January 13, 2020

Ms. Gwen Keen
Real Estate Project Manager
QuikTrip Corporation
2255 Bluestone Drive
St. Charles, Missouri 63303

RE: Traffic Impact Study
Proposed QuikTrip #613 Gas Station and Convenience Store
Southwest Quadrant of Olive Boulevard at Graeser Road/Dautel Lane
Creve Coeur, Missouri
CBB Job No. 29-2018-28

Dear Ms. Keen:

As requested, CBB has completed a traffic impact study pertaining to the proposed construction of a QuikTrip gas station and convenience store #613 in Creve Coeur, Missouri. The site is located on the southwest corner of Olive Boulevard and Graeser Road/Dautel Lane. The existing site consists of a variety of commercial uses, none of which appear to generate high traffic volumes. The location of the site relative to the surrounding area is depicted in **Figure 1**, and a closer aerial view of the site is shown in **Figure 2**.

QuikTrip Corporation proposes to construct a 4,993 square foot (SF) convenience store with 8 fueling pumps, providing 16 vehicle-fueling positions (vfp). A copy of the site plan provided by QuikTrip at the commencement of the study is shown in **Figure 3**. It should be noted that QuikTrip is assembling multiple parcels to create the subject site. However, the larger retail building to the immediate west will remain in operation on a separate lot(s).

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

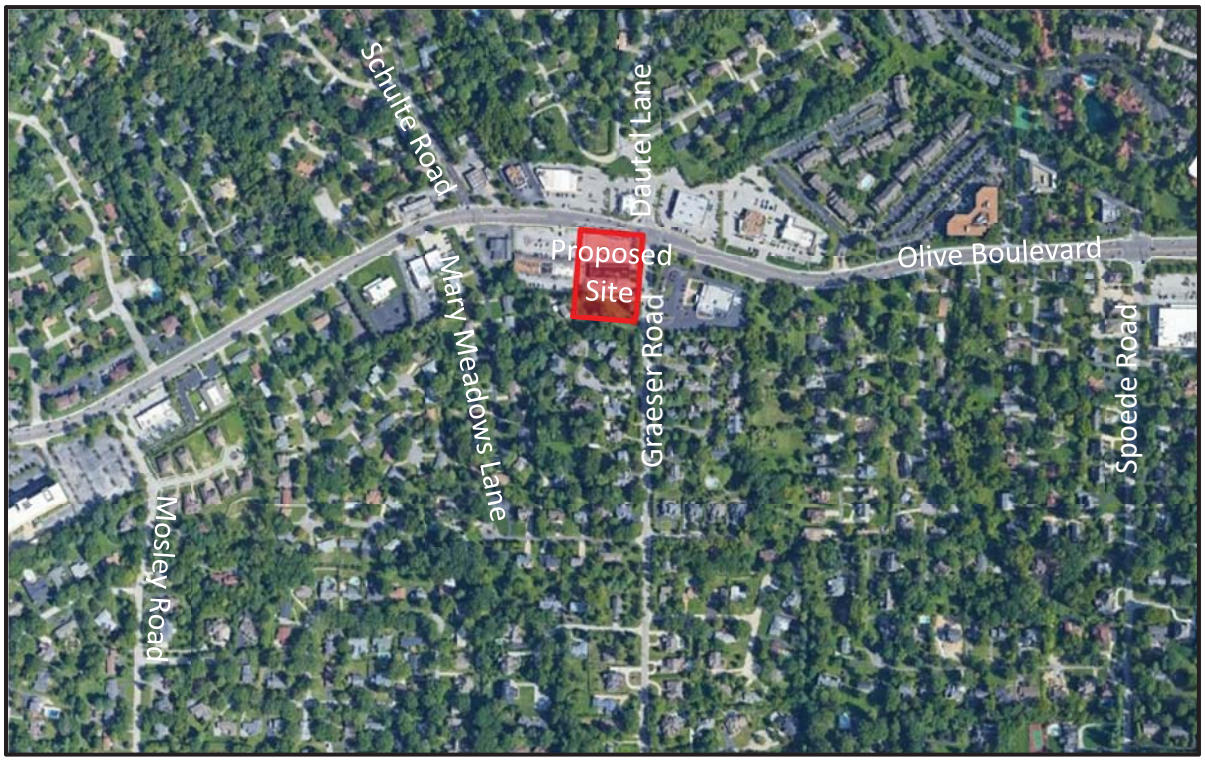

Figure 1: Project Location Map

Figure 2: Site Location

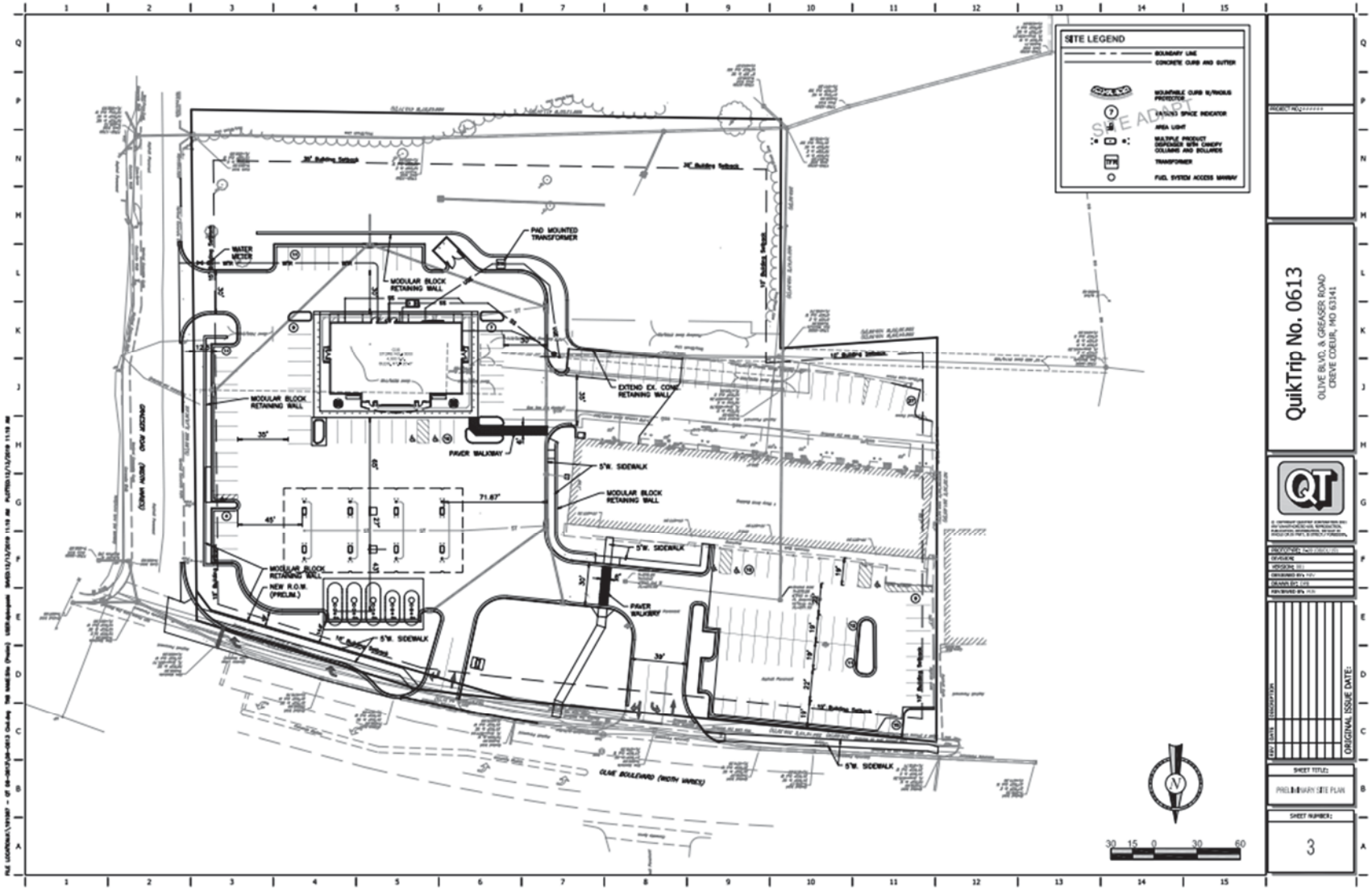

Figure 3: Concept Site Plan (provided by others)

