RBA FORM (OFFICE USE)
MEETING DATE: **April 20, 2016**
Regular ( ) Work Session (X)
ATTACHMENT: YES (X) NO ( )
Contract ( ) Ordinance ( ) Other (X)

Request for Board Action
By: Mayor ZUCKER

Ward: All

- **Description: Review Traffic Study and recommendations for Bryan & Feise Roads Related to the Area Plan/PUD for the 16 acre Cora Marie Marketplace**

Recommendation: Staff – Approve ( ) Disapprove ( )

- The City is reviewing the pending application for approval of an Area Plan/PUD for 16 acres at the NW corner of Bryan & Feise Rds.
- A Traffic impact study was performed by CBB reported on 02/01/2016 concerning traffic associated with the Neighborhood Grocery and gas station (Attached Tab A)
- An additional impact study was reported 03/30/2016 concerning traffic associated with the entire 16 acre tract, including 3 additional hypothetical buildings. (Attached Tab B)
- A map showing proposed lanes and signals is attached at Tab C. A more detailed map will be available for study at the Workshop.
- Notice that widening of Feise Rd west of Bryan takes ground on the north edge of Feise (Bopp property); widening of Bryan north of Feise takes ground on the west edge (Bopp Property). If Bryan south of Feise needs to be widened to realign lanes on the western edge of Bryan, there is already an existing public ROW dedicated for that purpose. (see Tab D).
- The purpose of this RBA is to afford the BOA time to focus on traffic issues ahead of the meeting on 5/4/2016 where we expect to vote on the Area Plan/PUD.
- **Budget Impact: TBD.**

RBA requested by: Mayor Zucker

February 1, 2016

Mr. Rick Rohlfing, PE, PLS, CPESC
BFA, Inc.
103 Elm Street
Washington, MO 63090

RECEIVED
FEB 01 2016
City of
Dardenne Prairie

RE: Traffic Impact Study - Proposed Grocery Store
Bryan Road and Feise Road
Dardenne Prairie, Missouri
CBB Job #29-15

Dear Mr. Rohlfing:

As requested, CBB has completed a traffic impact study pertaining to the proposed development of a grocery store with fueling station in Dardenne Prairie, Missouri. The proposed site is located in the northwest quadrant of the intersection of Bryan Road and Feise Road. The location of the site in relation to the surrounding road system is depicted in **Figure 1**.

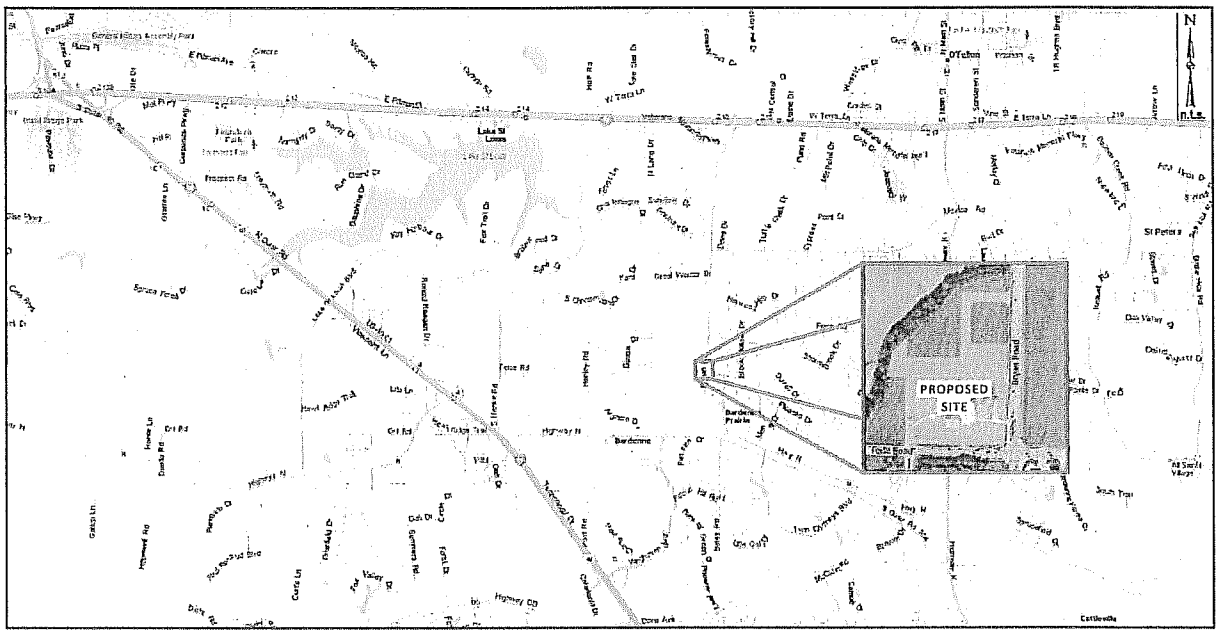

Figure 1: Project Location Map

The proposed site is located within a larger development area known as the Bopp property within the city limits of Dardenne Prairie. HR Green Inc. prepared a traffic impact study for the overall 174 acre development of the Bopp property in July 2013. To date, there has been no development on the Bopp property. It is our understanding that the City of O'Fallon has requested that the Bopp property traffic study be updated to reflect the changes in travel patterns since the Page Avenue extension opened last fall. That said, this study which addresses the currently proposed grocery store with fueling station would represent a Phase I in the overall development plan.

Based on the site plan provided, the proposed development would consist of a grocery store of approximately 50,000 square feet with an 8-position fueling center. Access to the site is proposed via four curb cuts; a full access drive and a right-in/right-out (RIRO) drive onto Bryan Road, as well as a full access drive and a right-in/right-out/left-in drive onto Feise Road. A schematic of the site plan you provided at the commencement of the study is shown in **Figure 2**.

The purpose of this study was to determine the number of additional trips that would be generated by the proposed development, evaluate the impact 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) would be 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.

The following intersections were included in the study:

- Bryan Road and Feise Road;
- Bryan Road and proposed site access drives; and
- Feise Road and proposed site access drives.

