

July 31, 2023

Mr. Jeff Hemme
Hemme Construction LLC
2301 Chapel Plaza Court
Columbia, Missouri 65203

RE: Traffic Impact Study – Grant Tract Residential Development
Gibbs Road/Barberry Avenue
Boone County, Missouri
CBB Job No. 059-23

Dear Mr. Hemme:

As requested, CBB has completed a traffic impact study pertaining to a proposed residential development, known as the Grant Tract, generally located north of Gibbs Road/Barberry Avenue approximately one-half mile west of Grayson Drive in Boone County, Missouri. The location of the site relative to the surrounding area is depicted in **Figure 1**.

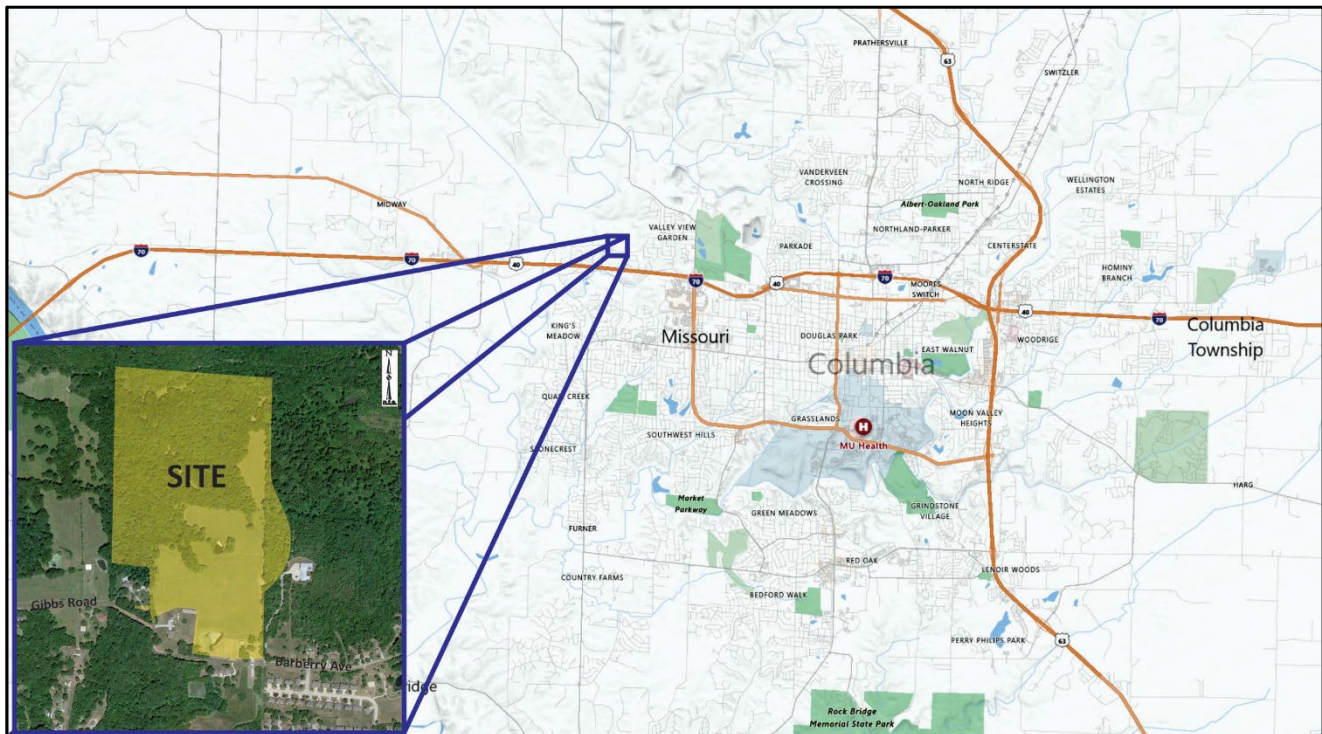


Figure 1: Project Location Map



Based on the latest site plan provided by Crockett Engineering, the proposed development will include approximately 123 single-family homes including traditional single-family and attached single-family homes. In conjunction with the proposed development, a new collector road would be constructed through the southern portion of the site originating near the 90-degree curve in Gibbs Roads and ending at the east property line, to be extended by others in the future. Access for the subdivision is proposed via two drives off this new collector road and one drive off Gibbs Road/Barberry Avenue. A schematic of the concept plan provided is shown in **Exhibit 1**.

The purpose of this study was to determine the number of additional trips that would be generated by the proposed development, assign the trips to the adjoining roadways, evaluate the impact of the additional trips on the operating conditions for the adjacent roadways, and determine the ability of motorists to safely enter and exit the site. If necessary, roadway improvements (lane additions and/or traffic control modifications) were recommended to mitigate the impact of the development and to accommodate the additional traffic. The focus of this study was the AM and PM peak hours of a typical weekday.

CBB discussed the scope of work for this traffic study with the City of Columbia and Boone County at the commencement of the traffic study process. CBB also provided the City and Boone County a Technical Memo summarizing the proposed site trip generation and directional distribution estimates, as well as the existing traffic conditions and gained their consensus on the assumptions prior to completing the traffic analyses.

As requested, the following key intersections were included in the study:

- Barberry Avenue and Grayson Drive;
- Interstate 70 Drive NW and Barnwood Drive;
- Interstate 70 Drive NW and Gibbs Road;
- Primrose Drive and Sunflower Street;
- Gibbs Road and proposed site drive; and
- New Collector Road and proposed site drives.

