

Evergreen Drive/Douglas Fir Drive Traffic Impact Study

Baxter, MN

BAXTE 176854 | September 20, 2026

Baxter City Council Acceptance Date: _____



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Evergreen Drive/Douglas Fir Drive Traffic Impact Study

Prepared for the City of Baxter

1 Introduction

This traffic impact study report provides the findings related to the analysis of the proposed gas station with a convenience store and liquor store in the southeast quadrant of the intersection of Trunk Highway (TH) 371 and College Road in Baxter, MN.

This study will serve to determine the impacts of the proposed gas station/liquor store as well as update the findings of the previous *CSAH 48 (Highland Scenic Road) Corridor Study*, completed in December 2022 for the City of Baxter, which analyzed the long-term needs of County State Aid Highway 48 (CSAH 48) between Isle Drive and College Road as development in the area continues. The *CSAH 48 (Highland Scenic Road) Corridor Study* also analyzed the long-term needs along College Road between TH 371 and CSAH 48, which this study will update based on the new proposed gas station/liquor store, which was not included in the previous study.

The primary focus of this traffic impact study is to determine the impact of the proposed 21 fueling stations (20 for passenger vehicles, 1 for heavy trucks) gas station with a 8,100 square foot (SF) convenience store, a 2,900 SF liquor store, a car wash, and parking for 5 semi-trucks on the surrounding roadway network, including College Road, Evergreen Drive, Douglas Fir Drive, TH 371, and CSAH 48. This project will also examines the proposed accesses to the gas station/liquor store along College Road and Douglas Fir Drive to ensure adequate access spacing. Construction of the proposed gas station with convenience store and liquor store will begin in 2027 and is currently planned to be open for business in fall 2027.

In 2027, prior to completion of the gas station/liquor store, the City of Baxter is planning to remove a portion of Evergreen Drive south of College Road, creating a dead end just north of the existing businesses, approximately 500 feet north of Hastings Road. As part of the proposed gas station/liquor store development, the existing right-in/right-out access for Evergreen Drive at College Road will become a private driveway access, providing direct access to the gas station/liquor store development and Service Master.

Traffic operations analyses were completed for the existing 2022 conditions as well as future 2027 No Build, 2027 Build, 2032 Build, and 2047 Build conditions. The 2027 analysis represents the year of opening, and the 2032 analysis represents 5 years after opening. The 2047 Build conditions serve to update the CSAH 48 (Highland Scenic Road) Corridor Study and determine the long-term needs at the study intersections as development in the area continues beyond the proposed gas station/liquor store. The following intersections were included in the analysis to ensure adequate traffic operations with the increased traffic demands from the proposed gas station.

Existing Intersections

- **TH 371 and College Road** – traffic signal.
- **College Road and Evergreen Drive (future gas station/liquor store and Service Master access)** – right-in/right-out only; will be converted to a private access driveway for the proposed gas station/liquor store site and Service Master with the 2027 Evergreen Drive dead end project.
- **College Road and Douglas Fir Drive** – minor street stop.

Planned Future Intersections

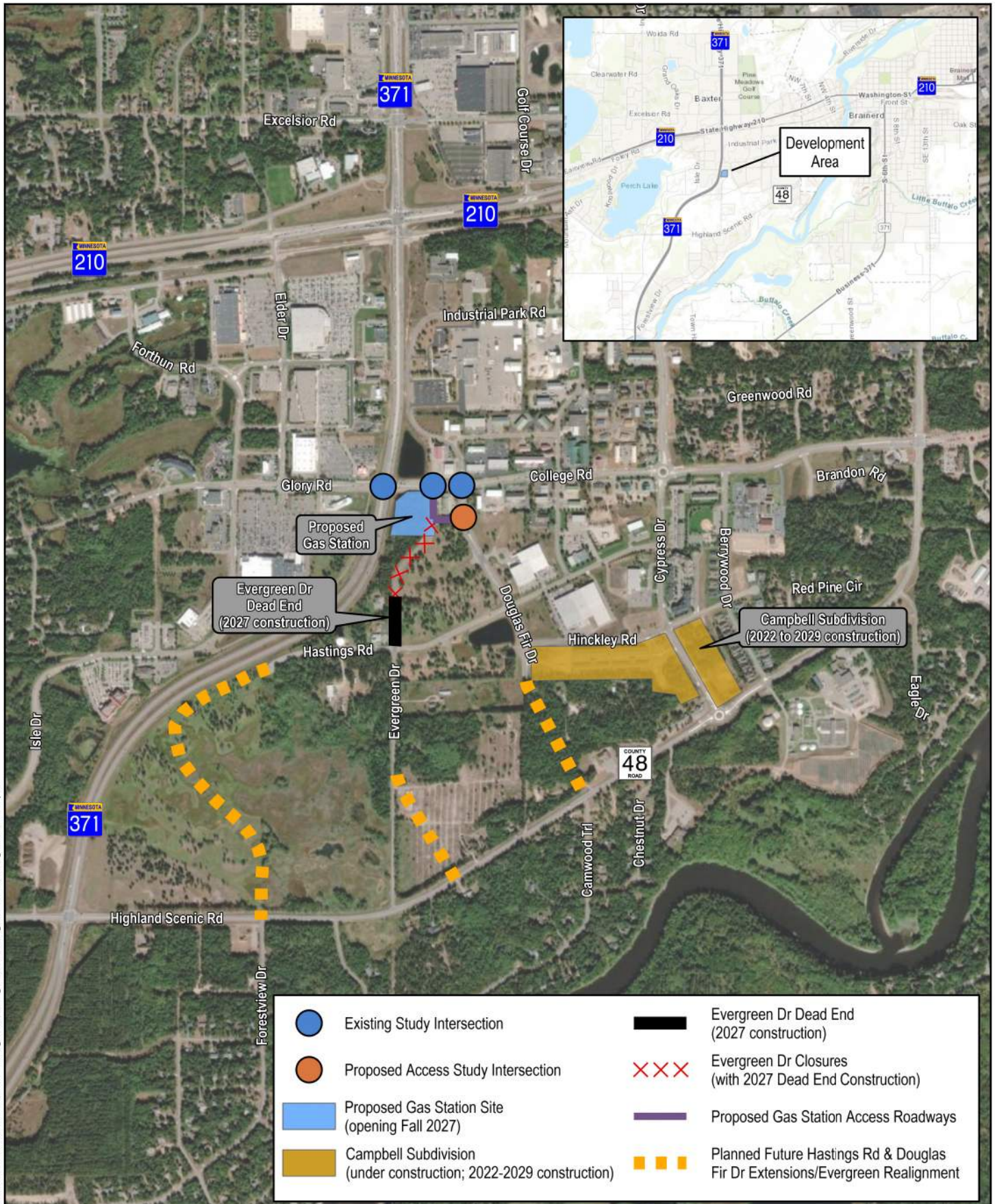
- **Douglas Fir Drive and Gas Station/Liquor Store Access** – proposed minor street stop, full access for the gas station/liquor store site and Service Master on Douglas Fir Drive; approximately 320 feet south of College Road. Whether this access can remain as full access was analyzed as part of this study.

In addition to the Evergreen Drive dead end project, there are several recent and planned improvements in the general area surrounded by TH 371, College Road, and CSAH 48, which could impact traffic patterns in the area. These improvements are summarized below:

- **Campbell Subdivision Development – Under construction; completion in 2029**
 - 289 apartment units being constructed along the Cypress Drive extension between Hinckley Road and CSAH 48.
 - The site is expected to generate approximately 1,690 trips per day, with approximately 15% of trips expected to use Douglas Fir Drive to access the site based on the traffic impact analysis for the site, which was completed in 2021.
- **Future Evergreen Drive Realignment at CSAH 48 – No current timeline for completion; will likely occur as development south of Hastings Road occurs.**
 - Beyond the planned 2027 project, Evergreen Drive will be further realigned south of Hastings Road to connect to CSAH 48 at closer to a 90-degree angle.
 - The realignment will improve sight lines and safety at the intersection and improve access spacing along CSAH 48.
- **Douglas Fir Drive and Hastings Road Extensions - No current timeline for completion; will likely occur with development of the area.**
 - As development in the area continues, both Douglas Fir Drive and Hastings Road are expected to be extended to connect to CSAH 48.
 - The extensions will provide access to new developments as well as run parallel to TH 371 to provide more route choices to vehicles accessing the area.

Figure 1 shows the project area, study intersections, and the recent/planned improvements in the area.

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Project: BAXTE 176854
Print Date: 5/26/2026

Map by: jdanibas
Projection: Crow Wing Co. Coords.
Source: ESRI

PROJECT LOCATION

Evergreen Dr & Douglas Fir Dr Traffic Impact Study
Baxter, MN

Figure
1

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2 Existing Conditions

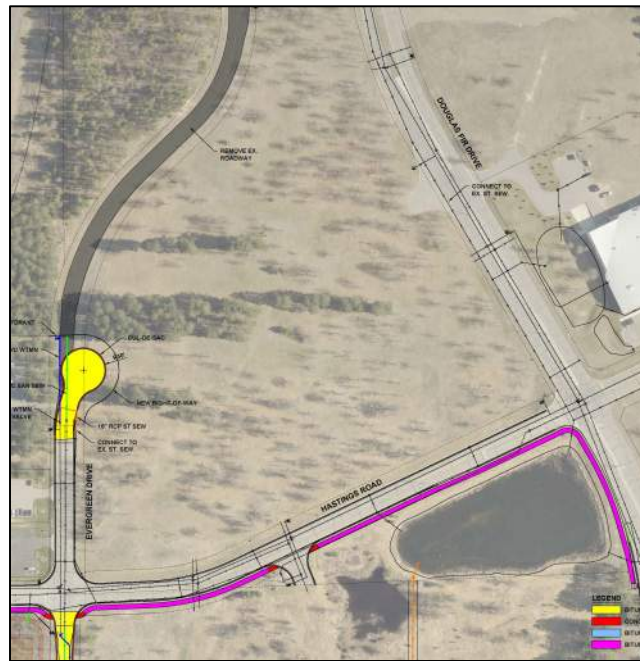
College Road is an east-west minor arterial roadway that connects from TH 371 to the eastern Baxter City limits, where it becomes W College Drive in Brainerd. College Road serves as a primary connection between Baxter and Brainerd south of TH 210, it is considered a parallel reliever for TH 210. College Road provides access to residential, industrial, office, and commercial land uses within the project area as well as Central Lakes College and Brainerd High School east of the project area. In the area of the proposed gas station/liquor store, College Road is a 4-lane divided roadway between TH 371 and approximately 250 feet east of Douglas Fir Drive, where it becomes a 4-lane undivided roadway with a continuous two-way left turn lane (TWLTL); also known as a 5-lane roadway. The posted speed limit on College Road is 40 mph.

Douglas Fir Drive is a north-south local roadway that connects from College Road to just south of Hinckley Road. It is planned that Douglas Fir Drive will be connected to CSAH 48 in the future as development in the area continues. Douglas Fir Drive currently provides access to primarily industrial land uses but will also serve as an access route to the Campbell Subdivision Development. Douglas Fir Drive is a 4-lane divided roadway with left turn lanes at major access points. There is currently no posted speed limit on Douglas Fir Drive, so a statutory speed limit of 30 mph was assumed. At College Road, Douglas Fir Drive aligns with Industrial Park Road to the north, which provides access to more industrial and commercial development.

Evergreen Drive is a north-south local roadway that currently connects from College Road to CSAH 48. Evergreen Drive currently connects to College Road as a right-in/right-out access. However, in 2027, Evergreen Drive will be disconnected from College Road and the roadway will dead end approximately 500 feet north of Hastings Road as shown in **Figure 2**.

TH 371 is a north-south principal arterial roadway, which extends from US Highway 10 in Little Falls, MN to US Highway 2 in Cass Lake, MN. TH 371 serves as a major regional corridor in this portion of the State and serves as the primary north-south connection for trips within the City of Baxter. TH 371 provides access to TH 210, which is the major east-west corridor in the region, as well as a significant amount of commercial development in the area. In the study area, TH 371 is a 4-lane divided roadway with dedicated left and right turn lanes at each intersection. The posted speed limit on TH 371 is 65 mph from approximately halfway between CSAH 48 and College Road to the south and 50 mph to the north.

Figure 2 – Evergreen Drive Realignment



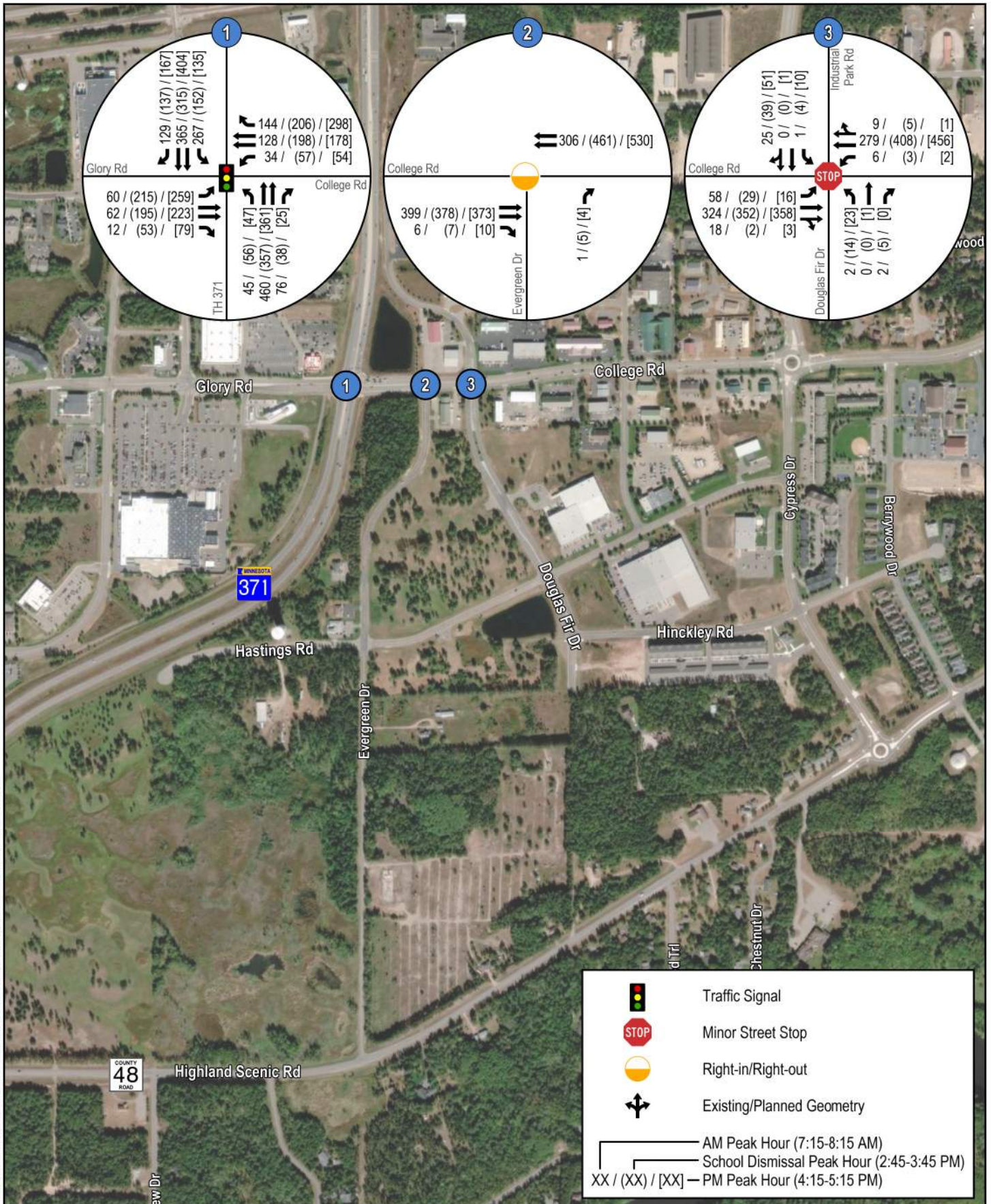
2.1 Vehicle Volumes

24-hour turning movement counts were collected at the intersections of TH 371 and College Road and College Road and Douglas Fir Drive as part of the *CSAH 48 (Highland Scenic Road) Corridor Study* in February 2022. No traffic counts were conducted at existing intersection of College Road and Evergreen Drive, however, traffic volumes on Evergreen Drive were estimated based on the counts at the adjacent intersections and are expected to be relatively low due to the limited existing development. Based on the traffic counts, the AM peak hour was determined to be 7:15 to 8:15 AM and the PM peak hour was determined to be 4:15 to 5:15 PM.

In addition to the traditional AM and PM peak hours, the school dismissal peak hour (2:45 to 3:45 PM) was analyzed due to the nearby Central Lakes College and Brainerd High School, Forestview Middle School, and Baxter Elementary School. The counts collected as part of the *CSAH 48 (Highland Scenic Road) Corridor Study* showed that traffic volumes on CSAH 48 were actually higher on CSAH 48 during the school dismissal peak hour than during the PM peak hour. However, the traffic volumes on College Road show that the PM peak hour has the highest volumes.

As part of the *CSAH 48 (Highland Scenic Road) Corridor Study*, the February 2022 turning movement counts were compared to recent traffic counts in the area and the historical Average Annual Daily Traffic (AADT) information for the study roadways were determined to be slightly lower than typical volumes. Therefore, the February 2022 traffic volumes were adjusted by approximately 15% to account for seasonal fluctuations in traffic demands. The raw February 2022 traffic counts can be found in **Appendix A**.

Figure 3 shows the 2022 existing traffic volumes during the AM, school dismissal, and PM peak hours as well as the existing roadway geometry and traffic control at each study intersection.



3 Future Conditions

As part of the traffic impact analysis for the proposed gas station with convenience store and liquor store, 2027 No Build, 2027 Build, 2032 Build, and 2047 Build volumes were estimated. The 2027 conditions represent the year of opening and the 2032 represents 5 years after opening which is standard practice for a traffic impact study. The 2047 Build conditions serve to update the CSAH 48 (Highland Scenic Road) Corridor Study and determine the long-term needs at the study intersections as development in the area continues beyond the proposed gas station/liquor store.

3.1 Background Traffic Growth

For consistency, this study utilized the same background growth rates as the previous *CSAH 48 (Highland Scenic Road) Corridor Study*, which forecast background traffic growth based on historical AADTs from MnDOT's Traffic Mapping Application. Based on the historical traffic volumes, TH 371 has been growing at a rate of approximately 1.5% per year and the majority of the other area roadways have had minimal growth. Therefore, the existing TH 371 through volumes were grown at a rate of 1.5% per year and the remaining study roadways were grown at a minimal 0.5% per year.

3.2 Recent and Planned Improvements/Development

There are several recent or planned improvements/developments in the study area that are expected to be in place when the proposed gas station/liquor store opens in 2027. These improvements and developments are expected to increase traffic volumes or change area traffic patterns, which need to be accounted for in all future (2027, 2032, and 2047) analysis scenarios for this study.

Figure 6 shows the 2027 No Build Volumes during the AM, school dismissal, and PM peak hours, which includes background growth and the increased traffic volumes and changes in area traffic patterns from the Evergreen Drive dead end and Campbell Subdivision Development.

3.2.1 Evergreen Drive Dead End

As was discussed previously, Evergreen Drive will be disconnected from College Road in 2027, with a dead end approximately 500 feet north of Hastings Road. While the existing traffic volumes on Evergreen Drive are relatively low due to the limited development in the area, those trips were routed along Hastings Road and Douglas Fir Drive in all future scenarios for this study.

Further realignment of Evergreen Drive, south of Hastings Road, to connect to CSAH 48 further east and at closer to a 90-degree angle is planned. There is currently no timeline for completion of that realignment, but it will likely occur as development along Evergreen Drive south of Hastings Road occurs.

3.2.2 Campbell Subdivision Development

A traffic impact analysis was completed in December 2021 for the 289-unit apartment Campbell Subdivision Development, which began construction in 2022 with a planned completion date in 2029. Based on that study, the 289-unit apartment complex is expected to generate approximately 1,690 daily trips with 120 trips during the AM peak hour (30 enter/90 exit) and 145 trips during the PM peak hour (90 enter/55 exit). Based on the traffic impact study, approximately

3.3 Trip Generation and Distribution

Daily trip generation estimates were also completed for the gas station/liquor store site and distributed over 24 hours using ITE's daily trip distribution information for gas stations with convenience stores for use in future traffic control warrant analysis for the study intersections. The time-of-day estimates were also used to estimate the school dismissal peak hour trips generated by the gas station.

[illegible]

With gas station developments, a majority of the trips to/from the site are not “primary” trips to/from the area as most gas station trips are stops of convenience as part of a longer trip as opposed to being the primary purpose of the trip. The ITE Trip Generation Handbook, 3rd Edition suggests that only approximately 20% of gas station trips are primary trips where the sole purpose is to travel to/from the gas station. The remaining 80% of trips are either pass-by (60%) or diverted trips (20%). Pass-by and diverted trips are not new trips to the study area, rather rerouted existing trips; therefore, only approximately 20% of the generated trips for the proposed gas station with liquor store are new trips in the area.

Pass-by trips are trips that are already traveling past the gas station that stop at the gas station on the way to their destination. For the proposed site, the pass-by trips would be trips traveling past on TH 371 or College Road on the way to other destinations. Diverted trips are trips that are traveling in the area that slightly divert the trip to stop at the gas station before continuing to their destination. For the proposed site, the diverted trips would be trips traveling on either CSAH 48, Cypress Drive, or other area roadways, which would divert on either College Road or Evergreen Drive to stop at the gas station before continuing to their destination. **Figure 5** illustrates the concept of primary, pass-by, and diverted trips.

Figure 5 – Primary, Pass-by, and Diverted Trips

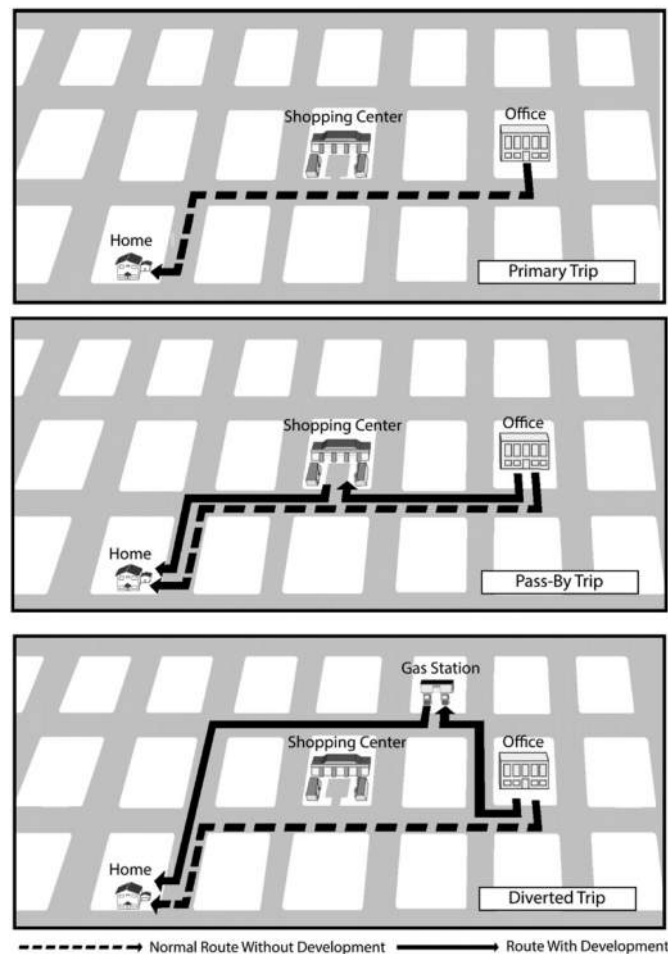


Table 1 summarizes the trip generation estimates for the proposed gas station/liquor store site for the AM peak hour, school dismissal peak hour, PM peak hour, and daily including the total trips and a breakdown of primary, pass-by, and diverted trips.

Table 1 – Site Trip Generation

Trip Type	Daily Trips	AM Peak Hour			School Dismissal Peak Hour ³			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Total Trips¹	3,630	139	139	278	115	115	230	150	150	300
Primary Trips (20%) ²	726	28	28	56	23	23	46	30	30	60
Pass-by Trips (60%) ²	2,178	83	83	166	69	69	138	90	90	180
Diverted Trips (20%) ²	726	28	28	56	23	23	46	30	30	60
¹ Trip generation estimates based on the trip generation rates provided by the developer. ² Primary, pass-by, and diverted trip estimates based on the ITE Trip Generation Handbook, 3 rd Edition. ³ School dismissal peak hour trips estimated based on ITE's daily trip distribution information for gas stations with convenience stores										

For the primary trips, which are new to the area, the same trip distribution as the 2022 *CSAH 48 (Highland Scenic Road) Corridor Study* was used, which is listed below:

- To/from north on TH 371 – **35%**
- To/from south on TH 371 – **15%**
- To/from west on CSAH 48 – **10%**
- To/from east on CSAH 48 – **5%**
- To/from south on Mapleton Road – **5%**
- To/from west on Glory Road – **10%**
- To/from north on Cypress Drive – **10%**
- To/from east on College Road – **15%**

For pass-by trips, the 2022 existing volumes on TH 371 and College Road were used to estimate the portion of pass-by trips for each direction on each roadway. Due to the convenience of making a northbound right turn off of TH 371, it was assumed that more of the TH 371 pass-by trips would be from the northbound direction. For pass-by trips, no new trips were added into the study area, just rerouting of existing trips already in the roadway network.

For diverted trips, the 2022 existing volumes on CSAH 48 and Cypress Drive were used to estimate the proportion of diverted trips on each roadway. For diverted trips, no new trips were added into the study area, just rerouting of existing trips already in the roadway network.

Figure 7 shows the 2027 Build traffic volumes during the AM, school dismissal, and PM peak hours, which include the trips generated/rerouted as part of the proposed gas station/liquor store development.

3.4 2047 Forecast Volumes

As part of the 2022 *CSAH 48 (Highland Scenic Road) Corridor Study*, 2045 traffic forecasts were developed based on the future land use plan from the City of Baxter's 2015 Comprehensive Plan. The areas near TH 371, College Road, and CSAH 48 are expected to have a significant amount of development/redevelopment over the next 20+ years. The previous study did not include the proposed gas station/liquor store development in its current location; therefore, the 2047 forecasts used in this project utilize the 2045 forecasts from the previous study updated to include the gas station/liquor store in order to analyze the long-term needs in the area.

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition was used to estimate the trips generated by the surrounding future developments in the area for the 2047 future conditions. Trip generation estimates were completed for the AM peak hour, school dismissal peak hour, and PM peak hour. Daily trip generation estimates were also completed and distributed over 24 hours using ITE's daily trip distribution information for each land use type for use in future traffic control warrant analysis at the study intersections.

The estimated trips generated by the development were distributed to the project area roadway network based on existing traffic demands and potential origins/destinations for future trips both regionally and within the Baxter/Brainerd area, which was also used to distribute the primary gas station/liquor store trips.

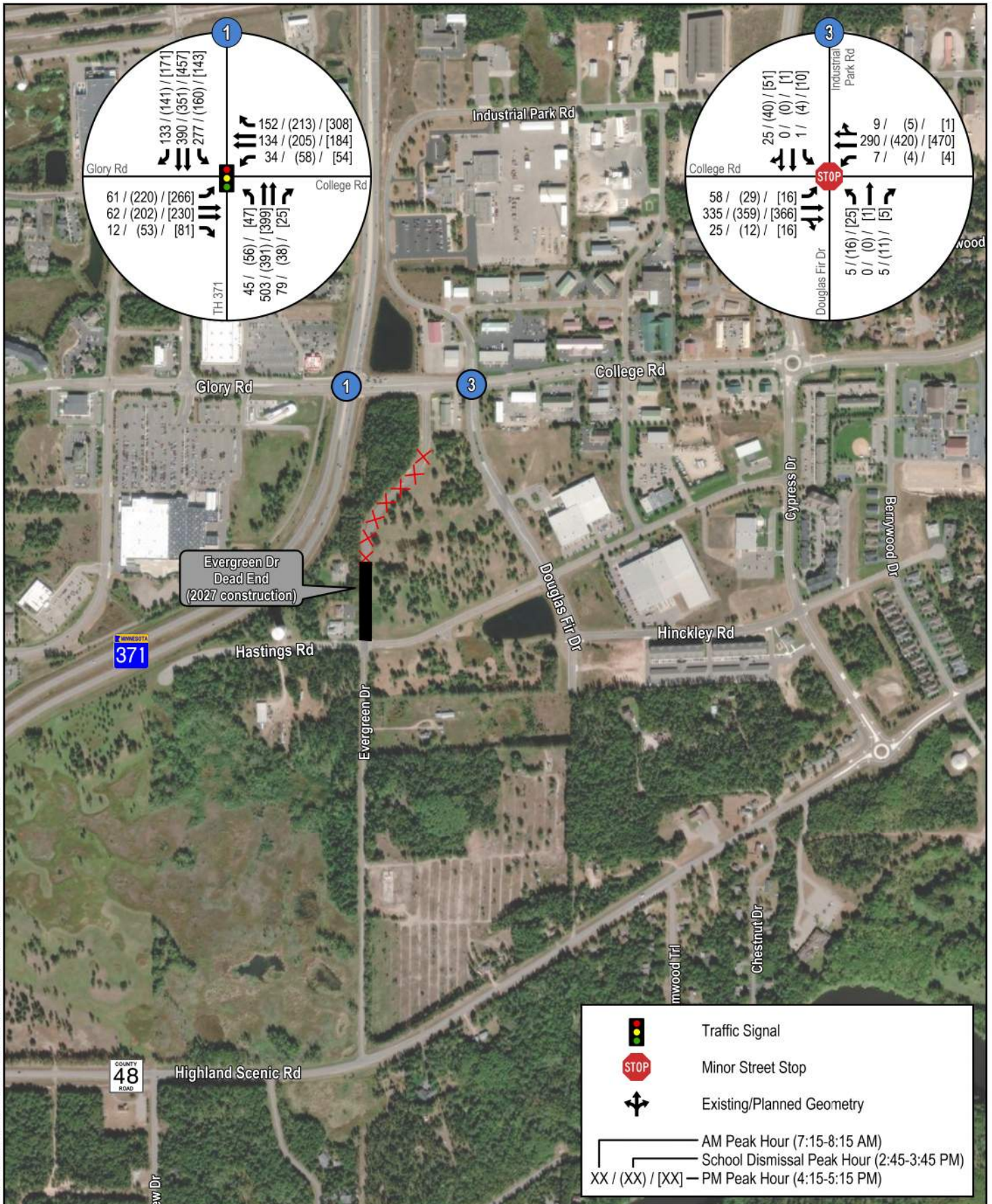
In total, the following total development quantity was assumed in the project area for the 2047 future traffic demands, in addition to the proposed gas station/liquor store site.