The following analysis scenarios were considered:

- Existing; and
- Forecasted (Existing plus Grocery Tenant).

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

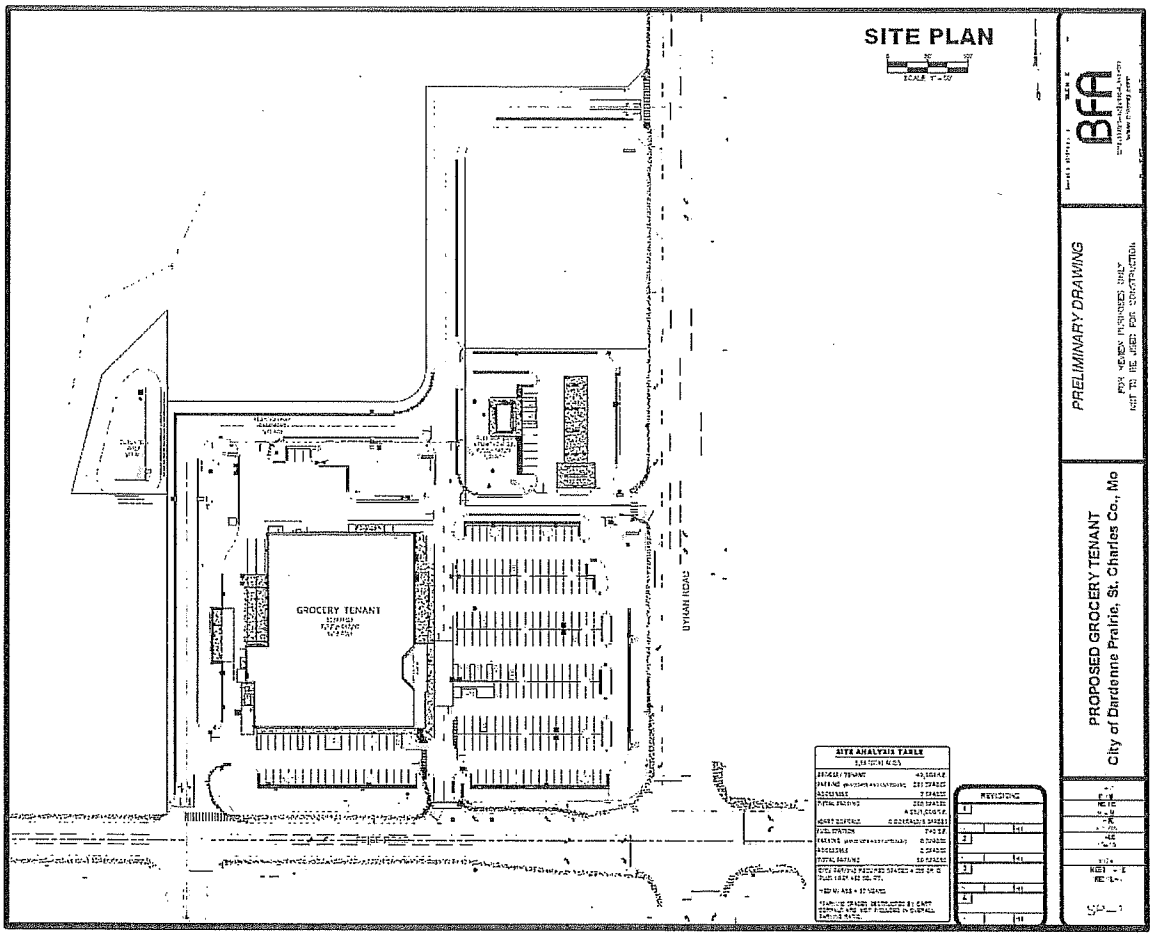

Figure 2: Preliminary Site Plan (provided by others)

EXISTING CONDITIONS

Area Roadway System: Bryan Road is a north-south major arterial maintained by the City of O'Fallon. Bryan Road serves central St. Charles County providing a connection to I-70 approximately two miles to the north and to the newly constructed Page Avenue extension (Route 364) approximately one half mile south and I-64 approximately two miles south of the subject site. The road provides five lanes, two in each direction with a center two-way left-turn lane (TWLTL) and has a posted speed limit of 40 miles per hour (mph). A sidewalk has been constructed along the west side of the road and a multi-use trail is located along the east side of the roadway.

Feise Road is an east-west roadway maintained by the City of Dardenne Prairie adjacent to the site. To the west Feise Road serves as an urban collector roadway, while to the east it serves as a minor arterial roadway. The road provides three lanes, one in each direction with a center TWLTL and has a posted speed limit of 35 mph. Sidewalks are provided along both sides of Feise Road.

The intersection of Bryan Road and Feise Road is controlled by a traffic signal. The signal is part of a coordinated traffic signal system along Bryan Road from just south of I-70 to just north of I-64. Separate right- and left-turn lanes are provided on all approaches to the intersection. All approaches operate under protected plus permissive phasing with a flashing yellow arrow to indicate permissive left turns. In addition, a right-turn overlap phase is provided for northbound and south bound Bryan Road. Push-button activated pedestrian signals and crosswalks are provided at the intersection. **Figure 3** provides an aerial view of the Bryan Road and Feise Road intersection.

Existing Traffic Volumes: In order to establish existing traffic conditions, manual traffic counts were conducted at the intersection of Bryan Road and Feise Road. The counts were conducted from 6:00 a.m. to 8:00 p.m. the last week of March 2015 with the morning and afternoon commuter peak hours having the highest amount of traffic. The existing AM and PM peak hour traffic volumes are summarized in **Exhibit 1**.

Based on the traffic data collected, the morning peak hour occurred between 7:00 and 8:00 a.m. and the afternoon peak hour occurred between 4:45 and 5:45 p.m. Given the traffic characteristics in the area and the anticipated trip generation for the proposed development, the peak periods identified would represent a "worst-case scenario" with regards to the traffic impact. If traffic operations are acceptable during these weekday peak hours, it can be reasoned that conditions would be acceptable throughout the remainder of the day.

