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TRAFFIC IMPACT STUDY

SCHAAD ROAD COMMERCIAL DEVELOPMENT
KNOX COUNTY, TENNESSEE

PREPARED ON BEHALF OF:

CARLSON CONSULTING ENGINEERS, INC.

PREPARED BY:

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

FEBRUARY 2026

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KNOX COUNTY, TENNESSEE

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Traffic Impact Study

Schaad Road Commercial Development
Knox County, Tennessee

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Introduction and Scope

The Schaad Road commercial development is a proposed development in Knox County, Tennessee that is planned to be located on a parcel of land on the southeast corner of the intersection of Schaad Road and Bakertown Road. The development is planned to include a Walmart Neighborhood Market, with a gross leasable area of 49,305 S.F., a fuel center with a convenience market and 16 vehicle fueling positions, and two outparcels that were assumed to be developed as strip retail, with a total anticipated square footage of 31,690 S.F. The project is proposed to have two driveways on Schaad Road (one right-only access and one full access) and three driveways on Bakertown Road. A buildout year of 2030 was assumed.

Based on January 2026 scoping discussions with Knox County staff, this report includes analyses at the following locations:

1. Ball Road & Bakertown Road
2. Schaad Road and Bakertown Road
3. Bakertown Road & Proposed North Project Access
4. Bakertown Road & Proposed Middle Project Access
5. Bakertown Road & Proposed South Project Access (Service)
6. Ball Camp Pike & Bakertown Road
7. Schaad Road & Proposed West Project Access (Right-Only)
8. Schaad Road & Proposed East Project Access

This report identifies potential traffic impacts to the surrounding roadway network based on the proposed commercial development. The following scenarios were considered for analysis:

- Existing Traffic Conditions (2026)
- Background Traffic Conditions (2030)
- Projected Traffic Conditions at Development Buildout (2030)

2026 Existing Traffic Conditions

Peak hour traffic counts (7 AM to 9 AM, 4 PM to 6 PM) were conducted on Bakertown Road at Ball Road and at Ball Camp Pike. Additionally, 12-hour traffic counts were performed (6 AM to 6 PM) at Schaad Road and Bakertown Road to provide data for traffic signal warrant analyses. Traffic counts were conducted on Wednesday, January 21st, 2026, while Knox County schools were in session.

Multimodal Review

From a review of the Knoxville Area Transit (KAT) routes map, there are currently no transit routes that service the roadways in the immediate vicinity of the proposed project site. There are no existing marked bicycle lanes in the vicinity of the project site. Currently, Schaad Road has sidewalk infrastructure along both sides of the roadway from its intersection with State Route 169 to its intersection with Oak Ridge Highway. While there are no existing sidwalks on Bakertown Road from Ball Road to Ball Camp Pike, proposed plans prepared by Knox County for Bakertown Road improvements include a sidewalk on the east side of Bakertown Road. Approximately two miles southwest of the project site, Nicholas Ball Park provides two paved greenways as part of its facilities.

2030 Background Traffic Conditions

Based on historical traffic data obtained from five TDOT count stations in the vicinity of the project site, the 2026 existing traffic volumes were increased by 4.5% per year for the four-year buildout period. In addition to this growth, traffic was included from two offsite developments to obtain the 2030 background traffic conditions: the Schaad Road apartments development and the Weigel's fuel center, convenience market, and car wash development.

It should be noted that the Knox County Department of Engineering and Public Works has traffic control and roadway improvement plans in the vicinity of the project site. Specifically, there are plans for traffic signal installation and left turn lane alignment at the intersection of Schaad Road and Bakertown Road; widening of Bakertown Road between Schaad Road and Ball Camp Pike to include two 10' travel lanes, as well as curb and gutter and a 5' sidewalk on the east side of Bakertown Road; realignment of the north and south legs of Bakertown Road at Ball Camp Pike; and widening of Ball Camp Pike at Bakertown Road to include a separate 200' eastbound left turn lane and separate 150' westbound left turn and right turn lanes. For the purposes of this study, it was assumed that these improvements would be completed by 2030.

2030 Buildout Traffic Conditions

Trips expected to be generated by the proposed development were determined from ITE's *Trip Generation, 12th Edition.* A 10% internal reduction rate was assumed, and varying pass-by rates were utilized for each land use. The development is expected to generate 5,500 net new daily trips, 275 AM peak hour trips, and 526 PM peak hour trips. The expected trip generation for the development was added to the 2030 background traffic conditions to determine the 2030 projected (buildout) traffic conditions. Turn lane evaluations were performed for the proposed access drives using the 2030 buildout traffic conditions. The

threshold for installation of an eastbound right turn lane on Schaad Road was met at both the proposed west project access (right-only) and the proposed east project access.

Sight Distance

From a field visit to the project site, it was determined that adequate sight distance can be provided at each of the proposed access drives.

Traffic Signal Warrant Analyses

Based on scoping discussions with Knox County staff, this report includes traffic signal warrant analyses for the intersection of Schaad Road and Bakertown Road. These analyses indicated that a traffic signal is warranted at this location when compared to the 2026 existing traffic conditions, the 2030 background traffic conditions, and the 2030 projected traffic conditions.

Conclusions and Recommendations

As previously noted, Knox County has improvement plans in the vicinity of the proposed project's site that include traffic signal installation and related intersection improvements at Schaad Road and Bakertown Road, as well as roadway improvements on Bakertown Road (from Schaad Road to Ball Camp Pike) and on Ball Camp Pike at Bakertown Road.

In conjunction with these planned improvements, the following recommendations have been identified for the Schaad Road commercial development:

1. Modify the existing median opening on Schaad Road to align with the proposed east project access. Align the left turn lanes on Schaad Road per County request to improve line of sight for turning vehicles.
2. Provide a 100' eastbound right turn lane on Schaad Road at the proposed east project access.
3. Provide a 100' eastbound right turn lane on Schaad Road at the proposed west project access (right-only).
4. Remove vegetation and grade the project site to ensure adequate sight distance can be provided at each proposed site access driveway on Bakertown Road.
5. Knox County should consider installing all-way stop control to improve the projected levels of service at the intersection of Ball Camp Pike and Bakertown Road.

1. INTRODUCTION

The purpose of this study is to evaluate the traffic impacts associated with the proposed Schaad Road commercial development in Knox County, Tennessee and to identify if any offsite access or traffic control improvements will be necessary to address those impacts.

The project site is located southeast of the intersection of Schaad Road and Bakertown Road. Figure 1 shows the proposed project site, along with the intersections that will be included as part of the study.

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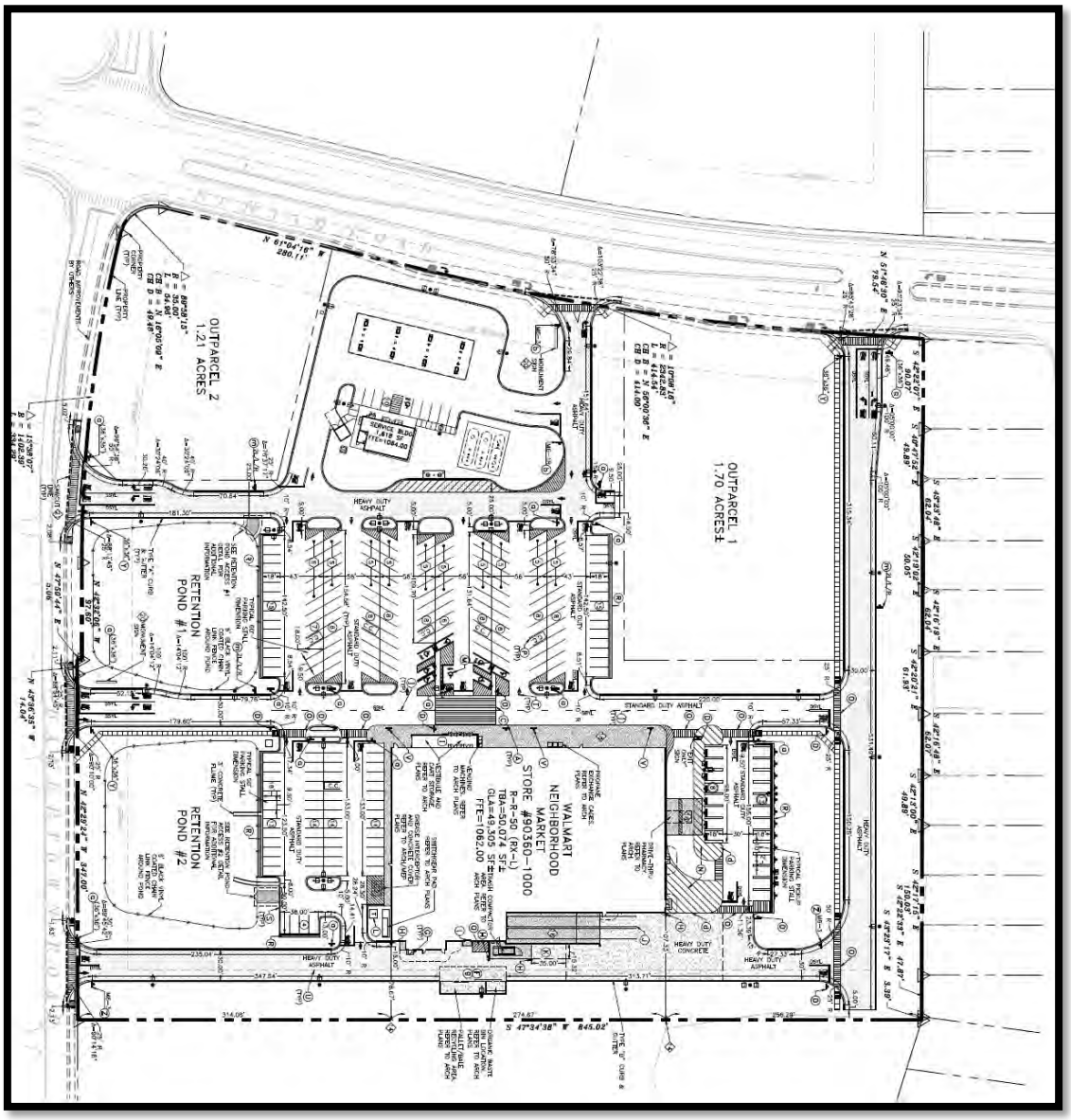
Figure 1.
Project Location &
Study Intersections

2. PROJECT DESCRIPTION

The current site development plan, provided by Carlson Consulting Engineers, Inc. (CCE), is illustrated in Figure 2. As detailed in Figure 2, the site plan proposes the development of a Walmart Neighborhood Market, with a planned gross leasable area of 49,305 S.F., a fuel center with a convenience market and 16 vehicle fueling positions, and two outparcels.

