09PD004

CBB Crawford, Bunte, Brammeier
Traffic and Transportation Engineers

Since 1973

March 11, 2009

Mr. Joseph Feldmann, PE/PLS/CPESC/CESSWI
BFA, Inc.
103 Elm Street
Washington, MO 63090

RECEIVED
MAR 16 2009
Rapid City Growth Management Department

RE: Sam's Club Traffic Signal Warrant Evaluation
Rapid City, South Dakota
CBB Job No: 44-09

Dear Mr. Feldmann:

As requested, Crawford, Bunte, Brammeier (CBB) has completed a traffic signal warrant analysis for the access to the proposed Sam's Club Warehouse Store in Rapid City, South Dakota. The proposed club store, along with an associated gas kiosk, is proposed at the west end of Rushmore Crossing, a large commercial development located along Eglin Street between LaCrosse Street and North Street, south of Interstate 90. **Exhibit 1** depicts the site's location relative to the surrounding road system.

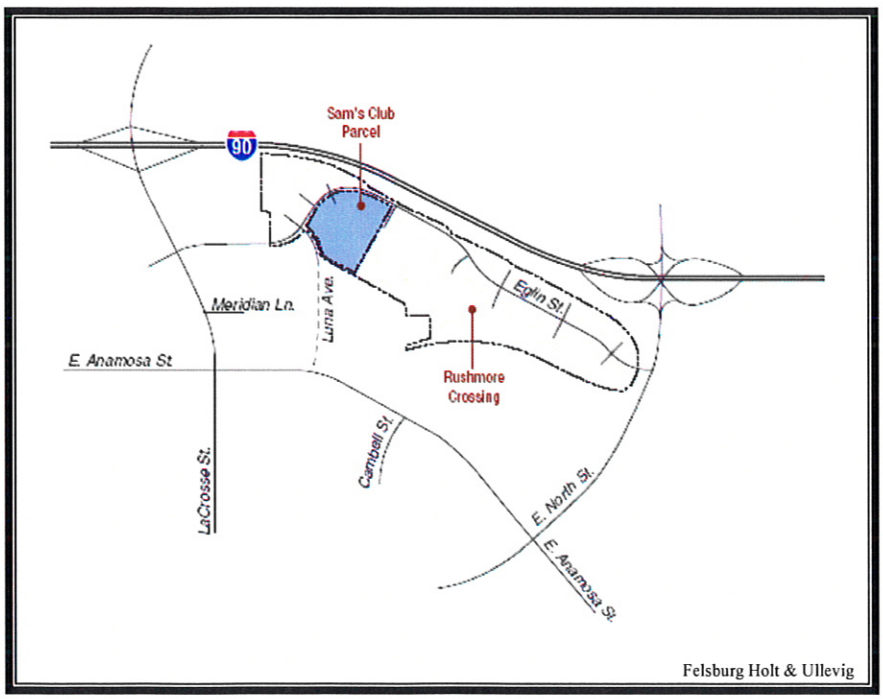

Exhibit 1: Site Location Map

450 Cottonwood Road - Suite B
Glen Carbon, IL 62034
(T) 618-656-2612 (F) 618-659-0650

1830 Craig Park Court - Suite 209
St. Louis, MO 63146
(T) 314-878-6644 (F) 314-878-5876

3261 S. Meadowbrook Road – Suite 300
Springfield, IL 62711
(T) 217-546-6433 (F) 217-546-6467

www.cbbtraffic.com

Felsburg Holt & Ullevig (FHU) completed a traffic impact study in February 2007 for the Rushmore Crossing Shopping Center. That study recommended that when signal warrants are met, along Eglin Street, signalization should be considered at several of the primary means of access to the shopping center. Now that a definitive site development plan is available for the Sam's Club parcel, as illustrated in **Exhibit 2,** the feasibility of signalizing Access B is being considered.

