

March 30, 2026

Mr. Tim Crockett, P.E.
Crockett Engineering
1000 West Nifong Boulevard, Building 1
Columbia, MO 65203

RE: Traffic Impact Study - Proposed Student Housing Development
Rock Quarry Road and Grindstone Parkway
Columbia, Missouri
CBB Job No. 027-26

Dear Mr. Crockett:

As requested, CBB has completed a traffic impact study pertaining to a proposed student housing development in Columbia, Missouri. The development site is generally located along the west side of Rock Quarry Road just north of Grindstone Parkway (Missouri Route AC). The site location is depicted in **Figure 1**.

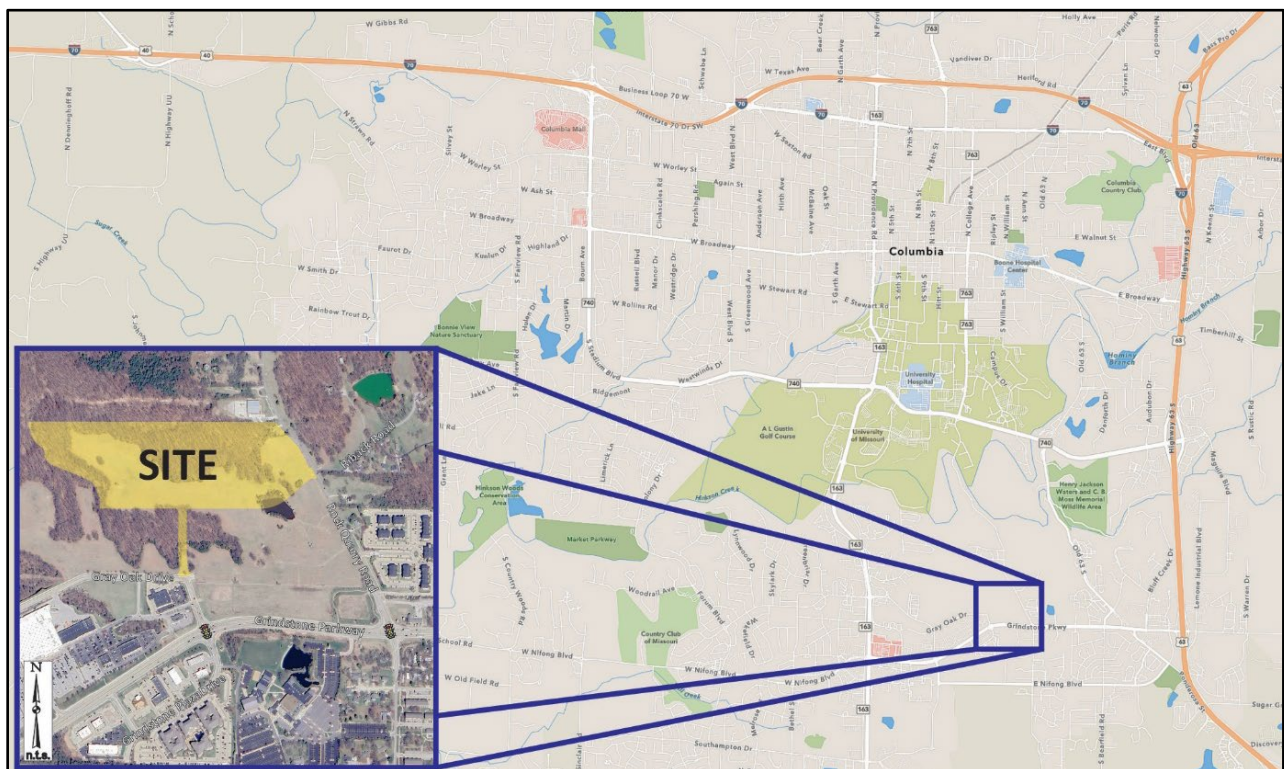


Figure 1: Project Location Map



Based on the site plan provided by Crockett Engineering, the proposed development will consist of approximately 191 apartment units totaling 720 beds. Access is proposed via one new drive on Rock Quarry Road, opposite Riback Road, and via a connection to Grindstone Plaza Drive at Gray Oak Drive. A schematic of the concept plan is shown in **Exhibit 1**.

The purpose of this study was to determine the number of trips that would be generated by the proposed development; evaluate the impact of those trips on operating conditions along the adjacent roadways; and determine the ability of motorists to safely enter and exit the site. If necessary, roadway improvements and/or traffic control modifications were recommended to mitigate the impact of the development. The focus of the analysis was the weekday Midday and PM peak hours.

The scope of work for this traffic impact study is based on email correspondence with the City of Columbia the week of February 9, 2026. CBB also provided MoDOT and the City a Technical Memo summarizing the existing traffic volumes, base assumptions, the proposed site trip generation and directional distribution estimates, and the analysis scenarios and gained their consensus on the assumptions prior to completing the traffic analyses.

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

- 2026 Conditions
 - ✓ 2026 Base Conditions (Existing plus Grindstone Plaza expansion trips and associated roadway improvements); and
 - ✓ 2026 Build Conditions (2026 Base plus student housing trips)

As requested, the study evaluated the following study intersections:

- Rock Quarry Road and Riback Road;
- Grindstone Plaza Drive and Gray Oak Drive;
- Grindstone Plaza Drive and Grindstone Plaza Entrance;
- Grindstone Parkway and Grindstone Plaza Drive; and
- Grindstone Parkway and Rock Quarry Road.

The following report presents the methodology and findings relative to the 2026 Base and Build conditions.

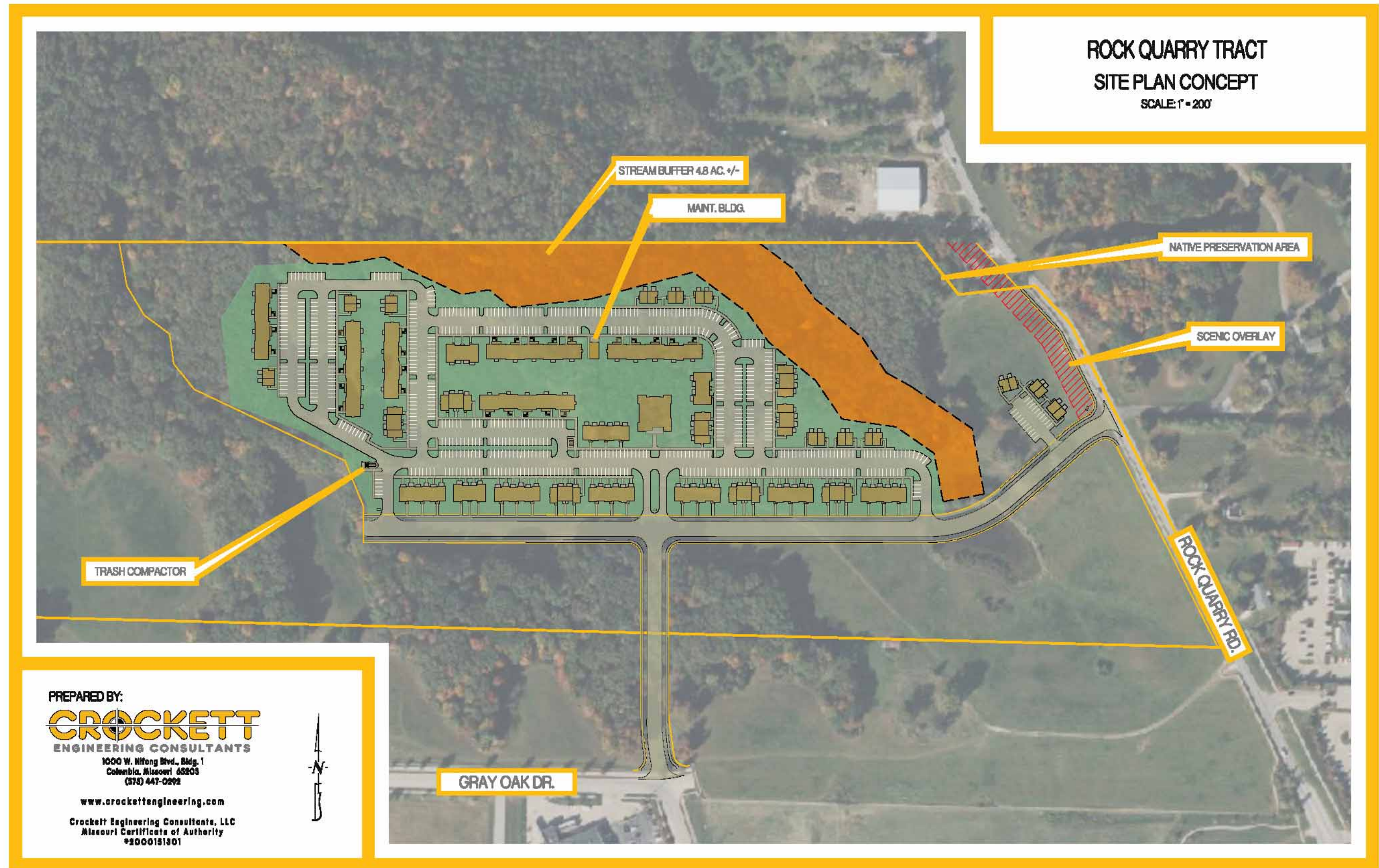


Exhibit 1: Preliminary Site Plan (provided by others)



EXISTING CONDITIONS

Area Roadway System: Grindstone Parkway (Missouri Route AC) is an east-west, median divided principal arterial owned and maintained by MoDOT. Grindstone Parkway consists of two lanes in each direction with additional turn lanes at signalized intersections. The posted speed limit is 50 miles per hour (mph). Sidewalks, bike lanes, and shoulders are provided on both sides of the roadway within most of the study area.