Since there were no specific details available for the two outparcels, each lot was assumed to be developed as strip retail with a 25% floor-area ratio (FAR). The net commercial building square footage for the 1.70-acre parcel was assumed to be 18,513 S.F., and the building square footage for the 1.21-acre parcel was assumed to be 13,177 S.F., for a total anticipated strip retail square footage of 31,690 S.F.

The Schaad Road commercial development is proposed to have multiple access points: two driveways on Schaad Road (one right-only access and one full access) and three driveways on Bakertown Road. For the purposes of this report, a buildout year of 2030 was assumed.



CARLSON CONSULTING ENGINEERS, INC.

Figure 2.
Site Development Plan

Project Scope

This report identifies potential traffic impacts to the surrounding roadway network based on the proposed development. Three scenarios were considered for analysis, as follows:

- Existing Traffic Conditions (2026)
- Background Traffic Conditions (2030)
- Projected Traffic Conditions (2030)

The following intersections were included in the scope of this traffic study:

- #1 – Ball Road & Bakertown Road
- #2 – Schaad Road & Bakertown Road
- #3 – Bakertown Road & North Project Access
- #4 – Bakertown Road & Middle Project Access
- #5 – Bakertown Road & South Project Access (Service)
- #6 – Ball Camp Pike & Bakertown Road
- #7 – Schaad Road & West Project Access (Right-Only)
- #8 – Schaad Road & East Project Access

To simplify review of the traffic study, each intersection was assigned a reference number, as shown above. The traffic assignment and capacity analyses worksheets contained in this report refer to each intersection by both name and assigned intersection number.

3. 2026 EXISTING TRAFFIC CONDITIONS

Methodology

The traffic analyses performed in this report were conducted using *Synchro 12* software, which emulates the methodologies set forth in the *Highway Capacity Manual, 7th Edition,* for evaluation of signalized and unsignalized intersections.

The intersections considered in this study were evaluated in terms of level of service (LOS), which is a rating of traffic conditions for a given roadway or intersection. For comparative purposes, the descriptions for the various levels of service at both signalized and unsignalized intersections are shown in Table 1 and Table 2, respectively.

Table 1
Level of Service Criteria for Signalized Intersections

Level of Service	Description	Control Delay (Seconds)
A	Very low delay with minimal stops.	<10
B	Stable traffic flow, low delay, few traffic stops.	>10 to ≤20
C	Operations with stable flow, moderate delay.	>20 to ≤ 35
D	Noticeable delays, many stopped vehicles.	>35 and ≤ 55
E	Unstable flow, high delays and congestion.	>55 and ≤ 80
F	Unacceptable delay, excessive congestion.	>80

Table 2
Level of Service Criteria for Unsignalized Intersections

Level of Service	Description	Control Delay (Seconds)
A	Minimal or no delay	≤ 10
B	Minor traffic delay	>10 and ≤ 15
C	Average traffic delay	>15 and ≤ 25
D	Long traffic delay	>25 and ≤ 35
E	Very long traffic delay	>35 and ≤ 50
F	Extreme traffic delay	> 50

Existing Roadway Network

The roadways in the vicinity of the site that will provide access to the proposed commercial development are described as follows:

- *Schaad Road* is classified in Knoxville-Knox County Planning's *2018 Major Road Plan* as a minor arterial roadway. In the vicinity of the project, Schaad Road is a four-lane, median-divided roadway, with two travel lanes in each direction. The analyses in this study assumed the orientation of Schaad Road as running east-west. The speed limit on Schaad Road is posted at 45 mph. Based on scoping meeting discussions, turn lane analyses conducted for intersections located on Schaad Road assumed a speed of 55 mph.

- *Bakertown Road* is classified in Knoxville-Knox County Planning's *2018 Major Road Plan* as a major collector roadway. Bakertown Road is a two-lane roadway with a speed limit of 30 mph posted south of Ball Camp Pike. For the purposes of this study, Bakertown Road was designated as running north-south.

- *Ball Road* is classified in Knoxville-Knox County Planning's *2018 Major Road Plan* as a major collector roadway. Ball Road is a two-lane roadway with a posted speed limit of 40 mph.

- *Ball Camp Pike* is classified in Knoxville-Knox County Planning's *2018 Major Road Plan* as a major collector roadway in the vicinity of the project site. Ball Camp Pike is a two-lane roadway with a posted speed limit of 40 mph.

Multimodal Network

Transit

From a review of the Knoxville Area Transit (KAT) routes map, there are currently no transit routes that service the roadways in the immediate vicinity of the proposed project site.

Bicycle Facilities

There are no existing marked bicycle lanes in the vicinity of the project site.

Sidewalk Facilities

Currently, Schaad Road has sidewalk infrastructure along both sides of the roadway for approximately five miles, spanning the termini of its intersection with State Route 169 and its intersection with Oak Ridge Highway. This sidewalk infrastructure includes the portion of Schaad Road that provides frontage for the proposed project site. There are no existing sidewalks on Bakertown Road from Ball Road to Ball Camp Pike. However, proposed plans prepared by Knox County for Bakertown Road improvements include the implementation of a sidewalk on the east side of Bakertown Road.

Greenways

Approximately two miles southwest of the project site, the Nicholas Ball Park is located at 8728 Ball Camp Pike and provides two paved greenways as part of its facilities.

Existing Traffic Operations

To provide data for the analysis, manual turning movement traffic counts were performed at the intersections identified in the study scope. Per the scoping meeting conducted with Knox County staff, peak hour traffic counts were collected for the Ball Road and Ball Camp Pike intersections on Bakertown Road. Additionally, 12-hour counts were performed at the intersection of Schaad Road and Bakertown Road to provide data for traffic signal warrant analyses. In summary, traffic counts were collected as follows:

- #1 – Ball Road & Bakertown Road (Peak Hours: 7 AM to 9 AM, 4 PM to 6 PM)
- #2 – Schaad Road & Bakertown Road (12-Hour Count: 6 AM to 6 PM)
- #6 – Ball Camp Pike & Bakertown Road (Peak Hours: 7 AM to 9 AM, 4 PM to 6 PM)

From the traffic counts collected, it was determined that the AM and PM peak hours varied by intersection.

- #1 – Ball Road & Bakertown Road: 7:15 AM to 8:15 AM, 5:00 PM to 6:00 PM
- #2 – Schaad Road & Bakertown Road: 7:30 AM to 8:30 AM, 4:45 PM to 5:45 PM
- #6 – Ball Camp Pike & Bakertown Road: 7:15 AM to 8:15 AM, 4:45 PM to 5:45 PM

The existing 2026 peak hour traffic volumes for the intersections studied are illustrated in Figure 3. The traffic count data utilized for this study are included in summary form in Appendix A.