As requested, the traffic impact study evaluated the following analysis scenarios for the weekday AM and PM peak hours:

- 2023 Existing Conditions; and
- 2023 Build Conditions (Existing plus Grant Tract Trips).

The following report presents the methodology and findings relative to the 2023 Existing and 2023 Build conditions.



EXISTING CONDITIONS

Interstate 70 Drive NW is a collector road maintained by the Missouri Department of Transportation (MoDOT). The road provides two lanes, one in each direction. The posted speed limit is 45 mph. Sidewalks are not provided along the roadway. This road gives access to residential areas, churches, businesses, and the Boone County Fire Protection District fire station. Interstate 70 Drive NW currently ends two miles to the west of Stadium Boulevard.

Gibbs Road is generally an east-west local road maintained by Boone County. The road provides two lanes, one in each direction. The posted speed limit is 35 mph with advisory speeds of 15 mph posted for sharp curves. Sidewalks are not provided along the roadway. The entire road is a no-passing zone with several horizontal and vertical changes in alignment. Trucks are not permitted after the road turns into Barberry Avenue.

Barberry Avenue is a local road that runs generally east-west and is maintained by the City of Columbia. The road provides two lanes, one in each direction. The posted speed limit is 30 mph with advisory speeds of 20 mph posted for several curves. At the curve by the Barberry Avenue and Mayberry Drive intersection, the posted advisory speed is 15 mph. Sidewalks are not provided along the roadway and the entire road is a no-passing zone. Trucks are not permitted.

Grayson Drive and **Barnwood Drive** are north-south local roads within a residential subdivision that provides two lanes, one in each direction. The posted speed limit is 25 mph. Sidewalks are provided along both sides of the roadways and there is on-street parking.

Primrose Drive is an east-west local road maintained by the City of Columbia within a residential area. The road provides two lanes, one in each direction. The posted speed limit is 25 mph with advisory speeds of 20 mph posted for the speed bumps. There are four speed bumps along the roadway. Sidewalks are not provided along the roadway and there is on-street parking. There are no parking signs along the street before and after the intersection of Gus Court and Primrose Drive.

Sunflower Street is a north-south local road maintained by the City of Columbia within a residential area. The road provides two lanes, one in each direction, though the road is wider at 36 feet. The posted speed limit is 25 mph. The southern half of this road provides sidewalks on the east side of the roadway while the northern half provides sidewalks on both sides of the roads. There is on-street parking.

The intersection of Barberry Avenue and Grayson Drive operates under side-street stop control. All approaches consist of a single shared lane. **Figure 2** provides an aerial view of the Barberry Avenue and Grayson Drive intersection.

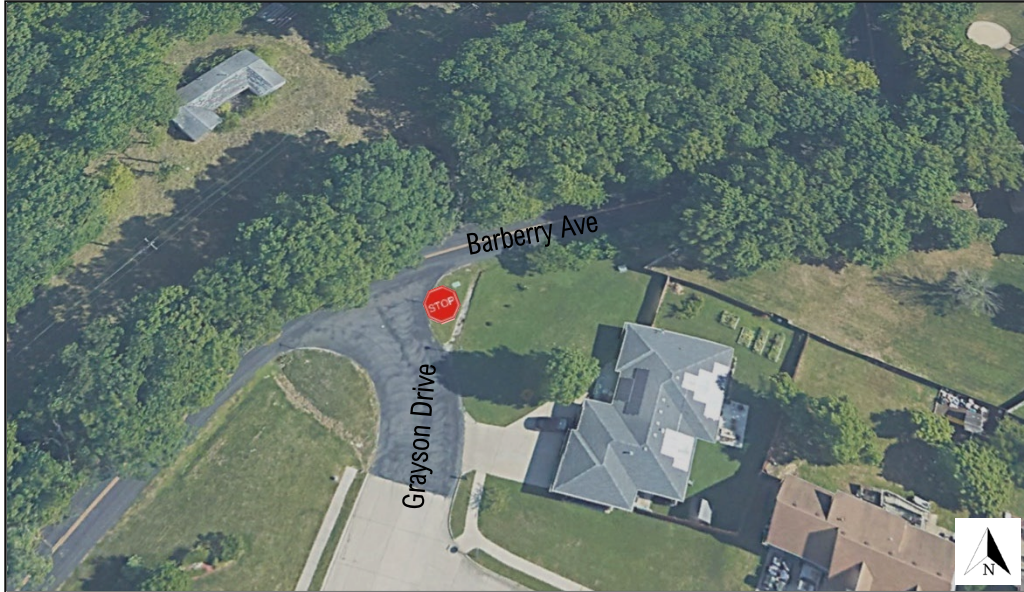


Figure 2: Aerial View of Barberr Avenue and Grayson Drive Intersection

The sight distance for the existing Barberr Ave and Greyson Drive intersection was noted as an area of concern. A general field review of the sight distance requirements indicates that an All-Way-Stop controlled intersection might be better suited for this intersection. Further recommendation is analyzed later in this report.

The intersection of Interstate 70 Drive NW and Barnwood Drive operates under side-street stop control. All approaches consist of a single shared lane. **Figure 3** provides an aerial view of the Interstate 70 Drive NW and Barnwood Drive intersection.