- | | |
|---|---------------------------|
| • 1,858 residential units – | 10,440 daily trips |
| • 111,000 square feet commercial development – | 4,070 daily trips |
| • 614,500 square feet office/industrial development – | 4,370 daily trips |
| • Proposed gas station with liquor store – | 3,630 daily trips |
| • Total Trips – | 22,510 daily trips |

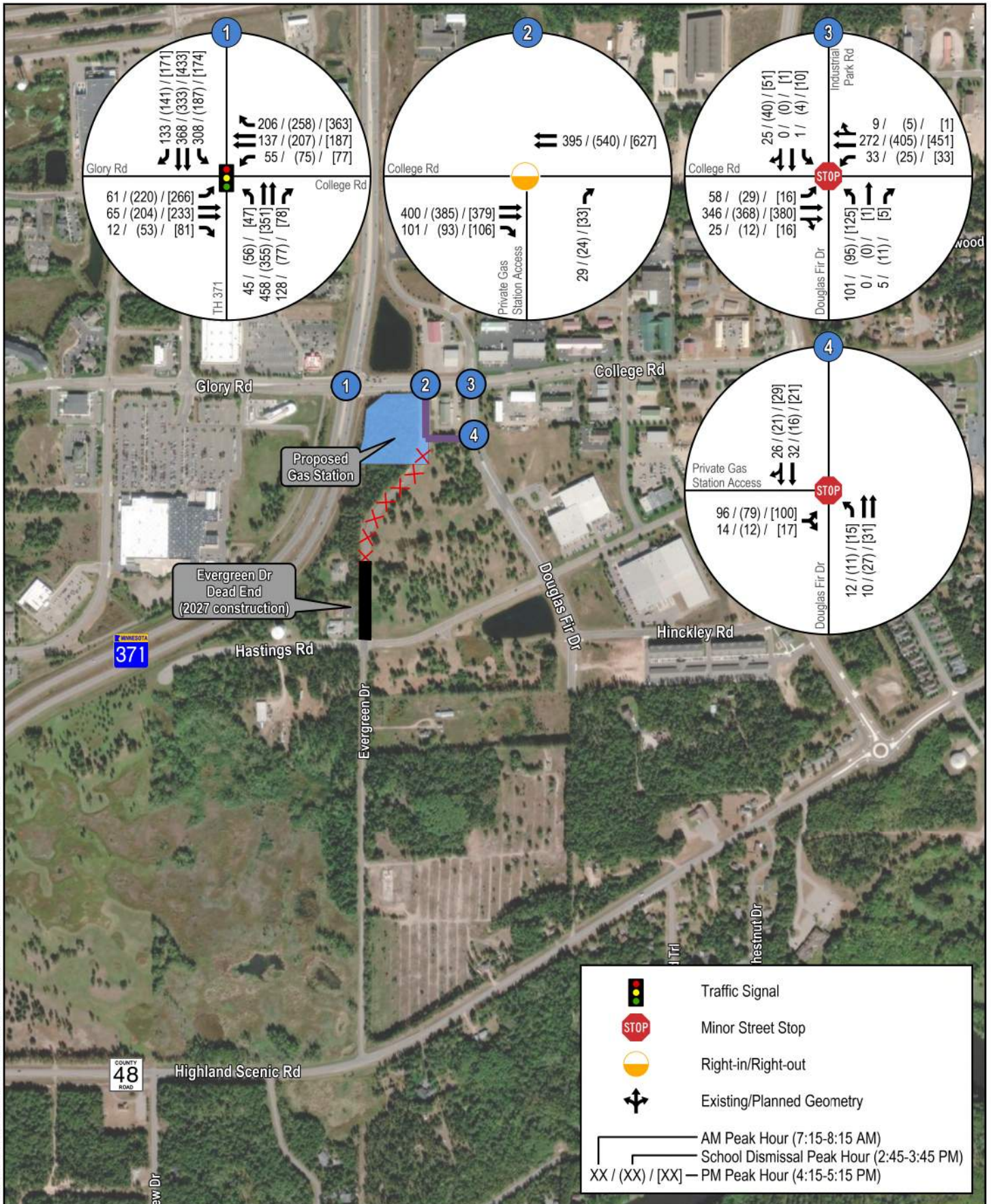
To estimate 2032 Build traffic volumes, linear growth between 2027 and 2047 traffic forecasts were assumed. This results in minimal development trips under 2032 Build conditions along with the background growth and gas station/liquor store trips.

Figure 8 shows the 2032 Build traffic volumes and **Figure 9** shows the 2047 Build traffic volumes during the AM, school dismissal, and PM peak hours.

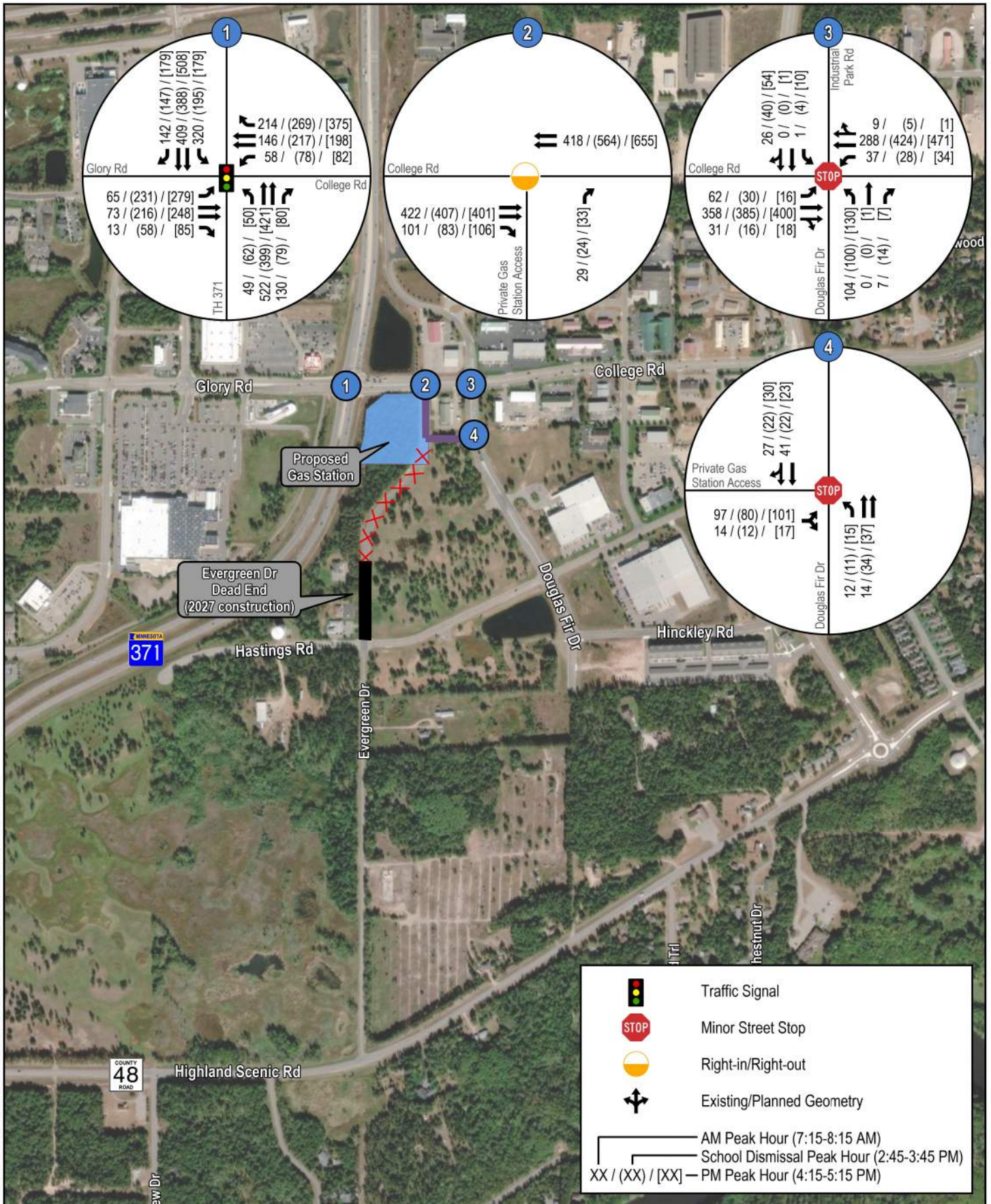
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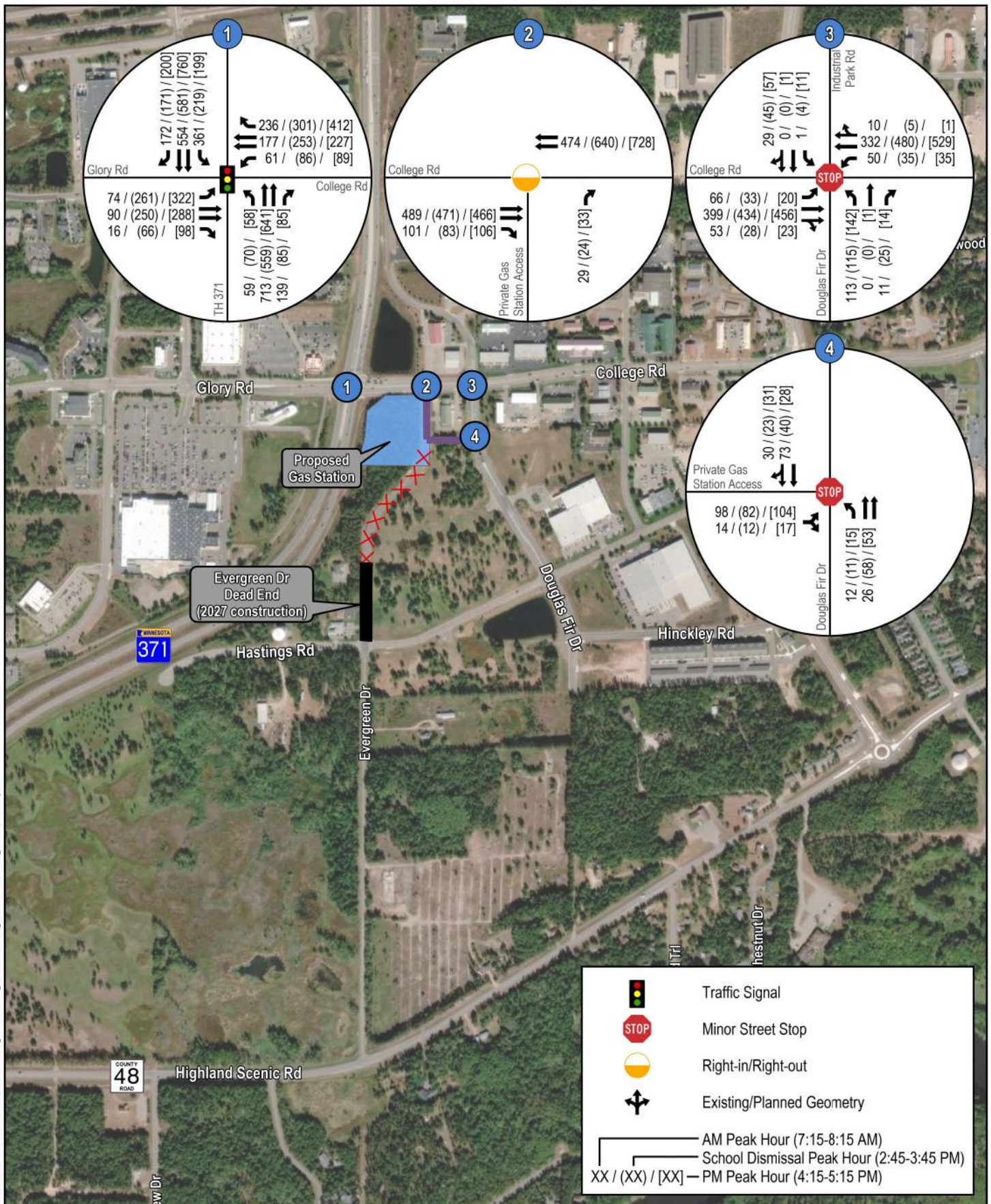


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		Project: BAXTE 176854 Print Date: 6/5/2026	2047 BUILD TRAFFIC VOLUMES Evergreen Dr & Douglas Fir Dr Traffic Impact Study Baxter, MN	Figure 9
		Map by: jdanibas Projection: Crow Wing Co. Coords. Source: ESRI		

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4 Intersection Warrant Analysis

The Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) provides guidance on when it may be appropriate to use all-way stop or signal control at an intersection. This guidance is provided in the form of “warrants”, or criteria, and engineering analysis of the intersection’s design factors to determine when all-way stop or signal control may be justified. All-way stop or signal control should not be installed at an intersection unless a MnMUTCD warrant is met. Meeting warrant criteria at an intersection does not in itself require the installation of a particular control type. The specific control type also requires an engineering analysis of the intersection’s design for it to be justified. Roundabouts are warranted if traffic volumes meet the criteria for either all-way stop or traffic signal control, or if there is a need to address an existing safety issue. The MnDOT ICE manual provides guidance on the approach and inputs for evaluating warrants.

Warrant analysis was completed for the intersection of College Road and Douglas Fir Drive under existing, 2027 No Build, 2027 Build and 2047 future conditions. The signal at the intersection of TH 371 and College Road is expected to remain in place

4.1 Requirements for Installation of an All-way Stop

For all-way stop control installation, the study reviewed the minimum volume criteria outlined in the MnMUTCD (Chapter 2B). This criteria states that for any eight hours of the day, the combined major approach volumes and combined minor approach volumes should be at or greater than the volume thresholds. An engineering study that considers factors, including warrants, should be performed to determine the “best” type of control at an intersection.

4.2 Requirements for Installation of a Traffic Signal

For traffic signal installation, many agencies typically require volume thresholds for Warrant 1 to be satisfied, which requires 8-hours of combined major approach volumes and the highest minor street approach volume to meet MnMUTCD thresholds (Chapter 4C). These thresholds vary with the number of approach lanes on the major and minor streets. However, other warrants may be used as indicators of a need to consider traffic control change.

In this analysis, Warrant 2 (4-hour volumes) and Warrant 3 (peak hour volumes) were also reviewed for the study intersection. An engineering study that considers factors, including warrants, should be performed to determine the “best” type of control.

4.3 Warrant Analysis Assumptions

The MnMUTCD and MnDOT ICE Manual provide guidance and options for performing Traffic Control Warrant Analysis. The following section will discuss the guidance, options, and assumptions used in the traffic control warrant analysis for this project.

The MnMUTCD and MnDOT ICE Manual guidelines suggest that for the purpose of warrant analysis, 100% of right turning traffic from the minor leg should be removed because right turning vehicles are typically able to enter the traffic stream with minimal delay or conflict; the right turning traffic would not require a traffic signal to reduce delay or improve safety. In certain circumstances, depending on the minor approach lane geometry, the ICE Manual has guidance on when to allow for the inclusion of either 100% or 50% of the minor street right turning traffic in the warrant analysis; Table 3 of the 2025 ICE Manual provides example lane geometrics, and the corresponding minor right turn percentage to include.

The MnMUTCD and MnDOT ICE Manual provide guidance on the number of lanes for each approach, two different lane options are provided including one lane and two (or more) lane approaches; including additional approach lanes above 2 does not change volume criteria. Typically, through lanes and shared through lanes are considered, but engineering judgment can be used to include separate turn lanes if the turning volume is sufficient. Engineering judgment should be used if the minor street approaches include left turn lanes and shared through lanes. On the minor street approaches, if the right turning volume is removed, a right turn lane should not be considered. Table 4 of the 2025 ICE Manual includes example lane geometrics and guidance on when to potentially not include all available lanes.

Based on the guidance, the number of lanes on the minor approaches, and percentage of minor right turn volumes, is noted in the warrant table and described below; it should be noted that College Road is a 4-lane divided roadway, and each major approach has 2-lanes and includes all approach volumes for the major approaches.

- Includes 0% of right turn volumes on the minor approaches because there are dedicated right turn lanes provided; the southbound approach has a shared through/right turn lane, a through lane, and a dedicated left turn lane, however, the low through volume makes the shared lane operate effectively as a dedicated right turn lane.
- The minor approaches include 1 lane for both approaches; the northbound and southbound through lanes and volumes were not included in the analysis as there are less than 10 through vehicles per day.

The MnMUTCD and MnDOT ICE Manual guidelines suggest that the warrant thresholds may be reduced based on the roadway speeds and population of the city the intersection is within. If either major approach to the intersection has a posted speed, or 85th percentile speed, that exceeds 40 mph, then a reduction to 70% threshold volumes is allowed in both the all-way stop warrant and traffic signal warrant. If the population of the city is less than 10,000 people, a reduction to 70% threshold volumes is allowed in the traffic signal warrant, but not in the all-way stop warrant.

Based on the guidance, the warrant analysis included the reduction based on speed because the speed limit on College Road is 40 mph and it can be reasonably assumed that the 85th percentile speed is at least 41 mph. The population of Baxter is currently less than 10,000 people, but will surpass 10,000 by 2030.

4.4 Warrant Analysis Results

Based on the existing and 2027 No Build traffic volumes, the intersection of College Road and Douglas Fir Drive does not meet the volume thresholds for either the all-way stop or any traffic signal warrant during any hour of the day.

With the proposed gas station/liquor store opening in 2027, the intersection is expected to meet Signal Warrant 1 (8 hour), indicating a traffic control change may be necessary at the intersection to serve the proposed gas station/liquor store trips. Under 2047 conditions, the intersection of College Road and Douglas Fir Drive meets Signal Warrants 1 (8 hour), 2 (4 hour), and 3 (peak hour). It is worth noting that this intersection has been planned future traffic signal based on the City of Baxter's 2015 Comprehensive Plan and 2000 Long Range Transportation Plan.

Table 2 provides the all-way stop and traffic signal warrant summary for the 2022 existing, 2027 No Build, 2027 Build, and 2047 Build conditions. Complete all-way stop and traffic signal analysis can be found in **Appendix B**.

Table 2 – Warrant Analysis Results

Scenario	Intersection	All-way Stop Warrant	Traffic Signal Warrants		
			Warrant 1 (8 Hour)	Warrant 2 (4 hour)	Warrant 3 (Peak Hour)
2022 Existing	College Rd and Douglas Fir Dr	Not Met	Not Met	Not Met	Not Met
		0 of 8 hours	0 of 8 hours	0 of 4 hours	0 of 1 hours
2027 No Build	College Rd and Douglas Fir Dr	Not Met	Not Met	Not Met	Not Met
		0 of 8 hours	0 of 8 hours	0 of 4 hours	0 of 1 hours
2027 Build	College Rd and Douglas Fir Dr	Not Met	MET	Not Met	Not Met
		3 of 8 hours	8 of 8 hours	3 of 4 hours	0 of 1 hours
2047 Build	College Rd and Douglas Fir Dr	Not Met	MET	MET	MET
		7 of 8 hours	12 of 8 hours	9 of 4 hours	2 of 1 hours

5 Traffic Operations Analysis

Traffic operations analysis was conducted to determine the level of service (LOS), delay, and queueing information for the AM, school dismissal, and PM peak hour conditions.

LOS is a qualitative rating system used to describe the efficiency of traffic operations at an intersection. Six LOS are defined, designated by letters A through F. LOS A represents the best operating conditions (no congestion), and LOS F represents the worst operating conditions (severe congestion). For the study intersections, it was assumed that a LOS D or better, for all approaches and the overall intersection, represent acceptable operating conditions. The minor approaches may operate at LOS E and some movements may operate at LOS F at the TH 371 signal due to the long cycle length MnDOT uses to serve the regional demands on TH 371.

LOS for intersections is determined by the average control delay per vehicle. The range of control delay for each LOS is different for signalized and unsignalized intersections. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will experience greater delays than an unsignalized intersection. Driver tolerance for delay is greater at a signal than at a stop sign; therefore, the LOS thresholds for each LOS category are lower for unsignalized intersections than for signalized intersections. **Table 3** shows the LOS thresholds for signalized and unsignalized intersections.

All traffic operations analysis for signalized and stop controlled intersections were performed using the Synchro/SimTraffic (Version 11) software package. The results reported in this analysis are an average of 10 runs in SimTraffic 11. All roundabout operations analysis was performed using the HCS 2025 software. The HCS software utilizes the equations and calculations from the Highway Capacity Manual. In addition, a simulation of the roundabout alternative was analyzed in Synchro/SimTraffic to analyze the interaction with the TH 371 signal. All relevant traffic operations results tables can be found in **Appendix C**.

Table 3 – Level of Service Thresholds

Level of Service	Average Vehicle Delay (sec/veh)	
	Signalized Intersection	Unsignalized (Stop or Roundabout) Intersection
A	0 to 10	0 to 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

The following scenarios were analyzed as part of this study:

- **2022 Existing Conditions**
 - Existing traffic volumes, intersection geometry, and traffic control.
- **2027 No Build Conditions**
 - 2027 No Build traffic volumes, including background growth and the increased traffic volumes and changes in area traffic patterns from the Evergreen Drive dead end and Campbell Subdivision Development.
- **2027 Build Conditions**
 - 2027 Build traffic volumes; No Build traffic volumes with gas station/liquor store trips/rerouting added.
- **2032 Build Conditions**
 - 2032 Build traffic volumes; include 2027 Build volumes with additional growth.
- **2032 Build Mitigated Conditions**
 - 2032 Build volumes.
 - Any necessary geometric or traffic control changes to provide acceptable traffic operations at the study intersections.
- **2047 Build Conditions**
 - 2047 Build traffic volumes; long-term forecasts for the study area including the proposed gas station/liquor store trips.
- **2047 Build Mitigated Conditions**
 - 2047 Build volumes.
 - Any necessary geometric or traffic control changes to provide acceptable traffic operations at the study intersections.

5.1 2022 Existing Conditions

Under 2022 existing conditions, the three existing study intersections operate acceptably at LOS C or better with each approach operating at LOS D or better during the AM, school dismissal, and PM peak hour. The two minor stop-controlled intersections on College Road operate at LOS A with each approach operating at LOS B or better with minimal delay and queueing. At the intersection of TH 371 and College Road, some of the minor street left turn and through movements and the left turn movements off of TH 371 operate at LOS E due to the longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better.

While the 95th percentile eastbound left turn queue at the intersection of TH 371 and College Road can approach the available storage, there are no significant queueing issues under 2022 existing conditions.

Table 4 shows a summary of the 2022 existing traffic operations at the study intersections during the AM, school dismissal, and PM peak hours.

Table 4 – 2022 Existing Traffic Operations

Intersection	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
TH 371 and College Rd (traffic signal)	EB	42.0 / D	20.2 / C	46.9 / D	33.0 / C	44.4 / D	30.6 / C
	WB	28.1 / C		37.6 / D		31.2 / C	
	NB	19.7 / B		31.0 / C		31.0 / C	
	SB	13.8 / B		20.1 / C		19.1 / B	
College Rd and Evergreen Dr (RIRO)	EB	1.5 / A	1.0 / A	1.9 / A	1.0 / A	2.0 / A	1.0 / A
	WB	0.3 / A		0.3 / A		0.3 / A	
	NB	2.5 / A		3.3 / A		2.9 / A	
College Rd and Douglas Fir Dr (minor stop)	EB	0.0 / A	0.7 / A	0.0 / A	1.2 / A	0.0 / A	1.4 / A
	WB	0.7 / A		0.7 / A		0.6 / A	
	NB	0.5 / A		0.8 / A		0.8 / A	
	SB	8.1 / A		10.8 / B		14.7 / B	

5.2 2027 No Build Conditions

The 2027 No Build conditions eliminates the Evergreen Drive access to College Road with the Evergreen Drive dead end project. The existing Evergreen Drive traffic would reroute using Hastings Road and Douglas Fir Drive to access College Road.

Under the 2027 No Build Conditions, with minimal growth, the study intersections are expected to continue to operate acceptably at LOS C or better with each approach operating at LOS D or better during the AM, school dismissal, and PM peak hour. The minor stop-controlled intersection of College Road and Douglas Fir Drive operates at LOS A with each approach operating at LOS B or better. At the intersection of TH 371 and College Road, some of the minor street left turn and through movements and the left turn movements off of TH 371 operate at LOS E due to the

longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better.

Similar to the existing conditions, the 95th percentile eastbound left turn queue at the intersection of TH 371 and College Road can approach the available storage, but there are no significant queueing issues under 2027 No Build conditions.

Table 5 shows a summary of the 2027 No Build traffic operations at the study intersections during the AM, school dismissal, and PM peak hours.

Table 5 – 2027 No Build Traffic Operations

Intersection	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
TH 371 and College Rd (traffic signal)	EB	40.7 / D	20.8 / C	47.2 / D	32.8 / C	45.0 / D	30.6 / C
	WB	27.8 / C		37.6 / D		31.7 / C	
	NB	21.3 / C		30.7 / C		30.6 / C	
	SB	14.1 / B		20.3 / C		19.5 / B	
College Rd and Douglas Fir Dr (minor stop)	EB	0.8 / A	0.9 / A	0.8 / A	1.2 / A	0.7 / A	1.4 / A
	WB	0.6 / A		0.7 / A		0.8 / A	
	NB	5.5 / A		8.9 / A		10.4 / B	
	SB	3.2 / A		5.5 / A		6.3 / A	

5.3 2027 Build Conditions

Under 2027 Build conditions, the proposed gas station/liquor store adds a private access road at the right-in/right-out access on College Road where Evergreen Drive currently connects as well as a private, full access on Douglas Fir Drive approximately 320 feet south of College Road.

Under 2027 Build conditions, with the proposed gas station/liquor store trips added, the study intersections are still expected to operate acceptably at LOS C or better with each approach operating at LOS D or better during the AM, school dismissal, and PM peak hour. At the intersection of TH 371 and College Road, some of the minor street left turn and through movements and the left turn movements from TH 371 operate at LOS E due to the longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better.

During the AM and school dismissal peak hours, all of the unsignalized, non-TH 371 intersections operate at LOS A with each approach operating at LOS C or better with minimal delay and queueing. However, during the PM peak hour the northbound left turning movement at the intersection of College Road and Douglas Fir Drive, which is expected to be significantly increased with the gas station, operates at LOS D with 95th percentile queues of 5 to 6 vehicles. This results in the overall northbound approach operating at LOS D as well.

Similar to the existing and No Build conditions, the 95th percentile eastbound left turn queue at the intersection of TH 371 and College Road can approach the available storage, but there are no significant queueing issues under 2027 Build conditions.

Table 6 shows a summary of the 2027 Build traffic operations at the study intersections during the AM, school dismissal, and PM peak hours.

Table 6 – 2027 Build Traffic Operations

Intersection	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
TH 371 and College Rd (traffic signal)	EB	41.2 / D	21.1 / C	47.1 / D	32.4 / C	46.2 / D	31.0 / C
	WB	26.1 / C		35.1 / D		31.7 / C	
	NB	21.9 / C		28.9 / C		28.2 / C	
	SB	14.5 / B		22.3 / C		20.8 / C	
College Rd and Gas Station Access (RIRO)	EB	1.6 / A	1.2 / A	1.9 / A	1.1 / A	1.9 / A	1.1 / A
	WB	0.5 / A		0.4 / A		0.4 / A	
	NB	3.4 / A		3.4 / A		3.4 / A	
College Rd and Douglas Fir Dr (minor stop)	EB	0.8 / A	2.9 / A	0.7 / A	3.0 / A	0.7 / A	5.0 / A
	WB	0.9 / A		1.1 / A		1.2 / A	
	NB	16.5 / C		17.3 / C		29.8 / D	
	SB	5.7 / A		7.3 / A		10.3 / B	
Douglas Fir Dr and Gas Station Access (minor stop)	EB	4.6 / A	2.9 / A	4.2 / A	2.5 / A	4.4 / A	2.7 / A
	NB	1.2 / A		0.6 / A		0.9 / A	
	SB	0.3 / A		0.3 / A		0.4 / A	

5.4 2032 Build Conditions

With the northbound left turn at the intersection of College Road and Douglas Fir Drive operating at LOS D during the year of opening, 2032 Build conditions were analyzed to determine how that delay may increase in the first 5 years of the gas station/liquor store being operational. The 2032 Build conditions have minimal background and development growth in the area compared to 2027 Build conditions.

