Please refer to ECM Appendix B and revise report to meet "Intermediate TIS" criteria.

## Traffic Impact Study

Mayberry Communities
Filing 4 Traffic Impact Study
El Paso County, Colorado
February 16, 2023
Add "PCD File No. CS233 and SF2317" since this TIS is being submitted with the final plat application as well.

> Include a signature sheet with the appropriate signature blocks. Refer to the website below for standard signature blocks: https://assets-planningdevelopment.elpasoco.com/wp-content/upl oads/Engineering/EngineeringDocuments/Standard-Signature-BI ocks-1.doc

# Traffic Impact Study 

Mayberry Communities - Filing 4

El Paso County, Colorado
February 16, 2023

## Prepared for

Mayberry Communities
Prepared by
HDR Engineering, Inc.
1670 Broadway Suite 3400
Denver, Colorado 80202 USA
Telephone 303-764-3300
Website: hdrinc.com


## Contents

Introduction ..... 0
Analysis Assumptions ..... 2
Directional Distribution ..... 2
Filing 3 Roadway Improvements ..... 2
Existing Thoroughfare System ..... 6
SH 94 ..... 6
Peyton Highway ..... 6
Ellicott Highway ..... 6
Site and Access Characteristics ..... 6
Traffic Analysis. ..... 8
2024 Forecasted Traffic Conditions ..... 8
2024 Existing plus Previous Filing Background Traffic Conditions ..... 11
Filings 1, 2, and 3 Site-Generated Traffic ..... 11
2024 Conditions with Filing 3 Site-Generated Traffic ..... 14
Filing 3 Site Generated Traffic ..... 14
Summary of Findings ..... 18
References ..... 19
Appendix A: Highway Capacity Manual Description ..... 20
Appendix B: Synchro Outputs ..... 21
Tables
Table 1: Forecasted Overall Directional Distribution Site-Oriented Traffic ..... 2
Table 2: 2024 Existing Forecasted Level of Service Summary ..... 9
Table 3: Summary of Unadjusted Daily and Peak Hour Trip Generation from Previous Filings ..... 11
Table 4: Filing 1, 2 and 3 Level of Service Summary ..... 12
Table 5: Summary of Unadjusted Daily and Peak Hour Trip Generation from Filing 3 ..... 14
Table 6: Filing 4 Level of Service Summary ..... 15
Table 7: Level of Service Summary ..... 18

## Figures

Figure 1: Area Location Map ..... 1
Figure 2: Generated Traffic Trip Distribution ..... 4
Figure 3: Proposed Filing 4 Site Plan ..... 5
Figure 4: Filing 4 Access Concept ..... 7
Figure 5: Adjusted 2024 Existing TMC Volumes ..... 10
Figure 7: Background + Filings 2 \& 3 Volumes ..... 13
Figure 7: Filing 4 Generated Volumes ..... 16
Figure 9: Background + Previous Development + Filing 4 Volumes ..... 17

## Introduction

Mayberry Communities have retained HDR Engineering, Inc. to perform a Traffic Impact Study (TIS) for the proposed Filing 4 development located in the southeast quadrant of Springs Road and SH 94, as shown in Figure 1. The development is anticipated to consist of 88,000 square feet of light industrial.

The project site is currently vacant, and the development is expected to be complete by 2024. This study serves as part of an update to the approved 2020 - June Ellicott Town Center Commercial Rezone TIS Report (LSC 194060) (Ref 1) and uses assumptions and traffic data from the 2022 - September - Mayberry Filing No. 3 (Ref 2) TIS. Filing 4 is part of the broader proposed Mayberry Communities Development just west of Ellicott between Peyton Highway and Log Road. This community is being developed in phases, and this report details the traffic impacts only due to the Filing 4 phase of development.

Per ECM Appendix B.2.1 provide the estimated completion date of Filing 4 and any improvements proposed.

Include in the introduction a discussion on access to the property and if Filing 4 is in conformance with previously approved TIS reports.

Please discuss the total number of lots in this subdivision and the number of lots being rezoned. Identify the size of the parcel/filing.


## Analysis Assumptions

This traffic impact study uses the Highway Capacity Manual 6 (HCM) (see Appendix A for a brief description of the level of service) as a basis for the capacity analysis as well as primary data and engineering judgment, which is required to estimate background traffic, pass-by capture, and internal capture reductions. These assumptions and engineering judgments are further described in the following paragraphs.

## Directional Distribution

Existing traffic projections are based on data collected for the development of the 2022 - September - Mayberry Filing No. 3. Turning movement counts were collected for the Peyton Highway/SH 94 intersection (west of Mayberry Communities) and the Ellicott Highway/SH 94 intersection (east of Mayberry Communities).