Figure 3: Aerial View of Interstate 70 Drive NW and Barnwood Drive Intersection



The intersection of Interstate 70 Drive NW and Gibbs Road operates under side-street stop control. All approaches consist of a single shared lane. **Figure 4** provides an aerial view of the Interstate 70 Drive NW and Gibbs Road intersection.



Figure 4: Aerial View of Interstate 70 Drive NW and Gibbs Road Intersection

The intersection of Primrose Drive and Sunflower Street operates under side-street stop control. All approaches consist of a single shared lane. **Figure 5** provides an aerial view of the Primrose Drive and Sunflower Street intersection.



Figure 5: Aerial View of Primrose Drive and Sunflower Street Intersection



Existing Traffic Volumes: Video, turning movement traffic counts were conducted on Thursday, May 18, 2023, during the morning commuter peak period (7:00 - 9:00 a.m.) and afternoon commuter peak period (3:00 - 6:00 p.m.) at the following intersections:

- Barberry Avenue and Grayson Drive;
- Interstate 70 Drive NW and Barnwood Drive;
- Interstate 70 Drive NW and Gibbs Road;
- Primrose Drive and Sunflower Street; and
- Gibbs Road near the proposed site.

The Columbia Public Schools academic calendar was reviewed to ensure that the data was collected during normal school operations. Based on the traffic data collected, the weekday morning and afternoon peak hours were slightly different at each intersection. Therefore, the peak hour for each intersection was evaluated to provide a “worst-case scenario”. The peak hours evaluated for each intersection is listed below:

- Barberry Avenue and Grayson Drive
7:00 to 8:00 AM and 4:00 to 5:00 PM
- Interstate 70 Drive NW and Barnwood Drive
7:30 to 8:30 AM and 4:30 to 5:30 PM
- Interstate 70 Drive NW and Gibbs Road
7:15 to 8:15 AM and 4:30 to 5:30 PM
- Primrose Drive and Sunflower Street
7:15 to 8:15 AM and 4:15 to 5:15 PM
- Gibbs Road near the proposed site
7:00 to 8:00 AM and 4:00 to 5:00 PM

The existing peak hour traffic volumes are summarized in **Exhibit 2**. The estimated Average Daily Traffic (ADT) volumes along Gibbs Road near the site are also shown in the Exhibit.



Exhibit 2: Existing Traffic Volumes



PROPOSED SITE

Proposed Land Use: Based upon the concept plan provided by Crockett Engineering, previously shown in Exhibit 1, the proposed development will include approximately 123 single-family homes including traditional single-family and attached single-family homes.

Site Access: As shown on the concept plan, in conjunction with the proposed development, a new collector road would be constructed through the southern portion of the site originating near the 90-degree curve in Gibbs Roads and ending at the east property line, to be extended by others in the future. Access for the subdivision is proposed via two drives off this new collector road and one drive off Gibbs Road.

Figure 6 depicts the planned roadways near the proposed Grant Tract. As depicted, the CATSO Roadway Map shows a Major Collector Roadway extending from Gibbs Road through the southeast corner of the Grant Tract and then continuing to the north. The proposed development shows the construction of this collector road within their property.

As shown in Figure 6, the CATSO Roadway Map also shows a future extension of Interstate 70 Drive NW from its current terminus to the west to Highway 40 in Midway.

