | 0    | 75   |
| Grp Volume(v), veh/h        | 1774 | 1863 | 0    | 0    | 1863 | 1520 | 0    | 1863 | 0    | 1774 | 0    |
| Grp Sat Flow(s), veh/hln    | 7.4  | 20.3 | 0.0  | 0.0  | 17.9 | 3.7  | 0.0  | 0.0  | 18.6 | 0.0  | 4.1  |
| Q_Serv(g.s), s              | 7.4  | 20.3 | 0.0  | 0.0  | 17.9 | 3.7  | 0.0  | 0.0  | 18.6 | 0.0  | 4.1  |
| Cycle Q Clear(g.c), s       | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 |
| Prop In Lane                | 148  | 1379 | 0    | 0    | 1162 | 1265 | 0    | 2    | 0    | 354  | 0    |
| Lane Grp Cap(c), veh/h      | 0.82 | 0.56 | 0.00 | 0.00 | 0.48 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 |
| V/C Ratio(X)                | 200  | 1379 | 0    | 0    | 1162 | 1265 | 0    | 102  | 0    | 419  | 0    |
| Avail Cap(c.a), veh/h       | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| HCM Platoon Ratio           | 0.64 | 0.64 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 49.6 | 6.3  | 0.0  | 0.0  | 11.1 | 2.0  | 0.0  | 0.0  | 0.0  | 42.7 | 0.0  |
| Uniform Delay (d), s/veh    | 8.6  | 1.1  | 0.0  | 0.0  | 1.4  | 0.3  | 0.0  | 0.0  | 0.0  | 16.2 | 0.0  |
| Incr Delay (d2), s/veh      | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Initial Q Delay(d3), s/veh  | 40   | 10.7 | 0.0  | 0.0  | 9.5  | 3.4  | 0.0  | 0.0  | 0.0  | 10.7 | 0.0  |
| %ile Back(Q)(50%), veh/hln  | 58.2 | 7.4  | 0.0  | 0.0  | 12.6 | 2.4  | 0.0  | 0.0  | 0.0  | 58.9 | 0.0  |
| LnGrp Delay(d), s/veh       | E    | A    |      |      | B    | A    |      |      | E    |      | C    |
| LnGrp LOS                   |      |      |      |      |      |      |      |      |      |      |      |
| Approach Vol, veh/h         | 894  |      |      | 805  |      |      | 0    |      | 385  |      |      |
| Approach Delay, s/veh       | 14.3 |      |      | 9.5  |      |      | 0.0  |      | 53.3 |      |      |
| Approach LOS                | B    |      |      | A    |      |      | D    |      |      |      |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |
| Assigned Phs                | 2    |      |      | 4    | 5    | 6    |      | 8    |      |      |      |
| Phs Duration (G+Y+Rc), s    | 85.0 |      |      | 25.0 | 12.8 | 72.2 |      | 0.0  |      |      |      |
| Change Period (Y+Rc), s     | 3.6  |      |      | 3.0  | 3.6  | 3.6  |      | 3.0  |      |      |      |
| Max Green Setting (Gmax), s | 68.4 |      |      | 26.0 | 12.4 | 52.4 |      | 6.0  |      |      |      |
| Max Q Clear Time (g.c+H), s | 22.3 |      |      | 20.6 | 9.4  | 19.9 |      | 0.0  |      |      |      |
| Green Ext Time (p.c), s     | 7.0  |      |      | 1.0  | 0.0  | 5.2  |      | 0.0  |      |      |      |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                |      |      |      |      |      |      |      |      |      |      |      |
| Notes                       |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 AM Existing plus Project - Proposed  
 Synchro 10 Report

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 1: Dutton Meadow & Hearn Ave

| Movement                    | EBT  | EBR   | WBL  | WBR  | NBL  | NBR  | SBL  | SBR |  |
|-----------------------------|------|-------|------|------|------|------|------|-----|--|
| Lane Configurations         | EB   | EB    | WB   | WB   | NB   | NB   | SB   | SB  |  |
| Traffic Volume (veh/h)      | 635  | 346   | 183  | 549  | 272  | 207  | 207  | 207 |  |
| Future Volume (veh/h)       | 635  | 346   | 183  | 549  | 272  | 207  | 207  | 207 |  |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |      |     |  |
| Initial Q (Cb), veh         | 0    | 0     | 0    | 0    | 0    | 0    |      |     |  |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |      |     |  |
| Adj Sat Flow, veh/hln       | 1863 | 1900  | 1863 | 1863 | 1863 | 1863 |      |     |  |
| Adj Flow Rate, veh/h        | 676  | 354   | 195  | 584  | 289  | 188  |      |     |  |
| Adj No. of Lanes            | 1    | 0     | 1    | 1    | 1    | 1    |      |     |  |
| Peak Hour Factor            | 0.94 | 0.94  | 0.94 | 0.94 | 0.94 | 0.94 |      |     |  |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |      |     |  |
| Cap. veh/h                  | 599  | 314   | 239  | 1319 | 358  | 533  |      |     |  |
| Arrive On Green             | 0.52 | 0.52  | 0.13 | 0.71 | 0.20 | 0.20 |      |     |  |
| Sat Flow, veh/h             | 1143 | 599   | 1774 | 1863 | 1774 | 1583 |      |     |  |
| Grp Volume(v), veh/h        | 0    | 1030  | 195  | 584  | 289  | 188  |      |     |  |
| Grp Sat Flow(s),veh/hln     | 0    | 1742  | 1774 | 1863 | 1774 | 1583 |      |     |  |
| Q_Serve(g.s), s             | 0.0  | 38.4  | 7.8  | 9.8  | 11.4 | 0.0  |      |     |  |
| Cycle Q Clear(g.c), s       | 0.0  | 38.4  | 7.8  | 9.8  | 11.4 | 0.0  |      |     |  |
| Prop In Lane                | 0    | 0.34  | 1.00 | 1.00 | 1.00 | 1.00 |      |     |  |
| Lane Grp Cap(c), veh/h      | 0    | 913   | 239  | 1319 | 358  | 533  |      |     |  |
| V/C Ratio(X)                | 0.00 | 1.13  | 0.82 | 0.44 | 0.81 | 0.35 |      |     |  |
| Avail Cap(c.a), veh/h       | 0    | 913   | 654  | 1319 | 775  | 905  |      |     |  |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |      |     |  |
| Upstream Filter(i)          | 0.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |      |     |  |
| Uniform Delay (d), s/veh    | 0.0  | 17.4  | 30.8 | 4.5  | 27.9 | 18.3 |      |     |  |
| Incr Delay (d2), s/veh      | 0.0  | 71.7  | 2.6  | 0.2  | 4.3  | 0.4  |      |     |  |
| Initial Q Delay(d3),s/veh   | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |      |     |  |
| %ile BackOf(50%),veh/hln    | 0.0  | 36.4  | 4.0  | 5.0  | 6.0  | 2.9  |      |     |  |
| LnGrp Delay(d),s/veh        | 0.0  | 89.2  | 33.4 | 4.8  | 32.2 | 18.7 |      |     |  |
| LnGrp LOS                   |      | F     | C    | A    | C    | B    |      |     |  |
| Approach Vol, veh/h         | 1030 |       |      | 779  |      |      | 477  |     |  |
| Approach Delay, s/veh       | 89.2 |       |      | 11.9 |      |      | 26.9 |     |  |
| Approach LOS                | F    |       |      | B    |      |      | C    |     |  |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    | 7    | 8   |  |
| Assigned Phs                | 1    | 2     |      |      |      |      |      |     |  |
| Phs Duration (G+Y+Rc), s    | 13.5 | 42.0  |      |      |      |      |      |     |  |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      |      |      |     |  |
| Max Green Setting (Gmax), s | 27.0 | * 38  |      |      |      |      |      |     |  |
| Max Q Clear Time (g.c+H), s | 9.8  | 40.4  |      |      |      |      |      |     |  |
| Green Ext Time (p.c), s     | 0.2  | 0.0   |      |      |      |      |      |     |  |
| Intersection Summary        | 49.9 |       |      |      |      |      |      |     |  |
| HCM 2010 Ctrl Delay         | D    |       |      |      |      |      |      |     |  |
| HCM 2010 LOS                | D    |       |      |      |      |      |      |     |  |
| Notes                       |      |       |      |      |      |      |      |     |  |

Dutton Meadows Phase II  
 PM Existing plus Project - Proposed  
 Synchro 10 Report

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 3: Dutton Meadow & Eiern School DrW/Northpoint Parkway

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | EB   | EB   | EB   | WB   | WB   | WB   | NB   | NB   | NB   | SB   | SB   | SB   |
| Traffic Volume (veh/h)      | 70   | 0    | 42   | 5    | 0    | 75   | 0    | 438  | 0    | 25   | 301  | 0    |
| Future Volume (veh/h)       | 70   | 0    | 42   | 5    | 0    | 75   | 0    | 438  | 0    | 25   | 301  | 0    |
| Number                      | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial Q (Cb), 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 | 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 |
| Adj Sat Flow, veh/hln       | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 70   | 0    | 42   | 5    | 0    | 75   | 0    | 438  | 0    | 25   | 301  | 0    |
| Adj No. of Lanes            | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    | 1    | 1    | 0    |
| 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  | 0    | 118  | 108  | 0    | 272  | 0    | 582  | 0    | 490  | 993  | 0    |
| Arrive On Green             | 0.07 | 0.00 | 0.07 | 0.06 | 0.00 | 0.06 | 0.00 | 0.31 | 0.00 | 0.11 | 0.53 | 0.00 |
| Sat Flow, veh/h             | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1863 | 0    | 1774 | 1863 | 0    |
| Grp Volume(v), veh/h        | 70   | 0    | 42   | 5    | 0    | 75   | 0    | 438  | 0    | 25   | 301  | 0    |
| Grp Sat Flow(s),veh/hln     | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1863 | 0    | 1774 | 1863 | 0    |
| Q_Serve(g.s), s             | 1.4  | 0.0  | 0.9  | 0.1  | 0.0  | 1.5  | 0.0  | 7.7  | 0.0  | 0.3  | 3.3  | 0.0  |
| Cycle Q Clear(g.c), s       | 1.4  | 0.0  | 0.9  | 0.1  | 0.0  | 1.5  | 0.0  | 7.7  | 0.0  | 0.3  | 3.3  | 0.0  |
| Prop In Lane                | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| Lane Grp Cap(c), veh/h      | 132  | 0    | 118  | 108  | 0    | 272  | 0    | 582  | 0    | 490  | 993  | 0    |
| V/C Ratio(X)                | 0.53 | 0.00 | 0.36 | 0.05 | 0.00 | 0.28 | 0.00 | 0.75 | 0.00 | 0.05 | 0.30 | 0.00 |
| Avail Cap(c.a), veh/h       | 784  | 0    | 699  | 784  | 0    | 874  | 0    | 926  | 0    | 490  | 1337 | 0    |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh    | 16.1 | 0.0  | 15.9 | 16.0 | 0.0  | 13.1 | 0.0  | 11.2 | 0.0  | 6.3  | 4.7  | 0.0  |
| Incr Delay (d2), s/veh      | 3.2  | 0.0  | 1.8  | 0.2  | 0.0  | 0.5  | 0.0  | 2.0  | 0.0  | 0.0  | 0.2  | 0.0  |
| Initial Q Delay(d3),s/veh   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%),veh/hln    | 0.8  | 0.0  | 0.5  | 0.1  | 0.0  | 0.7  | 0.0  | 4.2  | 0.0  | 0.1  | 1.7  | 0.0  |
| LnGrp Delay(d),s/veh        | 19.4 | 0.0  | 17.7 | 16.2 | 0.0  | 13.6 | 0.0  | 13.2 | 0.0  | 6.4  | 4.9  | 0.0  |
| LnGrp LOS                   | B    |      | B    | B    | B    | B    | B    | B    | B    | A    | A    | A    |
| Approach Vol, veh/h         | 112  |      |      | 80   |      |      | 438  |      |      | 326  |      |      |
| Approach Delay, s/veh       | 18.8 |      |      | 13.8 |      |      | 13.2 |      |      | 5.0  |      |      |
| Approach LOS                | B    |      |      | B    |      |      | B    |      |      | A    |      |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    |      |      |      |      |      |      |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 8.0  | 15.3 |      |      |      |      |      |      |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  |      |      |      |      |      |      |      |      |      |      |
| Max Green Setting (Gmax), s | 4.0  | 18.0 |      |      |      |      |      |      |      |      |      |      |
| Max Q Clear Time (g.c+H), s | 2.3  | 9.7  |      |      |      |      |      |      |      |      |      |      |
| Green Ext Time (p.c), s     | 0.0  | 1.7  |      |      |      |      |      |      |      |      |      |      |
| Intersection Summary        | 11.1 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | B    |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |
| Notes                       |      |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 AM Existing plus Project - Proposed  
 Synchro 10 Report