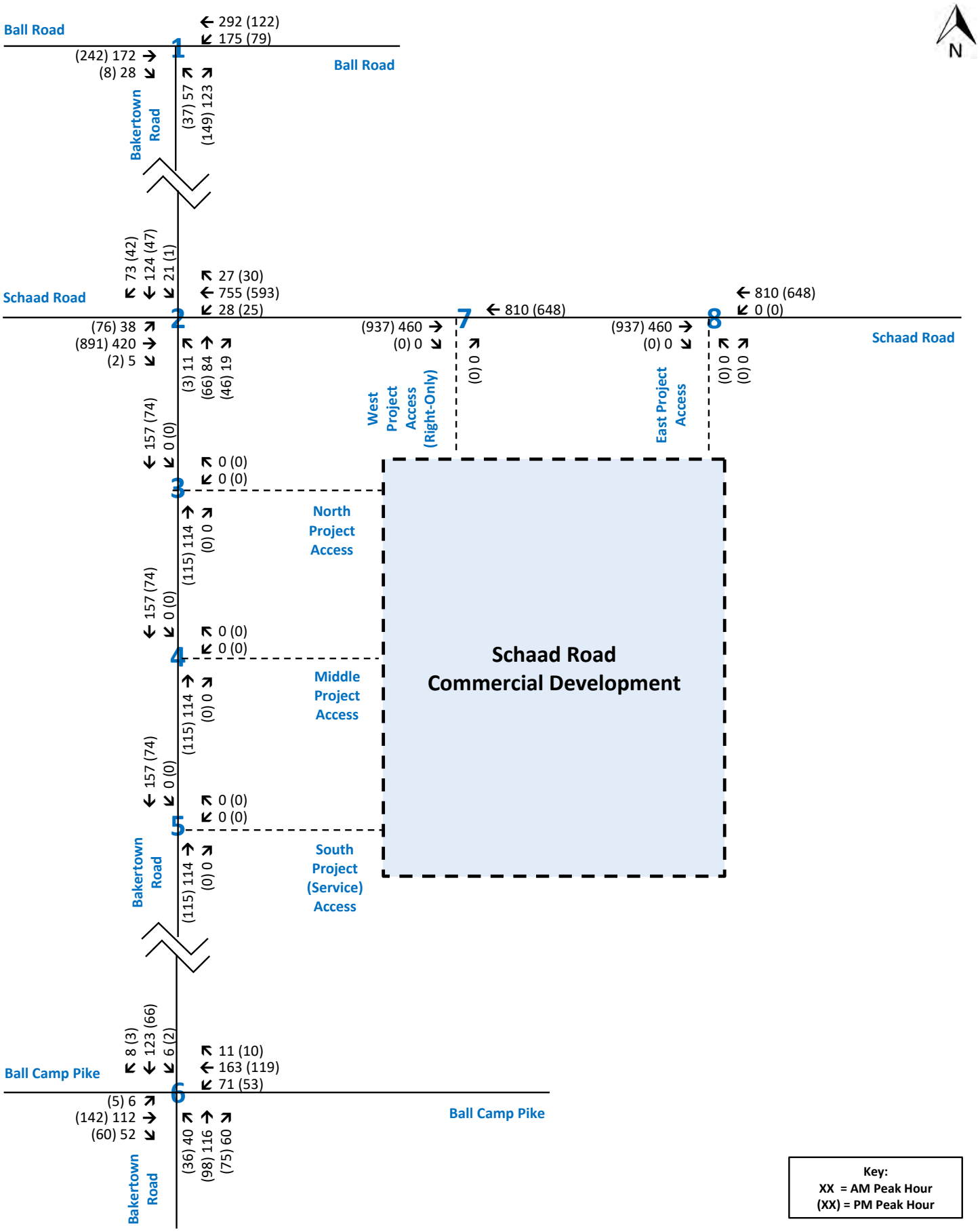


Figure 3.
Existing Traffic Volumes (2026)
Schaad Road Commercial Development
Knox County, Tennessee

Existing Intersection Capacity Analyses

To determine the current LOS of the intersections studied, capacity analyses were performed for the AM and PM peak hours of traffic. The capacity calculations were performed in accordance with the methods outlined in the *Highway Capacity Manual*.

As previously described, the capacity analyses result in the determination of a Level of Service (LOS) for an intersection. The LOS is a concept used to describe how well an intersection or roadway operates. LOS A is the best, while LOS F is the worst.

As shown in Table 3, the intersections contained in the study area presently operate overall at exceptional levels of service (LOS A) during the AM and PM peak traffic hours.

Appendix B contains the capacity analysis worksheets for the 2026 existing traffic conditions.

Table 3
2026 Existing Traffic Conditions Analyses – Peak Hour Levels of Service

Intersection			AM Peak Hour			PM Peak Hour		
#	**Description**	**Approach / Movement**	**LOS**	**Delay (sec)**	**95th % Queue (ft)** (1)	**LOS**	**Delay (sec)**	**95th % Queue (ft)** (1)
1	Ball Road & Bakertown Road	Northbound Approach	C	17.6	50’	B	13.0	50’
		Westbound Left	A	8.1	25’	A	8.0	25’
		Overall Intersection	**A**	**5.4**	**---**	**A**	**4.8**	**---**
2	Schaad Road & Bakertown Road	Northbound Approach	D	30.3	75’	D	32.8	75’
		Southbound Approach	E	41.1	150’	D	25.2	50’
		Eastbound Left	A	9.9	25’	A	9.2	25’
		Westbound Left	A	8.4	25’	B	10.1	25’
		Overall Intersection	**A**	**8.1**	**---**	**A**	**3.8**	**---**
3	Bakertown Road & North Project Access	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
4	Bakertown Road & Middle Project Access	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
5	Bakertown Road & South Project Access (Service)	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
6	Ball Camp Pike & Bakertown Road	Northbound Approach	C	21.1	75’	C	15.9	50’
		Southbound Approach	C	17.9	50’	B	14.1	25’
		Eastbound Left	A	7.6	25’	A	7.5	25’
		Westbound Left	A	7.7	25’	A	7.8	25’
		Overall Intersection	**A**	**9.9**	**---**	**A**	**7.1**	**---**
7	Schaad Road & West Project Access (Right-Only)	Northbound Right	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
8	Schaad Road & East Project Access	Northbound Approach	---	---	---	---	---	---
		Westbound Left	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**

(1) For the 95th percentile queue calculations at unsignalized intersections, it was assumed that each 25’ was equivalent to one vehicle. # Indicates the 95th percentile volume exceeds capacity; queue may be longer.

4. 2030 BACKGROUND TRAFFIC CONDITIONS

The 2030 background conditions analyses are presented to evaluate the traffic levels expected at the project buildout year due to traffic growth. Data from five nearby traffic count stations were obtained from TDOT. Based on historical ADT traffic counts at these count stations, an average annual rate of 4.5% traffic growth was indicated in the vicinity of the project site over the last five-year period. Therefore, the 2026 existing traffic volumes were increased by 4.5% per year for four years to obtain the 2030 background traffic volumes.

In addition to historical growth, two specific offsite developments were identified for inclusion in the 2030 background traffic conditions. These developments are the Schaad Road apartments development, located on Schaad Road about a quarter mile west of the project site, and the Weigel's convenience market, fuel center, and car wash development, located opposite the proposed Schaad Road commercial development, on a parcel at the northeast corner of Schaad Road and Bakertown Road. The trips projected to be generated by these developments were added to the historical traffic growth to obtain the 2030 background conditions for this report.

In the absence of a traffic study for the Weigel's development, trip generation calculations and traffic assignments were determined for the offsite project. The trip generations were based on development of a Weigel's fuel center with 16 vehicle fueling positions, a 7,000 S.F. (+/-) convenience market, and a car wash.

The 2030 background traffic volumes are illustrated in Figure 4. These traffic volumes represent the traffic which could be expected to travel through the study area, even if the proposed Schaad Road commercial development is not completed.

The historical TDOT data from the count stations reviewed are included in Appendix A.

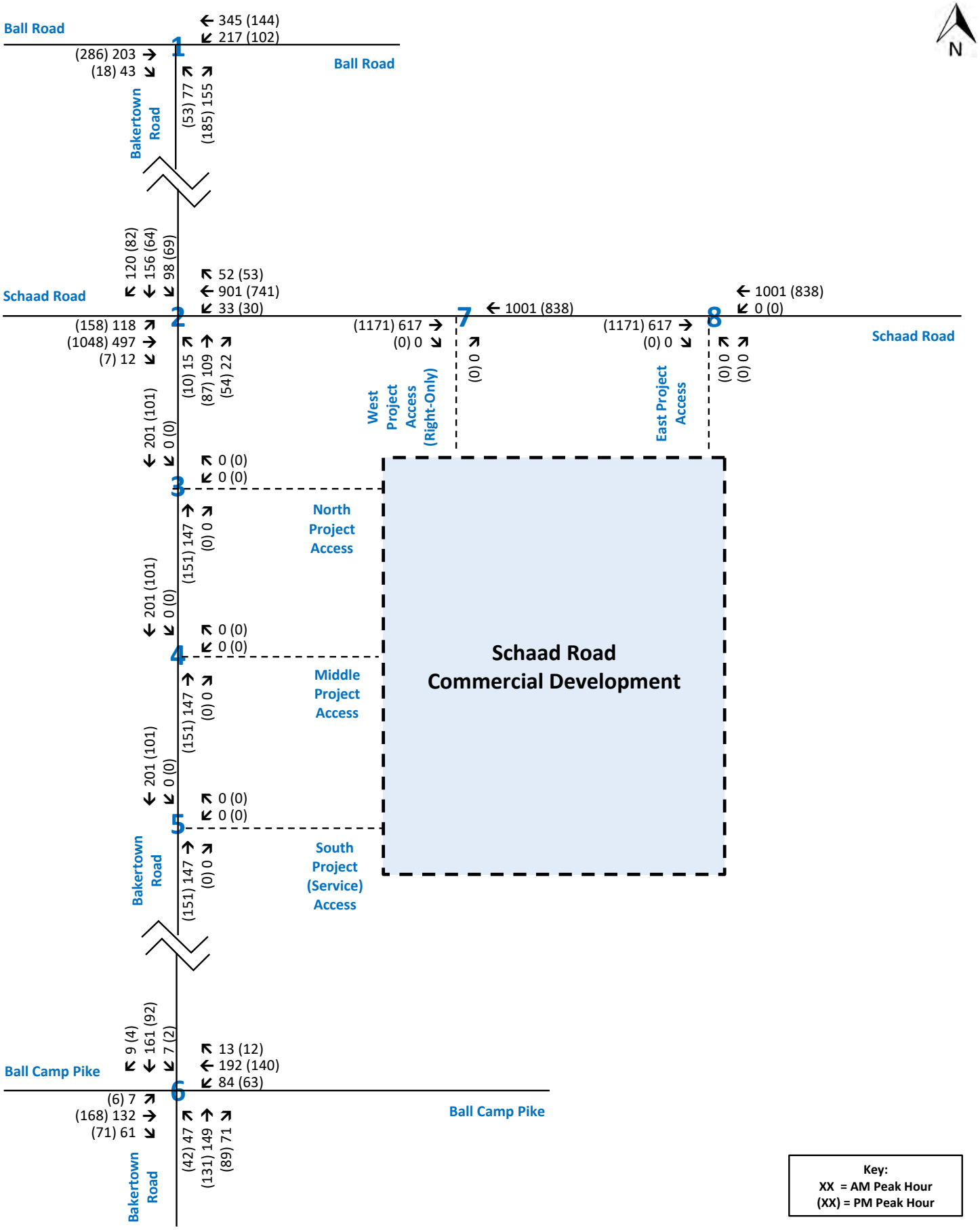


Figure 4.
Background Traffic Volumes (2030)
Schaad Road Commercial Development
Knox County, Tennessee

Bakertown Road Improvements and Traffic Signal at Schaad Road and Bakertown Road

It should be noted that the Knox County Department of Engineering and Public Works plans to improve Bakertown Road from Ball Camp Pike to Schaad Road. Based on roadway plans from September 2025, these future improvements will include the installation of a traffic signal at Schaad Road and Bakertown Road, with alignment of the eastbound and westbound left turn lanes on Schaad Road, as well as road realignment and widening at Bakertown Road and Ball Camp Pike. Currently, the intersection of Ball Camp Pike and Bakertown Road has a single approach lane in each direction, and the north and south legs of the intersection are offset by about 30'. Part of the roadway improvement plans includes a realignment of the Bakertown Road legs, as well as the addition of a separate 200' eastbound left turn lane and separate 150' westbound left turn and right turn lanes on Ball Camp Pike. For the purposes of this traffic study, it was assumed that these improvements would be completed by 2030. Therefore, these improvements were integrated into the analyses in this study for the 2030 background and 2030 projected traffic conditions.

