## The Anderson 400 Traffic Impact Study

## City of Princeton, IA

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#### **CONTENTS**

Executive Summary	3
Existing & Projected No Build Conditions	5
Adjacent Streets Traffic Volume Data Background Traffic Growth Crash Analysis	5 6 
Projected Buildout Conditions & Mitigation	10
Development Description	10
Trip Generation	11
Trip Distribution	11
Left-Turn Bay Warrant Analysis	13
Right-Turn Bay Warrant Analysis	14
Signal Warrant Analysis	15
Traffic Modeling	23
Operational Analysis	23
Comparative Operational Analysis	25
Summary and Conclusion	26

## **Figures**

Figure ES1	Trip Distribution – One Access Point 2020 to 2025	4
Figure ES2	Trip Distribution – Two Access Points 2025 through 2050	4
Figure 1	Study Area Map	5
Figure 2	Study Intersections – AM & PM Peak Hour No Build Volumes	7
Figure 3	Lost Grove Road – 270 <sup>th</sup> Avenue to 5 <sup>th</sup> Street	8
Figure 4	Preliminary Site Plan	10
Figure 5	Trip Distribution – One Access Point 2020 to 2025	12
Figure 6	Trip Distribution – Two Access Points 2025 through 2050	12
Figure 7	Left-Turn Bay Warrant Based on Approach Volume	13
Figure 8	Right-Turn Bay Warrant Based on Approach Volume – Iowa DOT Chapter 6A - 1	14
Figure 9	Right-Turn Bay Warrant Based on Approach Volume – NCHRP 457 Report	15
Figure 10	Four Hour Vehicular Volume Warrant – Analysis Year 2028, Great River Road & South Access	17
Figure 11	Four Hour Vehicular Volume Warrant – Analysis Year 2030, Lost Grove Road and North Access	18
Figure 12	Study Intersections – 2030 Buildout Recommended Lane Configuration and Control	20
Figure 13	Study Intersections – AM & PM Peak Hour Build Volumes	21



#### **Tables**

Table 1	Crash Type – Lost Grove Rd 270 <sup>th</sup> Ave to 5 <sup>th</sup> St (1/1/08 – 12/31/17)	8
Table 2	Major Causes of Crashes – Lost Grove Rd 270 <sup>th</sup> Ave to 5 <sup>th</sup> St (1/1/08 – 12/31/17)	9
Table 3	Crash Severity – Lost Grove Rd 270 <sup>th</sup> Ave to 5 <sup>th</sup> St (1/1/08 – 12/31/17)	9
Table 4	Trip Generation	11
Table 5	Scheduled Improvements	19
Table 6	AM Peak Hour Turning Movement Volumes	22
Table 7	PM Peak Hour Turning Movement Volumes	22
Table 8	LOS Criteria for Signalized and Unsignalized Intersections	23
Table 9	Projected Signalized Intersection Operations	24
Table 10	Projected Unsignalized Intersection Operations	24
Table 11	Projected Signalized Comparative Operations	25

## Appendices

Appendix 1	Turning Movement Data
Appendix 2	Crash Data
Appendix 3	US 67 and Access Point Exhibits
Appendix 4	Operational Analysis Worksheets



## **Executive Summary**

Paul and Marijo Anderson initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Anderson 400 development. The proposed Anderson 400 development site will be located on approximately 400 acres near Princeton, Iowa. Two access points are ultimately proposed, with one onto Great River Road (US 67) and one onto Lost Grove Road. The access onto Great River Road will be located near the existing driveway to the Anderson's farm. The access onto Lost Grove Road will be located between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic.

The following study intersections within the study area were identified for analysis:

- 1. Great River Road & South Access
- 2. Lost Grove Road & North Access

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Great River Road and South Access). The area immediately surrounding the proposed development incorporates agricultural, undeveloped, and residential land uses.

The Anderson 400 development's initial vision is a corporate headquarters technology campus that will include a public park with an outdoor theater and multi-purpose trails. A bike sharing service is anticipated to be provided within the park. The development is expected to be completely built by the end of 2030 and employ up to 6,100 employees. 6,100 employees was identified as the approximate maximum number of employees allowable while maintaining acceptable vehicle operations at the two study intersections through the design year of 2050. Acceptable vehicle operations was defined as having an overall intersection Level of Service (LOS) of D or better, as well as not allowing more than one individual movement to operate at LOS E or worse. The Traffic Modeling section discusses vehicle operations in greater detail.

Turning movement volumes were collected at the intersection of the Anderson Farm driveway and Great River Road (#1 Great River Road and South Access) and Lost Grove Road and 270<sup>th</sup> Avenue. Only the eastbound and westbound volumes at Lost Grove Road and 270<sup>th</sup> Avenue were used in the analysis presented herein. Turning movement volumes were collected between the hours of 5:00 AM and 8:00 PM. The peak hours of the study intersections were determined based on the highest consecutive four consecutive 15-minute turning movement counts at the intersection of Great River Road and South Access governed the AM and PM peak hours because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 6:15 and 7:15. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour data are provided in Appendix 1 of this report.

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for traffic volume growth passing through study intersections. This traffic volume growth is often referred to as background traffic growth. A review of Annual Average Daily Traffic (AADT) provided by the Iowa Department of Transportation (DOT) volumes near the development site indicated an approximate 2.0 percent annual growth rate. However, the Bi-State Regional Commission traffic model indicates a negative growth rate between 2018 and 2045. It should also be noted, over time growth rates generally do not exhibit a straight line growth, but rather tends to level off as the surrounding area continues to develop. Therefore in order to provide a conservative analysis, a 2.0 percent annual growth rate was applied between 2018 and 2030 (full buildout), a 1.0 percent annual growth rate was applied between 2030 and 2040, and 0.5 percent annual growth rate was applied between 2040 and 2050 (design year). This approach is meant to represent a period of relative rapid traffic volume growth followed by a period of more moderate traffic volume growth.

The Iowa Crash Analysis Tool (ICAT) website administered by the Iowa DOT was used to collect available crash data for the ten-year period between January 1, 2008 and December 31, 2017. There were no crashes



near the Anderson Farm driveway (#1 Great River Road and South Access), which will become the south access for the proposed development. There were 11 crashes along Lost Grove Road between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street, which is the segment of roadway that is anticipated to have the north access for the proposed development. The crash data indicates animal crossings may be an issue along this segment of roadway. Watch for Wildlife or Wild Life Crossing signs could be installed to potentially alert drivers of this potential safety issue. Crash data for this analysis is provided in Appendix 2.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will all operate at acceptable LOS C or better during the AM and PM peak hour conditions through 2050 with buildout of the proposed Anderson 400 development. This determination is based on the improvement schedule outline in Table 5, as well as traffic volume and trip generation trends identified herein. Operational analysis worksheets are contained in Appendix 4.

Trip distribution percentages for the proposed Anderson 400 development are based upon existing traffic patterns observed in the AM and PM peak hour volumes, as well expected traffic patterns in the surrounding roadway network over the 2050 design year. Trip distribution percentages for the Anderson 400 development are presented in the following figures.





Figure ES2 Trip Distribution – Two Access Points 2025 through 2050



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## **Existing & Projected No Build Conditions**

Paul and Marijo Anderson initiated this traffic study to identify potential traffic impacts on the adjacent roadway network and provide traffic mitigation measures, if necessary, due to their proposed Anderson 400 development. The proposed Anderson 400 development site will be located on approximately 400 acres near Princeton, Iowa. Two access points are ultimately proposed, with one onto Great River Road (US 67) and one onto Lost Grove Road. The access onto Great River Road will be located near the existing driveway to the Anderson's farm. The access onto Lost Grove Road will be located between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street.

The following study intersections within the study area were identified for analysis:

- 1. Great River Road & South Access
- 2. Lost Grove Road & North Access

The above list assigns each study intersection with a number that is used throughout the report. (e.g. #1 = Great River Road and South Access).

The area immediately surrounding the proposed development incorporates agricultural, undeveloped, and residential land uses. A study area map depicting the location of the study intersections, as well as the location of proposed development site (delineated in red) is depicted in Figure 1.



#### Figure 1 Study Area Map

#### **Adjacent Streets**

The following descriptions are specific to the area near the proposed development.

Great River Road is a north/south two-lane (one lane in each direction) principal arterial roadway. Parking is prohibited along Great River Road and the posted speed is 55 mph.

Lost Grove Road is an east/west two-lane (one lane in each direction) minor collector roadway. Parking is prohibited along Lost Grove Road and the posted speed is 40 mph.



#### **Traffic Volume Data**

Turning movement volumes were collected at the intersection of the Anderson Farm driveway and Great River Road (#1 Great River Road and South Access) and Lost Grove Road and 270<sup>th</sup> Avenue. Only the eastbound and westbound volumes at Lost Grove Road and 270<sup>th</sup> Avenue were used in the analysis presented herein. Turning movement volumes were collected between the hours of 5:00 AM and 8:00 PM. The peak hours of the study intersections were determined based on the highest consecutive four consecutive 15-minute turning movement counts at the intersection of Great River Road and South Access governed the AM and PM peak hour because it is the study intersection with the highest volume of entering vehicles. The AM peak hour was determined to occur between 6:15 and 7:15. The PM peak hour was determined to occur between 4:30 and 5:30. The AM and PM peak hour were determined to occur between 4:30 and 5:30. The AM and PM peak hour were between data are provided in Appendix 1 of this report.

#### **Background Traffic Growth**

Projected traffic analysis will typically apply an annual growth rate to study intersections' existing turning movement volumes prior to adding project development trips to account for traffic volume growth passing through study intersections. This traffic volume growth is often referred to as background traffic growth. A review of Annual Average Daily Traffic (AADT) provided by the Iowa Department of Transportation (DOT) volumes near the development site indicated an approximate 2.0 percent annual growth rate. However, the Bi-State Regional Commission traffic model indicates a negative growth rate between 2018 and 2045. It should also be noted, over time growth rates generally do not exhibit a straight line growth, but rather tends to level off as the surrounding area continues to develop. Therefore in order to provide a conservative analysis, a 2.0 percent annual growth rate was applied between 2018 and 2030 (full buildout), a 1.0 percent annual growth rate was applied between 2030 and 2040, and 0.5 percent annual growth rate was applied between 2040 and 2050 (design year). This approach is meant to represent a period of relative rapid traffic volume growth followed by a period of more moderate traffic volume growth. Projected 2020 and 2050 AM and PM peak hour turning movement volumes without the proposed development (no build) are presented in Figure 2.





Figure 2 Study Intersections – AM & PM Peak Hour No Build Volumes

2020 AM Peak Hour



2050 AM Peak Hour



2020 PM Peak Hour



2050 PM Peak Hour





#### **Crash Analysis**

The Iowa Crash Analysis Tool (ICAT) website administered by the Iowa DOT was used to collect available crash data for the ten-year period between January 1, 2008 and December 31, 2017.

There were no crashes near the Anderson Farm driveway (#1 Great River Road and South Access), which will become the south access for the proposed development. There were 11 crashes along Lost Grove Road between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street, which is the segment of roadway that is anticipated to have the north access for the proposed development.

Figure 3 presents the location of the eleven crashes along Lost Grove Road between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street. The red dots indicate locations of crash incidents.

Figure 3 Lost Grove Road – 270<sup>th</sup> Avenue to 5<sup>th</sup> Street



Table 1 presents crash statistics for each crash organized by crash type.

#### Table 1 Crash Type – Lost Grove Rd 270<sup>th</sup> Ave to 5<sup>th</sup> St (1/1/08 – 12/31/17)

	Crash Type												
Single Vehicle	Head On	Rear End	Broadside	Not Reported/ Other	Total								
7	1	1	1	1	11								

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

4 of the 11 crashes occurred during dry roadway conditions; the remaining 7 crashes occurred during the following roadway conditions:

- Wet = 1
- Ice/Frost = 1
- Snow = 1
- Not Reported = 4



Table 2 summarizes reported major causes for the crashes.

#### Table 2Major Causes of Crashes – Lost Grove Rd 270th Ave to 5th St (1/1/08 – 12/31/17)

Major Causes												
Animal	Followed Too Closely	Ran Off Road (Right)	Swerving Evasive Action									
6	1	3	1									

Source: Iowa Department of Transportation, Bureau of Transportation Safety.

Table 3 presents crash injury statistics for the crashes organized by severity.

#### Table 3Crash Severity – Lost Grove Rd 270th Ave to 5th St (1/1/08 – 12/31/17)

Number		Crash	Severity	
of Crashes	Major Injury	Minor Injury	Property Damage Only	Injuries per Crash
11	0	1	10	0.09

The crash data indicates animal crossings may be an issue along this segment of roadway. Watch for Wildlife or Wild Life Crossing signs could be installed to potentially alert drivers of this potential safety issue. Crash data for this analysis is provided in Appendix 2.



## **Projected Buildout Conditions & Mitigation**

#### **Development Description**

The Anderson 400 development's initial vision is a corporate headquarters technology campus that will include a public park with an outdoor theater and multi-purpose trails. A bike sharing service is anticipated to be provided within the park. The development is expected to be completely built by the end of 2030 and employ up to 6,100 employees. The total of 6,100 employees was identified as the approximate maximum number of employees allowable while maintaining acceptable vehicle operations at the two study intersections through the design year of 2050. Acceptable vehicle operations was defined as having an overall intersection Level of Service (LOS) of D or better, as well as not allowing more than one individual movement to operate at LOS E or worse. The Traffic Modeling section discusses vehicle operations in greater detail. A preliminary site plan is provided in Figure 4. Opening and design year exhibits are provided in Appendix 3.

#### Figure 4 Preliminary Site Plan



The site plan indicates two access points onto Great River Road, with the further south access point operating as an emergency only access and the further north access point operating as the main access point. The further south access point is intended to be 20 feet wide with a gravel surface and is it anticipated to be barricaded except for emergency uses and as such the analysis presented herein assumes all trips will be using the further north (main) access point. The emergency access is intended to provide an additional access point for emergency vehicles should the main access point become unusable (e.g. during a crash incident). Construction vehicles are also anticipated to use the emergency access road during the construction of the further north (main) access point onto Great River Road. As discussed in greater detail in Table 5, the further north (main) access point onto Great River Road will initially be constructed with northbound and southbound single lane approaches and then later improved with additional turn bays as needed.



#### **Trip Generation**

Project trip generation is based on nationally accepted trip generation rates and fitted curve equations contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, 2017. For the purposes of this study the development will be analyzed under four phases, which include buildout year 2020, 2025, and 2030, as well as the design year of 2050. Additionally, it is assumed the proposed public park will be fully built by 2020.

The proposed Anderson 400 development is most closely represented by ITE's Corporate Headquarters Building (ITE 714). However, due to the small ITE sample size of studies (both the AM and PM peak hours only had 1 study) Office Park (ITE Code 750) was chosen, which has a larger sample size of studies (both the AM and PM peak hours had 3 studies). These ITE studies are used in the development of the ITE trip generation rates and fitted curve equations. Therefore, it is reasonable to assume a larger sample size of studies would produce more accurate rates and fitted curve equations. Public Park (ITE Code 411) was chosen for the proposed public park. Generated trips correspond to the weekday AM and PM peak hour of the generator. The AM and PM peak hours at the study intersections are anticipated to be determined by employees traveling to/from the proposed development. Table 4 presents AM and PM peak hour trip generation estimates for the proposed Anderson 400 development.

			Daily	AM Peak Hour						PM	Peak Hou	r	
Land Use	ITE Code <sup>1</sup>	Quantity	Total Trips	Total Trips	% In	% Out	Trips In	Trips Out	Total Trips	% In	% Out	Trips In	Trips Out
Office Park	750	6,100 Employees	21,594	2,379	92%	8%	2,189	190	2,257	15%	85%	339	1,918
Public Park	411	100 Acres	152 <sup>2</sup>	2	59%	41%	1	1	29 <sup>3</sup>	55%	45%	16	13
2020 B	uildout Tri	p Generation (5% of Total)	1,232	121			110	11	142			33	109
2025 Buildout Trip Generation (40% of Total)			8,790	954			877	77	932			152	780
2030 Buildout Trip Generation (100% of Total)		21,746	2,381			2,190	191	2,286			355	1,931	

#### Table 4 Trip Generation

Institue of Transportation Engineers Trip Generation Handbook, 10th Edition, 2017

<sup>2</sup> Fitted curve equation, T = 0.64(X) + 88.46, was used

<sup>3</sup> Fitted curve equation, T = 0.06(X) + 22.60, was used

#### **Trip Distribution**

Trip distribution percentages for the proposed Anderson 400 development, with only the initial access point onto Great River Road are based upon expected travel patterns to/from the proposed development and are presented in Figure 5. Trip distribution percentages with both planned access points (one onto Great River Road and one onto Lost Grove Road) are based upon expected travel patterns to/from the proposed development over the design year of 2050 and are presented in Figure 6.





#### Figure 5 Trip Distribution – One Access Point 2020 to 2025

Figure 6 Trip Distribution – Two Access Points 2025 through 2050



The 45 percent to/from the west on Lost Grove Road South is justifiable in that motorists will generally choose routes that minimize their travel time/distance. Therefore, as the initial access point onto US 67 becomes congested, motorists become more likely to use the access point on to Lost Grove Road to/from their ultimate destinations/origins that is largely anticipated to be the Quade Cities, which is south and west of the proposed development. It should also be noted GPS data indicates the shortest path to the Quad Cities is via Lost Grove Road and 240<sup>th</sup> Avenue, therefore justifying the trip distribution adopted.