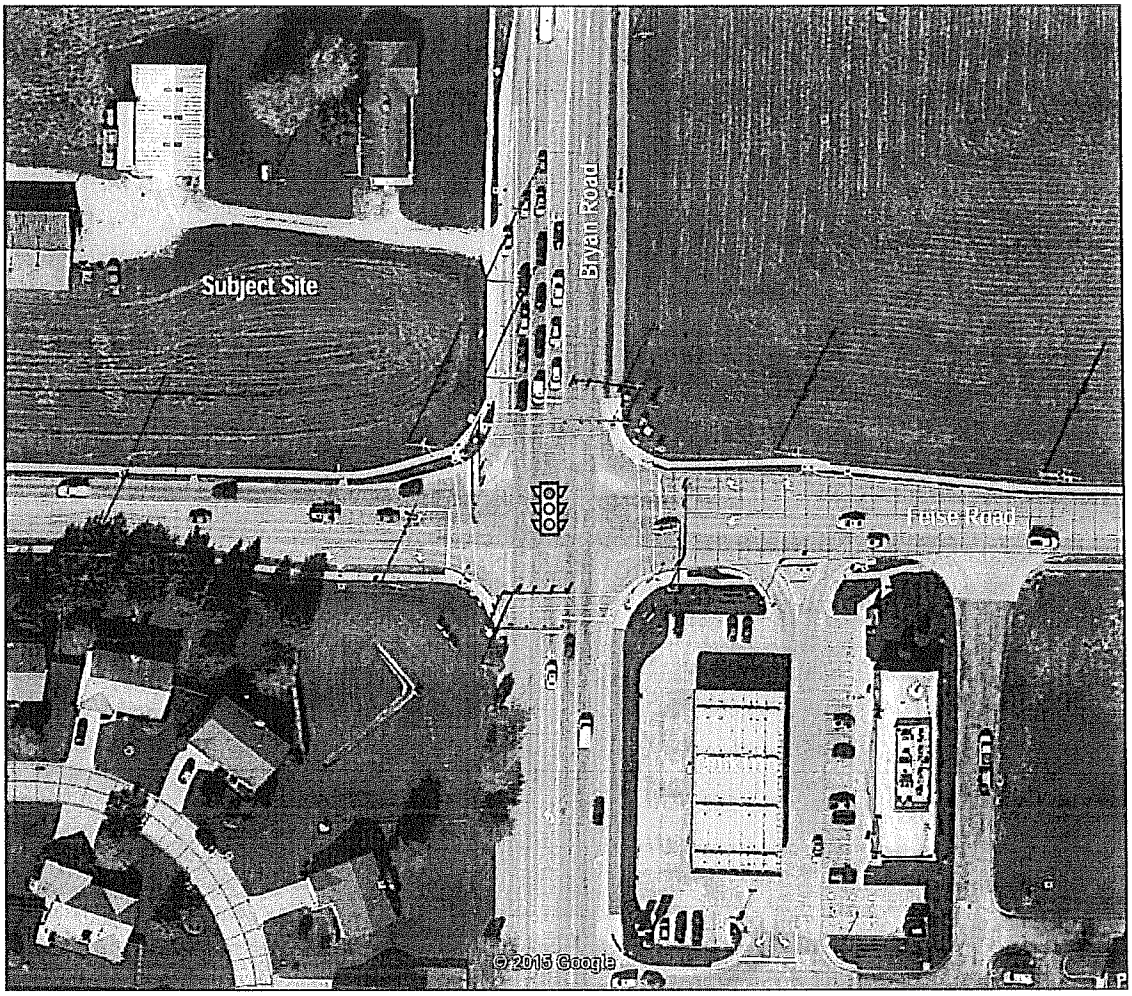

Figure 3: Aerial View of Bryan Road and Feise Road Intersection

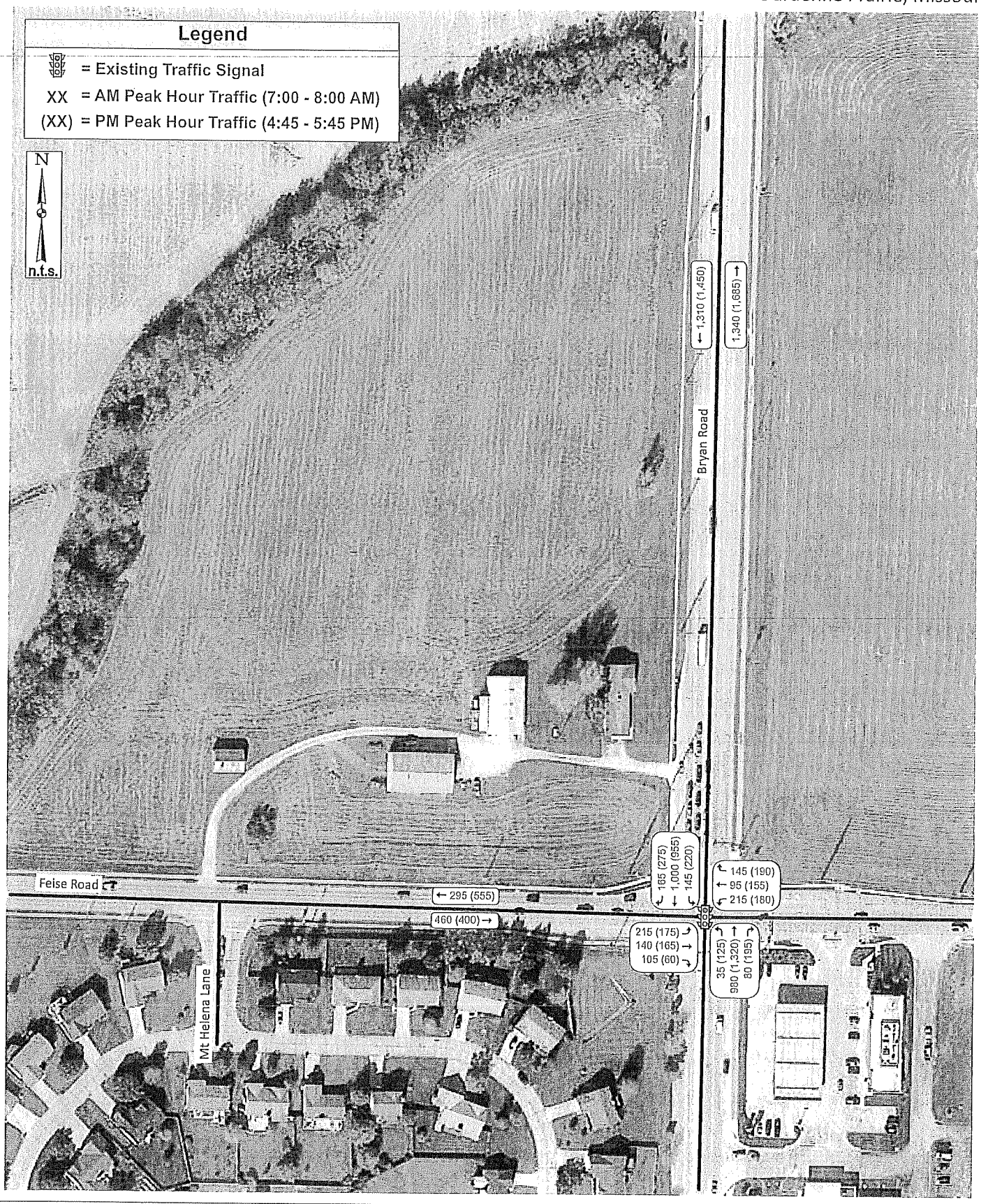

Exhibit 1: Existing Traffic Volumes

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PROPOSED SITE

Overall Development Tract – Bopp Property: The proposed site is located within a larger development area known as the Bopp property within the city limits of Dardenne Prairie. HR Green Inc. prepared a traffic impact study for the overall development of the Bopp property in July 2013. The overall development area consists of approximately 174 acres (96 acres of residential and 78 acres of commercial).

To date, there has been no development on the Bopp property. It is our understanding that the City of O'Fallon has requested that the Bopp property traffic study be updated with new traffic counts and an expanded study area since the Page Avenue extension (Route 364) recently opened in the Fall of 2014 and it is anticipated that the traffic volumes in the area have changed. As the City of O'Fallon controls Bryan Road, the City has indicated that they would not review partial impact studies on the Bopp property until an overall traffic study is submitted and approved by the City outlining the long-term plan for access to the Bopp Property development tract. It is our understanding that HR Green is in the process of updating the overall traffic study.

That said, this study which addresses the currently proposed grocery store with fueling station would represent a Phase I in the overall development plan. The access proposed for the grocery store with fueling station is consistent with the overall development of the Bopp property. The main signalized access on Bryan Road was previously shown approximately 1,075 feet north of Feise Road near the culvert crossing. However, in order to better serve the vacant land on the east side of Bryan Road, this main access is now shown approximately 165 feet further to the south.

Furthermore, the overall development plan shows two RIRO drives on Bryan Road between Feise Road and the main site access. The plan as currently proposed for the grocery store, depicts one RIRO drive which is consistent with the overall plan. The overall development plan also shows one full access drive on Feise Road opposite Mt. Helena Lane and one restricted access drive approximately half way between Mt. Helena Lane and Bryan Road which is consistent with the currently proposed access for the grocery store.

Proposed Land Use: Based upon the site plan provided by you at the commencement of the study, an approximately 50,000 square foot grocery store and a 4 pump fueling center (eight vehicle fueling positions) with a small kiosk are proposed. A schematic of the site plan provided was previously shown in **Figure 2**.

Site Access: As shown on the site plan, access to the site is proposed via four curb cuts as follows:

- one full access onto Bryan Road approximately 910 feet north of Feise Road (It is our understanding that this access would be aligned opposite a future access to the vacant tract on the east side of Bryan Road.);
- one right-in/right-out (RIRO) drive onto Bryan Road approximately 425 feet north of Feise Road;