This study follows the assumption established in the 2022 - September - Mayberry Filing No. 3 that $90 \%$ of vehicle trips go to and come from points west of the development, while $10 \%$ go to and come from points east of the development. Following the 90/10 assumption, future traffic is then assumed to be proportionally distributed according to the turning movement counts collected at Peyton Highway and Ellicott Highway intersections. These counts provide the basis for the overall directional distribution of traffic approaching and departing the project site, as summarized in Table 1.

Table 1: Forecasted Overall Directional Distribution Site-Oriented Traffic

| Direction/Roadway | AM \% Overall <br> Distribution | PM \% Overall <br> Distribution |
| :--- | :---: | :---: |
| SH 94 W | $82.4 \%$ | $76.6 \%$ |
| SH 94 E | $5.3 \%$ | $6.0 \%$ |
| Peyton Hwy S | $2.3 \%$ | $5.9 \%$ |
| Peyton Hwy N | $5.3 \%$ | $7.5 \%$ |
| Ellicott Hwy S | $4.0 \%$ | $2.3 \%$ |
| Ellicott Hwy N | $0.6 \%$ | $1.7 \%$ |

HDR has not found other studies in the area. Based on current land use at the site, this study does not use pass-by, internal capture, pedestrian, and bicycle reductions.

## Filing 3 Roadway Improvements

The LOS analysis is based on the proposed improvements from 2022 - September Mayberry Filing No. 3. The roadway network proposed in Filing 3 is assumed to be in place at the time of completion for Filing 4.

New Log Road and SH 94 will be an unsignalized intersection with stop control on the northbound approach. The approaches will be constructed according to the following parameters:

- One left-turn lane and one right-turn lane for the northbound approach on New Log Road
- A through lane and a dedicated right-turn turn lane on the eastbound approach of SH 94
- A dedicated left-turn lane and one through lane on the westbound approach of SH 94

The ability of the roadway network to accommodate the generated traffic of Filing 4 is contingent upon the completion of an internal roadway network comprised of Village Main, Mayberry Drive, and the construction of New Log Road and Springs Road.

Discuss Filing 4's responsibility for roadway improvements as mentioned in Table 12 and Table 12a from Filing 3's TIS. Provide updated tables as well with trigger points for the construction of all required future improvements including but not limited to turn lanes, signals, widenings, and openings or closings of accesses. ("Trigger points" are the conditions that, when met, will call for the construction of said improvements.) Cost estimates and escrow amounts can be determined at the final plat stage. State specifically which improvements the developer will be constructing with this final plat.

| Table 12: CDOT Roadway Improvements |  |  |  |
| :---: | :---: | :---: | :---: |
| Item \# | Improvement | Timing | Responsibility |
| Roadway Segment Improvements |  |  |  |
| 1-6 | El Paso County Improvements - Please refer to Table 12a |  |  |
| CDOT - New Log Road/SH 94 Intersection Improvements |  |  |  |
| 7 | Eastbound Right-Turn Deceleration Lane | With Filing No. 1. Construction nearing completion. | Applicant |
| 8 <br> UPDATED w/Filing 3 | Westbound Left-Turn Deceleration Lane - 525' - to accommodate Filings 1,2,2A and 3. | This improvement would be triggered after 65 lots are developed in Filing No. 3 | Applicant |
| 9 UPDATED w/Filing 3 | A left-turn acceleration lane will be required for the northbound to westbound movement. | With the installation of the westbound left-turn deceleration lane - Item No. 8 (after 65 lots are developed in Filing No. 3) | Applicant |
| 10 | Lengthening of the above westbound left turn deceleration lane lengthening to accommodate additional stacking for future development - length TBD with future TIS reports | Future Development* | Applicant |
| 11 | Eastbound Right Turn Acceleration Lane | With Future PUD development - TBD. | Applicant |

Include a section on CDOT Access Permits. Is the development in conformance with CDOT Access Permits, is a revised access permit required. Previous TIS reports states this "Filing 4" used to be "Filing 3 " in other reports. Discuss the name change and impact to any permits.

Address internal
trips also.



FIGURE 3: FILING 4 CONCEPTUAL SITE PLAN

## Existing Thoroughfare System

As indicated on the area location map (Figure 1) and the conceptual site plan (Figure 3), the project is located in the southeast quadrant of New Log Road and SH 94, near Ellicott, CO.

Average daily traffic estimates SH 94 were obtained from the Colorado Department of Transportation (CDOT) Online Transportation Information System (OTIS) (Ref. 3) and turning movement counts provided in the previous TIAS dated September 2022. To adequately describe these roadways, further characterization is provided for each adjacent major roadway to the development.