The following intersections were included in the study:

- Olive Boulevard at Mosley Road (Signalized);
- Olive Boulevard at Schulte Road/Mary Meadows Lane (Signalized);
- Olive Boulevard at Graeser Road/Dautel Lane (Signalized);
- Olive Boulevard at Spoede Road (Signalized);
- Olive Boulevard at Existing West Site Driveway/St. Vincent DePaul Driveway (Side-Street Stop);
- Olive Boulevard at Existing Central Site Driveway/Proposed QuikTrip Driveway (Right-In/Right-Out);
- Olive Boulevard at Existing East Site Driveway (Right-In/Right-Out – To Be Removed);
- Graeser Road at Proposed QuikTrip North Driveway (Side-Street Stop);
- Graeser Road at Existing Site Driveway/Proposed QuikTrip South Driveway (Side-Street Stop); and
- Graeser Road at First Community Driveway (Side-Street Stop).

The following analysis scenarios were considered:

- 2020 Baseline Conditions (Recent CBB Counts plus known developments);
- 2020 Build Conditions (2020 Baseline plus Site Trips).

The following report presents the methodology and findings relative to the 2020 Baseline and 2020 Build conditions.

EXISTING CONDITIONS

Jurisdictional Agency: The adjacent roadway jurisdictions vary. The City of Creve Coeur owns and maintains most of the surface streets, and the Missouri Department of Transportation (MoDOT) owns and maintains Olive Boulevard (Route 340). Consequently, any proposed improvements on these routes will be subject to both agencies' approvals through their typical permitting processes. CBB and other representatives of the project team met with staff from the City of Creve Coeur and MoDOT on July 10, 2019 to garner their input on the study scope. This traffic impact study was intended to meet both the City's and MoDOT's collective requirements.

Area Roadway System: CBB inspected the surrounding roadway system to verify number and use of travel lanes, traffic controls in place, adjacent driveway locations, posted speed limits, the presence of non-motorized facilities (pedestrian sidewalks and marked crossings as well as bike lanes) and other pertinent physical features.

Olive Boulevard (Missouri Route 340) is a major east-west arterial that provides access to Interstate 270 to the west and Lindbergh Boulevard (US Route 67) and I-170 to the east. Olive Boulevard is owned and maintained by MoDOT.

Within the study area, Olive Boulevard provides two through lanes in each direction. To the west of Schulte Road/Mary Meadows Lane as well as to the east of Graeser Road/Dautel Lane, Olive Boulevard provides a center two-way left-turn lane. Between Schulte Road/Mary Meadows Lane and Graeser Road/Dautel Lane, Olive Boulevard is divided by a raised concrete median with one break to serve the subject site and St. Vincent DePaul across the street. The posted speed limit is 35 miles per hour (mph). Sidewalks are provided along both sides of the roadway. The traffic signals along Olive Boulevard operate as part of a coordinated system.

Mosley Road is a minor north-south collector road owned and maintained by the City of Creve Coeur. The road provides two lanes, one in each direction, and its north terminus is a tee intersection with Olive Boulevard. Sidewalks are present along both sides of the roadway. Mosley Road has a posted speed limit of 30 mph. At the signalized intersection with Olive Boulevard, pedestrian crossings are marked across the south and east legs.

Schulte Road is a major north-south collector roadway owned and maintained by the St. Louis County Department of Transportation. The road provides two lanes, one in each direction. Within the study area, Schulte Road intersects Olive Boulevard at a signalized intersection. To the south of Olive Boulevard, the road changes names to **Mary Meadows Lane**, which is a local residential road ending in a cul-de-sac maintained by the City of Creve Coeur. Sidewalks are not present along the roadway except for the Circle K frontage on the north side of Olive Boulevard. Schulte Road has a posted speed limit of 35 mph. At the signalized intersection with Olive Boulevard, pedestrian crossings are marked across the north and south legs only.

Graeser Road is a minor north-south collector road owned and maintained by the City of Creve Coeur. The road provides two lanes, one in each direction. Sidewalks are present along the east side of the roadway. Graeser Road has a posted speed limit of 30 mph. At the signalized intersection with Olive Boulevard, pedestrian crossings are marked across the north, south, and east legs. To the north of Olive Boulevard, the road changes names to **Dautel Lane**.

Spoede Road is a major north-south collector roadway owned and maintained by the City of Creve Coeur. The road provides two lanes, one in each direction. Within the study area, Spoede Road intersects Olive Boulevard at a signalized intersection. Sidewalks are provided along the west side of the roadway. Spoede Road has a posted speed limit of 30 mph. At the signalized intersection with Olive Boulevard, pedestrian crossings are marked across the north, south, and west legs.

Existing Traffic Volumes: In order to identify the traffic impacts associated with the proposed QuikTrip development, it is essential to first understand the pre-development traffic conditions in the area. To that end, it was necessary to perform an operational analysis of the existing traffic volumes on the surrounding road system. Therefore, any deficiencies in the current road system would be identified before the traffic generated by the proposed development is added to the system.

Given the traffic characteristics in the area, the weekday AM, Midday, and PM peak hours would be expected to represent a "worst-case scenario" with regards to the traffic impact. If traffic operations are acceptable during these peak hours, it can be reasoned that conditions would be as good or better throughout the remainder of the day.

Turning movement counts were collected during the weekday AM commuter peak period (7:00 to 9:00 AM), the weekday Midday peak period (11:00 AM to 1:00 PM), and the weekday PM commuter peak period (4:00 to 6:00 PM) in August 2019 after local school began Fall term. Based on the traffic counts, the AM peak hour occurred from 7:30 to 8:30 AM, the Midday peak hour occurred from 11:30 AM to 12:30 PM, and the PM peak hour occurred from 4:30 to 5:30 PM. The Existing Traffic Volumes are summarized in **Exhibit 1**. While not shown on Exhibit 1, pedestrians and bicycles were counted at all study locations. Those levels were relatively low; total inbound/outbound trips for all the current uses during the three peak hours were 1/1, 2/1, and 4/4, respectively.

Spot counts were completed to assess existing traffic at the intersections of Olive Boulevard with all existing site driveways (one full access and two right-in/right-out only on Olive Boulevard as well as one full access on Graeser Road) and also the First Community Credit Union driveway on Graeser Road to the south. Existing volumes at these driveways are low, as can be seen in **Exhibit 1**.

Baseline Traffic Volumes: Expected traffic volumes from two other developments were added to existing traffic volumes to reflect opening year Baseline traffic volumes. Trips from a previous study completed by CBB for a Mobil on the Run gas station at Olive Boulevard and Schulte Road/Mary Meadows Lane as well as trips from the expected full occupancy of the 166,000-SF HBE office building on Olive Boulevard at Mosely Road (based on data from the ITE Trip Generation Manual) were added to the Existing traffic volumes in Exhibit 1 to determine the total volumes in the 2020 Baseline scenario, shown in **Exhibit 2**. Trip generation data for the Mobil on the Run and HBE office uses are shown in **Tables 1 and 2**, respectively.