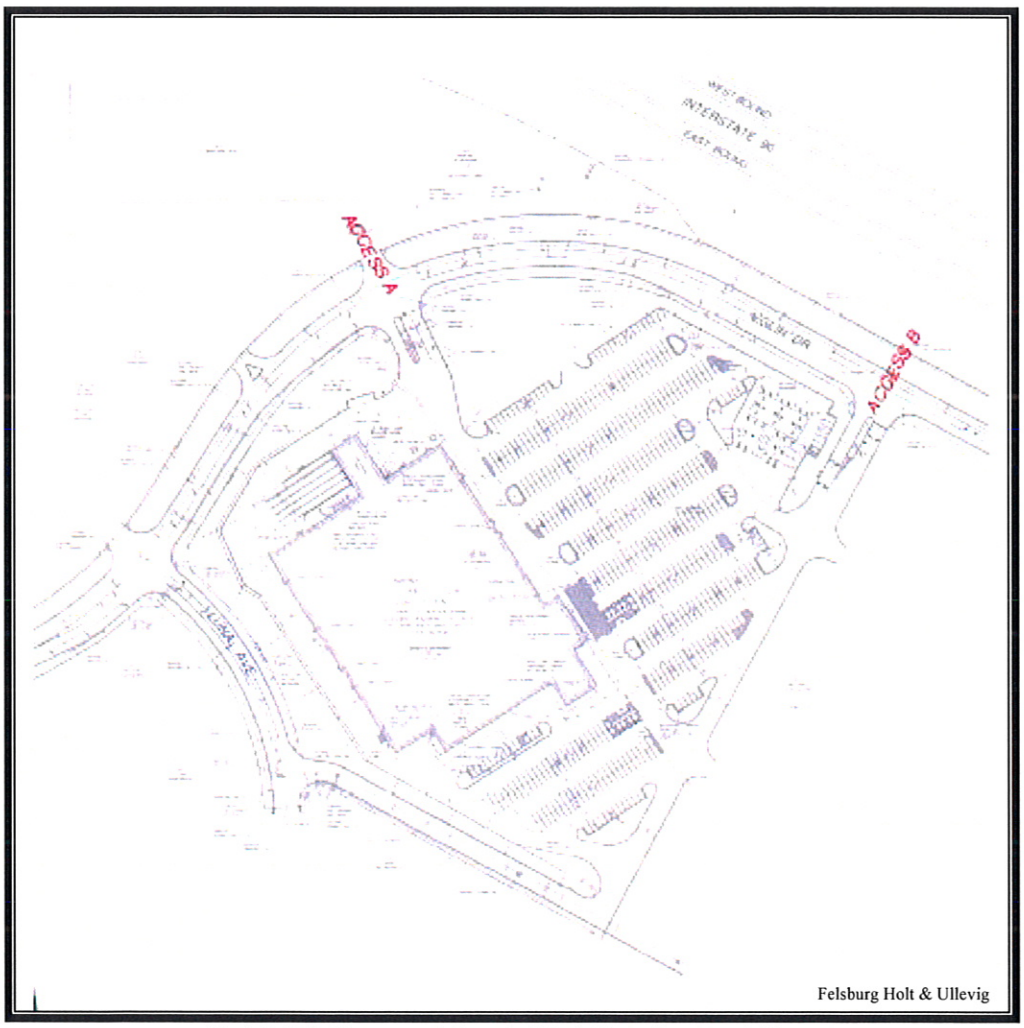

Exhibit 2: Proposed Sam's Club Development Plan

The following report presents the study's methodology and the findings of the signal warrant analysis with respect to Access B and Eglin Street. The focus of the signal warrant analysis was the proposed intersection of Access B and Eglin Street. Given the orientation of the proposed Sam's Club Store and the concentration of its parking on the eastern portion of the parcel, it was deemed unnecessary to consider Access A and/or Luna Avenue since it was unlikely that a signal would be warranted at those locations based upon the Sam's Club and gas kiosk. The analysis was based on a weekday PM peak hour since this tends to represent one of the most critical periods with respect to a commercial development such as Rushmore Crossings' traffic generation characteristics.