Under 2032 Build conditions, the study intersections are still expected to operate acceptably at LOS C or better with each approach operating at LOS D or better during the AM and school dismissal peak hours. However, during the PM peak hour, the northbound left turning movement to the intersection of College Road and Douglas Fir Drive is expected to operate at LOS E, with approximately 38 seconds of delay per vehicle and a 95th percentile queue of approximately 5 to 6 vehicles. This results in the overall northbound approach operating at LOS E as well.

At the intersection of TH 371 and College Road, some of the minor street left turn and through movements and the left turn movements off of TH 371 operate at LOS E due to the longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better.

Similar to the other scenarios, the 95th percentile eastbound left turn queue at the intersection of TH 371 and College Road can approach the available storage, but there are no significant queueing issues under 2032 Build conditions.

Table 7 shows a summary of the 2032 Build traffic operations at the study intersections during the AM, school dismissal, and PM peak hours.

Table 7 – 2032 Build Traffic Operations

Intersection	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
TH 371 and College Rd (traffic signal)	EB	41.1 / D	21.5 / C	46.9 / D	32.9 / C	46.2 / D	31.4 / C
	WB	26.5 / C		35.5 / D		32.8 / C	
	NB	22.9 / C		30.1 / C		30.1 / C	
	SB	14.6 / B		23.6 / C		20.5 / C	
College Rd and Gas Station Access (RIRO)	EB	1.6 / A	1.2 / A	1.9 / A	1.1 / A	1.9 / A	1.1 / A
	WB	0.5 / A		0.4 / A		0.4 / A	
	NB	3.4 / A		3.3 / A		3.2 / A	
College Rd and Douglas Fir Dr (minor stop)	EB	0.8 / A	3.1 / A	0.7 / A	3.6 / A	0.6 / A	5.9 / A
	WB	0.9 / A		1.1 / A		1.3 / A	
	NB	19.3 / C		22.5 / C		35.5 / E	
	SB	5.2 / A		8.4 / A		10.3 / B	
Douglas Fir Dr and Gas Station Access (minor stop)	EB	4.4 / A	2.6 / A	4.3 / A	2.5 / A	4.5 / A	2.7 / A
	NB	1.0 / A		0.8 / A		0.8 / A	
	SB	0.4 / A		0.3 / A		0.4 / A	

5.5 2032 Build Mitigated Conditions

With the northbound approach to the intersection of College Road and Douglas Fir Drive operating at LOS E during the PM peak hour and the intersection meeting signal warrants under the 2027 Build conditions, a traffic signal and roundabout were analyzed at the intersection to improve delay and queueing. This intersection has been planned as a future traffic signal based on the City of Baxter's 2015 Comprehensive Plan.

For the traffic signal, no geometric changes would be needed, just installation of the signal system and conduit for interconnect with the TH 371 signal, which would cost approximately \$750,000 to \$1 million. A roundabout at the intersection would need to be an unbalanced (2x1) roundabout with two approach lanes in each direction on College Road and a single approach lane in each direction on Douglas Fir Drive/Industrial Park Road in order to match the existing cross section of the roadway. This would involve a significant amount of reconstruction as well as right-of-way acquisition and would cost approximately \$2.8 million. **Figure 10** shows a preliminary layout of a roundabout at the intersection, which is also provided in **Appendix D**.

Both traffic control options would eliminate the delay issues for the northbound left turn movement during the PM peak hour. Under either control alternative the intersection would

operate at LOS A during the AM, school dismissal, and PM peak hours; the roundabout would also have each approach operating at LOS A. The traffic signal would be coordinated with the signal at TH 371 and College Road, likely running a half cycle during most of the day and would operate at LOS C in the school dismissal and PM peak hours and LOS D in the AM peak hour for the northbound approach.

The roundabout would have minimal queueing with 95th percentile queues on each approach being approximately 1 vehicle. The traffic signal would have longer queues; however, the 95th percentile queues would not exceed 5 or 6 vehicles during the AM, school dismissal, or PM peak hours. Neither control option would be expected to have any queueing issues between the intersection at Douglas Fir Drive and the signal at TH 371, which are approximately 625 feet apart.

Table 8 shows a summary of the 2032 Build Mitigated traffic operations at the intersection of College Road and Douglas Fir Drive during the AM, school dismissal, and PM peak hours under both traffic signal and roundabout control.

Table 8 – 2032 Build Mitigated Traffic Operations – College Rd and Douglas Fir Dr

College Rd and Douglas Fir Dr Traffic Control	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
Traffic Signal	EB	2.3 / A	7.7 / A	4.8 / A	7.3 / A	6.0 / A	8.8 / A
	WB	3.7 / A		4.9 / A		5.8 / A	
	NB	43.9 / D		26.5 / C		26.4 / C	
	SB	8.1 / A		8.6 / A		11.0 / B	
Unbalanced Roundabout (2x1) ¹	EB	4.3 / A	4.4 / A	4.3 / A	4.7 / A	4.2 / A	4.7 / A
	WB	4.3 / A		4.9 / A		4.9 / A	
	NB	5.2 / A		5.4 / A		5.4 / A	
	SB	4.4 / A		5.5 / A		5.5 / A	
¹ Roundabout traffic operations analyses were completed using HCS 2025 software							

Figure 10 – Douglas Fir Drive Roundabout Preliminary Layout



5.6 2047 Build Conditions

The 2047 Build conditions were analyzed to determine the long-term needs at the study intersections as development in the area continues beyond the proposed gas station/liquor store. It also serves to update the findings of the 2022 *CSAH 48 (Highland Scenic Road) Corridor Study*, which focused on CSAH 48 but analyzed the long-term needs for the greater CSAH 48 and College Road area.

This scenario does not include the previous 2032 mitigations at College Road and Douglas Fir Drive, in order to evaluate the increase in delay at the minor stop.

Under 2047 Build conditions, the study intersections are still expected to operate acceptably at LOS D or better with each approach operating at LOS D or better during the AM and school dismissal peak hours. However, during the PM peak hour, the northbound left turning movement to the intersection of College Road and Douglas Fir Drive operates at LOS F, with approximately 63 seconds of delay per vehicle and a 95th percentile queue of approximately 7 to 8 vehicles. This results in the overall northbound approach operating at LOS F as well.

At the intersection of TH 371 and College Road, some of the minor street left turn and through movements and the left turn movements off of TH 371 operate at LOS E due to the longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better. With the increased traffic volumes under 2047 conditions, the 95th percentile eastbound left turn queues at the intersection of TH 371 and College Road exceed the available storage during the PM peak hour, but there are no significant queueing issues under 2047 Build conditions.

Table 9 shows a summary of the 2047 Build traffic operations at the study intersections during the AM, school dismissal, and PM peak hours.

Table 9 – 2047 Build Traffic Operations

Intersection	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
TH 371 and College Rd (traffic signal)	EB	39.7 / D	22.7 / C	45.6 / D	34.6 / C	48.9 / D	36.7 / D
	WB	28.5 / C		41.3 / D		44.5 / D	
	NB	25.0 / C		34.5 / C		37.2 / D	
	SB	15.7 / B		23.6 / C		24.0 / C	
College Rd and Gas Station Access (RIRO)	EB	1.7 / A	1.3 / A	1.9 / A	1.2 / A	2.1 / A	1.3 / A
	WB	0.6 / A		0.4 / A		0.6 / A	
	NB	3.8 / A		3.9 / A		3.8 / A	
College Rd and Douglas Fir Dr (minor stop)	EB	0.9 / A	3.9 / A	0.9 / A	4.9 / A	0.8 / A	8.5 / A
	WB	1.3 / A		1.2 / A		1.3 / A	
	NB	26.5 / D		29.9 / D		56.8 / F	
	SB	6.3 / A		10.5 / B		13.7 / B	
Douglas Fir Dr and Gas Station Access (minor stop)	EB	5.0 / A	2.4 / A	4.6 / A	2.2 / A	6.7 / A	3.7 / A
	NB	1.0 / A		0.6 / A		1.3 / A	
	SB	0.4 / A		0.4 / A		0.4 / A	

5.7 2047 Build Mitigated Conditions

With the northbound approach to the intersection of College Road and Douglas Fir Drive operating at LOS F during the PM peak hour and the intersection meeting signal warrants under the 2027 and 2047 Build conditions, the traffic signal and roundabout were again analyzed at the intersection to improve delay and queueing.

Both traffic control options would eliminate the delay issues for the northbound left turn movement during the PM peak hour. Under either control alternative the intersection would operate at LOS A during the AM, school dismissal, and PM peak hours; the roundabout would also have each approach operating at LOS A. The traffic signal would be coordinated with the signal at TH 371 and College Road, likely running a half cycle during most of the day and would operate at LOS C in the school dismissal and PM peak hours and LOS D in the AM peak hour for the northbound approach.

The roundabout would have minimal queueing with 95th percentile queues on each approach being approximately 1 to 2 vehicles. The traffic signal would have longer queues; however, the 95th percentile queues would not exceed 6 or 7 vehicles during the AM, school dismissal, or PM peak hours. Neither control option would be expected to have any queueing issues between the intersection at Douglas Fir Drive and the signal at TH 371, which are approximately 625 feet apart.

Table 8 shows a summary of the 2047 Build Mitigated traffic operations at the intersection of College Road and Douglas Fir Drive during the AM, school dismissal, and PM peak hours under both traffic signal and roundabout control.

Table 10 – 2047 Build Mitigated Traffic Operations – College Rd and Douglas Fir Dr

College Rd and Douglas Fir Dr Traffic Control	Approach	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)	Approach (delay / LOS)	Intersection (delay / LOS)
Traffic Signal	EB	2.7 / A	7.6 / A	6.2 / A	8.3 / A	7.2 / A	9.7 / A
	WB	4.1 / A		6.0 / A		7.1 / A	
	NB	41.2 / D		24.1 / C		25.5 / C	
	SB	6.0 / A		9.2 / A		11.6 / B	
Unbalanced Roundabout (2x1) ¹	EB	4.6 / A	4.7 / A	4.6 / A	5.2 / A	4.5 / A	5.1 / A
	WB	4.6 / A		5.4 / A		5.2 / A	
	NB	5.6 / A		6.2 / A		5.8 / A	
	SB	4.6 / A		6.1 / A		5.9 / A	

¹Roundabout traffic operations analyses were completed using HCS 2025 software

5.8 2047 College Road Queuing Analysis

With concerns over potential queuing impacts between an improved College Road and Douglas Fir Drive and the TH 371 signal, queuing results from each 2047 Build alternative were reviewed. While Synchro/SimTraffic is not typically used to analyze roundabout traffic operations, a potential unbalanced (2x1) roundabout at the intersection of College Road and Douglas Fir Drive operates well under capacity and showed traffic operational results similar to the HCS evaluation.

There is approximately 625 feet of usable storage between the existing TH 371 and Douglas Fir Drive intersections on College Road. **Table 11** summarizes the Synchro/SimTraffic average and 95th percentile queues between Douglas Fir Drive and TH 371 on College Road under 2047 build conditions with the Douglas Fir Drive intersection under minor stop, traffic signal, and roundabout control. The HCS queueing results for the roundabout are also shown for comparison.

Based on the queuing results, the maximum eastbound 95th percentile queue from the Douglas Fir Drive intersection is 158 feet under traffic signal control and 38 feet under roundabout control, neither of which exceed 25% of the available storage between Douglas Fir Drive and College Road. The maximum westbound 95th percentile queue for the TH 371 signal is 365 feet, which is approximately 58% of the available storage between the two intersections. Queues between the intersections are not expected to be a concern through 2047.

Table 11 – 2047 College Road Queueing Summary

Douglas Fir Dr Traffic Control	Measure	AM Peak Hour		School Dismissal Peak Hour		PM Peak Hour	
		Westbound TH 371	Eastbound Douglas Fir	Westbound TH 371	Eastbound Douglas Fir	Westbound TH 371	Eastbound Douglas Fir
Minor Stop (SimTraffic)	Average Queue (ft)	75	20	115	20	159	20
	95 th Percentile Queue (ft)	140	45	187	48	296	32
	Intersection (Delay / LOS)	22.7 / C	3.9 / A	34.6 / C	4.8 / A	36.7 / D	8.5 / A
Traffic Signal (SimTraffic)	Average Queue (ft)	71	29	115	53	171	66
	95 th Percentile Queue (ft)	169	98	223	147	365	158
	Intersection (Delay / LOS)	23.0 / C	7.6 / A	34.3 / C	8.3 / A	37.0 / D	9.7 / A
Unbalanced Roundabout (SimTraffic)	Average Queue (ft)	73	20	116	20	170	20
	95 th Percentile Queue (ft)	140	38	192	35	297	36
	Intersection (Delay / LOS)	23.3 / C	4.3 / A	34.7 / C	4.7 / A	37.5 / D	5.0 / A
Unbalanced Roundabout (HCS)	Average Queue (ft)	n/a	n/a	n/a	n/a	n/a	n/a
	95 th Percentile Queue (ft)		23		23		21
	Intersection (Delay / LOS)		4.7 / A		5.2 / A		5.1 / A
College Rd Queueing			Queue Exceeds 85% of available storage (530 ft)			Queue Exceeds available storage (625 ft)	

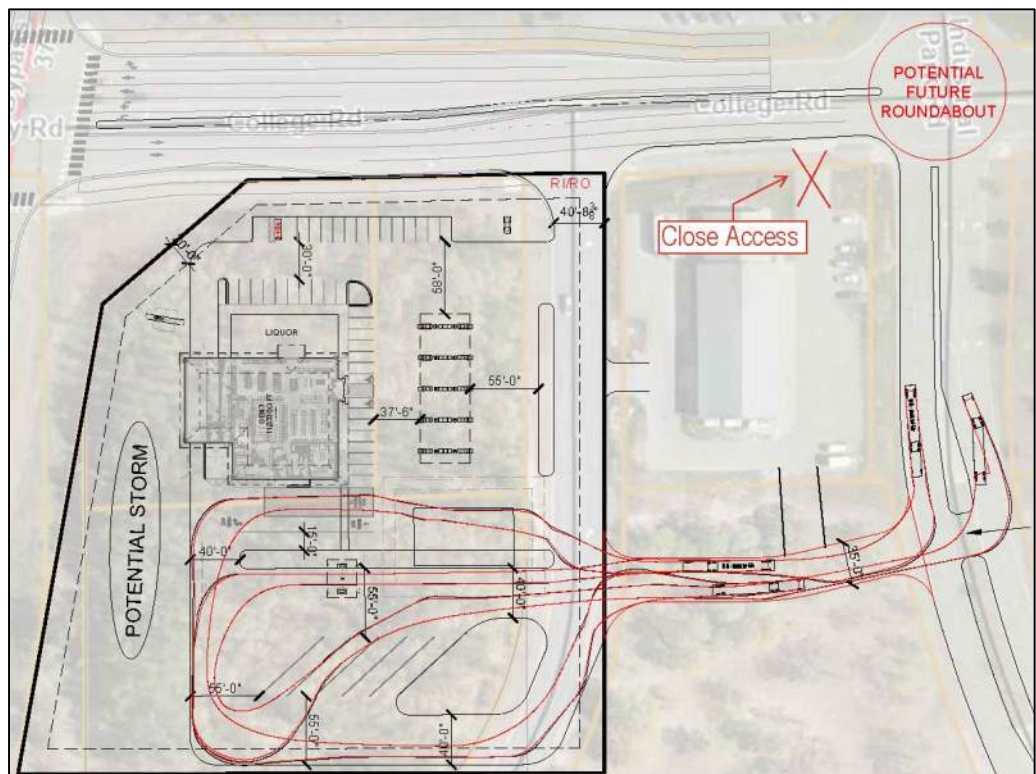
6 Access Review

The City of Baxter's 2015 Comprehensive Plan provides access management guidelines for providing adequate access while maintaining traffic flow and safety along roadways. The access spacing guidelines depend on the type of roadway and type of access as well as other factors such as roadway speed, traffic volume, sight distance, etc.

The proposed gas station/liquor store has two proposed access locations, which will connect to two private development roadways within the site and are described below (shown in **Figure 11**). The private access roadways will also provide access to the existing Service Master site and Service Master's existing access to College Road will be closed. Service Master will have an access point on both private access roadways within the development site.

- **College Road Access (Right-in/Right-out)** – located where the existing Evergreen Drive right-in/right-out access is currently; approximately 390 feet east of TH 371 and 250 feet west of Douglas Fir Drive.
- **Douglas Fir Access (Proposed as Full Access)** – located approximately 320 feet south of College Road, just south of the existing northbound left turn lane for the College Road intersection. There is currently a median on Douglas Fir Drive at this location. As part of the gas station/liquor store development, it is proposed that the median be opened to allow for full access.

Figure 11 – Site Access Plan



College Road is classified as a minor arterial roadway in the City's Comprehensive Plan, which means that commercial driveway spacing should be between 1/8 and 1/4 mile depending on

speed, volume, and sight distance based on the City's access management guidelines. Along College Road, the signal at TH 371 and Douglas Fir Drive are spaced at approximately 1/8 mile, so the proposed right-in/right-out access does not meet the spacing guidelines. The Comprehensive Plan does not specify separate spacing guidelines for reduced access (3/4 access or right-in/right-out), however, typically these access points are allowed more frequently because the limited access limits disruption of traffic flow and potential safety concerns. The proposed right-in/right-out on College Road will provide improved access to the site without detrimentally impacting traffic flow or safety on College Road, therefore, the access location is considered acceptable. The right-in/right-out location also has an existing dedicated right turn lane, which should remain in place to limit the disruption to traffic flow on College Road.

Douglas Fir Drive is classified as a local roadway in the City's Comprehensive Plan, which means that commercial driveway spacing should be at least 100 feet depending on speed, volume, and sight distance based on the City's access management guidelines. The proposed full access location on Douglas Fir Drive meets the access spacing guidelines as it is approximately 320 feet south on Douglas Fir Drive. However, based on the traffic operations analysis, there are times when the maximum northbound left turn queue from the intersection of College Road at Douglas Fir Drive could reach this driveway, which could create operational and safety issues at the driveway.

If the intersection of College Road and Douglas Fir Drive remains minor stop controlled or is converted to a traffic signal, it is recommended that the Douglas Fir Drive access be right-in/right-out only. However, if a roundabout is constructed at the intersection of College Road and Douglas Fir Drive, the access could be full access as proposed because the roundabout has minimal queueing which would not impact the driveway.

If the Douglas Fir Drive access is right-in/right-out only, vehicles routing back to westbound College Road and TH 371 from the gas station/liquor store would have to make a right out of the site on either College Road or Douglas Fir Drive and then make a U-turn at the next intersection.

7 Conclusion

The proposed gas station with convenience store and liquor store, is to be located in the southeast quadrant of the intersection of TH 371 and College Road, includes 21 fueling stations (20 for passenger vehicles, 1 for heavy trucks), a 8,100 square foot (SF) convenience store, a 2,900 SF liquor store, a car wash, and 5 semi-truck parking spaces. The proposed gas station/liquor store is expected to generate approximately 3,630 trips per day, which will use the two proposed access locations on College Road and Douglas Fir Drive.

With gas station developments, a majority of the trips to/from the site are not “primary” trips to/from the area as most gas station trips are stops of convenience as part of a longer trip as opposed to being the primary purpose of the trip. The ITE Trip Generation Handbook, 3rd Edition suggests that only approximately 20% of gas station trips are primary trips where the sole purpose is to travel to/from the gas station. The remaining 80% of trips are either pass-by (60%) or diverted trips (20%). Pass-by and diverted trips are not new trips to the area, rather rerouted existing trips currently on the roadway network; therefore, only approximately 20% of the generated trips are actually new trips in the study area. For the proposed gas station, the 80% pass-by/diverted trips are expected to be trips that reroute from TH 371, College Road, CSAH 48, or Cypress Drive to stop at the gas station before continuing to their ultimate destination.

In 2027, prior to completion of the gas station/liquor store, the City of Baxter is planning to remove a portion of Evergreen Drive south of College Road, creating a dead end just north of the existing businesses, approximately 500 feet north of Hastings Road. As part of the proposed gas station/liquor store development, the existing right-in/right-out access for Evergreen Drive at College Road will become a private driveway access, providing direct access to the gas station/liquor store development.

Traffic operations were analyzed under 2022 existing, 2027 No Build, 2027 Build, 2032 Build, and 2047 Build conditions. The 2027 analysis represents the year of opening, and the 2032 analysis represents 5 years after opening. The 2047 Build conditions serve to update the CSAH 48 (Highland Scenic Road) Corridor Study and determine the long-term needs at the study intersections as development in the area continues beyond the proposed gas station.

The No Build scenarios for this study included two recent or planned improvements and developments in the area including the Evergreen Drive dead end and the Campbell Subdivision.

Under the existing and No Build conditions, each intersection operates acceptably at LOS C or better with each approach operating at LOS D or better during the AM, school dismissal, and PM peak hour. Each of the unsignalized College Road intersections operate at LOS A with each approach operating at LOS B or better with minimal delay and queueing.

Under the existing and each future scenario, some of the minor street left turn and through movements and the left turn movements off of TH 371 at the TH 371 signal operate at LOS E due to the longer cycle length at the TH 371 signals during the school dismissal and PM peak hours. During the AM peak hour, the TH 371 signal cycle length is shorter so all movements operate at LOS D or better.

Under 2027 Build traffic volumes, the intersection of College Road at Douglas Fir Drive meets traffic signal warrants with the added gas station/liquor store trips. With the proposed gas station/liquor store trips added, the study intersections are still expected to operate acceptably at

LOS C or better with each approach operating at LOS D or better during the AM, school dismissal, and PM peak hour. However, during the PM peak hour the northbound left turning movement at the intersection of College Road and Douglas Fir Drive, which is expected to be significantly increased with the gas station/liquor store trips, operates at LOS D with 95th percentile queues of 5 to 6 vehicles. This results in the overall northbound approach operating at LOS D as well.

Under 2032 Build conditions, as traffic volumes on College Road and Douglas Fir Drive increase, the northbound left turning movement to the intersection of College Road and Douglas Fir Drive operates at LOS E during the PM peak hour, with approximately 38 seconds of delay per vehicle and a 95th percentile queue of approximately 5 to 6 vehicles. This results in the overall northbound approach operating at LOS E as well. All other study intersections operate acceptably under 2032 Build conditions.

To mitigate the delay issues for northbound left turns at the intersection of College Road and Douglas Fir Drive, both traffic signal control and roundabout control were analyzed under 2032 Build traffic demands. Both traffic control options would be expected to operate at LOS A during the AM, school dismissal, and PM peak hours with the roundabout having slightly lower delays and shorter queues. Neither control option would be expected to have any queueing issues between the intersection at Douglas Fir Drive and the signal at TH 371, which are approximately 625 feet apart.

For the traffic signal, no geometric changes would be needed, just installation of the signal system and conduit for interconnect with the TH 371 signal, which would cost approximately \$750,000 to \$1 million. A roundabout at the intersection would need to be an unbalanced (2x1) roundabout with two approach lanes in each direction on College Road and a single approach lane in each direction on Douglas Fir Drive/Industrial Park Road in order to match the existing cross section of the roadway. This would involve a significant amount of reconstruction as well as right-of-way acquisition and would cost approximately \$2.8 million.

Under 2047 Build conditions, as traffic volumes continue to increase with development in the area, the northbound left turning movement to the intersection of College Road and Douglas Fir Drive operates at LOS F during the PM peak hour, with approximately 63 seconds of delay per vehicle and a 95th percentile queue of approximately 7 to 8 vehicles under minor street stop control. This results in the overall northbound approach operating at LOS F as well. All other study intersections operate acceptably under 2032 Build conditions.

The traffic signal and roundabout are expected to continue to operate at LOS A during the AM, school dismissal, and PM peak hours with 2047 traffic demands. The roundabout would have slightly lower delays and shorter queues. Neither control option would be expected to have any queueing issues between the intersection at Douglas Fir Drive and the signal at TH 371, which are approximately 625 feet apart.

The proposed gas station/liquor store is expected to significantly increase the northbound left turning volume at the intersection of College Road and Douglas Fir Drive. Based on the warrant analysis, a traffic signal or roundabout would be warranted with year of opening (2027) traffic demands. The traffic operations analysis showed that delays for the northbound left turns are expected to be at an acceptable LOS D or better in the year of opening but would operate at LOS E or F as the area develops in the next 5 to 10 years, indicating that a traffic control change will be needed at the intersection in the near future.

Based on the 2047 Build traffic forecasts, the gas station/liquor store is expected to generate nearly 65% of the Douglas Fir Drive approach volumes. With the intersection meeting the 8-hour signal warrant in the year of opening and the traffic operations showing delay for the northbound left turn reaching an unacceptable LOS E within 5 years of the gas station/liquor store opening, it would be prudent to improve the traffic control at the intersection with the gas station/liquor store development. This intersection is a planned future traffic signal in the City of Baxter's 2015 Comprehensive Plan and 2000 Long Range Transportation Plan and based on the traffic analysis either a traffic signal or roundabout could mitigate the northbound left turn delay issues at the intersection.

As part of this study, the two proposed accesses to the gas station/liquor store site and Service Master were reviewed to ensure adequate access spacing based on the guidelines from the City of Baxter's 2015 Comprehensive Plan. As part of the development, the existing Service Master access on College Road will be closed, and access will be provided to Service Master on both of the private development roadways on the site. The right-in/right-out access on College Road does not meet the City's 1/8 to 1/4 mile spacing guidelines for minor arterials; however, the proposed right-in/right-out on College Road will replace the existing Evergreen Drive access and will provide improved access to the gas station/liquor store and Service Master sites without detrimentally impacting traffic flow or safety on College Road, therefore, the access location is considered acceptable. The right-in/right-out location also has an existing dedicated right turn lane, which should remain in place to limit the disruption to traffic flow on College Road.

The proposed full access location on Douglas Fir Drive meets the 100-foot access spacing guideline as it is approximately 320 feet south Douglas Fir Drive. However, based on the traffic operations analysis, there are times when the maximum northbound left turn queue from the intersection of College Road at Douglas Fir Drive reaches this driveway, which could create operational and safety issues at the driveway.

If the intersection of College Road and Douglas Fir Drive remains minor stop controlled or is converted to a traffic signal, it is recommended that the Douglas Fir Drive access be right-in/right-out only. However, if a roundabout is constructed at the intersection of College Road and Douglas Fir Drive, the access could be full access as proposed because the roundabout has minimal queueing which would not impact the driveway.

If the Douglas Fir Drive access is right-in/right-out only, vehicles routing back to westbound College Road and TH 371 from the gas station/liquor store would have to make a right out of the site on either College Road or Douglas Fir Drive and then make a U-turn at the next intersection.

7.1 Recommendation

Based on the analysis of the proposed gas station/liquor store development, the following improvements are recommended to accommodate the additional traffic demands generated.

- **Construct an unbalanced (2x1) roundabout at the intersection of College Road and Douglas Fir Drive**
 - Traffic operations show that a traffic control change will be needed within 5 years of the gas station/liquor store opening.
 - The intersection is expected to meet signal warrants once the gas station/liquor store opens in 2027 due to the increased northbound left turn traffic demands generated by the gas station/liquor store, which means a roundabout is also warranted.

- A roundabout is expected to operate at LOS A at the intersection through 2047 as the area continues to develop. No queuing issues are expected along College Road between the closely spaced TH 371 and Douglas Fir Drive intersections, which are approximately 625 feet apart.
- A preliminary layout of the roundabout is provided in **Appendix D**.
- **If a roundabout is constructed at the intersection of College Road and Douglas Fir Drive, the proposed access on Douglas Fir Drive can be full access.**
 - Based on the traffic operations, the roundabout would have minimal queuing northbound on Douglas Fir Drive, which would not impact the driveway.
 - If the intersection of College Road and Douglas Fir Drive remains minor stop controlled or converted to traffic signal controlled the Douglas Fir Drive access should be right-in/right-out only.

7.2 Next Steps

In order to get MnDOT State Aid approval on a traffic control change at the intersection of College Road and Douglas Fir Drive, an Intersection Control Evaluation (ICE) report needs to be completed and submitted to MnDOT for review.

The improvements at the intersection of College Road and Douglas Fir Drive will need to be completed in 2027 due to several planned construction projects in the area over the next 5 years, which is the same year the gas station with liquor store is planning to open. In 2026 and 2027, TH 210 through Brainerd will be under construction and College Road in Baxter and W College Drive in Brainerd will be used as a detour route during construction. In 2028 and 2029, the interchange at TH 210 and TH 371 will be under construction, which will have impacts on traffic patterns throughout Baxter. It would be beneficial to complete the improvements to the intersection of College Road and Douglas Fir Drive in 2027 before the interchange construction begins as many drivers will be using College Road and other area routes to avoid the TH 210/TH 371 construction area.