2030 Background Intersection Capacity Analyses

To determine the LOS of the intersections studied, capacity analyses were performed for the AM and PM peak hours of traffic for the 2030 background traffic conditions. The capacity calculations were performed in accordance with the methods outlined in the *Highway Capacity Manual*. The capacity analyses result in the determination of a Level of Service (LOS) for an intersection. The LOS is a concept used to describe how well an intersection or roadway operates. LOS A is the best, while LOS F is the worst.

As shown in Table 4, the intersections in the study area are expected to operate at relatively good levels of service (LOS C or better) overall during the AM and PM peak traffic hours. As previously noted, the analyses for the background and projected traffic conditions in this report assume the completion of planned roadway and traffic control improvements in the vicinity of the project site, including traffic signalization at the intersection of Schaad Road and Bakertown Road and the widening of Ball Camp Pike at Bakertown Road. It should also be noted that both the background and projected traffic conditions in this report include analysis of intersection #6, Ball Camp Pike and Bakertown Road, as both a two-way stop-controlled intersection and an all-way stop-controlled intersection. For the 2030 background traffic conditions, this all-way stop improves the LOS for the northbound approach of Bakertown road from LOS E to LOS C, and the overall intersection LOS from LOS C to LOS B, during the AM peak hour of traffic.

Appendix B contains the capacity analysis worksheets for the 2030 background traffic conditions.

Table 4
2030 Background Traffic Conditions Analyses – Peak Hour Levels of Service

Intersection			AM Peak Hour			PM Peak Hour		
#	Description	Approach / Movement	LOS	Delay (sec)	95th % Queue (ft) (1)	LOS	Delay (sec)	95th % Queue (ft) (1)
1	Ball Road & Bakertown Road	Northbound Approach	D	33.9	125'	C	16.5	75'
		Westbound Left	A	8.4	25'	A	8.3	25'
		Overall Intersection	**A**	**9.3**	**---**	**A**	**6.1**	**---**
2	Schaad Road & Bakertown Road *With Traffic Signal Control*	Northbound Approach	C	23.2	121'	C	22.3	113'
		Southbound Approach	C	27.9	243'	C	23.3	102'
		Eastbound Approach	B	14.8	167'	B	16.9	297'
		Westbound Approach	C	21.0	356'	B	17.8	205'
		Overall Intersection	**C**	**20.6**	**---**	**B**	**18.1**	**---**
3	Bakertown Road & North Project Access	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
4	Bakertown Road & Middle Project Access	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
5	Bakertown Road & South Project Access (Service)	Southbound Left	---	---	---	---	---	---
		Westbound Approach	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
6	Ball Camp Pike & Bakertown Road	Northbound Approach	E	42.2	175'	C	22.3	100'
		Southbound Approach	C	24.6	75'	C	16.4	25'
		Eastbound Left	A	7.7	25'	A	7.6	25'
		Westbound Left	A	7.8	25'	A	7.9	25'
		Overall Intersection	**C**	**17.5**	**---**	**A**	**9.7**	**---**
6	Ball Camp Pike & Bakertown Road *With All-Way Stop Control*	Northbound Approach	C	16.5	100'	B	13.9	75'
		Southbound Approach	B	13.5	50'	B	10.7	25'
		Eastbound Approach	B	14.6	50'	B	13.9	75'
		Westbound Approach	B	12.8	50'	B	10.7	25'
		Overall Intersection	**B**	**14.4**	**---**	**B**	**12.7**	**---**
7	Schaad Road & West Project Access (Right-Only)	Northbound Right	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**
8	Schaad Road & East Project Access	Northbound Approach	---	---	---	---	---	---
		Westbound Left	---	---	---	---	---	---
		Overall Intersection	**---**	**---**	**---**	**---**	**---**	**---**

(1) For the 95th percentile queue calculations at unsignalized intersections, it was assumed that each 25' was equivalent to one vehicle. # Indicates the 95th percentile volume exceeds capacity; queue may be longer.

5. 2030 PROJECTED TRAFFIC CONDITIONS

To reach the 2030 projected traffic conditions, the trips expected to be generated by the proposed development were determined. These trips were then assigned to the roadway network using directional traffic distributions.

As stated in the project description, the development is proposed to include a 49,305-S.F. grocery store, a fuel center with a convenience market and 16 vehicle fueling positions, and two commercial outparcels. It was assumed for this study that these two outparcels would be developed as approximately 31,690 S.F. of commercial retail (18,513 S.F. and 13,177 S.F., respectively).

Trips expected to be generated by the proposed development were calculated using data from *Trip Generation* (12th Edition), which is a publication of the Institute of Transportation Engineers (ITE). The results of the trip generation calculations are presented in Table 5. This table also includes the number of internal and pass-by trips assumed for the development.

- Internal Trip Reduction – Information contained in the *Trip Generation Handbook* indicates that multi-use sites with retail-to-retail attraction can result in as much as a 30% reduction in external trips. To be conservative, a 10% internal reduction was applied to the proposed development's weekday, AM peak hour, and PM peak hour trip generations.

- Pass-By Trips – Information contained in the *Trip Generation Handbook* indicates that pass-by capture rates are significant for retail land uses. Varying pass-by rates were applied for each land use: a 30% pass-by rate was utilized for the weekday, AM peak hour, and PM peak hour trip generations for the Walmart Neighborhood Market, a 50% pass-by rate was utilized for each of the scenarios for the fuel center, and a 25% pass-by rate was utilized for each of the scenarios for the two commercial outparcels.

Table 5
Trip Generation for the Proposed Schaad Road Commercial Development

Description	ITE Land Use Code (LUC)	Size	Weekday Daily Trips			AM Peak Hour Trips			PM Peak Hour Trips		
			Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Grocery Store	850	49,305 S.F.	2,287	2,287	4,574	86	60	146	216	216	432
Fuel Center with Convenience Market	945	16 Vehicle Fueling Positions	1,565	1,565	3,130	109	109	218	127	127	254
Strip Retail Plaza (<40,000 S.F.)	822	18,513 S.F.	504	504	1,008	40	33	73	58	58	116
Strip Retail Plaza (<40,000 S.F.)	822	13,177 S.F.	393	393	786	28	23	51	46	46	92
Total Generated Trips			**4,749**	**4,749**	**9,498**	**263**	**225**	**488**	**447**	**447**	**894**
Internal Trip Reduction (10%)			(475)	(475)	(950)	(27)	(22)	(49)	(46)	(46)	(92)
Total External Trips			**4,274**	**4,274**	**8,548**	**236**	**203**	**439**	**401**	**401**	**802**
Pass-By Trip Reduction [(1)]			(1,524)	(1,524)	(3,048)	(87)	(77)	(164)	(138)	(138)	(276)
Net New Trips Generated			**2,750**	**2,750**	**5,500**	**149**	**126**	**275**	**263**	**263**	**526**

[(1)] For land use code (LUC) 850 (grocery store), a pass-by reduction rate of 30% was used for the weekday, AM peak hour, and PM peak hour trip generations. For LUC 945 (fuel center with convenience market), a pass-by reduction rate of 50% was used for the weekday, AM peak hour, and PM peak hour trip generations. For LUC 822 (strip retail, <40,000 S.F.), a pass-by reduction rate of 25% was used for the weekday, AM peak hour, and PM peak hour trip generations.

Additional information pertaining to the trip generation calculations for the proposed development, including the internal and pass-by capture rates utilized in this study, is contained in Appendix C.

Trip Distribution

The trips that will be generated by the proposed development were assigned to the roadway network using trip distributions that are detailed in Appendix D. These directional distributions were based on the existing directional split of traffic, the access proposed for the site, and the population centers in the area.

Separate trip distributions were developed for each of the proposed land uses in this project. Additionally, for each land use, separate primary and pass-by distributions were determined. As an example, Figure 5 illustrates the primary trip distribution for the Walmart Neighborhood Market portion of the development, which is detailed below.