## SH 94

CDOT classifies SH 94 as a functional type Minor Arterial and an access control type as a Non-Rural Principal Highway (NR-A) west of County Road 493 and a Regional Highway (R-A) east of County Road 493. The posted speed limit is 65 miles per hour near the development. An OTIS straight-line diagram of SH 94 near the project site is provided in Appendix A. According to CDOT's traffic volume database, the existing daily traffic volume on SH 94 is listed below:

- 4,000 vpd between Peyton Highway and Ellicott Highway
- 3,000 vpd east of Ellicott Highway


## Peyton Highway

The El Paso County 2040 Major Transportation Corridor Plan (MTCP)(Ref. 4) classifies Peyton Highway as a Minor Arterial and has a speed limit of 55 mph .

## Ellicott Highway

The El Paso County MTCP classifies Ellicott Highway as a Minor Arterial and has a speed limit of 55 mph .

## Site and Access Characteristics

As shown in Figure 4, access to Filing 4 will be provided via one full-movement driveways along Marketplace Drive.

Discuss roadway improvements for the intersection of Springs Road and SH 94. What is the construction status of the improvements called out in previous TIS reports.


## Traffic Analysis

To assess the traffic impacts of the proposed development, two (2) time periods (AM Peak Hour and PM Peak Hour) and three (3) travel conditions were evaluated:

- 2024 Forecasted Traffic Conditions
- 2024 Forecasted plus Previous Filing 3 Background Traffic Conditions
- 2024 Background plus Site-Generated Traffic Conditions

Intersections in the vicinity of the site are considered to be the locations of principal concern because they are the locations of the highest traffic conflict and delay. The standard used to evaluate traffic conditions at intersections is level of service (LOS), which is a qualitative measure of the effect of a number of factors such as speed, the volume of traffic, geometric features, traffic interruptions, freedom to maneuver, safety, driving comfort, convenience, and operating cost.

## 2024 Forecasted Traffic Conditions

The analysis of existing traffic conditions required the collection of data on the major roadways and intersections. Traffic counts for the following study area intersections were collected in March and August 2022 while schools were in session unless otherwise noted:

- Peyton Highway and SH 94
- Ellicott Highway and SH 94

The existing TMC values were grown by the growth rate provided by OTIS to reach a 2024 forecast year. This process used trends established by prior data for the major roadways and intersections near the project site. The adjusted 2024 existing turning movement counts are provided in Figure 5. Descriptions of existing study intersections are discussed in the following sections as well as the forecasted LOS for the Year 2024. Table 2 provides the summary of both LOS and delay.

## Peyton Highway and SH 94

Peyton Highway and SH 94 is currently an unsignalized intersection with stop controls on the northbound and southbound approaches. The northbound and southbound approaches of Peyton Highway provide one left-turn/through/right-turn shared lane. The eastbound and westbound approaches of SH 94 provide one leftturn lane and a through/right-turn shared lane. The northbound leg of the intersection currently operates at LOS B under the existing traffic conditions during both the AM and PM peak periods.

## Ellicott Highway and SH 94

Ellicott Highway and SH 94 is currently an unsignalized intersection with stop controls on the northbound and southbound approaches. The northbound and
southbound approaches of Ellicott Highway provide one left-turn/through/right-turn shared lane. The eastbound and westbound approaches of SH 94 provide one leftturn lane and a through/right-turn shared lane. The northbound leg of the intersection currently operates at LOS C under the existing traffic conditions during both the AM and PM peak periods.

Table 2: 2024 Existing Forecasted Level of Service Summary

| Intersection | 2024 Existing |  |
| :---: | :---: | :---: |
|  | AM | PM |
| Peyton Highway and SH 94 | B <br> $(14.1)$ | B <br> $(13.5)$ |
| Ellicott Highway and SH 94 | C <br> $(16.0)$ | C |



Provide information on future traffic conditions up to 2044 per ECM Appendix B. Please include information on the LOS for intersections in the future and ADT.

## 2024 Existing plus Previous Filing Background Traffic Conditions

The generated traffic from the previous Filings 1, 2, and 3 are assumed to be part of the background traffic. The proposed access roads that will accommodate this traffic are studied for the background traffic and the development traffic to follow. The additional intersections that will be built as part of Mayberry Filing 3 are listed below:

- New Log Road and SH 94
- Spring Road and SH 94


## Filings 1, 2, and 3 Site-Generated Traffic

Determining the site-generated traffic, or the traffic generated due to the development of the previous Filings is the goal of this analysis. Unadjusted daily trips and the peak hour traffic associated with these Filings were estimated using recommendations and data contained in the Institute of Transportation Engineers Trip Generation, 11th Edition (Ref. 6).

These previous Filings generate approximately 2,420 unadjusted daily trips upon build-out. Table 3 provides a detailed traffic generation summary related to the assumed land use plan.

