



# Traffic Impact Study

**Snow Hill Subdivision Development**

**6500 Snow Hill Road**

**Ooltewah, TN 37363**

PREPARED FOR

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June 10, 2019

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## 1.0 INTRODUCTION

### 1.1 Project Scope

This report summarizes the results of the traffic analyses for the proposed subdivision bounded by Snow Hill Road on the west and Mountain View Road on the east in Ooltewah, Hamilton County, Tennessee. **Figure 1** displays the area map of the location of the proposed development. The subdivision is located approximately at 6500 Snow Hill Road. **Figure 2** illustrates the location map of the proposed subdivision. The developer plans to build a subdivision with 453 single family dwellings. The primary goal of the study is to estimate the number of vehicles to be generated from this subdivision in the year 2025 when the development is fully occupied and determine the potential impact to Snow Hill Road and Mountain View Road.

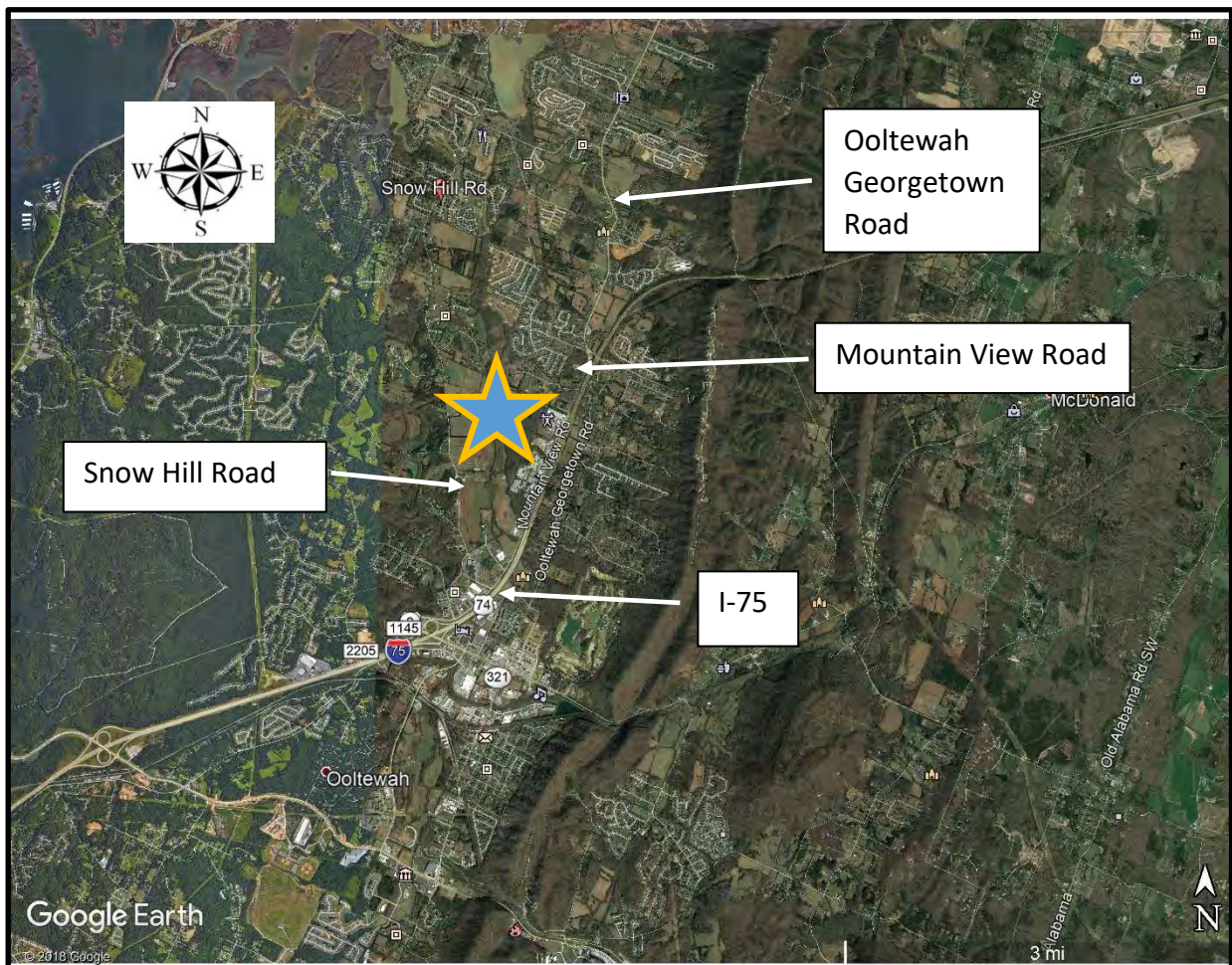


Figure 1 - Area Map



Figure 2 - Location Map

### 1.2 Project Description

The plan as mentioned above is to construct 453 single family dwellings on the site between Snow Hill Road and Mountain View Road. The proposed site plan is shown in the green color on the Site Map in **Figure 3**

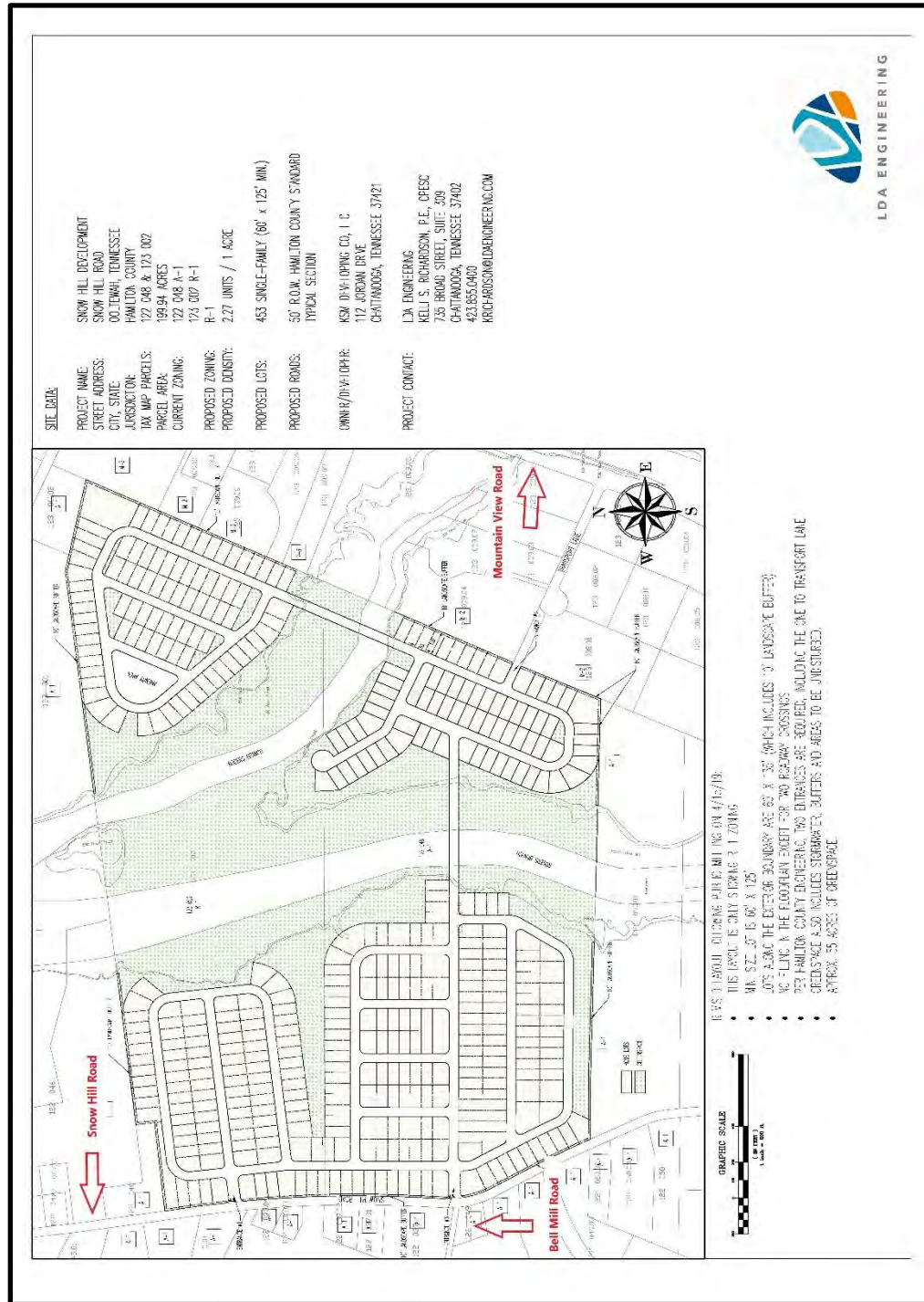


Figure 3 –Site Map



### 1.3 Study Area Description

The proposed subdivision is situated between Snow Hill Road on the west side and Mountain View Road on the east side. Snow Hill Road is a rolling two-lane connector road with a posted speed of 40 miles per hour. Ooltewah High School is located just south of the proposed subdivision. Mountain View Road is also a two-lane collector road in the study area with a posted speed of 45 miles per hour. Three entrances/exits are proposed for the development. Entrance 1 and Entrance 3 are planned for Snow Hill Road. Entrance 3 will be directly across from Bell Mill Road. Entrance 1 will be located approximately 1100 feet north of Entrance 3. Entrance 2 will be connected to Transport Lane which connects directly onto Mountain View Road. **Figures 4 A and B** show the entrance locations.



Figure 4A – Location of Entrance 1 and 3



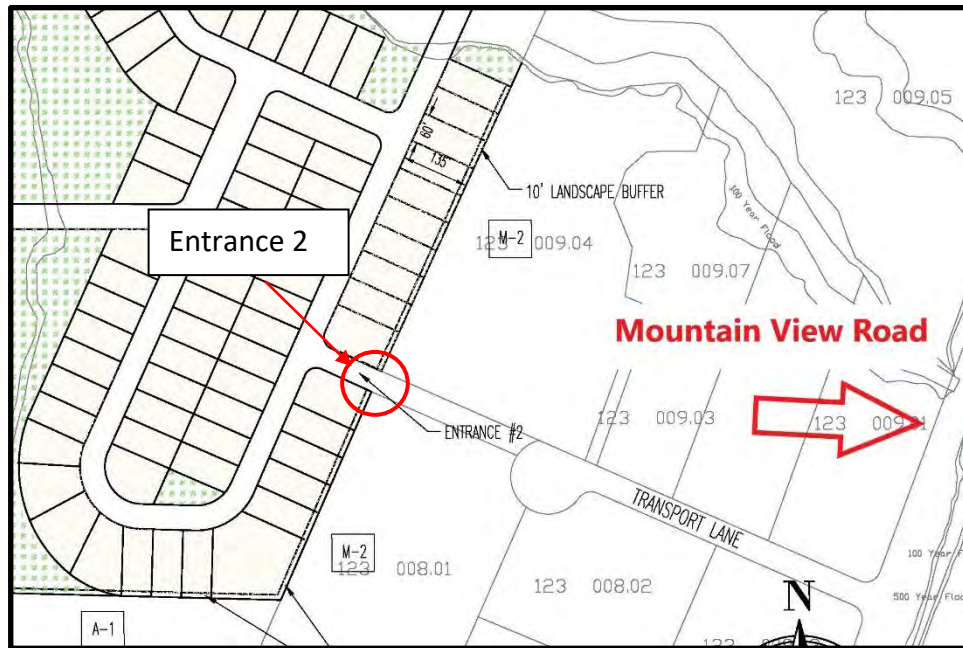


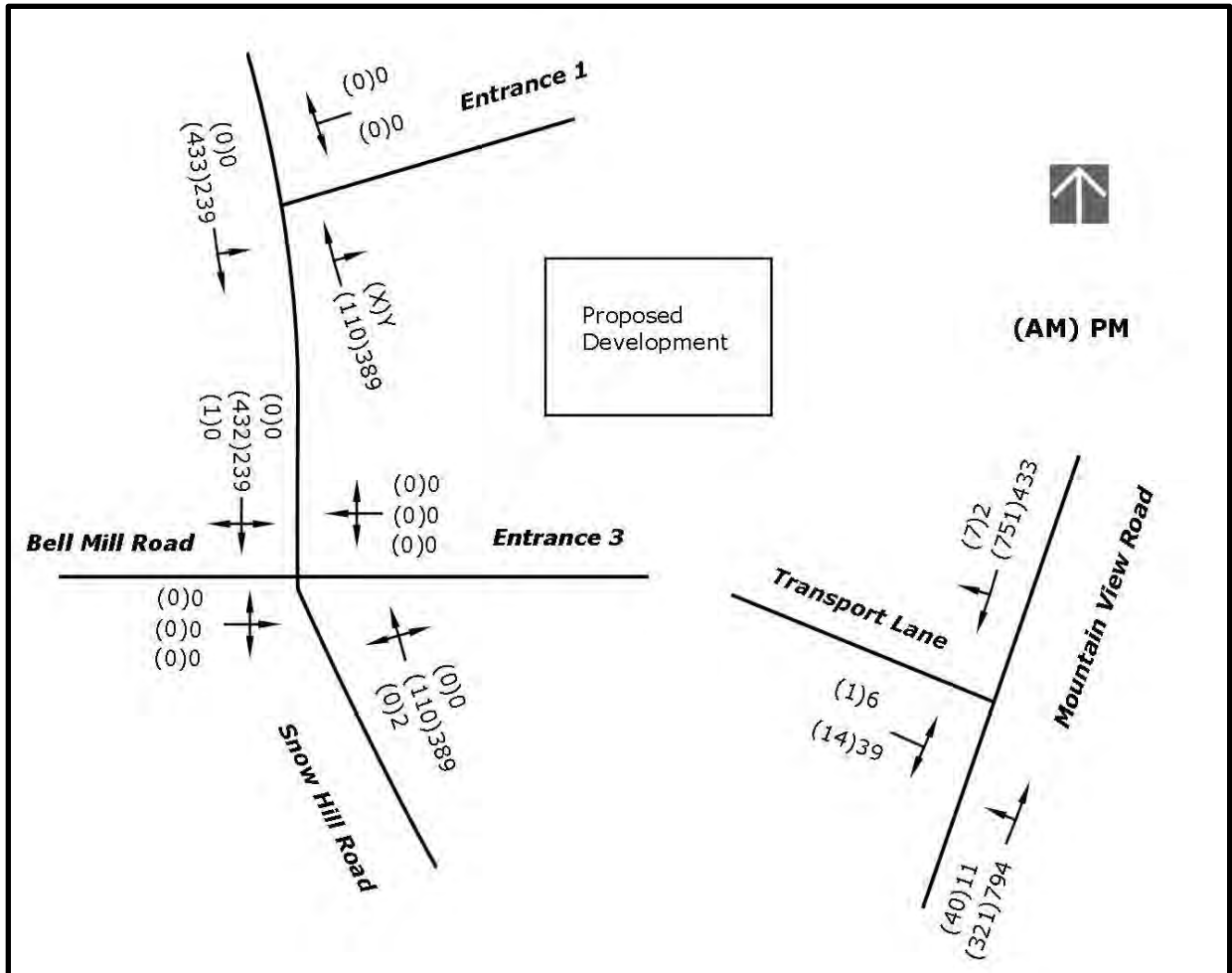
Figure 4B –Entrance 2

## 2.0 EXISTING CONDITIONS

### 2.1 2019 Traffic Volumes and Capacity Analysis

Fifteen-minute turning movement counts were made on May 21, 2019 from 7:00-9:00 AM and 2:00-6:00 PM to allow calculations of Level of Service (LOS) for Snowhill Road at Bell Mill Road and for Mountain View Road at Transport Drive. The traffic counts are shown in **Appendix 1**. The AM and PM Peaks were determined for Snow Hill Road to be from 7:15-8:15 AM and 5:00-6:00 PM, respectively. For Mountain View Road the AM and PM Peaks were determined to be 7:15-8:15 AM and 5:00-6:00 PM, respectively. **Figure 5** illustrates the hourly counts for the AM and PM Peaks in the area of study.