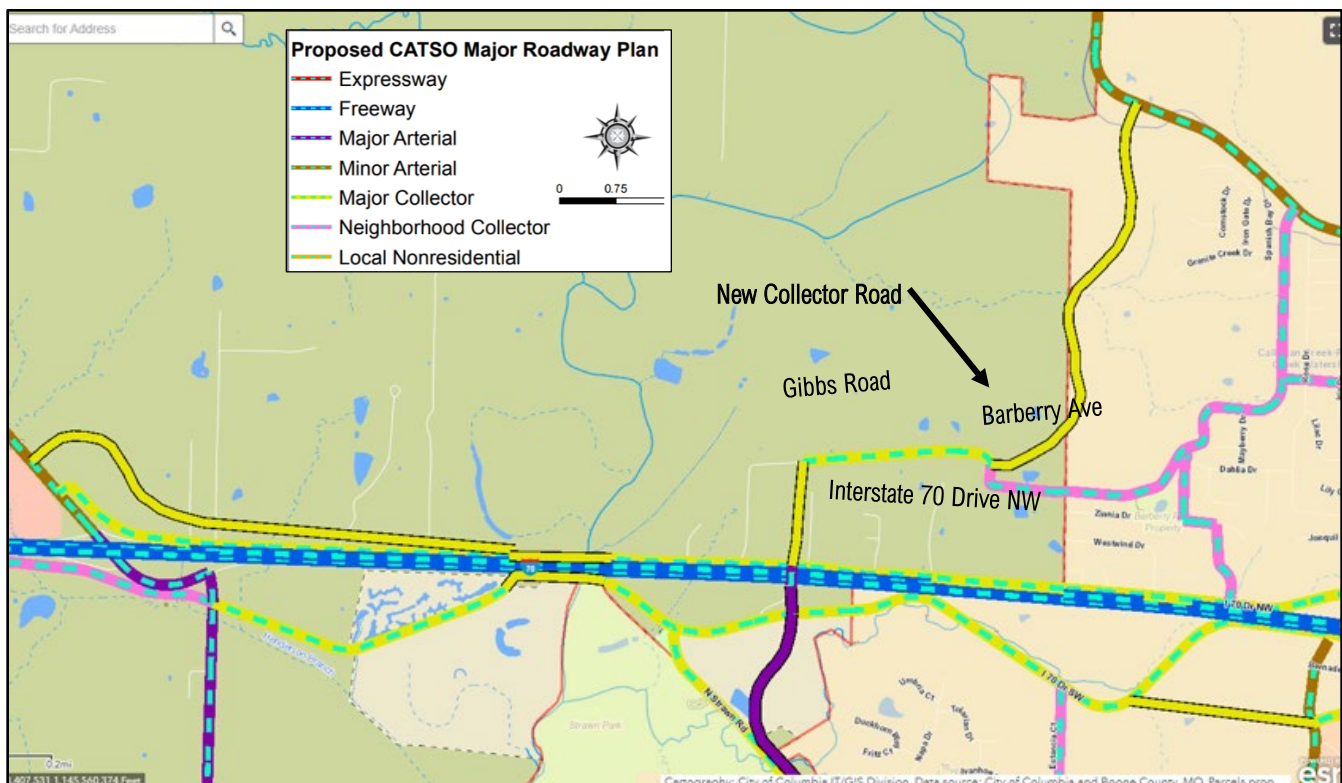


Figure 6: CATSO Roadway Map Excerpt



The future extension of the new collector road to the north and Interstate 70 Drive NW to the west is not expected to have a notable impact of the site-generated trip distribution as most of the site trips would be oriented to and from the Columbia metro area which is south and east of the site.

Intersection Sight Distance: Based on guidelines found in MoDOT's Engineering Policy Guide, Section 941.7 which is based the guidelines found in *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials (AASHTO), the intersection sight distance requirement for the proposed site drives on the new collector road and Gibbs Road is 445 feet (assuming a 35 mph posted speed limit and 40 mph design speed).

Note that the sight distance was not measured in the field to evaluate the available sight distance at the proposed site drives. It is recommended the site design engineer verify adequate sight distance is provided at the proposed site drives.

Careful consideration should be given to sight distance obstructions when planning future aesthetics enhancements, such as signs, berms, fencing and landscaping, to ensure that these improvements do not obstruct the view of entering and exiting traffic at the intersection of all drives with the public roadways. It is generally recommended that all improvements higher than 3 ½ feet above the elevation of the nearest pavement edge be held back at least 20 feet from the traveled roadway.

Trip Generation: Forecasts were prepared to estimate the amount of traffic the proposed development would generate during the weekday AM and PM peak periods. These forecasts were based upon information provided in the latest edition of the *Trip Generation Manual*. Estimates for the proposed development were based upon Land Use 210 – Single-Family Detached Housing.

The peak hour of adjacent street traffic (one hour between 7 and 9 a.m.) was utilized for the AM peak hour and the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.) was utilized for the PM peak hour trip generation. Based on this data, the trip generation forecast for the proposed Grant Tract is shown in **Table 1**. As shown, the proposed Grant Tract would generate a total of 89 new trips during the weekday AM peak hour and 121 new trips during the weekday PM peak hour.



Table 1: Trip Estimate – Grant Tract

ITE Code	Land Use	Unit	ADT (VPD)	Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
210	Single-Family Homes	123 Homes	1,221	22	67	89	76	45	121
New Trips				22	67	89	76	45	121

Trip Distribution: The site-generated trips for the proposed Grant Tract were then assigned into and out of the site based upon an estimated directional distribution. Based upon the existing travel patterns and the surrounding area and roadway network, it is anticipated that the distribution of new site-generated trips would be as summarized in **Table 2**.

Table 2: Trip Distribution Assumptions – New Trips

DIRECTION OF TRAVEL	TRIP DISTRIBUTION
To/from the southeast via Grayson Drive/Barnwood Drive to I-70 Drive NW	63%
To/from the southwest via Gibbs Road	10%
To/from the north via Barberry Avenue to Sunflower Street	7%
To/from the northeast via Barberry Avenue/Sunflower Street to Primrose Drive	20%

The Grant Tract site-generated trips for the weekday AM and PM peak hours, as well as the ADT volumes, are shown in **Exhibit 3**.

2023 Build Traffic Volumes (Existing plus Site Trips): The assigned traffic volumes resulting from the trip distribution for the proposed residential development (Exhibit 3) were added to the Existing traffic volumes (Exhibit 2) to determine the total volumes in the forecasted scenario. The forecasted, or 2023 Build, traffic volumes for the weekday AM and PM peak hours are shown in **Exhibit 4**.



Exhibit 3: Site Generated Trips



Exhibit 4: Build Traffic Volumes - 2023



TRAFFIC ANALYSIS

Study Procedures: The 2023 Existing and Build operating conditions were analyzed using SYNCHRO 11, a macro-level analytical traffic flow model. SYNCHRO is based on study procedures outlined in the *Highway Capacity Manual*, published by the Transportation Research Board. This manual, which is used universally by traffic engineers to measure roadway capacity, establishes six levels of traffic service: Level A ("Free Flow"), to Level F ("Fully Saturated"). Levels of service (LOS) are measures of traffic flow, which consider such factors as speed, delay, traffic interruptions, safety, driver comfort, and convenience. Level C, which is normally used for highway design, represents a roadway with volumes ranging from 70% to 80% of its capacity. However, Level D is often considered acceptable for peak period conditions in urban and suburban areas.