Furthermore, it should be noted that all of the data pertaining to existing traffic volumes, directional distributions, potential development uses and time frames was provided by BFA, Inc., Midland Atlantic Development Company and/or FHU. CBB did not collect any traffic volume data along Eglin Street as part of their efforts. The following paragraphs discuss our methodology, findings and recommendations.

EXISTING ROADWAY CONDITIONS

It is our understanding that Eglin Street was constructed as a two-lane roadway primarily serving the Rushmore Crossing development. The roadway runs east-west between LaCrosse Street and North Street, both of which ultimately provide access to I-90. Access to Rushmore Crossing, which was approximately 40% completed as of December 2008, is provided at various locations along the roadway. According to mechanical traffic counts conducted by FHU in December 2008, Eglin Street carries approximately 3,100 vehicles per day (vpd), with an afternoon peak hour volumes of 311 vehicles per hour (vph). **Exhibit 3** illustrates the existing PM peak hour traffic volumes in the vicinity of Access B.

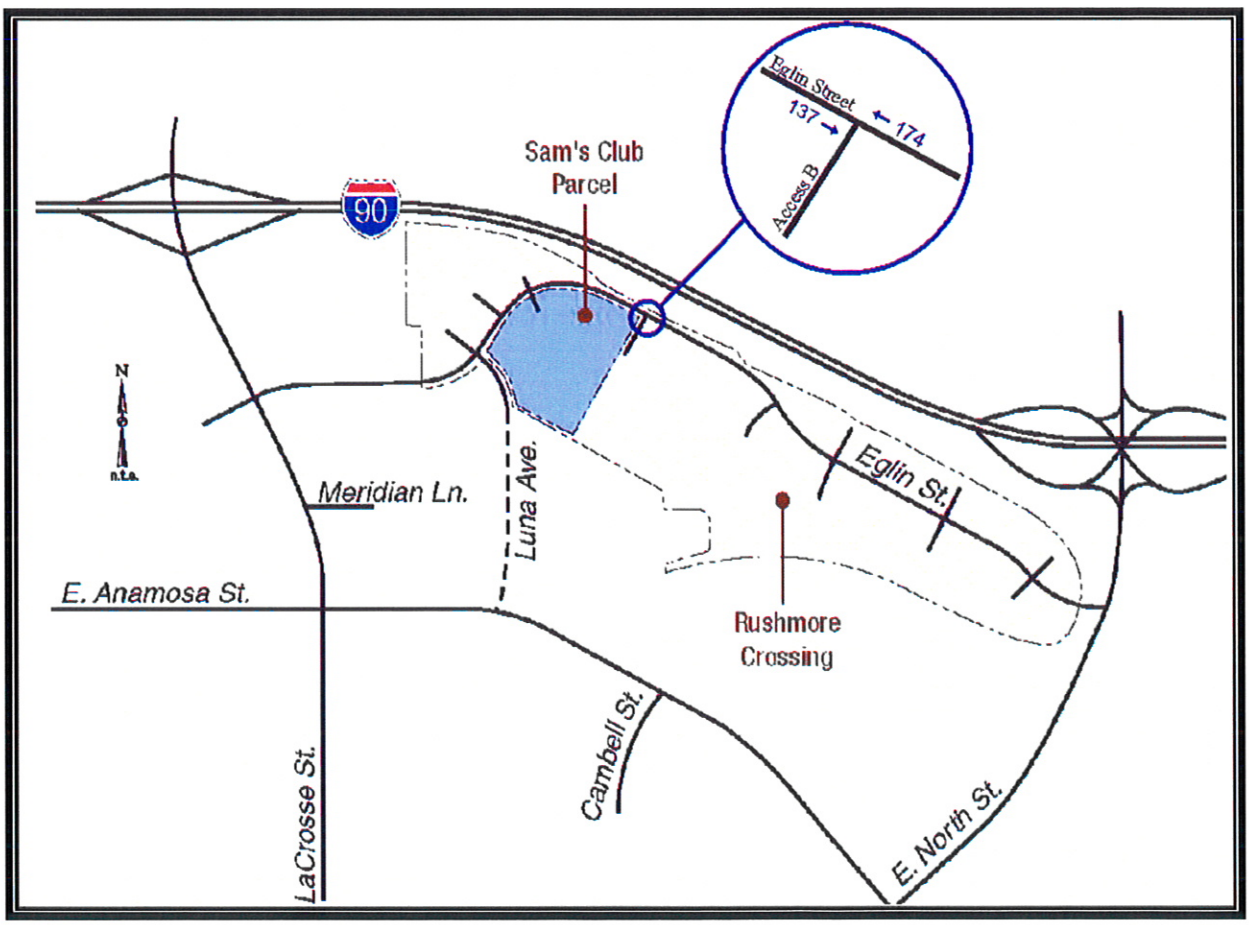

Exhibit 3 – Existing PM Peak Hour Traffic Volumes

2009 No Build Traffic Volumes

Based on data provided by Midland Atlantic Development Company, the following uses within the Rushmore Crossing development have recently opened since the traffic count data was collected by FHU:

- Scheel's Sports – 100,000 ft^2 and
- Michael's – 21,449 ft^2.

Furthermore, the following uses within the Rushmore Crossing development are already under construction or are expected to be constructed by the end of 2009:

- Interstate Battery – 6,228 ft^2;
- Credit Union - 7,500 ft^2;
- Dollar Tree - 10,200 ft^2;
- Target District Shops - 21,081 ft^2; and
- Outlot Multi-Tenant Building - 20,820 ft^2.

In order to establish the 2009 No Build traffic volumes the trips associated with the above referenced stores were estimated as detailed in the following section.

Planned Retail - Trip Generation and Distribution