Rock Quarry Road is a north-south major collector owned and maintained by the City of Columbia. Rock Quarry Road provides two lanes, one in each direction. Within the study area, the posted speed limit is 30 mph. Sidewalks are provided on both sides of the roadway along the frontage of a few newer developed parcels.

Riback Road is a two lane local road that provides access to a few homes. There is no posted speed limit that CBB could identify. Neither shoulders, sidewalks, nor bicycle facilities, are provided along the roadway.

Grindstone Plaza Drive is a two lane local road maintained by the City of Columbia. Grindstone Plaza Drive provides access to multiple commercial sites. There is no posted speed limit that CBB could identify. Sidewalks are provided on both sides of the roadway.

Gray Oak Drive is two lane local road maintained by the City of Columbia. Gray Oak Drive provides rear access to multiple commercial sites. The posted speed limit is 30 mph. Sidewalks are provided on both sides of the roadway.

The intersection of Grindstone Parkway and Rock Quarry Road operates under signal control. The eastbound and westbound Grindstone Parkway approaches provide one left-turn lane, two through lanes and one separate channelized right-turn lane. The northbound Rock Quarry Road approach provides one left-turn lane and one shared through/channelized right-turn lane. The southbound Rock Quarry Road approach provides two left-turn lanes, one through lane, and one separate channelized right-turn lane. The eastbound and westbound Grindstone Parkway and southbound Rock Quarry Road left-turns operate under protected only phasing. The northbound Rock Quarry Road left-turn operates under protected plus permissive left-turn phasing. There are marked crosswalks and pedestrian heads provided across all legs of the intersection. **Figure 2** provides an aerial view of the Grindstone Parkway and Rock Quarry Road intersection.



Figure 2: Aerial View of the Grindstone Parkway and Rock Quarry Road Intersection

The intersection of Grindstone Parkway and Grindstone Plaza Drive operates under signal control. The eastbound and westbound Grindstone Parkway approaches provide one left-turn lane, two through lanes and one channelized separate right-turn lane. The northbound and southbound Grindstone Plaza Drive approaches currently provide one left-turn lane and one shared through/channelized right-turn lane. The eastbound and westbound Grindstone Parkway left-turns operate under protected only phasing, while the northbound and southbound Grindstone Plaza Drive left-turns currently operate under protected plus permissive left-turn phasing. There are marked crosswalks and pedestrian push buttons provided across all legs of the intersection. **Figure 3** provides an aerial view of the existing Grindstone Parkway and Grindstone Plaza Drive intersection. The planned Grindstone Plaza Expansion development has been approved in the north-east quadrant of the intersection. This development will include the addition of a second southbound left-turn lane at the signal. The southbound left-turn would operate under protected only phasing once improved.



Figure 3: Aerial View of the Grindstone Parkway and Grindstone Plaza Drive Intersection

The intersection of Grindstone Plaza Drive and Grindstone Plaza Entrance operates under side-street stop control with Grindstone Plaza Entrance required to stop. All approaches currently consist of a single shared lane. There are no marked crosswalks provided at the intersection. **Figure 4** provides an aerial view of the existing Grindstone Plaza Drive and Grindstone Plaza Entrance intersection. The planned Grindstone Plaza Expansion development has been approved east of Grindstone Plaza Drive. This development will include a westbound approach to the Grindstone Plaza Drive and Grindstone Plaza Entrance intersection as well as the addition of a northbound left-turn lane.

The intersection of Grindstone Plaza Drive and Gray Oak Drive currently only consists of two legs, with Gray Oak Drive having the right-of-way and Grindstone Plaza Drive under yield control. All approaches consist of a single shared lane. There are no marked crosswalks provided at the intersection. **Figure 5** provides an aerial view of the Grindstone Plaza Drive and Gray Oak Drive intersection.

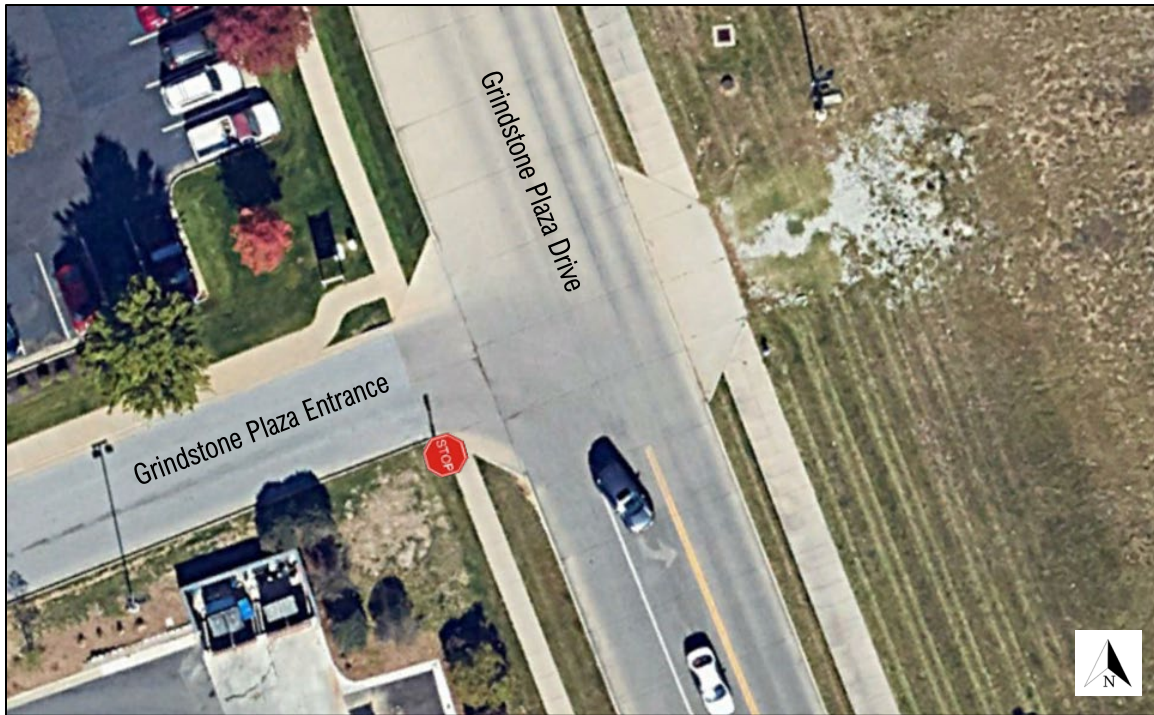


Figure 4: Aerial View of the Grindstone Plaza Drive and Grindstone Plaza Entrance Intersection