Table 1: Net Trips – Mobil on the Run Redevelopment (By Others)

Trip Estimate from Previous Study	*Weekday AM Peak Hour*			*Weekday Midday Peak Hour*			*Weekday PM Peak Hour*		
	In	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
Increase in Trips for Mobil on the Run Gas Station Redevelopment									
Total Trips	55	65	120	90	100	190	70	70	140
New Trips	**20**	**30**	**50**	**35**	**45**	**80**	**30**	**30**	**60**
Pass-by Trips	**35**	**35**	**70**	**55**	**55**	**110**	**40**	**40**	**80**

Table 2: HBE Office Building Trips

Land Use	***Size***	***Weekday AM Peak Hour***			***Weekday Midday Peak Hour***			***Weekday PM Peak Hour***		
		In	***Out***	***Total***	***In***	***Out***	***Total***	***In***	***Out***	***Total***
Full Occupancy of HBE Office Building										
General Office Building	16 vfp	165	30	195	60	60	120	30	160	190

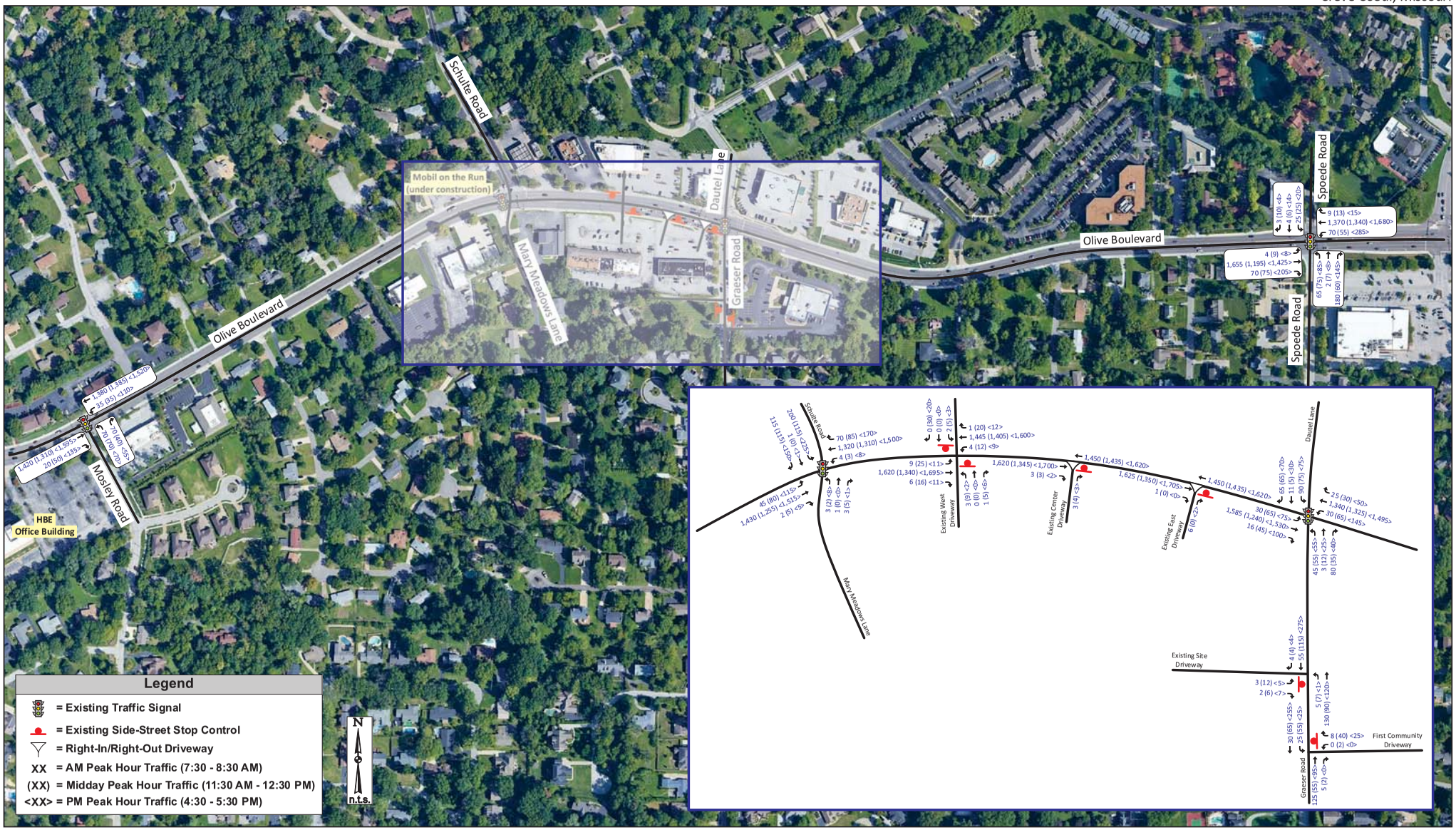

Exhibit 1: Existing Traffic Volumes

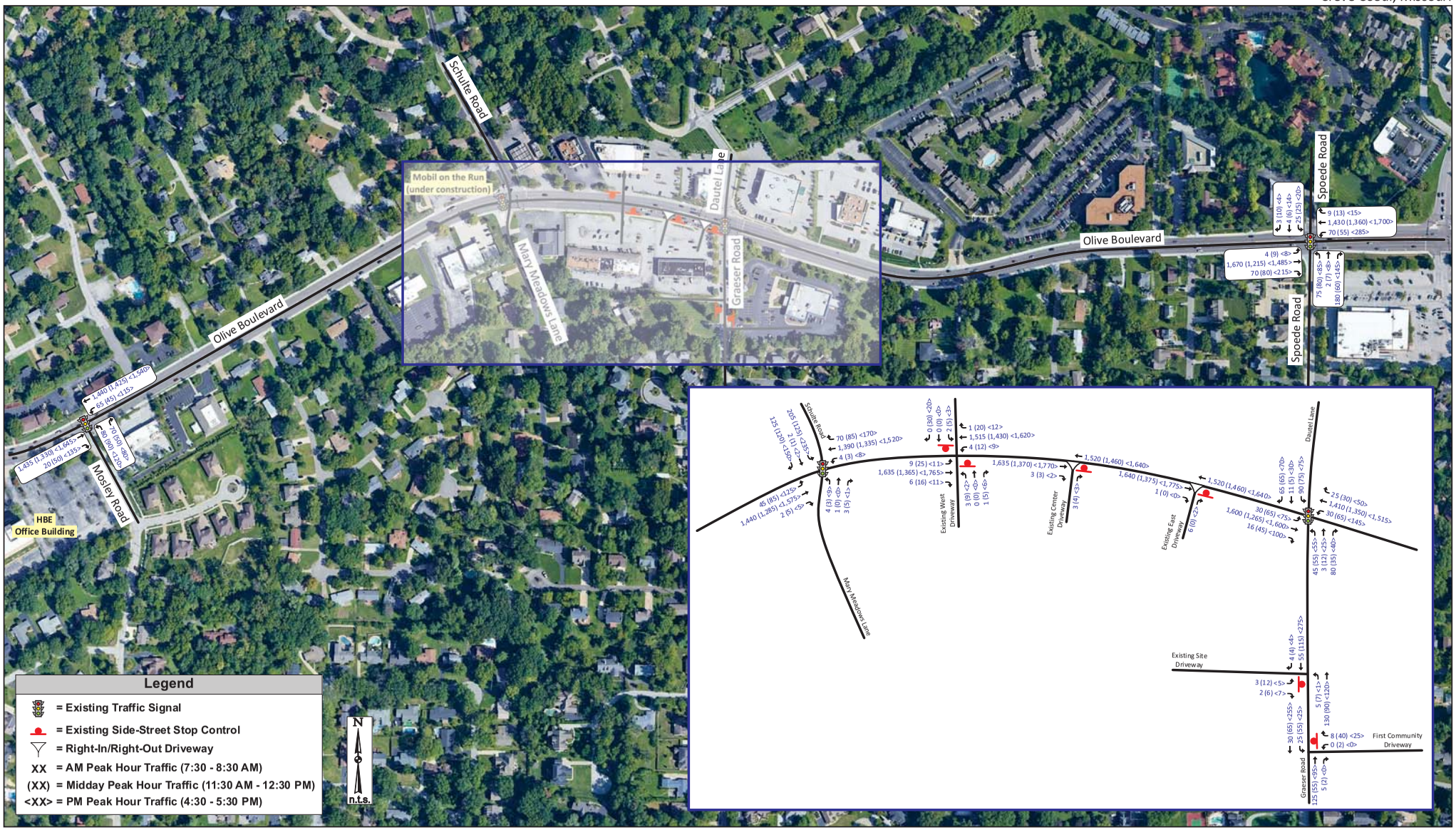

Exhibit 2: 2020 Baseline Traffic Volumes

PROPOSED SITE

Proposed Land Use: Based upon the site plan provided by QuikTrip, shown in **Figure 3**, the proposed convenience store would be approximately 4,993 SF. The number vehicle fueling stations would be 16 under a single canopy.

Site Access: Direct access to the QuikTrip store is proposed via one full-access driveway on Graeser Road as well as one right-in/right-out driveway on Olive Boulevard. One of the existing driveways on Olive Boulevard serving this site would be closed. A full access driveway on Olive Boulevard is present on the adjacent site to the west, and cross access would be maintained between the two sites such that the proposed QuikTrip will use that driveway.

Trip Generation: As a primary step in this analysis, forecasts were prepared to estimate the amount of traffic that the proposed QuikTrip development would generate during the AM, Midday and PM peak hours. Traffic forecasts for the proposed QuikTrip were developed using data from counts performed at similar facilities within the St. Louis metropolitan area.

For comparison, the *Trip Generation Manual*, Tenth Edition, published by the Institute of Transportation Engineers (ITE) was also used to estimate the anticipated trips for the QuikTrip store. This manual, which is a standard resource for transportation engineers, is based on a compilation of nationwide studies documenting the trip generation characteristics of various land uses. Specifically, ITE Code 945 (Gasoline Station with Convenience Store) was used for comparison to the empirical numbers. The estimated trip generation for the proposed development is summarized in **Table 3**.

A significant portion of these trips would already be traveling along Olive Boulevard and would stop at this site as part of another trip (i.e. pass-by trips). Pass-by trips are classified as traffic already using the adjacent roadways that are attracted to the site as an intermediate stop on the way to and from other destinations. These pass-by trips create turning movements at the driveways serving the site, but they do not represent new traffic on the adjacent roadways and therefore, do not increase traffic at upstream and downstream intersections.