#### Left-Turn Bay Warrant Analysis

The subsequent analysis was performed under the guidelines and procedures as outlined in the National Cooperative Highway Research Program (NCHRP) report Development of Left-Turn Warrants for Unsignalized Intersections (2013). This report states that left-turn bays should be provided where there are more than 12 left turns during the peak hour, when delay caused by left-turning vehicles blocking through vehicles would become a problem, and that dedicated left-turn bays not only increase intersection capacity but also increase vehicle safety. Figure 7 provides thresholds curve figures for determining if a left-turn bay is warranted based on approach volume.



#### Figure 7 Left-Turn Bay Warrant Based on Approach Volume



Please note Great River Road has a posted speed limit of 55 mph in the vicinity of the Great River Road and South Access intersection. However, for the purposes of this analysis the 40-45 mph threshold curve will be used to determine if a left-turn bay is warranted on the northbound approach to the Great River Road and South Access intersection. The analysis presented herein projects that 99 and 31 vehicles will be making a left turn during the projected 2020 buildout AM and PM peak hours, respectively. As such a left-turn bay is warranted during both the AM and PM peak hour 2020 buildout condition.

The 95<sup>th</sup> percentile queue length is the length of which a queue will be less than 95 percent of the time and is often analyzed to determine appropriate lengths for turn bays. The AM and PM peak hour northbound left-turn 95th percentile queue at the Great River Road and South Access intersection under projected 2050 buildout conditions is anticipated to be 247 and 207 feet, respectively. As such a 250 foot northbound left-turn bay is recommended at the Great River Road and South Access intersection.



#### **Right-Turn Bay Warrant Analysis**

The Iowa DOT requested a review of the Iowa DOT Design Manual and The National Cooperative Highway Research Program Report (NCHRP) 457 Evaluating Intersection Improvements: An Engineering Study Guide. The review request is specific to determine whether a right-turn bay on the southbound approach to the Great River Road and South Access intersection is warranted, which based on the analysis presented herein is recommended to be signalized by 2025.

Figure 8 provides a threshold curve figure, prepared by the Iowa DOT Office of Design (Chapter 6A-1) for determining if a right-turn bay is warranted based on approach volume on a two-lane roadway at unsignalized intersections.

#### Figure 8 Right-Turn Bay Warrant Based on Approach Volume – Iowa DOT Chapter 6A - 1 Rural Two–Lane Highways



\*Traffic volume must be adjusted for trucks based on Table 1.

\*\*At gravel road intersections, use minor right turn.

Based on projected 2025 buildout peak hour turning movement volumes a right-turn bay is not warranted during the AM or PM peak hours for the above threshold curve warrant. Additionally, it is recommended the intersection be signalized by 2025, which would make the above figure inapplicable at this intersection.

The NCHRP 457 report, states "provision of a right-turn bay on the major road to a two-way stop-controlled intersection can significantly improve operations and safety at the intersection".

Figure 9 provides a threshold curve figure, prepared for NCHRP 457 report, for determining if a right-turn bay is warranted at unsignalized intersections based on approach volume on a two-lane roadway with a 60, 55,



50, 45, and 40 mph posted speed limit. It should be noted Great River Road (US 67) has a posted speed limit of 55 mph near the proposed access point.



Figure 9 Right-Turn Bay Warrant Based on Approach Volume – NCHRP 457 Report

Based on projected 2025 buildout peak hour turning movement volumes a right-turn bay is warranted during the AM peak hour, but not during the PM peak hour for the above threshold curve warrant. Additionally, it is recommended the intersection be signalized by 2025, which would make the above figure inapplicable. It should be noted based on projected 2020 buildout peak hour turning movement volumes a right-turn bay is not warranted during the AM or PM peak hours for the above threshold curve warrant.

#### **Signal Warrant Analysis**

The subsequent analysis was performed under the guidelines and procedures as outlined in the 2009 Manual of Uniform Traffic Control Devices (MUTCD) and is used to determine the approximate year a traffic signal will be warranted at the intersections of Great River Road and South Access and Lost Grove Road and North Access. The MUTCD states a traffic control signal should not be installed unless one or more signal warrants are met. If these requirements are not met, the MUTCD states a traffic control signal should not be put into operation.

For the purposes of this analysis the MUTCD Warrant 2 – Four-Hour Vehicular Volume was analyzed. The Four-Hour warrant was chosen, because it is anticipated a traffic signal will only be warranted during the period of time when the majority of employees are traveling to and from the proposed development. For the purposes of this analysis the 7:00 - 8:00 AM and 8:00 - 9:00 AM and 4:00 - 5:00 PM and 5:00 - 6:00 PM hours were chosen. The ITE Trip Generation Manual, 10<sup>th</sup> Edition was used to estimate inbound and outbound trips during these hours. Please note the hourly signal warrant turning movement volumes do not match the AM and PM peak hour volumes, because the analyzed hourly periods of time are different. The AM peak hour was determined to occur between 6:15 and 7:15. The PM peak hour was determined to occur between 4:30 and 5:30. The signal warrant will analyze the 7:00 to 8:00 and 8:00 to 9:00 AM hours and the 4:00 to 5:00 and 5:00 to 6:00 PM hours

The following figures identify the anticipated lane configuration under projected 2050 buildout conditions at the intersections of Great River Road and South Access (#1) and Lost Grove Road and North Access (#2). It is anticipated the intersection of Great River Road and South access (#1) will be the sole access until operational considerations indicate the second access onto Lost Grove Road is needed





Please note the MUTCD provides the following guidance with regards to the consideration of the number of lanes at intersection approaches:

"Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics dictate whether an approach should be considered as one lane or two lanes. For example, for an approach with a shared through and right-turning lane plus a left-turn lane, engineering judgment could indicate that it should be considered a one-lane approach if the traffic using the left-turn lane is minor. In such a case, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes **if approximately half** of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles. Similar engineering judgment and rationale should be applied to a street approach with one lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered."

Based on the trip distributions identified in Figures 5 and Figure 6, less than half of anticipated vehicles will be turning left at the eastbound approach and more than half will be making a left at the northbound approach to the intersection of Great River Road and South Access. As such, the following signal warrant analysis will assume the following lane configuration at the intersection of Great River Road and South Access:



Warrant 2 – Four-Hour Vehicular Volume

The Four-Hour Vehicular Volume signal warrant condition is intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. This warrant is satisfied when the plotted points representing vehicles per hour on the major street (total of both approaches) and corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the curve in the figure below for the existing combination of approach lanes for all four selected hours of an average day. The applicable threshold curve for the intersection is identified in the figure below by a green rectangle. On the minor street, the higher volume is not required to be on the same approach during each of the four hours. Figure 10 presents the Warrant 2 – Four-Hour Vehicular Volume for the intersection of Great River Road and South Access by the end of the year 2028.





#### Figure 10 Four Hour Vehicular Volume Warrant – Analysis Year 2028, Great River Road & South

#### MAJOR STREET - TOTAL OF BOTH APPROACHES - VPH

\*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane. Source: Manual of Uniform Traffic Control Devices, December 2009

Based on the traffic volume and trip generation trends identified herein, traffic volume characteristics at the intersection of Great River Road and South Access is expected to meet the threshold to justify a signalized intersection under Warrant 2 - Four-Hour Vehicular Volume by the end of the year 2028 (as shown in Figure 10). However, for operational purposes it is recommended that the intersection of Great River Road and South Access be signalized by the end of 2025.

Based on the traffic volume and trip generation trends identified herein the second access onto Lost Grove Road will be needed operationally by the end of 2025 to relieve congestion at the initial access onto Great River Road and will need to be signalized by the end of 2030 (as shown in Figure 11). Figure 11 presents the Warrant 2 – Four-Hour Vehicular Volume for the intersection of Lost Grove Road and North Access by the end of the year 2030.





## Figure 11 Four Hour Vehicular Volume Warrant – Analysis Year 2030, Lost Grove Road and North Access

#### MAJOR STREET - TOTAL OF BOTH APPROACHES - VPH

\*Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor street approach with one lane. Source: Manual of Uniform Traffic Control Devices, December 2009

Please note, the MUTCD states a satisfaction of a traffic control warrant or warrants does not in itself require a modification to the existing traffic control. In general, a modification to an existing traffic control should not be made unless analysis indicates it will improve the overall safety and or operations of the intersection. The ultimate decision resides on engineering judgement.

Table 5 provides a comprehensive schedule of improvements based on the traffic volume and trip generation trends identified herein. The identified improvements are assumed to be implemented by the identified dates for the purposes of the operational analysis. The no build condition assumes the Anderson Farm's driveway remains a private driveway and the Lost Grove Road and North Access intersection is never constructed.



#### Table 5 Scheduled Improvements

	Intersection	Year Implemented	Existing/Assumed Configuration	Recommended Configuration	Details
1	Great River Rd & South Access	2020			The intersection is anticipated to be constructed with dedicated eastbound and northbound left turn bays.
1	Great River Rd & South Access	2025			The intersection is anticipated to be signalized and the northbound left movement is anticipated to operate as a permitted (green ball) only movement.
2	Lost Grove Rd & North Access	2025			The north access is anticipated to be constructed as an unsignalized intersection with a stop sign on the northbound approach.
2	Lost Grove Rd & North Access	2030	2 × × × ×	2 ~ ~ ~ ~	The north access is anticipated to be signalized.
1	Great River Rd & South Access	2030			The northbound left movement is anticipated to operate with protected- permitted (green arrow followed by green ball) phases.

The recommended lane configuration and control for the study intersections by the end of 2030 under full buildout conditions is presented in Figure 12.





Figure 12 Study Intersections – 2030 Buildout Recommended Lane Configuration and Control



Projected 2020, 2025, 2030, and 2050 AM and PM peak hour turning movement volumes upon buildout of the proposed Anderson 400 development are presented in Figure 13. Table 6 and 7 present turning movement volumes at the study intersection organized by the following volume classifications:

- 2020 Volumes No Build
- Background Traffic Volume Growth
- 2050 Volumes No Build

- Development Trips
- 2020 Volumes Buildout
- 2050 Volumes Buildout



# Dth St Oth St

#### Figure 13 Study Intersections – AM & PM Peak Hour Build Volumes

2020 AM Peak Hour



2025 AM Peak Hour



2030 AM Peak Hour



#### 2050 AM Peak Hour



2020 PM Peak Hour



2025 PM Peak Hour



2030 PM Peak Hour



#### 2050 PM Peak Hour





#1 Great River Road & South Access													
		Southbo	ound		Westbound			Northbo	und		Eastbo	und	Int
Traffic Volume Classification	Gr	eat Rive	r Road		NA		Gr	eat Rive	r Road	5	South Ac	cess	Count
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	oouni
2020 Volumes Without Project	0	246	2	0	0	0	0	131	0	1	0	1	381
Background Traffic Volume Growth	0	101	1	0	0	0	0	55	0	0	0	0	157
2050 Volumes Without Project	0	347	3	0	0	0	0	186	0	1	0	1	538
2020 Development Trips	0	0	12	0	0	0	99	0	0	2	0	9	122
2050 Development Trips	0	0	110	0	0	0	986	0	0	10	0	85	1,191
2020 Volumes With Project	0	246	14	0	0	0	99	131	0	3	0	10	503
2050 Volumes With Project	0	347	113	0	0	0	986	186	0	11	0	86	1,729
		#2	2 Lost G	rove F	Road 8	North	Acces	s					
		Southbo	ound	Westbound			Northbound			Eastbound			les 4
Traffic Volume Classification		NA		Lost Grove Road			North Access			Lost Grove Road			Int.
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Count
2020 Volumes Without Project	0	0	0	0	41	0	0	0	0	0	10	0	51
Background Traffic Volume Growth	0	0	0	0	16	0	0	0	0	0	5	0	21
2050 Volumes Without Project	0	0	0	0	57	0	0	0	0	0	15	0	72
2020 Development Trips	0	0	0	0	1	0	0	0	0	0	6	0	7
2050 Development Trips	0	0	0	110	0	0	0	0	0	0	0	986	1,096
2020 Volumes With Project	0	0	0	0	42	0	0	0	0	0	16	0	58
2050 Volumes With Project	0	0	0	110	57	0	0	0	0	0	15	986	1,168

#### Table 6 AM Peak Hour Turning Movement Volumes

#### Table 7

#### PM Peak Hour Turning Movement Volumes

#1 Great River Road & South Access													
		Southbo	ound	1	Westbound			Northbo	und		Eastbou	und	Int.
Traffic Volume Classification	Gr	eat Rive	r Road		NA		Gr	eat Rive	r Road	5	South Ac	cess	Count
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2020 Volumes Without Project	0	222	0	0	0	0	1	267	0	1	0	2	493
Background Traffic Volume Growth	0	91	0	0	0	0	0	111	0	0	0	1	203
2050 Volumes Without Project	0	313	0	0	0	0	1	378	0	1	0	3	696
2020 Development Trips	0	0	4	0	0	0	30	0	0	10	0	99	143
2050 Development Trips	0	0	18	0	0	0	160	0	0	97	0	868	1,143
2020 Volumes With Project	0	222	4	0	0	0	31	267	0	11	0	101	636
2050 Volumes With Project	0	313	18	0	0	0	161	378	0	98	0	871	1,839
		#2	2 Lost G	rove F	Road &	North	Acces	s					
		Southbo	und	Westbound			Northbound			Eastbound			Int
Traffic Volume Classification		NA		Lost Grove Road			North Access			Lost Grove Road			Count
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Count
2020 Volumes Without Project	0	0	0	0	28	0	0	0	0	0	54	0	82
Background Traffic Volume Growth	0	0	0	0	12	0	0	0	0	0	23	0	35
2050 Volumes Without Project	0	0	0	0	40	0	0	0	0	0	77	0	117
2020 Development Trips	0	0	0	0	5	0	0	0	0	0	2	0	7
2050 Development Trips	0	0	0	18	0	0	869		97	0	0	160	1,144
2020 Volumes With Project	0	0	0	0	33	0	0	0	0	0	56	0	89
2050 Volumes With Project	0	0	0	18	40	0	869	0	97	0	77	160	1,261



## **Traffic Modeling**

#### **Operational Analysis**

Vehicular operational analysis for this study was performed using the methodology of the 6<sup>th</sup> Edition Highway Capacity Manual (HCM) through PTV Vistro 5.00-00 traffic analysis software. Operational analysis is generally categorized in terms of Level of Service (LOS). LOS describes the quality of traffic operations and is graded from A to F; with LOS A representing free-flow conditions and LOS F representing congested conditions.

Procedures outlined in Chapter 19 of the HCM 6<sup>th</sup> Edition were used to analyze intersection performance at signalized intersections. The primary measure<sup>1</sup> used to quantify LOS at signalized intersections is average intersection control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection and the time for vehicles to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches.

A queueing analysis was also performed at the signalized intersections. A vehicle queue is a line of vehicles waiting to pass through an intersection. As vehicles arrive the queue grows and as the movement is served, the queue length shrinks. To account for this variation, it is common to consider the 95<sup>th</sup> percentile queue length. The 95<sup>th</sup> percentile queue is the length of which the queue will be less than 95 percent of the time.

Procedures outlined in Chapters 20 (two-way stop control) of the HCM 6<sup>th</sup> Edition were used to analyze intersection performance at unsignalized intersections. While LOS for signalized intersections is primarily based on the volume weighted average delay per vehicle traveling through the intersection (average intersection control delay), LOS for unsignalized intersections is based primarily on the movement with the longest delay.

Table 8 presents the range of traffic delays associated for signalized and unsignalized intersections.

LOS	Signalized Intersection Average Delay (sec/veh)	Unsignalized Intersection Delay (sec/veh)
A	≤ <b>10</b>	≤ <b>10</b>
В	> 10 to 20	> 10 to 15
С	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

#### Table 8 LOS Criteria for Signalized and Unsignalized Intersections

Source: HCM 6<sup>th</sup> Edition, Exhibit 19-8 LOS Criteria for Signalized Intersections and Exhibit 20-2 LOS Criteria for Unsignalized Intersections.

sec/veh = seconds per vehicle

The following operational analysis assumes the lane configuration and control presented in Table 5. The signalized operations assume optimized cycle lengths and phasing splits as identified through PTV 5.00-00. Table 9 presents operational conditions including 95<sup>th</sup> percentile queue lengths for the signalized study intersection. Table 10 presents delay and LOS on the worse movement at the unsignalized study intersection. The no build condition assumes the Anderson Farm's driveway remains a private driveway and the Lost Grove Road and North Access intersection is never constructed. Operational analysis worksheets are contained in Appendix 4.

<sup>&</sup>lt;sup>1</sup> Volume to Capacity (V/C) ratio is another measurement used to determine LOS. If the V/C ratio is greater than 1.0 LOS is F regardless of delay. An expanded discussion of v/c ratios is provided in Appendix 4.