The thresholds that define level of service at an intersection are based upon the type of control used (i.e., whether it is signalized or unsignalized) and the calculated delay. For signalized and all-way stop intersections, the average control delay per vehicle is estimated for each movement and aggregated for each approach and then the intersection as a whole. At intersections with partial (side-street) stop control, delay is calculated for the minor movements only since motorists on the main road are not required to stop.

Level of service is directly related to control delay. At signalized intersections, the level of service criteria differ from that at unsignalized intersections primarily because varying transportation facilities create different driver expectations. The expectation is that a signalized intersection is designed to carry higher traffic volumes, and consequently may experience greater delay than an unsignalized intersection. **Table 3** summarizes the thresholds used in the analysis for signalized and unsignalized intersections.

Table 3: Level of Service Thresholds

LEVEL OF SERVICE (LOS)	CONTROL DELAY PER VEHICLE (SEC/VEH)	
	SIGNALIZED INTERSECTIONS	UNSIGNALIZED INTERSECTIONS
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50



Auxiliary Left-Turn Lane Warrants: The need for left-turn lanes on the proposed new collector road and on Gibbs Road at the proposed site drives were evaluated using the *Left-Turn Guidelines for Two-lane Roadway* nomograph which is based on criteria using MoDOT's Access Management Guidelines (AMG). The MoDOT criteria provides guidelines for separate left-turn lanes on the through roadway by comparing the total advancing volume (which includes all turning traffic) to the total opposing volume (which includes opposing through and right-turn movements) during the design hour with respect to the number of mainline left-turns. Then, the percentage of left-turns is determined by dividing the number of left-turns by the total advancing volume. If the point lies to the right of the percentage line, then a left-turn lane should be considered. If the point is to the left of the line, then a left-turn lane is not necessary. Since, the posted speed on Gibbs Road is 35 mph, the less than or equal to 40-mph nomograph was used.

Note that the westbound left-turn volumes on the proposed new collector road at the proposed West Site Drive during both peak hours, and the East Site Drive during the AM peak hour are all less than 10 vph, as such, separate left-turn lanes are not warranted on the new collector road at the West and East Site Drives.

Figure 7 graphically illustrates the westbound left-turn evaluation on the proposed new collector road at the Central Site Drive assuming the 2023 Build traffic volumes during the weekday AM and PM peak hours. As can be seen in Figure 7, a separate westbound left-turn lane on the proposed new collector road at the Central Site Drive is not warranted assuming the 2023 Build traffic volumes.

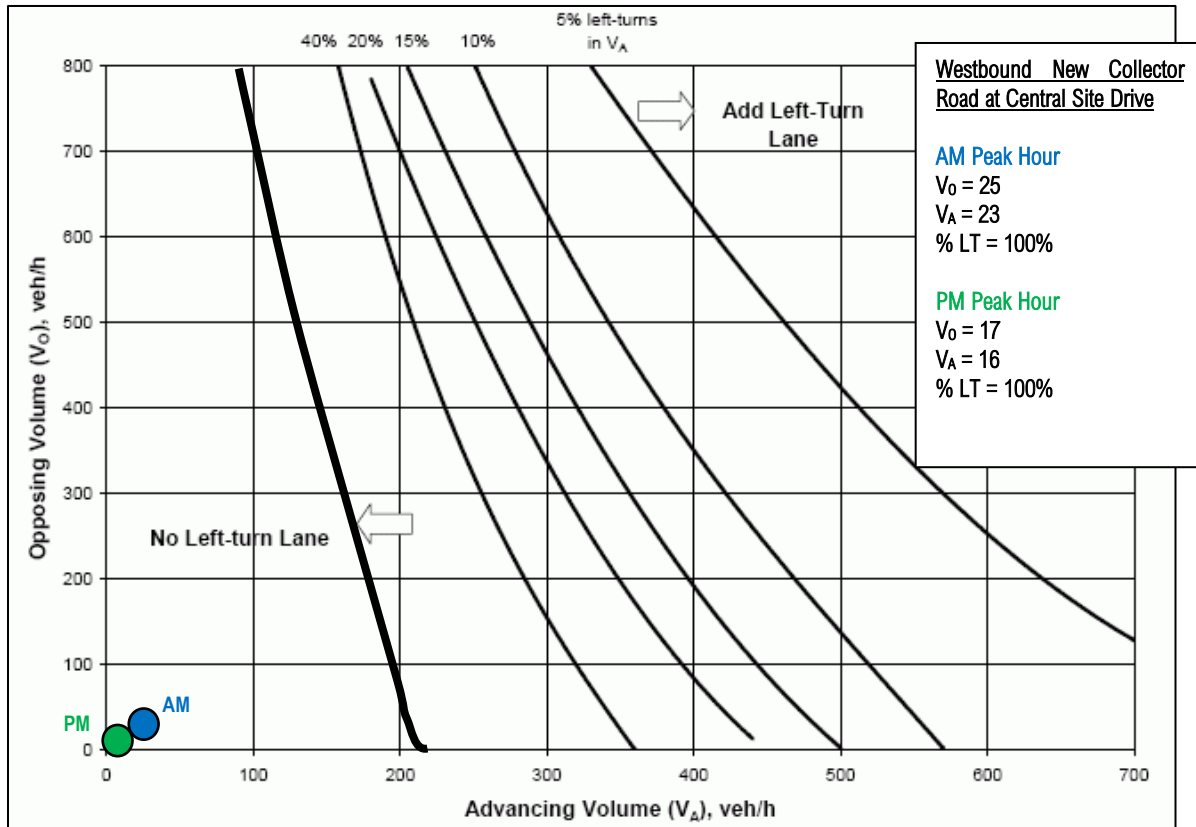


Figure 7: Volume Guidelines for Left-Turn Lanes at Unsignalized Intersections on Two-Lane Roads - 2023 Build