Table 3: Trip Generation Estimate

Land Use	*Size*	*Weekday AM Peak Hour*			*Weekday Midday Peak Hour*			*Weekday PM Peak Hour*		
		In	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
Trip Generation Based on ITE Land Use Code 945										
Gas Station w/ Convenience Store	16 vfp	100	100	200	125	125	250	125	125	250
New Trips		**40**	**40**	**80**	**55**	**55**	**110**	**55**	**55**	**110**
Pass-by Trips (62%/56%/56%)		**60**	**60**	**120**	**70**	**70**	**140**	**70**	**70**	**140**
Trip Generation Based on CBB Local Data for QuikTrip Stores										
Area QuikTrip Stores*	16 vfp	170	165	335	145	140	285	145	140	285
New Trips		**45**	**40**	**85**	**40**	**35**	**75**	**40**	**35**	**75**
Pass-by Trips (75%)		**125**	**125**	**250**	**105**	**105**	**210**	**105**	**105**	**210**

*Trips based on multiple driveway count studies by CBB

The statistical information provided in the *Trip Generation Handbook, A Recommended Practice*, published by ITE, supports pass-by percentages of 62 percent for gas station trips during the weekday AM peak hour and 56 percent for gas station trips during the weekday PM peak hour. Since no Midday pass-by rates were recommended by ITE, the PM peak hour pass-by trip rates were applied to the Midday peak hour. With the use of the higher trip projections based on the local QuikTrip sites, CBB also used a higher pass-by rate of 75% for our QuikTrip forecasts.

As a result, the proposed QuikTrip is estimated to generate 85 *new* trips during the weekday AM peak hour and 75 *new* trips during the weekday Midday and PM peak hours. The proposed QuikTrip is also estimated to generate 250 pass-by trips during the weekday AM peak hour and 210 pass-by trips during the weekday Midday and PM peak hours.

Trip Distribution: The site-generated trips for the proposed QuikTrip were assigned into and out of the site based upon existing travel patterns, current roadway network, and the proximity to similar uses. The distribution of new site-generated trips was estimated as follows:

- To/From the west on Olive Boulevard 45%
- To/From the east on Olive Boulevard 35%
- To/From the south on Mosley Road 5%
- To/From the north on Schulte Road 5%
- To/From the south on Graeser Road 5%
- To/From the south on Spoede Road 5%

The pass-by trips were assigned in accordance with the existing traffic volumes on the adjacent roadways, specifically Olive Boulevard eastbound and westbound.

The site-generated trips (new and pass-by) for the weekday AM, Midday, and PM peak hours are shown in **Exhibit 3.**

2020 Build Traffic Volumes: The increases in traffic volumes resulting from the trip assignment for the proposed QuikTrip (Exhibit 3) were aggregated with the 2020 Baseline Traffic Volumes (Exhibit 2) to determine the total volumes in the 2020 Build scenario. The 2020 Build Traffic Volumes for the weekday AM, Midday and PM peak hours are shown in **Exhibit 4**.