					A Peak	M			P Peak	M Hour	
	Intersection	Scenario	Metric	NB	SB	EB	WB	NB	SB	EB	WB
			Approach Delay	8.0	1.1	63.3	-	9.5	8.1	23.6	-
			Approach LOS	А	А	E	-	А	А	С	-
		Projected 2025	95 <sup>th</sup> %tile Queue	LT	TR	R	-	LT	TR	R	-
		Buildout	(Longest Movement) in Feet	173	7	42	-	93	59	232	-
			Intersection Delay & LOS		7.4	4, A			15.	0, B	
			Approach Delay	26.5	30.0	35.0	-	16.5	26.3	25.1	-
	Creat Diver		Approach LOS	С	С	D	-	В	С	С	-
1	Rd & South	Projected 2030 <sup>1</sup>	95 <sup>th</sup> %tile Queue	L	TR	R	-	Т	TR	R	-
•	Access	Buildout	(Longest Movement) in Feet	247	228	47	-	154	184	381	-
			Intersection Delay & LOS		27.	7, C			22.	5, C	
			Approach Delay	31.2	37.7	65.2	-	16.9	35.7	23.1	-
		Projected 2050 <sup>1</sup>	Approach LOS	С	D	E	-	В	D	С	-
			95 <sup>th</sup> %tile Queue	L	TR	R	-	Т	TR	R	-
	Buildout		(Longest Movement) in Feet	247	371	87	-	163	224	332	-
			Intersection Delay & LOS		34.	3, C			23.	6, C	
			Approach Delay	34.4	-	4.1	4.7	20.3	-	18.7	16.3
		D : ( 10000 1	Approach LOS	С	-	А	А	С	-	В	В
	Projected 2030 Buildout		95 <sup>th</sup> %tile Queue	LR	-	TR	TL	LR	-	TR	TL
			(Longest Movement) in Feet	69	-	33	39	416	-	89	25
2	Lost Grove		Intersection Delay & LOS		7.	1, A			19.	9, B	
2	Access		Approach Delay	34.2	-	4.1	4.6	20.3	-	19.0	16.3
			Approach LOS	С	-	А	А	С	-	В	В
		Projected 2050	95 <sup>th</sup> %tile Queue	LR	-	TR	TL	LR	-	TR	TL
		Dundout	(Longest Movement) in Feet	71	-	36	41	416	-	97	28
			Intersection Delay & LOS		7.2	2, A			19.	9, B	

#### Table 9 Projected Signalized Intersection Operations

Queue, Delay, and LOS analysis based on HCM 6<sup>th</sup> Edition Signalized Methodology <sup>1</sup> The frequency of arriving vehicles is anticipated to be nearly consistent.

 Table 10
 Projected Unsignalized Intersection Operations

				AM Peak Hour			PM Peak Hour	
	Intersection	Scenario	Worst Mov Mov Dela	Approach rement ly (sec)	HCM LOS	Worst / Mov Dela	Approach ement y (sec)	HCM LOS
		Projected 2020 No Build	EBL	10.8	В	EBL	11.8	В
1	Great River Rd &	Projected 2025 No Build	EBL	11.1	В	EBL	12.3	В
1	South Access	Projected 2030 No Build	EBL	12.1	В	EBL	12.9	В
		Projected 2050 No Build	EBL	12.9	В	EBL	14.0	В
2	Lost Grove Rd & North Access	Projected 2025 Buildout	NBL	15.7	С	NBL	13.7	В

Delay and LOS analysis based on HCM 6th Edition Two-way Stop Control Methodology

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will all operate at acceptable LOS C or better during the AM and PM peak hour conditions through 2050 with buildout of the proposed Anderson 400 development. This determination is based on the improvement schedule outline in Table 5, as well as traffic volume and trip generation trends identified herein.

#### **Comparative Operational Analysis**

A southbound right-turn bay at the intersection of Great River Road and South Access was analyzed for comparative operational purposes in the following table.

				AM Peak Hour							
	Intersection	Scenario	Metric	NB	SB	EB	WB	NB	SB	EB	WB
			Approach Delay	31.2	37.7	65.2	-	16.9	35.7	23.1	-
		Projected 2050 <sup>1</sup>	Approach LOS	С	D	E	-	В	D	С	-
		Buildout Without	95 <sup>th</sup> %tile Queue	L	TR	R	-	Т	TR	R	-
		Southbound Right-Turn Bay	(Longest Movement) in Feet	247	371	87	-	163	224	332	-
1	Great River		Intersection Delay & LOS		34	.3, C			23.	6, C	
	Rd & South Access	Approach Delay	20.9	23.7	35.0	-	17.6	27.5	25.5	-	
		Projected 2050 <sup>1</sup>	Approach LOS	С	С	D	-	В	С	С	-
		Buildout With	95 <sup>th</sup> %tile Queue	L	Т	R	-	Т	Т	R	-
	Southbound Right-Turn Bay		(Longest Movement) in Feet	208	196	47	-	188	206	384	-
			Intersection Delay & LOS		22	.2, C		23.2, C			

Table 11 **Projected Signalized Comparative Operations** 

Queue, Delay, and LOS analysis based on HCM 6<sup>th</sup> Edition Signalized Methodology <sup>1</sup> The frequency of arriving vehicles is anticipated to be nearly consistent.

A southbound right-turn bay at the intersection of Great River Road and South Access is expected to provide a higher LOS than what is expected at this intersection without a southbound right-turn bay. However, a southbound right-turn bay at the Great River Road and South Access intersection is not expected to be needed in order to provide a LOS of C or better through the buildout design year of 2050.



## **Summary and Conclusion**

The Anderson 400 development's initial vision is a corporate headquarters technology campus that will include a public park with an outdoor theater and multi-purpose trails. A bike sharing service is anticipated to be provided within the park. The development is expected to be completely built by the end of 2030 and employ up to 6,100 employees. 6,100 employees was identified as the approximate maximum number of employees allowable while maintaining acceptable vehicle operations at the two study intersections through the design year of 2050. Acceptable vehicle operations was defined as having an overall intersection Level of Service (LOS) of D or better, as well as not allowing more than one individual movement operate at LOS E or worse. Two access points are ultimately proposed, with one onto Great River Road and one onto Lost Grove Road. The access onto Lost Grove Road will be located near the existing driveway to the Anderson's farm. The access onto Lost Grove Road will be located between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street. Sight visibility zones corresponding to intersection sight distance calculations as defined through AASHTO should be identified and maintained at these access points. These zones should not contain structures or plantings that would preclude unobstructed views of oncoming traffic.

The Iowa Crash Analysis Tool (ICAT) website administered by the Iowa Department of Transportation (DOT) was used to collect available crash data at the study intersections for the ten-year period between January 1, 2008 and December 31, 2017.

There were no crashes near the Anderson Farm driveway (#1 Great River Road and South Access), which will become the south access for the proposed development. There were 11 crashes along Lost Grove Road between 270<sup>th</sup> Avenue and 5<sup>th</sup> Street, which is the segment of roadway that is anticipated to have the north access for the proposed development. The crash data indicates animal crossings may be an issue along this segment of roadway. Watch for Wildlife or Wild Life Crossing signs could be installed to potentially alert drivers of this potential safety issue. Crash data for this analysis is provided in Appendix 2.

LOS D or better is generally identified as acceptable in urban conditions. The analysis presented herein indicates the study intersections will all operate at acceptable LOS C or better during the AM and PM peak hour conditions through 2050 with buildout of the proposed Anderson 400 development. This determination is based on the improvement schedule outline in Table 5, as well as traffic volume and trip generation trends identified herein. Operational analysis worksheets are contained in Appendix 4.



# **Appendix 1**

#### (1) Great River Road and South Access - All Vehicles 5AM to 8PM

	From N	orth (Sout	hbound)	From E	East (West	bound)	From Se	outh (Nortl	hbound)	From \	West (East	bound)	Int	Peak
15-min	Gre	en River R	load		NA		Gre	en River R	load	S	outh Acce	ss	Count	Hour
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
5:00 - 5:15		28	0				0	7		0		0	35	179
5:15 - 5:30		30	0				0	16		0		0	46	221
5:30 - 5:45		28	0				0	15		0		0	43	281
5:45 - 6:00		30	0				0	25		0		0	55	336
6:00 - 6:15		48	0				0	29		0		0	77	357
6:15 - 6:30		66	1				0	39		0		0	106	366
6:30 - 6:45		70	0				0	27		0		1	98	346
6:45 - 7:00		48	0				0	27		1		0	76	325
7:00 - 7:15		52	1				0	33		0		0	86	343
7:15 - 7:30		56	0				0	30		0		0	86	345
7:30 - 7:45		38	0				0	39		0		0	77	316
7:45 - 8:00		52	0				0	42		0		0	94	328
8:00 - 8:15		46	0				1	41		0		0	88	277
8:15 - 8:30		37	0				0	20		0		0	57	252
8:30 - 8:45		49	0				0	40		0		0	89	269
8:45 - 9:00		24	0				0	19		0		0	43	252
9:00 - 9:15		30	0				0	32		1		U	03	284
9:15 - 9:30		38	0				0	30		0		0	74	2/3
9:30 - 9:45		34	0				0	31		1		0	75	249
9.45 - 10:00 10:00 10:15		31	1				0	44 20		0		0	75 52	241
10:00 - 10:15		20	0				0	20		0	-	0	52	220
10:30 - 10:45		20	0				0	30		0		0	50 64	232
10:45 - 11:00		28	0				0	26		0		0	54	242
11:00 - 11:15		32	0				0	20		1		0	64	253
11:15 - 11:30		30	0				0	30		0		0	60	270
11:30 - 11:45		29	0				0	26		0		0	55	281
11:45 - 12:00		33	0				0	41		0		0	74	303
12:00 - 12:15		41	0				0	40		0		0	81	296
12:15 - 12:30		32	0				1	38		0		0	71	278
12:30 - 12:45		34	0				0	43		0		0	77	282
12:45 - 1:00		40	0				0	27		0		0	67	277
1:00 - 1:15		29	0				0	34		0		0	63	280
1:15 - 1:30		38	0				0	37		0		0	75	296
1:30 - 1:45		39	0				0	33		0		0	72	314
1:45 - 2:00		29	0				0	41		0		0	70	333
2:00 - 2:15		47	0				0	32		0		0	79	348
2:15 - 2:30		45	0				0	47		1		0	93	346
2:30 - 2:45		47	0				0	44		0		0	91	364
2:45 - 3:00		29	0				0	56		0		0	85	381
3:00 - 3:15		38	0				0	39		0		0	77	417
3:15 - 3:30		57	0				0	54		0		0	111	434
3:30 - 3:45		37	0				0	71		0	ļ	0	108	429
3:45 - 4:00		58	0				0	63		0	ļ	0	121	436
4:00 - 4:15	ļ	40	1				0	53		0		0	94	436
4:15 - 4:30		51	0				0	55		0		0	106	458
4:30 - 4:45		51	0				0	63		1		0	115	474
4:45 - 5:00		53	0				0	68		0		0	121	467
5:00 - 5:15		59	0				0	57		0		0	116	408
5:15 - 5:30		50	0				1	69		0		2	122	349
5:30 - 5:45		50	0				0	58		0	<u> </u>	0	108	304
5:45 - 6:00		28	0				0	34		0		0	62	252
6:00 - 6:15		20	1				0	29		1		0	57	194
6:15 - 6:30		24	0				0	22		0		0	F6	104
6:45 7:00		23 10	0				0	33		0	<u> </u>	0	50	102
7:00 7:45		20	1				0	24		0	<u> </u>	0	45	150
7:00 - 7:15		20	0				0	24		0	<u> </u>	0	40	100
7:30 - 7:45		19	0				0	19		0		0	38	
7:45 - 8:00		13	0				0	22		0	l	0	35	

\* Counts collected during peak hours on Wednesday, September 26th, 2018.

AM Intersection Peak Hour Factor (PHF) = 0.86 PM Intersection Peak Hour Factor (PHF) =

0.97

#### (1) Great River Road and South Access - Articulated Trucks 5AM to 8PM

	From N	orth (Sout	hbound)	From I	East (West	bound)	From Se	outh (Nortl	hbound)	From \	Nest (East	bound)	Int	Peak
15-min	Gre	en River R	load		NA	_	Gre	en River R	load	S	outh Acces	ss	Count	Hour
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
5:00 - 5:15		1	0				0	0		0		0	1	8
5:15 - 5:30		2	0				0	0		0		0	2	8
5:30 - 5:45		1	0				0	0		0		0	1	6
5:45 - 6:00		2	0		1		0	2		0		0	4	6
6:00 - 6:15		0	0				0	1		0		0	1	10
6:15 - 6:30		0	0				0	0		0		0	0	12
6:30 - 6:45		0	0	-	-		0	1		0		0	5	10
0:45 - 7:00			0				0	5		0		0	5	25
7:15 - 7:30		2	0				0	1		0		0	3	26
7:30 - 7:45		0	0				0	5		0		0	5	26
7:45 - 8:00		6	0				0	5		0		0	11	29
8:00 - 8:15		0	0				0	7		0		0	7	23
8:15 - 8:30		3	0				0	0		0		0	3	28
8:30 - 8:45		4	0				0	4		0		0	8	34
8:45 - 9:00		3	0				0	2		0		0	5	37
9:00 - 9:15		5	0				0	7		0		0	12	41
9:15 - 9:30		6	0				0	3		0		0	9	32
9:30 - 9:45		4	0				0	7		0		0	11	30
9:45 - 10:00		3	0				0	6		0		0	9	30
10:00 - 10:15		1	0	ļ			0	2		0		0	3	30
10:15 - 10:30		1	0				0	6		0		0	7	32
10:30 - 10:45		5	0				0	6		0		0	11	35
10:45 - 11:00		5	0				0	4		0		0	9	30
11:00 - 11:15		3	0				0	2		0		0	5	20
11:15 - 11:30		2	0	-			0	1		0		0	6	27
11:30 - 11:45		2	0				0	4		0		0	5	25
12:00 - 12:15		2	0				0	9		0		0	11	31
12:15 - 12:30		3	0				0	2		0		0	5	29
12:30 - 12:45		1	0				0	3		0		0	4	31
12:45 - 1:00		7	0				0	4		0		0	11	34
1:00 - 1:15		4	0				0	5		0		0	9	28
1:15 - 1:30		6	0				0	1		0		0	7	31
1:30 - 1:45		4	0				0	3		0		0	7	28
1:45 - 2:00		3	0				0	2		0		0	5	27
2:00 - 2:15		7	0				0	5		0		0	12	29
2:15 - 2:30		3	0				0	1		0		0	4	22
2:30 - 2:45		3	0				0	3		0		0	6 7	27
2:45 - 3:00		2 A	0				0	- J - 1		0		0	5	29
3.15 - 3.30		5	0				0	4		0		0	9	28
3:30 - 3:45		6	0	<u> </u>	<u> </u>		0	2		0		0	8	23
3:45 - 4:00		4	0				0	3		0		0	7	20
4:00 - 4:15		2	0		1		0	2		0		0	4	18
4:15 - 4:30		0	0	İ	İ		0	4		0		0	4	16
4:30 - 4:45		3	0				0	2		0		0	5	13
4:45 - 5:00		2	0				0	3		0		0	5	14
5:00 - 5:15		1	0				0	1		0		0	2	13
5:15 - 5:30		1	0				0	0		0		0	1	15
5:30 - 5:45		2	0				0	4		0		0	6	15
5:45 - 6:00		1	0	ļ			0	3		0		0	4	9
6:00 - 6:15		2	0				0	2		0		0	4	6
6:15 - 6:30		0	0		ļ		0	1		0		0	1	2
6:30 - 6:45		0	0				0	0		0		0	0	4
6:45 - 7:00		0	0				0	3		0		0	3	5
7:00 - 7:15		1	0	<u> </u>	<u> </u>		0	0		0		0	1	0
7:30 - 7:45		1	0				0	0		0		0	1	
7:45 - 8:00		2	0	1	1		0	1		0		0	3	
			-				-			-		-		

\* Counts collected during peak hours on Wednesday, September 26th, 2018.