- one full access onto Feise Road approximately 625 feet west of Bryan Road opposite Mt. Helena Lane; and
- one right-in/right-out/left-in access onto Feise Road approximately 300 feet west of Bryan Road.

Based on Section 14 of the City of O'Fallon's Traffic Management Policy, it is recommended that a minimum of 660 feet be provided between full access intersections on Major Arterials such as Bryan Road. Thus the full access for the proposed development, as well as the overall Bopp property, exceeds the recommended minimum of 660 feet with a spacing of 910 feet. It is my understanding that access drives with a spacing less than 660 feet may be restricted in access. While the additional drive on Bryan Road proposed to serve the site provides a spacing less than the recommended minimum, it is proposed as a RIRO only drive which would restrict all left-turn movements.

Trip Generation: As a primary step in this analysis, forecasts were prepared to estimate the amount of traffic that 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*, published by the Institute of Transportation Engineers (ITE). This manual, which is a standard resource for transportation engineers, is based on a compilation of nationwide studies documenting the characteristics of various land uses. Estimates for the proposed development were based upon the following land uses:

- Land Use: 850 – Supermarket/Grocery Store
- Land Use: 945 – Gasoline Station w/Convenience Store

The proposed gas station is unique in that many of the trips would be shared trips with the proposed grocery tenant. The fueling center is intended to enhance the customer experience and provide an added incentive for patrons to shop at the grocery store. A typical gas station usually has a convenience market with approximately 3,000 to 4,000 square feet, while the proposed fueling center would have a small kiosk with only minimal convenience items offered, and as such, would not be expected to generate the higher trip levels estimated using the *Trip Generation Manual*.

Based on data provided for similar facilities, up to 60% of the customers for the gas station would be a shared trip with the grocery store. As such, it was conservatively assumed that 50% of the gas station trips would be a common trip with the grocery store.

It should also be noted that not all of these trips would represent *new* traffic on the adjacent roadways. Nationwide studies have found that a large percentage of convenience-oriented trips, such as grocery stores and fueling stations, would already be present on the adjacent roads and would be attracted to the development on their way to or from home, work or another destination (i.e., pass-by trips). The statistical information provided in the *Trip Generation Handbook, A Recommended Practice*, published by ITE, supports a pass-by percentage of 62% during the AM peak hour and 56% during the PM peak hour for gas stations and 36% during the PM peak hour for grocery stores. Based on this data, a pass-by rate of 50% was assumed for the new trips to the fueling center as well as a 36% pass-by rate during the PM peak hour for the grocery store. The trip generation estimates for the proposed development are summarized in **Table 1**.