The number of trips that would be generated by each of the uses identified above was estimated using data provided in the *Trip Generation Manual*, Eighth Edition, published by the Institute of Transportation Engineers (ITE). This publication is a standard resource for transportation engineers, and consists of a compilation of nationwide studies documenting the characteristics of various land uses. Specifically, the following categories from the *Trip Generation Manual* were applied to the proposed development:

- Land Use Code 820, *Shopping Center,* was used to determine the estimated trip generation of the Michael's, Interstate Battery, Dollar Tree, Target District Shops and the Outlot Multi-Tenant Building;
- Land Use Code 861, *Sporting Good Superstore*, was used to determine the anticipated trip generation of the recently opened Scheel's Sports; and
- Land Use Code 912, *Drive-In Bank*, was used to determine the anticipated trip generation for the credit union.

The resulting trip generation estimate is summarized in **Table 1**.

Table 1
Trip Generation Estimate
Rushmore Crossing - Recently Constructed and/or Planned Developments in 2009

Land Use	*Size*	*Weekday PM Peak Hour*		
		In	*Out*	*Total*
Sporting Goods Store (Gross Trips)	100,000 ft^2	146	164	310
Common Trip Reduction		(29)	(33)	(62)
Sporting Goods Store (Net Trips)		117	131	248
General Retail	79,778 ft^2	146	152	298
Drive-In Bank	7,500 ft^2	97	97	194
Total Trips		**360**	**380**	**740**

It is important to note that ITE estimates assume that each use within the development would be freestanding. Instead, some uses would share access and parking. Published studies show that portions of the trips generated by multi-use developments are captured internally and do not impact the external road network. As a result, a "common trip" reduction is typically applied to ancillary uses to account for patrons that would visit multiple uses during a single trip.

Specifically, a 20% reduction was applied during the p.m. peak hour to the Scheel's Sports store. The trip generation estimate presented in Table 1 was adjusted accordingly. The ITE *Shopping Center* use already accounts for shared trips so no further reductions were applied to the other retail uses. Given the location of the proposed credit union relative to the remainder of Rushmore Crossing, a conservative approach was taken in that no common trips were assumed.