Appendix A

2022 Turning Movement Counts

Location: College Road at TH 371
 Count Date: 2/9/2022
 Counted By: CountCloud



TURNING MOVEMENT COUNT DATA

All Vehicles

Start Time	TH 371				College Rd				TH 371				Glory Rd				Int. Total	
	Southbound				Westbound				Northbound				Eastbound					
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds		
0:00	2	5	0	0	0	0	3	0	0	3	1	0	0	0	1	0	0	15
0:15	0	1	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	4
0:30	1	2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	5
0:45	0	2	0	0	1	0	0	0	0	2	1	0	0	1	0	0	0	7
1:00	1	1	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	6
1:15	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5
1:30	1	0	0	0	0	0	0	0	0	3	1	0	0	0	1	1	0	7
1:45	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
2:00	0	1	0	0	0	0	1	0	0	3	1	0	0	1	0	0	0	7
2:15	1	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	6
2:30	2	1	0	0	0	1	1	0	0	1	0	0	0	0	1	0	0	7
2:45	2	1	0	0	0	1	2	0	0	2	0	0	0	0	1	0	0	9
3:00	0	2	0	0	0	0	1	0	0	4	0	0	0	1	1	0	0	9
3:15	4	4	1	0	1	1	0	0	0	4	0	0	0	0	1	0	0	16
3:30	1	6	2	0	0	3	0	0	1	3	0	0	0	1	1	0	0	18
3:45	0	0	1	0	0	2	1	0	0	1	2	0	0	1	0	0	0	8
4:00	3	2	0	0	1	2	1	0	0	2	0	0	0	0	0	0	0	11
4:15	0	5	1	0	2	3	1	0	0	6	1	0	0	0	0	0	0	19
4:30	2	4	2	0	1	3	1	0	0	5	1	0	0	0	1	0	0	20
4:45	3	1	4	0	0	6	2	0	2	10	0	0	0	0	0	0	0	28
5:00	7	9	1	0	0	1	3	0	1	5	6	0	0	0	1	1	0	35
5:15	11	10	1	0	0	2	6	0	0	13	2	0	0	1	0	0	0	46
5:30	18	15	6	0	0	6	3	0	0	18	1	0	0	0	0	1	0	68
5:45	24	23	1	0	3	5	4	0	0	16	2	0	0	1	1	0	0	80
6:00	17	24	7	0	3	3	14	0	0	25	3	0	0	1	1	0	0	98
6:15	24	33	8	0	1	6	12	0	0	30	4	0	0	2	4	1	0	125
6:30	35	43	9	0	3	4	14	0	4	39	6	0	0	4	8	1	0	170
6:45	39	47	10	0	2	15	14	0	4	49	10	0	0	5	6	4	0	205
7:00	41	39	11	0	4	10	16	0	4	66	13	0	0	7	8	2	0	221
7:15	57	90	20	0	7	25	29	0	12	79	10	0	0	9	13	2	0	353
7:30	64	96	27	0	10	25	34	0	14	102	20	0	0	12	12	1	0	417
7:45	70	96	45	0	12	35	29	0	9	143	19	0	0	20	18	4	0	500
8:00	63	65	31	0	3	37	46	0	8	114	23	0	0	16	15	5	0	426
8:15	32	45	29	0	7	28	19	0	12	71	10	0	0	19	14	3	0	289
8:30	28	44	23	0	2	19	31	0	9	63	11	0	0	25	27	2	0	284
8:45	37	42	28	0	5	32	24	0	21	60	6	0	0	32	27	5	0	319
9:00	28	56	35	0	7	24	22	0	9	57	1	0	0	22	25	8	0	294
9:15	30	38	37	0	9	33	19	0	10	60	4	0	0	52	18	7	0	317
9:30	25	49	50	0	1	35	25	0	14	49	6	0	0	38	28	5	0	325
9:45	38	55	41	0	6	44	32	0	5	56	8	0	0	35	29	9	0	358
10:00	25	61	33	0	1	49	29	0	9	52	7	0	0	28	28	9	0	331
10:15	18	50	35	0	2	36	18	0	9	69	2	0	0	29	12	10	0	290
10:30	24	53	44	0	5	37	21	0	9	70	5	0	0	39	36	15	0	358
10:45	23	56	39	0	6	30	20	0	11	64	4	0	0	57	41	18	0	369
11:00	24	61	40	0	4	45	33	0	11	50	1	0	0	49	32	11	0	361
11:15	17	66	35	0	0	34	41	0	16	54	6	0	0	43	34	10	0	356
11:30	22	68	56	0	12	38	34	0	11	63	0	0	0	47	40	3	0	394
11:45	16	63	43	0	7	49	39	0	15	62	1	1	0	58	37	10	0	400
12:00	31	79	45	0	4	39	54	0	10	46	5	1	0	50	36	8	2	407
12:15	32	61	57	0	3	38	27	0	9	62	2	0	0	52	33	13	0	389
12:30	31	67	45	0	0	38	26	0	14	54	1	0	0	61	34	8	0	379
12:45	47	69	56	0	1	29	19	0	18	52	10	0	0	45	39	13	0	398
13:00	37	74	40	0	5	48	26	0	11	39	1	0	0	45	32	10	0	368
13:15	30	66	43	0	2	42	27	0	14	51	2	0	0	53	34	11	0	375
13:30	33	57	36	0	3	39	29	0	12	46	3	0	0	52	34	18	0	362
13:45	31	71	38	0	2	26	25	0	13	52	5	0	0	60	49	10	0	382
14:00	31	92	34	0	6	39	39	0	14	65	4	0	0	62	27	12	0	425
14:15	21	79	34	0	5	40	34	0	11	50	0	0	0	60	38	9	0	381
14:30	25	95	36	0	17	37	33	0	10	85	3	0	0	39	36	11	0	427
14:45	30	73	23	0	12	34	30	0	14	77	7	0	0	47	47	8	0	402
15:00	27	66	23	0	19	41	38	0	11	94	12	0	0	55	39	11	0	436
15:15	35	75	31	0	6	55	43	0	10	67	7	0	0	45	31	12	0	417
15:30	40	60	43	0	12	43	68	0	13	72	7	0	0	40	52	15	0	465
15:45	30	79	36	0	7	47	39	0	16	79	8	0	0	49	38	22	0	450

Location: College Road at TH 371
 Count Date: 2/9/2022
 Counted By: CountCloud



TURNING MOVEMENT COUNT DATA

All Vehicles

Start Time	TH 371				College Rd				TH 371				Glory Rd				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
16:00	33	66	33	0	11	39	53	0	14	60	4	0	64	48	11	0	436
16:15	36	72	37	0	10	41	54	0	7	61	3	0	54	41	13	0	429
16:30	21	94	40	0	11	38	66	0	5	86	9	0	53	42	21	0	486
16:45	33	84	30	0	9	28	58	0	13	75	5	0	45	50	18	0	448
17:00	18	73	26	0	13	35	59	0	13	66	3	0	55	45	11	0	417
17:15	32	63	24	0	2	45	41	0	14	68	8	0	55	32	18	0	402
17:30	30	81	24	0	5	25	35	0	6	67	1	0	44	28	12	0	358
17:45	21	49	33	0	3	21	43	0	7	76	4	0	31	27	11	0	326
18:00	22	54	20	0	5	26	18	0	10	43	4	0	22	32	15	0	271
18:15	31	43	19	0	1	18	16	0	9	44	0	0	29	20	9	0	239
18:30	21	33	17	0	2	19	24	0	4	43	3	0	43	29	11	0	249
18:45	15	33	20	0	3	14	15	0	3	35	3	0	25	18	3	0	187
19:00	19	27	13	0	2	15	9	0	3	31	0	0	16	15	4	0	154
19:15	10	43	17	0	2	11	11	0	3	45	2	0	17	17	10	0	188
19:30	14	26	10	0	0	4	4	0	4	37	4	0	13	21	2	0	139
19:45	11	33	9	0	2	10	18	0	3	23	1	0	24	7	3	0	144
20:00	18	32	10	0	2	7	27	0	2	25	3	0	27	12	7	0	172
20:15	6	31	10	0	1	9	18	0	2	21	2	0	12	9	8	0	129
20:30	11	27	8	0	3	9	9	0	0	25	2	0	14	4	6	0	118
20:45	7	25	6	0	0	0	12	0	2	18	1	0	11	4	1	0	87
21:00	8	23	9	0	1	4	17	0	2	25	0	0	6	9	3	0	107
21:15	6	16	7	0	0	3	3	0	1	10	0	0	6	12	1	0	65
21:30	5	15	4	0	0	13	5	0	1	19	1	0	9	9	0	0	81
21:45	9	11	7	0	1	11	10	0	2	14	0	0	5	6	1	0	77
22:00	3	17	6	0	1	4	11	0	2	16	0	0	5	7	4	0	76
22:15	3	9	1	0	1	3	2	0	1	10	0	0	8	9	1	0	48
22:30	4	5	1	0	0	6	5	0	1	8	1	0	6	4	3	0	44
22:45	3	4	2	0	1	2	3	0	1	6	1	0	4	0	3	0	30
23:00	7	6	0	0	1	0	2	0	0	9	1	0	6	6	0	0	38
23:15	2	4	0	0	0	0	1	0	1	7	0	0	4	5	0	0	24
23:30	2	1	0	0	0	0	4	0	0	4	1	0	3	0	3	0	18
23:45	2	5	1	0	1	0	0	0	0	4	1	0	2	2	0	0	18
Total	1856	3713	1820	0	329	1824	1859	0	567	3723	346	2	2189	1693	552	2	18271
Cars+ Trucks	1819	3531	1812	0	285	1800	1821	0	543	3549	296	2	2167	1675	534	2	19832
	37	182	8	0	44	24	38	0	24	174	50	0	22	18	18	0	639
% Trucks	2.0	4.9	0.4	0.0	13.4	1.3	2.0	0.0	4.2	4.7	14.5	0.0	1.0	1.1	3.3	0.0	
	3.1				2.6				5.3				1.3				3.5

Location: College Road at Douglas Fir Drive
 Count Date: 2/9/2022
 Counted By: CountCloud



TURNING MOVEMENT COUNT DATA

All Vehicles

Start Time	Industrial Park Rd				College Rd				Douglas Fir Dr				College Rd				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
0:00	1	0	0	0	0	0	0	0	2	0	0	0	0	4	0	0	7
0:15	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	3
0:30	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
0:45	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	3
1:00	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	4
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
2:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2:15	1	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0	5
2:30	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	5
2:45	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	1	6
3:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	2
3:15	0	0	0	0	0	2	0	0	0	0	0	0	0	1	3	1	7
3:30	0	0	0	0	0	3	0	0	0	0	0	0	0	1	1	0	5
3:45	0	0	0	0	0	3	0	0	0	0	0	0	0	1	1	0	5
4:00	1	0	1	0	0	3	0	0	0	0	0	0	0	0	3	0	8
4:15	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0	1	7
4:30	0	0	0	0	0	5	0	0	0	0	0	0	0	0	4	0	9
4:45	0	0	1	0	0	8	0	0	0	0	0	1	0	1	2	1	14
5:00	0	0	0	0	0	4	0	0	0	0	0	0	0	2	5	6	17
5:15	0	0	0	0	0	8	0	0	0	0	0	0	0	3	5	8	24
5:30	0	0	1	0	0	9	0	0	0	0	0	0	0	6	12	1	29
5:45	0	0	0	0	0	12	2	0	2	2	0	0	0	8	16	2	42
6:00	0	0	1	0	0	15	0	0	6	0	0	0	0	3	15	4	44
6:15	0	0	1	0	0	15	1	0	4	0	0	0	0	4	26	3	54
6:30	1	0	3	0	1	21	1	0	0	0	0	0	0	11	38	3	79
6:45	0	0	2	0	1	28	1	0	0	0	1	0	0	13	38	1	85
7:00	2	0	2	0	0	30	1	0	0	0	0	0	0	9	56	2	102
7:15	0	0	4	0	0	55	0	0	0	0	0	0	0	11	63	3	136
7:30	0	0	5	0	2	68	2	0	1	0	0	0	0	15	75	7	175
7:45	0	0	5	0	3	68	6	0	0	0	2	0	0	15	88	4	191
8:00	1	0	10	0	1	74	1	0	1	0	0	0	0	13	83	4	188
8:15	1	0	5	0	1	46	0	0	1	0	1	0	0	2	57	1	115
8:30	4	0	2	0	1	54	0	0	1	0	0	0	0	6	61	0	129
8:45	0	1	8	0	1	53	4	0	1	0	0	0	0	1	54	6	129
9:00	2	0	3	0	1	45	1	0	1	0	0	0	0	3	53	0	109
9:15	1	0	6	0	0	51	1	0	1	0	0	1	0	9	40	0	109
9:30	0	0	2	0	3	59	1	0	0	0	1	0	0	2	57	0	125
9:45	1	0	4	0	1	75	0	0	3	0	1	0	0	5	70	0	160
10:00	0	0	6	0	0	74	1	0	0	0	1	0	0	2	52	1	137
10:15	0	0	3	0	0	55	1	0	2	0	0	0	0	3	27	0	91
10:30	1	0	6	0	3	54	0	0	2	1	0	0	0	2	59	1	129
10:45	0	1	6	0	0	50	1	0	2	0	0	0	0	7	65	0	132
11:00	0	0	5	0	0	69	0	0	3	0	0	0	0	3	52	1	133
11:15	0	0	2	0	1	72	1	0	3	0	2	0	0	2	52	3	138
11:30	1	0	6	0	1	75	0	0	1	0	0	1	0	3	56	1	144
11:45	3	0	7	0	1	88	0	0	1	0	1	0	0	1	53	1	156
12:00	0	0	11	0	1	86	1	0	1	0	2	2	0	4	66	1	173
12:15	1	0	7	0	4	62	1	0	3	1	0	0	0	7	62	0	148
12:30	0	0	3	0	2	60	1	1	1	1	1	0	0	2	61	3	135
12:45	0	0	5	0	1	48	0	0	2	0	0	0	0	16	75	1	148
13:00	1	0	9	0	2	66	0	0	1	0	0	0	0	7	61	4	151
13:15	0	1	6	0	1	70	1	0	0	0	1	0	0	4	55	7	146
13:30	0	0	4	0	0	63	1	0	0	0	1	0	0	7	54	3	133
13:45	0	0	6	0	1	53	0	0	3	0	0	0	0	5	72	3	143
14:00	1	0	8	0	0	68	0	0	10	0	0	0	0	5	62	1	155
14:15	1	1	6	0	1	68	2	0	2	0	1	0	0	0	58	1	141
14:30	1	1	3	0	1	84	0	0	3	0	1	0	0	5	56	1	156
14:45	0	0	5	0	0	73	2	0	0	0	0	0	0	5	76	2	163
15:00	0	0	6	0	0	66	1	0	5	0	2	0	0	12	82	0	174
15:15	1	0	5	0	2	99	1	0	4	0	2	0	0	2	69	0	185
15:30	3	0	17	0	1	106	1	0	3	0	1	0	0	6	84	0	222
15:45	0	0	7	0	1	87	0	0	1	0	0	0	0	3	73	0	172

Location: College Road at Douglas Fir Drive
Count Date: 2/9/2022
Counted By: CountCloud



TURNING MOVEMENT COUNT DATA

All Vehicles

	Industrial Park Rd				College Rd				Douglas Fir Dr				College Rd				
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
16:00	1	0	10	0	0	94	0	0	1	0	1	0	2	82	0	0	191
16:15	1	1	6	0	1	97	1	0	1	1	0	1	3	76	1	0	189
16:30	6	0	11	0	0	102	0	0	6	0	0	0	3	67	1	0	196
16:45	0	0	8	0	0	84	0	0	9	0	0	0	3	79	0	2	183
17:00	1	0	15	0	1	92	0	0	2	0	0	0	3	64	1	2	179
17:15	0	0	11	0	1	74	0	0	3	0	0	0	3	67	0	0	159
17:30	1	1	4	0	0	57	0	0	0	0	1	0	3	58	0	1	125
17:45	0	0	2	0	0	57	0	0	5	0	0	0	4	50	0	1	118
18:00	0	0	3	0	1	48	0	0	1	0	0	0	2	60	0	1	115
18:15	0	0	1	0	0	34	0	0	0	0	0	0	0	53	1	0	89
18:30	0	0	1	0	0	45	0	0	1	0	0	0	0	55	1	0	103
18:45	0	0	0	0	0	30	0	0	1	0	0	0	1	39	0	0	71
19:00	0	0	2	0	1	25	0	0	1	0	0	0	1	32	0	1	62
19:15	0	0	0	0	0	22	0	0	1	0	0	0	0	26	0	1	49
19:30	0	0	2	0	0	6	0	0	0	0	0	0	2	40	0	0	50
19:45	0	0	5	0	0	24	2	0	0	0	0	0	1	17	0	0	49
20:00	1	1	1	0	0	34	0	0	0	0	0	0	0	31	0	0	68
20:15	1	0	0	0	0	27	0	0	1	0	0	0	0	15	1	0	45
20:30	0	0	2	0	0	18	1	0	0	0	0	0	0	15	1	0	37
20:45	2	0	0	0	0	14	0	0	0	0	0	0	0	12	0	0	28
21:00	0	0	3	0	0	18	0	0	1	0	0	0	0	16	1	0	39
21:15	0	0	2	0	0	4	0	0	0	0	0	0	0	18	0	0	24
21:30	0	0	1	0	0	17	0	0	1	0	0	0	1	13	1	0	34
21:45	0	0	0	0	0	22	0	0	0	0	0	0	0	15	0	0	37
22:00	0	0	0	0	0	11	0	0	4	0	1	0	0	10	0	0	26
22:15	0	0	0	0	0	5	0	0	2	0	0	0	0	12	0	0	19
22:30	0	0	0	0	0	8	0	0	2	0	0	0	1	8	0	0	19
22:45	0	0	0	0	0	6	1	0	0	0	0	0	1	3	0	0	11
23:00	0	0	1	0	0	2	0	0	0	0	0	0	0	14	0	0	17
23:15	1	0	0	0	0	1	0	0	0	0	0	0	0	7	0	0	9
23:30	0	0	0	0	0	3	0	0	1	0	0	0	0	3	0	0	7
23:45	1	0	1	0	0	0	2	0	1	0	0	0	0	4	0	0	9
Total	46	8	312	0	45	3605	46	1	124	4	27	5	298	3487	103	27	7253
Cars+	45	6	276	0	40	3554	46	1	107	3	22	5	269	3410	92	27	7870
Trucks	1	2	36	0	5	51	0	0	17	1	5	0	29	77	11	0	235
% Trucks	2.2	25.0	11.5	0.0	11.1	1.4	0.0	0.0	13.7	25.0	18.5	0.0	9.7	2.2	10.7	0.0	3.2
	10.7				1.5				14.8				3.0				

Appendix B

Warrant Analysis Results

College Rd at Douglas Fir Dr - Existing 2022

ALL WAY STOP WARRANT ANALYSIS

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach Total
41	Major App1:	College Rd	EB	2	4,478
41	Major App3:	College Rd	WB	2	4,231
30	Minor App2:	Douglas Fir Dr	NB	1	173
30	Minor App4:	Industrial Park Rd	SB	1	414

*Posted Speed or 85th Percentile
0.70 SPEED FACTOR USED? **Yes**
CORRECTABLE CRASHES: 0

(12-month period)

Minimum Volume Requirement

210
140
(base requirements are 300 and 200 vph)

	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
HOURLY	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	8	4	5	1	12	6	NO / NO
1:00 - 2:00	9	1	0	2	10	2	NO / NO
2:00 - 3:00	9	5	0	3	14	3	NO / NO
3:00 - 4:00	10	9	0	0	19	0	NO / NO
4:00 - 5:00	13	21	1	4	34	5	NO / NO
5:00 - 6:00	84	36	2	1	120	3	NO / NO
6:00 - 7:00	183	89	13	8	272	21	YES / NO
7:00 - 8:00	366	245	3	18	611	21	YES / NO
8:00 - 9:00	302	244	5	33	546	38	YES / NO
9:00 - 10:00	282	282	8	21	564	29	YES / NO
10:00 - 11:00	254	268	8	26	522	34	YES / NO
11:00 - 12:00	261	360	12	27	621	39	YES / NO
12:00 - 13:00	345	296	14	31	641	45	YES / NO
13:00 - 14:00	325	287	6	31	612	37	YES / NO
14:00 - 15:00	313	341	19	30	654	49	YES / NO
15:00 - 16:00	375	431	20	45	806	65	YES / NO
16:00 - 17:00	401	461	24	56	862	80	YES / NO
17:00 - 18:00	323	357	14	44	680	58	YES / NO
18:00 - 19:00	244	178	3	5	422	8	YES / NO
19:00 - 20:00	139	93	2	10	232	12	YES / NO
20:00 - 21:00	86	107	1	8	193	9	NO / NO
21:00 - 22:00	74	71	2	6	145	8	NO / NO
22:00 - 23:00	40	36	10	0	76	10	NO / NO
23:00 - 24:00	32	9	1	4	41	5	NO / NO
Daily	4,478	4,231	173	414			

	Met (Hr)	Required (Hr)
Hours met for warrant:	0	8

AWS Volume Warrant:
(2B.16 MnMUTCD)
Not satisfied
Crash Warrant:
(2B.13 MnMUTCD)
Not Satisfied
COMMENTS: In addition to the 8-hour volume and crash experience warrants, sight distance, interim conditions, and other factors may be considered.

College Rd at Douglas Fir Dr - Existing 2022

SIGNAL WARRANT ANALYSIS

Warrant 1 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,449
41	Major App3:	College Rd	WB	2	4,230
30	Minor App2:	Douglas Fir Dr	NB	1	137
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

CORRECTABLE CRASHES: 0

(12-month period)

	Minimum Volume Requirement		
	1A	1B	1A&B*
Major Total	420	630	504
Minor Approach	105	53	84

*Combination 1A&B Warrant is 80% of highest 1A or 1B criteria.

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MAX MINOR APPROACH	WARRANT 1A - 8 Hour	WARRANT 1B - 8 Hour	WARRANT 1A/B - 8 Hour
	APP. 1	APP. 3	APP. 2	APP. 4	S (APP. 1 + APP. 3)	(APP. 2 or 4)	MAJOR/MINOR	MAJOR/MINOR	MAJOR/MINOR
0:00 - 1:00	8	4	4	1	12	4	NO / NO	NO / NO	NO / NO
1:00 - 2:00	9	1	0	0	10	0	NO / NO	NO / NO	NO / NO
2:00 - 3:00	9	5	0	1	14	1	NO / NO	NO / NO	NO / NO
3:00 - 4:00	10	9	0	0	19	0	NO / NO	NO / NO	NO / NO
4:00 - 5:00	13	21	0	1	34	1	NO / NO	NO / NO	NO / NO
5:00 - 6:00	84	36	2	0	120	2	NO / NO	NO / NO	NO / NO
6:00 - 7:00	183	89	12	1	272	12	NO / NO	NO / NO	NO / NO
7:00 - 8:00	365	245	1	2	610	2	YES / NO	NO / NO	YES / NO
8:00 - 9:00	302	244	4	6	546	6	YES / NO	NO / NO	YES / NO
9:00 - 10:00	275	282	5	4	557	5	YES / NO	NO / NO	YES / NO
10:00 - 11:00	251	268	6	1	519	6	YES / NO	NO / NO	YES / NO
11:00 - 12:00	260	360	8	4	620	8	YES / NO	NO / NO	YES / NO
12:00 - 13:00	341	295	7	1	636	7	YES / NO	YES / NO	YES / NO
13:00 - 14:00	324	287	4	1	611	4	YES / NO	NO / NO	YES / NO
14:00 - 15:00	312	341	17	3	653	17	YES / NO	YES / NO	YES / NO
15:00 - 16:00	375	431	15	4	806	15	YES / NO	YES / NO	YES / NO
16:00 - 17:00	398	461	21	10	859	21	YES / NO	YES / NO	YES / NO
17:00 - 18:00	318	357	13	2	675	13	YES / NO	YES / NO	YES / NO
18:00 - 19:00	243	178	3	0	421	3	YES / NO	NO / NO	NO / NO
19:00 - 20:00	137	93	2	0	230	2	NO / NO	NO / NO	NO / NO
20:00 - 21:00	86	107	1	4	193	4	NO / NO	NO / NO	NO / NO
21:00 - 22:00	74	71	2	0	145	2	NO / NO	NO / NO	NO / NO
22:00 - 23:00	40	36	9	0	76	9	NO / NO	NO / NO	NO / NO
23:00 - 24:00	32	9	1	2	41	2	NO / NO	NO / NO	NO / NO
Totals	4,449	4,230	137	48					

		Met (Hr)	Required (Hr)	WARRANT MET:
Warrant 1	Eight Hour Volumes	0	8	Not satisfied
	Warrant 1A Minimum Vehicular Volume	0	8	Not satisfied
	Warrant 1B Interruption of Continuous Flow	0	8	Not satisfied
	1A & 1B Combination of Warrants (80% of 1A and 1B)	0	8	Not satisfied
Warrant 2	Four Hour Volumes	0	4	Not satisfied
Warrant 3	Peak Hour Volumes	0	1	Not satisfied
Warrant 7	Crash Experience	0	8	Not satisfied

MINOR APPROACHES:

NB: 0% Minor Rights Included; Minor Left is approximately 82% of total approach volume.
SB: 0% Minor Rights Included; Minor Left is approximately 12% of total approach volume.

College Rd at Douglas Fir Dr - Existing 2022

SIGNAL WARRANT ANALYSIS

Warrants 2 and 3 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,449
41	Major App3:	College Rd	WB	2	4,230
30	Minor App2:	Douglas Fir Dr	NB	1	137
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

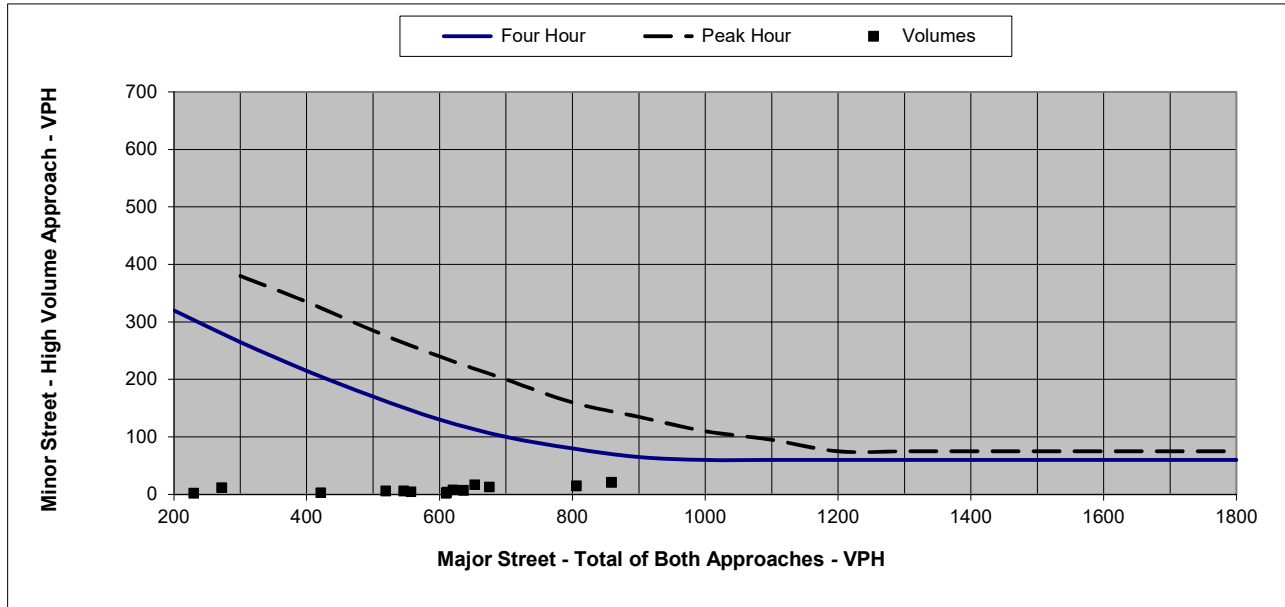


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria (Graph)		
Major	Minor App.	Minor App.
Approach	Four Hour	Peak Hour
200	320	380
300	265	335
400	215	285
500	170	240
600	130	200
700	100	160
800	80	135
900	65	110
1000	60	95
1100	60	75
1200	60	75
1300	60	75
1400	60	75
1500	60	75
1600	60	75
1700	60	75
1800	60	75

Actual Hourly Count			Warrants Met:	
HOUR	Sum Major App.	Max Minor App.	Warrant 2	Warrant 3
0:00 - 1:00	12	4	NO	NO
1:00 - 2:00	10	0	NO	NO
2:00 - 3:00	14	1	NO	NO
3:00 - 4:00	19	0	NO	NO
4:00 - 5:00	34	1	NO	NO
5:00 - 6:00	120	2	NO	NO
6:00 - 7:00	272	12	NO	NO
7:00 - 8:00	610	2	NO	NO
8:00 - 9:00	546	6	NO	NO
9:00 - 10:00	557	5	NO	NO
10:00 - 11:00	519	6	NO	NO
11:00 - 12:00	620	8	NO	NO
12:00 - 13:00	636	7	NO	NO
13:00 - 14:00	611	4	NO	NO
14:00 - 15:00	653	17	NO	NO
15:00 - 16:00	806	15	NO	NO
16:00 - 17:00	859	21	NO	NO
17:00 - 18:00	675	13	NO	NO
18:00 - 19:00	421	3	NO	NO
19:00 - 20:00	230	2	NO	NO
20:00 - 21:00	193	4	NO	NO
21:00 - 22:00	145	2	NO	NO
22:00 - 23:00	76	9	NO	NO
23:00 - 24:00	41	2	NO	NO

College Rd at Douglas Fir Dr - 2027 No Build

ALL WAY STOP WARRANT ANALYSIS

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach Total
41	Major App1:	College Rd	EB	2	4,621
41	Major App3:	College Rd	WB	2	4,402
30	Minor App2:	Douglas Fir Dr	NB	1	213
30	Minor App4:	Industrial Park Rd	SB	1	415

*Posted Speed or 85th Percentile
0.70 SPEED FACTOR USED? **Yes**
CORRECTABLE CRASHES: 0

(12-month period)

Minimum Volume Requirement

210
140
(base requirements are 300 and 200 vph)

	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
HOURLY	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	8	3	5	1	11	6	NO / NO
1:00 - 2:00	9	1	0	2	10	2	NO / NO
2:00 - 3:00	9	5	0	3	14	3	NO / NO
3:00 - 4:00	10	9	0	0	19	0	NO / NO
4:00 - 5:00	13	24	1	4	37	5	NO / NO
5:00 - 6:00	84	40	2	1	124	3	NO / NO
6:00 - 7:00	187	98	18	8	285	26	YES / NO
7:00 - 8:00	378	257	9	18	635	27	YES / NO
8:00 - 9:00	316	257	12	33	573	45	YES / NO
9:00 - 10:00	282	279	11	21	561	32	YES / NO
10:00 - 11:00	258	281	8	26	539	34	YES / NO
11:00 - 12:00	268	362	11	27	630	38	YES / NO
12:00 - 13:00	349	313	12	31	662	43	YES / NO
13:00 - 14:00	332	304	6	31	636	37	YES / NO
14:00 - 15:00	324	349	19	30	673	49	YES / NO
15:00 - 16:00	389	447	28	46	836	74	YES / NO
16:00 - 17:00	424	482	26	56	906	82	YES / NO
17:00 - 18:00	330	364	20	44	694	64	YES / NO
18:00 - 19:00	258	194	6	5	452	11	YES / NO
19:00 - 20:00	149	101	4	10	250	14	YES / NO
20:00 - 21:00	93	114	1	8	207	9	NO / NO
21:00 - 22:00	78	74	2	6	152	8	NO / NO
22:00 - 23:00	41	36	10	0	77	10	NO / NO
23:00 - 24:00	32	8	2	4	40	6	NO / NO
Daily	4,621	4,402	213	415			

	Met (Hr)	Required (Hr)
Hours met for warrant:	0	8

AWS Volume Warrant:
(2B.16 MnMUTCD)
Not satisfied
Crash Warrant:
(2B.13 MnMUTCD)
Not Satisfied
COMMENTS: In addition to the 8-hour volume and crash experience warrants, sight distance, interim conditions, and other factors may be considered.