- 10% to / from the north via Bakertown Road
- 20% to / from the south via Bakertown Road
- 30% to / from the east via Schaad Road
- 40% to / from the west via Schaad Road

Appendix D contains the following trip distribution sheets:

- Primary Trip Distribution – Schaad Road Commercial Development
    - Grocery Store (49,305 S.F.)
    - Fuel Center with Convenience Market (16 Vehicle Fueling Positions)
    - Outparcel #1 – Commercial Retail (18,513 S.F.)
    - Outparcel #2 – Commercial Retail (13,177 S.F.)
- Pass-By Trip Distribution – Schaad Road Commercial Development
    - Grocery Store (49,305 S.F.)
    - Fuel Center with Convenience Market (16 Vehicle Fueling Positions)
    - Outparcel #1 – Commercial Retail (18,513 S.F.)
    - Outparcel #2 – Commercial Retail (13,177 S.F.)
- Offsite Trip Distribution
    - Schaad Road Apartments
    - Weigel's Convenience Market & Car Wash (Primary)
    - Weigel's Convenience Market & Car Wash (Pass-By)

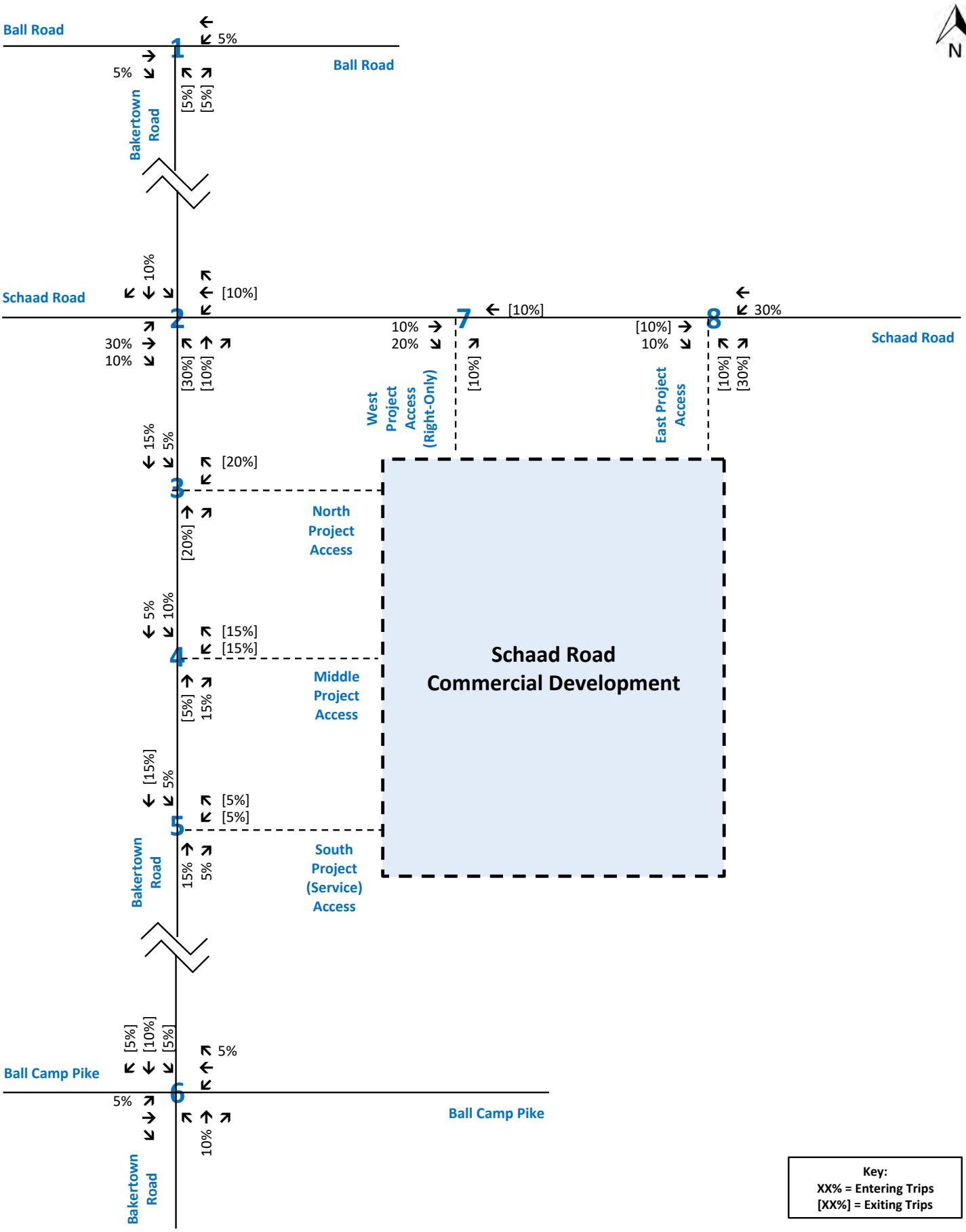


Figure 5.
Primary Trip Distribution - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

Traffic Assignment

The assignments of the total trips that will be generated by the proposed development are presented in Figure 6. Appendix E contains the traffic assignment figures utilized in developing the 2030 projected traffic volumes. Traffic assignment information included in Appendix E is listed as follows:

- Existing Traffic Volumes (2026)
- Background Traffic Volumes (2030)
    - Historical Growth (4.5% per year for 4 years)
    - Offsite Traffic
        - Schaad Road Apartments
        - Weigel's Convenience Market & Car Wash (Primary Trips)
        - Weigel's Convenience Market & Car Wash (Pass-By Trips)
        - Total Offsite Traffic
    - Historical Growth + Offsite (2030)
    - Total Background Traffic Volumes (2030)
- Site-Generated Traffic Assignment
    - Primary Traffic Assignment
        - Grocery Store (49,305 S.F.)
        - Fuel Center with Convenience Market (16 Vehicle Fueling Positions)
        - Outparcel #1 – Commercial Retail (18,513 S.F.)
        - Outparcel #2 – Commercial Retail (13,177 S.F.)
        - Total Primary Traffic Assignment
    - Pass-By Traffic Assignment
        - Grocery Store (49,305 S.F.)
        - Fuel Center with Convenience Market (16 Vehicle Fueling Positions)
        - Outparcel #1 – Commercial Retail (18,513 S.F.)
        - Outparcel #2 – Commercial Retail (13,177 S.F.)
        - Total Pass-By Traffic Assignment
- Total Site-Generated Traffic Assignment (Primary Trips + Pass-By Trips)
- Total Projected Traffic Volumes (2030)

Figure 7 presents the total projected AM and PM peak hour traffic volumes expected at the buildout year of 2030.

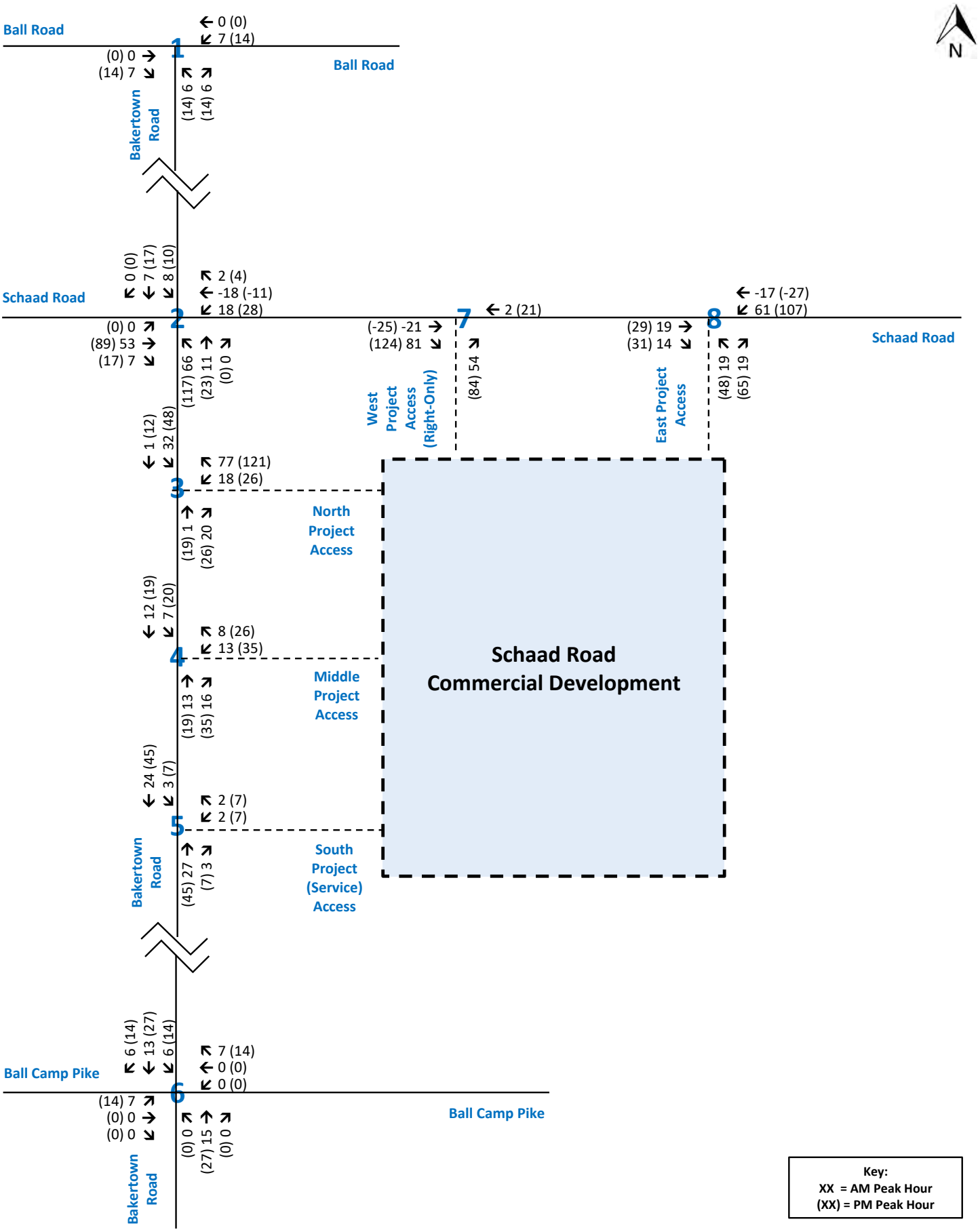


Figure 6.
Site Generated Traffic
Schaad Road Commercial Development
Knox County, Tennessee