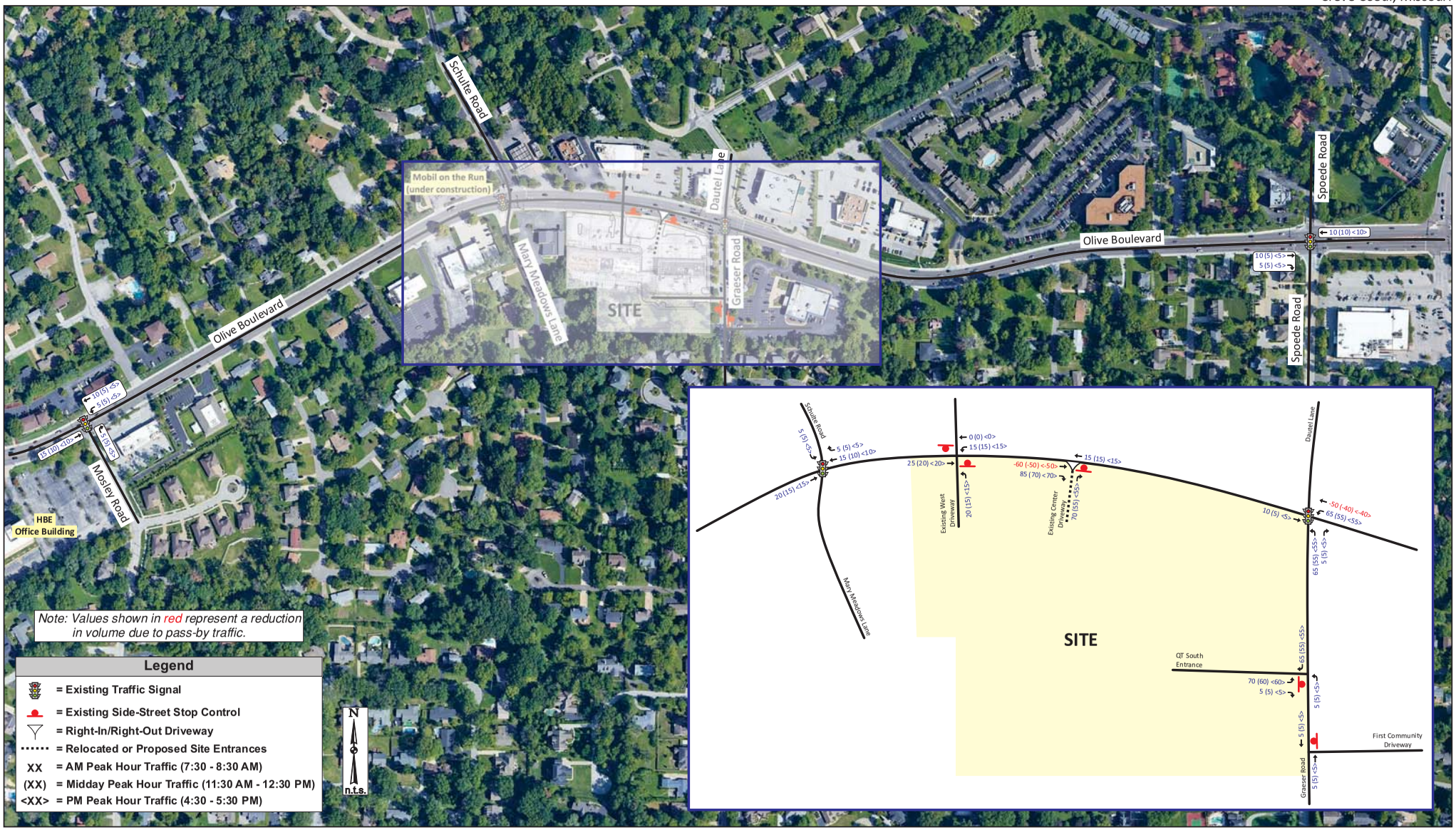

Exhibit 3: Site-Generated Traffic Volumes

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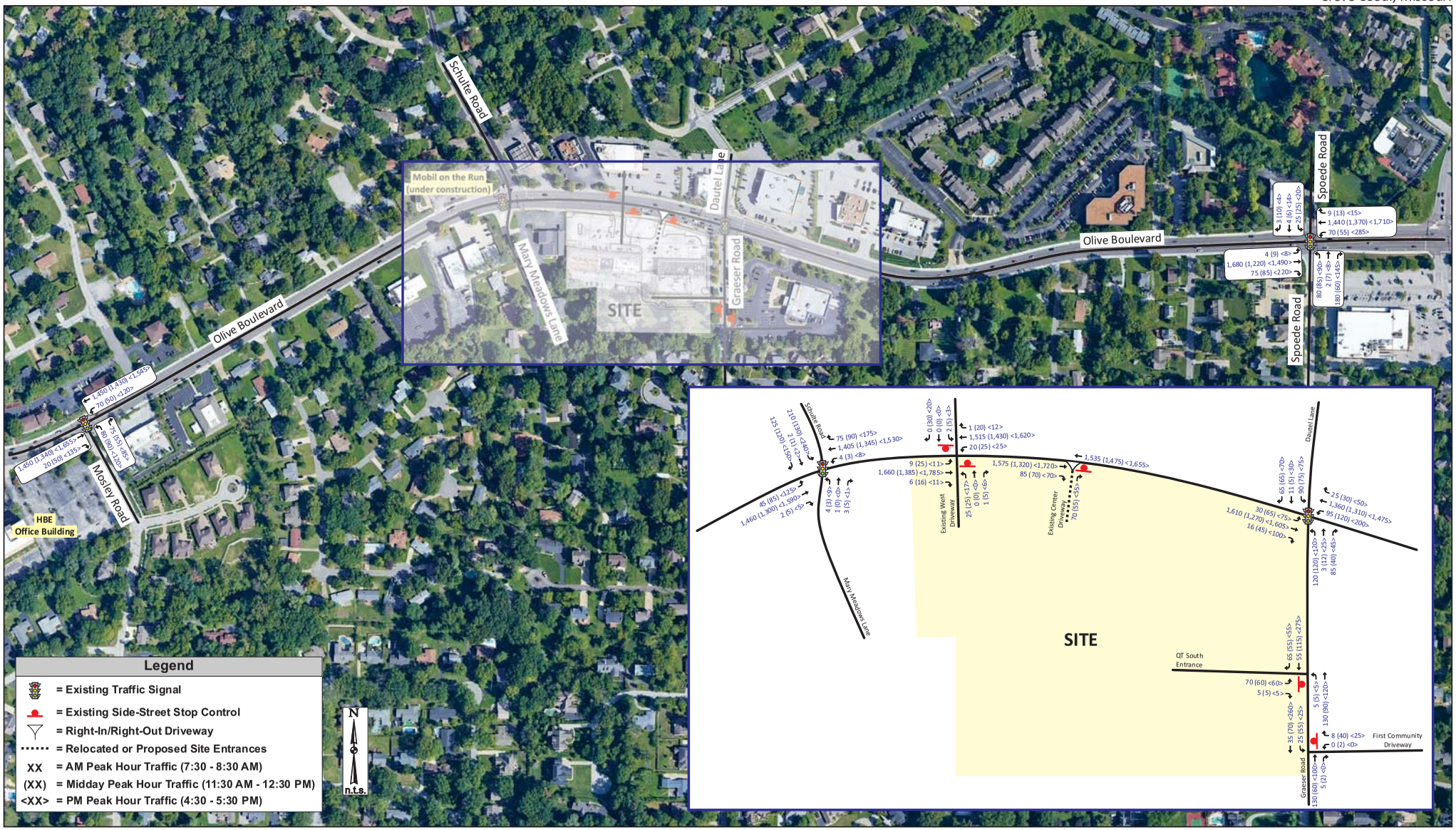

Exhibit 4: 2020 Build Traffic Volumes

Right-Turn Lane Warrants

The need for auxiliary eastbound right-turn lanes on Olive Boulevard at the existing driveway on the neighbor's property (full access), proposed/shifted QuikTrip site driveway (right-in/right-out), and Graeser Road (signalized intersection) was evaluated using MoDOT's Access Management Guidelines (AMG). These guidelines consider 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 method provides volume guidelines for the consideration of separate turn lanes by comparing the total advancing volume (which includes all turning traffic) to the number of right turns during the design hour with respect to a given major road speed.

Utilizing MoDOT's AMG *Right-Turn Lane Guideline for Four-Lane Roadway* nomograph, shown in **Figures 4, 5, and 6**, separate eastbound right-turn lanes are warranted on Olive Boulevard at the QuikTrip right-in/right-out drive and the Graeser Road signalized intersection, but not at the shared full-access driveway on the neighbor's property. However, due to the limited distance between the two private entrances, a useful right-turn lane may not be practical at the QuikTrip driveway. It should be acknowledged that the proposed redevelopment is not expected to add many, if any, eastbound right-turn movements on Olive Boulevard at Graeser Road; the warrants for an eastbound right-turn lane at the signalized intersection are based on an existing need to serve current volumes.