College Rd at Douglas Fir Dr - 2027 No Build

SIGNAL WARRANT ANALYSIS

Warrant 1 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,621
41	Major App3:	College Rd	WB	2	4,402
30	Minor App2:	Douglas Fir Dr	NB	1	163
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

CORRECTABLE CRASHES: 0
(12-month period)

	Minimum Volume Requirement		
	1A	1B	1A&B*
Major Total	420	630	504
Minor Approach	105	53	84

*Combination 1A&B Warrant is 80% of highest 1A or 1B criteria.

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MAX MINOR APPROACH	WARRANT 1A - 8 Hour	WARRANT 1B - 8 Hour	WARRANT 1A/B 8 Hour
	APP. 1	APP. 3	APP. 2	APP. 4	S (APP. 1 + APP. 3)	(APP. 2 or 4)	MAJOR/MINOR	MAJOR/MINOR	MAJOR/MINOR
0:00 - 1:00	8	3	4	1	11	4	NO / NO	NO / NO	NO / NO
1:00 - 2:00	9	1	0	0	10	0	NO / NO	NO / NO	NO / NO
2:00 - 3:00	9	5	0	1	14	1	NO / NO	NO / NO	NO / NO
3:00 - 4:00	10	9	0	0	19	0	NO / NO	NO / NO	NO / NO
4:00 - 5:00	13	24	0	1	37	1	NO / NO	NO / NO	NO / NO
5:00 - 6:00	84	40	2	0	124	2	NO / NO	NO / NO	NO / NO
6:00 - 7:00	187	98	15	1	285	15	NO / NO	NO / NO	NO / NO
7:00 - 8:00	378	257	5	2	635	5	YES / NO	YES / NO	YES / NO
8:00 - 9:00	316	257	7	6	573	7	YES / NO	NO / NO	YES / NO
9:00 - 10:00	282	279	9	4	561	9	YES / NO	NO / NO	YES / NO
10:00 - 11:00	258	281	6	1	539	6	YES / NO	NO / NO	YES / NO
11:00 - 12:00	268	362	8	4	630	8	YES / NO	YES / NO	YES / NO
12:00 - 13:00	349	313	7	1	662	7	YES / NO	YES / NO	YES / NO
13:00 - 14:00	332	304	4	1	636	4	YES / NO	YES / NO	YES / NO
14:00 - 15:00	324	349	17	3	673	17	YES / NO	YES / NO	YES / NO
15:00 - 16:00	389	447	17	4	836	17	YES / NO	YES / NO	YES / NO
16:00 - 17:00	424	482	23	10	906	23	YES / NO	YES / NO	YES / NO
17:00 - 18:00	330	364	15	2	694	15	YES / NO	YES / NO	YES / NO
18:00 - 19:00	258	194	6	0	452	6	YES / NO	NO / NO	NO / NO
19:00 - 20:00	149	101	4	0	250	4	NO / NO	NO / NO	NO / NO
20:00 - 21:00	93	114	1	4	207	4	NO / NO	NO / NO	NO / NO
21:00 - 22:00	78	74	2	0	152	2	NO / NO	NO / NO	NO / NO
22:00 - 23:00	41	36	9	0	77	9	NO / NO	NO / NO	NO / NO
23:00 - 24:00	32	8	2	2	40	2	NO / NO	NO / NO	NO / NO
Totals	4,621	4,402	163	48					

		Met (Hr)	Required (Hr)	WARRANT MET:
Warrant 1	Eight Hour Volumes	0	8	Not satisfied
	Warrant 1A Minimum Vehicular Volume	0	8	Not satisfied
	Warrant 1B Interruption of Continuous Flow	0	8	Not satisfied
	1A & 1B Combination of Warrants (80% of 1A and 1B)	0	8	Not satisfied
Warrant 2	Four Hour Volumes	0	4	Not satisfied
Warrant 3	Peak Hour Volumes	0	1	Not satisfied
Warrant 7	Crash Experience	0	8	Not satisfied

MINOR APPROACHES:

NB: 0% Minor Rights Included; Minor Left is approximately 77% of total approach volume.

SB: 0% Minor Rights Included; Minor Left is approximately 12% of total approach volume.

College Rd at Douglas Fir Dr - 2027 No Build

SIGNAL WARRANT ANALYSIS

Warrants 2 and 3 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,621
41	Major App3:	College Rd	WB	2	4,402
30	Minor App2:	Douglas Fir Dr	NB	1	163
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

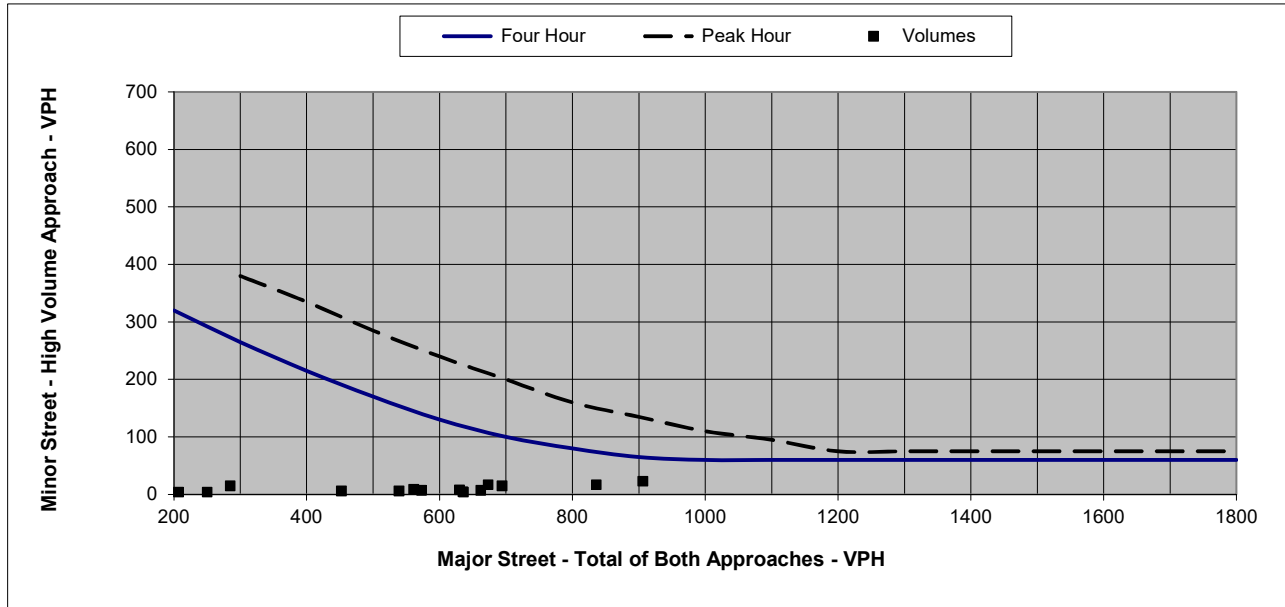


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria (Graph)		
Major	Minor App.	Minor App.
Approach	Four Hour	Peak Hour
200	320	380
300	265	335
400	215	285
500	170	240
600	130	200
700	100	160
800	80	135
900	65	110
1000	60	95
1100	60	75
1200	60	75
1300	60	75
1400	60	75
1500	60	75
1600	60	75
1700	60	75
1800	60	75

Actual Hourly Count			Warrants Met:	
HOUR	Sum Major App.	Max Minor App.	Warrant 2	Warrant 3
0:00 - 1:00	11	4	NO	NO
1:00 - 2:00	10	0	NO	NO
2:00 - 3:00	14	1	NO	NO
3:00 - 4:00	19	0	NO	NO
4:00 - 5:00	37	1	NO	NO
5:00 - 6:00	124	2	NO	NO
6:00 - 7:00	285	15	NO	NO
7:00 - 8:00	635	5	NO	NO
8:00 - 9:00	573	7	NO	NO
9:00 - 10:00	561	9	NO	NO
10:00 - 11:00	539	6	NO	NO
11:00 - 12:00	630	8	NO	NO
12:00 - 13:00	662	7	NO	NO
13:00 - 14:00	636	4	NO	NO
14:00 - 15:00	673	17	NO	NO
15:00 - 16:00	836	17	NO	NO
16:00 - 17:00	906	23	NO	NO
17:00 - 18:00	694	15	NO	NO
18:00 - 19:00	452	6	NO	NO
19:00 - 20:00	250	4	NO	NO
20:00 - 21:00	207	4	NO	NO
21:00 - 22:00	152	2	NO	NO
22:00 - 23:00	77	9	NO	NO
23:00 - 24:00	40	2	NO	NO

College Rd at Douglas Fir Dr - 2027 Build

ALL WAY STOP WARRANT ANALYSIS

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach Total
41	Major App1:	College Rd	EB	2	4,784
41	Major App3:	College Rd	WB	2	4,533
30	Minor App2:	Douglas Fir Dr	NB	1	1,449
30	Minor App4:	Industrial Park Rd	SB	1	415

*Posted Speed or 85th Percentile

0.70 SPEED FACTOR USED? **Yes**
CORRECTABLE CRASHES: 0

(12-month period)

Minimum Volume Requirement

210
140

(base requirements are 300 and 200 vph)

	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
HOURLY	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	9	6	14	1	15	15	NO / NO
1:00 - 2:00	9	2	5	2	11	7	NO / NO
2:00 - 3:00	9	5	4	3	14	7	NO / NO
3:00 - 4:00	10	9	6	0	19	6	NO / NO
4:00 - 5:00	14	26	12	4	40	16	NO / NO
5:00 - 6:00	88	42	28	1	130	29	NO / NO
6:00 - 7:00	194	102	83	8	296	91	YES / NO
7:00 - 8:00	389	265	95	18	654	113	YES / NO
8:00 - 9:00	324	259	99	33	583	132	YES / NO
9:00 - 10:00	291	285	79	21	576	100	YES / NO
10:00 - 11:00	266	287	72	26	553	98	YES / NO
11:00 - 12:00	276	371	75	27	647	102	YES / NO
12:00 - 13:00	364	321	83	31	685	114	YES / NO
13:00 - 14:00	342	314	71	31	656	102	YES / NO
14:00 - 15:00	336	358	87	30	694	117	YES / NO
15:00 - 16:00	399	454	106	46	853	152	YES / YES
16:00 - 17:00	436	490	124	56	926	180	YES / YES
17:00 - 18:00	342	375	104	44	717	148	YES / YES
18:00 - 19:00	268	200	83	5	468	88	YES / NO
19:00 - 20:00	156	106	68	10	262	78	YES / NO
20:00 - 21:00	98	120	52	8	218	60	YES / NO
21:00 - 22:00	83	83	39	6	166	45	NO / NO
22:00 - 23:00	45	42	40	0	87	40	NO / NO
23:00 - 24:00	36	11	20	4	47	24	NO / NO
Daily	4,784	4,533	1,449	415			

Hours met for warrant: **Met (Hr) 3** **Required (Hr) 8**

AWS Volume Warrant:
(2B.16 MnMUTCD)

Not satisfied
Crash Warrant:
(2B.13 MnMUTCD)

Not Satisfied
COMMENTS: In addition to the 8-hour volume and crash experience warrants, sight distance, interim conditions, and other factors may be considered.

College Rd at Douglas Fir Dr - 2027 Build

SIGNAL WARRANT ANALYSIS

Warrant 1 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,784
41	Major App3:	College Rd	WB	2	4,533
30	Minor App2:	Douglas Fir Dr	NB	1	1,404
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

CORRECTABLE CRASHES: 0

(12-month period)

	Minimum Volume Requirement		
	1A	1B	1A&B*
Major Total	420	630	504
Minor Approach	105	53	84

*Combination 1A&B Warrant is 80% of highest 1A or 1B criteria.

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MAX MINOR APPROACH	WARRANT 1A - 8 Hour	WARRANT 1B - 8 Hour	WARRANT 1A/B 8 Hour
	APP. 1	APP. 3	APP. 2	APP. 4	S (APP. 1 + APP. 3)	(APP. 2 or 4)	MAJOR/MINOR	MAJOR/MINOR	MAJOR/MINOR
0:00 - 1:00	9	6	13	1	15	13	NO / NO	NO / NO	NO / NO
1:00 - 2:00	9	2	5	0	11	5	NO / NO	NO / NO	NO / NO
2:00 - 3:00	9	5	4	1	14	4	NO / NO	NO / NO	NO / NO
3:00 - 4:00	10	9	6	0	19	6	NO / NO	NO / NO	NO / NO
4:00 - 5:00	14	26	11	1	40	11	NO / NO	NO / NO	NO / NO
5:00 - 6:00	88	42	28	0	130	28	NO / NO	NO / NO	NO / NO
6:00 - 7:00	194	102	82	1	296	82	NO / NO	NO / YES	NO / NO
7:00 - 8:00	389	265	91	2	654	91	YES / NO	YES / YES	YES / YES
8:00 - 9:00	324	259	97	6	583	97	YES / NO	NO / YES	YES / YES
9:00 - 10:00	291	285	77	4	576	77	YES / NO	NO / YES	YES / NO
10:00 - 11:00	266	287	70	1	553	70	YES / NO	NO / YES	YES / NO
11:00 - 12:00	276	371	72	4	647	72	YES / NO	YES / YES	YES / NO
12:00 - 13:00	364	321	78	1	685	78	YES / NO	YES / YES	YES / NO
13:00 - 14:00	342	314	69	1	656	69	YES / NO	YES / YES	YES / NO
14:00 - 15:00	336	358	85	3	694	85	YES / NO	YES / YES	YES / YES
15:00 - 16:00	399	454	95	4	853	95	YES / NO	YES / YES	YES / YES
16:00 - 17:00	436	490	121	10	926	121	YES / YES	YES / YES	YES / YES
17:00 - 18:00	342	375	99	2	717	99	YES / NO	YES / YES	YES / YES
18:00 - 19:00	268	200	83	0	468	83	YES / NO	NO / YES	NO / NO
19:00 - 20:00	156	106	68	0	262	68	NO / NO	NO / YES	NO / NO
20:00 - 21:00	98	120	52	4	218	52	NO / NO	NO / NO	NO / NO
21:00 - 22:00	83	83	39	0	166	39	NO / NO	NO / NO	NO / NO
22:00 - 23:00	45	42	39	0	87	39	NO / NO	NO / NO	NO / NO
23:00 - 24:00	36	11	20	2	47	20	NO / NO	NO / NO	NO / NO
Totals	4,784	4,533	1,404	48					

		Met (Hr)	Required (Hr)	WARRANT MET:
Warrant 1	Eight Hour Volumes	8	8	Satisfied
	Warrant 1A Minimum Vehicular Volume	1	8	Not satisfied
	Warrant 1B Interruption of Continuous Flow	8	8	Satisfied
	1A & 1B Combination of Warrants (80% of 1A and 1B)	6	8	Not satisfied
Warrant 2	Four Hour Volumes	3	4	Not satisfied
Warrant 3	Peak Hour Volumes	0	1	Not satisfied
Warrant 7	Crash Experience	11	8	Crashes Insufficient

MINOR APPROACHES:

NB: 0% Minor Rights Included; Minor Left is approximately 97% of total approach volume.

SB: 0% Minor Rights Included; Minor Left is approximately 12% of total approach volume.

College Rd at Douglas Fir Dr - 2027 Build

SIGNAL WARRANT ANALYSIS

Warrants 2 and 3 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	4,784
41	Major App3:	College Rd	WB	2	4,533
30	Minor App2:	Douglas Fir Dr	NB	1	1,404
30	Minor App4:	Industrial Park Rd	SB	1	48

*Posted Speed or 85th Percentile

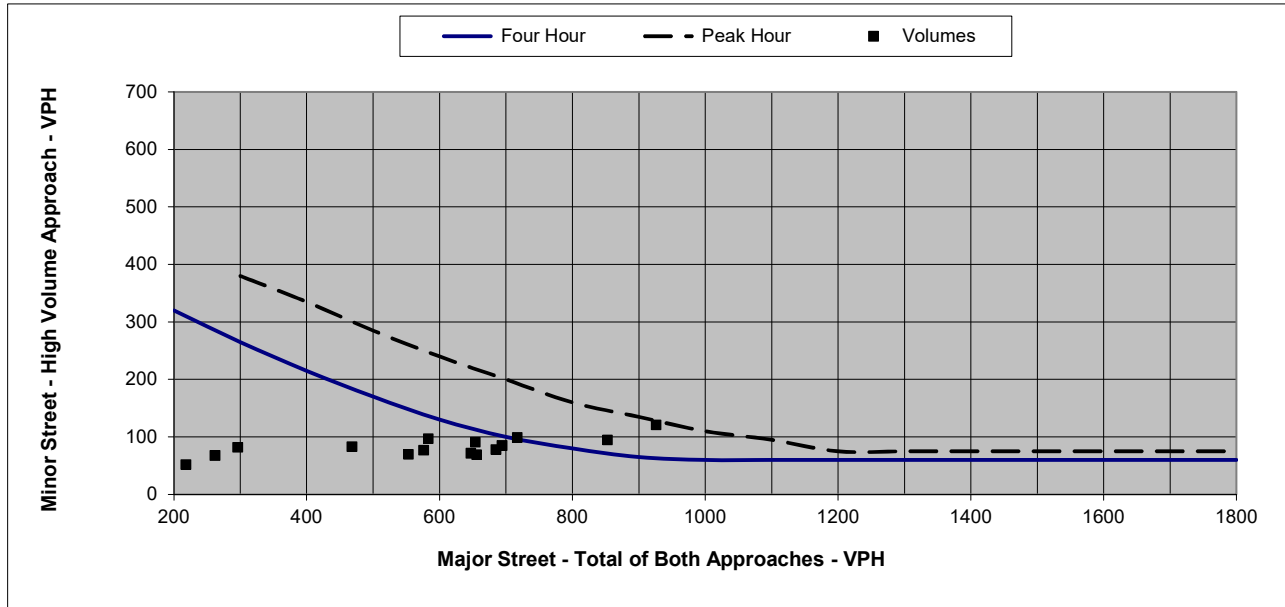


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria (Graph)		
Major	Minor App.	Minor App.
Approach	Four Hour	Peak Hour
200	320	
300	265	380
400	215	335
500	170	285
600	130	240
700	100	200
800	80	160
900	65	135
1000	60	110
1100	60	95
1200	60	75
1300	60	75
1400	60	75
1500	60	75
1600	60	75
1700	60	75
1800	60	75

Actual Hourly Count			Warrants Met:	
HOUR	Sum Major App.	Max Minor App.	Warrant 2	Warrant 3
0:00 - 1:00	15	13	NO	NO
1:00 - 2:00	11	5	NO	NO
2:00 - 3:00	14	4	NO	NO
3:00 - 4:00	19	6	NO	NO
4:00 - 5:00	40	11	NO	NO
5:00 - 6:00	130	28	NO	NO
6:00 - 7:00	296	82	NO	NO
7:00 - 8:00	654	91	NO	NO
8:00 - 9:00	583	97	NO	NO
9:00 - 10:00	576	77	NO	NO
10:00 - 11:00	553	70	NO	NO
11:00 - 12:00	647	72	NO	NO
12:00 - 13:00	685	78	NO	NO
13:00 - 14:00	656	69	NO	NO
14:00 - 15:00	694	85	NO	NO
15:00 - 16:00	853	95	YES	NO
16:00 - 17:00	926	121	YES	NO
17:00 - 18:00	717	99	YES	NO
18:00 - 19:00	468	83	NO	NO
19:00 - 20:00	262	68	NO	NO
20:00 - 21:00	218	52	NO	NO
21:00 - 22:00	166	39	NO	NO
22:00 - 23:00	87	39	NO	NO
23:00 - 24:00	47	20	NO	NO

College Rd at Douglas Fir Dr - 2047 Build

ALL WAY STOP WARRANT ANALYSIS

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach Total
41	Major App1:	College Rd	EB	2	5,790
41	Major App3:	College Rd	WB	2	5,450
30	Minor App2:	Douglas Fir Dr	NB	1	1,831
30	Minor App4:	Industrial Park Rd	SB	1	459

*Posted Speed or 85th Percentile

0.70 SPEED FACTOR USED? **Yes**
CORRECTABLE CRASHES: 0
 (12-month period)

Minimum Volume Requirement

210 140

(base requirements are 300 and 200 vph)

	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
HOURLY	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	12	7	11	1	19	12	NO / NO
1:00 - 2:00	10	1	4	2	11	6	NO / NO
2:00 - 3:00	9	5	4	3	14	7	NO / NO
3:00 - 4:00	10	9	4	0	19	4	NO / NO
4:00 - 5:00	15	30	9	4	45	13	NO / NO
5:00 - 6:00	102	51	24	1	153	25	NO / NO
6:00 - 7:00	233	127	75	8	360	83	YES / NO
7:00 - 8:00	468	329	109	21	797	130	YES / NO
8:00 - 9:00	394	326	111	37	720	148	YES / YES
9:00 - 10:00	346	338	97	23	684	120	YES / NO
10:00 - 11:00	319	339	99	29	658	128	YES / NO
11:00 - 12:00	331	432	118	30	763	148	YES / YES
12:00 - 13:00	432	387	124	35	819	159	YES / YES
13:00 - 14:00	409	374	103	35	783	138	YES / NO
14:00 - 15:00	399	425	116	33	824	149	YES / YES
15:00 - 16:00	482	539	142	51	1,021	193	YES / YES
16:00 - 17:00	523	570	159	63	1,093	222	YES / YES
17:00 - 18:00	421	443	158	49	864	207	YES / YES
18:00 - 19:00	326	249	98	5	575	103	YES / NO
19:00 - 20:00	199	142	87	11	341	98	YES / NO
20:00 - 21:00	133	153	68	8	286	76	YES / NO
21:00 - 22:00	113	106	53	6	219	59	YES / NO
22:00 - 23:00	59	53	43	0	112	43	NO / NO
23:00 - 24:00	45	15	15	4	60	19	NO / NO
Daily	5,790	5,450	1,831	459			

Hours met for warrant: **Met (Hr) Required (Hr)**
 7 8

AWS Volume Warrant:
 (2B.16 MnMUTCD)

Not satisfied
Crash Warrant:
 (2B.13 MnMUTCD)

Not Satisfied
COMMENTS: In addition to the 8-hour volume and crash experience warrants, sight distance, interim conditions, and other factors may be considered.

College Rd at Douglas Fir Dr - 2047 Build

SIGNAL WARRANT ANALYSIS

Warrant 1 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	5,790
41	Major App3:	College Rd	WB	2	5,450
30	Minor App2:	Douglas Fir Dr	NB	1	1,617
30	Minor App4:	Industrial Park Rd	SB	1	50

*Posted Speed or 85th Percentile

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

CORRECTABLE CRASHES: 0

(12-month period)

	Minimum Volume Requirement		
	1A	1B	1A&B*
Major Total	420	630	504
Minor Approach	105	53	84

*Combination 1A&B Warrant is 80% of highest 1A or 1B criteria.

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MAX MINOR APPROACH	WARRANT 1A - 8 Hour	WARRANT 1B - 8 Hour	WARRANT 1A/B 8 Hour
	APP. 1	APP. 3	APP. 2	APP. 4	S (APP. 1 + APP. 3)	(APP. 2 or 4)	MAJOR/MINOR	MAJOR/MINOR	MAJOR/MINOR
0:00 - 1:00	12	7	10	1	19	10	NO / NO	NO / NO	NO / NO
1:00 - 2:00	10	1	4	0	11	4	NO / NO	NO / NO	NO / NO
2:00 - 3:00	9	5	4	1	14	4	NO / NO	NO / NO	NO / NO
3:00 - 4:00	10	9	4	0	19	4	NO / NO	NO / NO	NO / NO
4:00 - 5:00	15	30	8	1	45	8	NO / NO	NO / NO	NO / NO
5:00 - 6:00	102	51	22	0	153	22	NO / NO	NO / NO	NO / NO
6:00 - 7:00	233	127	68	1	360	68	NO / NO	NO / YES	NO / NO
7:00 - 8:00	468	329	98	2	797	98	YES / NO	YES / YES	YES / YES
8:00 - 9:00	394	326	99	7	720	99	YES / NO	YES / YES	YES / YES
9:00 - 10:00	346	338	85	4	684	85	YES / NO	YES / YES	YES / YES
10:00 - 11:00	319	339	87	1	658	87	YES / NO	YES / YES	YES / YES
11:00 - 12:00	331	432	103	4	763	103	YES / NO	YES / YES	YES / YES
12:00 - 13:00	432	387	107	1	819	107	YES / YES	YES / YES	YES / YES
13:00 - 14:00	409	374	89	1	783	89	YES / NO	YES / YES	YES / YES
14:00 - 15:00	399	425	103	3	824	103	YES / NO	YES / YES	YES / YES
15:00 - 16:00	482	539	117	4	1,021	117	YES / YES	YES / YES	YES / YES
16:00 - 17:00	523	570	144	11	1,093	144	YES / YES	YES / YES	YES / YES
17:00 - 18:00	421	443	140	2	864	140	YES / YES	YES / YES	YES / YES
18:00 - 19:00	326	249	87	0	575	87	YES / NO	NO / YES	YES / YES
19:00 - 20:00	199	142	78	0	341	78	NO / NO	NO / YES	NO / NO
20:00 - 21:00	133	153	60	4	286	60	NO / NO	NO / YES	NO / NO
21:00 - 22:00	113	106	48	0	219	48	NO / NO	NO / NO	NO / NO
22:00 - 23:00	59	53	38	0	112	38	NO / NO	NO / NO	NO / NO
23:00 - 24:00	45	15	14	2	60	14	NO / NO	NO / NO	NO / NO
Totals	5,790	5,450	1,617	50					

		Met (Hr)	Required (Hr)	WARRANT MET:
Warrant 1	Eight Hour Volumes	12	8	Satisfied
	Warrant 1A Minimum Vehicular Volume	4	8	Not satisfied
	Warrant 1B Interruption of Continuous Flow	11	8	Satisfied
	1A & 1B Combination of Warrants (80% of 1A and 1B)	12	8	Satisfied
Warrant 2	Four Hour Volumes	9	4	Satisfied
Warrant 3	Peak Hour Volumes	2	1	Satisfied
Warrant 7	Crash Experience	12	8	Crashes Insufficient

MINOR APPROACHES:

NB: 0% Minor Rights Included; Minor Left is approximately 88% of total approach volume.

SB: 0% Minor Rights Included; Minor Left is approximately 11% of total approach volume.