The proposed distribution of the recently constructed and/or planned developments in 2009 within the Rushmore Crossing development was based on the February 2007 Rushmore Crossing Traffic Impact Study prepared by FHU. In the study it was assumed that approximately 65% of the traffic would be to and from the west on Eglin Street and the remaining 35% would be to and from the east on Eglin Street. Based on the trip generation estimates and the anticipated trip distribution, the resulting site-generated traffic forecasts for the p.m. peak hour for the recently constructed and/or planned developments in 2009 within the Rushmore Crossing development are depicted in **Exhibit 4** (not inclusive of the proposed Sam's Club or the gas station).

The traffic generated by the recently constructed and/or planned developments in 2009 within the Rushmore Crossing development (Exhibit 4) was aggregated with the existing traffic volumes (Exhibit 3), resulting in the 2009 No Build traffic volumes shown in **Exhibit 5**.

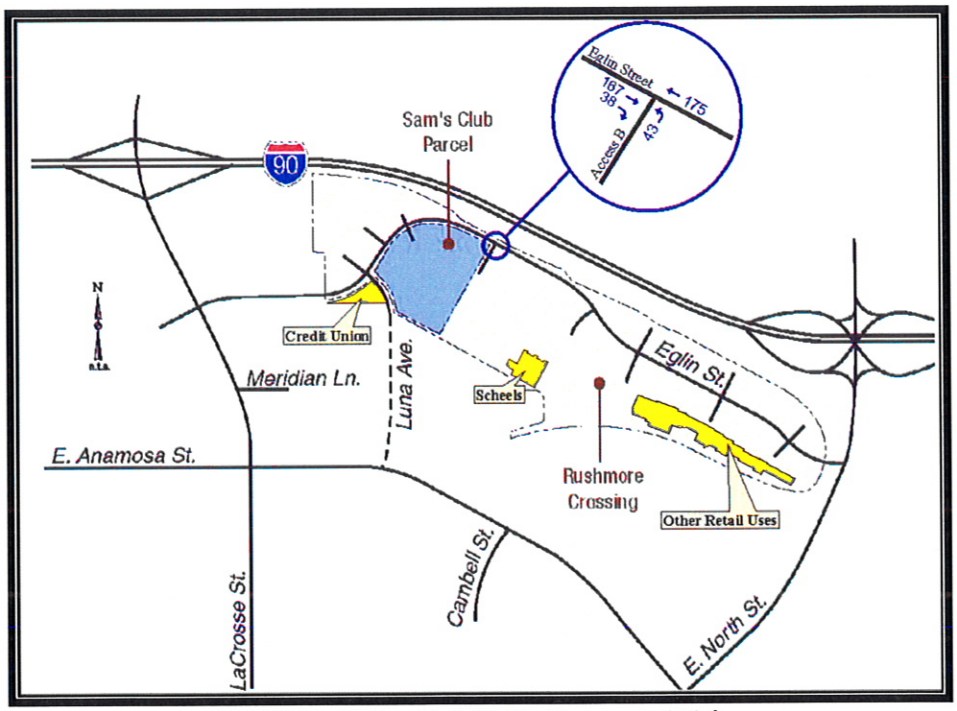

Exhibit 4: Other Retail Site-Generated Trips

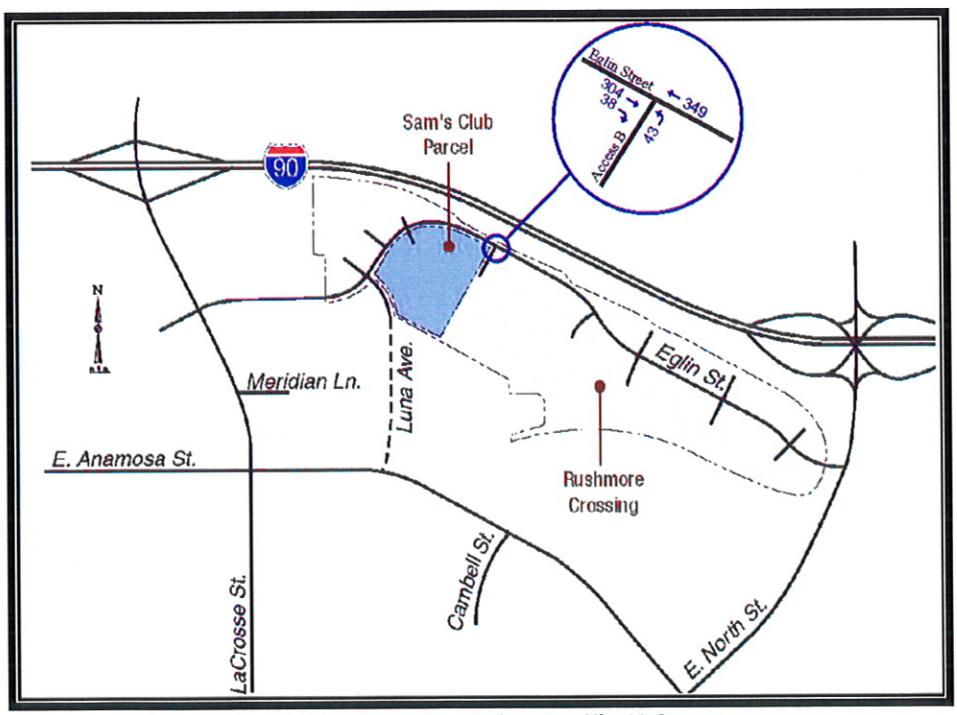

Exhibit 5: 2009 No Build Traffic Volumes

2009 BUILD TRAFFIC VOLUMES

Based on data provided by Midland Atlantic Development Company, a 141,253 ft^2 Sam's Club Warehouse with a gas station is proposed in the northwest quadrant of Eglin Street and Luna Avenue. In order to establish the 2009 Build traffic volumes the trips associated with the Sam's Club were estimated as detailed in the following section.

Sam's Club - Trip Generation and Distribution

The number of trips that would be generated by the Sam's Club was estimated using data provided in the *Trip Generation Manual*, Eighth Edition, published by ITE. Specifically, the following categories from the *Trip Generation Manual* were applied to the proposed development:

- Land Use Code 857, *Discount Club,* was used to determine the estimated trip generation of the Sam's Club warehouse; and