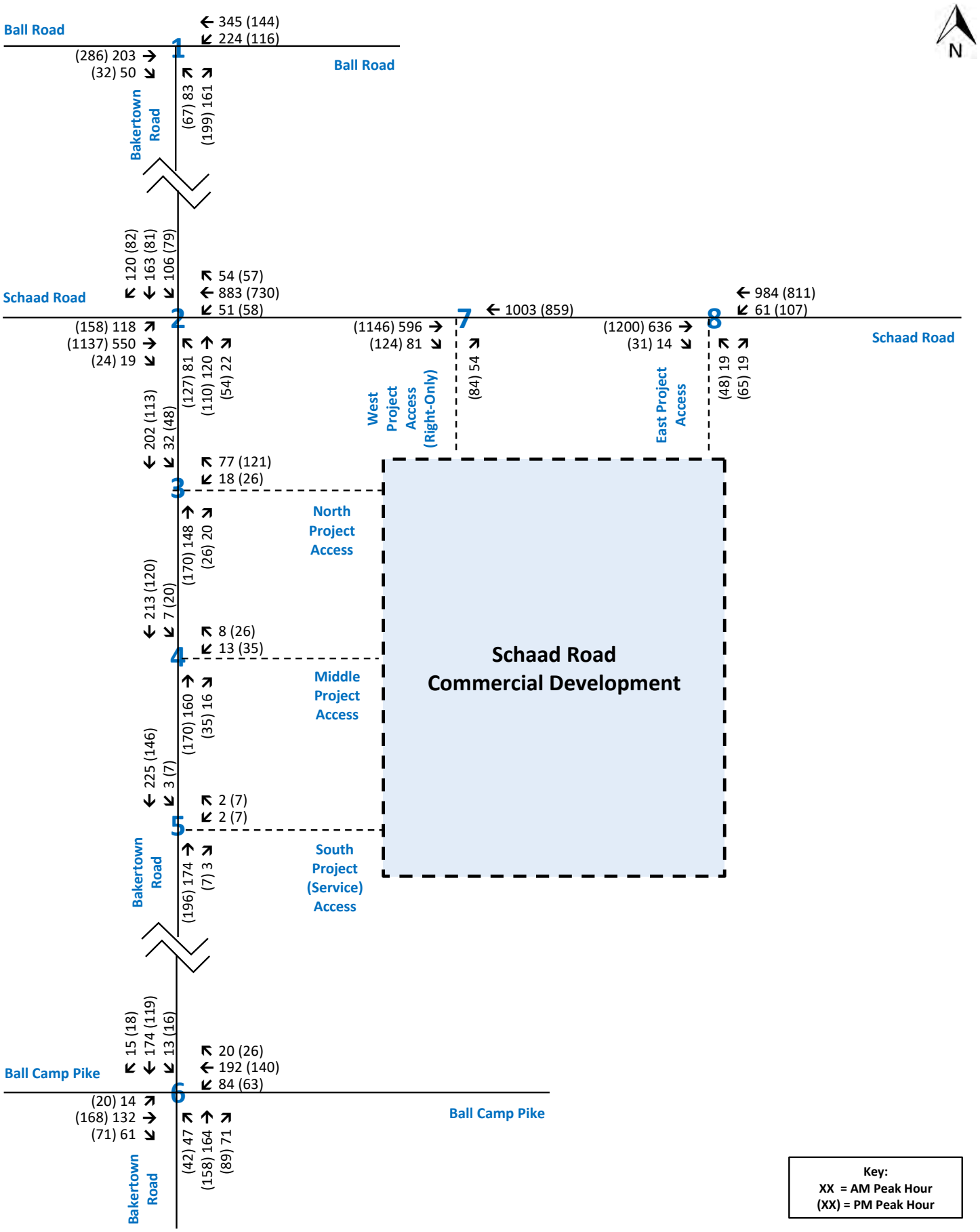


Figure 7.
Total Projected Traffic at Buildout (2030)
Schaad Road Commercial Development
Knox County, Tennessee

2030 Projected Intersection Capacity Analyses

Capacity analyses were performed in order to determine the impact of the project on the intersections included in the scope of the study. These capacity analyses were used to evaluate the need for roadway and traffic control improvements at the intersections studied.

The results of the capacity analyses for the 2030 projected traffic conditions at the intersections studied are presented in Table 6. As shown, the intersections included in this study are projected to operate overall at relatively good levels of service (LOS C or better) during the AM and PM peak traffic hours. As with the 2030 background capacity analyses, these projected analyses include consideration of an all-way stop at intersection #6, Ball Camp Pike and Bakertown Road. Additionally, these 2030 projected capacity analyses include considerations for a separate eastbound right turn lane at each of the two proposed project access drives on Schaad Road. Turn lane evaluations are detailed on the following pages of this report.

Appendix B contains the capacity analysis worksheets for the 2030 projected traffic conditions.

Table 6
2030 Projected Traffic Conditions – Peak Hour Levels of Service

Intersection			AM Peak Hour			PM Peak Hour		
#	Description	Approach / Movement	LOS	Delay (sec)	95th % Queue (ft) (1)	LOS	Delay (sec)	95th % Queue (ft) (1)
1	Ball Road & Bakertown Road	Northbound Approach	E	40.8	150'	C	19.4	100'
		Westbound Left	A	8.5	25'	A	8.4	25'
		Overall Intersection	**B**	**11.1**	---	**A**	**7.3**	---
2	Schaad Road & Bakertown Road *With Traffic Signal Control*	Northbound Approach	C	26.0	130'	C	27.2	150'
		Southbound Approach	C	25.8	247'	C	25.9	136'
		Eastbound Approach	B	18.3	190'	C	20.8	407'
		Westbound Approach	C	24.4	349'	B	19.1	241'
		Overall Intersection	**C**	**23.0**	---	**C**	**21.4**	---
3	Bakertown Road & North Project Access	Southbound Left	A	7.7	25'	A	7.8	25'
		Westbound Approach	B	10.2	25'	B	10.5	25'
		Overall Intersection	**A**	**2.4**	---	**A**	**3.8**	---
4	Bakertown Road & Middle Project Access	Southbound Left	A	7.7	25'	A	7.8	25'
		Westbound Approach	B	10.7	25'	B	10.6	25'
		Overall Intersection	**A**	**0.7**	---	**A**	**2.0**	---
5	Bakertown Road & South Project Access (Service)	Southbound Left	A	7.6	25'	A	7.7	25'
		Westbound Approach	B	10.5	25'	B	10.4	25'
		Overall Intersection	**A**	**0.2**	---	**A**	**0.5**	---
6	Ball Camp Pike & Bakertown Road	Northbound Approach	F	58.9	225'	D	30.8	150'
		Southbound Approach	D	30.3	100'	C	21.0	50'
		Eastbound Left	A	7.7	25'	A	7.6	25'
		Westbound Left	A	7.8	25'	A	7.9	25'
		Overall Intersection	**C**	**23.8**	---	**B**	**13.7**	---
6	Ball Camp Pike & Bakertown Road *With All-Way Stop Control*	Northbound Approach	C	18.1	100'	C	16.3	100'
		Southbound Approach	B	14.8	75'	B	12.5	50'
		Eastbound Approach	C	15.1	75'	C	15.3	75'
		Westbound Approach	B	13.2	50'	B	11.4	50'
		Overall Intersection	**C**	**15.3**	---	**B**	**14.2**	---
7	Schaad Road & West Project Access (Right-Only)	Northbound Right	B	11.2	25'	C	16.4	25'
		Overall Intersection	**A**	**0.3**	---	**A**	**0.6**	---
7	Schaad Road & West Project Access (Right-Only) *With EB RTL*	Northbound Right	B	10.8	25'	C	15.1	25'
		Overall Intersection	**A**	**0.2**	---	**A**	**0.6**	---
8	Schaad Road & East Project Access	Northbound Approach	C	15.1	25'	D	26.2	50'
		Westbound Left	A	9.3	25'	B	13.6	25'
		Overall Intersection	**A**	**0.7**	---	**A**	**1.9**	---
8	Schaad Road & East Project Access *With EB RTL*	Northbound Approach	B	14.9	25'	D	25.7	50'
		Westbound Left	A	9.3	25'	B	13.6	25'
		Overall Intersection	**A**	**0.7**	---	**A**	**1.9**	---

(1) For the 95th percentile queue calculations at unsignalized intersections, it was assumed that each 25' was equivalent to one vehicle. # Indicates the 95th percentile volume exceeds capacity; queue may be longer.

Consideration of Offsite Improvements

Based on the results of the 2030 projected intersection capacity analyses, the need for offsite improvements was evaluated. Specifically, the need for left turn lanes or right turn lanes was examined. Of note, the standard methodologies used in analyzing the need for left turn lanes are only applicable for unsignalized intersections with two-way stop control.

Left Turn Lane Warrants

The 2030 projected traffic volumes were compared to the standards set forth in *NCHRP 457*. Analyses were conducted to determine the need for left turn lane improvements at the following locations:

- #3 – Bakertown Road & North Project Access
- #4 – Bakertown Road & Middle Project Access
- #5 – Bakertown Road & South Project Access (Service)

#3 – Bakertown Road & North Project Access

The results of the analyses show that the projected volumes do not meet the thresholds required for the installation of a southbound left turn lane at this location.