1. Northpoint Parkway & Hearn Ave

10/18/2018

2. Dutton Ave & Hearn Ave

10/18/2018

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|-------|------|------|------|------|
| Lane Configurations         | ↑    | ↑     | ↑    | ↑    | ↑    | ↑    |
| Traffic Volume (veh/h)      | 541  | 222   | 145  | 445  | 310  | 229  |
| Future Volume (veh/h)       | 541  | 222   | 145  | 445  | 310  | 229  |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |
| Initial Q (Cb), veh         | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |
| Adj Sat Flow, veh/hln       | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 541  | 214   | 145  | 445  | 310  | 209  |
| Adj No. of Lanes            | 1    | 1     | 1    | 1    | 1    | 1    |
| Peak Hour Factor            | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap. veh/h                  | 744  | 618   | 233  | 1139 | 427  | 588  |
| Arrive On Green             | 0.40 | 0.40  | 0.13 | 0.61 | 0.24 | 0.24 |
| Sat Flow, veh/h             | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(v), veh/h        | 541  | 214   | 145  | 445  | 310  | 209  |
| Grp Sat Flow(s), veh/hln    | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Q_Serve(g.s), s             | 10.9 | 4.3   | 3.4  | 5.4  | 7.2  | 0.0  |
| Cycle Q Clear(g.c), s       | 10.9 | 4.3   | 3.4  | 5.4  | 7.2  | 0.0  |
| Prop In Lane                | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 744  | 618   | 233  | 1139 | 427  | 588  |
| V/C Ratio(X)                | 0.73 | 0.35  | 0.62 | 0.39 | 0.73 | 0.36 |
| Avail Cap(c.a), veh/h       | 1984 | 1649  | 598  | 2737 | 1116 | 1204 |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 11.3 | 9.3   | 18.3 | 4.4  | 15.6 | 10.1 |
| Incr Delay (d2), s/veh      | 1.4  | 0.3   | 1.0  | 0.2  | 2.4  | 0.4  |
| Initial Q Delay(Q3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/hln  | 5.8  | 1.8   | 1.8  | 2.8  | 3.7  | 1.9  |
| LnGrp Delay(d), s/veh       | 12.7 | 9.7   | 19.3 | 4.6  | 17.9 | 10.5 |
| LnGrp LOS                   | B    | A     | B    | A    | B    | B    |
| Approach Vol, veh/h         | 755  |       | 590  | 519  |      |      |
| Approach Delay, s/veh       | 11.8 |       | 8.2  | 14.9 |      |      |
| Approach LOS                | B    |       | A    | B    |      |      |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2     | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s    | 9.4  | 21.4  |      |      |      |      |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      |      |
| Max Green Setting (Gmax), s | 15.0 | * 4.7 |      |      |      |      |
| Max Q Clear Time (g.c+H), s | 5.4  | 12.9  |      |      |      |      |
| Green Ext Time (p.c), s     | 0.1  | 4.8   |      |      |      |      |
| Intersection Summary        |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay         | 11.6 |       |      |      |      |      |
| HCM 2010 LOS                | B    |       |      |      |      |      |
| Notes                       |      |       |      |      |      |      |

Dutton Meadows Phase 2  
AM Future plus Project - Planned

Synchro 10 Report

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | NBL  | NBT  | NBR  | SBL  | SBT   | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|-------|------|
| Lane Configurations         | ↑    | ↑    | ↑    | ↑    | ↑    | ↑    | ↑    | ↑    | ↑    | ↑     | ↑    |
| Traffic Volume (veh/h)      | 88   | 690  | 20   | 432  | 506  | 182  | 20   | 195  | 384  | 269   | 191  |
| Future Volume (veh/h)       | 88   | 690  | 20   | 432  | 506  | 182  | 20   | 195  | 384  | 269   | 191  |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   | 7     | 4    |
| Initial Q (Cb), veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 0.96 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  | 0.96 |
| 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 |
| Adj Sat Flow, veh/hln       | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863  | 1900 |
| Adj Flow Rate, veh/h        | 88   | 690  | 20   | 432  | 506  | 174  | 20   | 195  | 384  | 269   | 191  |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1     | 1    |
| 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 |
| Percent Heavy Veh, %        | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2     | 2    |
| Cap. veh/h                  | 110  | 957  | 28   | 436  | 850  | 688  | 51   | 382  | 714  | 257   | 591  |
| Arrive On Green             | 0.06 | 0.27 | 0.27 | 0.25 | 0.46 | 0.46 | 0.03 | 0.21 | 0.21 | 0.14  | 0.32 |
| Sat Flow, veh/h             | 1774 | 3508 | 102  | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774  | 1839 |
| Grp Volume(v), veh/h        | 88   | 348  | 362  | 432  | 506  | 174  | 20   | 195  | 384  | 269   | 0    |
| Grp Sat Flow(s), veh/hln    | 1774 | 1770 | 1840 | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774  | 0    |
| Q_Serve(g.s), s             | 5.6  | 20.3 | 20.3 | 27.7 | 23.1 | 8.1  | 1.3  | 10.6 | 20.0 | 16.5  | 0.0  |
| Cycle Q Clear(g.c), s       | 5.6  | 20.3 | 20.3 | 27.7 | 23.1 | 8.1  | 1.3  | 10.6 | 20.0 | 16.5  | 0.0  |
| Prop In Lane                | 1.00 | 1.00 | 0.06 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  | 0.01 |
| Lane Grp Cap(c), veh/h      | 110  | 483  | 502  | 436  | 850  | 688  | 51   | 382  | 714  | 257   | 0    |
| V/C Ratio(X)                | 0.80 | 0.72 | 0.72 | 0.99 | 0.60 | 0.25 | 0.39 | 0.51 | 0.54 | 0.05  | 0.00 |
| Avail Cap(c.a), veh/h       | 110  | 483  | 502  | 436  | 850  | 688  | 109  | 433  | 757  | 257   | 0    |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  | 1.00 |
| Upstream Filter(i)          | 0.79 | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  | 1.00 |
| Uniform Delay (d), s/veh    | 52.7 | 37.5 | 37.5 | 42.9 | 23.2 | 19.1 | 54.4 | 40.2 | 22.7 | 48.8  | 0.0  |
| Incr Delay (d2), s/veh      | 26.6 | 7.2  | 7.0  | 40.8 | 3.1  | 0.9  | 4.8  | 1.1  | 0.7  | 69.2  | 0.0  |
| Initial Q Delay(Q3), s/veh  | 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/hln  | 3.6  | 10.9 | 11.3 | 18.5 | 12.5 | 3.5  | 0.7  | 5.6  | 8.8  | 13.0  | 0.0  |
| LnGrp Delay(d), s/veh       | 79.3 | 44.7 | 44.5 | 83.6 | 26.2 | 19.9 | 59.2 | 41.3 | 23.4 | 117.9 | 0.0  |
| LnGrp LOS                   | E    | D    | D    | F    | C    | B    | E    | D    | C    | F     | C    |
| Approach Vol, veh/h         | 798  |      |      | 1112 |      |      | 599  |      |      | 462   |      |
| Approach Delay, s/veh       | 48.4 |      |      | 47.5 |      |      | 30.4 |      |      | 81.0  |      |
| Approach LOS                | D    |      |      | D    |      |      | C    |      |      | F     |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |       |      |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |       |      |
| Phs Duration (G+Y+Rc), s    | 32.0 | 35.1 | 6.8  | 40.1 | 11.1 | 56.0 | 20.0 | 26.9 |      |       |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 3.5  | 3.5  | 4.0  | 4.0  | 3.5  | 3.5  |      |       |      |
| Max Green Setting (Gmax), s | 28.0 | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 | 26.5 |      |       |      |
| Max Q Clear Time (g.c+H), s | 29.7 | 22.3 | 3.3  | 11.0 | 7.6  | 25.1 | 18.5 | 22.0 |      |       |      |
| Green Ext Time (p.c), s     | 0.0  | 2.1  | 0.0  | 1.1  | 0.0  | 4.1  | 0.0  | 1.1  |      |       |      |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |       |      |
| HCM 2010 Ctrl Delay         | 49.5 |      |      |      |      |      |      |      |      |       |      |
| HCM 2010 LOS                | D    |      |      |      |      |      |      |      |      |       |      |

Dutton Meadows Phase 2  
AM Future plus Project - Planned

Synchro 10 Report

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 3. Northpoint Parkway & Dutton Meadow