Table 1: Trip Generation Estimate

Land Use	*Size*	*Weekday AM Peak Hour*			*Weekday PM Peak Hour*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Supermarket	50,000 ft²	105	65	170	230	240	470
Gas station	8 pumps	40	40	80	55	55	110
Gas Trips Common with Grocery (50%)		*(20)*	*(20)*	*(40)*	*(25)*	*(25)*	*(50)*
Subtotal		*125*	*85*	*210*	*260*	*270*	*530*
Pass-by Trips [1]		10	10	20	100	100	200
New Trips		115	75	190	160	170	330

[1] Pass by Trips: Gas = 50% Net AM & PM; Grocery = 36% PM

Trip Distribution: The site-generated trips were then assigned into and out of the site based upon the estimated directional distribution. Based upon the existing travel patterns in the area, and the proximity to nearby grocery stores, it is anticipated that the distribution of *new* site-generated trips would be as follows:

- To/from the west on Feise Road 20%
- To/from the east on Feise Road 20%
- To/from the north on Bryan Road 30%
- To/from the south on Bryan Road 30%

The pass-by trips were assigned in accordance with the existing traffic volumes on Bryan Road and Feise. The site-generated trips for the weekday AM and PM peak hours are shown in **Exhibit 2.**

Forecasted (Existing plus Development) Traffic Volumes: The assigned traffic volumes resulting from the trip distribution for the proposed development were then added to the existing traffic volumes to determine the total volumes in the forecasted scenario. The forecasted, or existing plus site trips, traffic volumes for the AM and PM peak hours are shown in **Exhibit 3.**