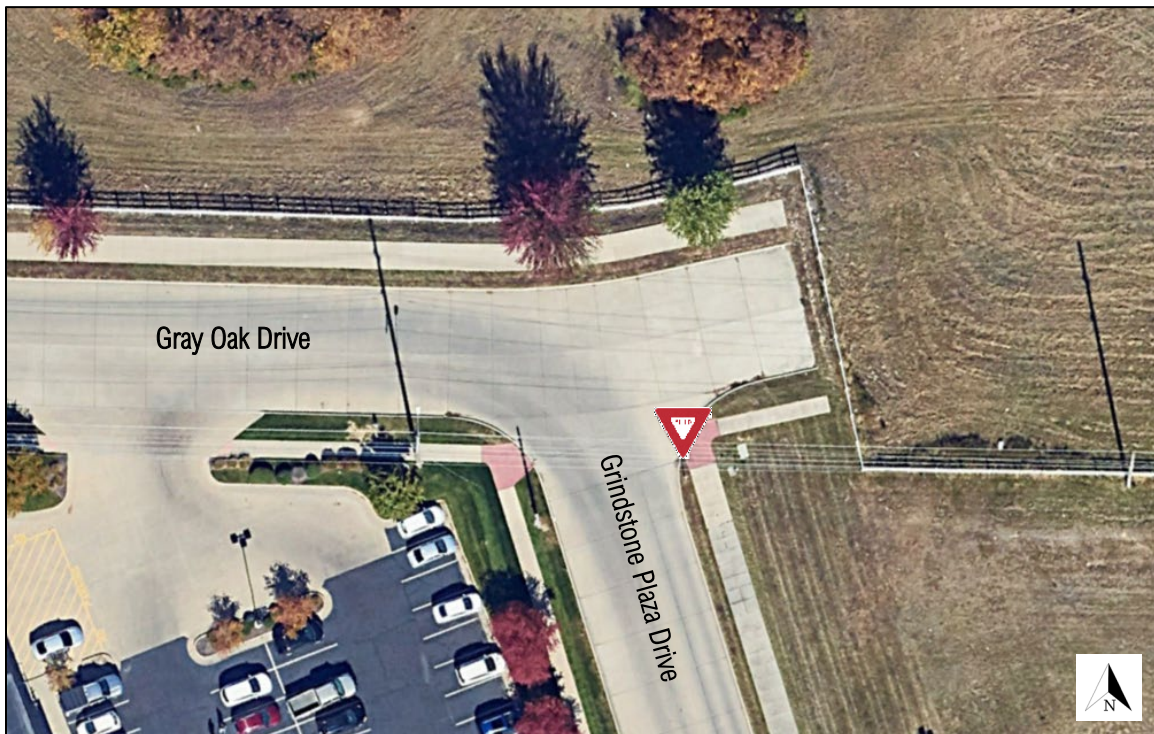


Figure 5: Aerial View of the Grindstone Plaza Drive and Gray Oak Drive Intersection



The intersection of Rock Quarry Road and Riback Road operates under side-street stop control with Riback Road required to stop. All approaches consist of a single shared lane. There are no marked crosswalks provided at the intersection. **Figure 6** provides an aerial view of the Rock Quarry Road and Riback Road intersection.

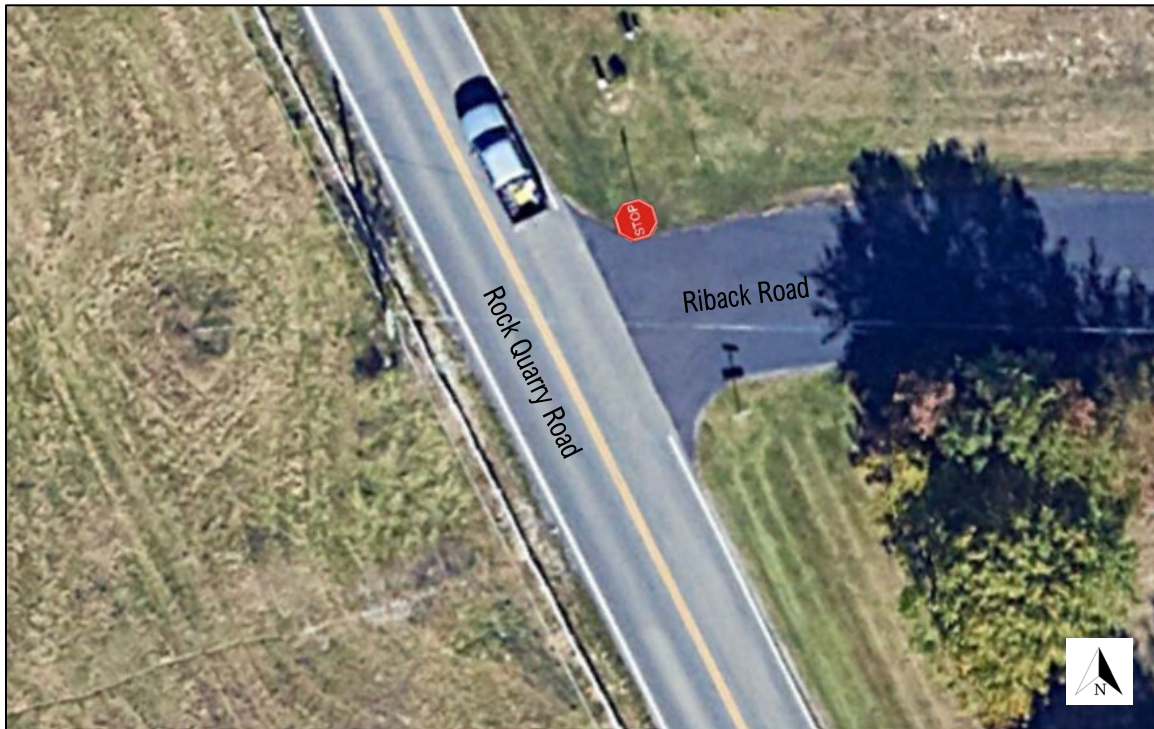


Figure 6: Aerial View of the Rock Quarry Road and Riback Road Intersection



2026 Existing Traffic Volumes: Video, turning movement traffic counts were conducted during the weekday midday (11:00 a.m. - 2:00 p.m.) and weekday afternoon (3:00 - 6:00 p.m.) peak periods on Thursday, February 19, 2026, at the following intersections:

- Rock Quarry Road and Riback Road;
- Grindstone Plaza Drive and Gray Oak Drive;
- Grindstone Plaza Drive and Grindstone Plaza Entrance;
- Grindstone Parkway and Grindstone Plaza Drive; and
- Grindstone Parkway and Rock Quarry Road.

The area school academic calendars were reviewed to ensure the data was collected during normal school operations. Further, the counts were not impacted by weather. Based on the traffic data collected, the weekday Midday peak hour occurred between 11:45 a.m. and 12:45 p.m. and weekday PM peak hour occurred between 4:15 and 5:15 p.m. The 2026 Existing Traffic Volumes are summarized in **Exhibit 2**. The existing traffic volumes were rounded to the nearest 5 vehicles per hour (vph) for volumes over 15 vph and balanced were appropriate.

Given the traffic characteristics in the area and the anticipated trip generation for the proposed development, the weekday Midday and PM peak periods would likely represent a “worst-case scenario” with regards to the traffic impact. If traffic operations are acceptable during these peak periods, it can be reasoned that conditions would be acceptable throughout the remainder of the day.