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)      | 180  | 30   | 25   | 25   | 130  | 82   | 25   | 272  | 27   | 84   | 150  | 130  |
| Future Volume (veh/h)       | 180  | 30   | 25   | 25   | 130  | 82   | 25   | 272  | 27   | 84   | 150  | 130  |
| Number                      | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial Q (Cb), 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 | 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 |
| Adj Sat Flow, veh/hln       | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 180  | 30   | 25   | 25   | 130  | 82   | 25   | 272  | 27   | 84   | 150  | 130  |
| Adj No. of Lanes            | 0    | 1    | 1    | 0    | 1    | 1    | 1    | 1    | 0    | 1    | 1    | 1    |
| 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                  | 255  | 43   | 264  | 41   | 211  | 310  | 416  | 427  | 42   | 397  | 204  | 177  |
| Arrive On Green             | 0.17 | 0.17 | 0.17 | 0.14 | 0.14 | 0.14 | 0.09 | 0.26 | 0.26 | 0.06 | 0.22 | 0.22 |
| Sat Flow, veh/h             | 1531 | 255  | 1583 | 298  | 1550 | 1583 | 1774 | 1668 | 166  | 1774 | 922  | 799  |
| Grp Volume(V), veh/h        | 210  | 0    | 25   | 155  | 0    | 82   | 25   | 0    | 299  | 84   | 0    | 280  |
| Grp Sat Flow(s), veh/hln    | 1786 | 0    | 1583 | 1848 | 0    | 1583 | 1774 | 0    | 1834 | 1774 | 0    | 1722 |
| Q_Serve(g.s), s             | 4.7  | 0.0  | 0.6  | 3.3  | 0.0  | 1.8  | 0.4  | 0.0  | 6.1  | 1.5  | 0.0  | 6.3  |
| Cycle Q Clear(g.c), s       | 4.7  | 0.0  | 0.6  | 3.3  | 0.0  | 1.8  | 0.4  | 0.0  | 6.1  | 1.5  | 0.0  | 6.3  |
| Prop In Lane                | 0.86 | 1.00 | 0.16 | 1.00 | 1.00 | 1.00 | 1.00 | 0.09 | 1.00 | 0.46 | 1.00 | 0.46 |
| Lane Grp Cap(c), veh/h      | 298  | 0    | 264  | 251  | 0    | 310  | 416  | 0    | 470  | 397  | 0    | 381  |
| V/C Ratio(X)                | 0.71 | 0.00 | 0.09 | 0.62 | 0.00 | 0.26 | 0.06 | 0.00 | 0.64 | 0.21 | 0.00 | 0.74 |
| Avail Cap(c.a), veh/h       | 682  | 0    | 604  | 705  | 0    | 698  | 925  | 0    | 1181 | 503  | 0    | 657  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh    | 16.5 | 0.0  | 14.8 | 17.1 | 0.0  | 14.3 | 10.4 | 0.0  | 13.9 | 11.7 | 0.0  | 15.2 |
| Incr Delay (d2), s/veh      | 3.1  | 0.0  | 0.2  | 2.5  | 0.0  | 0.5  | 0.1  | 0.0  | 1.4  | 0.3  | 0.0  | 2.8  |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 2.5  | 0.0  | 0.3  | 1.9  | 0.0  | 0.8  | 0.2  | 0.0  | 3.3  | 0.7  | 0.0  | 3.2  |
| LnGrp Delay(d), s/veh       | 19.6 | 0.0  | 14.9 | 19.5 | 0.0  | 14.8 | 10.5 | 0.0  | 15.3 | 11.9 | 0.0  | 18.0 |
| LnGrp LOS                   | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Approach Vol, veh/h         | 235  |      |      | 237  |      |      | 324  |      |      |      | 364  |      |
| Approach Delay, s/veh       | 19.1 |      |      | 17.9 |      |      | 14.9 |      |      |      | 16.6 |      |
| Approach LOS                | B    |      |      | B    |      |      | B    |      |      |      | B    |      |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    |      | 4    | 5    | 6    |      | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 6.5  | 14.7 |      | 11.0 | 8.0  | 13.3 |      | 9.7  |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  |      | 4.0  | 4.0  | 4.0  |      | 4.0  |      |      |      |      |
| Max Green Setting (Gmax), s | 5.0  | 27.0 |      | 16.0 | 16.0 | 16.0 |      | 16.0 |      |      |      |      |
| Max Q Clear Time (g.c+H), s | 3.5  | 8.1  |      | 6.7  | 2.4  | 8.3  |      | 5.3  |      |      |      |      |
| Green Ext Time (g.c), s     | 0.0  | 1.6  |      | 0.8  | 0.0  | 0.9  |      | 0.8  |      |      |      |      |
| Intersection Summary        |      |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 16.9 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 AM Future plus Project - Planned  
 Synchro 10 Report

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement  | EBT  | EBR  | WBL  | WBT  | NBL  | NBR  |
|---|------|------|------|------|------|------|
| Lane Configurations   | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)  | 541  | 222  | 145  | 445  | 310  | 229  |
| Future Volume (veh/h)   | 541  | 222  | 145  | 445  | 310  | 229  |
| Number  | 2    | 12   | 1    | 6    | 3    | 18   |
| Initial Q (Cb), veh   | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)   | 0.98 | 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 |
| Adj Sat Flow, veh/hln   | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h  | 541  | 214  | 145  | 445  | 310  | 209  |
| Adj No. of Lanes  | 1    | 1    | 1    | 1    | 1    | 1    |
| Peak Hour Factor  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh, %  | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h  | 744  | 618  | 233  | 1139 | 427  | 588  |
| Arrive On Green   | 0.40 | 0.40 | 0.13 | 0.61 | 0.24 | 0.24 |
| Sat Flow, veh/h   | 1863 | 1549 | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(V), veh/h  | 541  | 214  | 145  | 445  | 310  | 209  |
| Grp Sat Flow(s), veh/hln  | 1863 | 1549 | 1774 | 1863 | 1774 | 1583 |
| Q_Serve(g.s), s   | 10.9 | 4.3  | 3.4  | 5.4  | 7.2  | 0.0  |
| Cycle Q Clear(g.c), s   | 10.9 | 4.3  | 3.4  | 5.4  | 7.2  | 0.0  |
| Prop In Lane  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h  | 744  | 618  | 233  | 1139 | 427  | 588  |
| V/C Ratio(X)  | 0.73 | 0.35 | 0.62 | 0.39 | 0.73 | 0.36 |
| Avail Cap(c.a), veh/h   | 1984 | 1649 | 598  | 2737 | 1116 | 1204 |
| HCM Platoon Ratio   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh  | 11.3 | 9.3  | 18.3 | 4.4  | 15.6 | 10.1 |
| Incr Delay (d2), s/veh  | 1.4  | 0.3  | 1.0  | 0.2  | 2.4  | 0.4  |
| Initial Q Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOfQ(50%), veh/ln   | 5.8  | 1.8  | 1.8  | 2.8  | 3.7  | 1.9  |
| LnGrp Delay(d), s/veh   | 12.7 | 9.7  | 19.3 | 4.6  | 17.9 | 10.5 |
| LnGrp LOS   | B    | A    | B    | A    | B    | B    |
| Approach Vol, veh/h   | 755  |      |      | 590  | 519  |      |
| Approach Delay, s/veh   | 11.8 |      |      | 8.2  | 14.9 |      |
| Approach LOS  | B    |      |      | A    | B    |      |
| Timer   | 1    | 2    | 3    | 4    | 5    | 6    |
| Assigned Phs  | 1    | 2    |      | 3    | 4    | 5    |
| Phs Duration (G+Y+Rc), s  | 9.4  | 21.4 |      | 30.8 | 13.7 | 8    |
| Change Period (Y+Rc), s   | 3.6  | 3.6  |      | 3.6  | 3.0  |      |
| Max Green Setting (Gmax), s   | 15.0 | 47   |      | 65.4 | 28.0 |      |
| Max Q Clear Time (g.c+H), s   | 5.4  | 12.9 |      | 7.4  | 9.2  |      |
| Green Ext Time (g.c), s   | 0.1  | 4.8  |      | 3.2  | 1.6  |      |
| Intersection Summary  |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay   | 11.6 |      |      |      |      |      |
| HCM 2010 LOS  | B    |      |      |      |      |      |
| Notes   |      |      |      |      |      |      |
| * HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier. |      |      |      |      |      |      |
| Dutton Meadows Phase 2  |      |      |      |      |      |      |
| AM Future + Project - Proposed  |      |      |      |      |      |      |
| Synchro 10 Report   |      |      |      |      |      |      |

Dutton Meadows Phase 2  
 AM Future + Project - Proposed  
 Synchro 10 Report

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 3. Northpoint Parkway & Elem School/DW

| Movement   | EBL  | EBT  | WBL  | WBT  | WBR  | NBL  | NBR  | SBL  | SBR  |
|--|------|------|------|------|------|------|------|------|------|
| Lane Configurations  | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Volume (veh/h)   | 70   | 0    | 42   | 155  | 0    | 354  | 0    | 180  | 55   |
| Future Volume (veh/h)  | 70   | 0    | 42   | 155  | 0    | 354  | 0    | 180  | 55   |
| Number   | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   |
| Initial O (Ob.) 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 | 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 |
| Adj Sat Flow, veh/h  | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 |
| Adj Flow Rate, veh/h   | 70   | 0    | 42   | 155  | 0    | 354  | 0    | 180  | 55   |
| Adj No. of Lanes   | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    |
| 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    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h   | 116  | 0    | 103  | 435  | 0    | 667  | 0    | 238  | 73   |
| Arrive On Green  | 0.07 | 0.00 | 0.07 | 0.25 | 0.00 | 0.25 | 0.00 | 0.17 | 0.18 |
| Sat Flow, veh/h  | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1370 | 419  |
| Grp Volume(V), veh/h   | 70   | 0    | 42   | 155  | 0    | 354  | 0    | 235  | 234  |
| Grp Sat Flow(s), veh/h/m/1774                                      | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1789 | 1774 | 1863 |
| Q Serve(g.s.) s  | 1.8  | 0.0  | 1.2  | 3.4  | 0.0  | 7.8  | 0.0  | 5.9  | 2.0  |
| Cycle O Clear(g.c.) s  | 1.8  | 0.0  | 1.2  | 3.4  | 0.0  | 7.8  | 0.0  | 5.9  | 2.0  |
| Prop In Lane   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h   | 116  | 0    | 103  | 435  | 0    | 667  | 0    | 310  | 810  |
| V/C Ratio(X)   | 0.60 | 0.00 | 0.41 | 0.36 | 0.00 | 0.53 | 0.00 | 0.76 | 0.75 |
| Avail Cap(c.a), veh/h  | 415  | 0    | 370  | 791  | 0    | 985  | 0    | 418  | 603  |
| HCM Platoon Ratio  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)   | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh   | 21.4 | 0.0  | 21.1 | 14.7 | 0.0  | 10.2 | 0.0  | 18.5 | 18.4 |
| Incr Delay (d2), s/veh   | 5.0  | 0.0  | 2.5  | 0.5  | 0.0  | 0.7  | 0.0  | 5.4  | 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/m/1.0  | 0.0  | 0.6  | 1.7  | 0.0  | 3.5  | 0.0  | 0.0  | 3.3  | 3.2  |
| LnGrp Delay(d), s/veh  | 26.4 | 0.0  | 23.7 | 15.2 | 0.0  | 10.8 | 0.0  | 23.9 | 22.0 |
| LnGrp LOS  | C    | C    | B    | B    | C    | C    | C    | C    | A    |
| Approach Vol, veh/h  | 112  | 509  | 12.1 | 235  | 364  |      |      |      |      |
| Approach Delay, s/veh  | 25.4 | 12.1 | 23.9 | 17.1 | 17.1 |      |      |      |      |
| Approach LOS   | C    | B    | C    | B    | B    |      |      |      |      |
| Timer  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |
| Assigned Phs   | 1    | 2    | 4    | 6    | 7    | 8    |      |      |      |
| Phs Duration (G+Y+R), s  | 12.3 | 12.2 | 7.1  | 24.5 | 15.5 |      |      |      |      |
| Change Period (Y+R), s   | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  |      |      |      |      |
| Max Green Setting (Gmax), s  | 11.0 | 11.0 | 11.0 | 31.0 | 21.0 |      |      |      |      |
| Max O Clear Time (g.c.+1/4), s                                     | 7.9  | 3.8  | 4.0  | 9.8  |      |      |      |      |      |
| Green Ext Time (p.c.), s   | 0.4  | 0.4  | 0.2  | 0.6  | 1.7  |      |      |      |      |
| Intersection Summary   |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay  | 17.1 |      |      |      |      |      |      |      |      |
| HCM 2010 LOS   | B    |      |      |      |      |      |      |      |      |
| Notes  |      |      |      |      |      |      |      |      |      |
| User approved pedestrian interval to be less than phase max green. |      |      |      |      |      |      |      |      |      |