**Figure 5 – 2019 AM and PM Peak Hour Volumes**

A capacity and Level of Service (LOS) were performed on the existing street network prior to the new development for the AM and PM periods above using the SYNCHRO<sup>®</sup> 10.1 traffic simulation program as defined by the Highway Capacity Manual (HCM).

What is (LOS) in traffic engineering terms? Level of service is a system of ranking intersection performance using the average delay per vehicle as the evaluation criteria (expressed as seconds of delay per vehicle, or sec/veh). The HCM LOS rankings are displayed in **Table 1**. *Normally if an intersection operates at a LOS of C or better, that is satisfactory.*



| TABLE 1                    |                         |              |
|----------------------------|-------------------------|--------------|
| HCM Level of Service (LOS) |                         |              |
| LOS                        | Average Delay (sec/veh) |              |
|                            | Signalized              | Unsignalized |
| A                          | ≤ 10                    | ≤ 10         |
| B                          | >10-20                  | >10-15       |
| C                          | >20-35                  | >15-25       |
| D                          | >35-55                  | >25-35       |
| E                          | >55-80                  | >35-50       |
| F                          | >80                     | >50          |

**Table 2** illustrates the existing 2019 level of service for the intersections of Snow Hill Road at Bell Mill Road and then at Mountain View Road at Transport Lane. Snow Hill Road at Bell Mill Road operates at a LOS of A during the AM and PM Peaks. Mountain View Road at Transport Lane operates at a LOS of B during the AM Peak and at a LOS of A in the PM Peak. The SYNCHRO print out sheets are shown in **Appendix 2** for 2019.

| TABLE 2                                       |         |         |
|---|---------|---------|
| EXISTING 2019 LEVEL OF SERVICE (Delay in Sec) |         |         |
| Snow Hill Road at Bell Mill Road              | AM PEAK | PM PEAK |
| Eastbound Left/Right                          | A (0.0) | A (0.0) |
| Northbound Left/Thru                          | A (0.0) | A (0.1) |
| Southbound Right/Thru                         | A (0.0) | A (0.0) |
| <b>Intersection LOS</b>                       | A (0.0) | A (0.0) |



| TABLE 2 (Cont.)                      |                |                |
|--------------------------------------|----------------|----------------|
| EXISTING 2019 LEVEL OF SERVICE       |                |                |
| Mountain View Road at Transport Lane | AM PEAK        | PM PEAK        |
| Eastbound Left/Right                 | C (15.7)       | A (0.0)        |
| Northbound Left/Thru                 | A (1.6)        | A (0.1)        |
| Southbound Thru/Right                | A (0.0)        | A (0.0)        |
| <b>Intersection LOS</b>              | <b>B (0.7)</b> | <b>A (0.0)</b> |

## 2.2 2025 Traffic Volumes and Capacity Analysis

The SUBDIVISION is planned to be completed by 2025, thus the 2019 Annual Average Daily Traffic (AADT) volumes will need to be expanded to 2025. From the TDOT count station 00251 on Snow Hill Road near Amos Road there were 15 years of volumes from 2001 to 2016. **Figure 6** below shows the volume data points and the projections using regression analysis to 2019 and 2025. The AADT for Snow Hill Road expand from 7,920 to 8,800 vehicles per day.

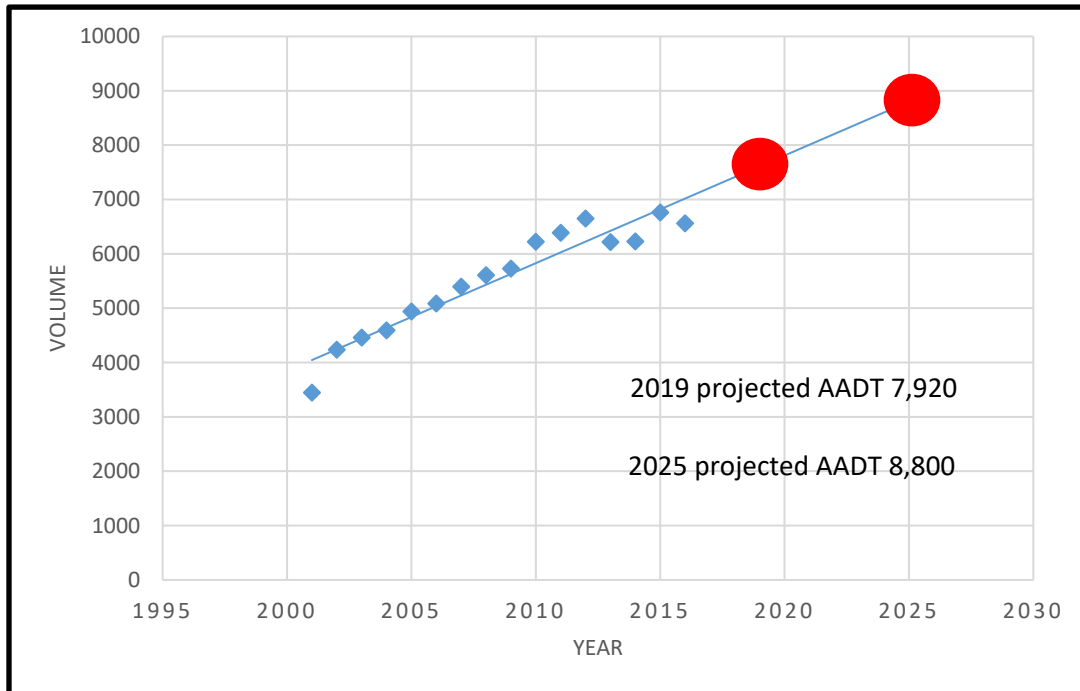
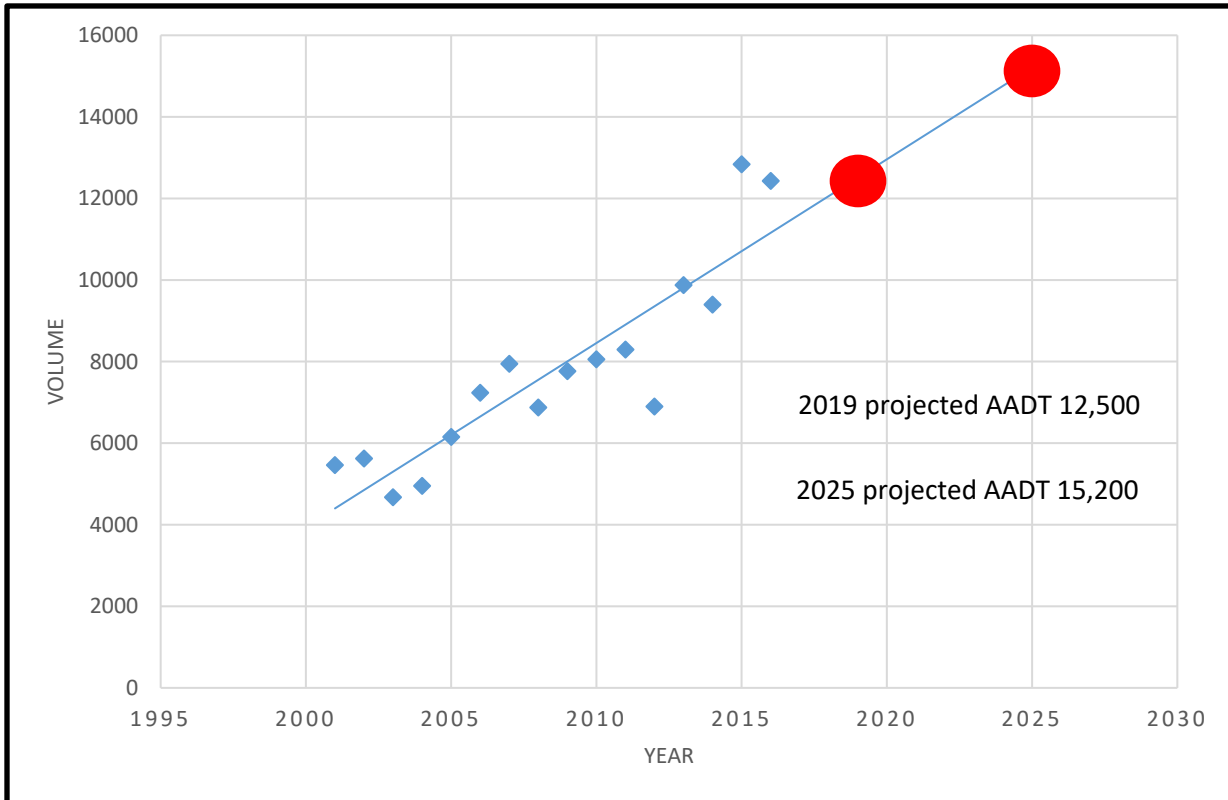


Figure 6-Projected Traffic Volumes on Snow Hill Road



From the TDOT count station 00534 on Mountain View Road near Transport Lane there were also 15 years of volumes from 2001 to 2016. **Figure 7** below shows the volume data points and the AADT projections on Mountain View Road from 12,500 to 15,200 vehicles per day in 2019 and 2025, respectively.



**Figure 7- Projected Traffic Volumes on Mountain View Road**

The percentage increase from 2019 to 2025 for Snow Hill Road is

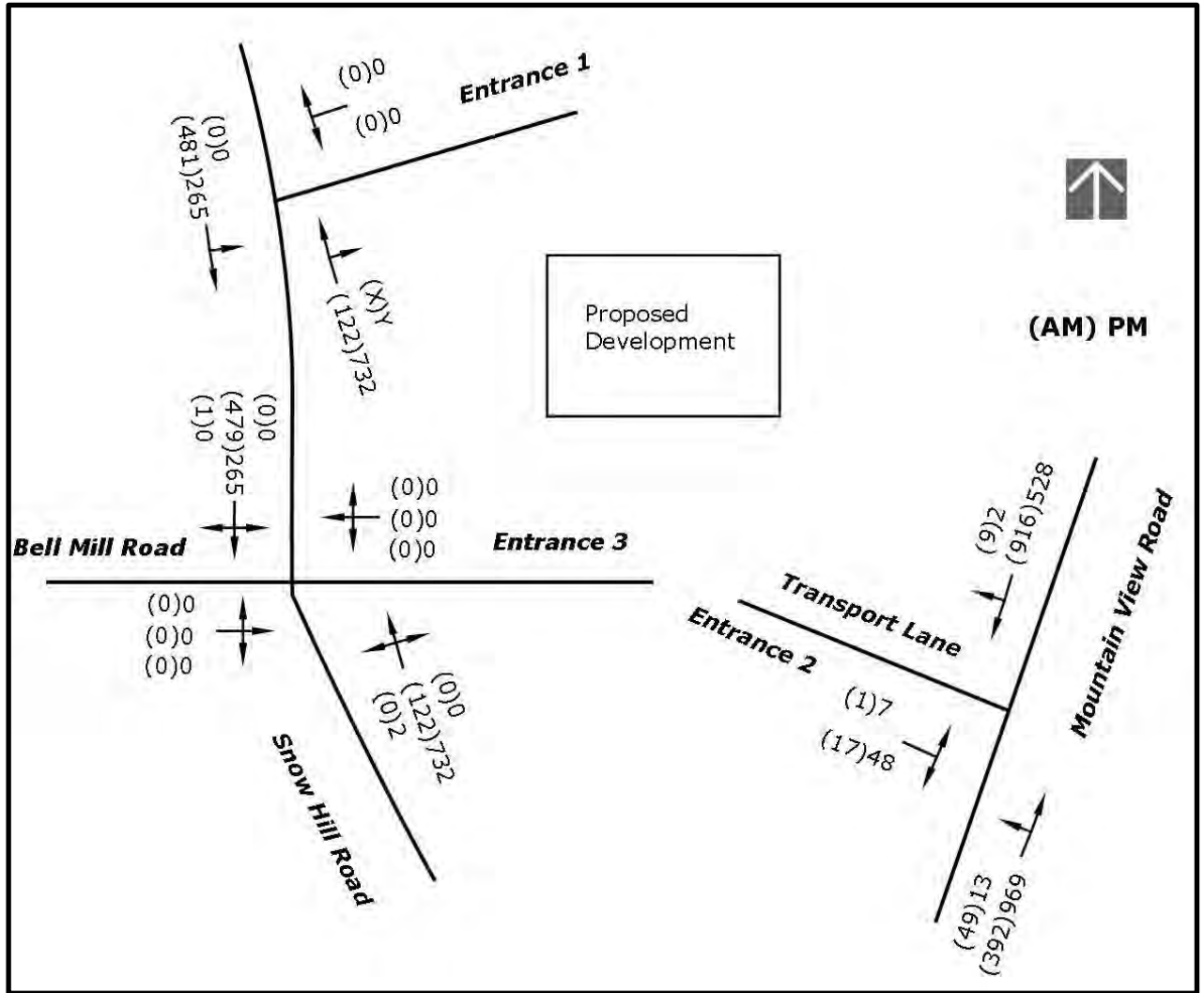
$$8,800/7,920 \text{ or } 11\%$$

The percentage increase from 2019 to 2025 for Mountain View Road is

$$15,200/12,500 \text{ or } 22\%$$

These values will be used to expand the 2019 hourly volumes to 2025 hourly volumes. **Figure 8** illustrates the expanded volumes for the 2025 AM and PM Peak Hour Volumes.