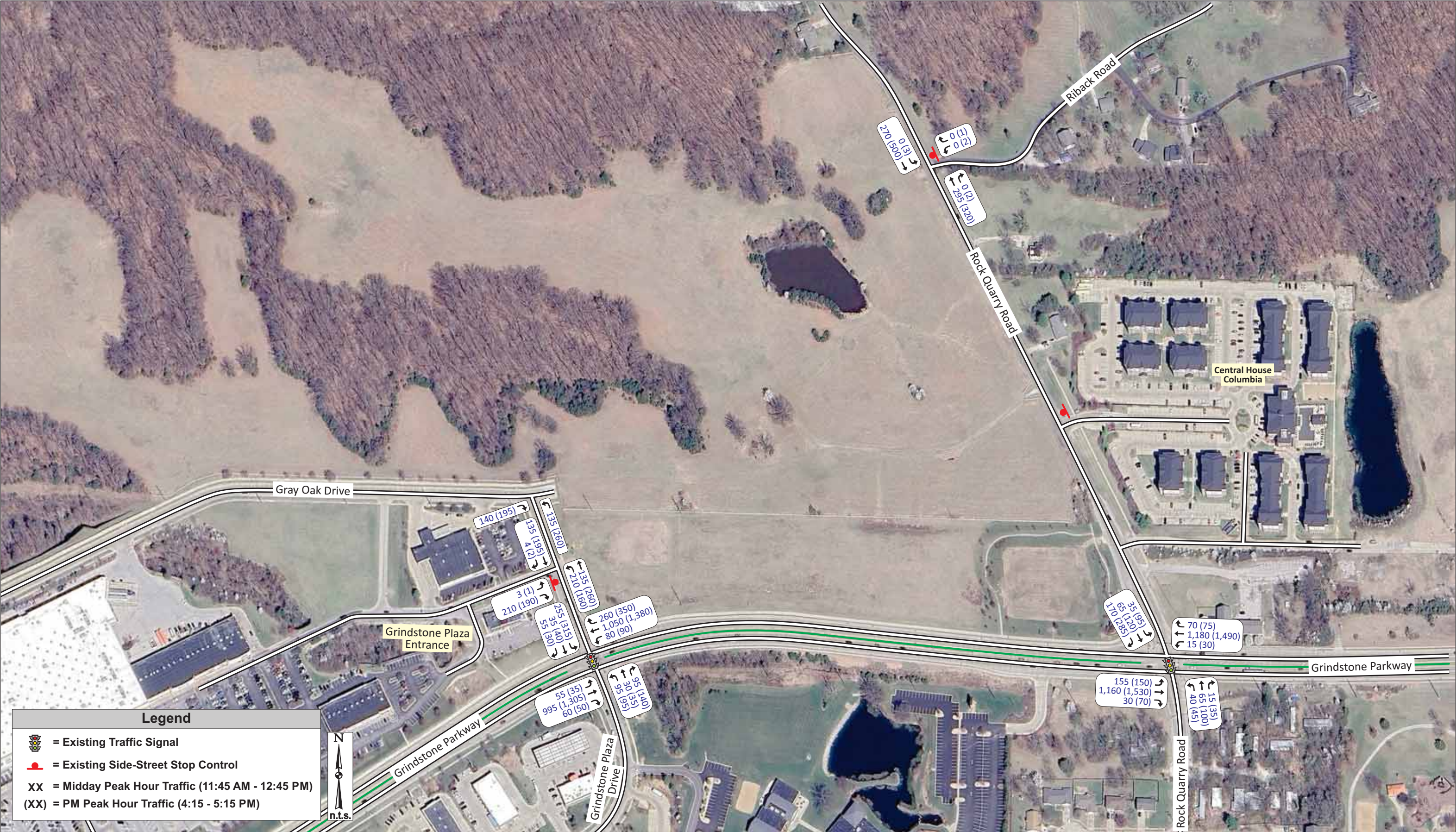


Exhibit 2: 2026 Existing Traffic Volumes



PLANNED ROADWAY IMPROVEMENTS AND DEVELOPMENTS IN THE AREA

It is our understanding that the Grindstone Plaza Expansion development has been approved near the study site, just south of the proposed student housing development. Per the *Traffic Impact Study for Proposed Grindstone Plaza Expansion*, prepared by Lochmueller Group, dated January 2018, the approved development includes approximately 18,120 square feet (SF) of retail and 15,400 SF of restaurant related land uses. Based on the January 2018 study, the approved development is estimated to generate a total of 405 trips during the Midday peak hour and 280 trips during the PM peak hour with a notable portion of the trips being pass-by trips (i.e., 164 pass-by trips in the Midday and 98 pass-by trips in the PM). As requested by the agencies, the trips associated with the approved Grindstone Plaza Expansion development were reflected in the 2026 Base scenario.

The site generated volumes provided in the *Traffic Impact Study for Proposed Grindstone Plaza Expansion* are shown in **Exhibit 3**. The trips associated with the full build-out of the approved Grindstone Plaza Expansion development (Exhibit 3) were added to the existing traffic volumes (Exhibit 2) to develop the 2026 Base Traffic Volumes. **Exhibit 4** summarizes the 2026 Base traffic volumes which include the approved Grindstone Plaza Expansion development trips.

Note that the roadway improvements recommended in the *Traffic Impact Study for Proposed Grindstone Plaza Expansion*, shown in **Figure 7**, were also assumed in the 2026 Base scenario. The following planned improvements will be included in the analysis.

- Dual southbound left-turn lanes on Grindstone Plaza Drive at Grindstone Parkway with a change to protected-only southbound left-turn phasing; and
- Northbound left-turn lane on Grindstone Plaza Drive at Grindstone Plaza Entrance.

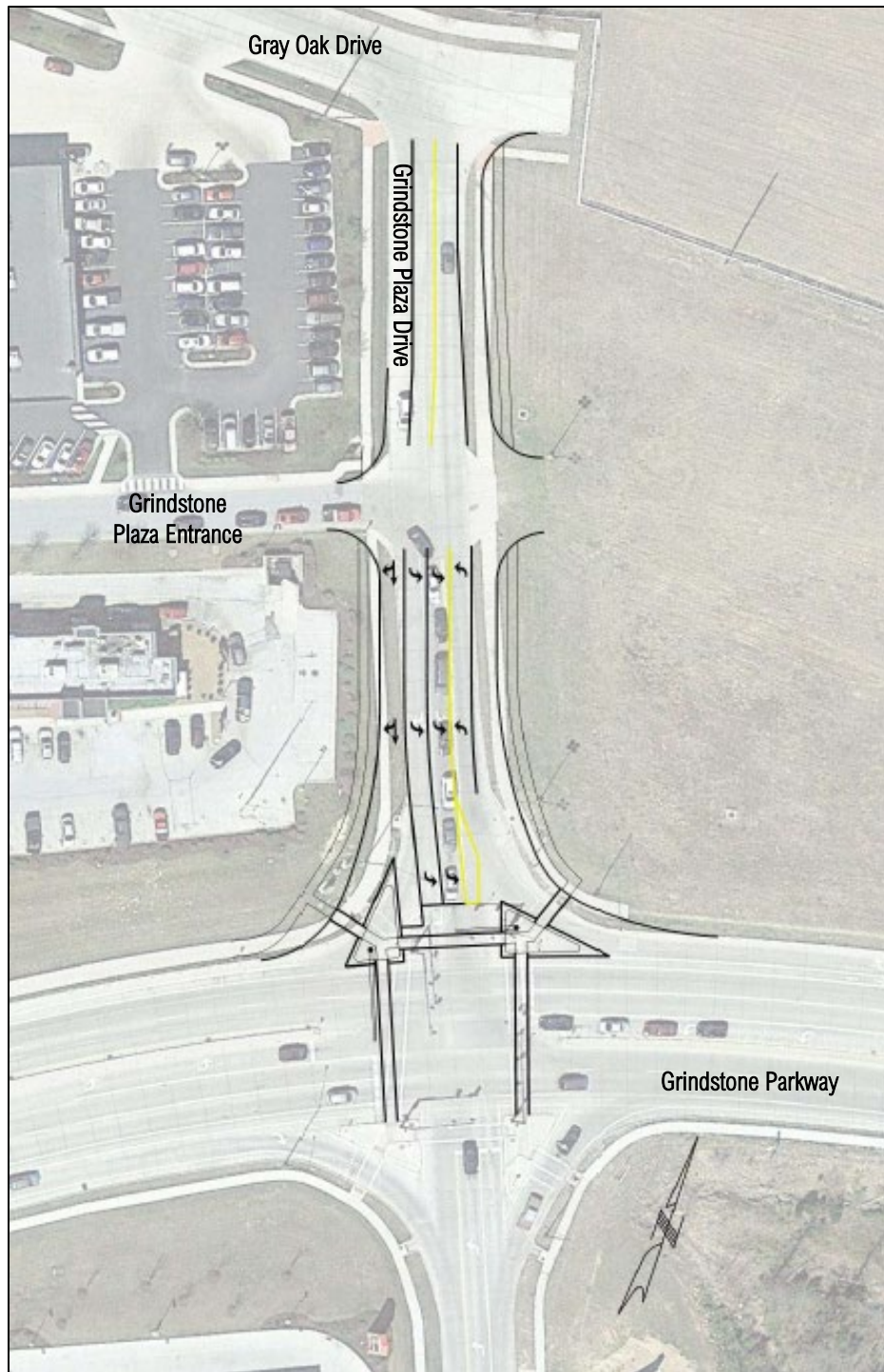


Figure 7: Grindstone Plaza Drive Roadway Improvements
(Excerpt from *Traffic Impact Study for Proposed Grindstone Plaza Expansion*)