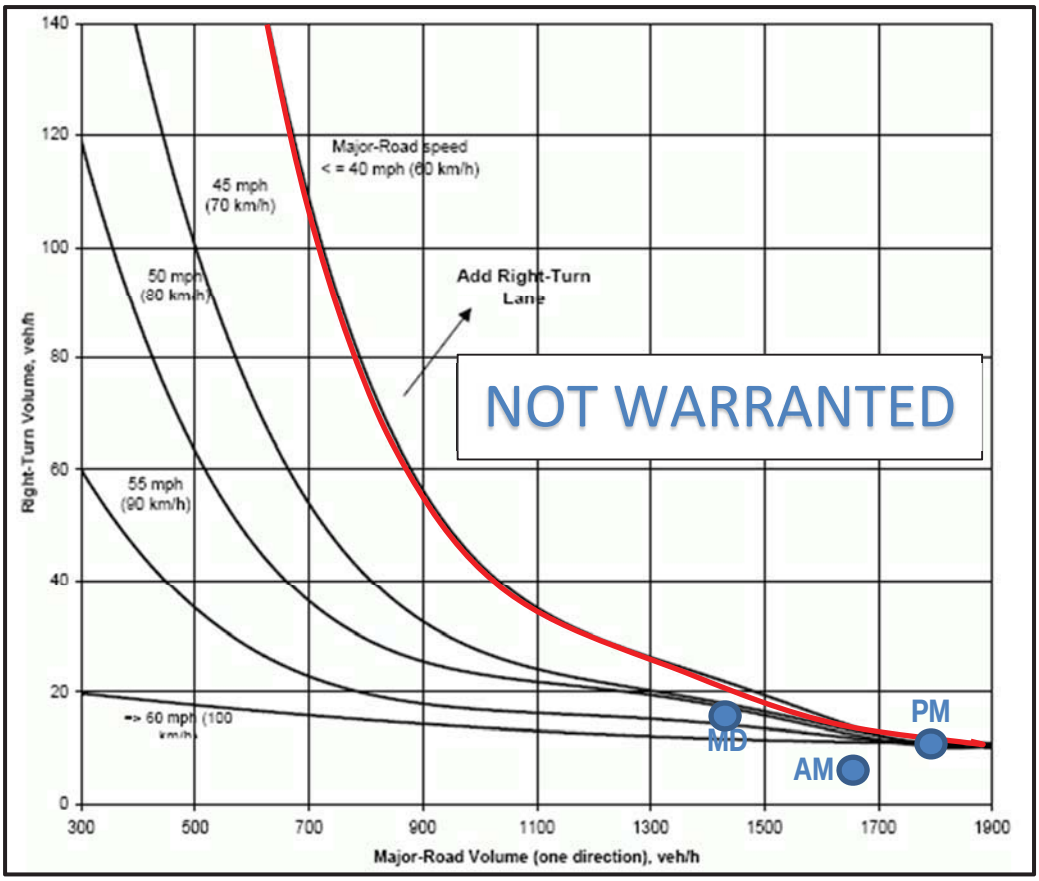

Figure 3: Right-Turn Lane Guidelines for Four Lane Roadways – Olive Boulevard at Shared Full Access Driveway on Neighbors Property

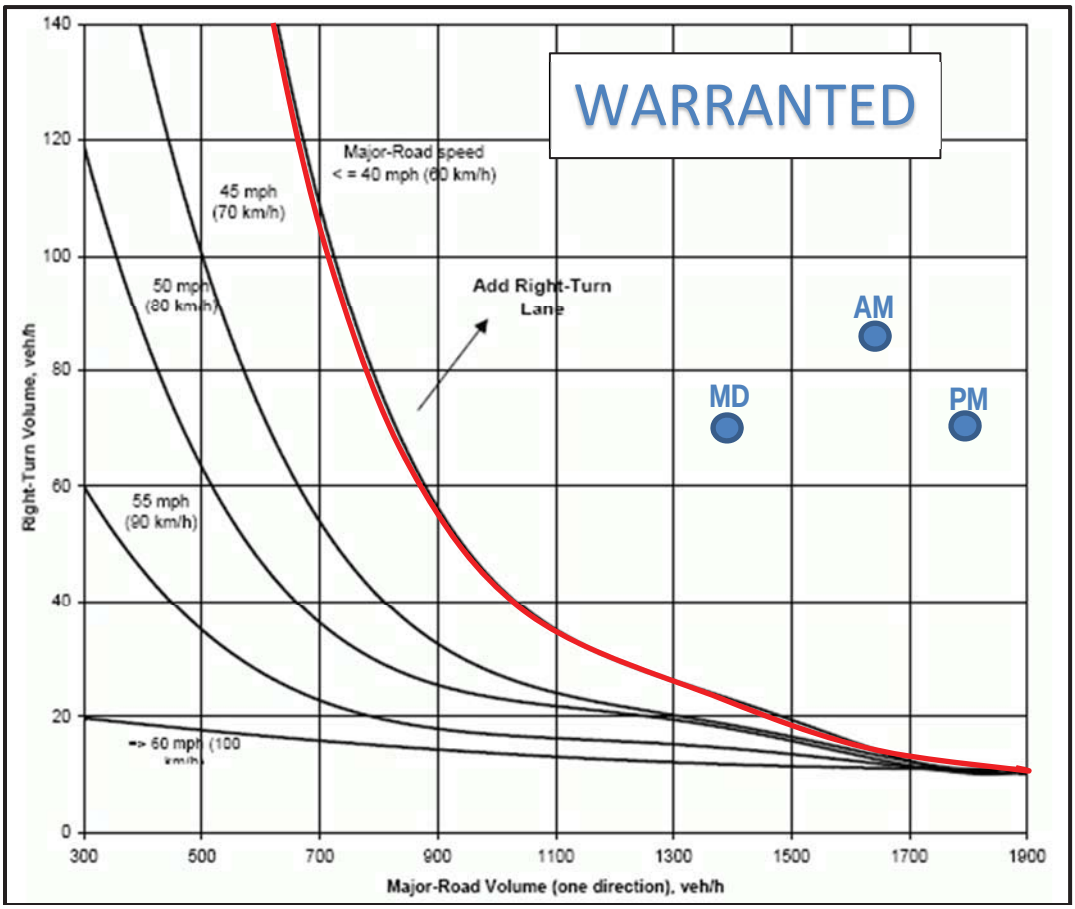

Figure 5: Right-Turn Lane Guidelines for Four Lane Roadways – Olive Boulevard at QuikTrip Driveway (Right-In/Right-Out)