College Rd at Douglas Fir Dr - 2047 Build

SIGNAL WARRANT ANALYSIS

Warrants 2 and 3 Summary

LOCATION: College Rd at Douglas Fir Dr

COUNTY: Crow Wing

REF. POINT: 0

DATE: 5/19/2026

OPERATOR: GTJ

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

Speed*	Approach	Description	Direction:	Lanes	Approach
41	Major App1:	College Rd	EB	2	5,790
41	Major App3:	College Rd	WB	2	5,450
30	Minor App2:	Douglas Fir Dr	NB	1	1,617
30	Minor App4:	Industrial Park Rd	SB	1	50

*Posted Speed or 85th Percentile

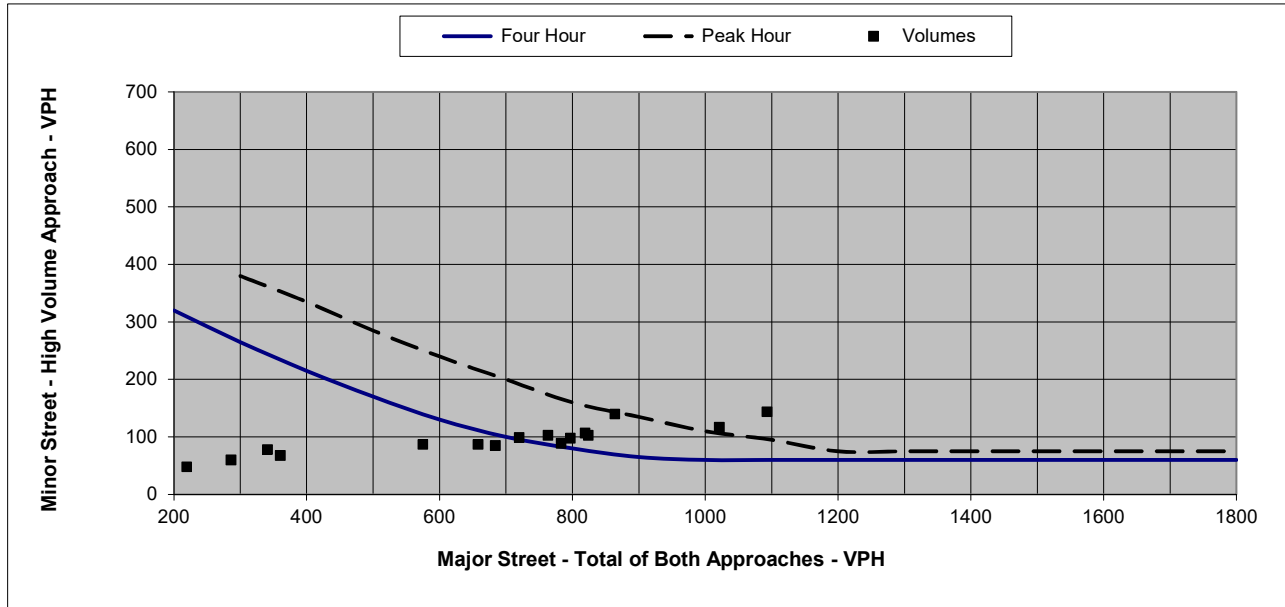


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria (Graph)		
Major	Minor App.	Minor App.
Approach	Four Hour	Peak Hour
200	320	
300	265	380
400	215	335
500	170	285
600	130	240
700	100	200
800	80	160
900	65	135
1000	60	110
1100	60	95
1200	60	75
1300	60	75
1400	60	75
1500	60	75
1600	60	75
1700	60	75
1800	60	75

Actual Hourly Count			Warrants Met:	
HOUR	Sum Major App.	Max Minor App.	Warrant 2	Warrant 3
0:00 - 1:00	19	10	NO	NO
1:00 - 2:00	11	4	NO	NO
2:00 - 3:00	14	4	NO	NO
3:00 - 4:00	19	4	NO	NO
4:00 - 5:00	45	8	NO	NO
5:00 - 6:00	153	22	NO	NO
6:00 - 7:00	360	68	NO	NO
7:00 - 8:00	797	98	YES	NO
8:00 - 9:00	720	99	YES	NO
9:00 - 10:00	684	85	NO	NO
10:00 - 11:00	658	87	NO	NO
11:00 - 12:00	763	103	YES	NO
12:00 - 13:00	819	107	YES	NO
13:00 - 14:00	783	89	YES	NO
14:00 - 15:00	824	103	YES	NO
15:00 - 16:00	1,021	117	YES	YES
16:00 - 17:00	1,093	144	YES	YES
17:00 - 18:00	864	140	YES	NO
18:00 - 19:00	575	87	NO	NO
19:00 - 20:00	341	78	NO	NO
20:00 - 21:00	286	60	NO	NO
21:00 - 22:00	219	48	NO	NO
22:00 - 23:00	112	38	NO	NO
23:00 - 24:00	60	14	NO	NO

Appendix C

Traffic Operations Analysis Results

Table C1

Evergreen Drive/Douglas Fir Drive Traffic Impact Study

Existing Conditions (2022)

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane					
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ---->	% Block Left ⁽²⁾ <----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ---->	% Block Thru ⁽²⁾ <----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹		
AM Peak Hour	College Rd at TH 371 (Signal)	EB	60	62	12	134	43.9	D	47.6	D	5.0	A	42.0	D	20.2	C	360	45	100			946	41	81			320	20	32		
		WB	34	128	144	306	44.4	D	46.6	D	7.3	A	28.1	C			300	33	85			382	53	93			190	45	78		
		NB	45	460	76	581	51.6	D	19.1	B	5.2	A	19.7	B			240	34	83			2869	81	162			240	20	50		
		SB	267	365	129	761	24.9	C	9.9	A	3.1	A	13.8	B			240	62	107			1863	36	83			250	20	27		
	College Rd at Evergreen Dr (Right-in/Right-out)	EB		399	6	405			1.5	A	1.6	A	1.5	A	1.0	A															
		WB		306		306			0.3	A			0.3	A																	
		NB			1	1					2.5	A	2.5	A														400	20	20	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	58	324	18	400	3.1	A	0.3	A	0.2	A	0.7	A	0.7	A	220	20	41												
		WB	6	279	9	294	3.3	A	0.5	A	0.5	A	0.5	A			220	20	20			894		20							
		NB	2		2	4	12.3	B			3.9	A	8.1	A			190	20	27								120	20	21		
		SB	1			25	26	7.8	A			3.2	A	3.4			A	120	20	20			577	20	40						
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	215	195	53	463	53.6	D	50.7	D	5.0	A	46.9	D	33.0	C	360	158	260			946	92	155			320	25	52		
		WB	57	198	206	461	48.4	D	62.9	E	8.0	A	37.6	D			300	51	112			382	92	150			190	54	99		
		NB	56	357	38	451	72.5	E	27.9	C	4.8	A	31.0	C			240	46	98			2869	91	166			240	20	37		
		SB	152	315	137	604	47.4	D	13.8	B	3.4	A	20.1	C			240	65	122			1863	42	93			250	20	32		
	College Rd at Evergreen Dr (Right-in/Right-out)	EB		378	7	385			1.9	A	1.7	A	1.9	A	1.0	A															
		WB		461		461			0.3	A			0.3	A																	
		NB			5	5					3.3	A	3.3	A													400	20	26		
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	29	352	2	383	5.5	A	0.3	A	0.2	A	0.7	A	1.2	A	220	20	48												
		WB	3	408	5	416	1.3	A	0.8	A	0.4	A	0.8	A			220		20			894		20							
		NB	14		5	19	14.9	B			3.1	A	10.8	B			190	20	38								120	20	26		
		SB	4		39	43	11.7	B			5.1	A	5.6	A			120	20	20			577	21	51							
PM Peak Hour	College Rd at TH 371 (Signal)	EB	259	223	79	561	52.7	D	48.5	D	5.6	A	44.4	D	30.6	C	360	185	297			946	98	165			320	30	56		
		WB	54	178	298	530	45.1	D	64.1	E	9.9	A	31.2	C			300	38	82			382	76	129			190	73	122		
		NB	47	361	25	433	69.9	E	27.5	C	4.7	A	31.0	C			240	42	99			2869	87	153			240	20	22		
		SB	135	404	167	706	51.5	D	14.7	B	3.5	A	19.1	B			240	65	123			1863	64	122			250	20	36		
	College Rd at Evergreen Dr (Right-in/Right-out)	EB		373	10	383			2.0	A	1.6	A	2.0	A	1.0	A															
		WB		530		530			0.3	A			0.3	A																	
		NB			4	4					2.9	A	2.9	A													400	20	20		
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	16	358	3	377	4.9	A	0.4	A	0.1	A	0.6	A	1.4	A	220	20	27												
		WB	2	456	1	459	2.8	A	0.8	A	0.1	A	0.8	A			220	20	20			894		20							
		NB	23	1		24	14.9	B	10.2	B			14.7	B			190	20	46			237	20	20							
		SB	10	1	51	62	12.3	B	7.2	A	5.3	A	6.4	A			120	20	27			577	23	46							

NOTES 1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.

2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.

3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C2
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2027 No Build Conditions
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)														
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane			
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹
AM Peak Hour	College Rd at TH 371 (Signal)	EB	61	62	12	135	43.7	D	44.5	D	5.3	A	40.7	D	20.8	C	360	50	106			946	41	87			320	20	33
		WB	34	134	152	320	42.1	D	45.5	D	7.7	A	27.8	C			300	30	72			382	56	101			190	48	85
		NB	45	503	79	627	51.8	D	21.0	C	6.1	A	21.3	C			240	36	87			2869	92	177			240	20	54
		SB	277	390	133	800	24.4	C	10.6	B	3.1	A	14.1	B			240	66	115			1863	43	97			250	20	23
	College Rd at Douglas Fir Dr (Minor Stop)	EB	58	335	25	418	3.6	A	0.4	A	0.2	A	0.8	A	0.9	A	220	20	47										
		WB	7	290	9	306	2.7	A	0.5	A	0.5	A	0.6	A			220	20	20										
		NB	5		5	10	11.2	B	0.0	A	3.4	A	5.5	A			190	20	24							120	20	38	
		SB	1		25	26	6.6	A			3.1	A	3.2	A			120	20	20			577	20	41					
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	220	202	53	475	52.2	D	52.2	D	5.2	A	47.2	D	32.8	C	360	161	268			946	97	166			320	24	48
		WB	58	205	213	476	44.8	D	64.2	E	8.2	A	37.6	D			300	47	107			382	94	157			190	56	98
		NB	56	391	38	485	71.1	E	28.2	C	4.4	A	30.7	C			240	47	99			2869	99	171			240	20	31
		SB	160	351	141	652	47.1	D	14.7	B	3.6	A	20.3	C			240	69	125			1863	56	114			250	20	34
	College Rd at Douglas Fir Dr (Minor Stop)	EB	29	359	12	400	4.8	A	0.5	A	0.2	A	0.8	A	1.2	A	220	20	41										
		WB	4	420	5	429	3.1	A	0.7	A	0.1	A	0.7	A			220		20			894		20					
		NB	16		11	27	14.5	B	0.0	A	3.5	A	8.9	A			190	20	38							120	20	33	
		SB	4		40	44	14.9	B			4.8	A	5.5	A			120	20	20			577	22	50					
PM Peak Hour	College Rd at TH 371 (Signal)	EB	266	230	81	577	52.7	D	49.7	D	5.7	A	45.0	D	30.6	C	360	183	302			946	103	161			320	30	56
		WB	54	184	308	546	44.5	D	60.9	E	11.3	B	31.7	C			300	43	92			382	81	131			190	81	140
		NB	47	399	25	471	73.6	E	27.6	C	5.4	A	30.6	C			240	38	89			2869	100	180			240	20	27
		SB	143	457	171	771	50.2	D	16.0	B	3.7	A	19.5	B			240	68	126			1863	77	137			250	20	36
	College Rd at Douglas Fir Dr (Minor Stop)	EB	16	366	16	398	5.1	A	0.6	A	0.2	A	0.7	A	1.4	A	220	20	26										
		WB	4	470	1	475	2.3	A	0.8	A	0.3	A	0.8	A			220	20	20			894		20					
		NB	25	1	5	31	13.0	B	3.1	A	4.0	A	10.4	B			190	20	45			237	20	20			120	20	24
		SB	10	1	51	62	13.4	B	11.4	B	4.9	A	6.3	A			120	20	30			577	23	44					

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C3
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2027 Build Conditions
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																	
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane						
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹			
AM Peak Hour	College Rd at TH 371 (Signal)	EB	61	65	12	138	43.5	D	46.3	D	4.8	A	41.2	D	21.1	C	360	49	101			946	36	75					320	20	32	
		WB	55	137	206	398	41.7	D	46.0	D	7.9	A	26.1	C			300	44	92			382	56	99					190	54	93	
		NB	45	458	128	631	52.7	D	23.1	C	7.1	A	21.9	C			240	35	88			2869	93	185					240	28	68	
		SB	308	368	133	809	24.3	C	10.7	B	3.1	A	14.5	B			240	75	129			1863	39	89					250	20	24	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		400	101	501			1.5	A	1.8	A	1.6	A	1.2	A																
		WB		398		398			0.5	A			0.5	A																		
		NB			29	29					3.4	A	3.4	A															400	20	31	
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Minor Stop)	EB	58	346	25	429	3.2	A	0.4	A	0.2	A	0.8	A	2.9	A	220	20	42			220		20								
		WB	33	272	9	314	4.0	A	0.6	A	0.4	A	0.9	A			220	20	32			894		20								
		NB	101		5	106	17.7	C	0.3	A	4.2	A	16.5	C			190	49	88									120	20	30		
		SB	1		25	26	13.0	B			5.1	A	5.7	A			120	20	20			577	20	42								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	96		14	110	4.8	A			3.5	A	4.6	A	2.9	A						627	35	56								
		WB											0.0	A																		
		NB	12	10		22	2.1	A	0.3	A			1.2	A			150		20													
		SB		32	26	58			0.3	A	0.3	A	0.3	A																		
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	220	204	53	477	52.0	D	52.8	D	5.4	A	47.1	D	32.4	C	360	156	268			946	92	163					320	26	53	
		WB	75	207	258	540	47.4	D	63.5	E	8.4	A	35.1	D			300	59	123			382	93	156					190	62	105	
		NB	56	355	77	488	69.2	E	28.1	C	5.3	A	28.9	C			240	44	98			2869	92	166					240	20	42	
		SB	187	333	141	661	49.7	D	15.3	B	3.7	A	22.3	C			240	80	146			1863	54	114					250	20	33	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		385	83	468			1.8	A	2.2	A	1.9	A	1.1	A																
		WB		540		540			0.4	A			0.4	A																		
		NB			24	24					3.4	A	3.4	A														400	20	30		
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Minor Stop)	EB	29	368	12	409	4.9	A	0.4	A	0.2	A	0.7	A	3.0	A	220	20	38					20								
		WB	25	405	5	435	3.9	A	0.9	A	0.3	A	1.1	A			220	20	23			894		20								
		NB	95		11	106	19.0	C	0.0	A	3.8	A	17.3	C			190	48	89									120	20	33		
		SB	4		40	44	16.4	C			6.6	A	7.3	A			120	20	20			577	21	50								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	79		12	91	4.4	A			3.2	A	4.2	A	2.5	A						627	31	51								
		WB											0.0	A																		
		NB	11	27		38	1.8	A	0.2	A			0.6	A			150		20													
		SB		16	21	37			0.4	A	0.3	A	0.3	A																		
PM Peak Hour	College Rd at TH 371 (Signal)	EB	266	233	81	580	53.4	D	51.8	D	5.8	A	46.2	D	31.0	C	360	192	305			946	93	160					320	31	58	
		WB	77	187	363	627	45.5	D	65.2	E	11.9	B	31.7	C			300	55	112			382	80	135					190	86	149	
		NB	47	351	78	476	68.4	E	28.5	C	6.1	A	28.2	C			240	36	92			2869	91	166					240	20	43	
		SB	174	433	171	778	50.7	D	15.4	B	3.6	A	20.8	C			240	85	152			1863	68	128					250	20	37	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		379	106	485			1.8	A	2.4	A	1.9	A	1.1	A																
		WB		627		627			0.4	A			0.4	A																		
		NB			33	33					3.4	A	3.4	A														400	20	34		
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Minor Stop)	EB	16	380	16	412	4.8	A	0.5	A	0.4	A	0.7	A	5.0	A	220	20	29			220		20								
		WB	33	451	1	485	3.9	A	1.0	A	0.1	A	1.2	A			220	20	28			894		20								
		NB	125	1	5	131	31.4	D	4.5	A	3.8	A	29.8	D			190	69	127			237	20	20				120	20	24		
		SB	10	1	51	62	16.4	C	37.1	E	8.7	A	10.3	B			120	20	29			577	26	55								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	100		17	117	4.6	A			3.5	A	4.4	A	2.7	A						627	35	55								
		WB											0.0	A																		
		NB	15	31		46	2.2	A	0.3	A			0.9	A			150	20	20													
		SB		21	29	50			0.4	A	0.4	A	0.4	A								237		20								

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C4
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2032 Build Conditions
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane					
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹		
AM Peak Hour	College Rd at TH 371 (Signal)	EB	65	73	13	151	41.8	D	46.8	D	5.2	A	41.1	D	21.5	C	360	49	99			946	40	82			320	20	32		
		WB	58	146	214	418	39.9	D	45.7	D	9.3	A	26.5	C			300	43	97			382	57	103			190	59	105		
		NB	49	522	130	701	54.0	D	23.8	C	7.7	A	22.9	C			240	38	91			2869	108	204			240	30	75		
		SB	320	409	142	871	24.1	C	11.3	B	3.4	A	14.6	B			240	77	128			1863	46	105			250	20	34		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		422	101	523			1.5	A	1.9	A	1.6	A	1.2	A															
		WB		418		418			0.5	A			0.5	A																	
		NB			29	29					3.4	A	3.4	A														400	20	35	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	62	358	31	451	3.4	A	0.4	A	0.2	A	0.8	A	3.1	A	220	20	44			220		20							
		WB	37	288	9	334	3.8	A	0.6	A	0.3	A	0.9	A			220	20	32			894		20							
		NB	104		7	111	20.8	C	0.4	A	3.5	A	19.3	C			190	51	98								120	20	32		
		SB	1		26	27	0.0	A			5.2	A	5.2	A			120		20			577	20	43							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	97		14	111	4.6	A			3.2	A	4.4	A	2.6	A						627	34	53							
		WB											0.0	A																	
		NB	12	14		26	2.1	A	0.3	A			1.0	A			150		20												
		SB		41	27	68			0.4	A	0.3	A	0.4	A																	
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	231	216	58	505	51.3	D	52.5	D	5.3	A	46.9	D	32.9	C	360	165	269			946	88	150			320	24	51		
		WB	78	217	269	564	44.8	D	63.5	E	9.7	A	35.5	D			300	57	120			382	97	160			190	68	118		
		NB	62	399	79	540	69.1	E	29.3	C	6.2	A	30.1	C			240	53	108			2869	105	186			240	20	51		
		SB	195	388	147	730	50.9	D	16.6	B	3.9	A	23.6	C			240	92	153			1863	68	132			250	20	35		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		407	83	490			1.8	A	2.3	A	1.9	A	1.1	A															
		WB		564		564			0.4	A			0.4	A																	
		NB			24	24					3.3	A	3.3	A													400	20	28		
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	30	385	16	431	5.0	A	0.4	A	0.2	A	0.7	A	3.6	A	220	20	39					20							
		WB	28	424	5	457	3.6	A	1.0	A	0.4	A	1.1	A			220	20	25			894		20							
		NB	100		14	114	25.2	D	0.6	A	4.4	A	22.5	C			190	55	107								120	20	35		
		SB	4		40	44	13.3	B			8.1	A	8.4	A			120	20	20			577	23	57							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	80		12	92	4.5	A			3.0	A	4.3	A	2.5	A						627	32	50							
		WB											0.0	A																	
		NB	11	34		45	2.2	A	0.3	A			0.8	A			150	20	20												
		SB		22	22	44			0.3	A	0.3	A	0.3	A																	
PM Peak Hour	College Rd at TH 371 (Signal)	EB	279	248	85	612	55.3	E	50.7	D	6.6	A	46.2	D	31.4	C	360	204	341			946	97	177			320	34	62		
		WB	82	198	375	655	44.6	D	63.1	E	14.2	B	32.8	C			300	66	128			382	86	138			190	98	172		
		NB	50	421	80	551	72.5	E	29.8	C	6.1	A	30.1	C			240	47	112			2869	104	196			240	20	43		
		SB	179	508	179	866	48.6	D	16.9	B	4.1	A	20.5	C			240	80	147			1863	87	156			250	20	41		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		401	106	507			1.8	A	2.4	A	1.9	A	1.1	A															
		WB		655		655			0.4	A			0.4	A																	
		NB			33	33					3.2	A	3.2	A													400	20	34		
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	16	400	18	434	5.3	A	0.5	A	0.2	A	0.6	A	5.9	A	220	20	29			220		20							
		WB	34	471	1	506	4.2	A	1.1	A	0.2	A	1.3	A			220	20	31			894		20							
		NB	130	1	7	138	37.6	E	4.5	A	4.1	A	35.5	E			190	78	149			237	20	43			120	20	25		
		SB	10	1	54	65	19.3	C	17.4	C	8.6	A	10.3	B			120	20	32			577	26	53							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	101		17	118	4.7	A			3.2	A	4.5	A	2.7	A						627	34	51							
		WB											0.0	A																	
		NB	15	37		52	2.1	A	0.3	A			0.8	A			150	20	20												
		SB		23	30	53			0.4	A	0.4	A	0.4	A																	

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C5
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2032 Build Conditions - Traffic Signal at College Rd/Douglas Fir Dr
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																	
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane						
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ¹	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹			
AM Peak Hour	College Rd at TH 371 (Signal)	EB	65	73	13	151	43.4	D	44.7	D	4.9	A	40.5	D	21.2	C	360	51	107			946	38	78					320	20	32	
		WB	58	146	214	418	37.2	D	39.2	D	8.1	A	23.3	C			300	46	102			382	58	104					190	56	99	
		NB	49	522	130	701	54.7	D	24.6	C	7.6	A	23.5	C			240	36	84			2869	109	197					240	27	69	
		SB	320	409	142	871	23.8	C	12.3	B	3.3	A	15.0	B			240	76	125			1863	53	116					250	20	27	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		422	101	523			1.5	A	1.9	A	1.6	A	1.4	A																
		WB		418		418			1.1	A			1.1	A																		
		NB			29	29					3.4	A	3.4	A															400	20	33	
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Signal)	EB	62	358	31	451	5.1	A	1.9	A	1.1	A	2.3	A	7.7	A	220	20	51			220	23	65								
		WB	37	288	9	334	6.0	A	3.5	A	1.8	A	3.7	A			220	20	38			894	27	82								
		NB	104		7	111	47.6	D	0.4	A	4.8	A	43.9	D			190	76	135									120	20	30		
		SB	1		26	27	78.0	E			5.4	A	8.1	A			120	20	20			577	20	43								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	97		14	111	4.7	A			3.3	A	4.5	A	2.7	A						627	34	53								
		WB											0.0	A																		
		NB	12	14		26	2.0	A	0.3	A			1.0	A			150	20	20													
		SB		41	27	68			0.4	A	0.4	A	0.4	A																		
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	231	216	58	505	51.5	D	51.4	D	5.4	A	46.4	D	32.9	C	360	165	267			946	93	164					320	26	52	
		WB	78	217	269	564	43.3	D	62.1	E	9.8	A	35.0	D			300	55	109			382	102	162					190	70	122	
		NB	62	399	79	540	71.5	E	31.2	C	6.3	A	31.6	C			240	50	105			2869	105	187					240	20	48	
		SB	195	388	147	730	49.5	D	16.5	B	4.3	A	22.7	C			240	89	152			1863	67	125					250	20	40	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		407	83	490			1.8	A	2.3	A	1.9	A	1.4	A																
		WB		564		564			0.9	A			0.9	A																		
		NB			24	24					3.2	A	3.2	A														400	20	28		
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Signal)	EB	30	385	16	431	9.2	A	4.6	A	3.0	A	4.8	A	7.3	A	220	20	54			220	42	103								
		WB	28	424	5	457	7.0	A	4.8	A	1.8	A	4.9	A			220	20	31			894	41	97								
		NB	100		14	114	30.2	C	0.6	A	4.4	A	26.5	C			190	64	110									120	20	32		
		SB	4		40	44	32.4	C			6.3	A	8.6	A			120	20	22			577	22	52								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	80		12	92	4.4	A			3.2	A	4.2	A	2.5	A						627	32	51								
		WB											0.0	A																		
		NB	11	34		45	2.0	A	0.3	A			0.7	A			150		20													
		SB		22	22	44			0.6	A	0.4	A	0.5	A																		
PM Peak Hour	College Rd at TH 371 (Signal)	EB	279	248	85	612	53.3	D	50.4	D	6.7	A	45.6	D	31.3	C	360	201	320			946	98	164					320	32	61	
		WB	82	198	375	655	43.1	D	61.1	E	16.1	B	32.6	C			300	58	115			382	83	137					190	112	202	
		NB	50	421	80	551	71.5	E	28.9	C	6.6	A	29.4	C			240	45	108			2869	97	178					240	20	46	
		SB	179	508	179	866	50.8	D	17.2	B	3.9	A	21.4	C			240	86	150			1863	88	157					250	20	40	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		401	106	507			1.9	A	2.4	A	2.0	A	1.5	A																
		WB		655		655			1.0	A			1.0	A																		
		NB			33	33					3.2	A	3.2	A														400	20	31		
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Signal)	EB	16	400	18	434	11.4	B	5.9	A	2.9	A	6.0	A	8.8	A	220	20	37			220	52	108								
		WB	34	471	1	506	7.2	A	5.7	A	2.8	A	5.8	A			220	20	36			894	49	112								
		NB	130	1	7	138	28.2	C	9.4	A	4.6	A	26.4	C			190	78	136			237	20	20				120	20	26		
		SB	10	1	54	65	30.8	C	0.0	A	7.0	A	11.0	B			120	20	36			577	26	51								
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	101		17	118	5.0	A			3.5	A	4.8	A	2.9	A						627	36	56								
		WB											0.0	A																		
		NB	15	37		52	2.0	A	0.3	A			0.8	A			150	20	20													
		SB		23	30	53			0.6	A	0.5	A	0.5	A																		

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

HCS Roundabouts Report

General Information	Site Information
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Analyst	Justin Anibas, PE		Intersection	College Rd at Douglas Fir Dr
Agency or Co.	SEH		E/W Street Name	College Rd
Date Performed	5/14/2026		N/S Street Name	Douglas Fir Dr
Analysis Year	2032		Analysis Time Period, hrs	0.25
Time Analyzed	Build AM Peak Hour		Peak Hour Factor	0.93
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study		Jurisdiction	Baxter, MN

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	62	358	31	0	37	288	9	0	104	0	7	0	1	0	26
Percent Heavy Vehicles, %	0	2	4	10	0	3	1	0	0	3	0	29	0	0	0	8
Flow Rate (v_{PCE}), pc/h	0	68	400	37	0	41	313	10	0	115	0	10	0	1	0	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	237	268		171	193			125			31	
Entry Volume, veh/h	228	257		169	191			119			29	
Circulating Flow (v_c), pc/h	42			183			469			469		
Exiting Flow (v_{ex}), pc/h	411			458			78			78		
Capacity (C_{pc}), pc/h	1367	1367		1202	1202			953			953	
Capacity (c), veh/h	1312	1312		1188	1188			910			885	
v/c Ratio (x)	0.17	0.20		0.14	0.16			0.13			0.03	

Delay and Level of Service	
1	1
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97	97
98	98
99	99
100	100

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.2	4.4		4.2	4.4			5.2			4.4	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.6	0.7		0.5	0.6			0.5			0.1	
95% Queue Length, Q ₉₅ (ft)	15.4	18.1		12.6	15.1			13.0			2.7	
Approach Delay, s/veh LOS	4.3		A	4.3		A	5.2		A	4.4		A
Intersection Delay, s/veh LOS	4.4						A					

HCS Roundabouts Report

General Information	Site Information
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Analyst	Justin Anibas, PE		Intersection	College Rd at Douglas Fir Dr
Agency or Co.	SEH		E/W Street Name	College Rd
Date Performed	5/14/2026		N/S Street Name	Douglas Fir Dr
Analysis Year	2032		Analysis Time Period, hrs	0.25
Time Analyzed	Build School Dismissal		Peak Hour Factor	0.85
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study		Jurisdiction	Baxter, MN

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	30	385	16	0	28	424	5	0	100	0	14	0	4	0	40
Percent Heavy Vehicles, %	0	13	2	0	0	4	1	0	0	2	0	0	0	0	0	8
Flow Rate (V_{PCE}), pc/h	0	40	462	19	0	34	504	6	0	120	0	16	0	5	0	51
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

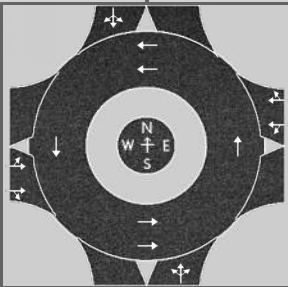
Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	245	276		256	288			136			56	
Entry Volume, veh/h	238	269		253	285			134			52	
Circulating Flow (v_c), pc/h	39			160			507			658		
Exiting Flow (v_{ex}), pc/h	483			675			46			53		
Capacity (C_{pce}), pc/h	1370	1370		1228	1228			923			812	
Capacity (c), veh/h	1335	1335		1213	1213			907			757	
v/c Ratio (x)	0.18	0.20		0.21	0.23			0.15			0.07	

Delay and Level of Service	
1	1
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100	100