#### (2) Lost Grove Road and 270th Avenue - All Vehicles 5AM to 8PM

	From N	orth (Sout	hbound)	From B	East (West	bound)	From Se	outh (North	hbound)	From	West (East	bound)	Int	Peak
15-min		Driveway		Los	st Grove R	oad	2	70th Avenu	ue	Lo	st Grove R	oad	Count	Hour
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
5:00 - 5:15	0	0	0	0	2	0	0	0	0	0	0	0	2	22
5:15 - 5:30	0	0	0	0	3	0	0	0	0	0	0	0	3	31
5:30 - 5:45	0	0	0	0	3	0	0	0	0	0	1	0	4	39
5:45 - 6:00	0	0	0	0	12	0	0	0	0	0	1	0	13	44
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	2	0	11	50
6:30 - 6:45	0	0	0	0	5	0	0	0	1	0	3	0	0	50 60
6:45 - 7:00	0	0	0	0	6	0	0	0	0	0	1	0	7	85
7:00 - 7:15	0	0	0	0	20	0	0	0	0	0	3	0	23	99
7:15 - 7:30	0	0	0	0	16	0	1	0	0	0	4	0	21	96
7:30 - 7:45	0	0	0	0	15	0	1	1	1	1	12	3	34	91
7:45 - 8:00	0	0	0	1	9	0	0	0	1	0	8	2	21	69
8:00 - 8:15	0	0	0	1	12	0	0	0	0	0	7	0	20	65
8:15 - 8:30	0	0	0	0	8	0	1	0	1	0	6	0	16	52
8:30 - 8:45	0	0	0	0	6	0	0	0	0	0	4	2	12	51
8:45 - 9:00	1	0	1	1	5	0	1	0	1	0	6	1	17	45
9:00 - 9:15	0	0	0	0	4	0	0	0	1	0	2	0	7	40
9:15 - 9:30	0	0	0	0	9	0	1	0	0	0	5	0	15	44
9:30 - 9:45	0	0	0	0	1	0	0	0	0	1	3	1	6	42
9:45 - 10:00	0	0	0	0	6	0	0	0	1	0	4	1	12	56
10:00 - 10:15	0	0	0	2	3	0	1	0	0	0	5	0	11	56
10:15 - 10:30	0	1	1	0	5	0	0	0	0	0	5	0	13	58
10:30 - 10:45	0	0	0	0	9	0	0	2	0	1	5	3	12	30
11:00 - 11:15	1	0	0	0	8	0	0	0	0	0	4	0	12	44
11:15 - 11:30	0	0	0	0	6	0	0	0	0	0	3	2	10	47
11:30 - 11:45	0	0	0	0	3	0	0	0	0	0	4	1	8	42
11:45 - 12:00	1	0	0	1	4	0	0	0	0	0	7	0	13	47
12:00 - 12:15	0	0	0	1	2	0	4	0	0	0	7	1	15	42
12:15 - 12:30	0	1	0	0	2	0	0	0	0	0	2	1	6	43
12:30 - 12:45	0	1	0	0	7	0	0	0	1	0	3	1	13	52
12:45 - 1:00	0	0	0	1	2	1	0	0	0	0	4	0	8	58
1:00 - 1:15	0	1	0	0	6	0	1	2	1	0	5	0	16	62
1:15 - 1:30	1	0	0	0	6	0	0	0	0	0	7	1	15	56
1:30 - 1:45	2	0	0	0	9	0	0	0	0	0	/	1	19	59
1:45 - 2:00	0	0	0	0	5	0	0	0	0	0	7	0	12	57
2:00 - 2:15	3	0	0	0	4	1	0	1	1	0	5	0	10	77
2:30 - 2:45	0	0	0	0	9	0	0	0	1	0	6	1	17	78
2:45 - 3:00	0	0	0	1	5	0	0	0	1	0	13	0	20	91
3:00 - 3:15	0	0	0	2	7	0	0	0	2	0	11	0	22	92
3:15 - 3:30	0	0	0	0	12	0	1	0	0	1	5	0	19	85
3:30 - 3:45	0	0	0	0	15	0	0	0	1	0	14	0	30	87
3:45 - 4:00	0	1	0	0	8	0	1	0	0	0	11	0	21	78
4:00 - 4:15	0	0	0	0	9	0	0	0	0	0	6	0	15	80
4:15 - 4:30	0	0	0	0	10	0	0	0	1	0	10	0	21	83
4:30 - 4:45	0	0	0	0	7	0	0	0	0	0	14	0	21	83
4:45 - 5:00	0	0	0	1	9	0	1	0	0	0	12	0	23	88
5:00 - 5:15	0	0	0	0	5	0	0	0	0	0	13	0	18	84
5:15 - 5:30	0	0	0	1	6	0	0	0	1	0	13	0	21	80
5:30 - 5:45	0	0	0	0	C g	0	0	0	1	0	20	0	20	67
6:00 - 6:15	0	0	0	0	8	0	0	0	0	0	12	0	20	62
6:15 - 6:30	0	0	0	0	4	0	0	0	1	0	10	0	15	42
6:30 - 6:45	0	0	0	0	1	0	0	0	0	0	12	0	13	33
6:45 - 7:00	0	0	0	0	5	0	0	0	0	0	9	0	14	27
7:00 - 7:15	0	0	0	1	1	0	0	0	0	0	4	0	6	25
7:15 - 7:30	0	0	0	0	2	0	1	0	0	0	4	0	7	
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	6	1	7	
7:45 - 8:00	0	0	0	0	1	0	0	0	0	0	4	0	5	

\* Counts collected during peak hours on Wednesday, September 26th, 2018.

#### (2) Lost Grove and 270th Avenue - Articulated Trucks 5AM to 8PM

	From N	orth (Sout	hbound)	From E	East (West	bound)	From Se	outh (North	hbound)	From \	Nest (East	bound)	Int	Peak
15-min		Driveway	_	Los	st Grove R	oad	2	70th Avenu	ue	Los	st Grove R	oad	Count	Hour
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right		
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 - 7:30	0	0	0	0	0	0	1	0	0	0	0	0	1	1
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	3
8:00 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8:15 - 8:30	0	0	0	0	0	0	1	0	0	0	0	0	1	4
8:30 - 8:45	0	0	0	0	0	0	0	0	0	0	1	1	2	4
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	1	1	3
9:00 - 9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	4
9:15 - 9:30	0	0	0	0	0	0	1	0	0	0	0	0	1	6
9:30 - 9:45	0	0	0	0	0	0	0	0	0	0	0	1	1	5
9:45 - 10:00	0	0	0	0	0	0	0	0	0	0	1	1	2	5
10:00 - 10:15	0	0	0	1	0	0	1	0	0	0	0	0	2	3
10:15 - 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2
10:30 - 10:45	0	0	0	0	0	0	0	0	0	0	0	1	1	5
10:45 - 11:00	0	0	0	0	0	0	0	0	0	0	1	0	0	6
11:15 - 11:30	0	0	0	0	0	0	0	0	0	0	1	2	3	7
11:30 - 11:45	0	0	0	0	1	0	0	0	0	0	0	1	2	7
11:45 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	7
12:00 - 12:15	0	0	0	0	0	0	2	0	0	0	0	0	2	7
12:15 - 12:30	0	1	0	0	0	0	0	0	0	0	1	1	3	7
12:30 - 12:45	0	1	0	0	0	0	0	0	0	0	0	1	2	6
12:45 - 1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	5
1:00 - 1:15	0	0	0	0	1	0	0	1	0	0	0	0	2	5
1:15 - 1:30	0	0	0	0	1	0	0	0	0	0	0	1	2	3
1:30 - 1:45	0	0	0	0	0	0	0	0	0	0	0	1	1	2
1:45 - 2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2:00 - 2:15	1	0	0	0	0	0	0	0	0	0	0	0	1	1
2:30 - 2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 - 3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 - 3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 - 3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 - 3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 - 4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 - 4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 - 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 - 4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 - 5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	

\* Counts collected during peak hours on Wednesday, September 26th, 2018.

#### Peak Hour Turning Movement Volumes

#### (1) Great River Road and South Access

	From No	orth (South	bound)	From E	East (West	bound)	From S	outh (Nort	hbound)	From V	Vest (East	bound)	Interrection
15-min	Gree	en River Ro	bad		NA		Gre	en River R	oad	S	outh Acces	ss	Count
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Count
6:15 - 6:30		66	1				0	39		0		0	106
6:30 - 6:45		70	0				0	27		0		1	98
6:45 - 7:00		48	0				0	27		1		0	76
7:00 - 7:15		52	1				0	33		0		0	86
2018 Volumes	0	236	2	0	0	0	0	126	0	1	0	1	366
Growth Factor From 2018	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
2020 Volumes	0	246	2	0	0	0	0	131	0	1	0	1	381
Growth Factor From 2018	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
2025 Volumes	0	271	2	0	0	0	0	145	0	1	0	1	420
Growth Factor From 2018	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
2030 Volumes	0	299	3	0	0	0	0	160	0	1	0	1	464
Growth Factor From 2030	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046
2040 Volumes	0	330	3	0	0	0	0	177	0	1	0	1	512
Growth Factor From 2040	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
2050 Volumes	0	347	3	0	0	0	0	186	0	1	0	1	538
Percent Heavy Vehicle	#DIV/0!	1%	0%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	7%	#DIV/0!	0%	#DIV/0!	0%	-
												PHF =	0.86
4:30 - 4:45		51	0				0	63		1		0	115
4:45 - 5:00		53	0				0	68		0		0	121
5:00 - 5:15		59	0				0	57		0		0	116
5:15 - 5:30		50	0				1	69		0		2	122
2018 Volumes	0	213	0	0	0	0	1	257	0	1	0	2	474
Growth Factor From 2018	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
2020 Volumes	0	222	0	0	0	0	1	267	0	1	0	2	493
Growth Factor From 2018	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
2025 Volumes	0	245	0	0	0	0	1	295	0	1	0	2	544
Growth Factor From 2018	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.1717
2030 Volumes	0	270	0	0	0	0	1	326	0	1	0	3	601
Growth Factor From 2030	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046
2040 Volumes	0	298	0	0	0	0	1	360	0	1	0	3	663
Growth Factor From 2040	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
2050 Volumes	0	313	0	0	0	0	1	378	0	1	0	3	696
Percent Heavy Vehicle	#DIV/0!	3%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0%	2%	#DIV/0!	0%	#DIV/0!	0%	-

PHF = 0.97

#### Peak Hour Turning Movement Volumes

#### (2) Lost Grove Road & 270th Avenue

	From No	orth (South	bound)	From E	ast (West	bound)	From Se	outh (Nort	hbound)	From V	Vest (East	bound)	Intersection
15-min		Driveway		Los	t Grove R	oad	2	70th Avenu	le	Los	st Grove R	oad	Count
Interval	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	ooum
6:15 - 6:30	0	0	0	0	8	0	0	0	0	0	3	0	11
6:30 - 6:45	0	0	0	0	5	0	0	0	0	0	3	0	8
6:45 - 7:00	0	0	0	0	6	0	0	0	0	0	1	0	7
7:00 - 7:15	0	0	0	0	20	0	0	0	0	0	3	0	23
2018 Volumes	0	0	0	0	39	0	0	0	0	0	10	0	49
Growth Factor From 2018	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
2020 Volumes	0	0	0	0	41	0	0	0	0	0	10	0	51
Growth Factor From 2018	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
2025 Volumes	0	0	0	0	45	0	0	0	0	0	11	0	56
Growth Factor From 2018	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
2030 Volumes	0	0	0	0	49	0	0	0	0	0	13	0	62
Growth Factor From 2030	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046
2040 Volumes	0	0	0	0	54	0	0	0	0	0	14	0	68
Growth Factor From 2040	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
2050 Volumes	0	0	0	0	57	0	0	0	0	0	15	0	72
Percent Heavy Vehicle	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0%	#DIV/0!	-
												PHF =	0.53
4:30 - 4:45	0	0	0	0	7	0	0	0	0	0	14	0	21
4:45 - 5:00	0	0	0	1	9	0	1	0	0	0	12	0	23
5:00 - 5:15	0	0	0	0	5	0	0	0	0	0	13	0	18
5:15 - 5:30	0	0	0	1	6	0	0	0	1	0	13	0	21
2018 Volumes	0	0	0	0	27	0	0	0	0	0	52	0	79
Growth Factor From 2018	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
2020 Volumes	0	0	0	0	28	0	0	0	0	0	54	0	82
Growth Factor From 2018	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
2025 Volumes	0	0	0	0	31	0	0	0	0	0	60	0	91
Growth Factor From 2018	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
2030 Volumes	0	0	0	0	34	0	0	0	0	0	66	0	100
Growth Factor From 2030	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046	1.1046
2040 Volumes	0	0	0	0	38	0	0	0	0	0	73	0	111
Growth Factor From 2040	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
2050 Volumes	0	0	0	0	40	0	0	0	0	0	77	0	117
Percent Heavy Vehicle	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0%	#DIV/0!	-

PHF = 0.86

## **Appendix 2**

Iowa Crash Ai Quick R 2008-2	nalysis Tool Report 2017	
1	Injury Status Summary	0
0	Fatal	0
0	Suspected serious/incapacitating	0
0	Suspected minor/non-incapacitating	0
0	Possible (complaint of pain/injury)	0
1	Uninjured	0
	Fatal, not crash-related	0
1	Unknown	0
	Not reported	0
	Average Severity	
2,000.00	Fatalities/Fatal Crash:	0.00
2,000.00	Fatalities/Crash:	0.00
1.00	Injuries/Crash:	0.00
1.00	Major Injuries/Crash:	0.00
777.00	Minor Injuries/Crash:	0.00
777.00	Possible/Unknown Injuries/Crash:	0.00
	Iowa Crash A         Quick F         2008:3         1         0         1         2,000.00         1.00         777.00         777.00         777.00         777.00         777.00         777.00         777.00         777.00         777.00         77.00         77.00         77.00         77.00         77.00         77.00         77.00         77.00 <t< td=""><td>Ova Crash Analysis 1001 2008-2017         1         1         0         1         0         1         0         1         0         1         0         1         0         1         0         1         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2<!--</td--></td></t<>	Ova Crash Analysis 1001 2008-2017         1         1         0         1         0         1         0         1         0         1         0         1         0         1         0         1         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2 </td


Major Cause			1
Animal	1	Ran traffic signal	0
Ran stop sign	0	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	0	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	0	FTYROW: From yield sign	0
FTYROW: Making left turn	0	FTYROW: From driveway	0
FTYROW: From parked position	0	FTYROW: To pedestrian	0
FTYROW: Other	0	Drove around RR grade crossing gates	0
Disregarded RR Signal	0	Crossed centerline (undivided)	0
Crossed median (divided)	0	Traveling wrong way or on wrong side of road	0
Aggressive driving/road rage	0	Driving too fast for conditions	0
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca	0	Followed too close	0
Passing: On wrong side	0	Passing: Where prohibited by signs/markings	0
Passing: With insufficient distance/inadequa	0	Passing: Through/around barrier	0
Passing: Other passing	0	Made improper turn	0
Driver Distraction: Manual operation of an e	0	Driver Distraction: Talking on a hand-held d	0
Driver Distraction: Talking on a hands free	0	Driver Distraction: Adjusting devices (radio	0
Driver Distraction: Other electronic device	0	Driver Distraction: Passenger	0
Driver Distraction: Unrestrained animal	0	Driver Distraction: Reaching for object(s)/f	0
Driver Distraction: Inattentive/lost in thou	0	Driver Distraction: Other interior distracti	0
Driver Distraction: Exterior distraction	0	Ran off road - right	0
Ran off road - straight	0	Ran off road - left	0
Lost control	0	Swerving/Evasive Action	0
Over correcting/over steering	0	Failed to keep in proper lane	0
Failure to signal intentions	0	Traveling on prohibited traffic way	0
Vehicle stopped on railroad tracks	0	Other: Vision obstructed	0
Other: Improper operation	0	Other: Disregarded warning sign	0
Other: Disregarded signs/road markings	0	Other: Illegal off-road driving	0
Downhill runaway	0	Separation of units	0
Towing improperly	0	Cargo/equipment loss or shift	0
Equipment failure	0	Oversized load/vehicle	0
Other: Getting off/out of vehicle	0	Failure to dim lights/have lights on	0
Improper backing	0	Improper starting	0
Illegally parked/unattended	0	Driving less than the posted speed limit	0
Operator inexperience	0	Other	0
Unknown	0	Not reported	0
Other: No improper action	0		



# Time of Day/Day of Week

Day of Week	12 AM to 2 AM	2 AM to 4 AM	4 AM to 6 AM	6 AM to 8 AM	8 AM to 10 AM	10 AM to Noon	Noon to 2 PM	2 PM to 4 PM	4 PM to 6 PM	6 PM to 8 PM	8 PM to 10 PM	10 PM to 12 AM	Not reporte d	Total
Sunday	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Monday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wednesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saturday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Manner of Crash Collision	1	Surface Conditions	1
Non-collision (single vehicle)	0	Dry	0
Head-on (front to front)	0	Wet	0
Rear-end (front to rear)	0	Ice/frost	0
Angle, oncoming left turn	0	Snow	0
Broadside (front to side)	0	Slush	0
Sideswipe, same direction	0	Mud, dirt	0
Sideswipe, opposite direction	0	Water (standing or moving)	0
Rear to rear	0	Sand	0
Rear to side	0	Oil	0
Not reported	1	Gravel	0
Other	0	Not reported	1
Unknown	0	Other	0
		Unknown	0

Fixed Object Struck			1
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	0	Embankment	0
Ground	0	Culvert/pipe opening	0
Guardrail - face	0	Guardrail - end	0
Concrete traffic barrier (median or right sid	0	Other traffic barrier	0
Cable barrier	0	Impact attenuator/crash cushion	0
Utility pole/light support	0	Traffic sign support	0
Traffic signal support	0	Other post/pole/support	0
Fire hydrant	0	Mailbox	0
Tree	0	Landscape/shrubbery	0
Snow bank	0	Fence	0
Wall	0	Building	0
Other fixed object	0	None (no fixed object struck)	1