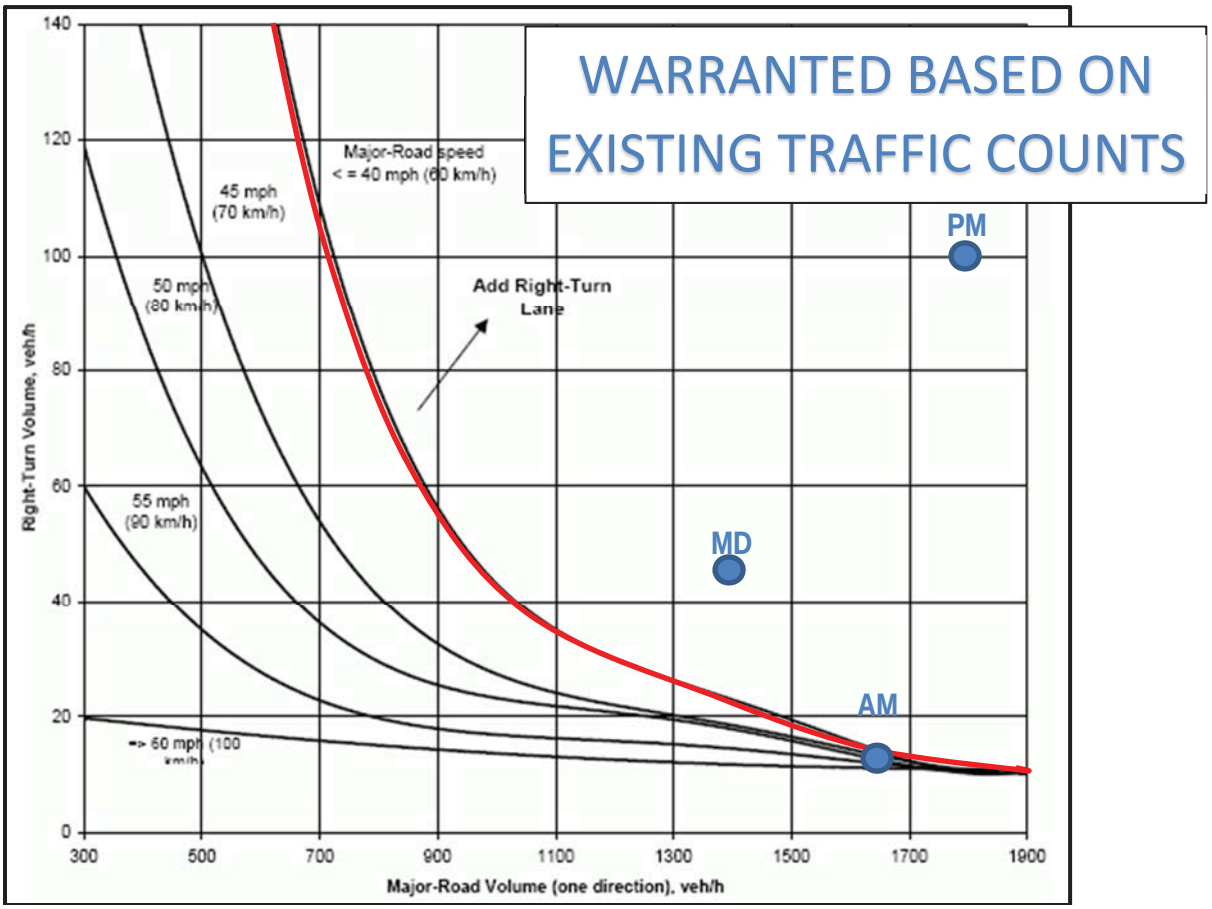

Figure 6: Right-Turn Lane Guidelines for Four-Lane Roadways – Olive Boulevard at Graeser Road Signalized Intersection

TRAFFIC ANALYSES

Study Procedures: The 2020 Baseline and 2020 Build operating conditions for the study area intersections were evaluated using SYNCHRO 10, which is based on procedures outlined in the *Highway Capacity Manual* to determine estimates of capacity and operational performance of signalized and unsignalized intersections. Our traffic operations analysis below includes measures of effectiveness generated by the SYNCHRO software.

The operating conditions were graded in accordance with 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.

It must also be acknowledged that the perception of acceptable traffic service varies widely by area. Specifically, more delay is usually tolerated in urban areas compared to rural areas. Based on the character of this area, we believe that overall intersection LOS D would be an appropriate target for overall peak period traffic operations, although potentially unattainable based on current high through volumes on Olive Boulevard

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 4** summarizes the level of service thresholds used in this analysis.

Table 4: 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

Given the general traffic characteristics in the area (Olive Boulevard being a major commuter route) and the anticipated trip generation for the proposed redevelopment (which would also be expected to peak during the weekday AM, Midday, and PM peak periods), the weekday AM, Midday, and PM peak hours would 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 as good or better throughout the remainder of the day.

Operating Conditions: The study intersections were evaluated using the methodologies described above. **Table 5** summarizes the results of these analyses, which compare the 2020 Baseline and 2020 Build operating conditions and average delays for each of the study intersections during the weekday AM, Midday, and PM peak hours. The estimated 95th percentile queue lengths for the critical movements are also shown in Table 5. It should be noted that the 2020 Build analyses included the two right-turn lanes along Olive Boulevard (shown to be warranted above) at the QuikTrip right-in/right-out driveway and Graeser Road signalized intersection.

As shown in Table 5, the intersection of Olive Boulevard at Schulte Road/Mary Meadows Lane operates at LOS E overall during the AM and PM peak hours under 2020 Baseline conditions due to the poor LOS for the southbound Schulte Road approach. Additionally, the southbound Dautel Lane approach, southbound Spoede Road approach, and the northbound and southbound Existing shared driveway/St. Vincent DePaul approaches at Olive Boulevard all operate at LOS E during the AM peak hour. The southbound Schulte Road approach at Olive Boulevard operates at LOS F during the Midday peak hour. The northbound Mosley Road approach at Olive Boulevard operates at LOS E during the PM peak hour. All other approaches and overall intersections within the study area operate at acceptable levels of service during each peak hour under 2020 Baseline conditions.

Under 2020 Build conditions, significant changes are not expected along Olive Boulevard. During the AM peak hour, the northbound Graeser Road approach at Olive Boulevard is expected to degrade from LOS C to LOS E with the intersection degrading from LOS B to LOS C overall. During the PM peak hour, that approach is expected to degrade from LOS D to LOS E with the intersection degrading from LOS B to LOS C overall. The northbound Spoede Road approach will degrade from LOS D to LOS E in the AM peak hour The northbound Shared Driveway approach at Olive Boulevard is expected to degrade to LOS F in the AM peak hour and LOS E during the Midday and PM peak hours. The additional five southbound left-turns expected on Schulte Road at Olive Boulevard are not expected to make a significant difference in operations at the approach, but timing or capacity adjustments are likely necessary to mitigate the poor baseline operations at the Schulte Road/Mary Meadows intersection.

Table 5: Traffic Operating Conditions – 2020 Baseline and 2020 Build Traffic Volumes