**Figure 8 – 2025 AM and PM Peak Hour Volumes**

**Table 3** illustrates the estimated 2025 LOS for the intersections of for Snow Hill Road at Bell Mill Road and for Mountain View Road at Transport Lane for the AM Peak and PM Peak in 2025 without the development. Snow Hill Road at Bell Mill Road operates at a LOS of A in the AM and PM Peaks. Mountain View Road at Transport Lane operates at a LOS of C in the AM and the PM Peaks. This is due mostly to the delay on Transport Lane. The SYNCHRO print out sheets are shown in **Appendix 4** for 2021.



| <b>TABLE 3</b>  |                |                |
|---|----------------|----------------|
| <b>ESTIMATED 2025 LEVEL OF SERVICE (Delay in Sec)</b> |                |                |
| <b>Snow Hill Road at Bell Mill Road</b>               | <b>AM PEAK</b> | <b>PM PEAK</b> |
| Eastbound Left/Right                                  | A (0.0)        | A (0.0)        |
| Northbound Left/Thru                                  | A (0.0)        | A (0.0)        |
| Southbound Right/Thru                                 | A (0.0)        | A (0.0)        |
| <b>Intersection LOS</b>                               | <b>A (0.0)</b> | <b>A (0.0)</b> |

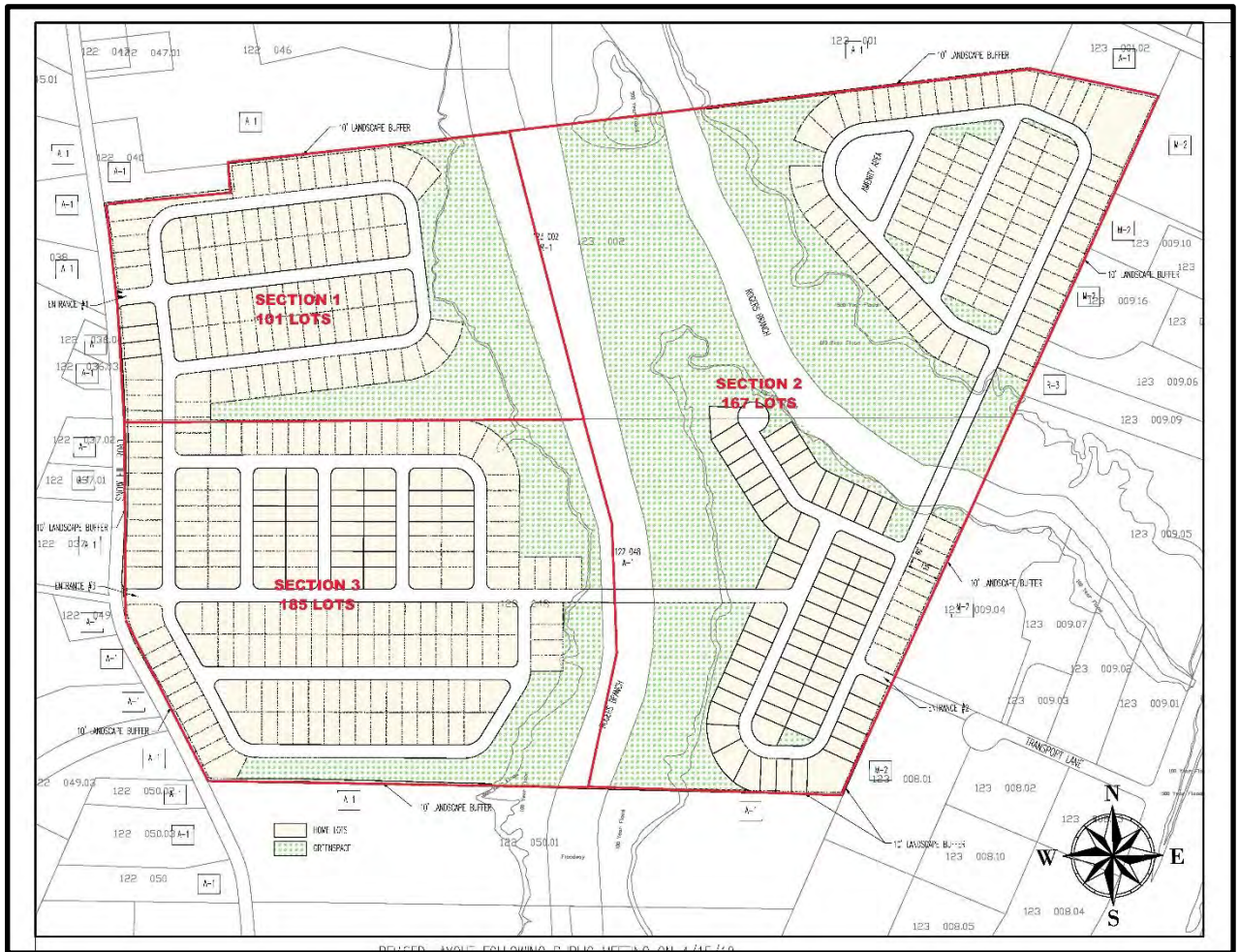
| <b>TABLE 3 (Cont.)</b>                                |                |                |
|---|----------------|----------------|
| <b>ESTIMATED 2025 LEVEL OF SERVICE (Delay in Sec)</b> |                |                |
| <b>Mountain View Road at Transport Lane</b>           | <b>AM PEAK</b> | <b>PM PEAK</b> |
| Eastbound Left/Right                                  | C (19.2)       | C (17.8)       |
| Northbound Left/Thru                                  | A (2.2)        | A (0.4)        |
| Southbound Thru/Right                                 | A (0.0)        | A (0.0)        |
| <b>Intersection LOS</b>                               | <b>C (0.9)</b> | <b>C (0.9)</b> |

### 3.0 NEW DEVELOPMENT LOS IMPACT

#### 3.1 Trip Generation

The ITE Trip Generation Manual Version 10 was used to estimate the number of trips generated by the new development. To estimate which entrance would be used by residents, three sections were identified to project from which lots trips would be generated. **Figure 9** illustrates the Section designation. Section 1 has 101 lots, Section 2 has 185 lots and Section 3 has 167 lots. The total number of lots is again at 453. For simplicity, trips from Section 1 will use Entrance 1, trips from Section 2 will use Entrance 2 and Trips from Section 3 will use Entrance 3.





**Figure 9 – Sections Used for Three Entrances**

The number of trips entering and exiting the new development by Section is summarized in **Table 4**. The report from the Trip Generation software is shown in **Appendix 5**.

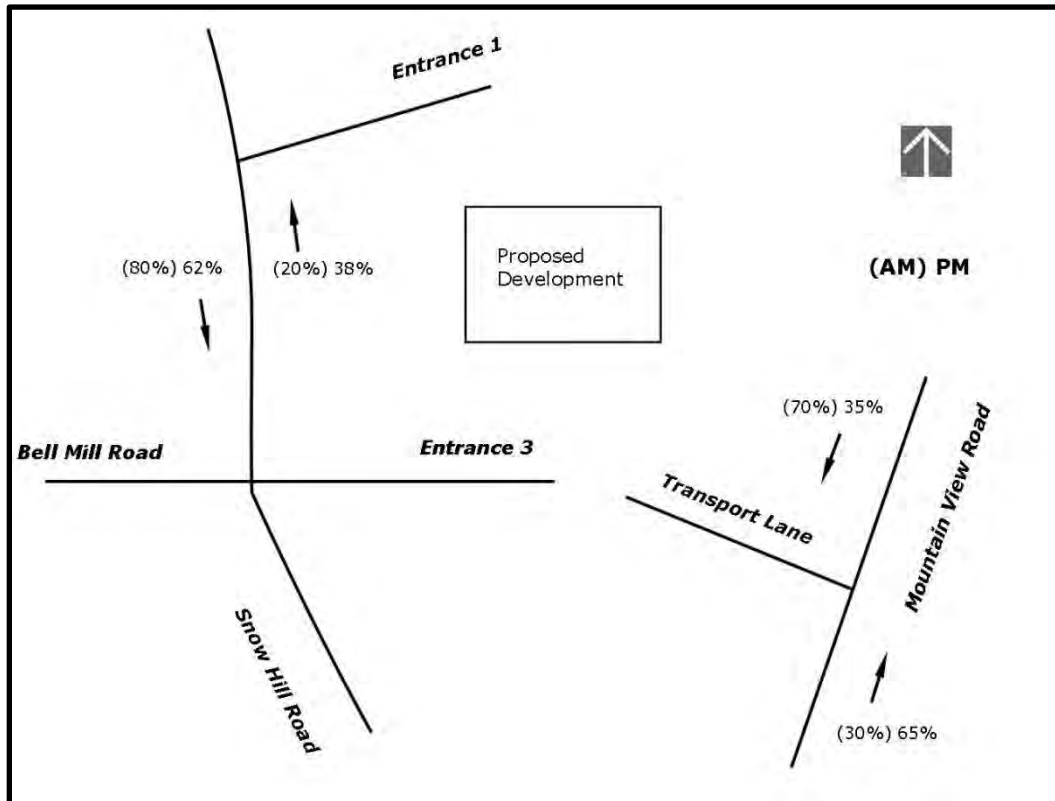
| <b>TABLE 4</b>                             |                     |             |              |                     |             |              |
|--|---------------------|-------------|--------------|---------------------|-------------|--------------|
| <b>TRIP GENERATION FOR NEW DEVELOPMENT</b> |                     |             |              |                     |             |              |
|  | <b>AM PEAK HOUR</b> |             |              | <b>PM PEAK HOUR</b> |             |              |
|  | <b>ENTER</b>        | <b>EXIT</b> | <b>TOTAL</b> | <b>ENTER</b>        | <b>EXIT</b> | <b>TOTAL</b> |
| Section 1                                  | 19                  | 56          | 75           | 63                  | 37          | 100          |
| Section 2                                  | 31                  | 93          | 124          | 104                 | 61          | 165          |
| Section 3                                  | 34                  | 103         | 137          | 115                 | 68          | 183          |
| <b>TOTAL</b>                               | <b>84</b>           | <b>252</b>  | <b>336</b>   | <b>282</b>          | <b>166</b>  | <b>448</b>   |





### 3.2 Trip Distribution and New Development Trips

The trip distribution is based on the existing directional split (turning movements) of the traffic in the AM and PM Peak periods from the 2019 traffic counts. **Figure 10** illustrates the percentages used to make assignments for the approaching vehicles for the AM and PM periods.



**Figure 10 – AM and PM Percentage Trip Distribution for Development**

Using the trip generation shown in **Table 4** and the percentage trip distribution shown in **Figure 8**, trip assignments were made for each of the new development's entrances. Those assignments are shown in **Figure 11**.

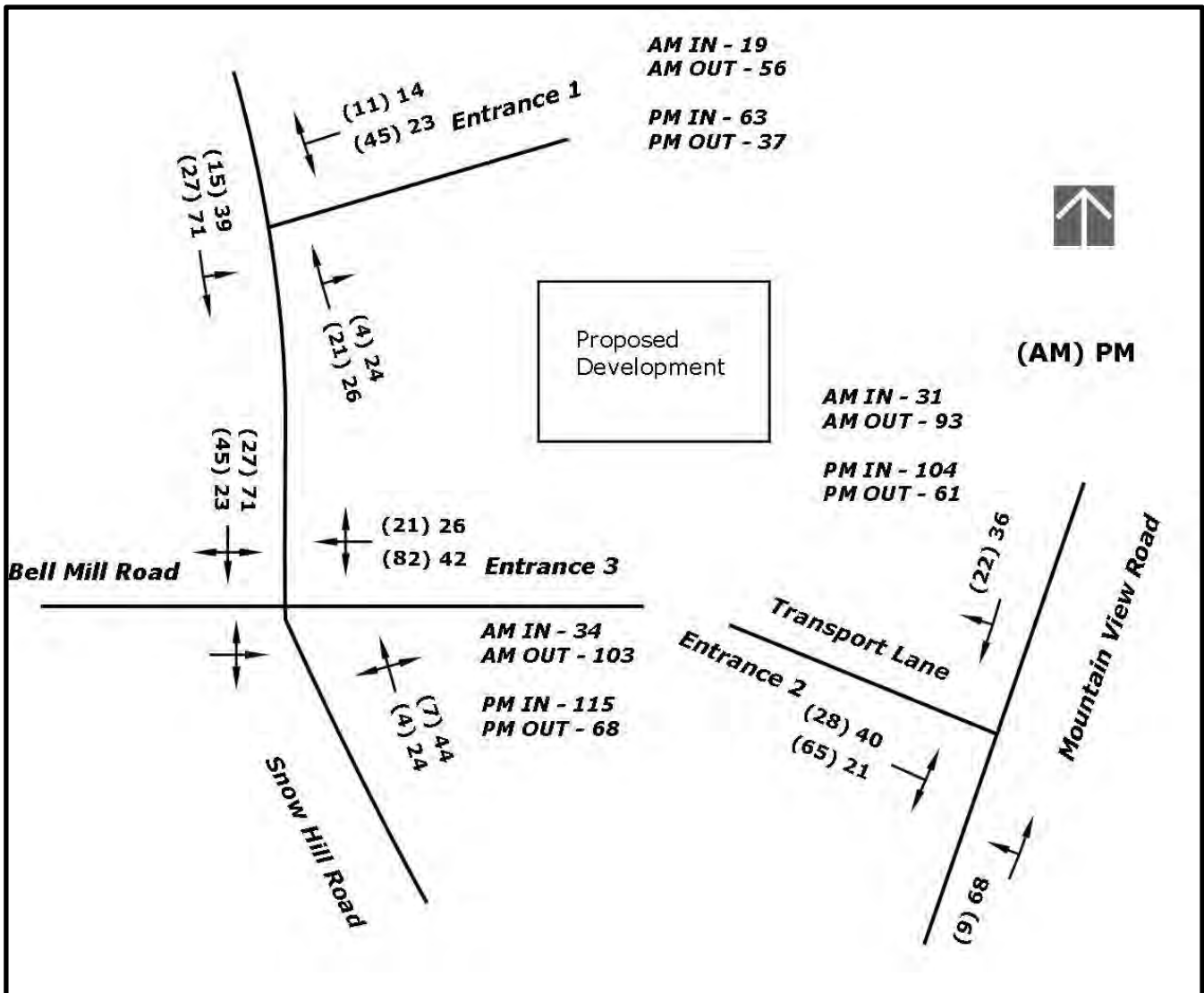


Figure 11 – AM and PM Trip Assignments

The estimated additional trips from the new development in **Figure 11** were added to the 2025 AM and PM peak hour trips from **Figure 8** to produce the 2025 total volumes after development is occupied and are shown in **Figure 12**.