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Driver Age/Drive	Driver Age/Driver Gender					
Driver Age - 5 year Bins	Female	Male	Not reported	Unknown	Total	
< 14	0	0	0	0	0	
= 14	0	0	0	0	0	
= 15	0	0	0	0	0	
= 16	0	0	0	0	0	
= 17	0	0	0	0	0	
= 18	0	1	0	0	1	
= 19	0	0	0	0	0	
= 20	0	0	0	0	0	
>= 21 and <= 24	0	0	0	0	0	
>= 25 and <= 29	0	0	0	0	0	
>= 30 and <= 34	0	0	0	0	0	
>= 35 and <= 39	0	0	0	0	0	
>= 40 and <= 44	0	0	0	0	0	
>= 45 and <= 49	0	0	0	0	0	
>= 50 and <= 54	0	0	0	0	0	
>= 55 and <= 59	0	0	0	0	0	
>= 60 and <= 64	0	0	0	0	0	
>= 65 and <= 69	0	0	0	0	0	
>= 70 and <= 74	0	0	0	0	0	
>= 75 and <= 79	0	0	0	0	0	
>= 80 and <= 84	0	0	0	0	0	
>= 85 and <= 89	0	0	0	0	0	
>= 90 and <= 94	0	0	0	0	0	
>= 95	0	0	0	0	0	
Not reported	0	0	0	0	0	
Unknown	0	0	0	0	0	
Total	0	1	0	0	1	

Drug/Alcohol Related	1
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug/Alcohol (< Statutory)	0
Drug/Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	1

Alcohol Test Given	1
None	1
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Given	1
None	1
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Result	1
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	1
Other	0



# Crash Severity - Annual

orash ocverity						
Crash Year	Fatal	Major Injury	Minor Injury	Possible/Unknown	Property Damage Only	Total
2008	0	0	0	0	0	0
2009	0	0	0	0	0	0
2010	0	0	0	0	1	1
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
Total	0	0	0	0	1	1





# Injury Status - Annual

injury Status - A	IIIuai							
Crash Year	Fatal	Suspected serious/incapac itating	Suspected minor/non- incapacitating	Possible (complaint of pain/injury)	Uninjured	Fatal, not crash-related	Unknown	Total
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0





### Meeting the following criteria

Jurisdiction: Statewide Year: 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 Map Selection: Yes Filter: None

Analyst Information

# Appendix 3

# Opening Day Intersection Layout/

GREAT RIVER ROAD

SCALE IN FEET

# Opening Day Turning Paths

GREAT RIVER ROAD



6.0 28.4 75.0

# Design Year Intersection Layout

GREAT RIVER ROAD



# Design Year Turning Paths

GREAT RIVER ROAD



# **Appendix 4**

# **Volume-to-Capacity Ratios**

Volume-to-capacity (v/c) is defined as the maximum rate at which vehicles can pass through a given point in an hour under prevailing conditions. The v/c ratio is calculated by dividing the total hourly volume of vehicles using the intersection by the hourly capacity. This ratio is used to determine an intersection's sufficiency to accommodate vehicular demand. A v/c ratio less than 0.85 generally indicates adequate capacity is available and vehicles are not expected to experience significant queues and delays. As the v/c ratio approaches 1.0, traffic flow may become unstable and delay and queuing conditions may occur. Table 1 presents ranges of v/c ratios and their corresponding level of service (LOS). The ranges are taken from Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, D.C., 1985 and Interim Materials on Highway Capacity, MCHRP Circular 212, 1982.

### Table 1 Volume to Capacity Ratio LOS Criteria for Signalized Intersections

LOS	Signalized Intersection V/C Ratio
А	< 0.600
В	0.601 to 0.700
С	0.701 to 0.800
D	0.801 to 0.900
E	0.901 to 1.000
F	> 1.001

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, D.C., 1985 and Interim Materials on Highway Capacity, MCHRP Circular 212, 1982.

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	10.8	В

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### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	10.8
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	bound	Sout	hbound	Eastbound		
Lane Configuration	-		F		T		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55	55.00		30.00	
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	′es	Yes		Yes		

Name	Great Ri	ver Road	Great Ri	Great River Road		South Access	
Base Volume Input [veh/h]	0	126	236	2	1	1	
Base Volume Adjustment Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	0	0	0	0	0	0	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	0	131	246	2	1	1	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	0	33	63	1	0	0	
Total Analysis Volume [veh/h]	0	134	251	2	1	1	
Pedestrian Volume [ped/h]		0		0	(	0	

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### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.72	0.00	0.00	0.00	10.81	9.56
Movement LOS	A	А	A	A	В	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.22	0.22
d_A, Approach Delay [s/veh]	0.00		0.00		10.19	
Approach LOS	A		A		В	
d_I, Intersection Delay [s/veh]	0.05					
Intersection LOS	В					

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	11.8	В

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2020 PM Peak

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	11.8
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	ibound	South	nbound	East	bound	
Lane Configuration	-		1	F		T	
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55	55.00		30.00	
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	Yes		Yes		Yes	

Name	Great Ri	ver Road	Great Ri	Great River Road		South Access	
Base Volume Input [veh/h]	1	257	213	0	1	2	
Base Volume Adjustment Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	0	0	0	0	0	0	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	1	267	222	0	1	2	
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	0	69	57	0	0	1	
Total Analysis Volume [veh/h]	1	275	229	0	1	2	
Pedestrian Volume [ped/h]		0		0		0	

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### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	7.67	0.00	0.00	0.00	11.83	9.44	
Movement LOS	A	А	A	A	В	A	
95th-Percentile Queue Length [veh]	0.77	0.77	0.00	0.00	0.01	0.01	
95th-Percentile Queue Length [ft]	19.15	19.15	0.00	0.00	0.33	0.33	
d_A, Approach Delay [s/veh]	0.	0.03 0.00		00	10.	23	
Approach LOS	ŀ	A		A		В	
d_I, Intersection Delay [s/veh]	0.08						
Intersection LOS			I	3			

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.007	13.4	В

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### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	13.4
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

### Intersection Setup

Name	Great River Road		Great River Road		South Access	
Approach	North	bound	Sout	hbound	East	bound
Lane Configuration	+	1	1	H	1	F
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55.00		55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Y	es	١	/es	Y	′es

Name	Great Ri	ver Road	Great Ri	ver Road	South	South Access	
Base Volume Input [veh/h]	0	126	236	2	1	1	
Base Volume Adjustment Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	99	0	0	12	2	9	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	99	131	246	14	3	10	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	25	33	63	4	1	3	
Total Analysis Volume [veh/h]	101	134	251	14	3	10	
Pedestrian Volume [ped/h]		0		0		0	

Version 5.00-00

### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.01	0.01	
d_M, Delay for Movement [s/veh]	7.98	0.00	0.00	0.00	13.40	9.64	
Movement LOS	A	А	А	A	В	A	
95th-Percentile Queue Length [veh]	0.65	0.65	0.00	0.00	0.02	0.04	
95th-Percentile Queue Length [ft]	16.31	16.31	0.00	0.00	0.52	0.97	
d_A, Approach Delay [s/veh]	3.	3.43		0.00		10.51	
Approach LOS	/	A		A		В	
d_I, Intersection Delay [s/veh]		1.84					
Intersection LOS			I	В			

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.023	12.8	В

Version 5.00-00

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### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	12.8
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	nbound	Sout	Southbound		Eastbound	
Lane Configuration	-		F		יד		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	′es	١	/es	ץ (	′es	

Name	Great Ri	ver Road	Great Ri	ver Road	South	Access
Base Volume Input [veh/h]	1	257	213	0	1	2
Base Volume Adjustment Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	30	0	0	4	10	99
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	31	267	222	4	11	101
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	69	57	1	3	26
Total Analysis Volume [veh/h]	32	275	229	4	11	104
Pedestrian Volume [ped/h]		0		0		0

Version 5.00-00

### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.02	0.13
d_M, Delay for Movement [s/veh]	7.74	0.00	0.00	0.00	12.80	10.08
Movement LOS	A	А	A	A	В	В
95th-Percentile Queue Length [veh]	0.88	0.88	0.00	0.00	0.07	0.44
95th-Percentile Queue Length [ft]	22.00	22.00	0.00	0.00	1.78	10.94
d_A, Approach Delay [s/veh]	0.81		0.00		10.34	
Approach LOS	A		A		В	
d_I, Intersection Delay [s/veh]	2.19					
Intersection LOS	В					

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2025 AM Peak

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Scenario 12 2025 AM 10/27/2018

## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	11.1	В

Version 5.00-00

2025 AM Peak

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	bound	Sout	Southbound		Eastbound	
Lane Configuration	•	1	1	H	+	r	
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	′es	Y	/es	Y	′es	

Name	Great Ri	ver Road	Great Ri	ver Road	South	Access
Base Volume Input [veh/h]	0	126	236	2	1	1
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	145	271	2	1	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	37	69	1	0	0
Total Analysis Volume [veh/h]	0	148	277	2	1	1
Pedestrian Volume [ped/h]		0		0		0

Version 5.00-00

### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.78	0.00	0.00	0.00	11.13	9.72
Movement LOS	A	А	A	A	В	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.23	0.23
d_A, Approach Delay [s/veh]	0.00		0.00		10.42	
Approach LOS	A		A		В	
d_I, Intersection Delay [s/veh]	0.05					
Intersection LOS	В					

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2025 PM Peak

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## Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	12.3	В

Version 5.00-00

2025 PM Peak

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	bound	Sout	Southbound		bound	
Lane Configuration	4		F		Ť		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Yes		Yes		Yes		

Name	Great Ri	ver Road	Great Ri	Great River Road		South Access	
Base Volume Input [veh/h]	1	257	213	0	1	2	
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	0	0	0	0	0	0	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	1	295	245	0	1	2	
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	0	76	63	0	0	1	
Total Analysis Volume [veh/h]	1	304	253	0	1	2	
Pedestrian Volume [ped/h]	d/h] 0		0		0		

Version 5.00-00

### Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

### Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	7.72	0.00	0.00	0.00	12.33	9.58	
Movement LOS	A	А	A	A	В	A	
95th-Percentile Queue Length [veh]	0.89	0.89	0.00	0.00	0.01	0.01	
95th-Percentile Queue Length [ft]	22.29	22.29	0.00	0.00	0.34	0.34	
d_A, Approach Delay [s/veh]	0.	0.03		0.00		10.49	
Approach LOS	A		A		В		
d_I, Intersection Delay [s/veh]			0.	07			
Intersection LOS			I	3			

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### 2025 AM Peak Build

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### **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	EB Right	0.680	7.4	A
2	Lost Grove Road & North Access	Two-way stop	HCM 6th Edition	NB Left	0.161	15.7	С

2025 AM Peak Build

Version 5.00-00

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	7.4
Analysis Method:	HCM 6th Edition	Level Of Service:	А
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.680

### Intersection Setup

Name	Great River Road		Great River Road		South Access	
Approach	North	bound	South	Southbound		bound
Lane Configuration	4		F		חר	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55	i.00	55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		Yes		Yes	

Name	Great River Road		Great River Road		South Access		
Base Volume Input [veh/h]	0	126	236	2	1	1	
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	395	0	0	44	4	34	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	14	0	11	
Total Hourly Volume [veh/h]	395	145	271	32	5	24	
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	115	42	79	9	1	7	
Total Analysis Volume [veh/h]	459	169	315	37	6	28	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	<b>g</b> 0		0		(	)	
v_di, Inbound Pedestrian Volume crossing r	n 0		0		0		
v_co, Outbound Pedestrian Volume crossing	<b>g</b> 0		0		0		
v_ci, Inbound Pedestrian Volume crossing n	mi 0		0		0		
v_ab, Corner Pedestrian Volume [ped/h]	(	)	0		0		
Bicycle Volume [bicycles/h]	(	0		0		0	

2025 AM Peak Build

Version 5.00-00

### Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

### Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive		
Signal group	5	2	6	0	3	0		
Auxiliary Signal Groups								
Lead / Lag	-	-	-	-	Lead	-		
Minimum Green [s]	0	5	5	0	5	0		
Maximum Green [s]	0	30	30	0	30	0		
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0		
All red [s]	0.0	1.0	1.0	0.0	1.0	0.0		
Split [s]	0	90	90	0	20	0		
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0		
Walk [s]	0	0	0	0	0	0		
Pedestrian Clearance [s]	0	0	0	0	0	0		
Rest In Walk		No	No		No			
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0		
l2, Clearance Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0		
Minimum Recall		No	No		No			
Maximum Recall		No	No		No			
Pedestrian Recall		No	No		No			
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0		
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0		
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00		

### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

### Lane Group Calculations

Lane Group	С	С	L	R
C, Cycle Length [s]	110	110	110	110
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	99	99	3	3
g / C, Green / Cycle	0.90	0.90	0.03	0.03
(v / s)_i Volume / Saturation Flow Rate	0.66	0.21	0.00	0.02
s, saturation flow rate [veh/h]	950	1666	1629	1454
c, Capacity [veh/h]	908	1493	51	45
d1, Uniform Delay [s]	3.63	0.75	51.81	52.64
k, delay calibration	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.32	0.37	1.02	12.90
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00
Lane Group Results				
X, volume / capacity	0.69	0.24	0.12	0.62
d, Delay for Lane Group [s/veh]	7.95	1.12	52.84	65.54
Lane Group LOS	A	A	D	E
Critical Lane Group	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	3.84	0.15	0.18	0.93
50th-Percentile Queue Length [ft]	95.99	3.85	4.39	23.15
95th-Percentile Queue Length [veh]	6.91	0.28	0.32	1.67
95th-Percentile Queue Length [ft]	172.79	6.94	7.90	41.67

Version 5.00-00

### Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.95	7.95	1.12	1.12 1.12		65.54			
Movement LOS	А	A	A	A	D	E			
d_A, Approach Delay [s/veh]	7	.95	1	.12	63.29				
Approach LOS		A	E						
d_I, Intersection Delay [s/veh]	7.44								
Intersection LOS	Α								
Intersection V/C	0.680								
Other Modes									
g_Walk,mi, Effective Walk Time [s]	1	6.0	8	6.0	86.0				
M_corner, Corner Circulation Area [ft²/ped]	0	00							
M_CW, Crosswalk Circulation Area [ft²/ped	0.00 0.00 0.00								
d_p, Pedestrian Delay [s]	40.16 2.62 2.62								
I_p,int, Pedestrian LOS Score for Intersection	ו 2.	2.598 2.123 2.685							
Crosswalk LOS	В В В								
s_b, Saturation Flow Rate of the bicycle lane	bicycle lane 2000			000	2000				
c_b, Capacity of the bicycle lane [bicycles/h]		0		0	0				
d_b, Bicycle Delay [s]	55	5.00	55	5.00	55.00				
I_b,int, Bicycle LOS Score for Intersection	5.	169	4.	4.132					
Bicycle LOS		F		)					

## Sequence

-																
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 90s	SG: 3 20s
SG: 6 90s	
Version 5.00-00

2025 AM Peak Build

## Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Two-way stop	Delay (sec / veh):	15.7
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.161

### Intersection Setup

Name	North Access		Lost Grove Road		Lost Grove Road		
Approach	North	bound	Wes	Westbound		astbound	
Lane Configuration	٢		ч		Y		
Turning Movement	Left	Right	Left	Thru	Thru	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	30.00		30.00		40.00		
Grade [%]	0.00		0.00		0.00		
Crosswalk	Y	′es	Ň	Yes		Yes	

Name	North	Access	Lost Gro	ove Road	Lost Grove Road	
Base Volume Input [veh/h]	0	0	0	39	10	0
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	35	4	44	0	0	395
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	4	44	45	11	395
Peak Hour Factor	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	2	20	21	5	183
Total Analysis Volume [veh/h]	65	7	81	83	20	731
Pedestrian Volume [ped/h]		0	0		0	

Version 5.00-00

## Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.01	0.09	0.00	0.00	0.01	
d_M, Delay for Movement [s/veh]	15.66	12.16	9.58	0.00	0.00	0.00	
Movement LOS	С	В	A	A	A	A	
95th-Percentile Queue Length [veh]	0.61	0.61	0.69	0.69	0.00	0.00	
95th-Percentile Queue Length [ft]	15.27	15.27	17.35	17.35	0.00	0.00	
d_A, Approach Delay [s/veh]	15	15.32		4.73		0.00	
Approach LOS	(	С		A		A	
d_I, Intersection Delay [s/veh]	1.90						
Intersection LOS	C						

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# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	EB Right	0.533	15.0	В
2	Lost Grove Road & North Access	Two-way stop	HCM 6th Edition	NB Left	0.468	13.7	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

2025 PM Peak Build

Version 5.00-00

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	15.0
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.533

### Intersection Setup

Name	Great River Road		Great River Road		South Access	
Approach	North	bound	South	Southbound		bound
Lane Configuration	<b>-</b>		F		יד	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	55	.00	55.00		30.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Y	es	Yes		Yes	

Name	Great Riv	ver Road	Great River Road		South Access	
Base Volume Input [veh/h]	1	257	213	0	1	2
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	68	0	0	8	39	351
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	5	0	211
Right-Turn on Red Volume [veh/h]	0	0	0	4	0	169
Total Hourly Volume [veh/h]	69	295	245	9	40	395
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	76	63	2	10	102
Total Analysis Volume [veh/h]	71	304	253	9	41	407
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	an Volume crossin <b>g</b> 0		0		0	
v_di, Inbound Pedestrian Volume crossing r	n (	)	C	)	(	)
v_co, Outbound Pedestrian Volume crossing	<b>9</b> 0		0		0	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	0		0	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	C	)	(	)
Bicycle Volume [bicycles/h]	(	)	C	)	0	