Table 3: Summary of Unadjusted Daily and Peak Hour Trip Generation from Previous Filings

| Site | Land Use | Land Use Code | Size | Trip Generation Method 1 | 24-Hour <br> TwoWay Volume | AM Peak Hour |  | PM Peak Hour |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Enter | Exit | Enter | Exit |
| Filing 1/1A/ 3 | Single <br> Family Detached Housing | 210 | $\begin{gathered} 240 \\ \text { DU } \end{gathered}$ | Fitted Curve | 2,257 | 43 | 123 | 143 | 84 |
| $\begin{gathered} \text { Filing } \\ 2 \end{gathered}$ | General <br> Light <br> Industrial | 110 | $\begin{gathered} 30 \\ \mathrm{KSF} \end{gathered}$ | Fitted Curve | 163 | 21 | 3 | 2 | 15 |
| Total |  |  |  |  | 2,420 | 64 | 126 | 145 | 99 |

The LOS summary for the trips generated from the previous Filings are discussed below. Table 4 provides the summary of both LOS and delay. Background plus Filing 3 volumes are shown in Figure 5.

## Peyton Highway and SH 94

The intersection will operate at LOS C under 2024 Forecasted plus Previous Filing 3 Background Traffic Conditions during the AM and PM peak periods.

## New Log Road and SH 94

New Log Road and SH 94 will be an unsignalized intersection with stop controls on the northbound approach. The northbound approach of New Log Road will provide one left-turn lane and one right-turn lane. The eastbound approach of SH 94 will provide a through lane and a dedicated right-turn turn lane. The westbound approach of SH 94 will provide a dedicated left-turn lane and one through lane. These improvements will be built concurrently with Filings 1, 2, and 3 and will be in place by the time Filing 4 is occupied. The intersection will operate at LOS B under 2024 Forecasted plus the full build out of Filing 3 Background Traffic Conditions during the AM and PM peak periods.

Springs Road and SH 94

Discuss improvements at this intersection. Westbound left turn is prohibited by CDOT.

The intersection will operate at LOS A and B under 2024 Forecasted plus Previous Filing 3 Background Traffic Conditions during the AM and PM peak periods, respectively.

## Ellicott Highway and SH 94

The intersection will operate at LOS C under 2024 Forecasted plus Previous Filing 3 Background Traffic Conditions during the AM and PM peak periods.

Table 4: Filing 1, 2 and 3 Level of Service Summary

| Intersection | 2024 Background + Filings 1,2 \& , 3 |
| :---: | :---: | :---: |



## 2024 Conditions with Filing 4 SiteGenerated Traffic

The proposed Filing 4 is anticipated to be completed in 2024. The forecasted traffic was projected using available information and was used to assess the major roadway impacts and evaluate potential improvements. All analysis assumes the completion of New Log Road and Springs Road improvements upon which previous filings are contingent.

## Filing 4 Site Generated Traffic

Unadjusted total trips per day and the peak hour traffic associated with the project were estimated using recommendations and data contained in the Institute of Transportation Engineers Trip Generation, 11th Edition.

Filing 4 is anticipated to consist of general light industrial development, which according to ITE, "has an emphasis on activities other than manufacturing" and supports activities such as "printing, material testing, and assembly of data processing equipment." Light industrial development generates more trips per floor area than related uses such as Industrial Park and Manufacturing, so light industrial is chosen as the most conservative choice given uncertainty about the commercial uses of Filing 4 land.

The proposed Filing 4 development will generate approximately 381 unadjusted daily trips upon build-out. Table 5 provides a detailed trip generation summary based on the land use plan.

Table 5: Summary of Unadjusted Daily and Peak Hour Trip Generation from Filing 4

| Site | Land Use | Land <br> Use <br> Code | Size | Trip <br> Generation <br> Method |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 24-Hour <br> Two- <br> Way <br> Volume | AM Peak <br> Hour | PM Peak <br> Enter |  | Exit | Enter | Exit |  |
| Filing <br> 4 | General <br> Light <br> Industrial | 110 | 88 KSF | Fitted Curve | 381 | 56 | 8 | 5 | 32 |

${ }^{1}$ Trip Generation is based on the higher of the ITE's average rate and fitted curve method for all land uses.
The LOS summary for the trips generated from Filing 4 are discussed below. Table 6 provides the summary of both LOS and delay. Filing 4 generated volumes are shown in Figure 7, and Background + Filing 3 + Filing 4 volumes are shown in Figure 8.

## Peyton Highway and Sł94

The intersection will opekate at LOS C under 2024 site plus forecasted traffic conditions during the AM and PM peak periods. There are no improvements recommended at this intersection as part of this TIS.