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 2. Dutton Ave & Hearn Ave

| Movement   | EBL  | EBT  | WBL  | WBT  | WBR  | NBL  | NBR  | SBL  | SBR  |
|--|------|------|------|------|------|------|------|------|------|
| Lane Configurations  | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Volume (veh/h)   | 88   | 690  | 20   | 432  | 506  | 182  | 20   | 195  | 384  |
| Future Volume (veh/h)  | 88   | 690  | 20   | 432  | 506  | 182  | 20   | 195  | 384  |
| Number   | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   |
| Initial O (Ob.) veh  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)  | 1.00 | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.96 |
| Parking Bus, Adj   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h  | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h   | 88   | 690  | 20   | 432  | 506  | 174  | 20   | 195  | 384  |
| Adj No. of Lanes   | 1    | 2    | 0    | 1    | 1    | 1    | 1    | 1    | 1    |
| 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    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h   | 110  | 957  | 28   | 436  | 850  | 688  | 51   | 382  | 714  |
| Arrive On Green  | 0.06 | 0.27 | 0.27 | 0.25 | 0.46 | 0.46 | 0.03 | 0.21 | 0.14 |
| Sat Flow, veh/h  | 1774 | 3508 | 102  | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 |
| Grp Volume(V), veh/h   | 88   | 348  | 362  | 432  | 506  | 174  | 20   | 195  | 384  |
| Grp Sat Flow(s), veh/h/m/1774                                      | 1770 | 1840 | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774 |
| Q Serve(g.s.) s  | 5.6  | 20.3 | 20.3 | 27.7 | 23.1 | 8.1  | 1.3  | 10.6 | 20.0 |
| Cycle O Clear(g.c.) s  | 5.6  | 20.3 | 20.3 | 27.7 | 23.1 | 8.1  | 1.3  | 10.6 | 20.0 |
| Prop In Lane   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h   | 110  | 483  | 502  | 436  | 850  | 688  | 51   | 382  | 714  |
| V/C Ratio(X)   | 0.80 | 0.72 | 0.72 | 0.99 | 0.60 | 0.25 | 0.39 | 0.51 | 0.54 |
| Avail Cap(c.a), veh/h  | 110  | 483  | 502  | 436  | 850  | 688  | 109  | 433  | 757  |
| HCM Platoon Ratio  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)   | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh   | 52.7 | 37.5 | 42.9 | 23.2 | 19.1 | 54.4 | 40.2 | 22.7 | 48.8 |
| Incr Delay (d2), s/veh   | 26.6 | 7.2  | 7.0  | 40.8 | 3.1  | 0.9  | 4.8  | 1.1  | 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/m/1.0  | 10.9 | 11.3 | 18.5 | 12.5 | 3.5  | 0.7  | 5.6  | 8.8  | 13.0 |
| LnGrp Delay(d), s/veh  | 79.3 | 44.7 | 44.5 | 83.6 | 26.2 | 19.9 | 59.2 | 41.3 | 23.4 |
| LnGrp LOS  | E    | D    | D    | F    | C    | B    | E    | D    | C    |
| Approach Vol, veh/h  | 798  | 1112 | 599  | 462  | 810  |      |      |      |      |
| Approach Delay, s/veh  | 48.4 | 47.5 | 30.4 | 81.0 | 81.0 |      |      |      |      |
| Approach LOS   | D    | D    | C    | F    | F    |      |      |      |      |
| Timer  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |
| Assigned Phs   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |
| Phs Duration (G+Y+R), s  | 32.0 | 35.1 | 6.8  | 40.1 | 11.1 | 56.0 | 20.0 | 26.9 |      |
| Change Period (Y+R), s   | 4.0  | 4.0  | 3.5  | 4.0  | 4.0  | 3.5  | 3.5  | 3.5  |      |
| Max Green Setting (Gmax), s  | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 | 26.5 |      |      |
| Max O Clear Time (g.c.+1/4), s                                     | 22.3 | 3.3  | 11.0 | 7.6  | 25.1 | 18.5 | 22.0 |      |      |
| Green Ext Time (p.c.), s   | 0.0  | 2.1  | 0.0  | 1.1  | 0.0  | 4.1  | 0.0  | 1.1  |      |
| Intersection Summary   |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay  | 49.5 |      |      |      |      |      |      |      |      |
| HCM 2010 LOS   | D    |      |      |      |      |      |      |      |      |
| Notes  |      |      |      |      |      |      |      |      |      |
| User approved pedestrian interval to be less than phase max green. |      |      |      |      |      |      |      |      |      |

10/22/2018  
 HCM 2010 TWSC  
 4: Northpoint Parkway & New Street

| Intersection             | 5.1    |        |        |        |       |       |
|--------------------------|--------|--------|--------|--------|-------|-------|
| Initial Delay, s/veh     | EBL    | EBT    | WBT    | WBR    | SBL   | SBR   |
| Movement                 | EBL    | EBT    | WBT    | WBR    | SBL   | SBR   |
| Lane Configurations      | 114    | 175    | 297    | 27     | 25    | 212   |
| Traffic Vol, veh/h       | 114    | 175    | 297    | 27     | 25    | 212   |
| Future Vol, veh/h        | 0      | 0      | 0      | 0      | 0     | 0     |
| Conflicting Peds, #/hr   | Free   | Free   | Free   | Free   | Stop  | Stop  |
| RT Channelized           | -      | None   | -      | None   | -     | None  |
| Storage Length           | 100    | -      | -      | -      | 0     | -     |
| Veh in Median Storage, # | -      | 0      | 0      | -      | 0     | -     |
| Grade, %                 | -      | 0      | 0      | -      | 0     | -     |
| Peak Hour Factor         | 95     | 95     | 95     | 95     | 95    | 95    |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2      | 2     | 2     |
| Mvmt Flow                | 120    | 184    | 313    | 28     | 26    | 223   |
| Major/Minor              | Major1 | Major2 | Minor2 | Minor2 |       |       |
| Conflicting Flow All     | 341    | 0      | -      | 0      | 751   | 327   |
| Stage 1                  | -      | -      | -      | -      | 327   | -     |
| Stage 2                  | -      | -      | -      | -      | 424   | -     |
| Critical Hdwy            | 4.12   | -      | -      | -      | 6.42  | 6.22  |
| Critical Hdwy Slg 1      | -      | -      | -      | -      | 5.42  | -     |
| Critical Hdwy Slg 2      | -      | -      | -      | -      | 5.42  | -     |
| Follow-up Hdwy           | 2.218  | -      | -      | -      | 3.518 | 3.318 |
| Pl Cap-1 Maneuver        | 1218   | -      | -      | -      | 378   | 714   |
| Stage 1                  | -      | -      | -      | -      | 731   | -     |
| Stage 2                  | -      | -      | -      | -      | 660   | -     |
| Platoon blocked, %       | -      | -      | -      | -      | -     | -     |
| Mov Cap-1 Maneuver       | 1218   | -      | -      | -      | 341   | 714   |
| Mov Cap-2 Maneuver       | -      | -      | -      | -      | 341   | -     |
| Stage 1                  | -      | -      | -      | -      | 659   | -     |
| Stage 2                  | -      | -      | -      | -      | 660   | -     |
| Approach                 | EB     | WB     | SB     |        |       |       |
| HCM Control Delay, s     | 3.3    | 0      | 14.2   |        |       |       |
| HCM LOS                  | B      |        | B      |        |       |       |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBT    | WBR    | SBLn1 |       |
| Capacity (veh/h)         | 1218   | -      | -      | -      | 640   |       |
| HCM Lane V/C Ratio       | 0.099  | -      | -      | -      | 0.39  |       |
| HCM Control Delay (s)    | 8.3    | -      | -      | -      | 14.2  |       |
| HCM Lane LOS             | A      | -      | -      | -      | B     |       |
| HCM 95th %ile Q(veh)     | 0.3    | -      | -      | -      | 1.8   |       |

10/18/2018  
 HCM 2010 Signalized Intersection Summary  
 1: Northpoint Parkway & Hearm Ave

| Movement                    | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|-------|------|------|------|------|
| Lane Configurations         | ↑    | ↑     | ↑    | ↑    | ↑    | ↑    |
| Traffic Volume (veh/h)      | 552  | 328   | 273  | 523  | 339  | 262  |
| Future Volume (veh/h)       | 552  | 328   | 273  | 523  | 339  | 262  |
| Number                      | 2    | 12    | 1    | 6    | 3    | 18   |
| Initial Q (Ob), veh         | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 0.98 | 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 |
| Adj Sat Flow, veh/h/m       | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 552  | 320   | 273  | 523  | 339  | 242  |
| Adj No. of Lanes            | 1    | 1     | 1    | 1    | 1    | 1    |
| Peak Hour Factor            | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh, %        | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap, veh/h                  | 719  | 598   | 332  | 1187 | 434  | 683  |
| Arrive On Green             | 0.39 | 0.39  | 0.19 | 0.64 | 0.24 | 0.24 |
| Sat Flow, veh/h             | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(v), veh/h        | 552  | 320   | 273  | 523  | 339  | 242  |
| Grp Sat Flow(s), veh/h/m    | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Q Serve(g_s), s             | 14.4 | 8.9   | 8.3  | 7.9  | 10.0 | 0.0  |
| Cycle Q Clear(g_c), s       | 14.4 | 8.9   | 8.3  | 7.9  | 10.0 | 0.0  |
| Prop In Lane                | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 719  | 598   | 332  | 1187 | 434  | 683  |
| V/C Ratio(X)                | 0.77 | 0.54  | 0.82 | 0.44 | 0.78 | 0.35 |
| Avail Cap(c_a), veh/h       | 1348 | 1121  | 731  | 2216 | 858  | 1062 |
| HCM Platoon Ratio           | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(i)          | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 15.0 | 13.3  | 21.8 | 5.1  | 19.7 | 10.7 |
| Incr Delay (d2), s/veh      | 1.8  | 0.7   | 2.0  | 0.3  | 3.1  | 0.3  |
| Initial Q Delay(i3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackQ(50%) veh/m       | 7.7  | 3.9   | 4.2  | 4.0  | 5.2  | 2.5  |
| LnGrp Delay(d)s/veh         | 16.7 | 14.0  | 23.8 | 5.4  | 22.8 | 11.0 |
| LnGrp LOS                   | B    | B     | C    | A    | C    | B    |
| Approach Vol, veh/h         | 872  |       |      | 796  | 581  |      |
| Approach Delay, s/veh       | 15.7 |       |      | 11.7 | 17.9 |      |
| Approach LOS                | B    |       |      | B    | B    |      |
| Timer                       | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2     |      |      |      | 8    |
| Phs Duration (G+Y+Rc), s    | 14.0 | 25.1  |      |      |      | 39.2 |
| Change Period (Y+Rc), s     | 3.6  | * 3.6 |      |      |      | 3.6  |
| Max Green Setting (Cmax), s | 23.0 | * 40  |      |      |      | 27.0 |
| Max Q Clear Time (g_c+H), s | 10.3 | 16.4  |      |      |      | 12.0 |
| Green Ext Time (g_e), s     | 0.3  | 5.1   |      |      |      | 1.7  |
| Intersection Summary        |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay         |      |       |      | 14.8 |      |      |
| HCM 2010 LOS                |      |       |      | B    |      |      |
| Notes                       |      |       |      |      |      |      |