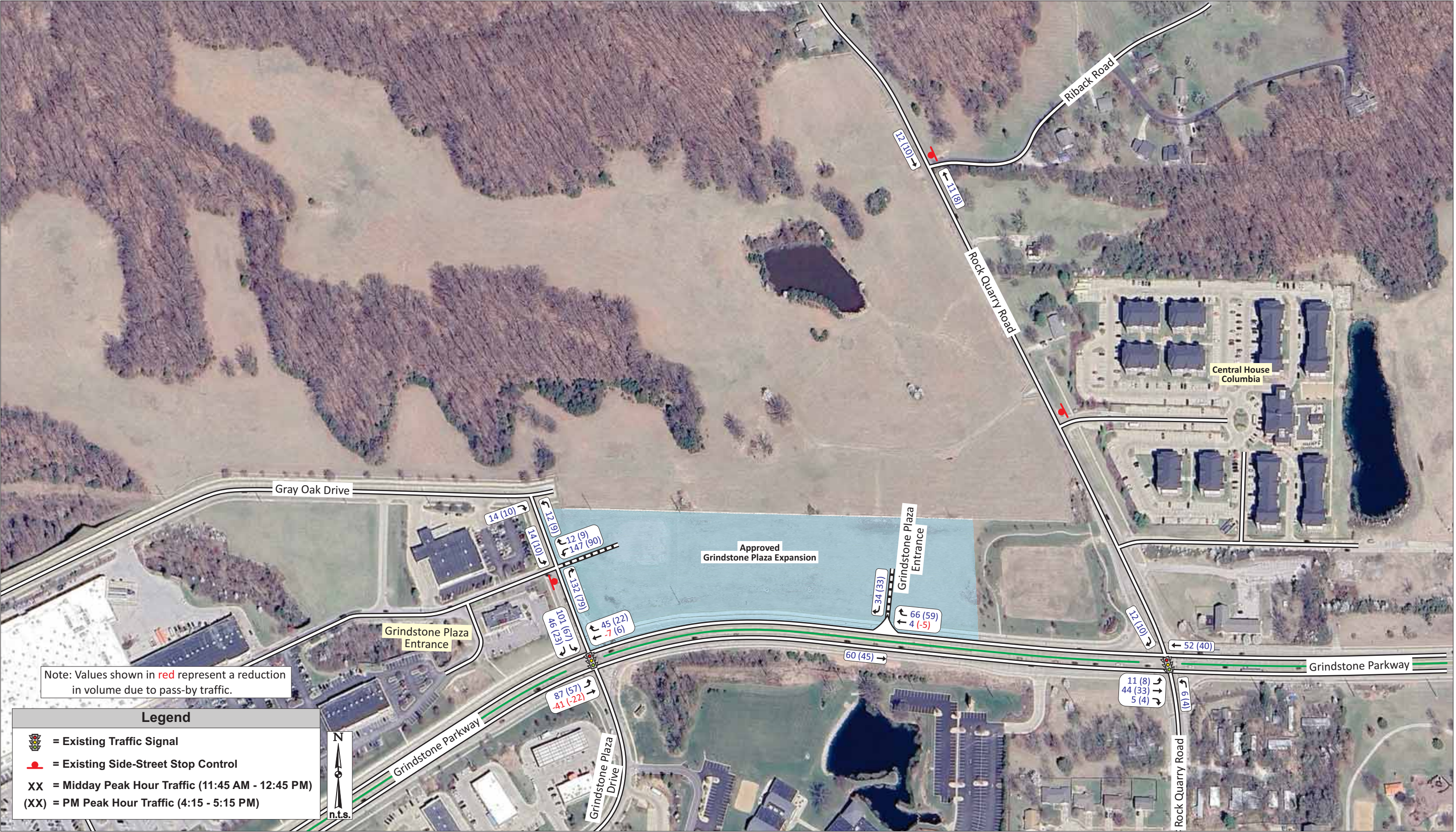


Exhibit 3: Approved Grindstone Plaza Expansion Trips (from Grindstone Plaza Expansion TIS)

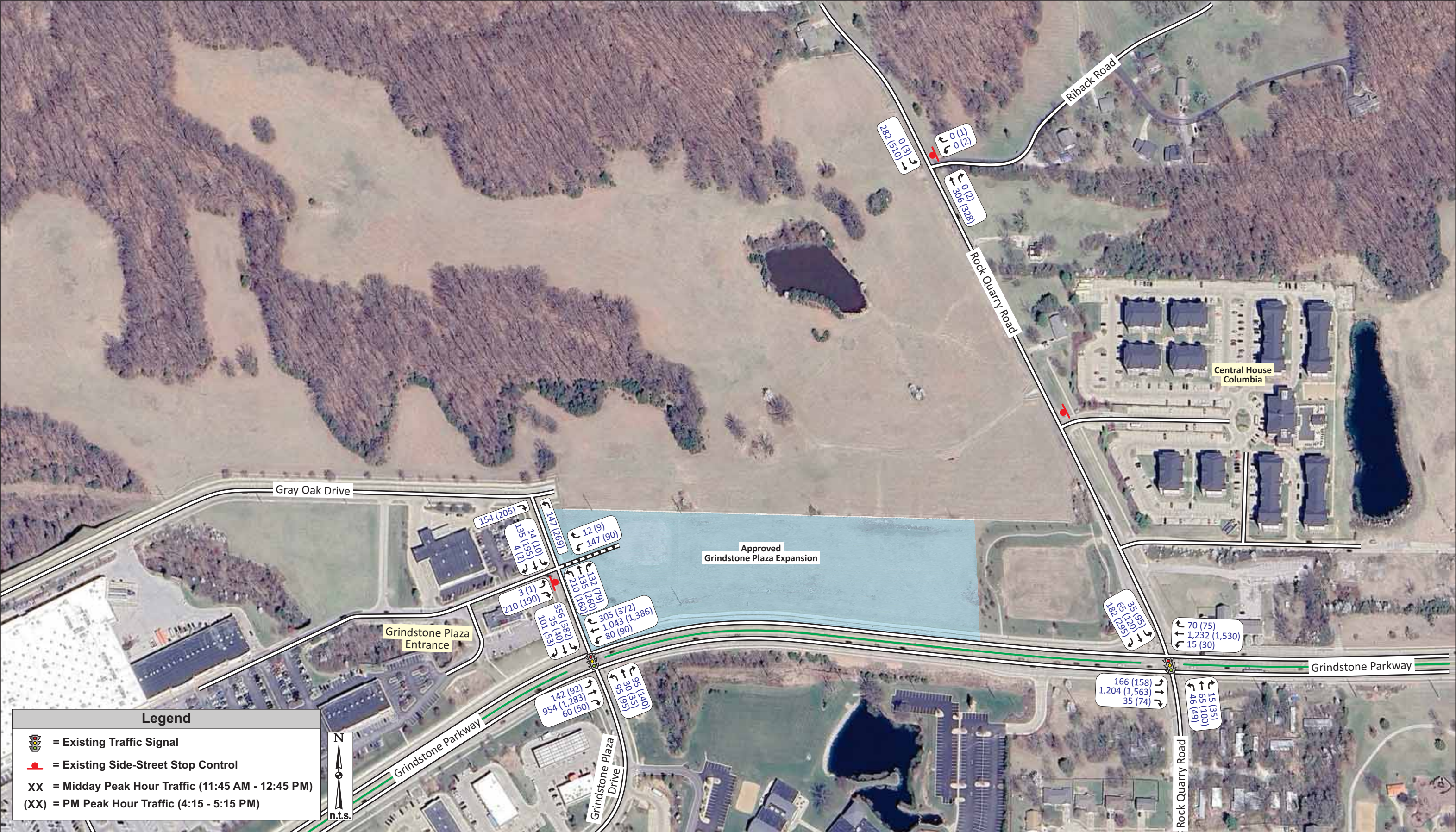


Exhibit 4: 2026 Base Traffic Volumes



PROPOSED SITE

Proposed Land Use: Based on the site plan provided by Crockett Engineering, the proposed development will consist of approximately 191 apartment units totaling 720 beds.

Site Access: Access is proposed via one new drive on Rock Quarry Road, opposite Riback Road, and via a connection to Grindstone Plaza Drive at Gray Oak Drive.

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 that the site civil engineer illustrate the necessary intersection sight distance triangles on the respective site plans for the proposed driveways. These areas should be kept clear of all obstructions to provide adequate visibility for safe operations.

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 Midday and PM peak hours. Traffic forecasts for the developments were estimated based upon information provided in the *Trip Generation Manual*, 12th Edition. Trip estimates for the proposed student housing development were based on ITE Code 225, Off-Campus Student Apartment (Low-Rise) (Over ½ Mile from Campus). The AM and PM peak hour of generator results were compared to determine which estimate was higher for the Midday peak hour. Consequently, the PM peak hour of generator was utilized for the Midday 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.

The resulting trip generation estimate for the proposed student housing development is summarized in **Table 1**. As shown in the table, the proposed residential development is estimated to generate a total of 230 trips during the weekday Midday peak hour and 225 trips during the weekday PM peak hour.

Table 1: Trip Generation Estimate – Proposed Student Housing Residential Development

Land Use	Size	Weekday Midday Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Off-Campus Student Apartment (Low-Rise) (ITE Land Use 225)	720 Beds	120	110	230	115	110	225

* Trips rounded to nearest 5



Trip Distribution: The total trips for the proposed development were then assigned into and out of the site based upon an assumed directional distribution. Based upon the existing travel patterns in the area and spot counts at the student housing development on the opposite side of Rock Quarry Road, it is anticipated that the distribution of site-generated trips would be as summarized in **Table 2**.

Table 2: Trip Distribution Assumptions – Proposed Student Housing Development

Route	Assumed Directional Distribution	
	Midday Peak Hour	PM Peak Hour
To/from the north on Rock Quarry Road	45%	35%
To/from the south on Rock Quarry Road	5%	5%
To/from the east on Grindstone Parkway	15%	15%
To/from the west on Grindstone Parkway	15%	15%
To/from the west and north via Gray Oak Drive	20%	30%

The resulting assignment of site-generated trips for the proposed student housing development for the weekday Midday and PM peak hours is summarized in **Exhibit 5**.