If the site is being rezoned to CS the highest and best uses in that zone shall be assumed for trip generation

## New Log Road and SH 94

The intersection will operate at LOS C under 2024 site plus forecasted traffic conditions during the AM and PM peak periods with the improvements identified in the previous section. Assuming the connections at both New Log Road and Springs Road are provided, there are no improvements recommended at this intersection as part of this TIS.

## Springs Road and SH 94

The intersection will operate at LOS A and B under 2024 site plus forecasted traffic conditions during the AM and PM peak periods, respectively. Assuming the connections at both New Log Road and Springs Road are provided, there are no improvements recommended at this intersection as part of this TIS.

## Ellicott Highway and SH 94

The intersection will operate at LOS C under 2024 site plus forecasted traffic conditions during the AM and PM peak periods. There are no improvements recommended at this intersection as part of this TIS.

Table 6: Filing 4 Level of Service Summary

| Intersection | 2024 Background + Previous Filings + |
| :--- | :---: | :---: |
|  |  |$|$




## Summary of Findings

Intersections adjacent to the development on SH 94 will operate at LOS C or better for all scenarios analyzed in this TIA. Therefore, the infrastructure that is anticipated to be in place by the time Filing 3 and Filing 4 are developed and occupied will have the capacity to handle the generated traffic. No improvements are needed for the addition of Filing 4 to the Mayberry Communities Development. Intersection LOS and delay results are presented in Table 7.

Table 7: Level of Service Summary

| Intersection | 2024 Existing |  | 2024 <br> Background + <br> Filings 1,2 \& , 3 |  | 2024 Background <br> + Filing 4 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AM | PM | AM | PM | AM | PM |


| Highest delay minor street approach is reported for all unsignalized intersections. |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Peyton Highway and SH 94 | B | B | C | C | C | C |
|  | $(14.1)$ | $(13.5)$ | $(15.8)$ | $(18.7)$ | $(16.7)$ | $(19.8)$ |
| New Log Road and SH 94 | - | - | B | B | C | C |
|  |  |  | $(14.5)$ | $(15.4)$ | $(15.2)$ | $(16.4)$ |
| Springs Road and SH 94 |  |  | A | B | A | B |
| Ellicott Highway and SH 94 | - | - | $(9.2)$ | $(10.1)$ | $(9.2)$ | $(10.2)$ |

State what the current applicable Transportation Impact Fees are and what option the developer will be selecting for payment. If the site is in s special district, so state and summarize the applicable fees.

State if any deviations are being proposed with Filing 4 and provide analysis regarding each deviation if so.

Include the name of the author/engineer of the report and PCD Filing number.

1. 2020 - June - Ellicott Town Center Commercial Rezone TIS Report
2. 2022 - September - Mayberry Filing No. 3
3. El Paso County 2016 Major Transportation Corridor Plan Update
4. Transportation Research Board 2016 Highway Capacity Manual, $6^{\text {th }}$ Edition, Washington, D.C.
5. Trafficware Ltd 2017 Synchro 11, Sugar Land, Texas
6. Institute of Transportation Engineers 2017 Trip Generation Manual, An Informational Report, $11^{\text {th }}$ Edition, Washington D.C.

Please include the El Paso County ECM in the references section.

Appendix A: Highway Capacity Manual Description

## HCM Unsignalized Intersection Level of Service

Unsignalized intersections were analyzed for this study. Unsignalized intersection LOS is defined in terms of average control delay and, in some cases, volume to capacity ( $\mathrm{v} / \mathrm{c}$ ) ratio. Control delay is that portion of total delay attributed to traffic control measures, either traffic signals or stop signs. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

For two-way stop-controlled intersections, the analysis method assumes that major street-through traffic is not affected by minor street flows. Major street left-turning traffic and the traffic on the minor approaches will be affected by opposing movements. Stop or yield signs are used to assign the right-of-way to the major street, and this designation forces drivers on the controlled street to judgmentally select gaps in the major street flow through which to execute crossing or turning maneuvers. Thus, the capacity of the controlled legs is based on two factors:

- The distribution of gaps in the major street traffic stream.
- Driver judgment in selecting gaps through which to execute their desired maneuvers.