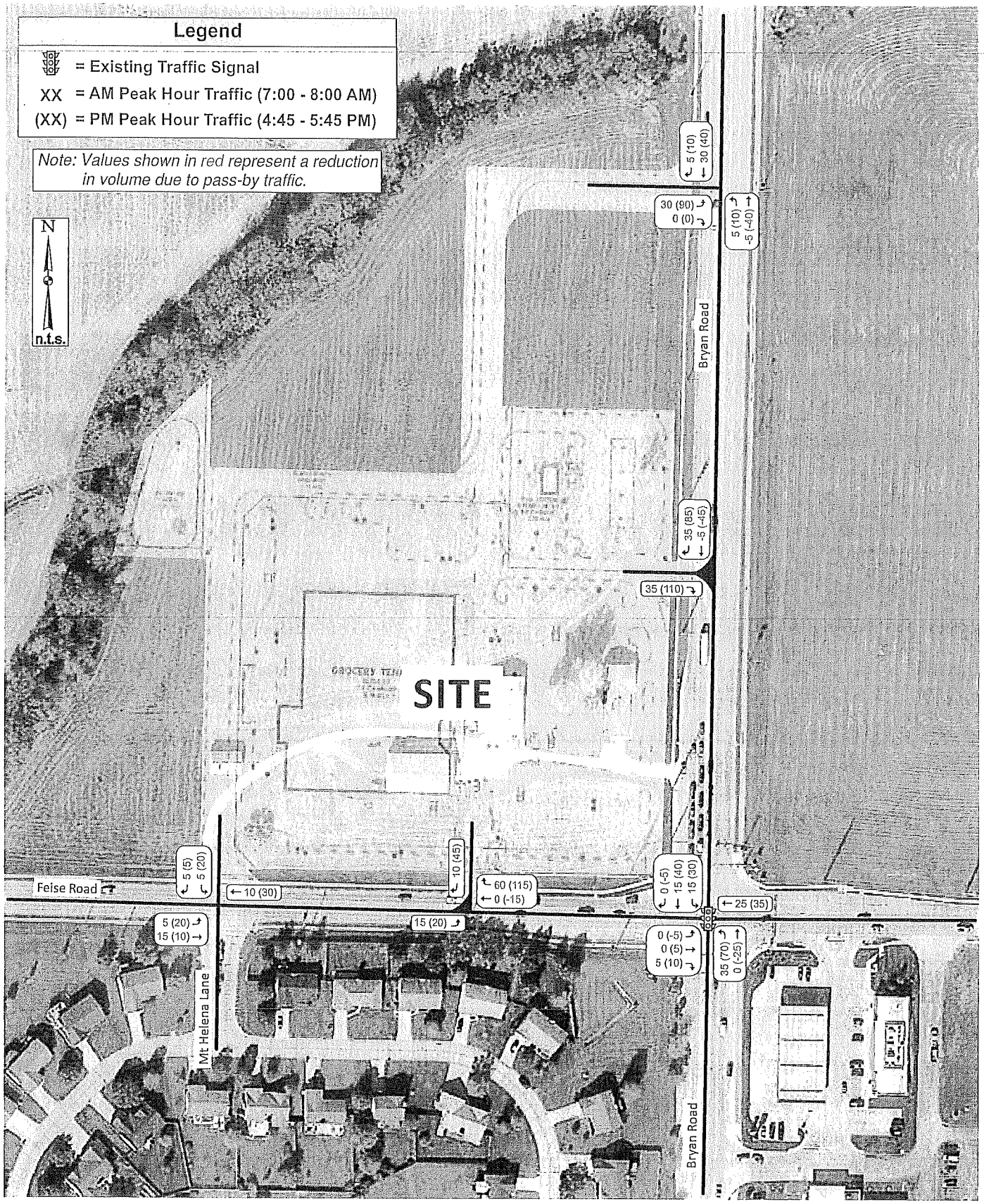

Exhibit 2: Site-Generated Traffic Volumes

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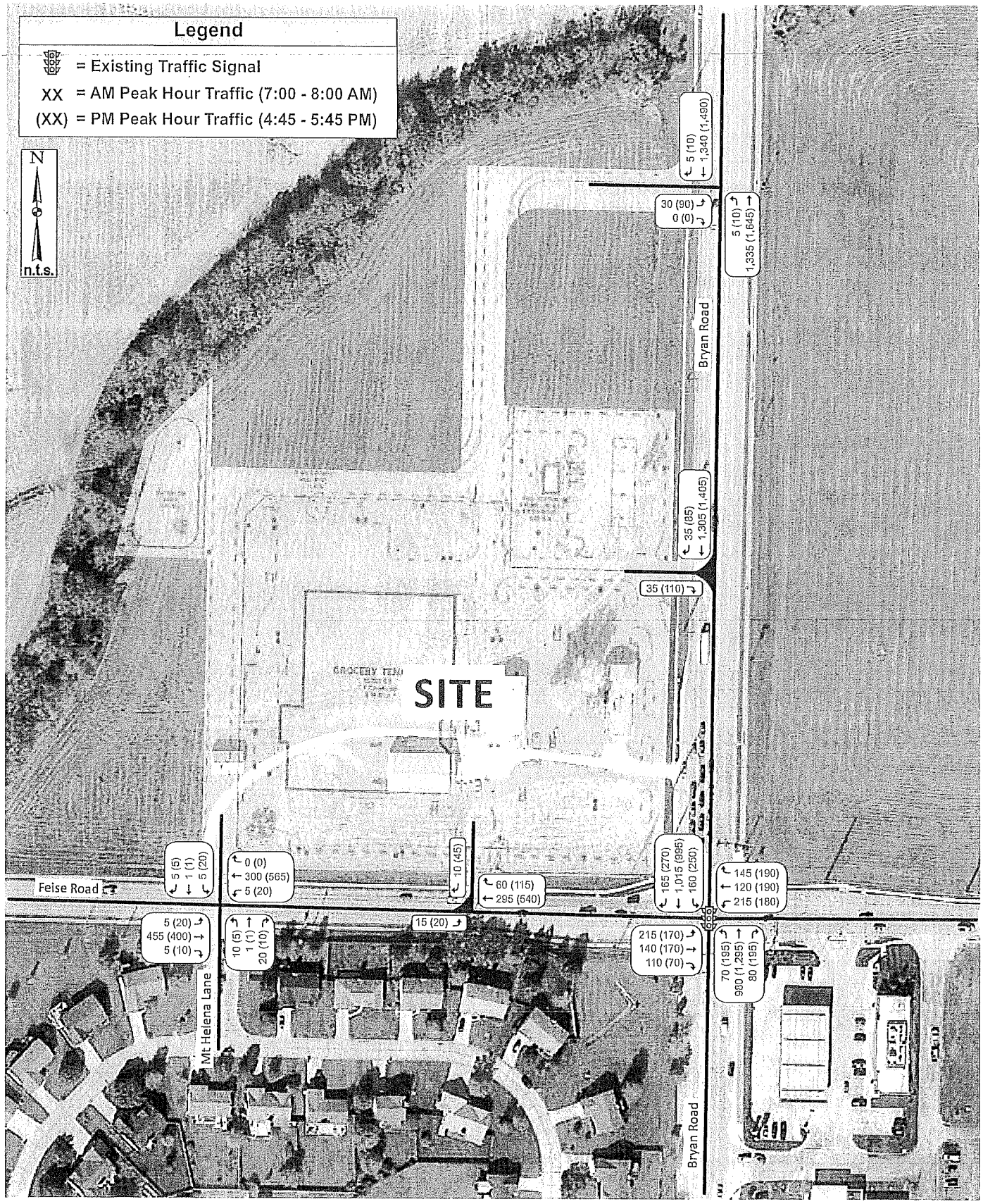

Exhibit 3: Forecasted Traffic Volumes

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TRAFFIC ANALYSIS

Planned Improvements: In conjunction with the proposed development, it is our understanding that separate right-turns lanes would be provided at the two proposed site drives on Bryan Road, as well as the east site drive on Feise Road.

All site drives would be controlled with STOP signs. The full access drive on Bryan Road, as well as the full access drive on Feise Road opposite Mt. Helena Lane are proposed with two lanes exiting, the two other drives would have one lane exiting as they are all right-turn only exits.

Auxiliary Turn Lane Needs: Based on Section 15 of the City of O'Fallon's Traffic Management Policy, right turns lanes are required on Major Arterials, such as Bryan Road, at all drives and streets. A minimum length of 250 feet plus taper should be provide at intersections with another arterial street and 100 feet plus taper at other locations. In accordance with the City of O'Fallon's guidelines, separate southbound right-turn lanes will be constructed on Bryan Road at the proposed site drives. The proposed right-turn lanes on Bryan Road should provide a minimum of 100 feet of storage plus taper.

The need for a seperate right-turn lane on Feise Road at the east site drive was also considered. However, we are not aware of specific right-turn lane warrant guidelines followed by the City of Dardenne Prairie. A Policy for the Geometric Design of Highways and Streets, published by the American Association of State Highway and Transportation Officials (AASHTO), commonly referred to as the *Green Book* is often used to evaluate the need for turn lanes, but the *Green Book* does not provide specific criteria to determine whether a right-turn lane is 'warranted'.

Outside other contributing factors that might necessitate the need for a separate right-turn lane, a general rule of thumb often used in the industry is to consider providing a separate right-turn lane when the right turn volume exceeds 100 vph during the peak hour. The forecasted right-turn volume on Feise Road at the proposed east site drive is 115 vehicles per hour(vph) during the PM peak hour which exceeds the general 100 vph guideline. In addition, considering the proximity to the traffic signal at Bryan Road, it is recommended that a separate right-turn lane with a minimum of 100 feet of storage plus taper be provided on Feise Road at the proposed east site drive.

Study Procedures: The existing and forecasted operating conditions were analyzed using SYNCHRO 8, 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 2** summarizes the thresholds used in the analysis for signalized and unsignalized intersections.

Table 2: Level of Service Thresholds

	Control Delay per Vehicle (sec/veh)	
Level of Service (LOS)	*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

Operating Conditions: The study intersections were evaluated using the methodologies described above. **Table 3** summarizes the results of this analysis, which reflects the existing and forecasted operating conditions and average delay for the study intersections during the weekday AM and PM peak hours. It is important to note that the forecasted analyses do reflect the proposed right-turn lanes on Bryan Road at the two site drive, as well as the recommended westbound right-turn lane on Feise Road at the east site drive.