Auxiliary Right-Turn Lane Warrants: The need for an eastbound right-turn lane on the new collector road at the proposed Central Site Drive, a westbound right-turn lane on the new collector road at the proposed West Site Drive and a westbound right-turn lane on Gibbs Road at the proposed Central Site Drive were evaluated using the *Right-Turn Guidelines for Two-Lane Roadway* nomograph which is based on criteria from MoDOT’s AMG criteria. The MoDOT AMG provides guidelines for separate right-turn lanes on the through roadway by comparing the total advancing volume (which includes all turning traffic) to the number of mainline right-turns. The operating speed (posted speed limit) of the major roadway is used to determine if a right-turn lane is warranted. If the point lies to the right of the operating speed line, then a right-turn lane should be considered. If the plotted point is to the left of the line, then a left-turn lane is not necessary. Gibbs Road has a posted speed of 35 mph, so the less than or equal to 40-mph nomograph was used.

Figure 8 graphically illustrates the eastbound and westbound right-turn evaluations at the proposed site drives assuming the 2023 Build traffic volumes. As can be seen in Figure 8, given the very low traffic volumes separate right-turn lanes are not warranted at any of the proposed site driveways.

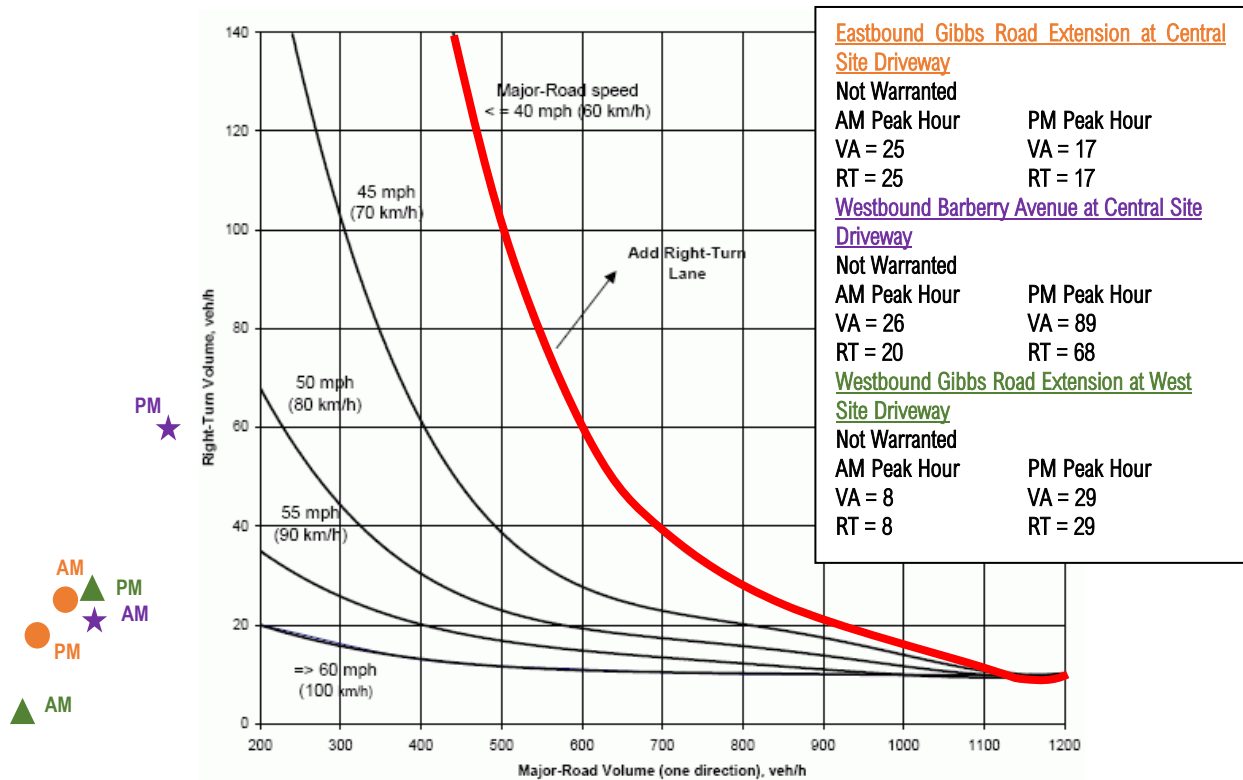


Figure 8: Volume Guidelines for Right-Turn Lanes at Unsignalized Intersections on Two-Lane Roads - 2023 Build

Operating Conditions: The study intersections were evaluated using the methodologies described previously. The existing lane configurations and traffic control were used in the analysis (i.e., no roadway or traffic control improvements). The proposed site drives were assumed to have one lane exiting and one lane entering, operating under side-street STOP control. **Table 4** summarizes the results of these analyses, which reflect the 2023 Existing and Build operating conditions and average delay for each of the existing study intersections during the weekday AM and PM peak hours.