The LOS procedure computes a capacity for each movement based on the critical time gap required to complete the maneuver and the volume of traffic that is opposing the movement. The average control delay for any particular movement is calculated as a function of the capacity of the approach and the degree of saturation ( $\mathrm{v} / \mathrm{c}$ ratio). The degree of saturation is defined as the volume for a movement, expressed as an hourly flow rate, divided by the movement's capacity, expressed as an hourly flow rate. With the HCM 6 methodology (Ref. 5), overall intersection LOS is best quantified based on minor street movement average control delay. The HCM 6 methodology adjusts individual movement delay to account for a degree of saturation ( $\mathrm{v} / \mathrm{c}$ ratio) that is greater than 1.0. Those movements are assigned a LOS of F, regardless of the average control delay. Engineering judgment must be used to determine which minor street movement controls for overall intersection LOS and whether unacceptable LOS on minor street movements appropriately reflects unacceptable LOS for the overall intersection.
Table 2 shows the relationship between the average control delay and the LOS. The LOS range for unsignalized intersections is different than that for signalized intersections, and this difference is because drivers expect different levels of performance from other kinds of transportation facilities. Unsignalized intersections carry less traffic volume than signalized intersections, and delays at unsignalized intersections are variable. For these reasons, control delay would be less for an unsignalized intersection than for a signalized intersection. The overall approach LOS is computed as a weighted average of the vehicle delay for each movement; therefore, an approach may have an overall LOS of $C$ or D and have individual movements, which are LOS E or F .

Analysis was performed using the microcomputer program "Synchro 11" (Ref. 6), based on the procedures contained in the Highway Capacity Manual.

Table 1: Unsignalized Intersection: Level of Service Measurement

| Level of <br> Service | Control Delay <br> Per Vehicle (sec) |
| :---: | :---: |
| A | $<10$ |
| B | $>10$ and $<15$ |
| C | $>15$ and $<25$ |
| D | $>25$ and $<35$ |
| E | $>35$ and $<50$ |
| F | $>50$ |

## Appendix B: Synchro Outputs

| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 5.9 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |  |
| Lane Configurations | ${ }^{*}$ | $\hat{\beta}$ |  | * | 个 |  |  | ¢ |  |  | * |  |  |
| Traffic Vol, veh/h | 20 | 63 | 125 | 14 | 159 | 12 | 101 | 25 | 6 | 13 | 60 | 33 |  |
| Future Vol, veh/h | 20 | 63 | 125 | 14 | 159 | 12 | 101 | 25 | 6 | 13 | 60 | 33 |  |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Sign Control F | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |  |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |  |
| Storage Length | 200 | - | - | 400 | - | - | - | - | - | - | - | - |  |
| Veh in Median Storage, \# | \# | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |  |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |  |
| Mvmt Flow | 22 | 68 | 136 | 15 | 173 | 13 | 110 | 27 | 7 | 14 | 65 | 36 |  |



| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 2.5 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |  |
| Lane Configurations | ${ }^{*}$ | $\hat{\beta}$ |  | ${ }^{*}$ | $\uparrow$ |  |  | $\uparrow$ |  |  | $\uparrow$ |  |  |
| Traffic Vol, veh/h | 7 | 119 | 12 | 10 | 332 | 22 | 28 | 16 | 10 | 11 | 7 | 35 |  |
| Future Vol, veh/h | 7 | 119 | 12 | 10 | 332 | 22 | 28 | 16 | 10 | 11 | 7 | 35 |  |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Sign Control F | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |  |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |  |
| Storage Length | 532 | - | - | 532 | - | - | - | - | - | - | - | - |  |
| Veh in Median Storage, \# | \# | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |  |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |  |
| Mvmt Flow | 8 | 129 | 13 | 11 | 361 | 24 | 30 | 17 | 11 | 12 | 8 | 38 |  |



| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh 6.1 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ${ }^{*}$ | $\uparrow$ |  | ${ }^{7}$ | $\uparrow$ |  |  | $\uparrow$ |  |  | \& |  |
| Traffic Vol, veh/h | 46 | 164 | 64 | 3 | 77 | 14 | 109 | 34 | 16 | 24 | 20 | 23 |
| Future Vol, veh/h | 46 | 164 | 64 | 3 | 77 | 14 | 109 | 34 | 16 | 24 | 20 | 23 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 200 | - | - | 400 | - | - | - | - | - | - | - | - |
| Veh in Median Storage, \# | \# | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 50 | 178 | 70 | 3 | 84 | 15 | 118 | 37 | 17 | 26 | 22 | 25 |



| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh 2.8 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ${ }^{*}$ | $\uparrow$ |  | ${ }^{*}$ | 个 |  |  | $\uparrow$ |  |  | \& |  |
| Traffic Vol, veh/h | 18 | 250 | 18 | 12 | 145 | 15 | 20 | 21 | 9 | 23 | 13 | 12 |
| Future Vol, veh/h | 18 | 250 | 18 | 12 | 145 | 15 | 20 | 21 | 9 | 23 | 13 | 12 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 532 | - | - | 532 | - | - | - | - | - | - | - | - |
| Veh in Median Storage, \# |  | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 20 | 272 | 20 | 13 | 158 | 16 | 22 | 23 | 10 | 25 | 14 | 13 |