2026 Build Traffic Volumes: The proposed site-generated trips (Exhibit 5) were added to the 2026 Base Traffic Volumes (Exhibit 4) to determine the total volume in the forecasted scenario. The forecasted, or 2026 Build, traffic volumes for the weekday Midday and PM peak hours are shown in **Exhibit 6**.



Exhibit 5: Site-Generated Trips

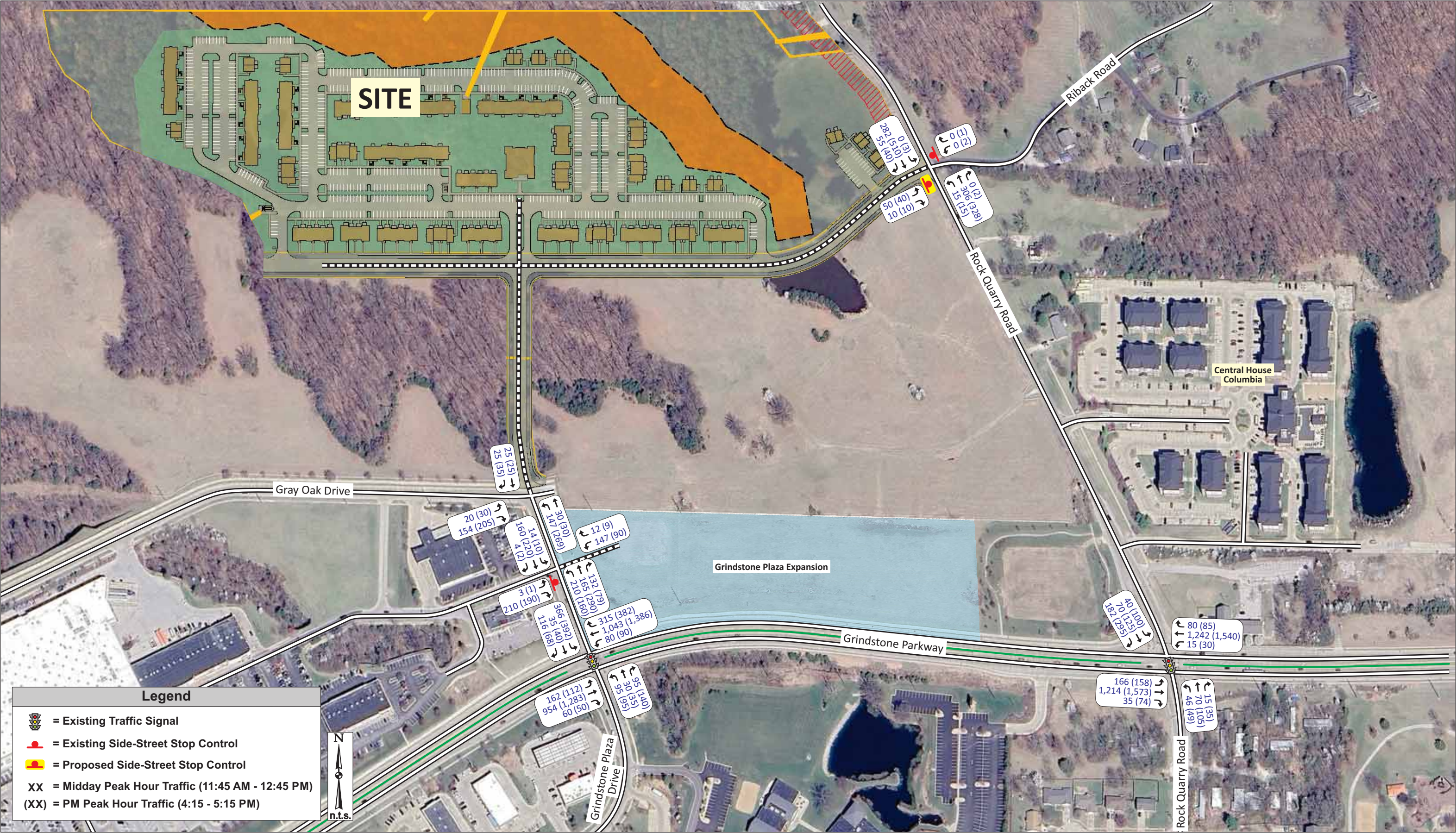


Exhibit 6: 2026 Build Traffic Volumes



2026 TRAFFIC ANALYSIS

Study Procedures: The 2026 Base and Build operating conditions were analyzed using SYNCHRO 11, which is based on procedures outlined in the *Highway Capacity Manual*, published by the Transportation Research Board to determine estimates of capacity and operational performance of signalized and unsignalized intersections. Our traffic operations analysis includes measures of effectiveness generated by the SYNCHRO software for all intersections. The Synchro 11 outputs are reported for signalized intersections, while the HCM 6th Edition outputs from Synchro are shown for the unsignalized intersections. The HCM outputs are considered more realistic for unsignalized intersections.

The HCM, 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") established by the *Highway Capacity Manual*. 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 generally considered acceptable for peak period conditions.

The thresholds that define levels 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 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. Furthermore, criteria differ for the two, since control types create different driver expectations. **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



2026 Build Auxiliary Right-Turn Lane Warrant: The need for a southbound right-turn lane on Rock Quarry Road at the proposed Site Drive was evaluated using the *Right-Turn Lane Guidelines for Two-Lane Roadway* nomograph which is based on criteria from MoDOT's Engineering Policy Guide (EPG). The MoDOT EPG considers auxiliary lanes an asset in promoting safety and improved traffic flow at relatively high conflict locations. Separate turn lanes are intended to remove turning vehicles from the through lanes to reduce the potential number of rear-end collisions at intersections.

The MoDOT EPG provides guidelines for separate right-turn lanes on the through roadway by comparing the total advancing volume to the number of mainline right-turns. The operating speed of the major roadway is used to determine if a right-turn lane is warranted. As discussed previously, Rock Quarry Road has a posted speed of 30 mph, so a design speed of 35 mph was used for the right turn lane analysis. A right-turn lane should be considered when the plotted point lies to the right of the line representing 40-mph on the graph.

Figure 8 graphically illustrates the right-turn evaluation assuming the 2026 Build traffic volumes during the peak hours. Based on the MoDOT EPG, a separate southbound right-turn lane is not warranted on Rock Quarry Road at the proposed Site Drive in the 2026 Build conditions.

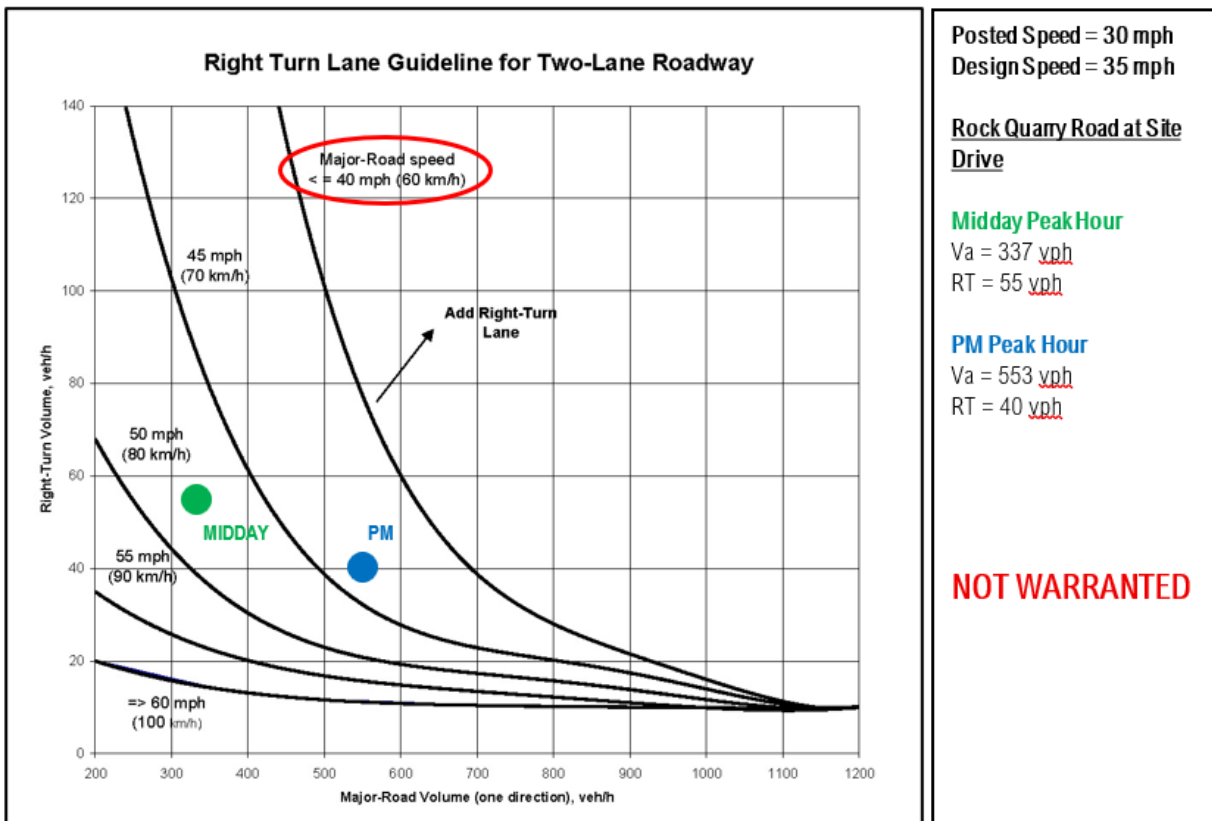


Figure 8: Southbound Rock Quarry Road Right-Turn Warrant at Site Drive – 2026 Build



2026 Build Auxiliary Left-Turn Lane Warrant: The need for a northbound left-turn lane on Rock Quarry Road at the proposed Site Drive was evaluated using the *Left-Turn Guidelines for Two-lane Roadway* nomograph which is based on criteria using MoDOT’s Engineering Policy Guide (EPG).