2025 PM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-
Minimum Green [s]	0	5	5	0	5	0
Maximum Green [s]	0	30	30	0	30	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	0.0
Split [s]	0	9	9	0	51	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall		No	No		No	
Maximum Recall		No	No		No	
Pedestrian Recall		No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

## Lane Group Calculations

Version 5.00-00

Lane Group	С	С	L	R
C, Cycle Length [s]	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	33	33	19	19
g / C, Green / Cycle	0.55	0.55	0.32	0.32
(v / s)_i Volume / Saturation Flow Rate	0.25	0.16	0.03	0.28
s, saturation flow rate [veh/h]	1482	1659	1629	1454
c, Capacity [veh/h]	881	906	522	466
d1, Uniform Delay [s]	7.97	7.34	14.21	19.24
k, delay calibration	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.51	0.81	0.06	5.28
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00
Lane Group Results				
X, volume / capacity	0.43	0.29	0.08	0.87
d, Delay for Lane Group [s/veh]	9.48	8.14	14.27	24.52
Lane Group LOS	A	A	В	С
Critical Lane Group	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	2.07	1.30	0.36	5.46
50th-Percentile Queue Length [ft]	51.78	32.52	9.12	136.58
95th-Percentile Queue Length [veh]	3.73	2.34	0.66	9.30
95th-Percentile Queue Length [ft]	93.20	58.53	16.42	232.41

Version 5.00-00

# Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.48	9.48	8.14	8.14	14.27	24.52	
Movement LOS	А	A	А	A	В	С	
d_A, Approach Delay [s/veh]	9.	.48	8.	14	23	.58	
Approach LOS		A	/	4	(	C	
d_I, Intersection Delay [s/veh]			14	.98	•		
Intersection LOS			I	В			
Intersection V/C			0.5	533			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	4	7.0	5	.0	5.0		
M_corner, Corner Circulation Area [ft²/ped]	0.	.00	0.	00	0.00		
M_CW, Crosswalk Circulation Area [ft²/ped	0.	.00	0.	00	0.00		
d_p, Pedestrian Delay [s]	1.	.41	25	.21	25.21		
I_p,int, Pedestrian LOS Score for Intersection	ו 2.0	662	2.3	312	2.4	196	
Crosswalk LOS		В	I	3	E	3	
s_b, Saturation Flow Rate of the bicycle lane	20	2000 200		00	20	00	
c_b, Capacity of the bicycle lane [bicycles/h]		0 0		0	(	0	
d_b, Bicycle Delay [s]	d_b, Bicycle Delay [s] 30.00		30	30.00		.00	
I_b,int, Bicycle LOS Score for Intersection	4.	751	4.5	571	4.132		
Bicycle I OS		F		=	1	<u>ר</u>	

# Sequence

Ring 1 -	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2 -	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 9s	SG: 3 51s	
SG: 6 9s		

Version 5.00-00

2025 PM Peak Build

## Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.468

### Intersection Setup

Name	North Access		Lost Gr	Lost Grove Road		Lost Grove Road	
Approach	North	bound	Wes	tbound	Southeastbound		
Lane Configuration	۲		ч		Y		
Turning Movement	Left	Right	Left	Thru	Thru	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	30.00		30	0.00	40.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	Yes		Yes		Yes	

Name	North	Access	Lost Gro	ove Road	Lost Grove Road		
Base Volume Input [veh/h]	0	0	0	27	52	0	
Base Volume Adjustment Factor	1.1487	1.1487	1.1487	1.1487	1.1487	1.1487	
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	351	39	8	0	0	68	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	351	39	8	31	60	68	
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	98	11	2	9	17	19	
Total Analysis Volume [veh/h]	390	43	9	34	67	76	
Pedestrian Volume [ped/h]	0		0		0		

Version 5.00-00

## Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.47	0.05	0.01	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	13.72	13.17	7.49	0.00	0.00	0.00	
Movement LOS	ВВ		A	A	A	A	
95th-Percentile Queue Length [veh]	2.98	2.98	0.09	0.09	0.00	0.00	
95th-Percentile Queue Length [ft]	74.62	74.62	2.29	2.29	0.00	0.00	
d_A, Approach Delay [s/veh]	13	66	1.	57	0.0	00	
Approach LOS	E	3	А		A		
d_I, Intersection Delay [s/veh]	9.67						
Intersection LOS		В					

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2030 AM Peak

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Scenario 16 2030 AM 10/30/2018

# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	12.1	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Version 5.00-00

2030 AM Peak

## Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	12.1
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	bound	South	Southbound		Eastbound	
Lane Configuration	4		F		T		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0.00		0.00		
Crosswalk	Y	′es	Yes		Yes		

Name	Great River Road		Great River Road		South Access	
Base Volume Input [veh/h]	0	126	236	2	1	1
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	160	299	3	1	1
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	47	87	1	0	0
Total Analysis Volume [veh/h]	0	186	348	3	1	1
Pedestrian Volume [ped/h]		0		0		0

Version 5.00-00

## Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	7.95	0.00	0.00	0.00	12.09	10.18	
Movement LOS	A	A	A	A	В	В	
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.01	0.01	
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.26	0.26	
d_A, Approach Delay [s/veh]	0.	0.00		0.00		11.13	
Approach LOS	ŀ	A	A		В		
d_I, Intersection Delay [s/veh]	0.04						
Intersection LOS	В						

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2030 PM Peak

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# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	12.9	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Version 5.00-00

2030 PM Peak

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	12.9
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	ibound	South	nbound	East	Eastbound	
Lane Configuration	<b>H</b>		F		T		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	Yes		Yes		Yes	

Name	Great River Road		Great River Road		South Access	
Base Volume Input [veh/h]	1	257	213	0	1	2
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	326	270	0	1	3
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	84	70	0	0	1
Total Analysis Volume [veh/h]	1	336	278	0	1	3
Pedestrian Volume [ped/h]		0	0		0	

Version 5.00-00

## Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	7.78	0.00	0.00	0.00	12.91	9.74	
Movement LOS	A	А	A	A	В	A	
95th-Percentile Queue Length [veh]	1.04	1.04	0.00	0.00	0.02	0.02	
95th-Percentile Queue Length [ft]	26.12	26.12	0.00	0.00	0.46	0.46	
d_A, Approach Delay [s/veh]	0.	0.02		0.00		10.53	
Approach LOS	ŀ	A	A		В		
d_I, Intersection Delay [s/veh]	0.08						
Intersection LOS	В						

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## 2030 AM Peak Build

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# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	EB Right	0.685	27.7	С
2	Lost Grove Road & North Access	Signalized	HCM 6th Edition	NB Left	0.496	7.1	А

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

2030 AM Peak Build

Version 5.00-00

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	27.7
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.685

### Intersection Setup

Name	Great R	iver Road	Great R	iver Road	South Access		
Approach	North	bound	South	bound	Eastbound		
Lane Configuration	ר			÷	ידר		
Turning Movement	Left	Left Thru Thru		Right	Left	Right	
Lane Width [ft]	12.00 12.00		12.00 12.00		12.00 12.00		
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00 100.00		100.00	
Speed [mph]	55	5.00	55	55.00		30.00	
Grade [%]	0.00		0.	.00	0.00		
Curb Present	1	No	1	No	No		
Crosswalk	Y	Yes Yes Yes		Yes		es	

Name	Great River Road Great River Road				South	Access	
Base Volume Input [veh/h]	0	126	236	2	1	1	
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	986	0	0	110	10	85	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	34	0	26	
Total Hourly Volume [veh/h]	986	160	299	79	11	60	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	252	41	76 20		3	15	
Total Analysis Volume [veh/h]	1006	163	305	81	11	61	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing 0		0	(	)	(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	ı 0		)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	0	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	0	0		(	)	
v_ab, Corner Pedestrian Volume [ped/h]	(	0	0		(	)	
Bicycle Volume [bicycles/h]	(	0	(	)	0		

2030 AM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	6 0 3		0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	30	51	21	0	9	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

# Lane Group Calculations

Version 5.00-00

Lane Group	L	С	С	L	R
C, Cycle Length [s]	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	48	48	18	4	4
g / C, Green / Cycle	0.81	0.81	0.31	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.76	0.10	0.24	0.01	0.04
s, saturation flow rate [veh/h]	1327	1615	1636	1629	1454
c, Capacity [veh/h]	1044	1301	499	100	89
d1, Uniform Delay [s]	10.28	1.26	18.95	26.61	27.59
k, delay calibration	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	20.31	0.20	11.07	0.48	8.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00
Lane Group Results					
X, volume / capacity	0.96	0.13	0.77	0.11	0.68
d, Delay for Lane Group [s/veh]	30.59	1.46	30.02	27.09	36.46
Lane Group LOS	С	A	С	С	D
Critical Lane Group	Yes	No	Yes	No	Yes
50th-Percentile Queue Length [veh]	5.89	0.07	5.34	0.15	1.03
50th-Percentile Queue Length [ft]	147.28	1.79	133.50	3.87	25.85
95th-Percentile Queue Length [veh]	9.87	0.13	9.13	0.28	1.86
95th-Percentile Queue Length [ft]	246.79	3.22	228.25	6.97	46.53

Version 5.00-00

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	30.59	1.46	30.02	30.02	27.09	36.46		
Movement LOS	С	A	С	С	C D			
d_A, Approach Delay [s/veh]	26	.53	30	.02	35	.03		
Approach LOS		С		C	1	D		
d_l, Intersection Delay [s/veh]			27	.73	•			
Intersection LOS				С				
Intersection V/C			0.0	685				
Other Modes								
g_Walk,mi, Effective Walk Time [s]	5	i.0	4	7.0	17	7.0		
M_corner, Corner Circulation Area [ft²/ped]	0.	0.00 0.00 0.00						
M_CW, Crosswalk Circulation Area [ft²/ped	0.	00	0.	00	0.	00		
d_p, Pedestrian Delay [s]	25	5.21	1.	41	15	.41		
I_p,int, Pedestrian LOS Score for Intersectio	n 2.	357	2.1	181	2.8	327		
Crosswalk LOS		С		В		C		
s_b, Saturation Flow Rate of the bicycle lane	. 20	000	20	000	20	000		
c_b, Capacity of the bicycle lane [bicycles/h								
d_b, Bicycle Delay [s]	30.00 30.00 30.00							
I_b,int, Bicycle LOS Score for Intersection	6.	061	4.8	325	4.1	132		
Bicycle LOS		F	E D					

# Sequence

-																
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 51s		SG: 3 9s
SG: 5 30s	SG: 6 21s	

2030 AM Peak Build

Version 5.00-00

### Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Signalized	Delay (sec / veh):	7.1
Analysis Method:	HCM 6th Edition	Level Of Service:	А
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.496

### Intersection Setup

Name	North	Access	Lost Grove Road		Lost Grove Road		
Approach	Northbound		West	Westbound		astbound	
Lane Configuration	<b>۲</b>		Ч		Ϋ́		
Turning Movement	Left	Right	Left	Thru	Thru	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	30	.00	30.00		40.00		
Grade [%]	0.	.00	0.00		0.00		
Curb Present	No		No		No		
Crosswalk	Y	Yes		Yes		Yes	

Name	North /	North Access		ve Road	Lost Grove Road		
Base Volume Input [veh/h]	0	0	0	39	10	0	
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	86	10	110	0	0	986	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	3	0	0	0	296	
Total Hourly Volume [veh/h]	86	7	110	49	13	690	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	22	2	28	13	3	176	
Total Analysis Volume [veh/h]	88	7	112	50	13	704	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	0		(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	(	)	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	(	)	
Bicycle Volume [bicycles/h]	(	)	0		0		

2030 AM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	No
Signal Coordination Group	
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	0	4	8	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	5	5	0
Maximum Green [s]	30	0	0	30	30	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	39	0	0	21	21	0
Vehicle Extension [s]	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

## Lane Group Calculations

Lane Group	С	С	С
C, Cycle Length [s]	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	48	48
g / C, Green / Cycle	0.07	0.79	0.79
(v / s)_i Volume / Saturation Flow Rate	0.05	0.23	0.44
s, saturation flow rate [veh/h]	1794	690	1619
c, Capacity [veh/h]	132	649	1284
d1, Uniform Delay [s]	27.19	3.79	2.30
k, delay calibration	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	7.21	0.92	1.76
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00
Lane Group Results			
X, volume / capacity	0.72	0.25	0.56
d, Delay for Lane Group [s/veh]	34.40	4.71	4.06
Lane Group LOS	С	A	A
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh]	1.53	0.86	0.73
50th-Percentile Queue Length [ft]	38.16	21.59	18.28
95th-Percentile Queue Length [veh]	2.75	1.55	1.32
95th-Percentile Queue Length [ft]	68.68	38.87	32.91

Version 5.00-00

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.40 34.40		4.71	4.71 4.71		4.06	
Movement LOS	С	С	A	А	A	A	
d_A, Approach Delay [s/veh]	34	.40	4.	71	4.	06	
Approach LOS	(	C	, , , , , , , , , , , , , , , , , , ,	A	A		
d_I, Intersection Delay [s/veh]			7.	13			
Intersection LOS			/	Ą			
Intersection V/C			0.4	96			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	17	7.0	35	5.0	17.0		
M_corner, Corner Circulation Area [ft²/ped]	0.	00	0.	00	0.00		
M_CW, Crosswalk Circulation Area [ft²/ped	] 0.	00	0.	00	0.00		
d_p, Pedestrian Delay [s]	15	.41	5.	21	15.41		
I_p,int, Pedestrian LOS Score for Intersection	n 2.4	135	1.7	29	2.976		
Crosswalk LOS	I	3		A	С		
s_b, Saturation Flow Rate of the bicycle lane	e 20	000	20	00	2000		
c_b, Capacity of the bicycle lane [bicycles/h	] (	0	(	)	0		
d_b, Bicycle Delay [s]	30	.00	30	.00	30.00		
I_b,int, Bicycle LOS Score for Intersection	4.2	294	4.4	.00	5.804		
Bicycle LOS		Ξ	E		F	-	

# Sequence

-				_												
Ring 1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 4 21s	
SG: 8 21s	

SG: 5 39s

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Version 5.00-00		

# 2030 PM Peak Build

Vistro File: D:\...\Network 20181221.vistro Report File: D:\...\12 2030 PM Peak Build.pdf Scenario 19 2030 PM Build 1/7/2019

# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	EB Right	0.670	22.5	С
2	Lost Grove Road & North Access	Signalized	HCM 6th Edition	NB Left	0.639	19.9	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

2030 PM Peak Build

Version 5.00-00

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	22.5
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.670

### Intersection Setup

Name	Great R	iver Road	Great R	Great River Road		South Access	
Approach	North	bound	South	bound	Eastbound		
Lane Configuration	<b>1</b>		F		ידר		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00 12.00		12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55	5.00	55	55.00		30.00	
Grade [%]	0.	0.00		0.00		0.00	
Curb Present	No		1	No	No		
Crosswalk	Yes		Y	Yes		Yes	

Name	Great Ri	ver Road	Great Riv	ver Road	South Access		
Base Volume Input [veh/h]	1	257	213	0	1	2	
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	160	0	0	18	97	868	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	5	0	261	
Total Hourly Volume [veh/h]	161	326	270	13	98	610	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	41	83	69	3	25	156	
Total Analysis Volume [veh/h]	164	333	276	13	100	622	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	0		
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	(	)	
Bicycle Volume [bicycles/h]	(	)	0		0		

2030 PM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	9	18	9	0	52	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

# Lane Group Calculations

Version 5.00-00

Lane Group	L	С	С	L	R
C, Cycle Length [s]	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	30	30	21	32	32
g / C, Green / Cycle	0.42	0.42	0.30	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.14	0.20	0.17	0.06	0.43
s, saturation flow rate [veh/h]	1146	1683	1656	1629	1454
c, Capacity [veh/h]	468	713	489	753	672
d1, Uniform Delay [s]	14.11	14.50	21.07	10.79	17.70
k, delay calibration	0.50	0.50	0.50	0.11	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.06	2.19	5.19	0.08	9.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00
Lane Group Results					
X, volume / capacity	0.35	0.47	0.59	0.13	0.93
d, Delay for Lane Group [s/veh]	16.17	16.69	26.26	10.87	27.34
Lane Group LOS	В	В	С	В	С
Critical Lane Group	Yes	No	Yes	No	Yes
50th-Percentile Queue Length [veh]	1.58	3.41	4.09	0.82	10.04
50th-Percentile Queue Length [ft]	39.43	85.37	102.32	20.61	251.11
95th-Percentile Queue Length [veh]	2.84	6.15	7.37	1.48	15.24
95th-Percentile Queue Length [ft]	70.98	153.67	184.17	37.10	381.05

Version 5.00-00

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	16.17	16.69	26.26	26.26	10.87	27.34	
Movement LOS	В	В	С	С	В	С	
d_A, Approach Delay [s/veh]	16	5.52	26	.26	25	.06	
Approach LOS		В	(	0	(	0	
d_l, Intersection Delay [s/veh]			22	.48	•		
Intersection LOS			(	0			
Intersection V/C			0.6	670			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	4	8.0	14	ł.0	5.0		
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0.	0.00 0.00			
M_CW, Crosswalk Circulation Area [ft²/ped	0	.00	0.	00	0.	00	
d_p, Pedestrian Delay [s]	3	.46	22	.40	30	.18	
I_p,int, Pedestrian LOS Score for Intersection	ו 2.	834	2.4	196	2.7	760	
Crosswalk LOS		С	I	3	(	C	
s_b, Saturation Flow Rate of the bicycle lane	20	000	20	00	20	000	
c_b, Capacity of the bicycle lane [bicycles/h		0	(	)	0		
d_b, Bicycle Delay [s]	35	5.00	35	35.00		.00	
I_b,int, Bicycle LOS Score for Intersection	4.	952	4.6	618	4.1	132	
Bicycle LOS		E	E D				