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.2	4.4		4.8	5.0			5.4			5.5	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.6	0.8		0.8	0.9			0.5			0.2	
95% Queue Length, Q ₉₅ (ft)	15.3	20.3		20.2	22.7			12.7			5.3	
Approach Delay, s/veh LOS	4.3		A	4.9		A	5.4		A	5.5		A
Intersection Delay, s/veh LOS	4.7						A					

HCS Roundabouts Report

General Information			Site Information		
Analyst	Justin Anibas, PE		Intersection	College Rd at Douglas Fir Dr	
Agency or Co.	SEH		E/W Street Name	College Rd	
Date Performed	5/14/2026		N/S Street Name	Douglas Fir Dr	
Analysis Year	2032		Analysis Time Period, hrs	0.25	
Time Analyzed	Build PM Peak Hour		Peak Hour Factor	0.95	
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study		Jurisdiction	Baxter, MN	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	16	400	18	0	34	471	1	0	130	1	17	0	10	1	54
Percent Heavy Vehicles, %	0	6	3	22	0	3	1	0	0	2	0	0	0	0	0	2
Flow Rate (V_{PCE}), pc/h	0	18	434	23	0	37	501	1	0	140	1	18	0	11	1	58
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	223	252		253	286			159			70	
Entry Volume, veh/h	215	242		250	282			156			69	
Circulating Flow (v_c), pc/h	49			159			463			678		
Exiting Flow (v_{ex}), pc/h	463			699			20			61		
Capacity (C_{PCE}), pc/h	1358	1358		1229	1229			958			798	
Capacity (c), veh/h	1307	1307		1215	1215			941			785	
v/c Ratio (x)	0.16	0.19		0.21	0.23			0.17			0.09	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.1	4.3		4.8	5.0			5.4			5.5	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.6	0.7		0.8	0.9			0.6			0.3	
95% Queue Length, Q ₉₅ (ft)	15.4	18.0		20.2	22.7			15.2			7.6	
Approach Delay, s/veh LOS	4.2		A	4.9		A	5.4		A	5.5		A
Intersection Delay, s/veh LOS	4.7						A					

Table C6
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2032 Build Conditions - Roundabout at College Rd/Douglas Fir Dr
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																	
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane						
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ¹	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ---->	% Block Left ⁽²⁾ <----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ---->	% Block Thru ⁽²⁾ <----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹			
AM Peak Hour	College Rd at TH 371 (Signal)	EB	65	73	13	151	41.2	D	47.1	D	4.5	A	40.9	D	21.7	C	360	51	102			946	40	77					320	20	33	
		WB	58	146	214	418	42.2	D	48.0	D	9.3	A	27.4	C			300	45	97			380	59	103					190	61	113	
		NB	49	522	130	701	53.5	D	23.6	C	7.3	A	22.6	C			240	38	86			2869	103	195					240	28	67	
		SB	320	409	142	871	24.0	C	12.2	B	3.5	A	15.0	B			240	77	129			1862	49	103					250	20	28	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		422	101	523			1.9	A	1.8	A	1.9	A	1.4	A																
		WB		418		418			0.6	A			0.6	A										20	20							
		NB			29	29					3.9	A	3.9	A															400	20	34	
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Roundabout)	EB	62	358	31	451	2.6	A	4.6	A	2.7	A	4.2	A	4.1	A						210	20	28								
		WB	37	288	9	334	2.6	A	4.4	A	3.0	A	4.2	A									884	20	36							
		NB	104		7	111	3.7	A	0.3	A	3.0	A	3.6	A									220	22	55							
		SB	1		26	27	2.6	A			2.6	A	2.6	A									577	20	22							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	97		14	111	4.8	A			3.2	A	4.6	A	2.7	A						627	34	55								
		WB											0.0	A																		
		NB	12	14		26	2.3	A	0.4	A			1.2	A			150	20	20													
		SB		41	27	68			0.3	A	0.2	A	0.3	A																		
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	231	216	58	505	53.1	D	50.2	D	5.4	A	46.4	D	32.7	C	360	168	274			946	87	148					320	26	51	
		WB	78	217	269	564	47.9	D	63.2	E	10.3	B	36.5	D			300	57	116			380	101	164					190	69	129	
		NB	62	399	79	540	65.1	E	30.3	C	5.9	A	30.5	C			240	54	110			2869	104	185					240	20	48	
		SB	195	388	147	730	48.1	D	16.1	B	3.9	A	21.9	C			240	85	146			1862	64	121					250	20	33	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		407	83	490			1.9	A	2.3	A	2.0	A	1.2	A																
		WB		564		564			0.5	A			0.5	A										20	20							
		NB			24	24					3.5	A	3.5	A															400	20	28	
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Roundabout)	EB	30	385	16	431	3.1	A	4.5	A	3.2	A	4.4	A	4.7	A						210	20	28								
		WB	28	424	5	457	3.1	A	5.3	A	3.5	A	5.2	A									884	20	33							
		NB	100		14	114	4.1	A	0.8	A	3.0	A	3.9	A									220	23	52							
		SB	4		40	44	4.4	A			3.1	A	3.2	A									577	20	34							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	80		12	92	4.5	A			3.2	A	4.3	A	2.4	A						627	33	54								
		WB											0.0	A																		
		NB	11	34		45	2.1	A	0.3	A			0.8	A			150	20	20													
		SB		22	22	44			0.3	A	0.2	A	0.3	A																		
PM Peak Hour	College Rd at TH 371 (Signal)	EB	279	248	85	612	53.7	D	51.9	D	6.3	A	46.2	D	31.5	C	360	202	313			946	98	158					320	33	59	
		WB	82	198	375	655	44.9	D	64.2	E	14.0	B	33.2	C			300	57	114			380	85	136					190	97	171	
		NB	50	421	80	551	70.0	E	28.8	C	6.1	A	29.0	C			240	43	101			2869	99	184					240	20	46	
		SB	179	508	179	866	49.5	D	17.4	B	4.1	A	21.2	C			240	81	151			1862	89	157					250	20	39	
	College Rd at Gas Station Access (Right-in/Right-out)	EB		401	106	507			2.0	A	2.4	A	2.1	A	1.3	A																
		WB		655		655			0.5	A			0.5	A										20	20							
		NB			33	33					3.5	A	3.5	A															400	20	32	
		SB											0.0	A																		
	College Rd at Douglas Fir Dr (Roundabout)	EB	16	400	18	434	2.9	A	4.5	A	3.0	A	4.4	A	4.6	A						210	20	32								
		WB	34	471	1	506	2.8	A	5.3	A	2.2	A	5.1	A									884	20	36							
		NB	130	1	7	138	4.3	A	2.2	A	3.3	A	4.2	A									220	27	58							
		SB	10	1	54	65	3.7	A	2.9	A	3.2	A	3.3	A									577	20	38							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	101		17	118	4.8	A			3.5	A	4.6	A	2.8	A						627	35	55								
		WB											0.0	A																		
		NB	15	37		52	2.0	A	0.3	A			0.8	A			150	20	20													
		SB		23	30	53			0.4	A	0.3	A	0.3	A																		

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C7
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2047 Build Conditions
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane					
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹		
AM Peak Hour	College Rd at TH 371 (Signal)	EB	74	90	16	180	41.4	D	44.9	D	6.8	A	39.7	D	22.7	C	360	53	111			946	46	89			320	20	38		
		WB	61	177	236	474	40.5	D	46.0	D	12.6	B	28.5	C			300	46	100			382	69	115			190	75	140		
		NB	59	713	139	911	53.0	D	25.9	C	8.8	A	25.0	C			240	45	104		1 %	2869	143	255	2 %		240	33	83		
		SB	361	554	172	1,087	24.4	C	13.8	B	4.1	A	15.7	B			240	86	137			1863	77	142			250	20	37		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		489	101	590			1.6	A	1.9	A	1.7	A	1.3	A															
		WB		474		474			0.6	A			0.6	A											20						
		NB			29	29					3.8	A	3.8	A														400	20	32	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	66	399	53	518	3.5	A	0.6	A	0.4	A	0.9	A	3.9	A	220	20	45			220	20	20							
		WB	50	332	10	392	4.7	A	0.8	A	0.4	A	1.3	A			220	20	43			894		20							
		NB	113		11	124	28.8	D	0.3	A	3.8	A	26.5	D			190	60	107								120	20	36		
		SB	1		29	30	18.4	C			5.9	A	6.3	A			120	20	20			577	20	47							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	98		14	112	5.2	A			3.5	A	5.0	A	2.4	A						627	35	54							
		WB											0.0	A																	
		NB	12	26		38	2.4	A	0.4	A			1.0	A			150	20	20												
		SB		73	30	103			0.4	A	0.4	A	0.4	A																	
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	261	250	66	577	51.1	D	50.2	D	6.9	A	45.6	D	34.6	C	360	191	297			946	102	168			320	29	57		
		WB	86	253	301	640	42.8	D	70.2	E	14.9	B	41.3	D			300	64	125			382	115	187			190	88	177		
		NB	70	559	85	714	72.9	E	33.8	C	7.5	A	34.5	C			240	65	146		2 %	2869	160	261	2 %		240	20	49		
		SB	219	581	171	971	50.8	D	19.1	B	4.6	A	23.6	C			240	95	157			1863	103	177			250	20	42		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		471	83	554			1.9	A	2.2	A	1.9	A	1.1	A															
		WB		640		640			0.4	A			0.4	A																	
		NB			24	24					3.9	A	3.9	A														400	20	27	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	33	434	28	495	5.9	A	0.6	A	0.3	A	0.9	A	4.8	A	220	20	48			220		20							
		WB	35	480	5	520	4.0	A	1.0	A	0.5	A	1.2	A			220	20	30			894		20							
		NB	115		25	140	35.9	E	0.6	A	4.7	A	29.9	D			190	70	137								120	20	42		
		SB	4		45	49	22.4	C			9.7	A	10.5	B			120	20	20			577	24	58							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	82		12	94	4.8	A			3.5	A	4.6	A	2.2	A						627	33	53							
		WB											0.0	A																	
		NB	11	58		69	2.2	A	0.4	A			0.6	A			150		20												
		SB		40	23	63			0.4	A	0.3	A	0.4	A																	
PM Peak Hour	College Rd at TH 371 (Signal)	EB	322	288	98	708	58.1	E	52.1	D	9.4	A	48.9	D	36.7	D	360	237	370			946	120	215			320	37	69		
		WB	89	227	412	728	44.9	D	72.8	E	28.9	C	44.5	D			300	68	128			382	102	170			190	159	296		
		NB	58	641	85	784	70.9	E	38.0	D	9.6	A	37.2	D			240	56	135		6 %	2869	194	334	6 %		240	27	100		
		SB	199	760	200	1,159	51.9	D	21.4	C	5.3	A	24.0	C			240	96	170			1863	147	237			250	20	50		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		466	106	572			2.0	A	2.5	A	2.1	A	1.3	A															
		WB		728		728			0.6	A			0.6	A							1 %			20	27	1 %					
		NB			33	33					3.8	A	3.8	A													400	20	32		
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Minor Stop)	EB	20	456	23	499	7.0	A	0.6	A	0.4	A	0.8	A	8.5	A	220	20	32			220		20							
		WB	35	529	1	565	4.6	A	1.1	A	1.1	A	1.3	A			220	20	31			894		20							
		NB	142	1	14	157	62.8	F	5.8	A	4.6	A	56.8	F			190	104	198			237	20	101			120	20	36		
		SB	11	1	57	69	25.0	D	16.4	C	10.6	B	13.7	B			120	20	39			577	27	53							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	104		17	121	7.2	A			3.6	A	6.7	A	3.7	A						627	38	72							
		WB											0.0	A																	
		NB	15	53		68	2.2	A	1.0	A			1.3	A			150	20	20			410	20	20							
		SB		28	31	59			0.5	A	0.3	A	0.4	A																	

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Table C8
Evergreen Drive/Douglas Fir Drive Traffic Impact Study
2047 Build Conditions - Traffic Signal at College Rd/Douglas Fir Dr
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours															Vehicle Queuing Information (feet)																
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane					
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ¹	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹		
AM Peak Hour	College Rd at TH 371 (Signal)	EB	74	90	16	180	43.0	D	44.7	D	6.0	A	40.3	D	23.0	C	360	59	151			946	43	100			320	20	39		
		WB	61	177	236	474	35.5	D	41.2	D	11.1	B	25.1	C			300	42	111			382	67	127			190	71	169		
		NB	59	713	139	911	52.9	D	27.9	C	9.1	A	26.7	C			240	45	132		2 %	2869	153	318	2 %		240	31	105		
		SB	361	554	172	1,087	24.0	C	14.8	B	4.1	A	16.2	B			240	87	163			1863	79	171			250	20	59		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		489	101	590			1.6	A	1.8	A	1.6	A	1.4	A															
		WB		474		474			1.1	A			1.1	A								250									
		NB			29	29					4.0	A	4.0	A														400	20	47	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Signal)	EB	66	399		53	518	5.7	A	2.4	A	1.5	A	2.7	A	7.6	A	220	22	59			220	29	98						
		WB	50	332	10	392	7.4	A	3.7	A	2.7	A	4.1	A	220			20	63			894	32	114							
		NB	113			11	124	45.9	D	0.3	A	5.5	A	41.2	D			190	83	168							120	20	53		
		SB	1			29	30	37.2	D			6.0	A	6.0	A			120	20	20			577	20	55						
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	98			14	112	5.1	A			3.8	A	4.9	A	2.5	A						627	36	70						
		WB											0.0	A																	
		NB	12	26			38	2.6	A	0.4	A			1.0	A			150	20	28											
		SB		73	30	103			0.5	A	0.5	A	0.5	A																	
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	261	250	66	577	53.9	D	49.7	D	6.7	A	46.8	D	34.3	C	360	190	333			946	99	205			320	27	60		
		WB	86	253	301	640	45.0	D	69.7	E	14.4	B	40.9	D			300	65	160			382	115	223			190	91	216		
		NB	70	559	85	714	71.6	E	33.4	C	7.9	A	34.0	C			240	63	163		1 %	2869	157	298	2 %		240	21	104		
		SB	219	581	171	971	49.0	D	18.6	B	4.9	A	23.0	C			240	96	173			1863	103	202			250	20	78		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		471	83	554			1.9	A	2.2	A	1.9	A	1.5	A															
		WB		640		640			1.0	A			1.0	A								250									
		NB			24	24					3.8	A	3.8	A														400	20	26	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Signal)	EB	33	434	28	495	10.0	B	6.0	A	4.3	A	6.2	A	8.3	A	220	20	73			220	53	147							
		WB	35	480	5	520	7.6	A	5.9	A	2.8	A	6.0	A			220	20	48			894	49	163							
		NB	115		25	140	29.0	C	0.4	A	5.0	A	24.1	C			190	69	144								120	20	44		
		SB	4		45	49	39.5	D			6.7	A	9.2	A			120	20	32			577	24	73							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	82		12	94	4.7	A			3.4	A	4.5	A	2.2	A						627	33	68							
		WB											0.0	A																	
		NB	11	58		69	2.2	A	0.3	A			0.6	A			150	20	20												
		SB		40	23	63			0.6	A	0.4	A	0.5	A																	
PM Peak Hour	College Rd at TH 371 (Signal)	EB	322	288	98	708	63.6	E	50.3	D	10.1	B	50.8	D	37.0	D	360	253	421			946	124	365			320	40	96		
		WB	89	227	412	728	41.6	D	74.7	E	31.7	C	45.8	D			300	60	143			382	101	178			190	171	365		
		NB	58	641	85	784	69.3	E	36.7	D	9.8	A	36.0	D			240	53	174		5 %	2869	186	361	5 %		240	21	77		
		SB	199	760	200	1,159	50.6	D	21.9	C	5.2	A	23.9	C			240	94	214		1 %	1863	149	275			250	20	68		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		466	106	572			2.0	A	2.6	A	2.1	A	2.1	A															
		WB		728		728			2.0	A			2.0	A								250	20	57	2 %			400	20	46	
		NB			33	33					4.3	A	4.3	A																	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Signal)	EB	20	456	23	499	10.1	B	7.2	A	5.0	A	7.2	A	9.7	A	220	20	57			220	66	158							
		WB	35	529	1	565	8.4	A	7.0	A	0.0	A	7.1	A			220	20	55			894	65	162							
		NB	142	1	14	157	27.7	C	13.1	B	4.8	A	25.5	C			190	80	155			237	20	24			120	20	33		
		SB	11	1	57	69	31.4	C	0.0	A	7.8	A	11.6	B			120	20	55			577	27	66							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	104		17	121	5.0	A			3.3	A	4.8	A	2.7	A						627	35	70							
		WB											0.0	A																	
		NB	15	53		68	2.1	A	0.4	A			0.8	A			150	20	20												
		SB		28	31	59			0.6	A	0.5	A	0.6	A								237		20							

NOTES

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

HCS Roundabouts Report

General Information	Site Information
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Analyst	Justin Anibas, PE		Intersection	College Rd at Douglas Fir Dr
Agency or Co.	SEH		E/W Street Name	College Rd
Date Performed	5/14/2026		N/S Street Name	Douglas Fir Dr
Analysis Year	2047		Analysis Time Period, hrs	0.25
Time Analyzed	Build AM Peak Hour		Peak Hour Factor	0.93
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study		Jurisdiction	Baxter, MN

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	66	399	53	0	50	332	10	0	113	0	11	0	1	0	29
Percent Heavy Vehicles, %	0	2	4	8	0	2	1	0	0	3	0	18	0	0	0	7
Flow Rate (V_{PC}), pc/h	0	72	446	62	0	55	361	11	0	125	0	14	0	1	0	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	273	307		201	226			139			34	
Entry Volume, veh/h	262	295		199	224			133			32	
Circulating Flow (v_c), pc/h	56			197			519			541		
Exiting Flow (v_{ex}), pc/h	461			519			83			117		
Capacity (C_{pc}), pc/h	1349	1349		1187	1187			913			897	
Capacity (c), veh/h	1296	1296		1174	1174			876			840	
v/c Ratio (x)	0.20	0.23		0.17	0.19			0.15			0.04	

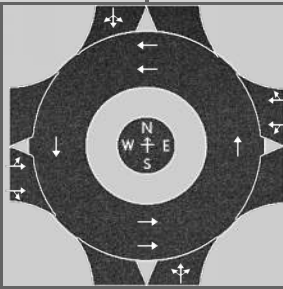
Delay and Level of Service	
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Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.5	4.7		4.5	4.7			5.6			4.6	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.8	0.9		0.6	0.7			0.5			0.1	
95% Queue Length, Q ₉₅ (ft)	20.6	23.3		15.1	17.6			12.9			2.6	
Approach Delay, s/veh LOS	4.6		A	4.6		A	5.6		A	4.6		A
Intersection Delay, s/veh LOS	4.7						A					

HCS Roundabouts Report

General Information

Analyst	Justin Anibas, PE
Agency or Co.	SEH
Date Performed	5/14/2026
Analysis Year	2047
Time Analyzed	Build School Dismissal
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study



Site Information

Intersection	College Rd at Douglas Fir Dr
E/W Street Name	College Rd
N/S Street Name	Douglas Fir Dr
Analysis Time Period, hrs	0.25
Peak Hour Factor	0.84
Jurisdiction	Baxter, MN

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	33	434	28	0	35	480	5	0	115	0	25	0	4	0	45
Percent Heavy Vehicles, %	0	15	2	0	0	3	1	0	0	2	0	0	0	0	0	9
Flow Rate (V _{PCE}), pc/h	0	45	527	33	0	43	577	6	0	140	0	30	0	5	0	58
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	284	321		294	332			170			63	
Entry Volume, veh/h	277	312		291	328			167			58	
Circulating Flow (v_c), pc/h	48			185			577			760		
Exiting Flow (v_{ex}), pc/h	562			775			51			76		
Capacity (C_{PCE}), pc/h	1359	1359		1200	1200			870			744	
Capacity (c), veh/h	1323	1323		1187	1187			856			688	
v/c Ratio (x)	0.21	0.24		0.25	0.28			0.20			0.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.5	4.7		5.2	5.6			6.2			6.1	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.8	0.9		1.0	1.1			0.7			0.3	
95% Queue Length, Q ₉₅ (ft)	20.5	22.8		25.2	27.7			17.7			8.0	
Approach Delay, s/veh LOS	4.6		A	5.4		A	6.2		A	6.1		A
Intersection Delay, s/veh LOS	5.2						A					

HCS Roundabouts Report

General Information	Site Information
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Analyst	Justin Anibas, PE		Intersection	College Rd at Douglas Fir Dr
Agency or Co.	SEH		E/W Street Name	College Rd
Date Performed	5/14/2026		N/S Street Name	Douglas Fir Dr
Analysis Year	2047		Analysis Time Period, hrs	0.25
Time Analyzed	Build PM Peak Hour		Peak Hour Factor	0.95
Project Description	Evergreen Dr/Douglas Fir Dr Traffic Impact Study		Jurisdiction	Baxter, MN

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	2	0	0	0	2	0	0	0	1	0	0	0	1	0
Lane Assignment	LT		TR		LT		TR				LTR				LTR	
Volume (V), veh/h	0	20	456	23	0	35	529	1	0	142	1	14	0	11	1	57
Percent Heavy Vehicles, %	0	5	3	22	0	3	1	0	0	1	0	0	0	0	0	2
Flow Rate (V_{PC}), pc/h	0	22	494	30	0	38	562	1	0	151	1	15	0	12	1	61
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				2				2			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs, %	0															

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway, s	4.5436	4.5436		4.5436	4.5436			4.3276			4.3276	
Follow-Up Headway, s	2.5352	2.5352		2.5352	2.5352			2.5352			2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h	257	289		282	319			167			74	
Entry Volume, veh/h	247	278		279	315			166			73	
Circulating Flow (v_c), pc/h	51			174			528			751		
Exiting Flow (v_{ex}), pc/h	521			774			24			69		
Capacity (C_{pc}), pc/h	1356	1356		1212	1212			907			750	
Capacity (c), veh/h	1304	1304		1199	1199			898			738	
v/c Ratio (x)	0.19	0.21		0.23	0.26			0.18			0.10	

Delay and Level of Service	
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Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh	4.4	4.6		5.1	5.4			5.8			5.9	
Lane LOS	A	A		A	A			A			A	
95% Queue Length, Q ₉₅ (veh)	0.7	0.8		0.9	1.1			0.7			0.3	
95% Queue Length, Q ₉₅ (ft)	17.9	20.6		22.7	27.7			17.6			7.6	
Approach Delay, s/veh LOS	4.5		A	5.2		A	5.8		A	5.9		A
Intersection Delay, s/veh LOS	5.1						A					

Table C9

Evergreen Drive/Douglas Fir Drive Traffic Impact Study

2047 Build Conditions - Roundabout at College Rd/Douglas Fir Dr

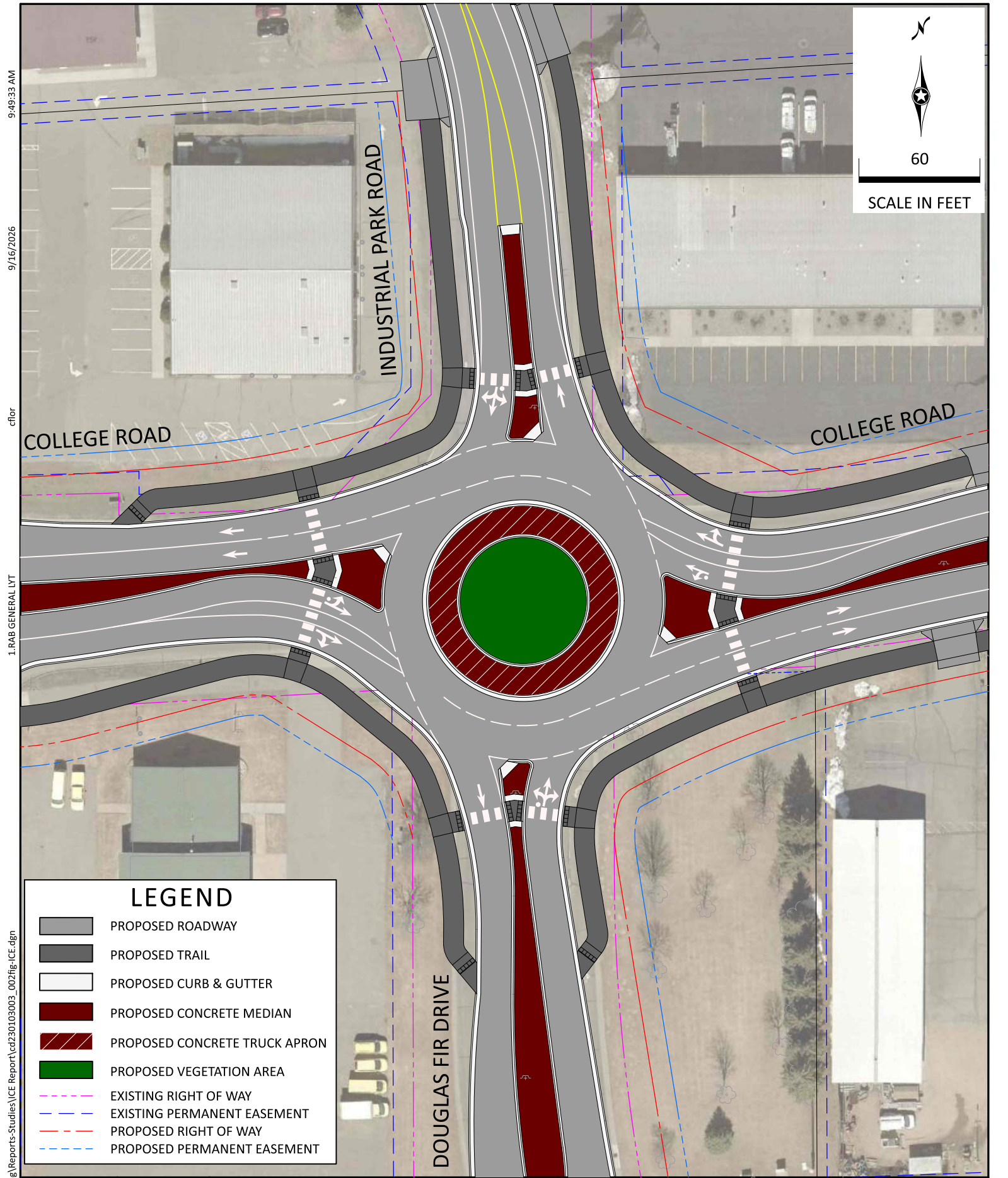
AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours

AM (7:15 to 8:15 AM), School Dismissal (2:45 to 3:45 PM), & PM (4:15 to 5:15 PM) Peak Hours																Vehicle Queuing Information (feet)															
Intersection		Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Left Turn Lane				Through Lane (s)					Right Turn Lane					
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Thru ⁽²⁾ ----->	% Block Left ⁽²⁾ <-----	Link Length (feet)	Avg. Queue (feet) ¹	95th % Queue (feet) ¹	% Block Right ⁽²⁾ ----->	% Block Thru ⁽²⁾ <-----	Storage (feet) ³	Avg. Queue (feet) ¹	95th % Queue (feet) ¹		
AM Peak Hour	College Rd at TH 371 (Signal)	EB	74	90	16	180	41.4	D	43.2	D	6.8	A	39.1	D	23.3	C	360	58	112			946	44	86				320	20	37	
		WB	61	177	236	474	42.1	D	46.0	D	13.4	B	29.7	C			300	44	95			380	68	111				190	73	140	
		NB	59	713	139	911	52.9	D	26.6	C	9.0	A	25.7	C			240	48	109		1 %	2869	147	255	1 %		240	30	70		
		SB	361	554	172	1,087	23.7	C	14.4	B	4.1	A	15.9	B			240	86	143			1862	76	143			250	20	32		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		489	101	590			2.1	A	1.9	A	2.1	A	1.5	A								20							
		WB		474		474			0.6	A			0.6	A														400	20	36	
		NB			29	29					4.6	A	4.6	A																	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Roundabout)	EB	66	399	53	518	3.3	A	4.8	A	3.2	A	4.4	A	4.3	A						211	20	38							
		WB	50	332	10	392	3.3	A	4.7	A	3.7	A	4.5	A								887	20	34							
		NB	113		11	124	3.9	A	0.4	A	3.2	A	3.8	A								221	24	51							
		SB	1		29	30	3.2	A			2.9	A	2.9	A								577	20	20							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	98		14	112	5.1	A			3.2	A	4.9	A	2.4	A						627	32	54							
		WB											0.0	A																	
		NB	12	26		38	2.5	A	0.5	A			1.1	A			150	20	20												
		SB		73	30	103			0.4	A	0.3	A	0.4	A																	
School Dismissal Peak Hour	College Rd at TH 371 (Signal)	EB	261	250	66	577	51.3	D	51.3	D	6.9	A	46.1	D	34.7	C	360	183	290			946	102	169				320	28	55	
		WB	86	253	301	640	44.3	D	69.7	E	17.1	B	41.7	D			300	63	128			380	116	192				190	95	191	
		NB	70	559	85	714	70.4	E	33.1	C	7.7	A	33.9	C			240	65	128		2 %	2869	158	265	2 %		240	20	52		
		SB	219	581	171	971	51.1	D	19.5	B	4.5	A	23.9	C			240	97	154			1862	104	176			250	20	36		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		471	83	554			2.1	A	2.3	A	2.1	A	1.3	A							20	25							
		WB		640		640			0.5	A			0.5	A														400	20	29	
		NB			24	24					3.8	A	3.8	A																	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Roundabout)	EB	33	434	28	495	2.9	A	4.6	A	3.0	A	4.4	A	4.7	A						211	20	35							
		WB	35	480	5	520	3.0	A	5.4	A	3.4	A	5.2	A								887	20	41							
		NB	115		25	140	4.6	A	0.9	A	3.3	A	4.3	A								221	28	61							
		SB	4		45	49	4.5	A			3.4	A	3.5	A								577	20	43							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	82		12	94	4.9	A			3.2	A	4.6	A	2.3	A						627	34	52							
		WB											0.0	A																	
		NB	11	58		69	2.1	A	0.5	A			0.7	A			150	20	20												
		SB		40	23	63			0.4	A	0.3	A	0.4	A																	
PM Peak Hour	College Rd at TH 371 (Signal)	EB	322	288	98	708	59.3	E	51.9	D	9.8	A	49.0	D	37.5	D	360	239	381			946	112	196				320	41	75	
		WB	89	227	412	728	44.4	D	79.3	E	30.4	C	47.3	D			300	64	124			380	107	183				190	170	297	
		NB	58	641	85	784	69.6	E	38.8	D	10.3	B	37.8	D			240	57	150		7 %	2869	192	353	7 %		240	28	105		
		SB	199	760	200	1,159	51.9	D	21.5	C	5.2	A	23.9	C			240	95	162			1862	145	233			250	20	52		
	College Rd at Gas Station Access (Right-in/Right-out)	EB		466	106	572			2.2	A	2.4	A	2.2	A	1.5	A															
		WB		728		728			0.9	A			0.9	A										20	38	1 %			400	20	34
		NB			33	33					3.9	A	3.9	A																	
		SB											0.0	A																	
	College Rd at Douglas Fir Dr (Roundabout)	EB	20	456	23	499	3.0	A	4.7	A	3.0	A	4.6	A	5.0	A						211	20	36							
		WB	35	529	1	565	3.1	A	5.7	A	6.1	A	5.5	A								887	20	41							
		NB	142	1	14	157	5.0	A	4.4	A	3.5	A	4.9	A								221	32	67							
		SB	11	1	57	69	4.4	A	2.7	A	3.2	A	3.4	A								577	20	40							
	Douglas Fir Dr at Gas Station Access (Minor Stop)	EB	104		17	121	5.2	A			3.3	A	4.9	A	2.7	A						627	36	55							
		WB											0.0	A																	
		NB	15	53		68	2.3	A	0.5	A			0.9	A			150	20	20												
		SB		28	31	59			0.4	A	0.3	A	0.4	A																	