Table 3: Operating Conditions Summary

Intersection / Approach	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Existing Conditions	Forecasted Conditions	Existing Conditions	Forecasted Conditions
Bryan Road and Feise Road (Signalized)				
Eastbound Feise Road Approach	C (30.1)	C (30.1)	C (32.3)	C (31.4)
EB Average Queue EB 95th Queue	125' Left 180' Left	125' Left 180' Left	115' Thru 165' Thru	115' Thru 170' Thru
Westbound Feise Road Approach	C (31.3)	C (33.1)	C (30.2)	C (32.3)
Northbound Bryan Road Approach	C (28.4)	C (28.6)	F (106.2)	F (109.2)
Southbound Bryan Road Approach	C (22.2)	C (26.2)	C (27.7)	C (35.0)
SB Average Queue SB 95th Queue	305' Thru 405' Thru	325' Thru 420' Thru	305' Thru 395' Thru	330' Thru 415' Thru
Overall	*C (26.6)*	*C (28.5)*	*E (61.4)*	*E (65.1)*
Bryan Road and Site Drive (RIRO Only)				
Eastbound Site Drive Right-Turn		C (15.6)		C (20.8)
Bryan Road and North Site Drive (Side-Street STOP)				
Eastbound Site Drive Approach		E (41.4)		F (153.3)
Northbound Bryan Road Left-Turn		B (13.0)		B (14.4)
Southbound Bryan Road Approach		*Free Flow*		*Free Flow*
Feise Road and Site Drive (3/4 access - Side-Street STOP)				
Eastbound Feise Road Left-Turn		A (8.1)		A (9.4)
Westbound Feise Road Approach		*Free Flow*		*Free Flow*
Southbound Site Drive Right-Turn		A (9.9)		B (12.4)
Feise Road and Site Drive/Mt. Helena Lane (Side-Street STOP)				
Eastbound Feise Road Left-Turn		A (7.9)		A (8.9)
Westbound Feise Road Left-Turn		A (8.4)		A (8.3)
Northbound Mt. Helena Lane Approach		B (12.2)		B (12.7)
Southbound Site Drive Approach		B (11.6)		B (14.9)

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

Also shown in the table is the average (50th percentile) and 95th percentile queues estimated from Synchro for the eastbound approach of Feise Road at Bryan Road and the southbound approach of Bryan Road at Feise Road in order to assess the potential for the queues to block the site drives.

As shown in the table, the signalized intersection of Bryan Road and Feise Road currently operates at overall LOS C during the AM peak hour and is expected to continue to operate at overall LOS C following the addition of the proposed development with minor increases in delay. Similarly, the signalized intersection of Bryan Road and Feise Road currently operates at overall LOS E during the PM peak hour and is expected to continue to operate at.overall LOS E following the addition of the proposed development with minor increases in delay.

Although the proposed development will have minimal impacts at the Bryan Road and Feise Road intersection, it is acknowledged that the intersection currently operates at less than desirable levels of service (i.e. LOS D or better is considered acceptable). Further review of the operations found that the intersection would benefit from a longer cycle length. As mentioned previously, the intersection is part of a coordinated traffic signal system along Bryan Road which operates on a 100 second cycle during the PM peak hour. However, the natural cycle length for the intersection of Bryan Road and Feise Road is approximately 135 to 145 seconds during the PM peak hour. If the cycle length was increased to approximately 140 seconds during the PM peak hour, the overall operations would improve from LOS E with approximately 61 seconds of delay per vehicle on average to LOS D with approximately 38 seconds of delay per vehicle on average.

Given the fairly recent opening of the Page Avenue extension and the changes in the traffic patterns in the area, it is likely that the signal system along Bryan Road would benefit from a retiming project. It should also be noted, that the HR Green traffic study for the overall Bopp property recommends dual left-turn lanes on all approaches at the Bryan Road and Feise Road intersection as an ultimate condition. As such, additional right-of-way may be necessary along Bryan Road and Feise Road to accommodate the ultimate design.

The 95th percentile queue for the southbound approach of Bryan Road at the traffic signal is currently estimated between 395 and 405 feet with average queues of 305 feet. With the addition of the proposed development, the forecasted queues would increase slightly with the 95th percentile queue estimated between 415 and 420 feet and the average queue between 325 and 330 feet. The RIRO drive is approximately 360 feet from the southbound Bryan Road stop bar, as such, the RIRO drive could occasionally be blocked by southbound queues on Bryan Road; however, since left-turns are not allowed at the intersection, the queues would not be a significant cause for concern. The southbound queues would not impact the main full access approximately 900 feet north of the signal.

The 95th percentile queue for the eastbound approach of Feise Road at the traffic signal is currently estimated between 165 and 180 feet with average queues between 115 and 125 feet. With the addition of the proposed development, the forecasted queues would increase slightly with the 95th percentile queue estimated between 170 and 180 feet and the average queue between 115 and 125 feet. The east site drive is approximately 235 feet from the eastbound Feise Road stop bar, as such, the drive is not expected to be blocked by eastbound queues on Feise Road; however, since exiting left-turns are not allowed at the intersection and a separate

left-turn is provided on Feise Road, the queues would not be a significant cause for concern. The eastbound queues would not impact the main full access approximately 600 feet west of the signal.

It is important to note that the 2013 HR Green traffic study found that the eastbound queues on Feise Road at the signal would consistently extend past the first site drive and recommended that the east site drive be restricted to RIRO. Therefore, the east site drive may be further restricted from the currently proposed right-in/right-out/left-in to RIRO only as the traffic volumes in the area increase.

As shown in the table, all of the site driveways are forecasted to operate at overall acceptable levels of service during the peak hours with the exception of the eastbound left-turn exiting the main site drive on Bryan Road which is forecasted to operate at LOS E during the AM peak hour and LOS F during the PM peak hour. This delay is attributed to the heavy traffic volumes on Bryan Road during the peak hours.

Ultimately, the HR Green traffic study for the overall Bopp property recommends a traffic signal at this main access on Bryan Road with dual northbound left-turns into the site and dual eastbound left-turns exiting the site. The following section evaluates the warrants for a traffic signal with only the currently proposed grocery store and fueling station.

Signal Warrants – Bryan Road and Main Site Access: The need for a traffic signal at Bryan Road and main site access was evaluated using criteria outlined in the *Manual on Uniform Traffic Control Devices* (MUTCD), published by the Federal Highway Administration, United States Department of Transportation. Part Four of the MUTCD provides nine different warrants for signalization that are based on hourly traffic volumes, traffic operations, pedestrian volumes and crash experience. Warrant 1B (Interruption of Continuous Traffic) is most applicable in this case.

Warrant 1B (Interruption of Continuous Traffic) requires approach volumes of at least 900 vph on major streets with two lanes per direction and a minimum of 100 vph on the minor street assuming a two-lane approach or 75 vph assuming a single lane approach. Since Bryan Road has posted speed limit of 40 mph which would likely result in an 85th percentile speed near 45 mph, the reduced 70% warrants can be used. As such, a minimum of 630 vph on Bryan Road would be required for eight hours with a minimum of 53 vph on the side street during the same eight hours.

Based on the 14-hour traffic counts collected on Bryan Road, the traffic volumes on Bryan Road more than exceed 630 vph for all 14 hours counted. As noted above, a minimum of 53 left-turns for the 8th highest hour is needed to meet Warrant 1B. Since forecasted traffic volumes are not available for eight hours on the proposed site drive, it was necessary to estimate the 8th highest hour of site traffic. One alternative is to estimate the 8th highest hour utilizing the Hourly Variation in Shopping Center Traffic published by ITE as it relates to the forecasted PM

peak hour. Using this estimation, the 8th highest hour would have a volume of approximately 61 vph which exceeds the minimum of 53 vph required. Another alternative commonly used to estimate the 8th highest hour is to use 55% of the PM peak hour as the 8th highest hour. Using this estimation, the 8th highest hour would have a volume of approximately 50 vph which would be just shy of the minimum of 53 vph required.

Given the forecasted delay for motorists exiting the site and the signal warrant evaluation, consideration should be given to installing a traffic signal at the main entrance on Bryan Road in conjunction with the proposed grocery store. It is recommended that the traffic signal design and construction accommodate the ultimate build-out of the intersection so as to avoid having to modify or replace the signal in the future. In addition, the traffic signal should be coordinated with the adjacent signals along Bryan Road.

SUMMARY

CBB completed the preceding study to address the traffic impacts associated with the proposed development of a grocery store with fueling station located in the northwest quadrant of the intersection of Bryan Road and Feise Road in Dardenne Prairie, Missouri.

The proposed site is located within a larger development area known as the Bopp property within the city limits of Dardenne Prairie. HR Green Inc. prepared a traffic impact study for the overall 174 acre development of the Bopp property in July 2013 and it currently in the process of revising the overall traffic study to reflect the change in travel patterns since the Page Avenue extension opened. That said, this study for the currently proposed grocery store with fueling station would represent a Phase I in the overall development plan.

Consistent with the overall Bopp property traffic study, access to the development tract is proposed via four curb cuts; a full access drive and a RIRO drive onto Bryan Road, as well as a full access drive and a right-in/right-out/left-in drive onto Feise Road.

It is important to note that the 2013 HR Green traffic study recommended that the east site drive on Feise Road be restricted to RIRO. Therefore, the east site drive may be further restricted from the currently proposed right-in/right-out/left-in to RIRO only as the traffic volumes in the area increase.

In conjunction with the proposed development, separate right-turns lanes would be provided at the two proposed site drives on Bryan Road, as well as the proposed east site drive on Feise Road.

The intersection of Bryan Road and Feise Road currently operates at overall LOS C during the AM peak hour and is expected to continue to operate at overall LOS C following the addition of the proposed development with minor increases in delay. Similarly, the signalized intersection of Bryan Road and Feise Road currently operates at overall LOS E during the PM peak hour and is expected to continue to operate at overall LOS E following the addition of the proposed development with minor increases in delay.

Although the proposed development will have minimal impacts at the Bryan Road and Feise Road intersection, it is acknowledged that the intersection currently operates at less than desirable levels of service during the PM peak hour. Further review of the operations found that the intersection would benefit significantly from a longer cycle length. Given the fairly recent opening of the Page Avenue extension and the changes in the traffic patterns in the area, it is likely that the signal system along Bryan Road would benefit from a retiming project.

All of the site driveways are forecasted to operate at overall acceptable levels of service during the peak hours with the exception of the eastbound left-turn exiting the main site drive on

Bryan Road which is forecasted to operate at LOS E during the AM peak hour and LOS F during the PM peak hour. This delay is attributed to the heavy traffic volumes on Bryan Road during the peak hours and the resulting limited number of gaps for motorists trying to make a left-turn from the side-street approaches. Ultimately, the 2013 HR Green traffic study for the overall Bopp property recommends a traffic signal at this main access on Bryan Road with dual northbound left-turns into the site and dual eastbound left-turns exiting the site.

Based on an evaluation of the signal warrants with only the currently proposed grocery store and fueling station, the forecasted volumes would satisfy the Warrant 1B (Interruption of Continuous Traffic) 70% warrants. Given the forecasted delay for motorists exiting the site and the signal warrant evaluation, consideration should be given to installing a traffic signal at the main entrance on Bryan Road in conjunction with the proposed grocery store. It is recommended that the traffic signal design and construction accommodate the ultimate build-out of the intersection so as to avoid having to modify or replace the signal in the future. In addition, the traffic signal should be coordinated with the adjacent signals along Bryan Road.

We trust that this traffic study adequately describes the forecasted traffic conditions that should be expected in the vicinity of the proposed grocery tenant development in Dardenne Prairie, Missouri. If additional information is desired, please feel free to contact me at 314-878-6644, extension 41 or swhite@cbbtraffic.com.

Sincerely,

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