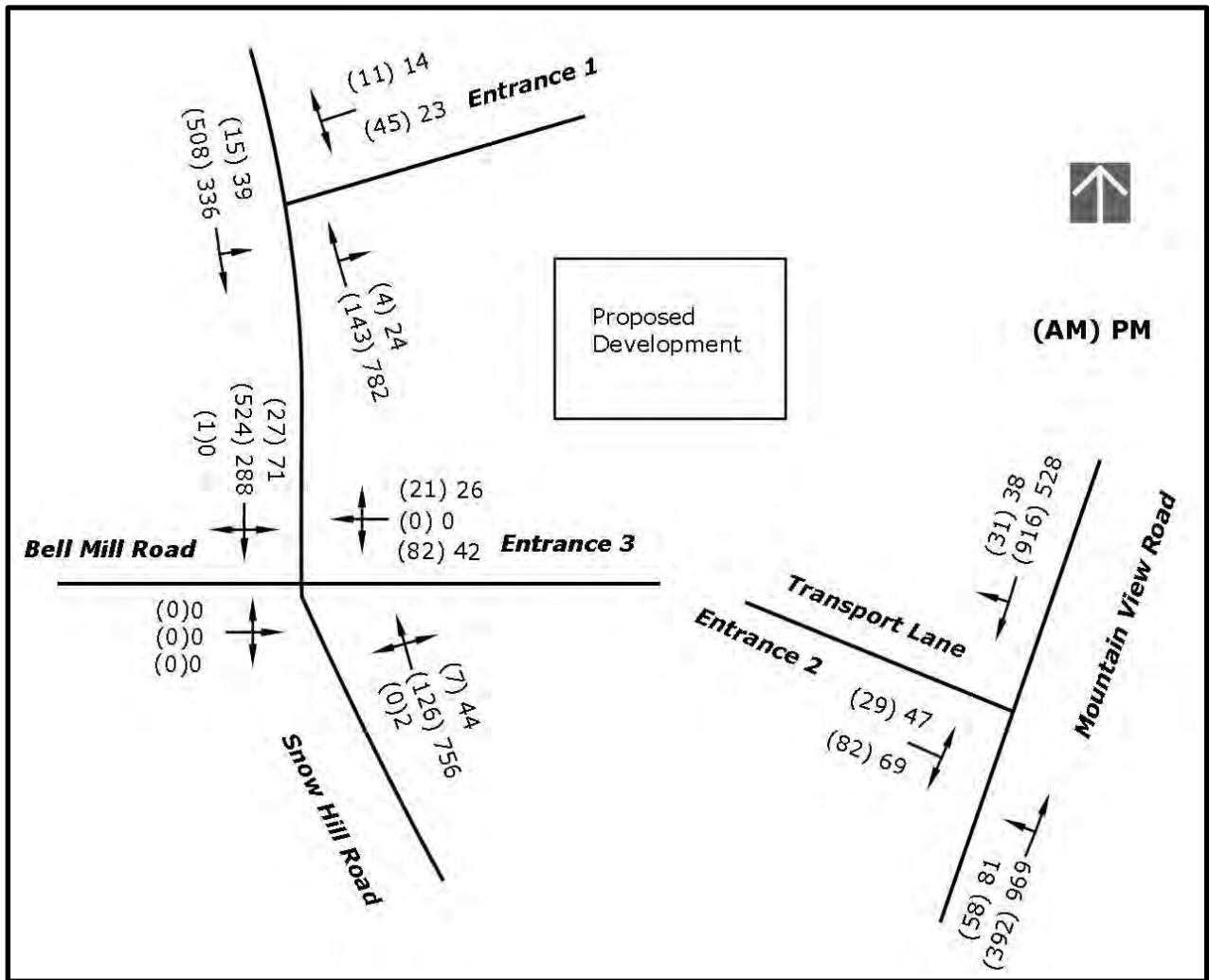


Figure 12 – 2025 Total Trips After New Development



### 3.3 LOS Evaluation

The volumes in **Figure 12** were input to SYNCHRO® 10.1 and produced the estimated LOS for each intersection movement along with the estimated delay in seconds. **Table 5** illustrates the estimated LOS of the intersections with the new development volumes added to the street network. The SYNCHRO print out sheets are shown in **Appendix 5** for 2025 with development.

| <b>TABLE 5</b>   |   |                    |   |                    |
|--|---|--------------------|---|--------------------|
| <b>2025 WITH NEW DEVELOPMENT LEVEL OF SERVICE (Delay in Sec)</b> |   |                    |   |                    |
| <b>Snow Hill Road at Bell Mill Road</b>                          | <b>AM PEAK</b>                              |                    | <b>PM PEAK</b>                              |                    |
|  | <b>No Development-&gt; With Development</b> |                    | <b>No Development-&gt; With Development</b> |                    |
| Eastbound Left/Thru/Right  | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0) | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0) |
| Westbound Left   | N/A -> C (21.0)                             | N/A -> C (18.6)    | N/A -> F (50.2)                             | N/A-> E (37.2)     |
| Westbound Thru/Right   | N/A -> A (9.1)                              |                    | N/A-> C (15.8)                              |                    |
| Northbound Left/Thru/Right                                       | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0) | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0) |
| Southbound Left/Thru/Right                                       | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.6) | A (0.0) -> A (3.0)                          | A (0.0) -> A (0.0) |
| <b>Intersection LOS</b>  | A (0.0) -> A (2.8)                          |                    | A (0.0) -> D (3.0)                          |                    |

| <b>TABLE 5 (Cont.)</b>   |   |                    |   |                    |
|--|---|--------------------|---|--------------------|
| <b>2025 WITH NEW DEVELOPMENT LEVEL OF SERVICE (Delay in Sec)</b> |   |                    |   |                    |
| <b>Snow Hill Road at Entrance 1</b>                              | <b>AM PEAK</b>                              |                    | <b>PM PEAK</b>                              |                    |
|  | <b>No Development-&gt; With Development</b> |                    | <b>No Development-&gt; With Development</b> |                    |
| Northbound Thru/Right  | A (0.0) ->                                  | A (0.0) -> A (0.0) | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0) |
| Southbound Thru/Left   | A (0.0) ->                                  | A (0.0) -> A (0.0) | A (0.0) -> A (1.4)                          | A (0.0) -> A (1.4) |
| Westbound Left   | N/A -> C (15.9)                             | N/A -> B (14.6)    | N/A -> E (40.1)                             | N/A -> D (30.9)    |
| Westbound Right  | N/A -> A (9.1)                              |                    | N/A -> C (15.6)                             |                    |
| <b>Intersection LOS</b>  | A (0.0) -> A (1.4)                          |                    | A (0.0) -> C (1.4)                          |                    |



| <b>TABLE 5 (Cont.)</b>   |   |                      |   |                      |
|--|---|----------------------|---|----------------------|
| <b>2025 WITH NEW DEVELOPMENT LEVEL OF SERVICE (Delay in Sec)</b> |   |                      |   |                      |
| <b>Mountain View Road at Transport Lane</b>                      | <b>AM PEAK</b>                              |                      | <b>PM PEAK</b>                              |                      |
|  | <b>No Development-&gt; With Development</b> |                      | <b>No Development-&gt; With Development</b> |                      |
| Eastbound Left/Right   | C (19.2) -> E (45.8)                        | C (19.2) -> E (45.8) | C (17.8) -> F (86.1)                        | C (17.8) -> F (86.1) |
| Northbound Thru/Left   | A (2.2) -> A (2.6)                          | A (2.2) -> A (2.6)   | A (0.4) -> A (2.7)                          | A (0.4) -> A (2.7)   |
| Southbound Thru/Right  | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0)   | A (0.0) -> A (0.0)                          | A (0.0) -> A (0.0)   |
| <b>Intersection LOS</b>  | C (0.9) -> E (4.1)                          |                      | C (0.9) -> F (7.5)                          |                      |

The additional number of trips according to SYNCHRO have the greatest impact on the vehicles leaving the new development.

- For Bell Mill Road at Entrance 3, the LOS for Snow Hill Road in the AM and PM Peaks continues to operate at LOS A. However, the vehicles leaving the development are estimated to operate at a LOS C in the morning and E in the afternoon.
- For Snow Hill Road at Entrance 1, the LOS for Snow Hill Road in the AM and PM Peaks continues to operate at LOS A. However, the vehicles leaving the development at Entrance 1 are estimated to operate at a LOS B in the morning and D in the afternoon.
- For Mountain View Road at Entrance 2, the LOS for Mountain View Road in the AM and PM Peaks continues to operate at LOS A. However, the vehicles leaving the development at Entrance 2 are estimated to operate at a LOS E in the morning and F in the afternoon.

One solution when the development is fully occupied in 2025 to the extended delays exiting the development is to add a two way left turn lane (TWLTL) to Snow Hill Road and to Mountain View Road at each entrance. For those turning left into the development, this would provide a refuge and allow the vehicles not turning to safely move past the entrance. The TWLTL would also allow vehicles leaving the entrances to cross the oncoming traffic from the left and have a refuge to merge into the through

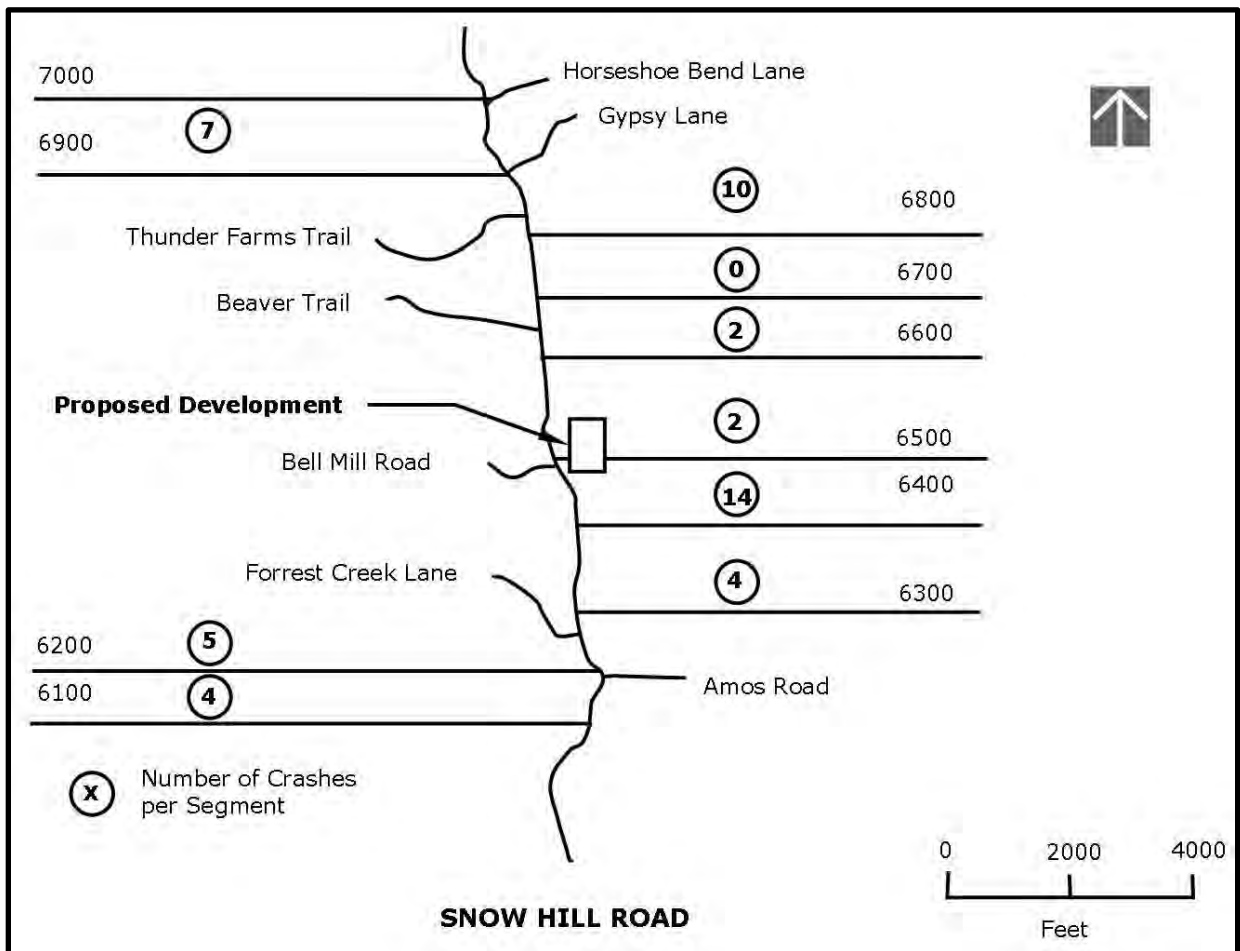


traffic on their right. The TWLTL would need to be a minimum of 150 including tapers feet on either side of each entrance to the subdivision.

#### 4.0 CRASH and SPEED DATA REVIEW

##### 4.1 Traffic Crash Data

The Hamilton County Engineering Department provided traffic crash data on Snow Hill Road from the 6100 block to the 6900 block from 2014 to 2018. The crash data was summarized by block and is shown in **Figure 13**.



**Figure 13 – Crash Data from 2015 to 2019**

From January 2015 to May 2019 there were a total of 48 crashes on Snow Hill Road from the 6100 Block through the 6900 block. The 6400 to 6500 Block experienced 14 crashes while the 6800 to 6900 Block experienced 10 crashes. Since the blocks are of differing lengths, to normalize this



information a calculation of Crash Rate by Length is made. The formula for calculating the Crash Rate by Length is shown below:

$$R=C/(N \times L) \text{ crashes per mile per year}$$

Where R=Crashes per mile for the road segment expressed as crashes per each one mile of roadway per year

C=Total number of crashes in study period

N=Number of years

L= Length of roadway segment in miles

For example, the 6100 Block of Snow Hill Road experienced 4 crashes, is 670 feet long (0.13 miles) over the 4-year period. The Crash Rate by Length is then:

$$R=4/(4 \times 0.13)= 7.88 \text{ crashes per mile per year}$$

**Table 6** summarizes the crashes per mile per year for each of the Blocks studied.

| TABLE 6                       |                   |                |      |         |                      |        |          |
|-------------------------------|-------------------|----------------|------|---------|----------------------|--------|----------|
| CRASH RATE BY ROADWAY SEGMENT |                   |                |      |         |                      |        |          |
| BLOCK NUMBER                  | BLOCK LENGTH (FT) | LENGTH (MILES) | ADT  | CRASHES | CRASH RATE BY LENGTH | INJURY | FATALITY |
| 6100                          | 670               | 0.13           | 7518 | 4       | 7.88                 | 0      | 0        |
| 6200                          | 1330              | 0.25           | 7518 | 5       | 4.96                 | 0      | 0        |
| 6300                          | 1405              | 0.27           | 7518 | 4       | 3.76                 | 0      | 0        |
| 6400                          | 1700              | 0.32           | 7518 | 14      | 10.87                | 1      | 1        |
| 6500                          | 980               | 0.19           | 7518 | 2       | 2.69                 | 0      | 0        |
| 6600                          | 932               | 0.18           | 7518 | 2       | 2.83                 | 0      | 0        |
| 6700                          | 1534              | 0.29           | 7518 | 0       | 0.00                 | 0      | 0        |
| 6800                          | 820               | 0.16           | 7518 | 10      | 16.10                | 1      | 0        |
| 6900                          | 1165              | 0.22           | 7518 | 7       | 7.93                 | 1      | 1        |
|                               |                   |                |      |         |                      |        |          |
| <b>TOTAL</b>                  | 10536             | 2.00           | 7518 | 48      | 6.01                 | 3      | 2        |

The highest crash rates by roadway segment from the 6100 to 6900 blocks occurred in the 6800 Block at 16.10 crashes per mile per year and the 6400 Block at 10.87 crashes per mile per year. The crash



rate for the total length from the 6100 Block to the 6900 Block was 6.01 crashes per mile per year.

It should be noted that there were three injuries and two fatalities for the studied blocks from 2015 to 2019. One of the fatalities occurred in the 6400 Block. The driver was not wearing a seat belt, the car rolled and the driver was thrown from the car. The second fatality occurred in the 6900 Block when a northbound driver ran into the right-side ditch, crossed the center line partially hitting the left-side ditch and then hit a southbound vehicle. The first vehicle driver died at the hospital.