## Sequence

•																
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	_

SG: 2 18s		SG: 3 52s	
SG: 5 9s SG:	95 <mark>.</mark>		

2030 PM Peak Build

## Version 5.00-00

### Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Signalized	Delay (sec / veh):	19.9
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.639

### Intersection Setup

Name	North	Access	Lost Gr	ove Road	Lost Grove Road			
Approach	North	bound	West	tbound	Southeastbound			
Lane Configuration	ጉ		т		Y			
Turning Movement	Left	Right	Left	Thru	Thru	Right		
Lane Width [ft]	12.00 12.00		12.00	12.00	12.00	12.00		
No. of Lanes in Pocket	0	0	0	0	0	0		
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00		
Speed [mph]	30	.00	30	30.00		40.00		
Grade [%]	0.	0.00		0.00		0.00		
Curb Present	١	10	1	No	No			
Crosswalk	Yes		Y	Yes		Yes		

Name	North A	Access	Lost Gro	ve Road	Lost Gro	ve Road
Base Volume Input [veh/h]	0	0	0	27	52	0
Base Volume Adjustment Factor	1.2682	1.2682	1.2682	1.2682	1.2682	1.2682
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	869	97	18	0	0	160
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	29	0	0	0	48
Total Hourly Volume [veh/h]	869	68	18	34	66	112
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	222	17	5	9	17	29
Total Analysis Volume [veh/h]	887	69	18	35	67	114
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	g (	)	0		(	)
v_di, Inbound Pedestrian Volume crossing r	n (	)	0		(	)
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	0		0	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	0	)	(	)
Bicycle Volume [bicycles/h]	(	)	(	)	(	)

2030 PM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	No
Signal Coordination Group	
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	0	4	8	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	5	5	0
Maximum Green [s]	30	0	0	30	30	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	51	0	0	9	9	0
Vehicle Extension [s]	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

## Lane Group Calculations

Lane Group	С	С	С
C, Cycle Length [s]	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00
g_i, Effective Green Time [s]	34	18	18
g / C, Green / Cycle	0.57	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.53	0.05	0.11
s, saturation flow rate [veh/h]	1794	1152	1710
c, Capacity [veh/h]	1026	420	504
d1, Uniform Delay [s]	11.77	15.63	16.69
k, delay calibration	0.23	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	8.53	0.62	1.99
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00
Lane Group Results			
X, volume / capacity	0.93	0.13	0.36
d, Delay for Lane Group [s/veh]	20.30	16.25	18.68
Lane Group LOS	С	В	В
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh]	11.14	0.56	1.98
50th-Percentile Queue Length [ft]	278.62	13.88	49.52
95th-Percentile Queue Length [veh]	16.62	1.00	3.57
95th-Percentile Queue Length [ft]	415.49	24.99	89.13

Version 5.00-00

# Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.30	20.30	16.25	16.25	18.68	18.68	
Movement LOS	С	С	В	В	В	В	
d_A, Approach Delay [s/veh]	20	.30	16	.25	18	.68	
Approach LOS		С	I	3	E	3	
d_I, Intersection Delay [s/veh]			19	.87			
Intersection LOS			I	3			
Intersection V/C			0.6	339			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	5	i.0	47.0		5.0		
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0.	00	0.00		
M_CW, Crosswalk Circulation Area [ft²/ped	0.00		0.	00	0.	00	
d_p, Pedestrian Delay [s]	25	5.21	1.	41	25	.21	
I_p,int, Pedestrian LOS Score for Intersectio	n 2.	2.336 1.692			3.7	/80	
Crosswalk LOS		В	,	Ą	[	D I	
s_b, Saturation Flow Rate of the bicycle lane	20	000	20	2000		00	
c_b, Capacity of the bicycle lane [bicycles/h	ity of the bicycle lane [bicycles/h] 0			)	0		
d_b, Bicycle Delay [s]	30	0.00	30	30.00 30.00			
I_b,int, Bicycle LOS Score for Intersection	5.758		4.2	4.220		510	
Bicycle LOS		F		ו	F	=	

# Sequence

Ring 1 -	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2 5	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 4 9s	3	
SG: 8 9:		

SG: 5 51s

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2050 AM Peak

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# **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	12.9	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Version 5.00-00

2050 AM Peak

### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	12.9
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

### Intersection Setup

Name	Great River Road		Great R	liver Road	South Access		
Approach	North	bound	Sout	hbound	Eastbound		
Lane Configuration	h i		F		יד		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00 12.00		12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	Yes		Yes		Yes	

Name	Great River Road		Great River Road		South Access	
Base Volume Input [veh/h]	0	177	330	3	1	1
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	186	347	3	1	1
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	54	101	1	0	0
Total Analysis Volume [veh/h]	0	216	403	3	1	1
Pedestrian Volume [ped/h]	0		0		0	

Version 5.00-00

## Intersection Settings

Priority Scheme	Free	Free	Stop	
Flared Lane				
Storage Area [veh]	0	0	0	
Two-Stage Gap Acceptance			No	
Number of Storage Spaces in Median	0	0	0	

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.09	0.00	0.00	0.00	12.94	10.54
Movement LOS	A	А	A	A	В	В
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.01	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.17	0.12
d_A, Approach Delay [s/veh]	0.00		0.00		11.74	
Approach LOS	A		A		В	
d_I, Intersection Delay [s/veh]	0.04					
Intersection LOS	В					
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2050 PM Peak

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Two-way stop	HCM 6th Edition	EB Left	0.002	14.0	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Version 5.00-00

2050 PM Peak

#### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Two-way stop	Delay (sec / veh):	14.0
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

#### Intersection Setup

Name	Great River Road		Great R	Great River Road		South Access	
Approach	North	bound	Sout	hbound	Eastbound		
Lane Configuration	лİ		F		ידר		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55.00		55.00		30.00		
Grade [%]	0.00		0	0.00		0.00	
Crosswalk	Y	es	Yes		Yes		

Name	Great Ri	ver Road	Great Ri	ver Road	South Access		
Base Volume Input [veh/h]	1	360	298	0	1	3	
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	0	0	0	0	0	0	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Total Hourly Volume [veh/h]	1	378	313	0	1	3	
Peak Hour Factor	0.9700	0.9700	0.9700	0.9700	0.9700	0.9700	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	0	97	81	0	0	1	
Total Analysis Volume [veh/h]	1	390	323	0	1	3	
Pedestrian Volume [ped/h]		0		0	0		

Version 5.00-00

## Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

## Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	
d_M, Delay for Movement [s/veh]	7.89	0.00	0.00	0.00	14.02	10.00	
Movement LOS	A	А	A	A	В	В	
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.01	0.01	
95th-Percentile Queue Length [ft]	0.06	0.00	0.00	0.00	0.19	0.31	
d_A, Approach Delay [s/veh]	0.	0.02		0.00		11.01	
Approach LOS	ŀ	A	A		В		
d_I, Intersection Delay [s/veh]	0.07						
Intersection LOS		В					

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## 2050 AM Peak Build

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	EB Right	0.696	34.3	С
2	Lost Grove Road & North Access	Signalized	HCM 6th Edition	NB Left	0.499	7.2	А

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

2050 AM Peak Build

Version 5.00-00

#### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	34.3
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.696

#### Intersection Setup

Name	Great Ri	iver Road	Great River Road		South Access		
Approach	North	bound	South	bound	Eastbound		
Lane Configuration	<b>1</b>		F		٦r		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55	5.00	55	55.00		30.00	
Grade [%]	0.00		0.	0.00		0.00	
Curb Present	No		1	No		No	
Crosswalk	Y	Yes		Yes		Yes	

Name	Great Ri	ver Road	Great River Road		South Access	
Base Volume Input [veh/h]	0	177	330	3	1	1
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	986	0	0	110	10	85
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	34	0	26
Total Hourly Volume [veh/h]	986	186	347	79	11	60
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	252	47	89	20	3	15
Total Analysis Volume [veh/h]	1006	190	354	81	11	61
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	trian Volume crossing 0		0		(	)
v_di, Inbound Pedestrian Volume crossing r	n O		0		(	)
v_co, Outbound Pedestrian Volume crossing	<b>g</b> 0		0		(	)
v_ci, Inbound Pedestrian Volume crossing n	ni O		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	(	0	0		0	
Bicycle Volume [bicycles/h]	(	0	(	)	0	

2050 AM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	52	91	39	0	9	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

# Lane Group Calculations

Version 5.00-00

Lane Group	L	С	С	L	R
C, Cycle Length [s]	100	100	100	100	100
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	87	87	35	5	5
g / C, Green / Cycle	0.87	0.87	0.35	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.77	0.12	0.26	0.01	0.04
s, saturation flow rate [veh/h]	1306	1615	1643	1629	1454
c, Capacity [veh/h]	1044	1405	576	81	73
d1, Uniform Delay [s]	16.51	0.96	28.70	45.43	47.10
k, delay calibration	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	20.33	0.20	8.95	0.74	21.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00
Lane Group Results					
X, volume / capacity	0.96	0.14	0.76	0.14	0.84
d, Delay for Lane Group [s/veh]	36.84	1.16	37.65	46.18	68.64
Lane Group LOS	D	A	D	D	E
Critical Lane Group	Yes	No	Yes	No	Yes
50th-Percentile Queue Length [veh]	5.90	0.08	9.73	0.28	1.93
50th-Percentile Queue Length [ft]	147.42	1.95	243.30	6.93	48.29
95th-Percentile Queue Length [veh]	9.88	0.14	14.85	0.50	3.48
95th-Percentile Queue Length [ft]	246.99	3.52	371.20	12.47	86.92

Version 5.00-00

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	36.84	1.16	37.65	37.65	46.18	68.64	
Movement LOS	D	A	D	D	D	E	
d_A, Approach Delay [s/veh]	31	.17	37	.65	65.	.21	
Approach LOS	(	C	[	)	E	E	
d_I, Intersection Delay [s/veh]			34	.27			
Intersection LOS			(	2			
Intersection V/C			0.6	96			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	5	.0	87	.0	35.0		
M_corner, Corner Circulation Area [ft²/ped]	0.	00	0.	00	0.00		
M_CW, Crosswalk Circulation Area [ft²/ped	] 0.	00	0.	00	0.0	00	
d_p, Pedestrian Delay [s]	45	.13	0.8	85	21.	.13	
I_p,int, Pedestrian LOS Score for Intersection	n 2.9	926	2.2	28	2.8	83	
Crosswalk LOS	(	C	E	3		c	
s_b, Saturation Flow Rate of the bicycle lane	e 20	00	20	00	20	00	
c_b, Capacity of the bicycle lane [bicycles/h	] (	0	(	)	(	)	
d_b, Bicycle Delay [s]	50	.00	50	.00	50.	.00	
I_b,int, Bicycle LOS Score for Intersection	6.1	06 4.906		6.106		4.1	32
Bicycle LOS		=	E		0	)	

## Sequence

•				_												
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 91s		SG: 3 9s
SG: 5 52s	SG: 6 39s	

2050 AM Peak Build

Version 5.00-00

#### Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Signalized	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	А
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

#### Intersection Setup

Name	North	Access	Lost Grove Road		Lost Grove Road		
Approach	North	bound	West	Westbound		astbound	
Lane Configuration	<u>ነ</u>	<b>→</b>	+	ſ	5	ŕ	
Turning Movement	Left	Right	Left	Thru	Thru	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	30	.00	30	30.00		40.00	
Grade [%]	0.	.00	0	.00	0.00		
Curb Present	No		1	No	No		
Crosswalk	Y	es	Y	'es	Yes		

Name	North A	Access	Lost Gro	ve Road	Lost Grove Road		
Base Volume Input [veh/h]	0	0	0	54	14	0	
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	86	10	110	0	0	986	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	3	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	3	0	0	0	296	
Total Hourly Volume [veh/h]	86	10	110	57	15	690	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	22	3	28	15	4	176	
Total Analysis Volume [veh/h]	88	10	112	58	15	704	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	(	)	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	(	)	
Bicycle Volume [bicycles/h]	(	)	(	)	0		

2050 AM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	No
Signal Coordination Group	
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	0	4	8	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	5	5	0
Maximum Green [s]	30	0	0	30	30	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	40	0	0	20	20	0
Vehicle Extension [s]	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

## Lane Group Calculations

Version 5.00-00

Lane Group	С	С	С
C, Cycle Length [s]	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	48	48
g / C, Green / Cycle	0.07	0.79	0.79
(v / s)_i Volume / Saturation Flow Rate	0.05	0.24	0.44
s, saturation flow rate [veh/h]	1788	707	1620
c, Capacity [veh/h]	136	659	1281
d1, Uniform Delay [s]	27.10	3.64	2.36
k, delay calibration	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	7.05	0.95	1.78
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00
Lane Group Results			
X, volume / capacity	0.72	0.26	0.56
d, Delay for Lane Group [s/veh]	34.15	4.59	4.14
Lane Group LOS	С	A	A
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh]	1.57	0.91	0.79
50th-Percentile Queue Length [ft]	39.16	22.78	19.81
95th-Percentile Queue Length [veh]	2.82	1.64	1.43
95th-Percentile Queue Length [ft]	70.49	41.01	35.65

Version 5.00-00

# Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.15	34.15	4.59	4.59	4.14	4.14	
Movement LOS	С	С	A	A	A	A	
d_A, Approach Delay [s/veh]	34	4.15	4	.59	4.14		
Approach LOS		С		A	A		
d_I, Intersection Delay [s/veh]			7	.20	•		
Intersection LOS				A			
Intersection V/C			0.	499			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	1	6.0	3	6.0	16.0		
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0	.00	0.00		
M_CW, Crosswalk Circulation Area [ft²/ped]	0	.00	0	.00	0.00		
d_p, Pedestrian Delay [s]	10	6.13	4	.80	16	.13	
I_p,int, Pedestrian LOS Score for Intersection	n 2.	439	1.	732	2.9	85	
Crosswalk LOS		В		A	(	;	
s_b, Saturation Flow Rate of the bicycle lane	2	000	20	000	20	00	
c_b, Capacity of the bicycle lane [bicycles/h]		0		0	0		
d_b, Bicycle Delay [s]	30	0.00	30	0.00	30.00		
I_b,int, Bicycle LOS Score for Intersection	4.	299	4.	413	5.807		
Bicycle LOS		E		E		-	

# Sequence

-				_												
Ring 1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	000000	SG: 4 20s	
GG: 5 40s		SG: 8 20s	

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#### 2050 PM Peak Build

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## **Intersection Analysis Summary**

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Great River Road & South Access	Signalized	HCM 6th Edition	SB Thru	0.700	23.6	С
2	Lost Grove Road & North Access	Signalized	HCM 6th Edition	NB Left	0.646	19.9	В

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

2050 PM Peak Build

Version 5.00-00

#### Intersection Level Of Service Report Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	23.6
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.700

#### Intersection Setup

Name	Great R	iver Road	Great R	Great River Road		Access	
Approach	North	bound	South	Southbound		bound	
Lane Configuration	лİ		F		חר		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00 12.00		12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55	5.00	55	55.00		30.00	
Grade [%]	0.00		0.	0.00		0.00	
Curb Present	No		1	No		No	
Crosswalk	Y	es	Y	Yes		Yes	

Name	Great Riv	ver Road	Great Riv	ver Road	South Access		
Base Volume Input [veh/h]	1	360	298	0	1	3	
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	160	0	0	18	97	868	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	5	0	261	
Total Hourly Volume [veh/h]	161	378	313	13	98	610	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	41	96	80	3	25	156	
Total Analysis Volume [veh/h]	164	386	319	13	100	622	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	<u>р 0</u>		(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	(	)	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	0		
Bicycle Volume [bicycles/h]	(	)	(	)	0		

2050 PM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	9	18	9	0	42	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

#### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

## Lane Group Calculations

Version 5.00-00

Lane Group	L	С	С	L	R
C, Cycle Length [s]	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	24	24	15	28	28
g / C, Green / Cycle	0.40	0.40	0.25	0.47	0.47
(v / s)_i Volume / Saturation Flow Rate	0.14	0.23	0.20	0.06	0.43
s, saturation flow rate [veh/h]	1153	1683	1658	1629	1454
c, Capacity [veh/h]	453	675	416	758	677
d1, Uniform Delay [s]	13.30	13.96	21.04	9.13	14.98
k, delay calibration	0.50	0.50	0.50	0.11	0.22
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.24	3.50	14.66	0.08	10.33
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00
Lane Group Results					
X, volume / capacity	0.36	0.57	0.80	0.13	0.92
d, Delay for Lane Group [s/veh]	15.54	17.46	35.70	9.21	25.31
Lane Group LOS	В	В	D	A	С
Critical Lane Group	Yes	No	Yes	No	Yes
50th-Percentile Queue Length [veh]	1.37	3.64	5.20	0.66	8.50
50th-Percentile Queue Length [ft]	34.19	90.95	130.12	16.47	212.47
95th-Percentile Queue Length [veh]	2.46	6.55	8.95	1.19	13.28
95th-Percentile Queue Length [ft]	61.53	163.70	223.66	29.65	331.99