#4 – Bakertown Road & Middle Project Access

The results of the analyses show that the projected volumes do not meet the thresholds required for the installation of a southbound left turn lane at this location.

#5 – Bakertown Road & South Project Access

The results of the analyses show that the projected volumes do not meet the thresholds required for the installation of a southbound left turn lane at this location.

Copies of the left turn warrant analyses sheets for the 2030 projected traffic conditions are included in Appendix F.

Right Turn Lane Evaluations

In accordance with TDOT's guidelines for right turn lane evaluations, the criteria contained in *NCHRP 457* were compared to 2032 projected traffic volumes at the following locations:

- #3 – Bakertown Road & North Project Access
- #4 – Bakertown Road & Middle Project Access
- #5 – Bakertown Road & South Project Access (Service)
- #7 – Schaad Road & West Project Access (Right-Only)
- #8 – Schaad Road & East Project Access

It should be noted that while the speed limit on Bakertown Road is posted at 30 mph, for intersections #3 - #5, the AM and PM peak hour volumes were compared to the data for a two-lane, 40-mph roadway. Additionally, while the speed limit on Schaad Road is posted at 45 mph, for intersections #7 and #8, the AM and PM peak hour volumes were compared to the data for a four-lane, 55-mph roadway.

#3 – Bakertown Road & North Project Access

The results of the analyses show that the projected volumes do not meet the thresholds indicated for the installation of a northbound right turn lane at this location.

#4 – Bakertown Road & Middle Project Access

The results of the analyses show that the projected volumes do not meet the thresholds indicated for the installation of a northbound right turn lane at this location.

#5 – Bakertown Road & South Project Access

The results of the analyses show that the projected volumes do not meet the thresholds indicated for the installation of a northbound right turn lane at this location.

#7 – Schaad Road & West Project Access (Right-Only)

The results of the analyses show that the projected volumes meet the thresholds indicated for the installation of an eastbound right turn lane at this location.

#8 – Schaad Road & East Project Access

The results of the analyses show that the projected volumes meet the thresholds indicated for the installation of an eastbound right turn lane at this location.

Copies of the right turn lane analyses sheets for the 2030 projected traffic conditions are included in Appendix F.

Sight Distance at Proposed Driveways

As part of scoping requirements for this study, a field visit was made to determine whether adequate sight distance would be able to be provided at each of the project's proposed access drives. The Knoxville-Knox County Subdivision Regulations note that the minimum sight distance shall be ten times the posted speed limit and measured at a minimum of 15' from the edge of the roadway. A summary of the sight distances measured at each proposed access drive is included below in Table 7. In addition, Appendix G contains photographs taken onsite at the location of each proposed driveway to document sight distance conditions.

Table 7
Sight Distance Summary
Schaad Road Commercial Development

Location	Measured Sight Distance	Required Sight Distance (1)	Adequate Sight Distance Available (Yes/No)
Intersection #3 – Bakertown Road & North Project Access			
Looking Right from Driveway	320'	300'	Yes
Looking Left from Driveway	350'	300'	Yes
Intersection #4 – Bakertown Road & Middle Project Access			
Looking Right from Driveway	500'+ (2)	300'	Yes (2)
Looking Left from Driveway	750'+ (2)	300'	Yes (2)
Intersection #5 – Bakertown Road & South Project Access			
Looking Right from Driveway	350'+ (2)	300'	Yes (2)
Looking Left from Driveway	550'+ (2)	300'	Yes (2)
Intersection #7 – Schaad Road & West Project Access (Right-Only)			
Looking Right from Driveway	N/A	N/A	N/A
Looking Left from Driveway	2,800'+	450'	Yes
Intersection #8 – Schaad Road & East Project Access			
Looking Right from Driveway	900'+	450'	Yes
Looking Left from Driveway	3,000'+	450'	Yes

(1) Minimum intersection sight distance calculated as ten times the posted speed limit, as per Knoxville-Knox County Subdivision Regulations.
(2) Requires removal of vegetation and on-site grading to ensure adequate sight distance

Northbound Queuing on Bakertown Road at Schaad Road

As noted previously in this study, a traffic signal is planned to be installed at the intersection of Schaad Road and Bakertown Road. In view of the proximity of this project's proposed north access drive on Bakertown Road to Schaad Road, specific attention was given to determine the anticipated queues for northbound traffic on Bakertown Road at Schaad Road, with the assumption of signalized traffic control.

The location of the proposed north access will allow for at least 250' of vehicle stacking of the northbound approach on Bakertown Road before operational issues would occur. As shown in Table 6 of this report, the projected 95th percentile queues for the northbound approach of Bakertown Road at Schaad Road are 130' during the AM peak hour and 150' during the PM peak hour. Therefore, it is anticipated that the queuing of northbound traffic on Bakertown Road at Schaad Road will not create operational issues with the proposed north driveway.

6. TRAFFIC SIGNAL WARRANT ANALYSES

Though Knox County has developed design plans for the installation of a traffic signal at the intersection of Schaad Road and Bakertown Road, traffic signal warrant analyses for this location were conducted as part of this traffic study in accordance with January 2026 scoping discussions with Knox County staff.

Traffic Signal Warrant Descriptions

Traffic signals are typically justified by using certain "Traffic Signal Warrants", which are based primarily on traffic volumes but can also involve a variety of other factors. These warrants are contained in *The Manual on Uniform Traffic Control Devices* (*MUTCD*), which is produced by the Federal Highway Administration (FHWA). The *MUTCD* has been adopted on Federal and State levels. These warrants detail the minimum conditions that indicate when a traffic signal can be justified, and are listed as follows:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour Vehicular Volume
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

Of the nine separate traffic signal warrants, only Warrants 1 - 3 were particularly applicable to the intersections under consideration in this study. Descriptions of Warrants 1 - 3 are included in the following pages. Additional information regarding signal warrants can be found in Appendix H. It should be noted that these warrants represent the minimum traffic volumes required to justify the installation of a traffic signal. As such, meeting a signal warrant does not mandate the installation of a traffic signal for a given location.

Warrant 1 – Eight-Hour Vehicular Volume

The primary signal warrant generally considered by many agencies is Warrant 1, which is called the Eight-Hour Vehicular Volume warrant. Warrant 1 is divided into two parts, conditions A and B. Since the speed limit on Schaad Road is posted at 45 mph, the required volume thresholds were analyzed at the reduced volume warrant levels (70% factor).

- Condition A: Minimum Vehicular Volume is based on a combination of traffic volumes between the major street and highest minor street approach, with an emphasis on the minor street traffic. For a major street with two travel lanes per direction, 420 vehicles per hour are required. For the minor street, 140 vehicles are required when a two-lane approach is considered. Volumes on both roadways must meet or exceed these levels for a minimum of 8 hours to satisfy Condition A of the warrant.

- Condition B: Interruption of Continuous Traffic is also based on a combination of traffic volumes between the major street and highest minor street. However, in Condition B, the emphasis is on the major street traffic, and lower thresholds are required for the minor street approach. For a major street with two travel lanes per direction, 630 vehicles per hour are required. The minor street volume requirement is 70 vehicles when a two-lane approach is considered. Volumes on both roadways must meet or exceed these levels for a minimum of 8 hours to satisfy Condition B of the warrant.

Warrant 2 – Four-Hour Vehicular Volume

The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. As the name suggests, to satisfy the warrant, traffic volumes must meet the conditions for a minimum of four hours. To evaluate Warrant 2, the existing traffic volumes were compared to Figure 4C-1 as contained in the *MUTCD*.

Warrant 3 – Peak Hour Vehicular Volume

The Peak Hour Vehicular Volume signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor street traffic suffers undue delay when entering or crossing the major street. To evaluate Warrant 3, the projected traffic volumes were compared to Figure 4C-3 as contained in the *MUTCD*.

As previously mentioned, only Warrants 1 - 3 were particularly applicable to the intersections under consideration in this study, as these warrants are solely based on traffic volumes.

2026 Existing Traffic Volumes – Schaad Road & Bakertown Road

The results of the signal warrant analyses for Warrant 1 are shown in Table 8, which indicates that Condition A, Minimum Vehicular Volumes, is satisfied for only two of the required eight hours when compared to 2026 existing traffic volumes at the intersection of Schaad Road and Bakertown Road. Condition B, Interruption of Continuous Traffic, is satisfied for nine hours (also compared to a threshold of eight hours).