The list of the crashes in the 6400 Block of Snow Hill Road is shown in **Table 7**.

| <b>TABLE 7</b>                                     |            |       |         |              |         |              |                          |          |
|--|------------|-------|---------|--------------|---------|--------------|--------------------------|----------|
| <b>CRASH LIST FOR 6400 BLOCK OF SNOW HILL ROAD</b> |            |       |         |              |         |              |                          |          |
| Crash Number                                       | DATE       | TIME  | WEATHER | LIGHT COND   | ALCOHOL | NO. VEHICLES | FIRST HARMFUL EVENT      | Fatality |
| 1  | 12/13/2015 | 19:41 | Cloudy  | Daylight     | Yes     | 1            | Embankment               | 0        |
| 2  | 7/23/2016  | 20:23 | Cloudy  | Daylight     | No      | 1            | Deer                     | 0        |
| 3  | 12/5/2016  | 23:29 | Rain    | Dark         | Yes     | 1            | Ditch                    | 0        |
| 4  | 2/5/2017   | 4:18  | Clear   | Dark         | No      | 1            | Curve/<br>Overcorrection | 0        |
| 5  | 2/21/2017  | 16:49 | Rain    | Daylight     | No      | 2            | Left Turn T-Bone         | 0        |
| 6  | 4/24/2017  | 00:01 | Rain    | Dark         | No      | 1            | Embankment               | 0        |
| 7  | 6/17/2017  | 1:59  | Cloudy  | Daylight     | No      | 2            | Golf Cart/Car            | 0        |
| 8  | 8/8/2017   | 8:56  | Cloudy  | Daylight     | No      | 1            | Curve/Speed              | 0        |
| 9  | 8/19/2017  | 18:09 | Clear   | Daylight     | No      | 1            | Hit and Run              | 0        |
| 10   | 9/6/2017   | 15:51 | Clear   | Daylight     | Yes     | 1            | Pedestrian/Speed         | 0        |
| 11   | 10/16/2017 | 19:36 | Clear   | Dark/Lighted | No      | 2            | Reckless Driving         | 0        |
| 12   | 4/19/2018  | 21:43 | Cloudy  | Dark         | No      | 1            | Roll Over                | 1        |
| 13   | 8/29/2018  | 23:35 | Clear   | Dark         | No      | 1            | Mail Box                 | 0        |
| 14   | 1/19/2019  | 16:21 | Rain    | Daylight     | Yes     | 2            | Sideswipe                | 0        |





Of the 14 crashes:

- 8 (57%) occurred during daylight hours
- 4 (29%) occurred during rain events
- 3 (21%) involved alcohol
- 10 (71%) were single vehicle crashes
- 11 (79%) could be considered related to speed

It appears that speed is a contributing factor for over 75% of the crashes in the 6400 Block of Snow Hill Road. Since 71% of the crashes are single vehicle, consideration for reviewing geometric changes of the roadway should be considered.

#### 4.2 Speed Data

The Hamilton County Sheriff's Office collected speed data at approximately the 6300 Block of Snow Hill Road from May 24, 2019 to May 28, 2019. The Sheriff's Office found that:

- Number of vehicles recorded ..... 25140 (100%)
- Number of vehicles recorded travelling below,  
at and up to 5 MPH over the posted speed limit ..... 15772 (63%)
- Number of vehicles recorded travelling 6-10 MPH  
over the posted speed limit ..... 7551 (30%)
- Number of vehicles recorded travelling 11-15 MPH  
over the posted speed limit ..... 1609 (6%)
- Number of vehicles recorded travelling 16 MPH  
over the posted speed limit ..... 208 (1%)

Considering that 37 per cent of the number of vehicles travelled over 6 MPH over the posted speed limit, the Hamilton County Sheriff's Office may wish to consider some additional speed enforcement on Snow Hill Road.



## 5.0 CONCLUSIONS

The development of the new subdivision on Snow Hill Road with 453 homes in 2025 is going to add traffic to Snow Hill Road and to Mountain View Road. The highest impact is estimated to occur for the residents leaving the development is fully developed in 2025. There will be considerable delays experienced during the AM and PM peaks as shown in the discussion above. To help reduce those delays and to improve safety one solution is to have a two way left turn lane be installed a minimum of 150 feet with tapers on either side of each entrance to the subdivision in 2025. This will allow vehicles turning left into the subdivision a safe area to wait for a gap in the traffic and allow the traffic behind the turning vehicle to move through the intersection. It will also allow vehicles exiting the subdivision a place to pause for a gap to develop in the through traffic movement.

From the traffic crash and speed data review, it appears that regular speed enforcement would help reduce the speed of vehicles in the 6400 Block of Snow Hill Road since over 75% appear have speed as a contributing factor. Further crash analyses should be made to determine if other safety measures are needed on Snow Hill Road.



# APPENDIX 1

## 15-minute Turning Movement Counts



## National Data & Surveying Services

# Intersection Turning Movement Count

Location: Mountain view Rd & Transport Ln  
 City: Ooltewah  
 Control: 1-Way Stop (EB)

Project ID: 19-10010-002  
 Date: 5/21/2019

### Total

| NS/EW Streets:          | Mountain view Rd    |        |       | Mountain view Rd |        |       | Transport Ln |       |        | Transport Ln |       |       | TOTAL        |
|-------------------------|---------------------|--------|-------|------------------|--------|-------|--------------|-------|--------|--------------|-------|-------|--------------|
|                         | NORTHBOUND          |        |       | SOUTHBOUND       |        |       | EASTBOUND    |       |        | WESTBOUND    |       |       |              |
|                         | 0                   | 1      | 0     | 0                | 1      | 0     | 0            | 1     | 0      | 0            | 0     | 0     |              |
| AM                      | NL                  | NT     | NR    | SL               | ST     | SR    | EL           | ET    | ER     | WL           | WT    | WR    |              |
| 7:00 AM                 | 3                   | 50     | 0     | 0                | 136    | 1     | 0            | 0     | 1      | 0            | 0     | 0     | 191          |
| 7:15 AM                 | 2                   | 67     | 0     | 0                | 144    | 0     | 0            | 0     | 1      | 0            | 0     | 0     | 214          |
| 7:30 AM                 | 4                   | 56     | 0     | 0                | 229    | 0     | 0            | 0     | 1      | 0            | 0     | 0     | 290          |
| 7:45 AM                 | 15                  | 78     | 0     | 0                | 153    | 5     | 0            | 0     | 4      | 0            | 0     | 0     | 255          |
| 8:00 AM                 | 7                   | 103    | 0     | 0                | 151    | 1     | 1            | 0     | 5      | 0            | 0     | 0     | 268          |
| 8:15 AM                 | 14                  | 84     | 0     | 0                | 218    | 1     | 0            | 0     | 4      | 0            | 0     | 0     | 321          |
| 8:30 AM                 | 7                   | 51     | 0     | 0                | 190    | 1     | 1            | 0     | 0      | 0            | 0     | 0     | 250          |
| 8:45 AM                 | 11                  | 77     | 0     | 0                | 113    | 0     | 0            | 0     | 5      | 0            | 0     | 0     | 206          |
| <b>TOTAL VOLUMES :</b>  | NL                  | NT     | NR    | SL               | ST     | SR    | EL           | ET    | ER     | WL           | WT    | WR    | TOTAL        |
|                         | 63                  | 566    | 0     | 0                | 1334   | 9     | 2            | 0     | 21     | 0            | 0     | 0     | 1995         |
| <b>APPROACH %'s :</b>   | 10.02%              | 89.98% | 0.00% | 0.00%            | 99.33% | 0.67% | 8.70%        | 0.00% | 91.30% |              |       |       |              |
| <b>PEAK HR :</b>        | 07:30 AM - 08:30 AM |        |       |                  |        |       |              |       |        |              |       |       | <b>TOTAL</b> |
| <b>PEAK HR VOL :</b>    | 40                  | 321    | 0     | 0                | 751    | 7     | 1            | 0     | 14     | 0            | 0     | 0     | 1134         |
| <b>PEAK HR FACTOR :</b> | 0.667               | 0.779  | 0.000 | 0.000            | 0.820  | 0.350 | 0.250        | 0.000 | 0.700  | 0.000        | 0.000 | 0.000 | 0.883        |
|                         |                     | 0.820  |       |                  | 0.828  |       |              | 0.625 |        |              |       |       |              |

| NS/EW Streets:          | Mountain view Rd    |        |       | Mountain view Rd |        |       | Transport Ln |       |        | Transport Ln |       |       | TOTAL        |
|-------------------------|---------------------|--------|-------|------------------|--------|-------|--------------|-------|--------|--------------|-------|-------|--------------|
|                         | NORTHBOUND          |        |       | SOUTHBOUND       |        |       | EASTBOUND    |       |        | WESTBOUND    |       |       |              |
|                         | 0                   | 1      | 0     | 0                | 1      | 0     | 0            | 1     | 0      | 0            | 0     | 0     |              |
| PM                      | NL                  | NT     | NR    | SL               | ST     | SR    | EL           | ET    | ER     | WL           | WT    | WR    |              |
| 2:00 PM                 | 5                   | 94     | 0     | 0                | 76     | 0     | 2            | 0     | 8      | 0            | 0     | 0     | 185          |
| 2:15 PM                 | 5                   | 105    | 0     | 0                | 101    | 1     | 2            | 0     | 5      | 0            | 0     | 0     | 219          |
| 2:30 PM                 | 3                   | 117    | 0     | 0                | 112    | 0     | 0            | 0     | 7      | 0            | 0     | 0     | 239          |
| 2:45 PM                 | 4                   | 127    | 0     | 0                | 95     | 1     | 0            | 0     | 6      | 0            | 0     | 0     | 233          |
| 3:00 PM                 | 3                   | 119    | 0     | 0                | 85     | 0     | 3            | 0     | 8      | 0            | 0     | 0     | 218          |
| 3:15 PM                 | 6                   | 133    | 0     | 0                | 63     | 0     | 0            | 0     | 1      | 0            | 0     | 0     | 203          |
| 3:30 PM                 | 4                   | 141    | 0     | 0                | 122    | 0     | 0            | 0     | 22     | 0            | 0     | 0     | 289          |
| 3:45 PM                 | 3                   | 128    | 0     | 0                | 137    | 1     | 0            | 0     | 9      | 0            | 0     | 0     | 278          |
| 4:00 PM                 | 4                   | 137    | 0     | 0                | 92     | 1     | 0            | 0     | 6      | 0            | 0     | 0     | 240          |
| 4:15 PM                 | 3                   | 180    | 0     | 0                | 96     | 0     | 1            | 0     | 1      | 0            | 0     | 0     | 281          |
| 4:30 PM                 | 3                   | 167    | 0     | 0                | 109    | 1     | 4            | 0     | 9      | 0            | 0     | 0     | 293          |
| 4:45 PM                 | 1                   | 160    | 0     | 0                | 107    | 0     | 1            | 0     | 10     | 0            | 0     | 0     | 279          |
| 5:00 PM                 | 5                   | 181    | 0     | 0                | 111    | 0     | 3            | 0     | 17     | 0            | 0     | 0     | 317          |
| 5:15 PM                 | 2                   | 197    | 0     | 0                | 110    | 1     | 2            | 0     | 10     | 0            | 0     | 0     | 322          |
| 5:30 PM                 | 3                   | 203    | 0     | 0                | 128    | 0     | 0            | 0     | 5      | 0            | 0     | 0     | 339          |
| 5:45 PM                 | 1                   | 213    | 0     | 0                | 84     | 1     | 1            | 0     | 7      | 0            | 0     | 0     | 307          |
| <b>TOTAL VOLUMES :</b>  | NL                  | NT     | NR    | SL               | ST     | SR    | EL           | ET    | ER     | WL           | WT    | WR    | TOTAL        |
|                         | 55                  | 2402   | 0     | 0                | 1628   | 7     | 19           | 0     | 131    | 0            | 0     | 0     | 4242         |
| <b>APPROACH %'s :</b>   | 2.24%               | 97.76% | 0.00% | 0.00%            | 99.57% | 0.43% | 12.67%       | 0.00% | 87.33% |              |       |       |              |
| <b>PEAK HR :</b>        | 05:00 PM - 06:00 PM |        |       |                  |        |       |              |       |        |              |       |       | <b>TOTAL</b> |
| <b>PEAK HR VOL :</b>    | 11                  | 794    | 0     | 0                | 433    | 2     | 6            | 0     | 39     | 0            | 0     | 0     | 1285         |
| <b>PEAK HR FACTOR :</b> | 0.550               | 0.932  | 0.000 | 0.000            | 0.846  | 0.500 | 0.500        | 0.000 | 0.574  | 0.000        | 0.000 | 0.000 | 0.948        |
|                         |                     | 0.940  |       |                  | 0.850  |       |              | 0.563 |        |              |       |       |              |



# APPENDIX 2

## 2019 SYNCHRO PRINTOUTS



HCM Unsignalized Intersection Capacity Analysis  
 2: Bell Mill Road/Entrance 3 & Snow Hill Road

06/04/2019

| Movement                          | EBL  | EBT  | EBR  | WBL   | WBT  | WBR  | NBL                  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|------|-------|------|------|----------------------|------|------|------|------|------|
| Lane Configurations               |      | ↔    |      | ↔     | ↔    |      |                      | ↔    |      |      | ↔    |      |
| Traffic Volume (veh/h)            | 0    | 0    | 0    | 0     | 0    | 0    | 0                    | 110  | 0    | 0    | 432  | 1    |
| Future Volume (veh/h)             | 0    | 0    | 0    | 0     | 0    | 0    | 0                    | 110  | 0    | 0    | 432  | 1    |
| Sign Control                      | Stop |      |      | Stop  |      |      | Free                 |      |      | Free |      |      |
| Grade                             | 0%   |      |      | 0%    |      |      | 0%                   |      |      | 0%   |      |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92                 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 0    | 0     | 0    | 0    | 0                    | 120  | 0    | 0    | 470  | 1    |
| Pedestrians                       |      |      |      |       |      |      |                      |      |      |      |      |      |
| Lane Width (ft)                   |      |      |      |       |      |      |                      |      |      |      |      |      |
| Walking Speed (ft/s)              |      |      |      |       |      |      |                      |      |      |      |      |      |
| Percent Blockage                  |      |      |      |       |      |      |                      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |      |       |      |      |                      |      |      |      |      |      |
| Median type                       |      |      |      |       |      |      | None                 |      |      | None |      |      |
| Median storage (veh)              |      |      |      |       |      |      |                      |      |      |      |      |      |
| Upstream signal (ft)              |      |      |      |       |      |      |                      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |      |       |      |      |                      |      |      |      |      |      |
| vC, conflicting volume            | 590  | 590  | 470  | 590   | 591  | 120  | 471                  |      |      |      | 120  |      |
| vC1, stage 1 conf vol             |      |      |      |       |      |      |                      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |      |       |      |      |                      |      |      |      |      |      |
| vCu, unblocked vol                | 590  | 590  | 470  | 590   | 591  | 120  | 471                  |      |      |      | 120  |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2  | 7.1   | 6.5  | 6.2  | 4.1                  |      |      |      | 4.1  |      |
| tC, 2 stage (s)                   |      |      |      |       |      |      |                      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3  | 3.5   | 4.0  | 3.3  | 2.2                  |      |      |      | 2.2  |      |
| pD queue free %                   | 100  | 100  | 100  | 100   | 100  | 100  | 100                  |      |      |      | 100  |      |
| cM capacity (veh/h)               | 419  | 420  | 593  | 419   | 420  | 931  | 1091                 |      |      |      | 1468 |      |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2 | NB 1  | SB 1 |      |                      |      |      |      |      |      |
| Volume Total                      | 0    | 0    | 0    | 120   | 471  |      |                      |      |      |      |      |      |
| Volume Left                       | 0    | 0    | 0    | 0     | 0    |      |                      |      |      |      |      |      |
| Volume Right                      | 0    | 0    | 0    | 0     | 1    |      |                      |      |      |      |      |      |
| cSH                               | 1700 | 1700 | 1700 | 1091  | 1468 |      |                      |      |      |      |      |      |
| Volume to Capacity                | 0.00 | 0.00 | 0.00 | 0.00  | 0.00 |      |                      |      |      |      |      |      |
| Queue Length 95th (ft)            | 0    | 0    | 0    | 0     | 0    |      |                      |      |      |      |      |      |
| Control Delay (s)                 | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  |      |                      |      |      |      |      |      |
| Lane LOS                          | A    | A    | A    |       |      |      |                      |      |      |      |      |      |
| Approach Delay (s)                | 0.0  | 0.0  |      | 0.0   | 0.0  |      |                      |      |      |      |      |      |
| Approach LOS                      | A    | A    |      |       |      |      |                      |      |      |      |      |      |
| Intersection Summary              |      |      |      |       |      |      |                      |      |      |      |      |      |
| Average Delay                     |      |      |      | 0.0   |      |      |                      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      |      | 26.1% |      |      | ICU Level of Service |      |      | A    |      |      |
| Analysis Period (min)             |      |      |      | 15    |      |      |                      |      |      |      |      |      |

HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/06/2019



| Movement                          | EBL         | EBR         | NBL         | NBT  | SBT                  | SBR  |
|-----------------------------------|-------------|-------------|-------------|------|----------------------|------|
| Lane Configurations               | ↘           |             |             | ↙    | ↘                    | ↙    |
| Traffic Volume (veh/h)            | 1           | 14          | 40          | 321  | 751                  | 7    |
| Future Volume (veh/h)             | 1           | 14          | 40          | 321  | 751                  | 7    |
| Sign Control                      | Stop        |             |             | Free | Free                 |      |
| Grade                             | 0%          |             |             | 0%   | 0%                   |      |
| Peak Hour Factor                  | 0.92        | 0.92        | 0.92        | 0.92 | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 1           | 15          | 43          | 349  | 816                  | 8    |
| Pedestrians                       |             |             |             |      |                      |      |
| Lane Width (ft)                   |             |             |             |      |                      |      |
| Walking Speed (ft/s)              |             |             |             |      |                      |      |
| Percent Blockage                  |             |             |             |      |                      |      |
| Right turn flare (veh)            |             |             |             |      |                      |      |
| Median type                       |             |             |             | None | None                 |      |
| Median storage (veh)              |             |             |             |      |                      |      |
| Upstream signal (ft)              |             |             |             |      |                      |      |
| pX, platoon unblocked             |             |             |             |      |                      |      |
| vC, conflicting volume            | 1255        | 820         | 824         |      |                      |      |
| vC1, stage 1 conf vol             |             |             |             |      |                      |      |
| vC2, stage 2 conf vol             |             |             |             |      |                      |      |
| vCu, unblocked vol                | 1255        | 820         | 824         |      |                      |      |
| tC, single (s)                    | 6.4         | 6.2         | 4.1         |      |                      |      |
| tC, 2 stage (s)                   |             |             |             |      |                      |      |
| tF (s)                            | 3.5         | 3.3         | 2.2         |      |                      |      |
| p0 queue free %                   | 99          | 96          | 95          |      |                      |      |
| cM capacity (veh/h)               | 179         | 375         | 306         |      |                      |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>SB 1</b> |      |                      |      |
| Volume Total                      | 16          | 392         | 824         |      |                      |      |
| Volume Left                       | 1           | 43          | 0           |      |                      |      |
| Volume Right                      | 15          | 0           | 8           |      |                      |      |
| cSH                               | 351         | 306         | 1700        |      |                      |      |
| Volume to Capacity                | 0.05        | 0.05        | 0.48        |      |                      |      |
| Queue Length 95th (ft)            | 4           | 4           | 0           |      |                      |      |
| Control Delay (s)                 | 15.7        | 1.6         | 0.0         |      |                      |      |
| Lane LOS                          | C           | A           |             |      |                      |      |
| Approach Delay (s)                | 15.7        | 1.6         | 0.0         |      |                      |      |
| Approach LOS                      | C           |             |             |      |                      |      |
| <b>Intersection Summary</b>       |             |             |             |      |                      |      |
| Average Delay                     |             |             | 0.7         |      |                      |      |
| Intersection Capacity Utilization |             |             | 60.4%       |      | ICU Level of Service | B    |
| Analysis Period (min)             |             |             | 15          |      |                      |      |





HCM Unsignalized Intersection Capacity Analysis  
 2: Bell Mill Road/Entrance 3 & Snow Hill Road

06/06/2019

| Movement                          | EBL  | EBT  | EBR  | WBL   | WBT  | WBR                  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations               |      | ↔    |      | ↔     | ↔    |                      |      | ↔    |      |      | ↔    |      |
| Traffic Volume (veh/h)            | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 389  | 0    | 0    | 239  | 0    |
| Future Volume (veh/h)             | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 389  | 0    | 0    | 239  | 0    |
| Sign Control                      | Stop |      |      | Stop  |      |                      | Free |      |      | Free |      |      |
| Grade                             | 0%   |      |      | 0%    |      |                      | 0%   |      |      | 0%   |      |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 423  | 0    | 0    | 260  | 0    |
| Pedestrians                       |      |      |      |       |      |                      |      |      |      |      |      |      |
| Lane Width (ft)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| Walking Speed (ft/s)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Percent Blockage                  |      |      |      |       |      |                      |      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |      |       |      |                      |      |      |      |      |      |      |
| Median type                       |      |      |      |       |      |                      | None |      |      | None |      |      |
| Median storage (veh)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Upstream signal (ft)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC, conflicting volume            | 687  | 687  | 260  | 687   | 687  | 423                  | 260  |      |      | 423  |      |      |
| vC1, stage 1 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vCu, unblocked vol                | 687  | 687  | 260  | 687   | 687  | 423                  | 260  |      |      | 423  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2  | 7.1   | 6.5  | 6.2                  | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3  | 3.5   | 4.0  | 3.3                  | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                   | 100  | 100  | 100  | 100   | 100  | 100                  | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)               | 361  | 369  | 779  | 361   | 369  | 631                  | 1304 |      |      | 1136 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2 | NB 1  | SB 1 |                      |      |      |      |      |      |      |
| Volume Total                      | 0    | 0    | 0    | 425   | 260  |                      |      |      |      |      |      |      |
| Volume Left                       | 0    | 0    | 0    | 2     | 0    |                      |      |      |      |      |      |      |
| Volume Right                      | 0    | 0    | 0    | 0     | 0    |                      |      |      |      |      |      |      |
| cSH                               | 1700 | 1700 | 1700 | 1304  | 1136 |                      |      |      |      |      |      |      |
| Volume to Capacity                | 0.00 | 0.00 | 0.00 | 0.00  | 0.00 |                      |      |      |      |      |      |      |
| Queue Length 95th (ft)            | 0    | 0    | 0    | 0     | 0    |                      |      |      |      |      |      |      |
| Control Delay (s)                 | 0.0  | 0.0  | 0.0  | 0.1   | 0.0  |                      |      |      |      |      |      |      |
| Lane LOS                          | A    | A    | A    | A     | A    |                      |      |      |      |      |      |      |
| Approach Delay (s)                | 0.0  | 0.0  |      | 0.1   | 0.0  |                      |      |      |      |      |      |      |
| Approach LOS                      | A    | A    |      |       |      |                      |      |      |      |      |      |      |
| Intersection Summary              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Average Delay                     |      |      |      | 0.0   |      |                      |      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      |      | 25.4% |      | ICU Level of Service |      |      | A    |      |      |      |
| Analysis Period (min)             |      |      |      | 15    |      |                      |      |      |      |      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/06/2019



| Movement                          | EBL         | EBR         | NBL         | NBT                  | SBT  | SBR  |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations               | ↘           |             |             | ↕                    | ↗    |      |
| Traffic Volume (veh/h)            | 6           | 39          | 11          | 794                  | 433  | 2    |
| Future Volume (veh/h)             | 6           | 39          | 11          | 794                  | 433  | 2    |
| Sign Control                      | Stop        |             |             | Free                 | Free |      |
| Grade                             | 0%          |             |             | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.92        | 0.92        | 0.92        | 0.92                 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 7           | 42          | 12          | 863                  | 471  | 2    |
| Pedestrians                       |             |             |             |                      |      |      |
| Lane Width (ft)                   |             |             |             |                      |      |      |
| Walking Speed (ft/s)              |             |             |             |                      |      |      |
| Percent Blockage                  |             |             |             |                      |      |      |
| Right turn flare (veh)            |             |             |             |                      |      |      |
| Median type                       |             |             |             | None                 | None |      |
| Median storage (veh)              |             |             |             |                      |      |      |
| Upstream signal (ft)              |             |             |             |                      |      |      |
| pX, platoon unblocked             |             |             |             |                      |      |      |
| vC, conflicting volume            | 1359        | 472         | 473         |                      |      |      |
| vC1, stage 1 conf vol             |             |             |             |                      |      |      |
| vC2, stage 2 conf vol             |             |             |             |                      |      |      |
| vCu, unblocked vol                | 1359        | 472         | 473         |                      |      |      |
| tC, single (s)                    | 6.4         | 6.2         | 4.1         |                      |      |      |
| tC, 2 stage (s)                   |             |             |             |                      |      |      |
| tF (s)                            | 3.5         | 3.3         | 2.2         |                      |      |      |
| p0 queue free %                   | 96          | 93          | 99          |                      |      |      |
| cM capacity (veh/h)               | 162         | 592         | 1089        |                      |      |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>SB 1</b> |                      |      |      |
| Volume Total                      | 49          | 875         | 473         |                      |      |      |
| Volume Left                       | 7           | 12          | 0           |                      |      |      |
| Volume Right                      | 42          | 0           | 2           |                      |      |      |
| cSH                               | 429         | 1089        | 1700        |                      |      |      |
| Volume to Capacity                | 0.11        | 0.01        | 0.28        |                      |      |      |
| Queue Length 95th (ft)            | 10          | 1           | 0           |                      |      |      |
| Control Delay (s)                 | 14.5        | 0.3         | 0.0         |                      |      |      |
| Lane LOS                          | B           | A           |             |                      |      |      |
| Approach Delay (s)                | 14.5        | 0.3         | 0.0         |                      |      |      |
| Approach LOS                      | B           |             |             |                      |      |      |
| <b>Intersection Summary</b>       |             |             |             |                      |      |      |
| Average Delay                     |             |             | 0.7         |                      |      |      |
| Intersection Capacity Utilization |             | 60.6%       |             | ICU Level of Service |      | B    |
| Analysis Period (min)             |             |             | 15          |                      |      |      |



APPENDIX 3  
2025 SYNCHRO REPORTS  
NO DEVELOPMENT



HCM Unsignalized Intersection Capacity Analysis  
6: Snow Hill Road & Entrance 1

06/06/2019

|                                   | ↙    | ↘    | ↑     | ↙    | ↘                    | ↓    |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement                          | WBL  | WBR  | NBT   | NBR  | SBL                  | SBT  |
| Lane Configurations               | ↙    | ↘    | ↑     |      |                      | ↓    |
| Traffic Volume (veh/h)            | 0    | 0    | 122   | 0    | 0                    | 481  |
| Future Volume (veh/h)             | 0    | 0    | 122   | 0    | 0                    | 481  |
| Sign Control                      | Stop |      | Free  |      |                      | Free |
| Grade                             | 0%   |      | 0%    |      |                      | 0%   |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 133   | 0    | 0                    | 523  |
| Pedestrians                       |      |      |       |      |                      |      |
| Lane Width (ft)                   |      |      |       |      |                      |      |
| Walking Speed (ft/s)              |      |      |       |      |                      |      |
| Percent Blockage                  |      |      |       |      |                      |      |
| Right turn flare (veh)            |      |      |       |      |                      |      |
| Median type                       |      |      | None  |      |                      | None |
| Median storage (veh)              |      |      |       |      |                      |      |
| Upstream signal (ft)              |      |      |       |      |                      |      |
| pX, platoon unblocked             |      |      |       |      |                      |      |
| vC, conflicting volume            | 656  | 133  |       |      | 133                  |      |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 656  | 133  |       |      | 133                  |      |
| tC, single (s)                    | 6.4  | 6.2  |       |      | 4.1                  |      |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 3.5  | 3.3  |       |      | 2.2                  |      |
| p0 queue free %                   | 100  | 100  |       |      | 100                  |      |
| cM capacity (veh/h)               | 430  | 916  |       |      | 1452                 |      |
| Direction, Lane #                 | WB 1 | WB 2 | NB 1  | SB 1 |                      |      |
| Volume Total                      | 0    | 0    | 133   | 523  |                      |      |
| Volume Left                       | 0    | 0    | 0     | 0    |                      |      |
| Volume Right                      | 0    | 0    | 0     | 0    |                      |      |
| cSH                               | 1700 | 1700 | 1700  | 1452 |                      |      |
| Volume to Capacity                | 0.00 | 0.00 | 0.08  | 0.00 |                      |      |
| Queue Length 95th (ft)            | 0    | 0    | 0     | 0    |                      |      |
| Control Delay (s)                 | 0.0  | 0.0  | 0.0   | 0.0  |                      |      |
| Lane LOS                          | A    | A    |       |      |                      |      |
| Approach Delay (s)                | 0.0  |      | 0.0   | 0.0  |                      |      |
| Approach LOS                      | A    |      |       |      |                      |      |
| <b>Intersection Summary</b>       |      |      |       |      |                      |      |
| Average Delay                     |      |      | 0.0   |      |                      |      |
| Intersection Capacity Utilization |      |      | 28.6% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |



HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/06/2019



| Movement                          | EBL  | EBR  | NBL  | NBT   | SBT                  | SBR  |
|-----------------------------------|------|------|------|-------|----------------------|------|
| Lane Configurations               | ↵    |      |      | ↕     | ↕                    |      |
| Traffic Volume (veh/h)            | 1    | 17   | 49   | 392   | 916                  | 9    |
| Future Volume (Veh/h)             | 1    | 17   | 49   | 392   | 916                  | 9    |
| Sign Control                      | Stop |      |      | Free  |                      | Free |
| Grade                             | 0%   |      |      | 0%    |                      | 0%   |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 1    | 18   | 53   | 426   | 996                  | 10   |
| Pedestrians                       |      |      |      |       |                      |      |
| Lane Width (ft)                   |      |      |      |       |                      |      |
| Walking Speed (ft/s)              |      |      |      |       |                      |      |
| Percent Blockage                  |      |      |      |       |                      |      |
| Right turn flare (veh)            |      |      |      |       |                      |      |
| Median type                       |      |      |      | None  | None                 |      |
| Median storage (veh)              |      |      |      |       |                      |      |
| Upstream signal (ft)              |      |      |      |       |                      |      |
| pX, platoon unblocked             |      |      |      |       |                      |      |
| vC, conflicting volume            | 1533 | 1001 | 1006 |       |                      |      |
| vC1, stage 1 conf vol             |      |      |      |       |                      |      |
| vC2, stage 2 conf vol             |      |      |      |       |                      |      |
| vCu, unblocked vol                | 1533 | 1001 | 1006 |       |                      |      |
| tC, single (s)                    | 6.4  | 6.2  | 4.1  |       |                      |      |
| tC, 2 stage (s)                   |      |      |      |       |                      |      |
| tF (s)                            | 3.5  | 3.3  | 2.2  |       |                      |      |
| p0 queue free %                   | 99   | 94   | 92   |       |                      |      |
| cM capacity (veh/h)               | 118  | 295  | 689  |       |                      |      |
| Direction, Lane #                 | EB 1 | NB 1 | SB 1 |       |                      |      |
| Volume Total                      | 19   | 479  | 1006 |       |                      |      |
| Volume Left                       | 1    | 53   | 0    |       |                      |      |
| Volume Right                      | 18   | 0    | 10   |       |                      |      |
| cSH                               | 273  | 689  | 1700 |       |                      |      |
| Volume to Capacity                | 0.07 | 0.08 | 0.59 |       |                      |      |
| Queue Length 95th (ft)            | 6    | 6    | 0    |       |                      |      |
| Control Delay (s)                 | 19.2 | 2.2  | 0.0  |       |                      |      |
| Lane LOS                          | C    | A    |      |       |                      |      |
| Approach Delay (s)                | 19.2 | 2.2  | 0.0  |       |                      |      |
| Approach LOS                      | C    |      |      |       |                      |      |
| Intersection Summary              |      |      |      |       |                      |      |
| Average Delay                     |      |      |      | 0.9   |                      |      |
| Intersection Capacity Utilization |      |      |      | 71.7% | ICU Level of Service | C    |
| Analysis Period (min)             |      |      |      | 15    |                      |      |



HCM Unsignalized Intersection Capacity Analysis  
 2: Bell Mill Road/Entrance 3 & Snow Hill Road

06/08/2019

| Movement                          | EBL  | EBT  | EBR  | WBL   | WBT  | WBR                  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations               |      | ↔    |      | ↔     | ↔    |                      |      | ↔    |      |      | ↔    |      |
| Traffic Volume (veh/h)            | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 732  | 0    | 0    | 265  | 0    |
| Future Volume (veh/h)             | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 732  | 0    | 0    | 265  | 0    |
| Sign Control                      | Stop |      |      | Stop  |      |                      | Free |      |      | Free |      |      |
| Grade                             | 0%   |      |      | 0%    |      |                      | 0%   |      |      | 0%   |      |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 0    | 0     | 0    | 0                    | 2    | 796  | 0    | 0    | 288  | 0    |
| Pedestrians                       |      |      |      |       |      |                      |      |      |      |      |      |      |
| Lane Width (ft)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| Walking Speed (ft/s)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Percent Blockage                  |      |      |      |       |      |                      |      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |      |       |      |                      |      |      |      |      |      |      |
| Median type                       |      |      |      |       |      |                      | None |      |      | None |      |      |
| Median storage (veh)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Upstream signal (ft)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC, conflicting volume            | 1088 | 1088 | 288  | 1088  | 1088 | 796                  | 288  |      |      | 796  |      |      |
| vC1, stage 1 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vCu, unblocked vol                | 1088 | 1088 | 288  | 1088  | 1088 | 796                  | 288  |      |      | 796  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2  | 7.1   | 6.5  | 6.2                  | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3  | 3.5   | 4.0  | 3.3                  | 2.2  |      |      | 2.2  |      |      |
| pD queue free %                   | 100  | 100  | 100  | 100   | 100  | 100                  | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)               | 193  | 215  | 751  | 193   | 215  | 387                  | 1274 |      |      | 826  |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2 | NB 1  | SB 1 |                      |      |      |      |      |      |      |
| Volume Total                      | 0    | 0    | 0    | 798   | 288  |                      |      |      |      |      |      |      |
| Volume Left                       | 0    | 0    | 0    | 2     | 0    |                      |      |      |      |      |      |      |
| Volume Right                      | 0    | 0    | 0    | 0     | 0    |                      |      |      |      |      |      |      |
| cSH                               | 1700 | 1700 | 1700 | 1274  | 826  |                      |      |      |      |      |      |      |
| Volume to Capacity                | 0.00 | 0.00 | 0.00 | 0.00  | 0.00 |                      |      |      |      |      |      |      |
| Queue Length 95th (ft)            | 0    | 0    | 0    | 0     | 0    |                      |      |      |      |      |      |      |
| Control Delay (s)                 | 0.0  | 0.0  | 0.0  | 0.0   | 0.0  |                      |      |      |      |      |      |      |
| Lane LOS                          | A    | A    | A    | A     | A    |                      |      |      |      |      |      |      |
| Approach Delay (s)                | 0.0  | 0.0  |      | 0.0   | 0.0  |                      |      |      |      |      |      |      |
| Approach LOS                      | A    | A    |      |       |      |                      |      |      |      |      |      |      |
| Intersection Summary              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Average Delay                     |      |      |      | 0.0   |      |                      |      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      |      | 43.4% |      | ICU Level of Service |      |      | A    |      |      |      |
| Analysis Period (min)             |      |      |      | 15    |      |                      |      |      |      |      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/08/2019



| Movement                          | EBL  | EBR  | NBL  | NBT   | SBT                  | SBR  |
|-----------------------------------|------|------|------|-------|----------------------|------|
| Lane Configurations               | ↘ ↙  |      |      | ↕ ↗   |                      |      |
| Traffic Volume (veh/h)            | 7    | 48   | 13   | 969   | 528                  | 2    |
| Future Volume (veh/h)             | 7    | 48   | 13   | 969   | 528                  | 2    |
| Sign Control                      | Stop |      |      | Free  |                      | Free |
| Grade                             | 0%   |      |      | 0%    | 0%                   |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 8    | 52   | 14   | 1053  | 574                  | 2    |
| Pedestrians                       |      |      |      |       |                      |      |
| Lane Width (ft)                   |      |      |      |       |                      |      |
| Walking Speed (ft/s)              |      |      |      |       |                      |      |
| Percent Blockage                  |      |      |      |       |                      |      |
| Right turn flare (veh)            |      |      |      |       |                      |      |
| Median type                       |      |      |      | None  | None                 |      |
| Median storage (veh)              |      |      |      |       |                      |      |
| Upstream signal (ft)              |      |      |      |       |                      |      |
| pX, platoon unblocked             |      |      |      |       |                      |      |
| vC, conflicting volume            | 1656 | 575  | 576  |       |                      |      |
| vC1, stage 1 conf vol             |      |      |      |       |                      |      |
| vC2, stage 2 conf vol             |      |      |      |       |                      |      |
| vCu, unblocked vol                | 1656 | 575  | 576  |       |                      |      |
| tC, single (s)                    | 6.4  | 6.2  | 4.1  |       |                      |      |
| tC, 2 stage (s)                   |      |      |      |       |                      |      |
| tF (s)                            | 3.5  | 3.3  | 2.2  |       |                      |      |
| p0 queue free %                   | 92   | 90   | 99   |       |                      |      |
| cM capacity (veh/h)               | 106  | 518  | 997  |       |                      |      |
| Direction, Lane #                 | EB 1 | NB 1 | SB 1 |       |                      |      |
| Volume Total                      | 60   | 1067 | 576  |       |                      |      |
| Volume Left                       | 8    | 14   | 0    |       |                      |      |
| Volume Right                      | 52   | 0    | 2    |       |                      |      |
| cSH                               | 341  | 997  | 1700 |       |                      |      |
| Volume to Capacity                | 0.18 | 0.01 | 0.34 |       |                      |      |
| Queue Length 95th (ft)            | 16   | 1    | 0    |       |                      |      |
| Control Delay (s)                 | 17.8 | 0.4  | 0.0  |       |                      |      |
| Lane LOS                          | C    | A    |      |       |                      |      |
| Approach Delay (s)                | 17.8 | 0.4  | 0.0  |       |                      |      |
| Approach LOS                      | C    |      |      |       |                      |      |
| Intersection Summary              |      |      |      |       |                      |      |
| Average Delay                     |      |      |      | 0.9   |                      |      |
| Intersection Capacity Utilization |      |      |      | 71.4% | ICU Level of Service | C    |
| Analysis Period (min)             |      |      |      | 15    |                      |      |



# APPENDIX 4

## TRIP GENERATION







**Trip Generation Summary**

Alternative: Alternative 1  
 Phase: Ooltewah Subdivision  
 Project: Ooltewah Subdivision  
 Open Date: 6/7/2019  
 Analysis Date: 6/7/2019

| ITE | Land Use                         | Weekday Average Daily Trips |      |       | Weekday AM Peak Hour of Adjacent Street Traffic |      |       | Weekday PM Peak Hour of Adjacent Street Traffic |      |       | Weekday AM Peak Hour of Generator |      |       |
|-----|----------------------------------|-----------------------------|------|-------|---|------|-------|---|------|-------|-----------------------------------|------|-------|
|     |                                  | * Enter                     | Exit | Total | * Enter   | Exit | Total | * Enter   | Exit | Total | * Enter                           | Exit | Total |
| 210 | Section 2<br>167 Dwelling Units  | 788                         | 788  | 1576  | 31  | 93   | 124   | 104   | 61   | 165   | 33                                | 84   | 127   |
| 210 | Section 3<br>185 Dwelling Units  | 873                         | 873  | 1746  | 34  | 103  | 137   | 115   | 68   | 183   | 37                                | 104  | 141   |
| 210 | Section 1<br>101 Dwelling Units  | 477                         | 476  | 953   | 19  | 56   | 75    | 63  | 37   | 100   | 20                                | 57   | 77    |
|     | Unadjusted Volume                | 2138                        | 2137 | 4275  | 84  | 252  | 336   | 282   | 166  | 448   | 90                                | 255  | 345   |
|     | Internal Capture Trips           | 0                           | 0    | 0     | 0   | 0    | 0     | 0   | 0    | 0     | 0                                 | 0    | 0     |
|     | Pass-By Trips                    | 0                           | 0    | 0     | 0   | 0    | 0     | 0   | 0    | 0     | 0                                 | 0    | 0     |
|     | Volume Added to Adjacent Streets | 2138                        | 2137 | 4275  | 84  | 252  | 338   | 282   | 166  | 448   | 90                                | 255  | 345   |

Total Weekday Average Daily Trips Internal Capture = 0 Percent  
 Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent  
 Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent  
 Total Weekday AM Peak Hour of Generator Internal Capture = 0 Percent

\* - Custom rate used for selected time period.

APPENDIX 5  
SYNCHRO REPORTS  
2025 WITH DEVELOPMENT



HCM Unsignalized Intersection Capacity Analysis  
 2: Bell Mill Road/Entrance 3 & Snow Hill Road

06/08/2019

| Movement                          | EBL  | EBT  | EBR  | WBL   | WBT  | WBR                  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations               |      | ↔    |      | ↔     | ↔    |                      |      | ↔    |      |      | ↔    |      |
| Traffic Volume (veh/h)            | 0    | 0    | 0    | 82    | 0    | 21                   | 0    | 126  | 7    | 27   | 524  | 1    |
| Future Volume (veh/h)             | 0    | 0    | 0    | 82    | 0    | 21                   | 0    | 126  | 7    | 27   | 524  | 1    |
| Sign Control                      | Stop |      |      | Stop  |      |                      | Free |      |      | Free |      |      |
| Grade                             | 0%   |      |      | 0%    |      |                      | 0%   |      |      | 0%   |      |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 0    | 89    | 0    | 23                   | 0    | 137  | 8    | 29   | 570  | 1    |
| Pedestrians                       |      |      |      |       |      |                      |      |      |      |      |      |      |
| Lane Width (ft)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| Walking Speed (ft/s)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Percent Blockage                  |      |      |      |       |      |                      |      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |      |       |      |                      |      |      |      |      |      |      |
| Median type                       |      |      |      |       |      |                      | None |      |      | None |      |      |
| Median storage (veh)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Upstream signal (ft)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC, conflicting volume            | 792  | 774  | 570  | 770   | 770  | 141                  | 571  |      |      | 145  |      |      |
| vC1, stage 1 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vCu, unblocked vol                | 792  | 774  | 570  | 770   | 770  | 141                  | 571  |      |      | 145  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2  | 7.1   | 6.5  | 6.2                  | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3  | 3.5   | 4.0  | 3.3                  | 2.2  |      |      | 2.2  |      |      |
| pD queue free %                   | 100  | 100  | 100  | 72    | 100  | 97                   | 100  |      |      | 98   |      |      |
| cM capacity (veh/h)               | 294  | 323  | 521  | 313   | 324  | 907                  | 1002 |      |      | 1437 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2 | NB 1  | SB 1 |                      |      |      |      |      |      |      |
| Volume Total                      | 0    | 89   | 23   | 145   | 600  |                      |      |      |      |      |      |      |
| Volume Left                       | 0    | 89   | 0    | 0     | 29   |                      |      |      |      |      |      |      |
| Volume Right                      | 0    | 0    | 23   | 8     | 1    |                      |      |      |      |      |      |      |
| cSH                               | 1700 | 313  | 907  | 1002  | 1437 |                      |      |      |      |      |      |      |
| Volume to Capacity                | 0.00 | 0.28 | 0.03 | 0.00  | 0.02 |                      |      |      |      |      |      |      |
| Queue Length 95th (ft)            | 0    | 29   | 2    | 0     | 2    |                      |      |      |      |      |      |      |
| Control Delay (s)                 | 0.0  | 21.0 | 9.1  | 0.0   | 0.6  |                      |      |      |      |      |      |      |
| Lane LOS                          | A    | C    | A    |       | A    |                      |      |      |      |      |      |      |
| Approach Delay (s)                | 0.0  | 18.6 |      | 0.0   | 0.6  |                      |      |      |      |      |      |      |
| Approach LOS                      | A    | C    |      |       |      |                      |      |      |      |      |      |      |
| Intersection Summary              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Average Delay                     |      |      |      | 2.8   |      |                      |      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      |      | 50.7% |      | ICU Level of Service |      |      | A    |      |      |      |
| Analysis Period (min)             |      |      |      | 15    |      |                      |      |      |      |      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
6: Snow Hill Road & Entrance 1