2: Dutton Ave & Hearn Ave

3: Northpoint Parkway & Dutton Meadow

10/18/2018

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)      | 40   | 718  | 20   | 448  | 696  | 204  | 28   | 395  | 297  | 224  | 256  | 89   |
| Future Volume (veh/h)       | 40   | 718  | 20   | 448  | 696  | 204  | 28   | 395  | 297  | 224  | 256  | 89   |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   | 3    | 8    | 18   | 7    | 4    | 14   |
| Initial Q (Cb), veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Peak-Bike Adj(A_pbT)        | 1.00 | 0.96 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.96 |
| Parking Bus, Adj            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/hln       | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 40   | 718  | 20   | 448  | 696  | 196  | 28   | 395  | 297  | 224  | 256  | 47   |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| 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                  | 78   | 888  | 25   | 436  | 847  | 685  | 64   | 425  | 750  | 251  | 508  | 93   |
| Arrive On Green             | 0.04 | 0.25 | 0.25 | 0.45 | 0.45 | 0.45 | 0.23 | 0.23 | 0.23 | 0.14 | 0.33 | 0.33 |
| Sat Flow, veh/h             | 1774 | 3512 | 98   | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774 | 1521 | 279  |
| Grp Volume(v), veh/h        | 40   | 362  | 376  | 448  | 696  | 196  | 28   | 395  | 297  | 224  | 0    | 303  |
| Grp Sat Flow(s), veh/hln    | 1774 | 1770 | 1840 | 1774 | 1863 | 1508 | 1774 | 1863 | 1583 | 1774 | 0    | 1800 |
| Q Serve(g.s), s             | 2.5  | 21.9 | 21.9 | 28.0 | 37.1 | 9.3  | 1.8  | 23.7 | 13.9 | 14.1 | 0.0  | 15.4 |
| Cycle Q Clear(g.c), s       | 2.5  | 21.9 | 21.9 | 28.0 | 37.1 | 9.3  | 1.8  | 23.7 | 13.9 | 14.1 | 0.0  | 15.4 |
| Prop In Lane                | 1.00 | 0.05 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.16 |
| Lane Grp Cap(c), veh/h      | 78   | 448  | 465  | 436  | 847  | 685  | 64   | 425  | 750  | 251  | 0    | 601  |
| V/C Ratio(X)                | 0.51 | 0.81 | 0.81 | 1.03 | 0.82 | 0.29 | 0.44 | 0.93 | 0.40 | 0.89 | 0.00 | 0.60 |
| Avail Cap(c.a), veh/h       | 110  | 448  | 465  | 436  | 847  | 685  | 109  | 433  | 757  | 257  | 0    | 601  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i)          | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 53.3 | 40.0 | 40.0 | 43.0 | 27.1 | 19.5 | 53.8 | 43.1 | 19.4 | 48.1 | 0.0  | 30.4 |
| Incr Delay (d2), s/veh      | 3.8  | 11.2 | 10.9 | 50.5 | 8.9  | 1.0  | 4.6  | 26.3 | 0.3  | 29.3 | 0.0  | 0.7  |
| Initial Q Delay(Q3), 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 BackOf(50%), veh/ln    | 1.3  | 12.0 | 12.5 | 19.8 | 21.0 | 4.1  | 0.9  | 15.3 | 6.1  | 9.0  | 0.0  | 7.8  |
| LnGrp Delay(d), s/veh       | 57.1 | 51.2 | 50.8 | 93.5 | 35.9 | 20.5 | 58.4 | 69.4 | 19.8 | 77.4 | 0.0  | 31.1 |
| LnGrp LOS                   | E    | D    | D    | F    | D    | C    | E    | E    | B    | B    | E    | C    |
| Approach Vol, veh/h         | 778  |      |      | 1340 |      |      | 720  |      |      |      |      | 527  |
| Approach Delay, s/veh       | 51.3 |      |      | 52.9 |      |      | 48.5 |      |      |      |      | 50.8 |
| Approach LOS                | D    |      |      | D    |      |      | D    |      |      |      |      | D    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 32.0 | 32.8 | 7.6  | 41.5 | 9.0  | 55.8 | 19.7 | 29.5 |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 3.5  | 3.5  | 4.0  | 4.0  | 3.5  | 3.5  |      |      |      |      |
| Max Green Setting (Gmax), s | 28.0 | 28.0 | 3.8  | 36.0 | 7.1  | 48.9 | 16.5 | 26.5 |      |      |      |      |
| Max Q Clear Time (g.c+H), s | 30.0 | 23.9 | 3.8  | 17.4 | 4.5  | 39.1 | 16.1 | 25.7 |      |      |      |      |
| Green Ext Time (p.c), s     | 0.0  | 1.7  | 0.0  | 1.8  | 0.0  | 3.9  | 0.0  | 0.3  |      |      |      |      |
| Intersection Summary        | 51.3 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | D    |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | D    |      |      |      |      |      |      |      |      |      |      |      |

2: Dutton Ave & Hearn Ave

3: Northpoint Parkway & Dutton Meadow

10/18/2018

| Movement                    | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations         | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| Traffic Volume (veh/h)      | 150  | 30   | 20   | 18   | 95   | 57   | 25   | 395  | 30   | 73   | 400  | 130  |
| Future Volume (veh/h)       | 150  | 30   | 20   | 18   | 95   | 57   | 25   | 395  | 30   | 73   | 400  | 130  |
| Number                      | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial Q (Cb), veh         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Peak-Bike Adj(A_pbT)        | 1.00 | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/hln       | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 | 1863 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h        | 150  | 30   | 20   | 18   | 95   | 57   | 25   | 395  | 30   | 73   | 400  | 130  |
| Adj No. of Lanes            | 0    | 1    | 1    | 0    | 1    | 1    | 1    | 1    | 1    | 0    | 1    | 1    |
| 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                  | 214  | 43   | 227  | 30   | 158  | 246  | 292  | 575  | 44   | 391  | 493  | 160  |
| Arrive On Green             | 0.14 | 0.14 | 0.14 | 0.10 | 0.10 | 0.10 | 0.02 | 0.34 | 0.34 | 0.05 | 0.37 | 0.37 |
| Sat Flow, veh/h             | 1490 | 298  | 1583 | 294  | 1554 | 1583 | 1774 | 1710 | 130  | 1774 | 1348 | 438  |
| Grp Volume(v), veh/h        | 180  | 0    | 20   | 113  | 0    | 57   | 25   | 0    | 425  | 73   | 0    | 530  |
| Grp Sat Flow(s), veh/hln    | 1788 | 0    | 1583 | 1848 | 0    | 1583 | 1774 | 0    | 1840 | 1774 | 0    | 1785 |
| Q Serve(g.s), s             | 4.2  | 0.0  | 0.5  | 2.6  | 0.0  | 1.4  | 0.4  | 0.0  | 8.7  | 1.1  | 0.0  | 11.7 |
| Cycle Q Clear(g.c), s       | 4.2  | 0.0  | 0.5  | 2.6  | 0.0  | 1.4  | 0.4  | 0.0  | 8.7  | 1.1  | 0.0  | 11.7 |
| Prop In Lane                | 0.83 | 1.00 | 0.16 | 1.00 | 1.00 | 1.00 | 1.00 | 0.07 | 1.00 | 0.07 | 1.00 | 0.25 |
| Lane Grp Cap(c), veh/h      | 256  | 0    | 227  | 188  | 0    | 246  | 292  | 0    | 618  | 391  | 0    | 653  |
| V/C Ratio(X)                | 0.70 | 0.00 | 0.09 | 0.60 | 0.00 | 0.23 | 0.09 | 0.00 | 0.69 | 0.19 | 0.00 | 0.81 |
| Avail Cap(c.a), veh/h       | 653  | 0    | 578  | 675  | 0    | 663  | 412  | 0    | 882  | 538  | 0    | 937  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filler(i)          | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 17.9 | 0.0  | 16.3 | 18.8 | 0.0  | 16.2 | 10.4 | 0.0  | 12.6 | 9.4  | 0.0  | 12.5 |
| Incr Delay (d2), s/veh      | 3.5  | 0.0  | 0.2  | 3.1  | 0.0  | 0.5  | 0.1  | 0.0  | 1.4  | 0.2  | 0.0  | 3.6  |
| Initial Q Delay(Q3), 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 BackOf(50%), veh/ln    | 2.3  | 0.0  | 0.2  | 1.4  | 0.0  | 0.6  | 0.2  | 0.0  | 4.6  | 0.6  | 0.0  | 6.4  |
| LnGrp Delay(d), s/veh       | 21.4 | 0.0  | 16.4 | 21.9 | 0.0  | 16.7 | 10.5 | 0.0  | 13.9 | 9.7  | 0.0  | 16.1 |
| LnGrp LOS                   | C    | B    | B    | C    | B    | B    | B    | B    | B    | A    | B    | B    |
| Approach Vol, veh/h         | 200  |      |      | 170  |      |      | 450  |      |      |      |      | 603  |
| Approach Delay, s/veh       | 20.9 |      |      | 20.2 |      |      | 13.7 |      |      |      |      | 15.4 |
| Approach LOS                | C    |      |      | C    |      |      | B    |      |      |      |      | B    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |      |
| Phs Duration (G+Y+Rc), s    | 6.4  | 18.7 | 10.3 | 5.0  | 20.0 | 8.4  |      |      |      |      |      |      |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  | 4.0  |      |      |      |      |      |      |
| Max Green Setting (Gmax), s | 6.0  | 21.0 | 16.0 | 4.0  | 23.0 | 16.0 |      |      |      |      |      |      |
| Max Q Clear Time (g.c+H), s | 3.1  | 10.7 | 6.2  | 2.4  | 13.7 | 4.6  |      |      |      |      |      |      |
| Green Ext Time (p.c), s     | 0.0  | 1.8  | 0.7  | 0.0  | 2.3  | 0.5  |      |      |      |      |      |      |
| Intersection Summary        | 16.2 |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | B    |      |      |      |      |      |      |      |      |      |      |      |
| HCM 2010 LOS                | B    |      |      |      |      |      |      |      |      |      |      |      |