- NOTES
1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
 2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
 3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

Appendix D

Douglas Fir Drive Roundabout Preliminary Layout





60
SCALE IN FEET

9:49:33 AM
9/16/2026
cfor
1.RAB GENERAL LYT
BAXTE\\192804\\Planning\\Reports-Studies\\ICE Report\\cd230103003_002fig-ICE.dgn

LEGEND

 PROPOSED ROADWAY

 PROPOSED TRAIL

 PROPOSED CURB & GUTTER

 PROPOSED CONCRETE MEDIAN

 PROPOSED CONCRETE TRUCK APRON

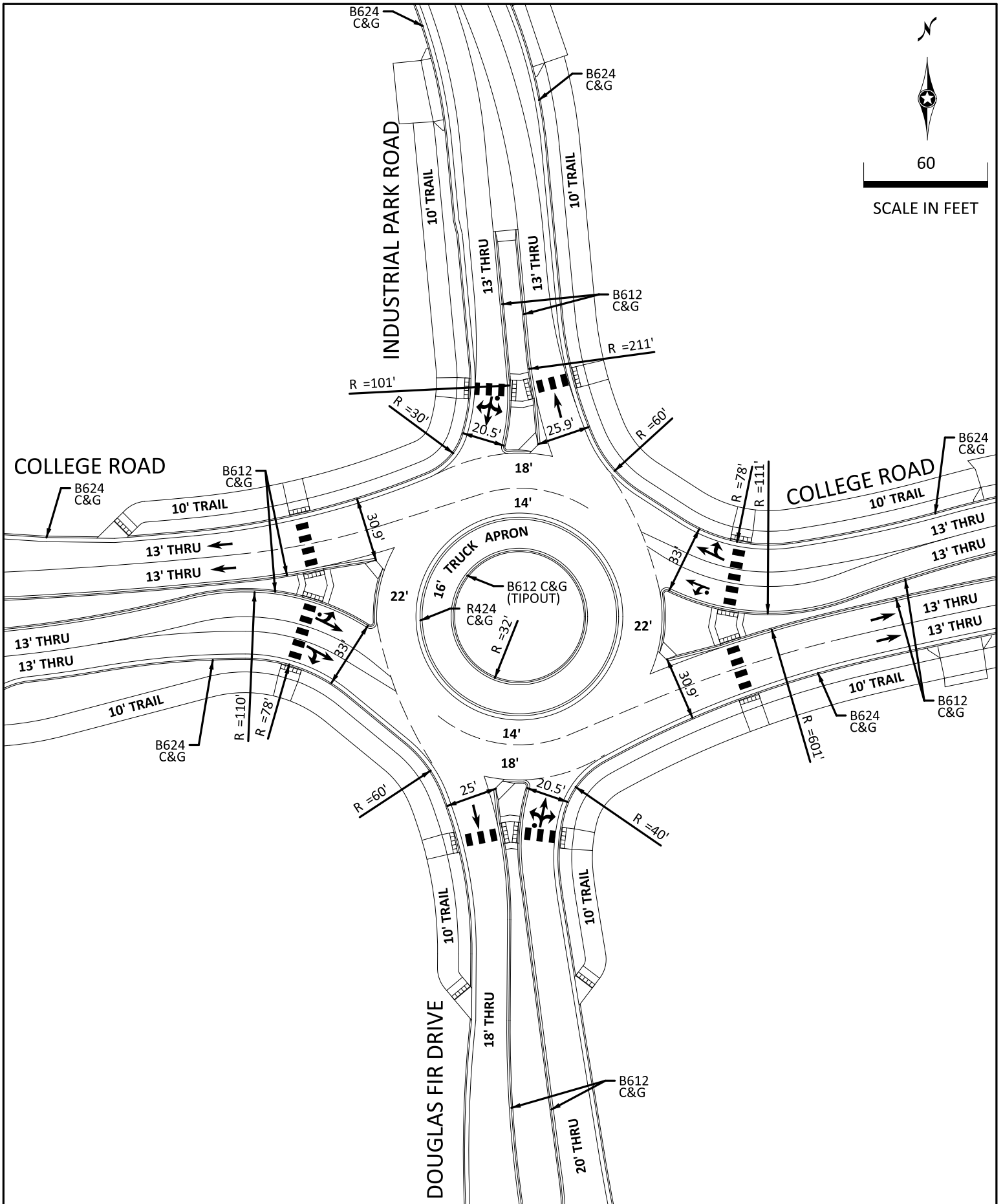
 PROPOSED VEGETATION AREA

 EXISTING RIGHT OF WAY

 EXISTING PERMANENT EASEMENT

 PROPOSED RIGHT OF WAY

 PROPOSED PERMANENT EASEMENT



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192804

DATE:
9/16/2026

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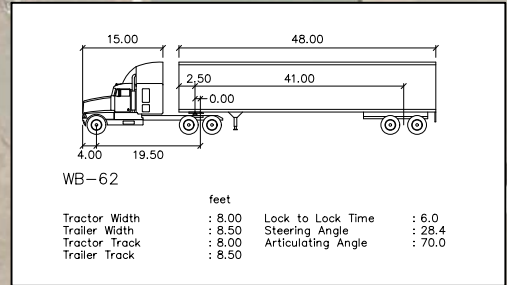
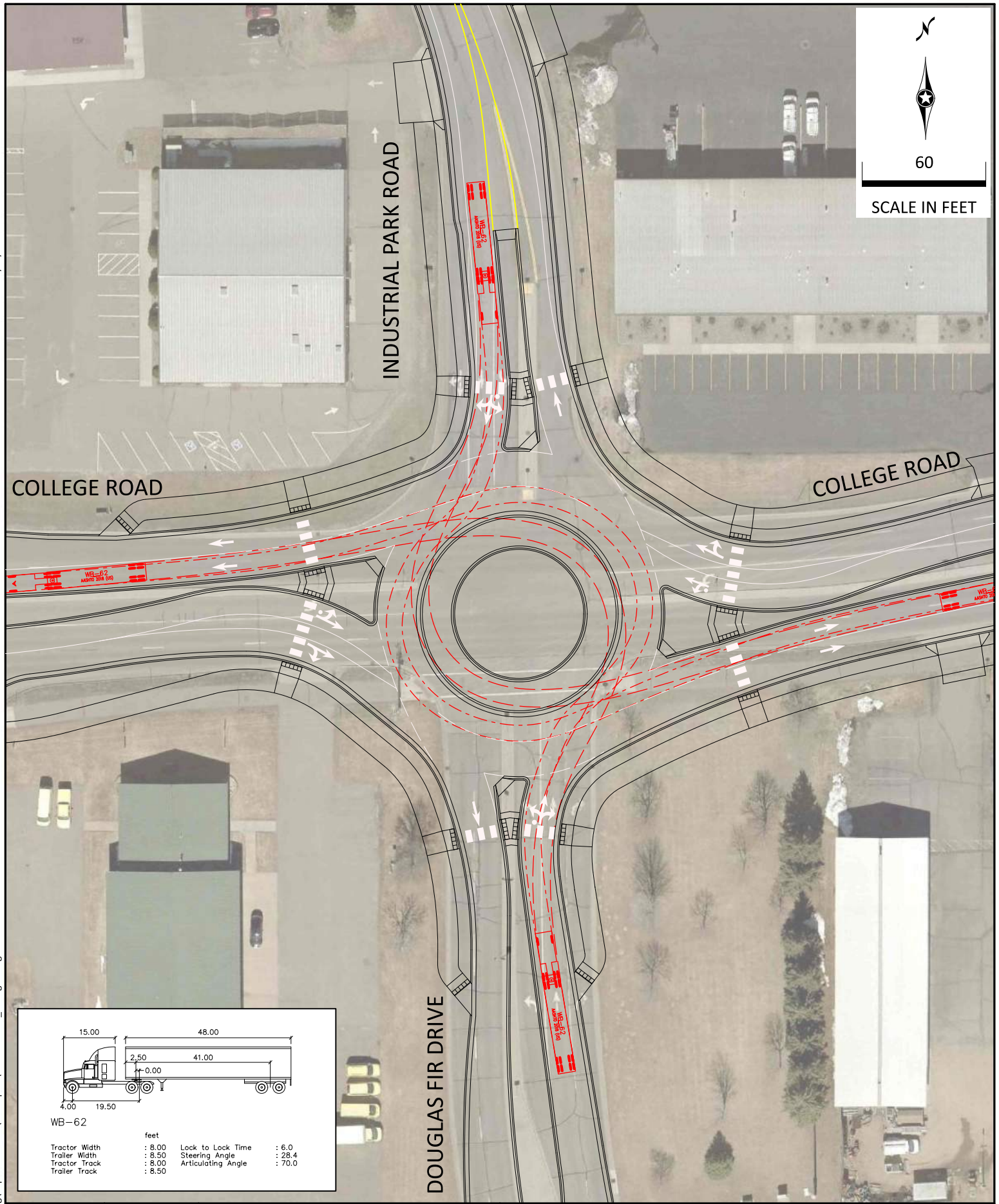
S.A.P. 230-103-003

**COLLEGE ROAD /
DOUGLAS FIR DRIVE**
PROPOSED ROUNDABOUT GEOMETRY DETAIL

FIGURE
No. 2

FIGURE
No. 3

BAXTE\192804\Planning\Reports-Studies\ICE Report\cd230103003_002fig-ICE.dgn
9/16/2026
9:49:37 AM
cfor
4 LEFT TURN MOVE WB-62 - 1



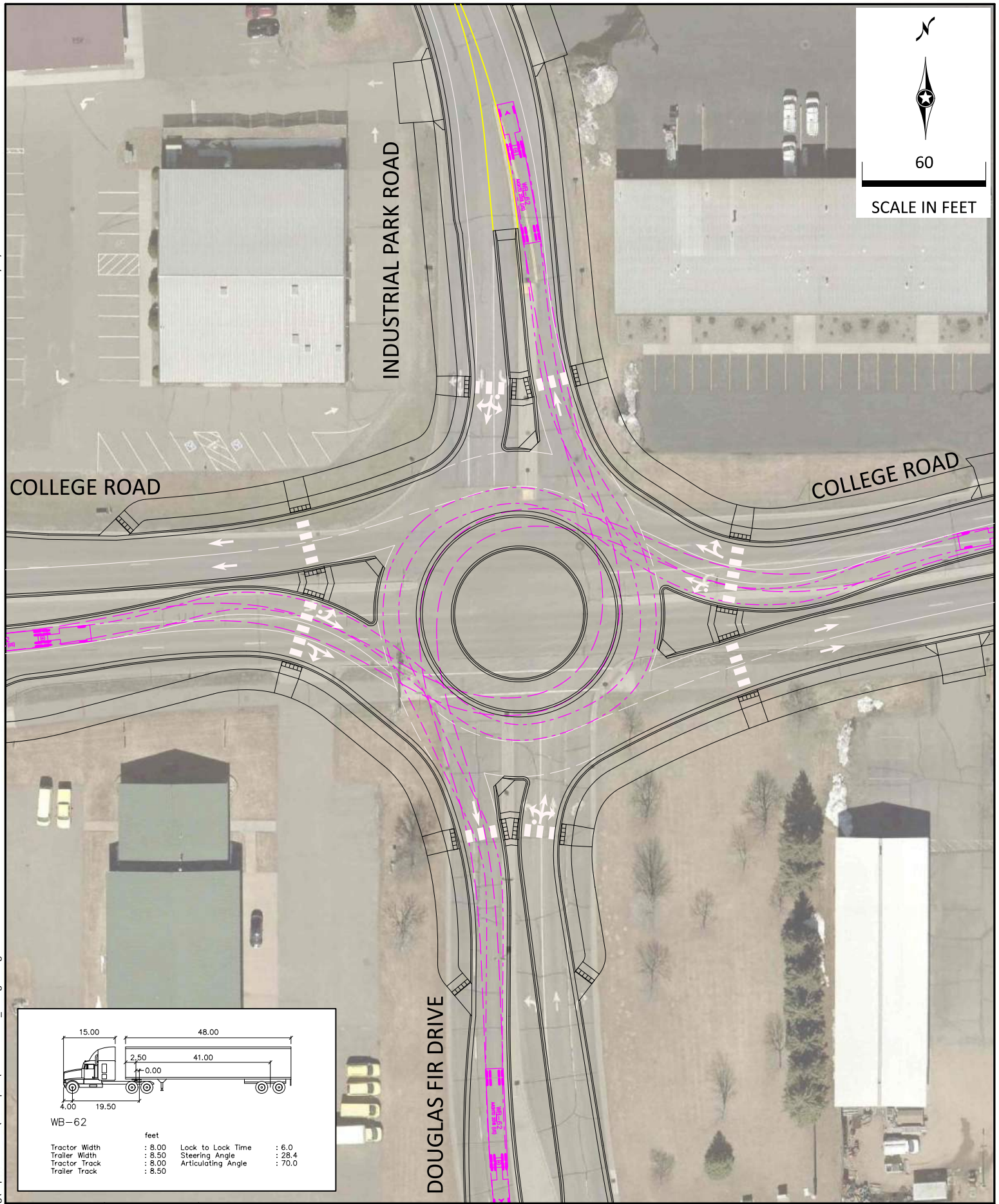
SEH NO.
192804
DATE:
9/16/2026

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S.A.P. 230-103-003

**COLLEGE ROAD /
DOUGLAS FIR DRIVE**
WB-62 LEFT TURNING MOVEMENTS
NB TO WB & SB TO EB

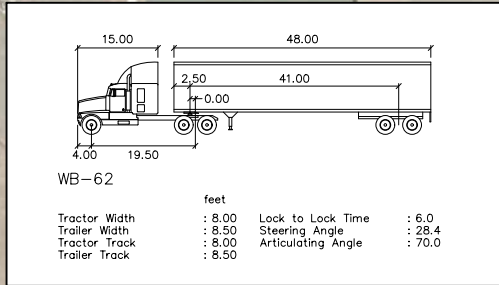
**FIGURE
No. 4**

BAXTER\192804\Planning\Reports-Studies\ICE Report\cd230103003_002fig-ICE.dgn 9:49:38 AM 9/16/2026 cfor 5 LEFT TURN MOVE WB-62 - 2





60
SCALE IN FEET



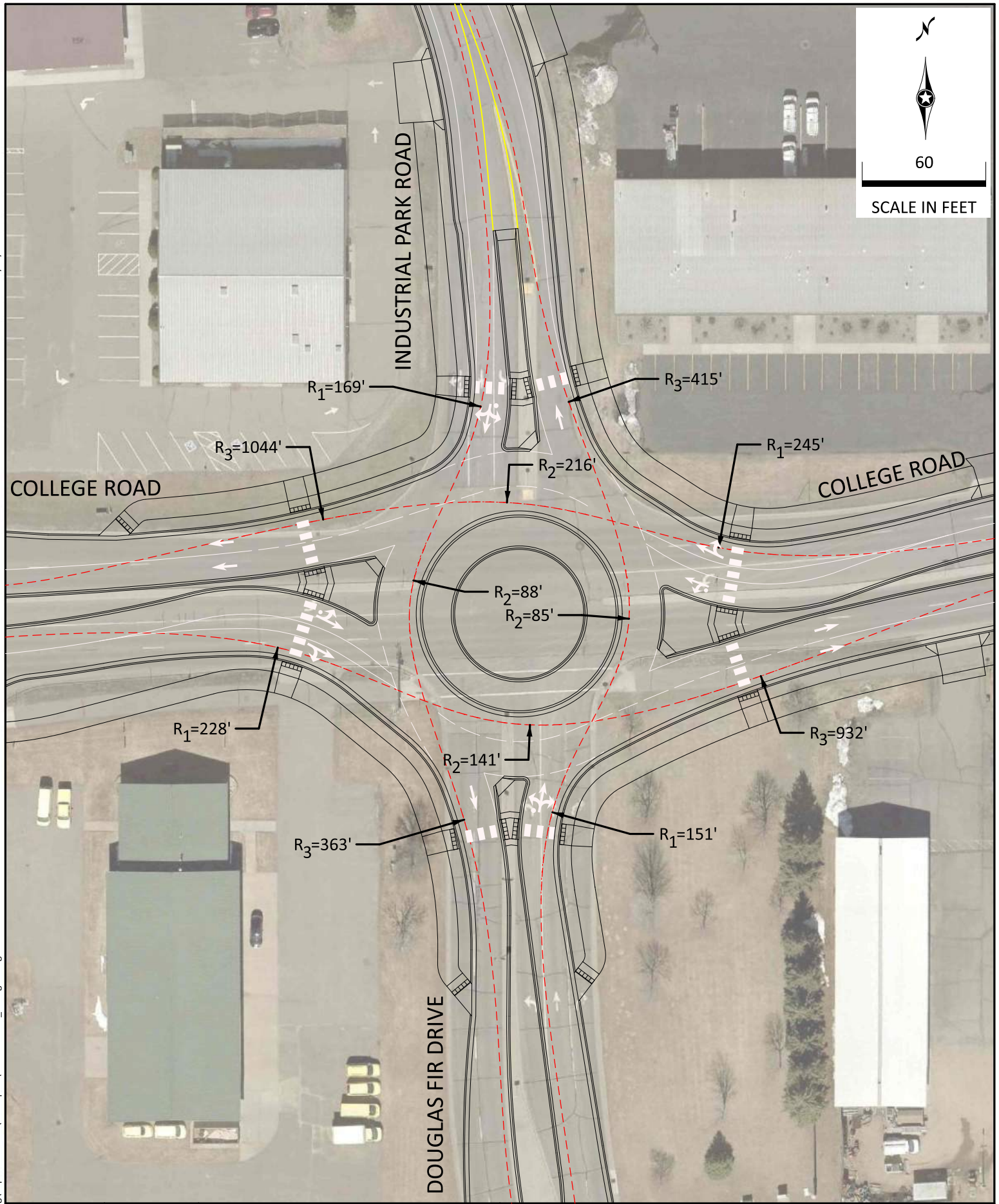
SEH NO.
192804
DATE:
9/16/2026

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S.A.P. 230-103-003

COLLEGE ROAD /
DOUGLAS FIR DRIVE
WB-62 LEFT TURNING MOVEMENTS
EB TO NB & WB TO SB

FIGURE
No. 5

9:49:39 AM
9/16/2026
cfor
6.FASTPATH 1 2 3
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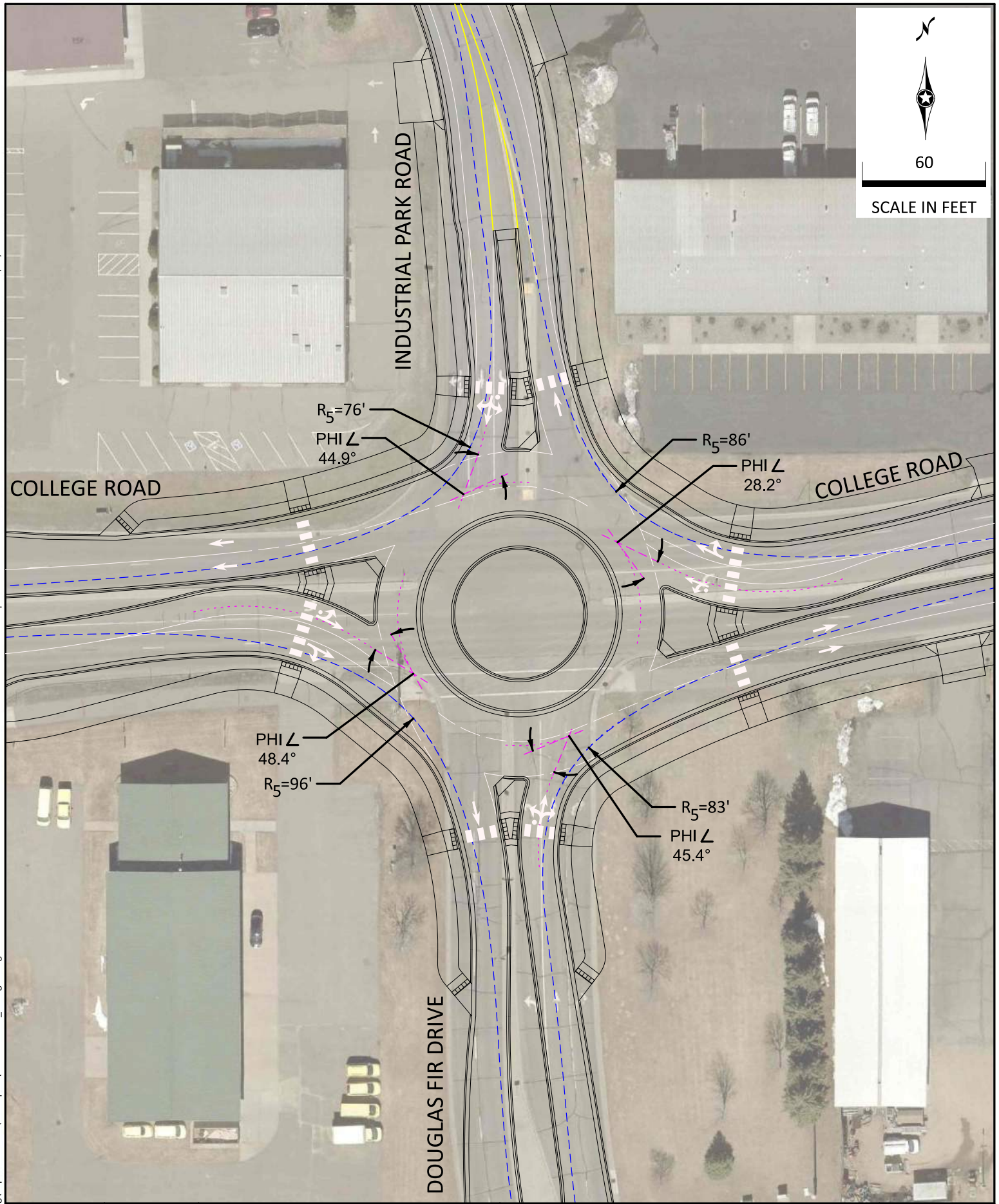
SEH NO.
192804
DATE:
9/16/2026

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**COLLEGE ROAD /
DOUGLAS FIR DRIVE**
FAST PATH ANALYSIS - R1,R2,R3

**FIGURE
No. 6**

BAXTE\192804\Planning\Reports-Studies\ICE Report\cd2301033003_002fig-ICE.dgn
7.FASTPATH 5+phi
cfor
9/16/2026
9:49:40 AM



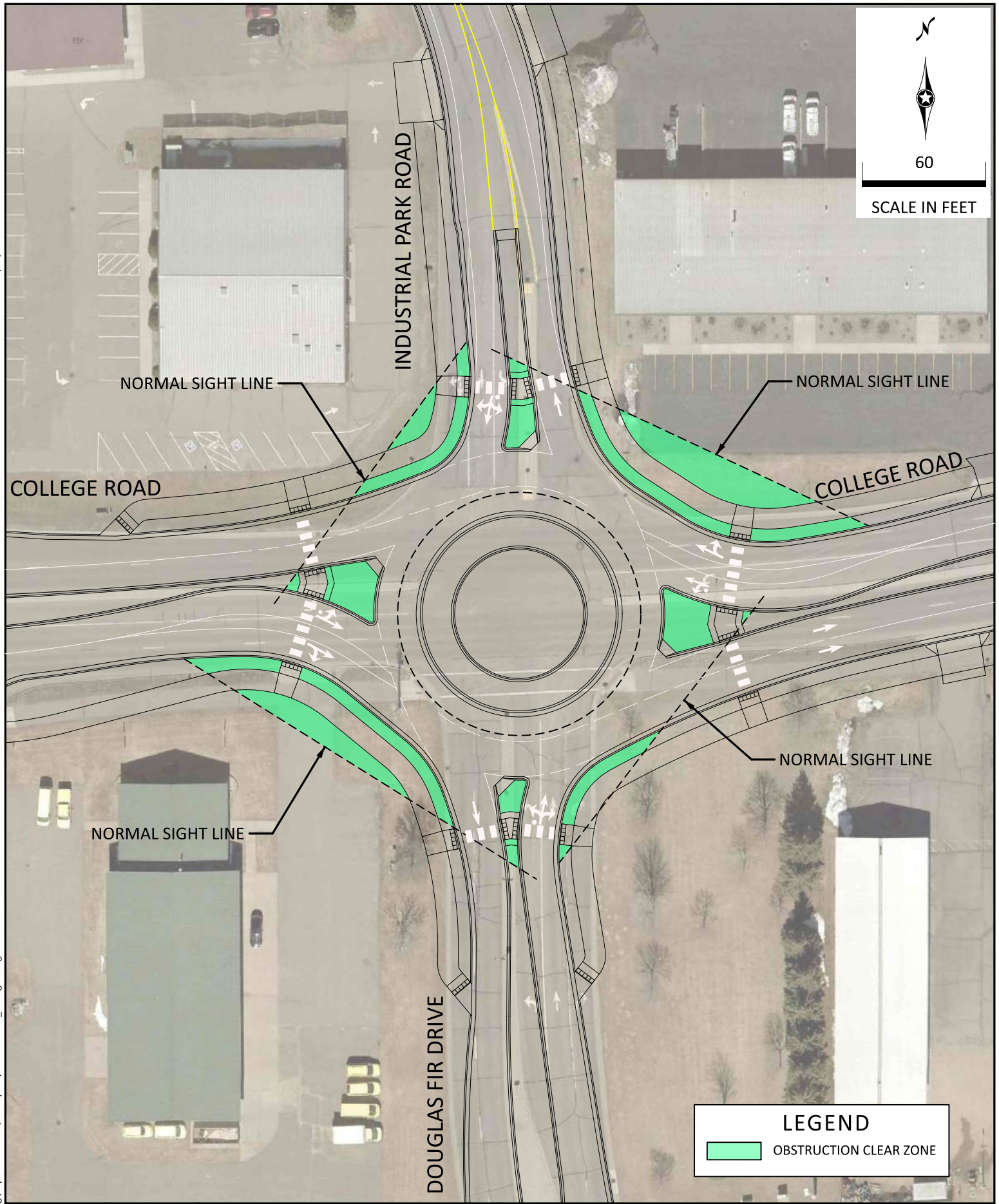
SEH NO.
192804
DATE:
9/16/2026

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**COLLEGE ROAD /
DOUGLAS FIR DRIVE**
FAST PATH ANALYSIS - R5 & PHI ANGLE

**FIGURE
No. 7**

BAXTE\192804\Planning\Reports-Studies\ICE Report\cd230103003_002fig-ICE.dgn
8.INT SIGHT DIST
cfor
9/16/2026
9:49:42 AM



LEGEND

 OBSTRUCTION CLEAR ZONE



SEH NO.
192804
DATE:
9/16/2026

CITY OF BAXTER, MN.
S.A.P. 230-103-003

**COLLEGE ROAD /
DOUGLAS FIR DRIVE**
FAST PATH ANALYSIS - R5 & PHI ANGLE

**FIGURE
No. 8**

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