Version 5.00-00

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	15.54	17.46	35.70	35.70	9.21	25.31	
Movement LOS	В	В	D	D	A	С	
d_A, Approach Delay [s/veh]	16	5.89	35	.70	23	.08	
Approach LOS		В		C	С		
d_I, Intersection Delay [s/veh]			23	.57	•		
Intersection LOS				0			
Intersection V/C			0.	700			
Other Modes							
g_Walk,mi, Effective Walk Time [s]	3	8.0	14	4.0	5.0		
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0.	00	0.	0.00	
M_CW, Crosswalk Circulation Area [ft²/ped]	0	.00	0.	00	0.	00	
d_p, Pedestrian Delay [s]	4	.03	17	.63	25	.21	
I_p,int, Pedestrian LOS Score for Intersection	2.	897	2.5	572	2.7	743	
Crosswalk LOS		С		3	E	3	
s_b, Saturation Flow Rate of the bicycle lane	20	000	20	00	20	00	
c_b, Capacity of the bicycle lane [bicycles/h]		0		0	(	0	
d_b, Bicycle Delay [s]	30	0.00	30	.00	30.00		
I_b,int, Bicycle LOS Score for Intersection	5.	5.040 4.688			4.132		
Bicycle LOS		F		Ξ	D		

# Sequence

-																
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 18s		SG: 3 42s	
SG: 5 9s SG:	6 9s		

2050 PM Peak Build

Version 5.00-00

#### Intersection Level Of Service Report Intersection 2: Lost Grove Road & North Access

Control Type:	Signalized	Delay (sec / veh):	19.9
Analysis Method:	HCM 6th Edition	Level Of Service:	В
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.646

#### Intersection Setup

Name	North Access		Lost Grove Road		Lost Grove Road		
Approach	North	bound	West	Westbound		Southeastbound	
Lane Configuration	ጉ		ч		Y		
Turning Movement	Left	Right	Left	Thru	Thru	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	30	.00	30	30.00		40.00	
Grade [%]	0.00		0.00		0.00		
Curb Present	No		No		No		
Crosswalk	Y	es	Yes		Yes		

Name	North A	Access	ccess Lost Grove Road			Lost Grove Road		
Base Volume Input [veh/h]	0	0	0	38	73	0		
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511		
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00		
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00		
In-Process Volume [veh/h]	0	0	0	0	0	0		
Site-Generated Trips [veh/h]	869	97	18	0	0	160		
Diverted Trips [veh/h]	0	0	0	0	0	0		
Pass-by Trips [veh/h]	0	0	0	0	0	0		
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0		
Other Volume [veh/h]	0	0	0	0	0	0		
Right-Turn on Red Volume [veh/h]	0	29	0	0	0	46		
Total Hourly Volume [veh/h]	869	68	18	40	77	114		
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800		
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000		
Total 15-Minute Volume [veh/h]	222	17	5	10	20	29		
Total Analysis Volume [veh/h]	887	69	18	41	79	116		
Presence of On-Street Parking	No	No	No	No	No	No		
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0		
Local Bus Stopping Rate [/h]	0	0	0	0	0	0		
v_do, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)		
v_di, Inbound Pedestrian Volume crossing r	n (	n 0		)	(	)		
v_co, Outbound Pedestrian Volume crossing	<b>j</b> 0		0		(	)		
v_ci, Inbound Pedestrian Volume crossing n	i O		0		0			
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	0			
Bicycle Volume [bicycles/h]	(	)	C	)	0			

2050 PM Peak Build

Version 5.00-00

## Intersection Settings

Located in CBD	No
Signal Coordination Group	
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	0	4	8	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	0	5	5	0
Maximum Green [s]	30	0	0	30	30	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	51	0	0	9	9	0
Vehicle Extension [s]	3.0	0.0	0.0	3.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

## **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

## Lane Group Calculations

Lane Group	С	С	С
C, Cycle Length [s]	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	2.00	0.00
I2, Clearance Lost Time [s]	2.00	2.00	2.00
g_i, Effective Green Time [s]	34	18	18
g / C, Green / Cycle	0.57	0.30	0.30
(v / s)_i Volume / Saturation Flow Rate	0.53	0.05	0.11
s, saturation flow rate [veh/h]	1794	1205	1719
c, Capacity [veh/h]	1026	433	507
d1, Uniform Delay [s]	11.77	15.64	16.83
k, delay calibration	0.23	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	8.53	0.65	2.20
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00
Lane Group Results			
X, volume / capacity	0.93	0.14	0.38
d, Delay for Lane Group [s/veh]	20.30	16.30	19.04
Lane Group LOS	С	В	В
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh]	11.14	0.62	2.16
50th-Percentile Queue Length [ft]	278.62	15.46	54.00
95th-Percentile Queue Length [veh]	16.62	1.11	3.89
95th-Percentile Queue Length [ft]	415.49	27.82	97.20

Version 5.00-00

# Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.30	20.30	16.30	16.30	19.04	19.04						
Movement LOS	С	С	В	В	В	В						
d_A, Approach Delay [s/veh]	20	0.30	16	.30	19	.04						
Approach LOS		С		В	В							
d_I, Intersection Delay [s/veh]		19.90										
Intersection LOS		В										
Intersection V/C		0.646										
Other Modes												
g_Walk,mi, Effective Walk Time [s]	5	5.0	4	7.0	5.0							
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0.	00	0.00							
M_CW, Crosswalk Circulation Area [ft²/ped]	0	.00	0.	00	0.	00						
d_p, Pedestrian Delay [s]	25	5.21	1.	41	25	.21						
I_p,int, Pedestrian LOS Score for Intersection	2.	336	1.7	701	3.7	'89						
Crosswalk LOS		В		A	[	)						
s_b, Saturation Flow Rate of the bicycle lane	20	000	20	000	20	00						
c_b, Capacity of the bicycle lane [bicycles/h]		0		0	(	)						
d_b, Bicycle Delay [s]	30	0.00	30	.00	30.00							
I_b,int, Bicycle LOS Score for Intersection 5.758 4.230						4.530						
Bicycle LOS		F		D	E							

# Sequence

Ring 1 -	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2 5	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG:	4 9s	
SG:	8 9s	

SG: 5 51s



Version 5.00-00

2050 AM Peak Build

## With Southbound Right-Turn Bay

Intersection Level Of Service Report

#### Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	22.2
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.658

#### Intersection Setup

Name	Great Ri	iver Road	Great R	iver Road	South Access			
Approach	North	bound	South	bound	Eastbound			
Lane Configuration	1	ı <b>İ</b>	1	<b>F</b>	יד			
Turning Movement	Left Thru		Thru	Right	Left	Right		
Lane Width [ft]	12.00 12.00		12.00	12.00	12.00	12.00		
No. of Lanes in Pocket	0 0		0	0	0	0		
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00		
Speed [mph]	55	5.00	55	55.00		30.00		
Grade [%]	0.	.00	0	.00	0.00			
Curb Present	١	٩o	1	No		No		
Crosswalk	Y	es	Yes		Yes			

Name	Great Riv	ver Road	Great Riv	ver Road	South /	Access	
Base Volume Input [veh/h]	0	177	330	3	1	1	
Base Volume Adjustment Factor	1.0511	1.0511	1.0511 1.0511		1.0511	1.0511	
Heavy Vehicles Percentage [%]	0.00	7.00	1.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	986	0	0	110	10	85	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	34	0	26	
Total Hourly Volume [veh/h]	986	186 347 79		79	11	60	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	252	47	89	20	3	15	
Total Analysis Volume [veh/h]	1006	190	354	81	11	61	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	C	)	(	)	
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	0		
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	0		
Bicycle Volume [bicycles/h]	(	)	(	)	0		

2050 AM Peak Build With Southbound Right-Turn Bay

## Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	30	51	21	0	9	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

#### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

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# 2050 AM Peak Build

## With Southbound Right-Turn Bay

## Lane Group Calculations

Lane Group	L	С	С	R	L	R
C, Cycle Length [s]	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	48	48	18	18	4	4
g / C, Green / Cycle	0.81	0.81	0.31	0.31	0.06	0.06
(v / s)_i Volume / Saturation Flow Rate	0.75	0.12	0.21	0.06	0.01	0.04
s, saturation flow rate [veh/h]	1339	1615	1696	1454	1629	1454
c, Capacity [veh/h]	1074	1301	518	444	100	89
d1, Uniform Delay [s]	8.59	1.29	18.30	15.33	26.61	27.59
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.96	0.24	7.15	0.90	0.48	8.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00
Lane Group Results						
X, volume / capacity	0.94	0.15	0.68	0.18	0.11	0.68
d, Delay for Lane Group [s/veh]	24.54	1.53	25.44	16.24	27.09	36.46
Lane Group LOS	С	A	С	В	С	D
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	4.76	0.09	4.40	0.76	0.15	1.03
50th-Percentile Queue Length [ft]	118.97	2.14	109.93	18.94	3.87	25.85
95th-Percentile Queue Length [veh]	8.34	0.15	7.84	1.36	0.28	1.86
95th-Percentile Queue Length [ft]	208.41	3.85	195.91	34.08	6.97	46.53

Version 5.00-00

# 2050 AM Peak Build

## With Southbound Right-Turn Bay

## Movement, Approach, & Intersection Results

I\_b,int, Bicycle LOS Score for Intersection

Bicycle LOS

d_M, Delay for Movement [s/veh]	24.54	1.53	25.44	16.24	27.09	36.46					
Movement LOS	С	A	С	В	С	D					
d_A, Approach Delay [s/veh]	20	20.89 23.73			23.73 35.03						
Approach LOS	C C D										
d_I, Intersection Delay [s/veh]	22.21										
Intersection LOS	C										
Intersection V/C	0.658										
Other Modes											
g_Walk,mi, Effective Walk Time [s]	Ę	5.0	4	7.0	17.0						
M_corner, Corner Circulation Area [ft²/ped]	0	.00	0.	.00	0.00						
M_CW, Crosswalk Circulation Area [ft²/ped	0	.00	0.	.00	0.	00					
d_p, Pedestrian Delay [s]	25	5.21	1.	.41	15	.41					
I_p,int, Pedestrian LOS Score for Intersection	2.	902	2.:	274	2.8	327					
Crosswalk LOS		С		В	С						
s_b, Saturation Flow Rate of the bicycle lane	20	000	20	000	2000						
c_b, Capacity of the bicycle lane [bicycles/h]	c_b, Capacity of the bicycle lane [bicycles/h] 0 0 0										
d_b, Bicycle Delay [s]	b, Bicycle Delay [s] 30.00 30.00 30.00										

# Sequence

-																
Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

4.906

Е

4.132

D

6.106

F

SG: 2 51s		SG: 3 9s
SG: 5 30s	SG: 6 21s	



Version 5.00-00

2050 PM Peak Build

## With Southbound Right-Turn Bay

Intersection Level Of Service Report

#### Intersection 1: Great River Road & South Access

Control Type:	Signalized	Delay (sec / veh):	23.2
Analysis Method:	HCM 6th Edition	Level Of Service:	С
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.687

#### Intersection Setup

Name	Great Ri	ver Road	Great R	iver Road	South Access		
Approach	North	bound	South	nbound	Eastbound		
Lane Configuration	лİ		İr		ידר		
Turning Movement	Left	Thru	Thru	Right	Left	Right	
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	
No. of Lanes in Pocket	0	0	0	0	0	0	
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	
Speed [mph]	55	5.00	55.00		30.00		
Grade [%]	0.	.00	0	.00	0.00		
Curb Present	N	10	1	No	No		
Crosswalk	Y	es	Y	Yes		Yes	

Name	Great Riv	ver Road	Great Riv	ver Road	South Access		
Base Volume Input [veh/h]	1	360	298	0	1	3	
Base Volume Adjustment Factor	1.0511	1.0511	1.0511	1.0511	1.0511	1.0511	
Heavy Vehicles Percentage [%]	0.00	2.00	3.00	0.00	0.00	0.00	
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	
In-Process Volume [veh/h]	0	0	0	0	0	0	
Site-Generated Trips [veh/h]	160	0	0	18	97	868	
Diverted Trips [veh/h]	0	0	0	0	0	0	
Pass-by Trips [veh/h]	0	0	0	0	0	0	
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	
Other Volume [veh/h]	0	0	0	0	0	0	
Right-Turn on Red Volume [veh/h]	0	0	0	5	0	261	
Total Hourly Volume [veh/h]	161	378	313	13	98	610	
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Total 15-Minute Volume [veh/h]	41	96	80	3	25	156	
Total Analysis Volume [veh/h]	164	386	319	13	100	622	
Presence of On-Street Parking	No	No	No	No	No	No	
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	
v_do, Outbound Pedestrian Volume crossing	g (	)	0		0		
v_di, Inbound Pedestrian Volume crossing r	n (	)	(	)	(	)	
v_co, Outbound Pedestrian Volume crossing	g (	)	(	)	(	)	
v_ci, Inbound Pedestrian Volume crossing n	ni (	)	(	)	(	)	
v_ab, Corner Pedestrian Volume [ped/h]	(	)	(	)	(	)	
Bicycle Volume [bicycles/h]	(	)	(	)	(	)	

# 2050 PM Peak Build With Southbound Right-Turn Bay

## Intersection Settings

•	
Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

## Phasing & Timing

Control Type	ProtectedPermissi	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	Lead	-
Minimum Green [s]	5	5	5	0	5	0
Maximum Green [s]	30	30	30	0	30	0
Amber [s]	3.0	3.0	3.0	0.0	3.0	0.0
All red [s]	1.0	1.0	1.0	0.0	1.0	0.0
Split [s]	9	19	10	0	51	0
Vehicle Extension [s]	3.0	3.0	3.0	0.0	3.0	0.0
Walk [s]	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	0	0
Rest In Walk		No	No		No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall	No	No	No		No	
Maximum Recall	No	No	No		No	
Pedestrian Recall	No	No	No		No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

#### **Exclusive Pedestrian Phase**

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Version 5.00-00

Generated with PTV VISTRO Version 5.00-00

# 2050 PM Peak Build

## With Southbound Right-Turn Bay

## Lane Group Calculations

Lane Group	L	С	С	R	L	R
C, Cycle Length [s]	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	30	30	21	21	32	32
g / C, Green / Cycle	0.42	0.42	0.30	0.30	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.15	0.23	0.19	0.01	0.06	0.43
s, saturation flow rate [veh/h]	1125	1683	1669	1454	1629	1454
c, Capacity [veh/h]	450	713	493	429	752	671
d1, Uniform Delay [s]	14.32	15.08	21.49	17.54	10.80	17.71
k, delay calibration	0.50	0.50	0.50	0.50	0.11	0.20
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.28	2.94	6.44	0.13	0.08	10.10
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00
Lane Group Results						
X, volume / capacity	0.36	0.54	0.65	0.03	0.13	0.93
d, Delay for Lane Group [s/veh]	16.60	18.01	27.93	17.67	10.88	27.81
Lane Group LOS	В	В	С	В	В	С
Critical Lane Group	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	1.59	4.18	4.70	0.14	0.82	10.13
50th-Percentile Queue Length [ft]	39.83	104.38	117.43	3.56	20.62	253.32
95th-Percentile Queue Length [veh]	2.87	7.52	8.25	0.26	1.48	15.35
95th-Percentile Queue Length [ft]	71.70	187.89	206.28	6.41	37.12	383.83

Version 5.00-00

# 2050 PM Peak Build With Southbound Right-Turn Bay

## Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	16.60	18.01	27.93	17.67	10.88	27.81				
Movement LOS	В	В	С	В	В	С				
d_A, Approach Delay [s/veh]	17	.59	27	.53	25	.47				
Approach LOS	E	3		С	С					
d_I, Intersection Delay [s/veh]		23.19								
Intersection LOS		С								
Intersection V/C		0.687								
Other Modes										
g_Walk,mi, Effective Walk Time [s]	47	7.0	1	15.0 6.0		.0				
M_corner, Corner Circulation Area [ft²/ped]	0.	00	0	.00	0.00					
M_CW, Crosswalk Circulation Area [ft²/ped	] 0.	00	0	.00	0.0	00				
d_p, Pedestrian Delay [s]	3.	78	21	.61	29.	.26				
I_p,int, Pedestrian LOS Score for Intersection	n 2.8	395	2.	560	2.7	/58				
Crosswalk LOS	(	C		В	(	C				

g_Walk,mi, Effective Walk Time [s]	47.0	15.0	6.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	3.78	21.61	29.26
I_p,int, Pedestrian LOS Score for Intersection	n 2.895	2.560	2.758
Crosswalk LOS	С	В	С
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h	] 0	0	0
d_b, Bicycle Delay [s]	35.00	35.00	35.00
I_b,int, Bicycle LOS Score for Intersection	5.040	4.688	4.132
Bicycle LOS	F	E	D

# Sequence

•		-	_												
Ring 1 -	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2 5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4 -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 2 19s		SG: 3 51s	
SG: 5 9s	SG: 6 10s		