The MoDOT EPG 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. Given the posted speed on Rock Quarry Road is 30 mph, the less than or equal to 40 mph graph was used.

Figure 9 graphically illustrates the northbound left-turn evaluation assuming the 2026 Build traffic volumes during the peak hours. Based on the MoDOT EPG, a separate northbound left-turn lane is not warranted on Rock Quarry Road at the proposed Site Drive in the 2026 Build conditions.

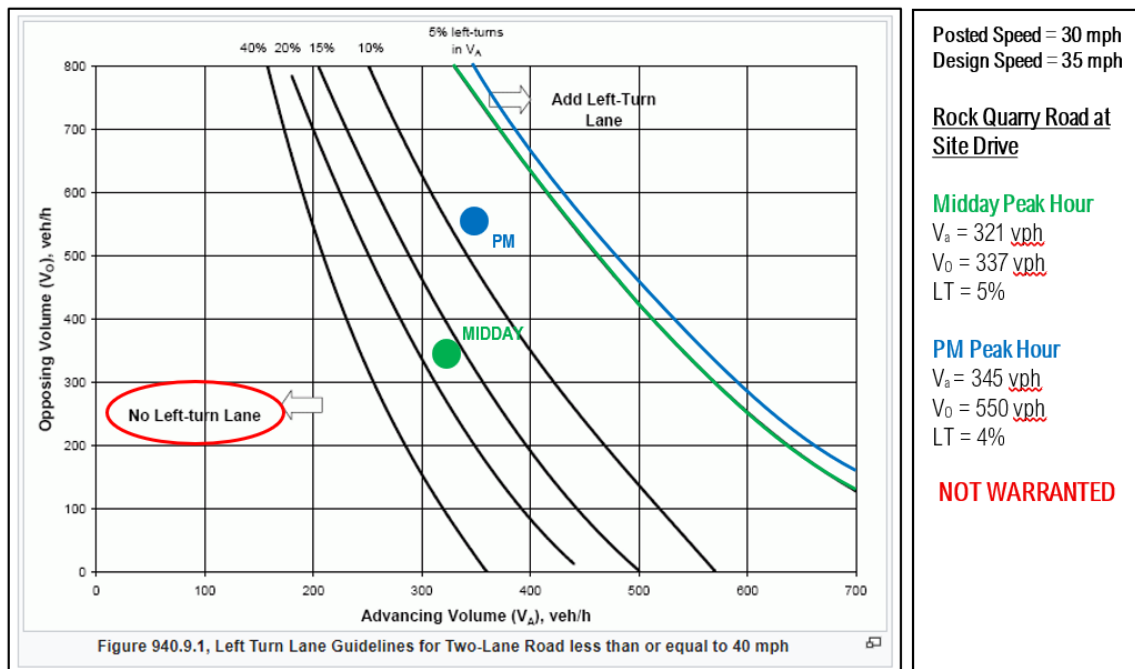


Figure 9: Northbound Rock Quarry Road Left-Turn Warrant at Site Drive – 2026 Build



2026 Operating Conditions: The study intersections were evaluated using the methodologies described previously. **Table 4** summarizes the results of this analysis, which reflects the 2026 Base and 2026 Build operating conditions and average delay at the study intersections during the weekday Midday and PM peak hours. In addition, the Synchro estimated 95th percentile queue length for approaches with a queue over 100 feet is shown in the table.

Note that the signalized intersections along Grindstone Parkway are part of an Adaptive Traffic Control System (ATCS). An ATCS can adjust timing plans in real-time based on current traffic patterns. As part of the *Traffic Impact Study for Proposed Grindstone Plaza Expansion*, average signal timing data for the intersections of Grindstone Parkway with Grindstone Plaza Drive and with Rock Quarry Road were obtained from Rhythm Engineering. As part of the prior study, video data was also reviewed to determine the total green time at the study intersections.

CBB obtained these Synchro files from the city and reviewed the recent video collected and confirmed that the timings in the model provided by the city are still representative for the ATCS system.

As shown in Table 4, most approaches at the study intersections currently operate at acceptable levels of service (i.e., LOS D or better) during both the weekday Midday and PM peak hours with a few exceptions which will be discussed in the following paragraphs. Most approaches at the study intersections are forecasted to continue to operate at acceptable levels of service for the Build condition during the weekday Midday and PM peak hours with minor increases in the forecasted delay as compared to the Base conditions.

In the 2026 Base conditions, the ***westbound Grindstone Plaza Entrance approach at Grindstone Plaza Drive*** operates at LOS F with a delay of approximately 149 seconds during the Midday peak hour and 56 seconds during the PM peak hour. In the 2026 Build condition, the westbound approach is forecasted to continue operating at LOS F with a delay of approximately 196 seconds during the Midday peak hour and 69 seconds during the PM peak hour. The 2018 traffic impact study results for the approved Grindstone Plaza Expansion site indicated that the westbound approach was forecasted to operate at LOS F during the Midday and PM peak hours. As discussed in the prior study, the high volume of westbound left-turns exiting the site in addition to the existing northbound and southbound volumes on Grindstone Plaza Drive result in poor levels of service. The intersection's close proximity to the signalized intersection of Grindstone Parkway and Grindstone Plaza Drive does not allow for the implementation of any geometric or traffic control measures which could mitigate the poor levels of service. It should be noted that drivers have the option of using the right-turn only access drive along Grindstone Parkway (shown in Exhibit 3) if the delay at the westbound Grindstone Plaza Entrance approach is longer than desired.

In the 2026 Base conditions, the ***southbound Grindstone Plaza Drive approach at Grindstone Parkway*** operates at LOS E with a delay of approximately 64 seconds during the PM peak hour. In the 2026 Build condition, the southbound approach is forecasted to continue operating at LOS E with essentially the same delay. The overall intersection is forecasted to operate at LOS



C in the PM peak hour with a nominal one second increase in delay over the 2026 Base conditions. The ATCS prioritizes the mainline through movement, Grindstone Parkway, often resulting in slightly poorer levels of service for the side streets. No further improvements beyond the planned dual southbound left-turn lanes are recommended at the intersection.

In the 2026 Base conditions, the **northbound Rock Quarry Road approach at Grindstone Parkway** operates at LOS E with a delay of approximately 79 seconds during the PM peak hour. In the 2026 Build condition, the northbound approach is forecasted to operate at LOS F with a delay of 81 seconds during the PM peak hour. While the LOS for the northbound approach falls into the next lower category, LOS F, the actual average delay for the approach only increases two seconds, a nominal increase. During the Midday peak hour, the northbound approach is forecasted to operate at LOS E with a delay of 56 seconds. The overall intersection is forecasted to operate at LOS C in the Midday and PM peak hours with less than a one second increase in delay over the 2026 Base conditions.

Again, it is not uncommon for the side streets approaches along Grindstone Parkway to result in slightly poorer levels of service due to the priority given to Grindstone Parkway. The ATCS system is constantly adjusting timing splits to better accommodate the traffic volumes through the study area which could result in additional time when necessary allotted to the side-streets.