Dutton Meadows Phase 2  
PM Future plus Project - Planned

Dutton Meadows Phase 2  
PM Future plus Project - Planned

Synchro 10 Report



10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 1. Northpoint Parkway & Hearn Ave

| Movement  | EBT  | EBR   | WBL  | WBT  | NBL  | NBR  |
|---|------|-------|------|------|------|------|
| Lane Configurations   | ←    | ←     | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)  | 552  | 328   | 273  | 523  | 339  | 262  |
| Future Volume (veh/h)   | 552  | 328   | 273  | 523  | 339  | 262  |
| Number  | 2    | 12    | 1    | 6    | 3    | 18   |
| Initial O (Ob.) veh   | 0    | 0     | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)   | 0.98 | 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 |
| Adj Sat Flow, veh/h/ln  | 1863 | 1863  | 1863 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h  | 552  | 320   | 273  | 523  | 339  | 242  |
| Adj No. of Lanes  | 1    | 1     | 1    | 1    | 1    | 1    |
| Peak Hour Factor  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %  | 2    | 2     | 2    | 2    | 2    | 2    |
| Cap. veh/h  | 719  | 598   | 332  | 1187 | 434  | 683  |
| Arrive On Green   | 0.39 | 0.39  | 0.19 | 0.64 | 0.24 | 0.24 |
| Sat Flow, veh/h   | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| Grp Volume(V), veh/h  | 552  | 320   | 273  | 523  | 339  | 242  |
| Grp Sat Flow(s), veh/h/ln   | 1863 | 1549  | 1774 | 1863 | 1774 | 1583 |
| O.SatVeh(g.s) s   | 14.4 | 8.9   | 8.3  | 7.9  | 10.0 | 0.0  |
| Cycle O Clear(g.c.) s   | 14.4 | 8.9   | 8.3  | 7.9  | 10.0 | 0.0  |
| Prop In Lane  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h  | 719  | 598   | 332  | 1187 | 434  | 683  |
| V/C Ratio(X)  | 0.77 | 0.54  | 0.82 | 0.44 | 0.78 | 0.35 |
| Avail Cap(c.a), veh/h   | 1348 | 1121  | 731  | 2216 | 858  | 1062 |
| HCM Platoon Ratio   | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)  | 1.00 | 1.00  | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh  | 15.0 | 13.3  | 21.8 | 5.1  | 19.7 | 10.7 |
| Incr Delay (d2), s/veh  | 1.8  | 0.7   | 2.0  | 0.3  | 3.1  | 0.3  |
| Initial O Delay(d3), s/veh  | 0.0  | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%), veh/ln  | 7.7  | 3.9   | 4.2  | 4.0  | 5.2  | 2.5  |
| LnGrp Delay(d), s/veh   | 16.7 | 14.0  | 23.8 | 5.4  | 22.8 | 11.0 |
| LnGrp LOS   | B    | B     | C    | A    | C    | B    |
| Approach Vol, veh/h   | 872  |       |      | 796  |      | 581  |
| Approach Delay, s/veh   | 15.7 |       |      | 11.7 |      | 17.9 |
| Approach LOS  | B    |       |      | B    |      | B    |
| Timer   | 1    | 2     | 3    | 4    | 5    | 6    |
| Assigned Phs  | 1    | 2     |      |      |      | 6    |
| Phs Duration (G+Y+Rc), s  | 14.0 | 25.1  |      |      |      | 39.2 |
| Change Period (Y+Rc), s   | 3.6  | * 3.6 |      |      |      | 3.0  |
| Max Green Setting (Gmax), s   | 23.0 | * 40  |      |      |      | 66.4 |
| Max O Clear Time (g.c+1), s   | 10.3 | 16.4  |      |      |      | 9.9  |
| Green Ext Time (g.e), s   | 0.3  | 5.1   |      |      |      | 3.9  |
| Intersection Summary  |      |       |      |      |      |      |
| HCM 2010 Ctrl Delay   | 14.8 |       |      |      |      |      |
| HCM 2010 LOS  | B    |       |      |      |      |      |
| Notes   |      |       |      |      |      |      |
| * HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier. |      |       |      |      |      |      |

10/22/2018  
 HCM 2010 Signalized Intersection Summary  
 2. Dutton Ave & Hearn Ave

| Movement                    | EBT  | EBR  | WBL  | WBT  | NBL  | NBR  |
|-----------------------------|------|------|------|------|------|------|
| Lane Configurations         | ←    | ←    | ←    | ←    | ←    | ←    |
| Traffic Volume (veh/h)      | 40   | 718  | 20   | 448  | 696  | 204  |
| Future Volume (veh/h)       | 40   | 718  | 20   | 448  | 696  | 204  |
| Number                      | 5    | 2    | 12   | 1    | 6    | 16   |
| Initial O (Ob.) veh         | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pbT)         | 1.00 | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 |
| Parking Bus, Adj            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln      | 1863 | 1863 | 1900 | 1863 | 1863 | 1863 |
| Adj Flow Rate, veh/h        | 40   | 718  | 20   | 448  | 696  | 196  |
| Adj No. of Lanes            | 1    | 2    | 0    | 1    | 1    | 1    |
| Peak Hour Factor            | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Percent Heavy Veh. %        | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                  | 78   | 888  | 25   | 436  | 847  | 685  |
| Arrive On Green             | 0.04 | 0.25 | 0.25 | 0.45 | 0.04 | 0.23 |
| Sat Flow, veh/h             | 1774 | 3512 | 98   | 1774 | 1863 | 1508 |
| Grp Volume(V), veh/h        | 40   | 362  | 376  | 448  | 696  | 196  |
| Grp Sat Flow(s), veh/h/ln   | 1774 | 1770 | 1840 | 1774 | 1863 | 1508 |
| O.SatVeh(g.s) s             | 2.5  | 21.9 | 21.9 | 28.0 | 37.1 | 9.3  |
| Cycle O Clear(g.c.) s       | 2.5  | 21.9 | 21.9 | 28.0 | 37.1 | 9.3  |
| Prop In Lane                | 1.00 | 0.05 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lane Grp Cap(c), veh/h      | 78   | 446  | 465  | 436  | 847  | 685  |
| V/C Ratio(X)                | 0.51 | 0.81 | 0.81 | 1.03 | 0.82 | 0.29 |
| Avail Cap(c.a), veh/h       | 110  | 448  | 465  | 436  | 847  | 685  |
| HCM Platoon Ratio           | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)          | 0.75 | 0.75 | 0.75 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh    | 32.0 | 40.0 | 40.0 | 43.0 | 27.1 | 19.5 |
| Incr Delay (d2), s/veh      | 3.8  | 11.2 | 10.9 | 50.5 | 8.9  | 1.0  |
| Initial O Delay(d3), s/veh  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(50%), veh/ln    | 12.0 | 12.5 | 19.8 | 21.0 | 4.1  | 0.9  |
| LnGrp Delay(d), s/veh       | 57.1 | 51.2 | 50.8 | 93.5 | 35.9 | 20.5 |
| LnGrp LOS                   | E    | D    | D    | F    | D    | C    |
| Approach Vol, veh/h         | 778  |      |      | 1340 |      | 720  |
| Approach Delay, s/veh       | 51.3 |      |      | 52.9 |      | 48.5 |
| Approach LOS                | D    |      |      | D    |      | D    |
| Timer                       | 1    | 2    | 3    | 4    | 5    | 6    |
| Assigned Phs                | 1    | 2    | 3    | 4    | 5    | 6    |
| Phs Duration (G+Y+Rc), s    | 32.0 | 32.8 | 7.6  | 41.5 | 9.0  | 55.8 |
| Change Period (Y+Rc), s     | 4.0  | 4.0  | 3.5  | 4.0  | 4.0  | 3.5  |
| Max Green Setting (Gmax), s | 28.0 | 7.0  | 36.0 | 7.1  | 48.9 | 16.5 |
| Max O Clear Time (g.c+1), s | 23.9 | 3.8  | 17.4 | 4.5  | 39.1 | 16.1 |
| Green Ext Time (g.e), s     | 0.0  | 1.7  | 0.0  | 1.8  | 0.0  | 3.9  |
| Intersection Summary        |      |      |      |      |      |      |
| HCM 2010 Ctrl Delay         | 51.3 |      |      |      |      |      |
| HCM 2010 LOS                | D    |      |      |      |      |      |

HCM 2010 Signalized Intersection Summary  
 3: Dutton Meadow & Elm School Dr/W & Northpoint Parkway

10/22/2018

| Movement                      | EBL  | EBT  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations           | 8    | 0    | 4    | 120  | 0    | 452  | 0    | 150  | 50   | 473  | 130  |
| Traffic Volume (veh/h)        | 8    | 0    | 4    | 120  | 0    | 452  | 0    | 150  | 50   | 473  | 130  |
| Future Volume (veh/h)         | 7    | 4    | 14   | 3    | 8    | 18   | 5    | 2    | 12   | 1    | 6    |
| Number                        | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Initial Q (Obs.) veh          | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Ped-Bike Adj(A_pb1)           | 1.00 | 1.00 | 1.00 | 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 |
| Adj Sat Flow, veh/h           | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h          | 8    | 0    | 4    | 120  | 0    | 452  | 0    | 150  | 50   | 473  | 130  |
| Adj No. of Lanes              | 1    | 1    | 0    | 0    | 1    | 1    | 0    | 1    | 0    | 1    | 0    |
| 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 |
| Percent Heavy Veh. %          | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| Cap. veh/h                    | 22   | 0    | 20   | 407  | 0    | 786  | 0    | 211  | 70   | 684  | 946  |
| Arrive On Green               | 0.01 | 0.00 | 0.01 | 0.23 | 0.00 | 0.23 | 0.00 | 0.16 | 0.16 | 0.27 | 0.51 |
| Sat Flow, veh/h               | 1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 1338 | 446  | 1774 | 1863 |
| Grp Volume(V), veh/h          | 8    | 0    | 4    | 120  | 0    | 452  | 0    | 200  | 473  | 130  | 0    |
| Grp Sat Flow(s), veh/h/m/1774 | 0    | 1583 | 1774 | 0    | 1583 | 0    | 0    | 1784 | 1774 | 1863 | 0    |
| Q Serve(g.s)                  | 0.2  | 0.0  | 0.1  | 2.7  | 0.0  | 9.6  | 0.0  | 0.0  | 5.1  | 9.3  | 1.8  |
| Cycle Q Clear(g.s)            | 0.2  | 0.0  | 0.1  | 2.7  | 0.0  | 9.6  | 0.0  | 0.0  | 5.1  | 9.3  | 1.8  |
| Prop In Lane                  | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.25 | 1.00 | 0.00 | 0.00 |
| Lane Grp Cap(c), veh/h        | 22   | 0    | 20   | 407  | 0    | 786  | 0    | 0    | 281  | 684  | 946  |
| V/C Ratio(X)                  | 0.37 | 0.00 | 0.21 | 0.29 | 0.00 | 0.58 | 0.00 | 0.00 | 0.71 | 0.69 | 0.14 |
| Avail Cap(c-a), veh/h         | 185  | 0    | 165  | 407  | 0    | 786  | 0    | 0    | 521  | 1469 | 2022 |
| HCM Platoon Ratio             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I)            | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh      | 23.5 | 0.0  | 23.4 | 15.3 | 0.0  | 8.5  | 0.0  | 0.0  | 19.2 | 10.1 | 6.2  |
| Incr Delay (d2), s/veh        | 9.9  | 0.0  | 5.1  | 0.4  | 0.0  | 1.0  | 0.0  | 0.0  | 3.3  | 1.3  | 0.1  |
| Initial Q Delay(d3), s/veh    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| %ile BackOf(C50%), veh/m/2    | 0.0  | 0.1  | 1.3  | 0.0  | 4.4  | 0.0  | 0.0  | 0.0  | 2.8  | 4.7  | 0.9  |
| LnGrp Delay(d), s/veh         | 33.4 | 0.0  | 28.5 | 15.7 | 0.0  | 9.5  | 0.0  | 0.0  | 22.5 | 11.4 | 6.3  |
| LnGrp LOS                     | C    | C    | C    | B    | A    | A    | A    | C    | B    | B    | A    |
| Approach Vol, veh/h           | 12   |      |      | 572  |      | 200  |      |      | 603  |      |      |
| Approach Delay, s/veh         | 31.8 |      |      | 10.8 |      | 22.5 |      |      | 10.3 |      |      |
| Approach LOS                  | C    |      |      | B    |      | C    |      |      | B    |      |      |
| Timer                         | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |      |      |      |
| Assigned Phs                  | 1    | 2    |      | 4    |      | 6    |      | 8    |      |      |      |
| Phs Duration (G+Y+R), s       | 11.5 |      |      | 4.6  |      | 28.3 |      | 15.0 |      |      |      |
| Change Period (Y+R), s        | 4.0  |      |      | 4.0  |      | 4.0  |      | 4.0  |      |      |      |
| Max Green Setting (Gmax), s   | 14.0 |      |      | 5.0  |      | 52.0 |      | 11.0 |      |      |      |
| Max O Clear Time (G_c+Y_c), s | 7.1  |      |      | 2.2  |      | 3.8  |      | 11.6 |      |      |      |
| Green Ext Time (p_c), s       | 1.5  |      |      | 0.0  |      | 0.7  |      | 0.0  |      |      |      |

Intersection Summary  
 HCM 2010 Ctrl Delay 12.5  
 HCM 2010 LOS B  
 Notes  
 User approved pedestrian interval to be less than phase max green.