06/08/2019

|                                   | ↙    | ↘    | ↑     | ↙                    | ↘    | ↓    |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement                          | WBL  | WBR  | NBT   | NBR                  | SBL  | SBT  |
| Lane Configurations               | ↙    | ↘    | ↑     |                      |      | ↓    |
| Traffic Volume (veh/h)            | 45   | 11   | 143   | 4                    | 15   | 508  |
| Future Volume (veh/h)             | 45   | 11   | 143   | 4                    | 15   | 508  |
| Sign Control                      | Stop |      | Free  |                      | Free |      |
| Grade                             | 0%   |      | 0%    |                      | 0%   |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92                 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 49   | 12   | 155   | 4                    | 16   | 552  |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      |      |
| Median type                       | None |      |       | None                 |      |      |
| Median storage (veh)              |      |      |       |                      |      |      |
| Upstream signal (ft)              |      |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            | 741  | 157  |       |                      | 159  |      |
| vC1, stage 1 conf vol             |      |      |       |                      |      |      |
| vC2, stage 2 conf vol             |      |      |       |                      |      |      |
| vCu, unblocked vol                | 741  | 157  |       |                      | 159  |      |
| tC, single (s)                    | 6.4  | 6.2  |       |                      | 4.1  |      |
| tC, 2 stage (s)                   |      |      |       |                      |      |      |
| tF (s)                            | 3.5  | 3.3  |       |                      | 2.2  |      |
| pO queue free %                   | 87   | 99   |       |                      | 99   |      |
| cM capacity (veh/h)               | 379  | 389  |       |                      | 1420 |      |
| Direction, Lane #                 | WB 1 | WB 2 | NB 1  | SB 1                 |      |      |
| Volume Total                      | 49   | 12   | 159   | 568                  |      |      |
| Volume Left                       | 49   | 0    | 0     | 16                   |      |      |
| Volume Right                      | 0    | 12   | 4     | 0                    |      |      |
| cSH                               | 379  | 389  | 1700  | 1420                 |      |      |
| Volume to Capacity                | 0.13 | 0.01 | 0.09  | 0.01                 |      |      |
| Queue Length 95th (ft)            | 11   | 1    | 0     | 1                    |      |      |
| Control Delay (s)                 | 15.9 | 9.1  | 0.0   | 0.3                  |      |      |
| Lane LOS                          | C    | A    |       | A                    |      |      |
| Approach Delay (s)                | 14.6 |      | 0.0   | 0.3                  |      |      |
| Approach LOS                      | B    |      |       |                      |      |      |
| <b>Intersection Summary</b>       |      |      |       |                      |      |      |
| Average Delay                     |      |      | 1.4   |                      |      |      |
| Intersection Capacity Utilization |      |      | 48.7% | ICU Level of Service | A    |      |
| Analysis Period (min)             |      |      | 15    |                      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/08/2019



| Movement                          | EBL         | EBR         | NBL         | NBT                  | SBT  | SBR  |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations               | ↔           | ↔           |             | ↕                    | ↕    |      |
| Traffic Volume (veh/h)            | 29          | 82          | 58          | 392                  | 916  | 31   |
| Future Volume (veh/h)             | 29          | 82          | 58          | 392                  | 916  | 31   |
| Sign Control                      | Stop        |             |             | Free                 | Free |      |
| Grade                             | 0%          |             |             | 0%                   | 0%   |      |
| Peak Hour Factor                  | 0.92        | 0.92        | 0.92        | 0.92                 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 32          | 89          | 63          | 426                  | 996  | 34   |
| Pedestrians                       |             |             |             |                      |      |      |
| Lane Width (ft)                   |             |             |             |                      |      |      |
| Walking Speed (ft/s)              |             |             |             |                      |      |      |
| Percent Blockage                  |             |             |             |                      |      |      |
| Right turn flare (veh)            |             |             |             |                      |      |      |
| Median type                       |             |             |             | None                 | None |      |
| Median storage (veh)              |             |             |             |                      |      |      |
| Upstream signal (ft)              |             |             |             |                      |      |      |
| pX, platoon unblocked             |             |             |             |                      |      |      |
| vC, conflicting volume            | 1565        | 1013        | 1030        |                      |      |      |
| vC1, stage 1 conf vol             |             |             |             |                      |      |      |
| vC2, stage 2 conf vol             |             |             |             |                      |      |      |
| vCu, unblocked vol                | 1565        | 1013        | 1030        |                      |      |      |
| tC, single (s)                    | 6.4         | 6.2         | 4.1         |                      |      |      |
| tC, 2 stage (s)                   |             |             |             |                      |      |      |
| tF (s)                            | 3.5         | 3.3         | 2.2         |                      |      |      |
| p0 queue free %                   | 71          | 69          | 91          |                      |      |      |
| cM capacity (veh/h)               | 111         | 290         | 674         |                      |      |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>SB 1</b> |                      |      |      |
| Volume Total                      | 121         | 489         | 1030        |                      |      |      |
| Volume Left                       | 32          | 63          | 0           |                      |      |      |
| Volume Right                      | 89          | 0           | 34          |                      |      |      |
| cSH                               | 203         | 674         | 1700        |                      |      |      |
| Volume to Capacity                | 0.59        | 0.09        | 0.61        |                      |      |      |
| Queue Length 95th (ft)            | 83          | 8           | 0           |                      |      |      |
| Control Delay (s)                 | 45.8        | 2.6         | 0.0         |                      |      |      |
| Lane LOS                          | E           | A           |             |                      |      |      |
| Approach Delay (s)                | 45.8        | 2.6         | 0.0         |                      |      |      |
| Approach LOS                      | E           |             |             |                      |      |      |
| <b>Intersection Summary</b>       |             |             |             |                      |      |      |
| Average Delay                     |             |             | 4.1         |                      |      |      |
| Intersection Capacity Utilization |             |             | 32.9%       | ICU Level of Service |      | E    |
| Analysis Period (min)             |             |             | 15          |                      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
 2: Bell Mill Road/Entrance 3 & Snow Hill Road

06/08/2019

| Movement                          | EBL  | EBT  | EBR  | WBL   | WBT  | WBR                  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
|-----------------------------------|------|------|------|-------|------|----------------------|------|------|------|------|------|------|
| Lane Configurations               |      | ↔    |      | ↔     | ↔    |                      |      | ↔    |      |      | ↔    |      |
| Traffic Volume (veh/h)            | 0    | 0    | 0    | 42    | 0    | 26                   | 2    | 756  | 44   | 71   | 288  | 0    |
| Future Volume (veh/h)             | 0    | 0    | 0    | 42    | 0    | 26                   | 2    | 756  | 44   | 71   | 288  | 0    |
| Sign Control                      | Stop |      |      | Stop  |      |                      | Free |      |      | Free |      |      |
| Grade                             | 0%   |      |      | 0%    |      |                      | 0%   |      |      | 0%   |      |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 0    | 0    | 0    | 46    | 0    | 28                   | 2    | 822  | 48   | 77   | 313  | 0    |
| Pedestrians                       |      |      |      |       |      |                      |      |      |      |      |      |      |
| Lane Width (ft)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| Walking Speed (ft/s)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Percent Blockage                  |      |      |      |       |      |                      |      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |      |       |      |                      |      |      |      |      |      |      |
| Median type                       | None |      |      |       |      |                      | None |      |      |      |      |      |
| Median storage (veh)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Upstream signal (ft)              |      |      |      |       |      |                      |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC, conflicting volume            | 1345 | 1341 | 313  | 1317  | 1317 | 846                  | 313  |      |      | 870  |      |      |
| vC1, stage 1 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |      |       |      |                      |      |      |      |      |      |      |
| vCu, unblocked vol                | 1345 | 1341 | 313  | 1317  | 1317 | 846                  | 313  |      |      | 870  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2  | 7.1   | 6.5  | 6.2                  | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |      |       |      |                      |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3  | 3.5   | 4.0  | 3.3                  | 2.2  |      |      | 2.2  |      |      |
| pD queue free %                   | 100  | 100  | 100  | 63    | 100  | 92                   | 100  |      |      | 90   |      |      |
| cM capacity (veh/h)               | 110  | 137  | 727  | 124   | 142  | 362                  | 1247 |      |      | 775  |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2 | NB 1  | SB 1 |                      |      |      |      |      |      |      |
| Volume Total                      | 0    | 46   | 28   | 872   | 390  |                      |      |      |      |      |      |      |
| Volume Left                       | 0    | 46   | 0    | 2     | 77   |                      |      |      |      |      |      |      |
| Volume Right                      | 0    | 0    | 28   | 48    | 0    |                      |      |      |      |      |      |      |
| cSH                               | 1700 | 124  | 362  | 1247  | 775  |                      |      |      |      |      |      |      |
| Volume to Capacity                | 0.00 | 0.37 | 0.08 | 0.00  | 0.10 |                      |      |      |      |      |      |      |
| Queue Length 95th (ft)            | 0    | 38   | 6    | 0     | 8    |                      |      |      |      |      |      |      |
| Control Delay (s)                 | 0.0  | 50.2 | 15.8 | 0.0   | 3.0  |                      |      |      |      |      |      |      |
| Lane LOS                          | A    | F    | C    | A     | A    |                      |      |      |      |      |      |      |
| Approach Delay (s)                | 0.0  | 37.2 |      | 0.0   | 3.0  |                      |      |      |      |      |      |      |
| Approach LOS                      | A    | E    |      |       |      |                      |      |      |      |      |      |      |
| Intersection Summary              |      |      |      |       |      |                      |      |      |      |      |      |      |
| Average Delay                     |      |      |      | 3.0   |      |                      |      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      |      | 75.0% |      | ICU Level of Service |      | D    |      |      |      |      |
| Analysis Period (min)             |      |      |      | 15    |      |                      |      |      |      |      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
6: Snow Hill Road & Entrance 1

06/08/2019

| Movement                          | WBL  | WBR  | NBT   | NBR                  | SBL  | SBT  |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations               | ↙    | ↗    | ↑     | ↘                    | ↙    | ↗    |
| Traffic Volume (veh/h)            | 23   | 14   | 782   | 24                   | 39   | 508  |
| Future Volume (veh/h)             | 23   | 14   | 782   | 24                   | 39   | 508  |
| Sign Control                      | Stop |      | Free  |                      | Free |      |
| Grade                             | 0%   |      | 0%    |                      | 0%   |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92                 | 0.92 | 0.92 |
| Hourly flow rate (vph)            | 25   | 15   | 850   | 26                   | 42   | 552  |
| Pedestrians                       |      |      |       |                      |      |      |
| Lane Width (ft)                   |      |      |       |                      |      |      |
| Walking Speed (ft/s)              |      |      |       |                      |      |      |
| Percent Blockage                  |      |      |       |                      |      |      |
| Right turn flare (veh)            |      |      |       |                      |      |      |
| Median type                       | None |      |       | None                 |      |      |
| Median storage (veh)              |      |      |       |                      |      |      |
| Upstream signal (ft)              |      |      |       |                      |      |      |
| pX, platoon unblocked             |      |      |       |                      |      |      |
| vC, conflicting volume            | 1499 | 863  |       |                      | 876  |      |
| vC1, stage 1 conf vol             |      |      |       |                      |      |      |
| vC2, stage 2 conf vol             |      |      |       |                      |      |      |
| vCu, unblocked vol                | 1499 | 863  |       |                      | 876  |      |
| tC, single (s)                    | 6.4  | 6.2  |       |                      | 4.1  |      |
| tC, 2 stage (s)                   |      |      |       |                      |      |      |
| tF (s)                            | 3.5  | 3.3  |       |                      | 2.2  |      |
| p0 queue free %                   | 80   | 96   |       |                      | 95   |      |
| cM capacity (veh/h)               | 127  | 354  |       |                      | 771  |      |
| Direction, Lane #                 | WB 1 | WB 2 | NB 1  | SB 1                 |      |      |
| Volume Total                      | 25   | 15   | 876   | 594                  |      |      |
| Volume Left                       | 25   | 0    | 0     | 42                   |      |      |
| Volume Right                      | 0    | 15   | 26    | 0                    |      |      |
| cSH                               | 127  | 354  | 1700  | 771                  |      |      |
| Volume to Capacity                | 0.20 | 0.04 | 0.52  | 0.05                 |      |      |
| Queue Length 95th (ft)            | 17   | 3    | 0     | 4                    |      |      |
| Control Delay (s)                 | 40.1 | 15.6 | 0.0   | 1.4                  |      |      |
| Lane LOS                          | E    | C    |       | A                    |      |      |
| Approach Delay (s)                | 30.9 |      | 0.0   | 1.4                  |      |      |
| Approach LOS                      | D    |      |       |                      |      |      |
| <b>Intersection Summary</b>       |      |      |       |                      |      |      |
| Average Delay                     |      |      | 1.4   |                      |      |      |
| Intersection Capacity Utilization |      |      | 68.9% | ICU Level of Service | C    |      |
| Analysis Period (min)             |      |      | 15    |                      |      |      |



HCM Unsignalized Intersection Capacity Analysis  
 11: Mountain View Road & Transport Lane

06/08/2019



| Movement                          | EBL         | EBR         | NBL         | NBT    | SBT                  | SBR  |
|-----------------------------------|-------------|-------------|-------------|--------|----------------------|------|
| Lane Configurations               | T           |             |             | T      |                      |      |
| Traffic Volume (veh/h)            | 47          | 69          | 81          | 969    | 528                  | 38   |
| Future Volume (veh/h)             | 47          | 69          | 81          | 969    | 528                  | 38   |
| Sign Control                      | Stop        |             |             | Free   |                      |      |
| Grade                             | 0%          |             |             | 0%     |                      |      |
| Peak Hour Factor                  | 0.92        | 0.92        | 0.92        | 0.92   | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 51          | 75          | 88          | 1053   | 574                  | 41   |
| Pedestrians                       |             |             |             |        |                      |      |
| Lane Width (ft)                   |             |             |             |        |                      |      |
| Walking Speed (ft/s)              |             |             |             |        |                      |      |
| Percent Blockage                  |             |             |             |        |                      |      |
| Right turn flare (veh)            |             |             |             |        |                      |      |
| Median type                       |             |             |             | None   | None                 |      |
| Median storage (veh)              |             |             |             |        |                      |      |
| Upstream signal (ft)              |             |             |             |        |                      |      |
| pX, platoon unblocked             |             |             |             |        |                      |      |
| vC, conflicting volume            | 1824        | 594         | 615         |        |                      |      |
| vC1, stage 1 conf vol             |             |             |             |        |                      |      |
| vC2, stage 2 conf vol             |             |             |             |        |                      |      |
| vCu, unblocked vol                | 1824        | 594         | 615         |        |                      |      |
| tC, single (s)                    | 6.4         | 6.2         | 4.1         |        |                      |      |
| tC, 2 stage (s)                   |             |             |             |        |                      |      |
| tF (s)                            | 3.5         | 3.3         | 2.2         |        |                      |      |
| p0 queue free %                   | 34          | 35          | 91          |        |                      |      |
| cM capacity (veh/h)               | 77          | 505         | 965         |        |                      |      |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>NB 1</b> | <b>SB 1</b> |        |                      |      |
| Volume Total                      | 126         | 1141        | 615         |        |                      |      |
| Volume Left                       | 51          | 88          | 0           |        |                      |      |
| Volume Right                      | 75          | 0           | 41          |        |                      |      |
| cSH                               | 156         | 965         | 1700        |        |                      |      |
| Volume to Capacity                | 0.81        | 0.09        | 0.36        |        |                      |      |
| Queue Length 95th (ft)            | 132         | 8           | 0           |        |                      |      |
| Control Delay (s)                 | 86.7        | 2.7         | 0.0         |        |                      |      |
| Lane LOS                          | F           | A           |             |        |                      |      |
| Approach Delay (s)                | 86.7        | 2.7         | 0.0         |        |                      |      |
| Approach LOS                      | F           |             |             |        |                      |      |
| <b>Intersection Summary</b>       |             |             |             |        |                      |      |
| Average Delay                     |             |             |             | 7.5    |                      |      |
| Intersection Capacity Utilization |             |             |             | 102.4% | ICU Level of Service | G    |
| Analysis Period (min)             |             |             |             | 15     |                      |      |