| Major/Minor | Major1 | Major2 |  |  |  |  |  | Minor1 |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 0 | 0 | 237 | 0 | 520 | 180 |  |  |  |  |
| Stage 1 | - | - | - | - | 180 | - |  |  |  |  |
| Stage 2 | - | - | - | - | 340 | - |  |  |  |  |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |  |  |  |  |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |  |  |  |  |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |  |  |  |  |
| Follow-up Hdwy | - | -2.218 | -3.518 | 3.318 |  |  |  |  |  |  |
| Pot Cap-1 Maneuver | - | - | 1330 | - | 516 | 863 |  |  |  |  |
| $\quad$ Stage 1 | - | - | - | - | 851 | - |  |  |  |  |
| Stage 2 | - | - | - | - | 721 | - |  |  |  |  |
| Platoon blocked, \% | - | - |  | - |  |  |  |  |  |  |
| Mov Cap-1 Maneuver | - | - | 1330 | - | 512 | 863 |  |  |  |  |
| Mov Cap-2 Maneuver | - | - | - | - | 512 | - |  |  |  |  |
| Stage 1 | - | - | - | - | 851 | - |  |  |  |  |
| Stage 2 | - | - | - | - | 715 | - |  |  |  |  |


| Approach | EB | WB | NB |
| :--- | ---: | :---: | :---: |
| HCM Control Delay, s | 0 | 0.3 | 14.2 |
| HCM LOS |  |  | B |


| Minor Lane/Major Mvmt | NBLn1 NBLn2 |  | EBT | EBR | WBL | WBT |
| :--- | ---: | ---: | ---: | ---: | ---: | :--- |
| Capacity (veh/h) | 512 | 863 | - | -1330 | - |  |
| HCM Lane V/C Ratio | 0.259 | 0.01 | - | -0.008 | - |  |
| HCM Control Delay (s) | 14.5 | 9.2 | - | - | 7.7 | - |
| HCM Lane LOS | B | A | - | - | A | - |
| HCM 95th \%tile Q(veh) | 1 | 0 | - | - | 0 | - |


| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |


|  | Major2 |  |  |  |  |  |
| :--- | ---: | :--- | :--- | :--- | :--- | :--- |
| Major/Minor | Major1 | Minor1 |  |  |  |  |
| Conflicting Flow All | 0 | 0 | - | - | - | 175 |
| $\quad$ Stage 1 | - | - | - | - | - | - |
| $\quad$ Stage 2 | - | - | - | - | - | - |
| Critical Hdwy | - | - | - | - | - | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | - | - | - | - | -3.318 |  |
| Pot Cap-1 Maneuver | - | - | 0 | - | 0 | 868 |
| $\quad$ Stage 1 | - | - | 0 | - | 0 | - |
| Stage 2 | - | - | 0 | - | 0 | - |
| Platoon blocked, \% | - | - |  | - |  |  |
| Mov Cap-1 Maneuver | - | - | - | - | - | 868 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - |
| $\quad$ Stage 1 | - | - | - | - | - | - |
| Stage 2 | - | - | - | - | - |  |


|  | EB | WB | NB |
| :--- | ---: | ---: | ---: |
| Approach | 0 | 9.2 |  |
| HCM Control Delay, s | 0 | 0 | A |


| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT |
| :--- | ---: | ---: | ---: | :--- |
| Capacity (veh/h) | 868 | - | - | - |
| HCM Lane V/C Ratio | 0.008 | - | - | - |
| HCM Control Delay (s) | 9.2 | - | - | - |
| HCM Lane LOS | A | - | - | - |
| HCM 95th \%tile Q(veh) | 0 | - | - | - |






| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Int Delay, s/veh | 2.3 |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | $\mathbf{4}$ | $\mathbf{7}$ | 1 | 4 | 1 | $\mathbf{7}$ |
| Traffic Vol, veh/h | 322 | 83 | 15 | 209 | 97 | 7 |
| Future Vol, veh/h | 322 | 83 | 15 | 209 | 97 | 7 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 570 | 570 | - | 0 | 0 |
| Veh in Median Storage, \# | 0 | - | - | 0 | 0 | - |
| Grade, \% | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 350 | 90 | 16 | 227 | 105 | 8 |


| Major/Minor | Major1 | Major2 |  |  | Minor1 |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Conflicting Flow All | 0 | 0 | 440 | 0 | 609 | 350 |
| $\quad$ Stage 1 | - | - | - | - | 350 | - |
| Stage 2 | - | - | - | - | 259 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | -3.518 | 3.318 |  |
| Pot Cap-1 Maneuver | - | - | 1120 | - | 458 | 693 |
| $\quad$ Stage 1 | - | - | - | - | 713 | - |
| Stage 2 | - | - | - | - | 784 | - |
| Platoon blocked, \% | - | - |  | - |  |  |
| Mov Cap-1 Maneuver | - | - | 1120 | - | 452 | 693 |
| Mov Cap-2 Maneuver | - | - | - | - | 452 | - |
| Stage 1 | - | - | - | - | 713 | - |
| Stage 2 | - | - | - | - | 773 | - |