HCM 2010 TWSC  
 4: Northpoint Parkway & New Street

10/22/2018

| Intersection             | EBL    | EBT    | WBT    | WBR    | SBL   | SBR   |
|--------------------------|--------|--------|--------|--------|-------|-------|
| Int Delay, s/veh         | 3.2    |        |        |        |       |       |
| Movement                 | EBL    | EBT    | WBT    | WBR    | SBL   | SBR   |
| Lane Configurations      | 103    | 420    | 420    | 30     | 18    | 152   |
| Traffic Vol, veh/h       | 103    | 420    | 420    | 30     | 18    | 152   |
| Future Vol, veh/h        | 103    | 420    | 420    | 30     | 18    | 152   |
| Conflicting Peds, #/hr   | 0      | 0      | 0      | 0      | 0     | 0     |
| Sign Control             | Free   | Free   | Free   | Free   | Stop  | Stop  |
| RT Channelized           | -      | None   | -      | None   | -     | None  |
| Storage Length           | 100    | -      | -      | -      | 0     | -     |
| Veh in Median Storage, # | -      | 0      | -      | -      | 0     | -     |
| Grade, %                 | -      | 0      | -      | -      | 0     | -     |
| Peak Hour Factor         | 95     | 95     | 95     | 95     | 95    | 95    |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2      | 2     | 2     |
| Mvmt Flow                | 108    | 442    | 442    | 32     | 19    | 160   |
| Major/Minor              | Major1 | Major2 | Major2 | Minor2 |       |       |
| Conflicting Flow All     | 474    | 0      | -      | 0      | 1116  | 458   |
| Stage 1                  | -      | -      | -      | -      | 458   | -     |
| Stage 2                  | -      | -      | -      | -      | 658   | -     |
| Critical Hdwy            | 4.12   | -      | -      | -      | 6.42  | 6.22  |
| Critical Hdwy Stg 1      | -      | -      | -      | -      | 5.42  | -     |
| Critical Hdwy Stg 2      | -      | -      | -      | -      | 3.518 | 3.318 |
| Follow-up Hdwy           | 2.218  | -      | -      | -      | 230   | 603   |
| Pl Cap-1 Maneuver        | 1088   | -      | -      | -      | 637   | -     |
| Stage 1                  | -      | -      | -      | -      | 515   | -     |
| Stage 2                  | -      | -      | -      | -      | 207   | 603   |
| Platoon blocked, %       | -      | -      | -      | -      | -     | -     |
| Mov Cap-1 Maneuver       | 1088   | -      | -      | -      | 207   | 603   |
| Mov Cap-2 Maneuver       | -      | -      | -      | -      | 574   | -     |
| Stage 1                  | -      | -      | -      | -      | 515   | -     |
| Stage 2                  | -      | -      | -      | -      | -     | -     |
| Approach                 | EB     | WB     | WB     | SB     |       |       |
| HCM Control Delay, s     | 1.7    | 0      | 0      | 16.1   |       |       |
| HCM LOS                  |        |        |        | C      |       |       |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBT    | WBR    | SBLn1 |       |
| Capacity (veh/h)         | 1088   | -      | -      | -      | 501   |       |
| HCM Lane V/C Ratio       | 0.1    | -      | -      | -      | 0.357 |       |
| HCM Control Delay (s)    | 8.7    | -      | -      | -      | 16.1  |       |
| HCM Lane LOS             | A      | -      | -      | -      | C     |       |
| HCM 95th %ile Q(veh)     | 0.3    | -      | -      | -      | 1.6   |       |

Dutton Meadows Phase 2  
 PM Future + Project - Proposed  
 Synchro 10 Report  
 W-Trans

# Appendix B

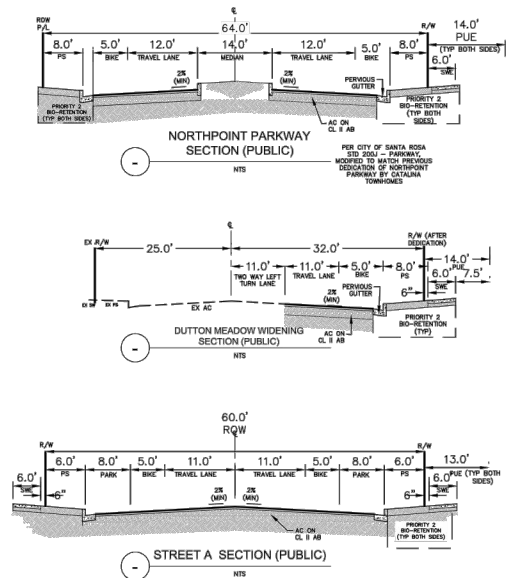
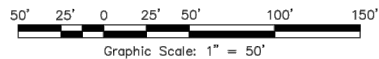
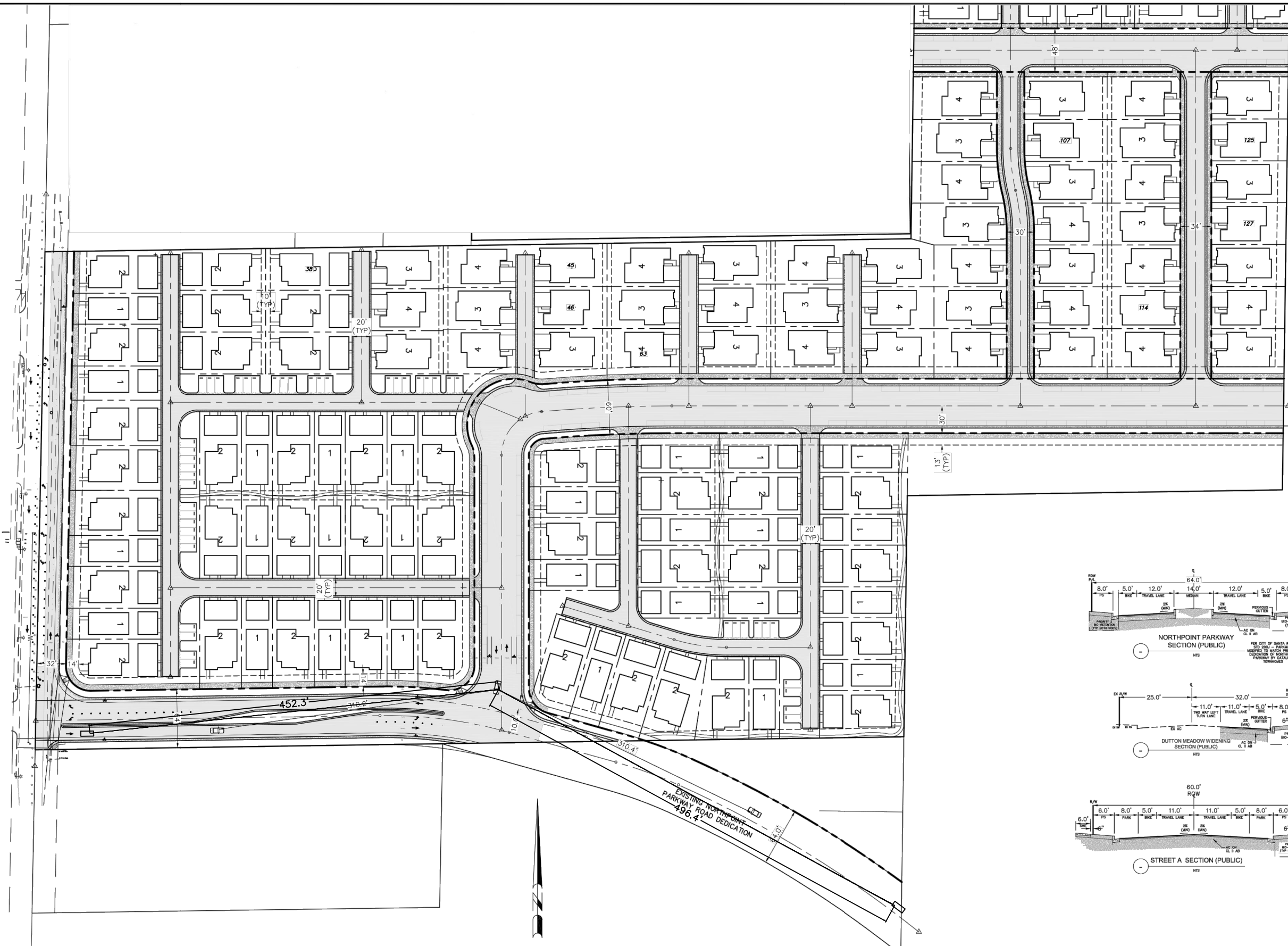
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## Sight Distance

PRELIMINARY



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### Dutton Meadows Site Exhibit

2850, 2666, 2684 DUTTON MEADOW  
1112, 1200 HEARN AVENUE  
Santa Rosa, California  
APN 043-071-007, 022, 023