- Land Use Code 944, *Gasoline Station*, was used to determine the anticipated trip generation for the gas station.

The resulting trip generation estimate is summarized in **Table 2**. Specifically, a 30% reduction was applied during the p.m. peak hour to the gas station to account for common trips with the Sam's Club. The trip generation estimate presented in Table 2 was adjusted accordingly.

Table 2
Trip Generation Estimate
Rushmore Crossing - Sam's Club Warehouse

Land Use	*Size*	*Weekday PM Peak Hour*		
		In	*Out*	*Total*
Sam's Club Discount Store	141,253 ft^2	299	299	598
Gas Station (Gross Trips)	12 fueling stations	83	83	166
Common Trip Reduction		(25)	(25)	(50)
Gas Station (Net Trips)		58	58	116
Total Trips		**357**	**357**	**714**

The trip generation for the gas station was further adjusted to account for the fact that not all of the trips would be *new* to Elgin Street. National studies show that a portion of the traffic generated by commercial developments of this nature would already be present on adjacent roads and would be attracted to the development on their way to or from another destination (i.e., pass-by or diverted trips). These trips would represent patrons attracted to the gas station on their way to or from one of the other retail developments along Eglin Street. The actual percentage of pass-by/diverted traffic depends upon the nature of the use, the volume on adjacent roadways, and the time of day. Given that the traffic volumes along Eglin Street are fairly moderate, a pass-by percentage of 20% was applied to the gas station.

Based on the trip generation estimates and the anticipated trip distribution, the resulting site-generated traffic forecasts for the p.m. peak hour for the proposed Sam's Club are depicted in **Exhibit 6**. The traffic generated by the proposed Sam's Club (Exhibit 6) was aggregated with the 2009 No Build traffic volumes (Exhibit 5), resulting in the 2009 Build traffic volumes shown in **Exhibit 7**.