As shown in Table 4, all of the existing study intersections operate at overall favorable levels of service (i.e., LOS B or better) in the 2023 Existing conditions and would continue to operate at overall favorable levels of service during the peak hours for the 2023 Build conditions with negligible differences in delay.



Table 4: 2023 Capacity Analysis Summary – Existing Intersections

Intersection / Approach	AM Peak Hour		PM Peak Hour	
	2023 Existing	2023 Build	2023 Existing	2023 Build
Barberry Avenue and Grayson Drive (Side-Street STOP)				
Eastbound Barberry Avenue Approach	Free Flow	Free Flow	Free Flow	Free Flow
Westbound Barberry Avenue Approach	A (3.6)	A (1.7)	A (<1.0)	A (<1.0)
Northbound Grayson Drive Approach	A (8.6)	A (9.0)	A (8.7)	A (9.3)
Interstate 70 Drive NW and Barnwood Drive (Side-Street STOP)				
Eastbound Interstate 70 Drive Approach	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)
Westbound Interstate 70 Drive Approach	Free Flow	Free Flow	Free Flow	Free Flow
Southbound Barwood Drive Approach	B (10.3)	B (11.1)	B (10.6)	B (11.3)
Interstate 70 Drive NW and Gibbs Road (Side-Street STOP)				
Eastbound Interstate 70 Drive Approach	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)
Westbound Interstate 70 Drive Approach	Free Flow	Free Flow	Free Flow	Free Flow
Southbound Gibbs Road Approach	A (8.6)	A (8.6)	A (8.6)	A (8.6)
Primrose Drive and Sunflower Street (Side-Street STOP)				
Westbound Primrose Drive Approach	A (8.7)	A (8.8)	A (8.8)	A (8.9)
Northbound Sunflower Street Approach	Free Flow	Free Flow	Free Flow	Free Flow
Southbound Sunflower Street Approach	A (4.1)	A (3.1)	A (3.1)	A (2.6)

X (XX.X) - Level of Service (Vehicular delay in seconds per vehicle)

Table 5 summarizes the 2023 Build operating conditions and average delay for each of the proposed site drive intersections, as well as the new intersection of the collector road and Gibbs Road during the weekday AM and PM peak hours. For the purposes of this analysis it was assumed that the west leg of Gibbs Road and the east leg of the new collector road would have the right-of-way with the northbound approach of Gibbs Road operated under STOP control.

As shown in Table 5, all of the proposed site drive intersections are forecasted to operate at very favorable levels of service in the 2023 Build conditions with all approaches operating at LOS A.

As mentioned previously, the recommended intersection sight distance for drives/streets along Gibbs Road is 445 feet. It is recommended the site design engineer verify adequate sight distance can be provided for the northbound approach of Gibbs Road at the new collector



road/existing Gibbs Road. If adequate sight distance cannot be provided, it is recommended the intersection operate under All-Way STOP control.

Table 5: 2023 Build Capacity Analysis Summary - Proposed Site Drives/Intersections

Intersection / Approach	AM Peak Hour	PM Peak Hour
Gibbs Road and Proposed New Collector Road (Side-Street Stop)		
Eastbound Gibbs Road Approach	Free Flow	Free Flow
Westbound New Collector Road Approach	Free Flow	Free Flow
Northbound Gibbs Road Approach	A (8.6)	A (8.7)
Proposed New Collector Road and Proposed West Site Drive (Side-Street STOP)		
Eastbound New Collector Road Approach	A (7.2)	A (7.3)
Westbound New Collector Road Approach	Free Flow	Free Flow
Southbound Proposed West Site Drive Approach	A (8.6)	A (8.7)
Proposed New Collector Road and Proposed Central Site Drive (Side-Street Stop)		
Eastbound New Collector Road Approach	Free Flow	Free Flow
Westbound New Collector Road Approach	A (7.3)	A (7.3)
Northbound Proposed Central Site Drive Approach	A (8.7)	A (8.8)
Proposed New Collector Road and Proposed East Site Drive (Side-Street STOP)		
Eastbound New Collector Road Approach	A (7.2)	A (7.3)
Westbound New Collector Road Approach	Free Flow	Free Flow
Southbound Proposed East Site Drive Approach	A (8.4)	A (8.4)
Barberry Avenue and Proposed Central Site Drive (Side-Street STOP)		
Eastbound Barberry Avenue Approach	Free Flow	Free Flow
Westbound Barberry Avenue Approach	Free Flow	Free Flow
Southbound Proposed Central Site Drive Approach	A (8.9)	A (9.1)

X (XX.X) - Level of Service (Vehicular delay in seconds per vehicle)

Barberry Avenue and Grayson Drive Sight Distance Limitation: Although not related to the proposed Grant Tract residential development, a field visit indicated probable sight distance limitations at the Barberry Avenue and Grayson Drive intersection.



The sight distance for the existing Barberrry Avenue and Grayson Drive intersection should be reviewed in the field with respect to the guidelines published in MoDOT's EPG. Adequate sight distance is necessary at intersections to allow drivers to perceive potentially conflicting vehicles and allow those motorists sufficient time to adjust their speed to avoid a collision or make a choice of when to cross or enter the mainline traffic flow. All drivers approaching or stopped at the intersection should have an unobstructed view of the entire intersection so that potential collisions can be avoided. Based on the MoDOT EPG, the recommended intersection sight distance for Grayson Drive at Barberrry Avenue is 390 feet.