| Approach | EB | WB | NB |
| :--- | :---: | :---: | :---: |
| HCM Control Delay, s | 0 | 0.6 | 15.1 |
| HCM LOS |  |  | C |


| Minor Lane/Major Mvmt | NBLn1 NBLn2 |  | EBT | EBR | WBL | WBT |
| :--- | ---: | ---: | ---: | ---: | ---: | :--- |
| Capacity (veh/h) | 452 | 693 | - | -1120 | - |  |
| HCM Lane V/C Ratio | 0.233 | 0.011 | - | -0.015 | - |  |
| HCM Control Delay (s) | 15.4 | 10.3 | - | - | 8.3 | - |
| HCM Lane LOS | C | B | - | - | A | - |
| HCM 95th \%tile Q(veh) | 0.9 | 0 | - | - | 0 | - |


| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Int Delay, s/veh | 0.1 |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | $\boldsymbol{F}$ |  |  | 4 |  | $\mathbf{T}$ |
| Traffic Vol, veh/h | 288 | 41 | 0 | 224 | 0 | 5 |
| Future Vol, veh/h | 288 | 41 | 0 | 224 | 0 | 5 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | - | 0 |
| Veh in Median Storage, \# | 0 | - | - | 0 | 0 | - |
| Grade, \% | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 313 | 45 | 0 | 243 | 0 | 5 |



| Approach | EB | WB | NB |
| :--- | ---: | ---: | ---: |
| HCM Control Delay, s | 0 | 0 | 10.1 |
| HCM LOS |  |  | B |


| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBT |
| :--- | ---: | ---: | ---: | :---: |
| Capacity (veh/h) | 706 | - | - | - |
| HCM Lane V/C Ratio | 0.008 | - | - | - |
| HCM Control Delay (s) | 10.1 | - | - | - |
| HCM Lane LOS | B | - | - | - |
| HCM 95th \%tile Q(veh) | 0 | - | - | - |


| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh 6.3 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ${ }^{7}$ | $\uparrow$ |  | ${ }^{*}$ | $\hat{\beta}$ |  |  | $\uparrow$ |  |  | $\uparrow$ |  |
| Traffic Vol, veh/h | 49 | 171 | 66 | 3 | 84 | 14 | 115 | 34 | 16 | 24 | 20 | 24 |
| Future Vol, veh/h | 49 | 171 | 66 | 3 | 84 | 14 | 115 | 34 | 16 | 24 | 20 | 24 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 200 | - | - | 400 | - | - | - | - | - | - | - | - |
| Veh in Median Storage, \# - |  | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 53 | 186 | 72 | 3 | 91 | 15 | 125 | 37 | 17 | 26 | 22 | 26 |





| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
| Int Delay, s/veh | 3 |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | 4 | $\mathbf{7}$ |  | 4 | l | $\mathbf{7}$ |
| Traffic Vol, veh/h | 183 | 86 | 15 | 293 | 129 | 8 |
| Future Vol, veh/h | 183 | 86 | 15 | 293 | 129 | 8 |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 570 | 570 | - | 0 | 0 |
| Veh in Median Storage, \# | 0 | - | - | 0 | 0 | - |
| Grade, \% | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 199 | 93 | 16 | 318 | 140 | 9 |



| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |





| Intersection |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 2.6 |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |  |
| Lane Configurations | ${ }^{7}$ | $\hat{\beta}$ |  | ${ }^{*}$ | $\uparrow$ |  |  | $\uparrow$ |  |  | $\uparrow$ |  |  |
| Traffic Vol, veh/h | 7 | 230 | 12 | 13 | 379 | 30 | 28 | 16 | 18 | 20 | 7 | 35 |  |
| Future Vol, veh/h | 7 | 230 | 12 | 13 | 379 | 30 | 28 | 16 | 18 | 20 | 7 | 35 |  |
| Conflicting Peds, \#/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Sign Control F | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |  |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |  |
| Storage Length | 532 | - | - | 532 | - | - | - | - | - | - | - | - |  |
| Veh in Median Storage, \# | \# | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Grade, \% | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |  |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |  |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |  |
| Mvmt Flow | 8 | 250 | 13 | 14 | 412 | 33 | 30 | 17 | 20 | 22 | 8 | 38 |  |





| Intersection |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |