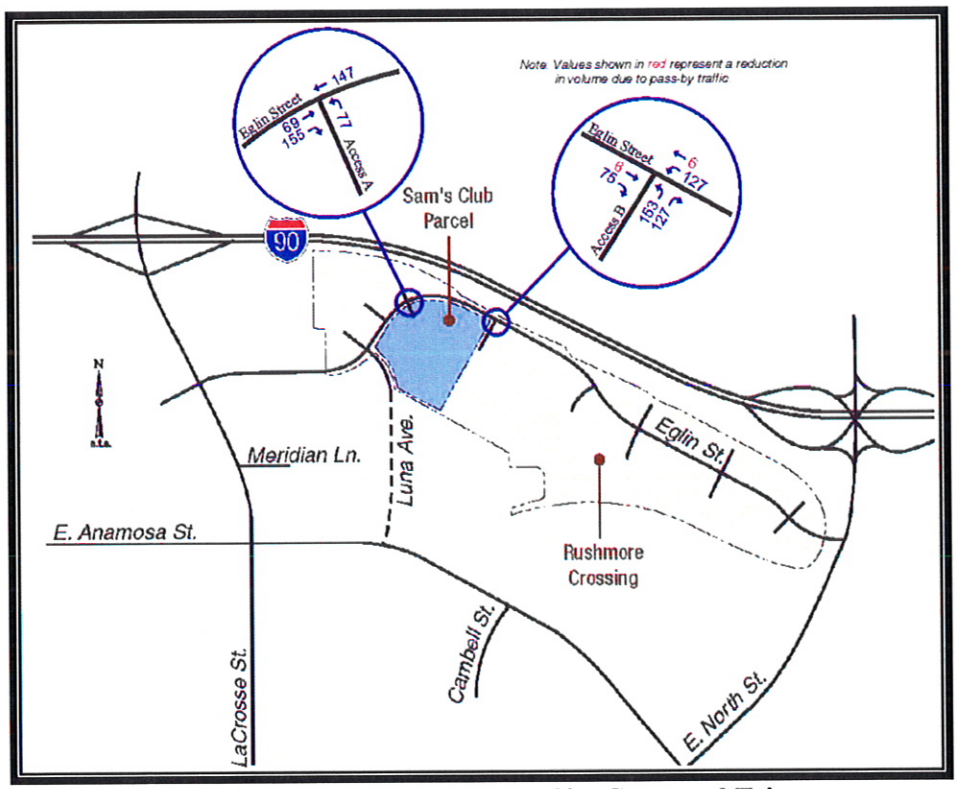

Exhibit 6: Proposed Sam's Club Site-Generated Trips

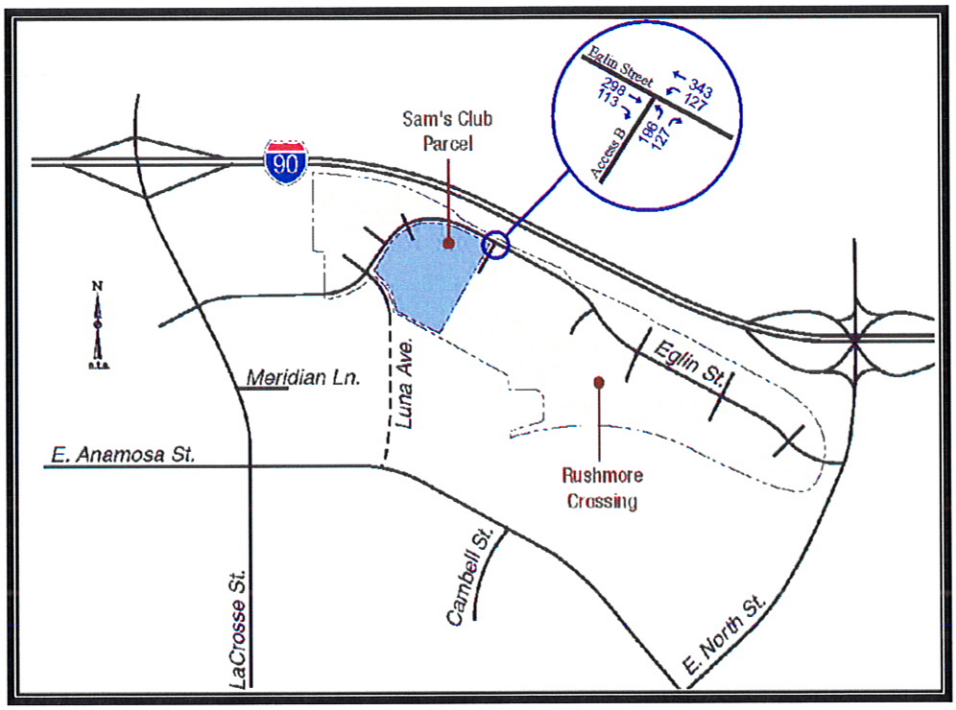

Exhibit 7: 2009 Build Traffic Volumes

SIGNAL WARRANT EVALUATION

The justification for a traffic signal at Eglin Street and Access B serving the Sam's Club and other retail development 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 eight different warrants for signalization that are based on hourly traffic volumes, traffic operations, pedestrian volumes or accident experience; however, Warrant 1 (Conditions A and B) are typically the most widely accepted warrants for justifying a traffic signal.

Warrant 1-Condition A (Minimum Vehicular Volume) requires hourly approach volumes of at least 600 vehicles per day (vph) on major streets with two lanes per direction for any eight hours of a typical day. During this same period, the volume of traffic entering from the minor street must exceed 150 vph (assuming a single-lane approach) or 200 vph (assuming a two-lane approach) on the minor street.

Warrant 1-Condition B (Interruption of Continuous Traffic) requires approach volumes of at least 900 vph on major streets with two lanes or more per direction with a minimum of 75 vph (assuming a single-lane approach) or 100 vph (assuming a two-lane approach) on the minor street.

To determine an appropriate estimation of the 8th highest hour traffic volume, hourly trip generation data documented for ITE Land Use Code 820 – *Shopping Center* was referenced. Given that Eglin Street primarily serves the Rushmore Crossing development, it is reasonable to assume that the hourly trip generation along Eglin Street would be similar to a shopping center. Based on that data provided in the *Trip Generation Manual* for ITE Code 820, the 8th highest hourly volume is computed to be approximately 81.6% of the weekday p.m. peak hour volume. Consequently, the traffic signal warrant analysis was conducted assuming the 8th highest hourly volumes as 81.6% of the p.m. peak hour 2009 Build traffic volumes. In accordance with common practice, our analysis considered only left-turns from the minor approach since separate left and right-turns are proposed on Access B (therefore, the 150 vph threshold for a single lane approach would apply).