Stopping sight distance is one of several types of sight distance used in road design. It is the minimum distance a vehicle driver needs to be able to stop before colliding with something in the roadway, such as a stopped or turning vehicle. Insufficient stopping sight distance can adversely affect the safety or operations of a roadway or intersection. Based on the MoDOT EPG, the minimum stopping sight distance for Grayson Drive at Barberrry Avenue is 250 feet.

To reiterate, design entering sight distance is the distance needed so that an approaching vehicle does not have to slow down to avoid a collision with a vehicle turning onto the roadway from the side-street, while the minimum stopping sight distance is the distance an approaching vehicle needs to be able to stop before colliding with something in the roadway, such as a stopped vehicle, animal, or road debris. Thus, the minimum stopping sight distance is required for safe operations while the design entering sight distance is desired, but not necessarily required.

Based on visual observations, the sight distance looking to the east and west down Barberrry Avenue from the Grayson Drive approach does not allow adequate stopping sight distance for vehicles traveling down Barberrry Avenue to stop in the case of a left-turning vehicle from Grayson Drive assuming they are traveling near the posted speed limit. The speed limits and roadway conditions approaching this intersection include several sharp turns and 15-mph advisory signs so it is likely that motorists are not traveling the speed limit. Based on the field observations described above and the photos shown in **Figure 9**, if the minimum stopping distance is not provided it is recommended that the intersection of Grayson Drive and Barberrry Avenue be All-Way STOP controlled.



Grayson Drive Looking to West



Grayson Drive Looking to East

Figure 9: Sight Distance for Grayson Drive at Barberrry Avenue

Table 6 summarizes the analysis results assuming All-Way STOP control at the intersection of Grayson Drive and Barberrry Avenue during the weekday AM and PM peak hours for the 2023 Existing and Build conditions.

Table 6: 2023 Capacity Analysis Summary – Barberrry and Grayson All-Way STOP Control

Intersection / Approach	AM Peak Hour		PM Peak Hour	
	2023 Existing	2023 Build	2023 Existing	2023 Build
Barberrry Avenue and Grayson Drive (All-Way STOP)				
Eastbound Barberrry Avenue Approach	A (6.8)	A (7.0)	A (6.8)	A (7.1)
Westbound Barberrry Avenue Approach	A (7.1)	A (7.2)	A (7.1)	A (7.4)
Northbound Grayson Drive Approach	A (6.8)	A (7.3)	A (7.1)	A (7.7)

X (XX.X) - Level of Service (Vehicular delay in seconds per vehicle)

As shown in Table 6, the All-Way stop control at the intersection of Grayson Drive and Barberrry Avenue would operate favorably with all approaches operating at LOS A in the peak hours.



SUMMARY

CBB completed the preceding study to address the anticipated traffic impacts associated with the proposed Grant Tract residential development generally located north of Gibbs Road/Barberry Avenue approximately one-half mile west of Grayson Drive in Boone County, Missouri.

In summary, the following findings and improvements should be considered in conjunction with the proposed Grant Tract development:

- In conjunction with the proposed development, a new collector road would be constructed through the southern portion of the property per the CATSO Roadway Plan.
- Access for the subdivision is proposed via two drives off the new collector road and one drive off Gibbs Road.
- It is recommended the site design engineer verify adequate sight distance is provided at all proposed site drives on the new collector road and Gibbs Road.
- Careful consideration should be given to sight distance obstructions when planning any future aesthetic enhancements, such as berms, fencing and landscaping, at any of the subdivision entrances to ensure that these improvements do not obstruct the view of entering and exiting traffic at the site intersections with the public roads. It is generally recommended that all improvements wider than two inches (posts, tree trunks, etc.) and higher than 3.5 feet above the elevation of the nearest pavement edge be held back at least 20 feet from the traveled roadway.
- The proposed Grant Tract residential development is expected to add 89 trips during the weekday AM peak hour and 121 trips during the weekday PM peak hour to the adjacent roadways.
- Based on the 2023 Build traffic volumes separate turn lanes are NOT warranted on the new collector road or Gibbs Road at any of the proposed site driveways.
- All of the existing study intersections operate at overall favorable levels of service in the 2023 Existing conditions and would continue to operate at favorable levels of service during the peak hours for the 2023 Build conditions with negligible differences in delay.
- All of the proposed site drive intersections are forecasted to operate at very favorable levels of service in the 2023 Build conditions with all approaches operating at LOS A.
- It was assumed that the west leg of Gibbs Road and the east leg of the new collector road would have the right-of-way with the northbound approach of Gibbs Road operated under STOP control.
 - It is recommended the site design engineer verify adequate sight distance can be provided for the northbound approach of Gibbs Road at the new collector



road/existing Gibbs Road. If adequate sight distance cannot be provided, it is recommended the intersection operate under All-Way STOP control which is forecasted to operate at LOS A.

- The existing sight distance for motorists on Grayson Drive desiring to turn onto Barberry Avenue appears to be restricted. It is recommended the intersection be evaluated further with regards to sight distance. If the minimum stopping distance is not provided, it is recommended that the intersection of Grayson Drive and Barberry Avenue be All-Way STOP controlled.

We trust this traffic impact study adequately describes the forecasted traffic conditions that should be expected as a result of the proposed Grant Tract residential development. If additional information is desired, please feel free to contact me at 314-449-9572 or swhite@cbbtraffic.com.

Sincerely,

Shawn Lerai White, P.E., PTOE
Associate - Senior Traffic Engineer