Table 4: 2026 Capacity Analysis Summary

Intersection / Approach	Weekday Midday Peak Hour		Weekday PM Peak Hour	
	2026 Base	2026 Build	2026 Base	2026 Build
Rock Quarry Road and Riback Road (Side-Street STOP)				
Eastbound Proposed Site Drive Approach		C (16.5)		C (24.0)
Westbound Riback Road Approach	B (10.1)	B (10.1)	C (15.2)	C (18.4)
Northbound Rock Quarry Road Approach	Free Flow	A (<1.0)	Free Flow	A (<1.0)
Southbound Rock Quarry Road Approach	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)
Gray Oak Drive and Grindstone Plaza Drive (Side-Street YIELD – Evaluated as all-way STOP in 2026 Build conditions)				
Eastbound Gray Oak Drive Approach	Free Flow	A (8.1)	Free Flow	A (9.6)
Northbound Grindstone Plaza Drive Approach	Free Flow	A (9.0)	Free Flow	B (11.7)
Southbound Proposed Site Drive Approach		A (7.6)		A (8.1)
Overall		A (8.4)		B (10.5)
Grindstone Plaza Drive and Grindstone Plaza Entrance (Side-Street STOP)				
Eastbound Grindstone Plaza Entrance Approach	B (10.7)	B (11.0)	B (10.8)	B (11.1)
Westbound Grindstone Plaza Entrance Approach	F (149.1) 95 th Q: 220'	F (196.2) 95 th Q: 250'	F (55.6)	F (68.9) 95 th Q: 100'
Northbound Grindstone Plaza Drive Left-Turn	A (8.0)	A (8.1)	A (8.0)	A (8.1)
Southbound Grindstone Plaza Drive Approach	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)
Grindstone Parkway and Grindstone Plaza Drive (Signal)				
Eastbound Grindstone Parkway Approach	C (28.3) 95 th Q: 380' T	C (30.1) 95 th Q: 380' T	D (35.5) 95 th Q: 565' T	D (37.4) 95 th Q: 565' T
Westbound Grindstone Parkway Approach	B (13.9) 95 th Q: 215' T	B (14.3) 95 th Q: 220' T	A (8.7) 95 th Q: 135' T	A (9.0) 95 th Q: 140' T
Northbound Grindstone Plaza Drive Approach	C (33.5) 95 th Q: 100' L	C (33.7) 95 th Q: 100' L	D (50.0) 95 th Q: 260' T	D (50.7) 95 th Q: 260' T
Southbound Grindstone Plaza Drive Approach	D (45.8) 95 th Q: 195' L	D (44.9) 95 th Q: 195' L	E (63.9) 95 th Q: 245' L	E (63.0) 95 th Q: 250' L
Overall	C (25.0)	C (25.8)	C (27.5)	C (28.5)
Grindstone Parkway and Rock Quarry Road (Signal)				
Eastbound Grindstone Parkway Approach	B (14.9) 95 th Q: 415' T	B (14.9) 95 th Q: 415' T	B (14.9) 95 th Q: 370' T	B (14.9) 95 th Q: 380' T
Westbound Grindstone Parkway Approach	C (23.8) 95 th Q: 500' T	C (24.2) 95 th Q: 510' T	C (32.4) 95 th Q: 780' T	C (32.9) 95 th Q: 790' T
Northbound Rock Quarry Road Approach	D (49.9) 95 th Q: 110' T	E (56.1) 95 th Q: 115' T	E (79.0) 95 th Q: 225' T	F (81.4) 95 th Q: 240' T
Southbound Rock Quarry Road Approach	C (28.2) 95 th Q: 100' T	C (29.4) 95 th Q: 105' T	D (44.6) 95 th Q: 185' T	D (45.4) 95 th Q: 190' T
Overall	C (21.2)	C (21.8)	C (28.4)	C (28.9)

X (XX.X) - Level of Service (Vehicular delay in seconds per vehicle)
95th percentile queue for approach (only values over 100 feet shown)



Given the current configuration of Gray Oak Drive and Grindstone Plaza Drive only has two legs with traffic volumes, the intersection essentially operates under free control. With the proposed new north leg of the intersection providing access to the site, the intersection was re-evaluated under both side-street stop control and all-way stop control. **Table 5** summarizes the results of this analysis which reflect the 2026 Build operating conditions during the Midday and PM peak hours.

As shown in the table, all unsignalized control options are forecasted to operate at acceptable levels of service. It should be noted that Gray Oak Drive could extend to the east in the future which may make one of the three options more desirable pending the anticipated traffic volume on the east leg in the future.

As shown in Exhibit 6, the west and south legs of the intersection have the higher traffic volumes. While all options presented are acceptable, it is recommended that the intersection of Gray Oak Drive and Grindstone Plaza Drive operate under side-street stop control with Grindstone Plaza Drive having the right-of-way or that the intersection operate under all-way stop control.

Table 5: 2026 Capacity Analysis Summary – Gray Oak Drive and Grindstone Plaza Drive Unsignalized Control Options

Intersection / Approach	2026 Build	
	Midday Peak Hour	PM Peak Hour
Gray Oak Drive and Grindstone Plaza Drive (Side-Street STOP) - <u>Grindstone Plaza Drive Free Flow</u>		
Eastbound Gray Oak Drive Approach	A (9.8)	B (11.6)
Northbound Grindstone Plaza Drive Approach	A (6.3)	A (7.1)
Southbound Proposed Site Drive Approach	Free Flow	Free Flow
Gray Oak Drive and Grindstone Plaza Drive (Side-Street STOP) - <u>Gray Oak Drive Free Flow</u>		
Eastbound Gray Oak Drive Approach	Free Flow	Free Flow
Northbound Grindstone Plaza Drive Approach	B (11.5)	C (15.9)
Southbound Proposed Site Drive Approach	A (9.6)	A (9.8)
Gray Oak Drive and Grindstone Plaza Drive (All-Way STOP)		
Eastbound Gray Oak Drive Approach	A (8.1)	A (9.6)
Northbound Grindstone Plaza Drive Approach	A (9.0)	B (11.7)
Southbound Proposed Site Drive Approach	A (7.6)	A (8.1)
Overall	A (8.4)	B (10.5)



SUMMARY

CBB completed the preceding study to address the traffic impacts associated with the proposed student housing development generally located along the west side of Rock Quarry Road just north of Grindstone Parkway in Columbia, Missouri. The proposed development will consist of approximately 191 apartment units totaling 720 beds. Access is proposed via one new drive on Rock Quarry Road, opposite Riback Road, and via a connection to Grindstone Plaza Drive at Gray Oak Drive.

In summary, the following findings should be considered in conjunction with the proposed development:

- The proposed residential development is estimated to generate a total of 230 trips during the weekday Midday peak hour and 225 trips during the weekday PM peak hour.
- Based on the MoDOT EPG, no auxiliary turn lanes are warranted on Rock Quarry Road at the proposed Site Drive in the Build conditions.
- Under the 2026 Base conditions, all approaches at the study intersections currently operate at acceptable levels of service during the Midday and PM peak hours except for the following locations:
 - The westbound Grindstone Plaza Entrance approach at Grindstone Plaza Drive operates at LOS F during the Midday and PM peak hours consistent with the prior traffic study findings for the proposed Grindstone Plaza Expansion development.
 - The southbound Grindstone Plaza Drive approach at Grindstone Parkway operates at LOS E during the PM peak hour.
 - The northbound Rock Quarry Road approach at Grindstone Parkway operates at LOS E during the PM peak hour.
- Under the 2026 Build conditions, all approaches continue to operate at acceptable levels of service during the peak hours except for the following locations:
 - The westbound Grindstone Plaza Entrance approach at Grindstone Plaza Drive which continues to operate at LOS F during the peak hours.
 - The southbound Grindstone Plaza Drive approach at Grindstone Parkway which continues to operate at LOS E during the PM peak hour.
 - The overall intersection is forecasted to operate at LOS C in the PM peak hour with a nominal one second increase in delay over the 2026 Base conditions. The ATCS prioritizes the mainline through movement often resulting in slightly poorer levels of service for the side streets. No further improvements beyond the planned dual southbound left-turn lanes are recommended at the intersection.



- The northbound Rock Quarry Road approach at Grindstone Parkway operates at LOS E during the Midday peak hour and LOS F during the PM peak hour.
 - While the LOS for the northbound approach falls into the next lower category, LOS F, the actual average delay for the approach only increases two seconds, a nominal increase.
 - The overall intersection is forecasted to operate at LOS C in the Midday and PM peak hours with less than a one second increase in delay over the 2026 Base conditions.
- It is recommended that the intersection of Gray Oak Drive and Grindstone Plaza Drive operate under side-street stop control with Grindstone Plaza Drive having the right-of-way or that the intersection operate under all-way stop control.
- As more detailed plans are developed, it is recommended that the site civil engineer illustrate the minimum sight distance triangle requirements on the plans at each proposed access point to ensure that adequate sight distance can be achieved for safe operations within the clear area of the right-of-way. Careful consideration should be given to sight distance obstructions when planning any future aesthetic enhancements, such as berms, fencing and landscaping, at the site drives to ensure that these improvements do not obstruct the view of entering and exiting traffic at the site intersections with the public roads.

We trust this traffic impact study adequately describes the forecasted traffic conditions that should be expected as a result of the proposed student housing development in Columbia, Missouri. 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