November 01, 2018

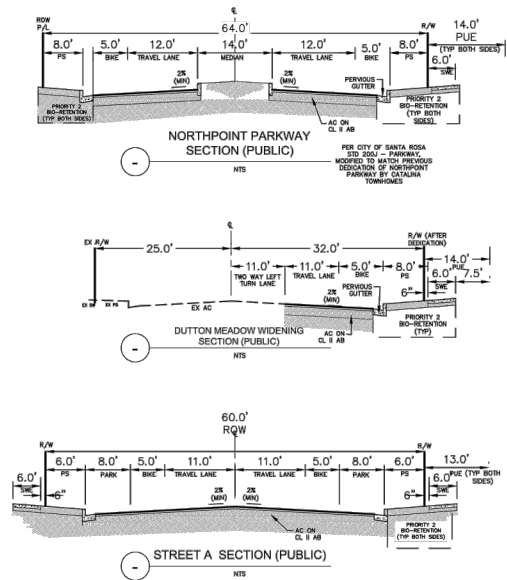
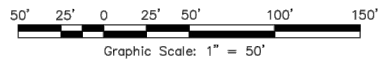
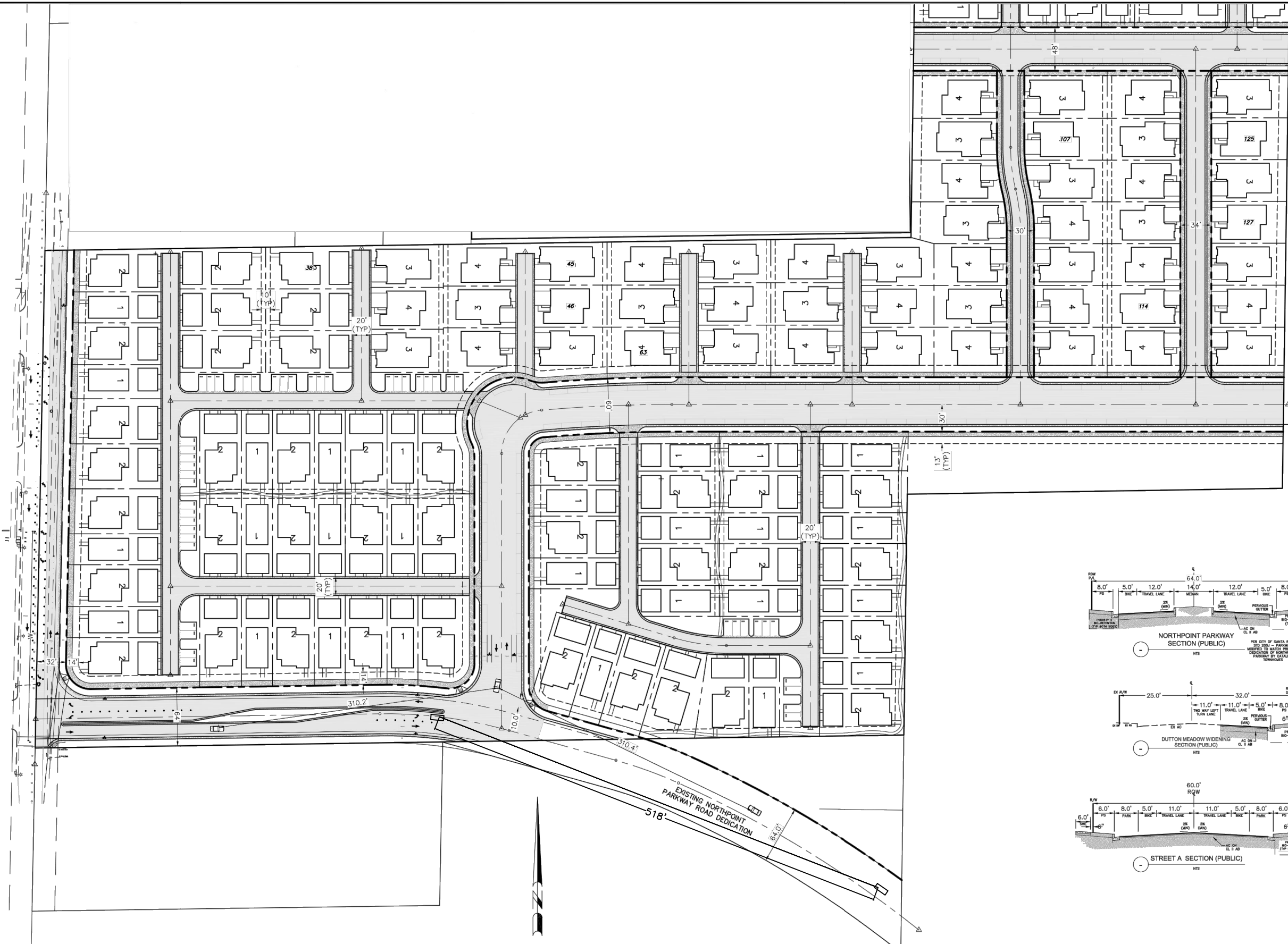
**adobe associates, inc.**  
civil engineering | land surveying | wastewater

1200 N. Dutton Ave., Santa Rosa, CA 95401  
P. (707) 541-2300 F. (707) 541-2301  
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|  |  |  |
|--|--|--|
| <b>Dutton Meadows Site Exhibit</b>   |  | November 01, 2018  |
| 2850, 2666, 2684 DUTTON MEADOW<br>1112, 1200 HEARN AVENUE<br>Santa Rosa, California<br>APN 043-071-007, 022, 023 |  | <b>adobe associates, inc.</b><br>civil engineering   land surveying   wastewater<br>1230 N. Dutton Ave., Santa Rosa, CA 95401<br>P. (707) 541-2300 F. (707) 541-2301<br>Website: www.adobeinc.com<br><small>*A Service You Can Count On!</small> |

# Appendix C

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## Queuing Calculations

PRELIMINARY







# Queues

## 3: Northpoint Parkway & Elem School D/W

10/23/2018



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBL  | SBT  |
|-------------------------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 70   | 42   | 155  | 354  | 235  | 234  | 130  |
| v/c Ratio               | 0.27 | 0.05 | 0.46 | 0.37 | 0.63 | 0.48 | 0.12 |
| Control Delay           | 27.6 | 0.1  | 27.3 | 2.5  | 32.8 | 25.0 | 10.2 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 27.6 | 0.1  | 27.3 | 2.5  | 32.8 | 25.0 | 10.2 |
| Queue Length 50th (ft)  | 22   | 0    | 49   | 0    | 71   | 73   | 24   |
| Queue Length 95th (ft)  | 60   | 0    | 107  | 36   | #199 | 155  | 61   |
| Internal Link Dist (ft) |      | 279  | 422  |      | 3424 |      | 876  |
| Turn Bay Length (ft)    |      |      |      |      |      | 175  |      |
| Base Capacity (vph)     | 380  | 846  | 726  | 990  | 401  | 553  | 1129 |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.18 | 0.05 | 0.21 | 0.36 | 0.59 | 0.42 | 0.12 |

### Intersection Summary

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

# Queues

## 3: Dutton Meadow & Elem School D/W & Northpoint Parkway

10/23/2018



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBL  | SBT  |
|-------------------------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 8    | 4    | 120  | 452  | 200  | 473  | 130  |
| v/c Ratio               | 0.04 | 0.00 | 0.37 | 0.41 | 0.50 | 0.54 | 0.10 |
| Control Delay           | 26.5 | 0.0  | 24.4 | 2.0  | 22.2 | 7.6  | 4.7  |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 26.5 | 0.0  | 24.4 | 2.0  | 22.2 | 7.6  | 4.7  |
| Queue Length 50th (ft)  | 2    | 0    | 26   | 0    | 39   | 48   | 10   |
| Queue Length 95th (ft)  | 16   | 0    | 97   | 35   | 135  | 159  | 42   |
| Internal Link Dist (ft) |      | 279  | 432  |      | 3424 |      | 880  |
| Turn Bay Length (ft)    |      |      |      |      |      | 175  |      |
| Base Capacity (vph)     | 195  | 845  | 430  | 1495 | 569  | 1350 | 1761 |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.04 | 0.00 | 0.28 | 0.30 | 0.35 | 0.35 | 0.07 |

### Intersection Summary

## Queue Length Estimation at Two-Way STOP Controlled Intersection

### Project Information

|                       |                                 |             |                     |
|-----------------------|---------------------------------|-------------|---------------------|
| Analyst:              | W-Trans                         | Agency/Co.: | City of Santa Rosa  |
| Analysis Time Period: | AM Peak                         | Project ID: | SRO461              |
| Date Performed:       | 10.24.2018                      | Scenario:   | AM Future + Project |
| Jurisdiction:         | City of Santa Rosa              |             |                     |
| Intersection:         | Northpoint Parkway/"New Street" |             |                     |
| East/West Street:     | Northpoint Parkway              |             |                     |
| North/South Street:   | "New Street"                    |             |                     |

### Instructions

Step 1 Input Volumes on **Volumes** sheet

|                   |       |   |  |
|-------------------|-------|---|--|
| Lane Group Code : | MJL   | 1 | Major street separate left turn lane / TWLT      |
|                   | MNLTR | 2 | Minor street shared left, through and right lane |
|                   | MNLR  | 3 | Minor street shared left, and right lane         |
|                   | MNL   | 4 | Minor street separate left turn lane             |
|                   | MNR   | 5 | Minor street separate right turn lane            |

Step 2 Calculate Input Parameters

- Calculate Lane Group Volumes, % Heavy Vehicles, and Conflicting Volumes (2.0% default)
- Identify the presence of an upstream signal within 1/4 mile on major approaches (Signal, 0 default)
- Identify the presence of a separate LT lane / TWLT on major street approaches (LT, 1 default)
- Verify the input ranges to feed into the models (see QueueLengthsModels sheet)

Step 3 **Obtain** queue lengths in feet from **Results** column

**Note:** *Round off queue lengths to the next highest 25 feet when reporting*

| Input    |                  |                |                  |                           |                 |                         | Results           |
|----------|------------------|----------------|------------------|---------------------------|-----------------|-------------------------|-------------------|
| Approach | Lane Group, Code | Volume, veh/hr | % Heavy Vehicles | Conflicting Volume,veh/hr | Signal (0 or 1) | Left Turn Lane (0 or 1) | Queue Length Feet |
| EB       | MJL              | 114            | 2.0%             | 324                       | 0               | 1                       | 50                |

## Queue Length Estimation at Two-Way STOP Controlled Intersection

### Project Information

|                       |                                 |             |                     |
|-----------------------|---------------------------------|-------------|---------------------|
| Analyst:              | W-Trans                         | Agency/Co.: | City of Santa Rosa  |
| Analysis Time Period: | PM Peak                         | Project ID: | SRO461              |
| Date Performed:       | 10.24.2018                      | Scenario:   | PM Future + Project |
| Jurisdiction:         | City of Santa Rosa              |             |                     |
| Intersection:         | Northpoint Parkway/"New Street" |             |                     |
| East/West Street:     | Northpoint Parkway              |             |                     |
| North/South Street:   | "New Street"                    |             |                     |

### Instructions

Step 1 Input Volumes on **Volumes** sheet

|                   |       |   |  |
|-------------------|-------|---|--|
| Lane Group Code : | MJL   | 1 | Major street separate left turn lane / TWLT      |
|                   | MNLTR | 2 | Minor street shared left, through and right lane |
|                   | MNLR  | 3 | Minor street shared left, and right lane         |
|                   | MNL   | 4 | Minor street separate left turn lane             |
|                   | MNR   | 5 | Minor street separate right turn lane            |

Step 2 Calculate Input Parameters

- Calculate Lane Group Volumes, % Heavy Vehicles, and Conflicting Volumes (2.0% default)
- Identify the presence of an upstream signal within 1/4 mile on major approaches (Signal, 0 default)
- Identify the presence of a separate LT lane / TWLT on major street approaches (LT, 1 default)
- Verify the input ranges to feed into the models (see QueueLengthsModels sheet)

Step 3 **Obtain** queue lengths in feet from **Results** column

**Note:** *Round off queue lengths to the next highest 25 feet when reporting*

| Input    |                  |                |                  |                           |                 |                         | Results           |
|----------|------------------|----------------|------------------|---------------------------|-----------------|-------------------------|-------------------|
| Approach | Lane Group, Code | Volume, veh/hr | % Heavy Vehicles | Conflicting Volume,veh/hr | Signal (0 or 1) | Left Turn Lane (0 or 1) | Queue Length Feet |
| EB       | MJL              | 103            | 2.0%             | 450                       | 0               | 1                       | <b>75</b>         |