Intersection/Approach	AM Peak Hour		Midday Peak Hour		PM Peak Hour	
	2020 Baseline	2020 Build	2020 Baseline	2020 Build	2020 Baseline	2020 Build
Olive Boulevard and Mosley Road (Signalized)						
Eastbound Olive Boulevard Approach	A (9.8)	B (10.8)	B (10.2)	B (10.3)	B (17.2)	B (17.5)
Westbound Olive Boulevard Approach	B (11.2)	B (11.5)	B (11.0)	B (10.7)	B (16.7)	B (16.5)
Northbound Mosley Road Approach	D (48.1)	D (46.9)	D (47.5)	D (46.3)	E (64.3)	E (62.9)
Overall	***B (12.3)***	***B (12.8)***	***B (12.5)***	***B (12.4)***	***C (20.6)***	***C (20.6)***
Olive Boulevard and Schulte Road/Mary Meadows Lane (Signalized)						
Eastbound Olive Boulevard Approach	C (22.3)	C (24.3)	B (10.4)	B (10.5)	B (16.4)	B (16.7)
Westbound Olive Boulevard Approach	A (8.4)	A (9.4)	A (3.9)	A (4.5)	A (5.9)	A (5.7)
Northbound Mary Meadows Lane Approach	D (50.6)	D (50.6)	D (45.0)	D (45.0)	D (50.7)	D (50.7)
Southbound Schulte Road Approach	F (>200)	F (>200)	F (>200)	F (>200)	F (>200)	F (>200)
Overall	***E (71.3)***	***E (75.2)***	***D (42.3)***	***D (45.5)***	***E (63.6)***	***E (65.8)***
Olive Boulevard and Graeser Road/Dautel Lane (Signalized)						
Eastbound Olive Boulevard Approach	A (7.8)	B (12.8)	A (4.4)	A (7.6)	B (18.4)	C (22.0)
Westbound Olive Boulevard Approach	B (17.0)	B (19.7)	B (12.6)	B (14.5)	B (14.2)	B (19.3)
Northbound Graeser Road Approach	C (31.3)	E (60.3)	D (39.0)	D (52.4)	D (52.1)	E (71.4)
95th Percentile Left-Turn Queue	75’	180’	85’	160’	100’	220’
Southbound Dautel Lane Approach	E (59.4)	D (45.8)	D (41.4)	C (34.9)	D (51.6)	D (41.9)
Overall	***B (15.2)***	***C (20.6)***	***B (11.7)***	***B (14.9)***	***B (19.3)***	***C (24.3)***
Olive Boulevard and Spoede Road (Signalized)						
Eastbound Olive Boulevard Approach	C (21.3)	B (16.7)	A (9.0)	A (7.0)	C (21.1)	B (17.7)
Westbound Olive Boulevard Approach	A (8.0)	A (8.2)	A (6.8)	A (6.9)	C (24.3)	C (24.5)
Northbound Spoede Road Approach	D (54.5)	E (55.5)	D (46.4)	D (48.6)	D (47.5)	D (48.4)
Southbound Spoede Road Approach	E (58.4)	E (58.4)	D (44.5)	D (44.5)	D (53.7)	D (53.5)
Overall	***B (19.2)***	***B (17.1)***	***B (10.7)***	***B (10.1)***	***C (24.7)***	***C (23.4)***
Olive Boulevard and Existing Shared Driveway/St. Vincent DePaul Driveway (Side-Street Stop)						
Eastbound Olive Boulevard Left-Turn	B (13.7)	B (13.7)	B (12.5)	B (12.5)	B (14.2)	B (14.1)
Westbound Olive Boulevard Left-Turn	C (15.3)	C (16.2)	B (12.6)	B (13.0)	C (16.0)	C (16.8)
Northbound Site Driveway Approach	E (45.0)	F (67.2)	D (29.5)	E (43.5)	C (18.9)	E (46.8)
95th Percentile Left-Turn Queue	<15’	30’	<15’	25’	<15’	20’
Southbound St. Vincent DePaul Driveway Approach	E (39.4)	E (42.1)	B (13.0)	B (13.2)	B (13.7)	B (13.7)
Olive Boulevard and Existing Central Site Driveway (Right-In/Right-Out)						
Northbound Right-Turn Approach	B (11.1)	B (11.9)	B (10.3)	B (10.8)	B (10.8)	B (11.3)
Olive Boulevard and Existing East Site Driveway (Right-In/Right-Out)						
Northbound Right-Turn Approach	B (11.1)		B (10.3)		B (10.7)	
Graeser Road at Existing Site Driveway/Proposed QuikTrip South Driveway (Side-Street Stop)						
Eastbound Site Driveway Approach	A (9.3)	B (10.4)	A (9.6)	B (10.3)	B (10.4)	B (12.1)
Northbound Graeser Road Left-Turn	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)	A (<1.0)
Graeser Road at First Community Driveway (Side-Street Stop)						
Westbound Site Driveway Approach	A (9.0)	A (9.0)	B (10.1)	B (10.2)	A (8.9)	A (8.9)
Southbound Graeser Road Approach	A (<1.0)	A (3.2)	A (<1.0)	A (3.5)	A (<1.0)	A (<1.0)

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

The 95th percentile northbound left-turn queue on Graeser Road from the Olive Boulevard signal was calculated to block the proposed QuikTrip south driveway during all three peak hours. However, as many of the northbound trips on Graeser Road at Olive Boulevard would originate from the proposed QuikTrip site, some of that queue will be stacked on the site as opposed to extending farther south on Graeser Road itself.

CBB considered an alternative signal configuration with split north-south phasing and dual northbound left-turn lanes, but that configuration would have worse operations than the current common north-south phase configuration despite shorter northbound queues. Therefore, the lane widening was not advanced as a viable alternative.

Non-Motorized Considerations

Pedestrian Accommodations Sidewalks are provided along both sides of Olive Boulevard and along the east side of Graeser Road, and all existing traffic signals addressed herein already provide pedestrian signals and crosswalks.

Segments of sidewalk at the new/widened driveways for the proposed site must be designed in compliance with current ADA (PROWAG) standards when considering ramps, cross-slopes, etc.

SUMMARY

CBB completed the preceding study to address the potential traffic impacts pertaining to the proposed development of QuikTrip gas station and convenience store #613 on the southwest corner of Olive Boulevard and Graeser Road/Dautel Lane in Creve Coeur, Missouri.

- The proposed gas station and convenience store would be approximately 4,993 SF with 16 vehicle fueling positions.
- The proposed development is estimated to generate up to 85 new trips during the weekday AM peak hour, 75 new trips during the weekday Midday peak hour, and 75 new trips during the weekday PM peak hour. Additionally, the new store is expected to generate 250 pass-by trips during the weekday AM peak hour, 210 pass-by trips during the weekday Midday peak hour, and 210 pass-by trips during the weekday PM peak hour.
- Access to the site is proposed to utilize the existing shared driveway on the neighbor's (full-access) and rebuilt QuikTrip Site Driveway (right-in/right-out) on Olive Boulevard. The existing East Site Driveway (right-in/right-out) would be closed. Access is also proposed on Graeser Road near the existing site driveway, which would remain in place and provide full access.

- CBB recommends that the proposed QuikTrip right-in/right-out access on Olive Boulevard be located near the existing curb cut to maximize spacing from the Graeser Road signal.
- Based on existing volumes, an eastbound right-turn lane is currently warranted on Olive Boulevard at the Graeser Road signalized intersection.
- An eastbound right-turn lane is warranted along Olive Boulevard at the proposed QuikTrip site entrance, but an auxiliary right-turn lane is not warranted at the shared, full access drive. Due to the limited distance between the two private entrances, a useful right-turn lane may not be practical.
- Under 2020 Baseline conditions, all study intersections operate at acceptable levels of service, overall and individual approaches, except the intersection of Olive Boulevard at Schulte Road/Mary Meadows Lane during the AM and PM peak hours (more specifically, the southbound Schulte Road approach during all three peak hours), the southbound Dautel Lane approach at Olive Boulevard during the AM peak hour, the northbound and southbound Existing shared driveway/St. Vincent DePaul approaches at Olive Boulevard during the AM peak hour, the southbound Spoede Road approach during the AM peak hour, and the northbound Mosely Road approach during the PM peak hour.
- Under 2020 Build conditions, significant operational issues are not expected, but the northbound Shared Driveway and northbound Graeser Road approaches are expected to degrade to poor levels of service. Those intersections are expected to operate at acceptable levels overall.
    - The 95th percentile left-turn queues on Graeser Road at Olive Boulevard under the unconstrained 2020 Build conditions are calculated to be up to 220 feet during the PM peak hour, which would extend past the site driveway. However, since a large portion of the northbound left-turns originate from the proposed site, many of those vehicles would be queued on the site as opposed to extending farther south on Graeser Road itself.

We trust that this traffic impact study adequately describes the forecasted traffic conditions that should be expected in the vicinity of the proposed QuikTrip convenience store in Creve Coeur, Missouri. If additional information is desired, please feel free to contact me at 314-308-6547 or Lcannon@cbbtraffic.com.

Sincerely,

Lee Cannon, P.E., PTOE
Principal – Traffic Engineer