Based upon this methodology, the combined eastbound and westbound approach volumes at the intersection of Eglin Street with Access B would be approximately 719 vph which satisfies the requirements of Warrant 1A (volumes greater than 600 vph), and the northbound approach on Access B would be approximately 160 vph which also satisfies the requirements for Warrant 1A (volumes greater than 150 vph). *Consequently, the intersection of Eglin Street with Access B would satisfy the requirements for signalization specified by Warrant 1A.*

The justification for signalization of Access B is further substantiated by the fact that Midland Atlantic Development Company anticipates nearly an additional 190,000 square feet of retail to be constructed within Rushmore Crossing by the end of 2011, of which approximately 100,000 SF of retail would be in close proximity to Access B. Consequently, it is highly probable that additional traffic beyond that contemplated in this analysis would utilize the signalized intersection of Access B and Eglin Drive within the near future.

CONCLUSION

Therefore, it is our conclusion that ***the installation of a traffic signal at the intersection of Access B and Eglin Street would be justified*** with the construction of the proposed Sam's Club Warehouse Store and associated gas kiosk, as well as the additional retail uses anticipated to be completed by the end of 2009. We trust that this signal warrant evaluation has adequately described the traffic conditions that should be expected in the vicinity of the proposed Sam's Club following its construction. If additional information is desired, please feel free to contact our office at 314-878-6644.

Sincerely,

Julie Nolfo

Julie M. Nolfo, PTOE, PE
Senior Traffic Engineer