Table 8
Warrant 1: Eight-Hour Vehicular Volume
2026 Existing Traffic Volumes – Schaad Road & Bakertown Road

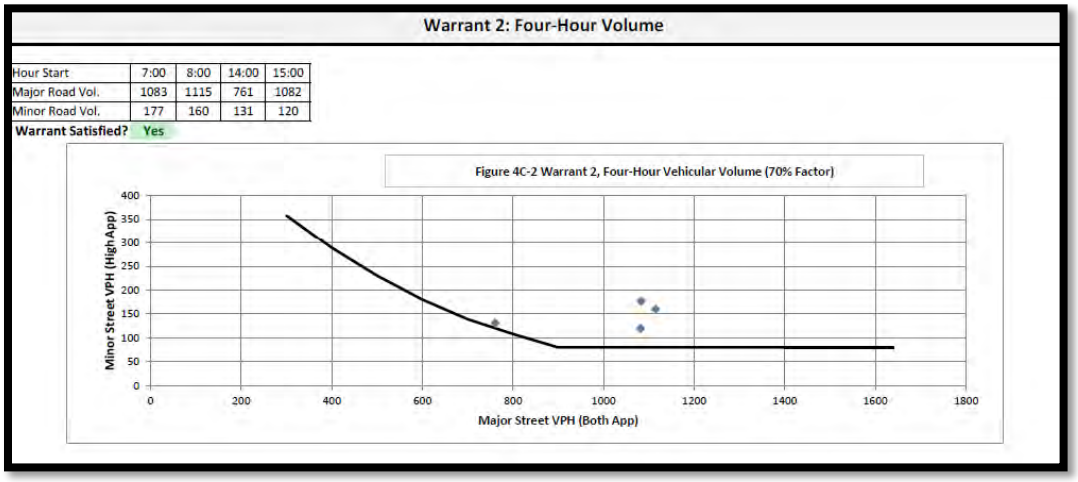
Condition A: Minimum Vehicular Volume	
Volume Level	70%
Major Rd. Req	420
Minor Rd. Req	140
# of Hours Met (8 Required)	**2**
Warrant 1A Satisfied? **No**	

Condition B: Interruption of Continuous Traffic	
Volume Level	70%
Major Rd. Req	630
Minor Rd. Req	70
# of Hours Met (8 Required)	**9**
Warrant 1B Satisfied? **Yes**	

From	To	Major Road Volume	Minor Road Highest Approach
6:00	7:00	420	51
7:00	8:00	1,083	177
8:00	9:00	1,115	160
9:00	10:00	673	90
10:00	11:00	507	67
11:00	12:00	533	71
12:00	13:00	631	86
13:00	14:00	653	99
14:00	15:00	761	131
15:00	16:00	1,082	120
16:00	17:00	1,331	98
17:00	18:00	1,538	113

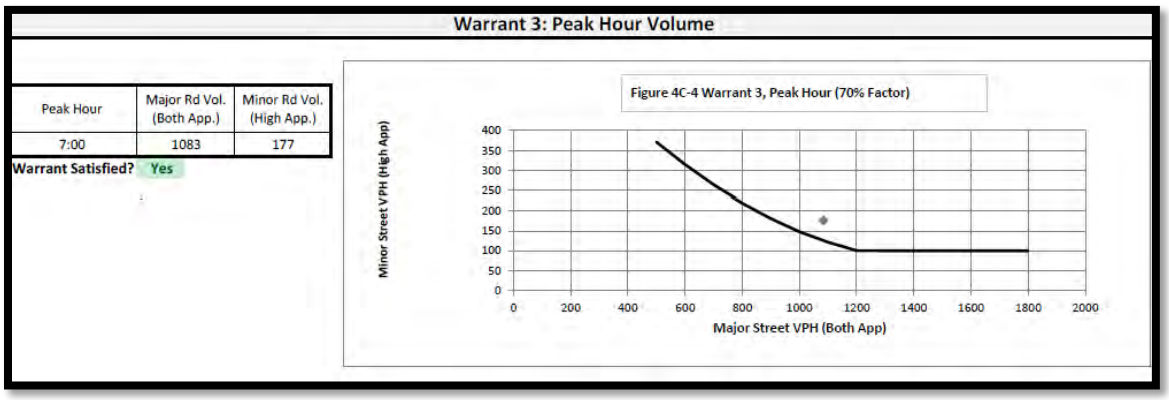
The results of the signal warrant analyses for Warrant 2, Four-Hour Vehicular Volumes, are shown below in Table 9. As shown, each of the four highest traffic hours meets the threshold when compared to the 2026 existing traffic volumes at Schaad Road and Bakertown Road.

Table 9
Warrant 2: Four-Hour Vehicular Volume
Schaad Road & Bakertown Road



The results of the signal warrant analyses for Warrant 3, Peak Hour Vehicular Volumes, are shown below in Table 10. As shown, the highest traffic hour meets the threshold for Warrant 3 when compared to the 2026 existing traffic volumes at Schaad Road and Bakertown Road.

Table 10
Warrant 3: Peak Hour Vehicular Volume
Schaad Road & Bakertown Road



Details regarding the signal warrant analyses for the 2026 existing traffic conditions are included in Appendix H.

In summary, the 2026 existing traffic conditions at the intersection of Schaad Road and Bakertown Road meet the thresholds outlined for Signal Warrants 1B, 2, and 3.

Summary of Signal Warrant Analyses

The signal warrant analyses presented on the previous pages reflect the results of the evaluations for signal warrants at intersection #2 based on 2026 existing traffic conditions. Signal warrant analyses were also performed for this intersection with the 2030 background traffic conditions and the 2030 projected traffic conditions. Table 11 summarizes the signal warrant analyses results for each scenario considered. The signal warrant analyses for the 2030 background and 2030 projected traffic conditions are also detailed in Appendix H.

Table 11
Summary of Signal Warrant Analyses Results
Intersection #2 – Schaad Road and Bakertown Road

Scenario	Warrant 1A Met?	Warrant 1B Met?	Warrant 2 Met?	Warrant 3 Met?
2026 Existing Traffic Conditions	**No**	**Yes**	**Yes**	**Yes**
2030 Background Traffic Conditions	**Yes**	**Yes**	**Yes**	**Yes**
2030 Projected Traffic Conditions	**Yes**	**Yes**	**Yes**	**Yes**

7. CONCLUSIONS AND RECOMMENDATIONS

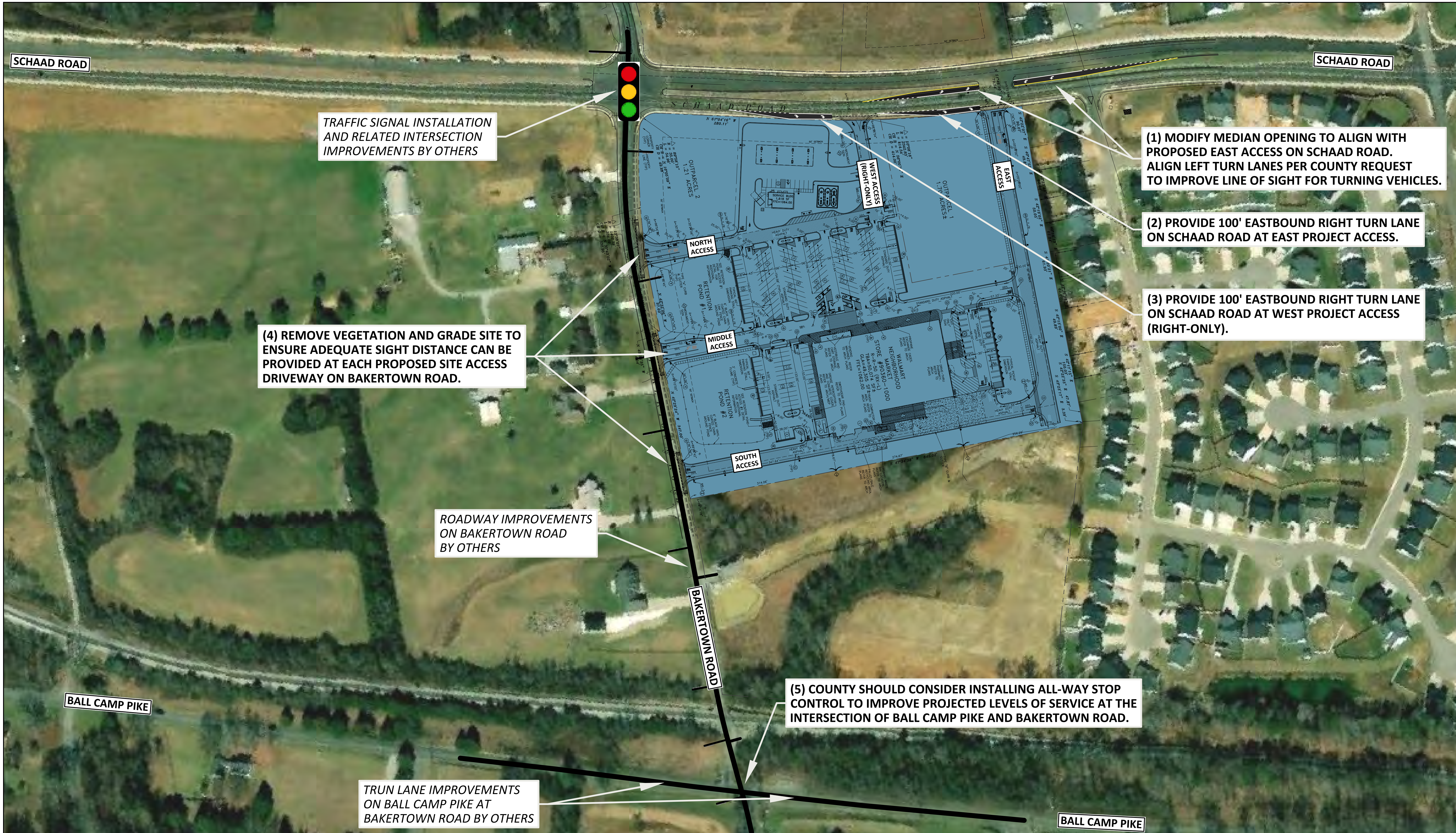
The analyses presented in this study indicate that the traffic generated by the proposed Schaad Road commercial development can generally be accommodated by the existing roadway network with certain offsite roadway improvements, in addition to the previously noted improvement plans by Knox County in the vicinity of the project site. These County improvement plans include:

- Traffic signal installation and related intersection improvements at Schaad Road and Bakertown Road
- Roadway improvements on Bakertown Road
    - Bakertown Road will be widened to provide two 10' wide travel lanes with 2' paved shoulders. Curb and gutter and a 5' wide concrete sidewalk are to be provided on the east side only.
    - The north and south legs of Bakertown Road will be aligned at Ball Camp Pike.
    - Ball Camp Pike will be widened to provide separate turn lanes at its intersection with Bakertown Road.

In conjunction with these planned improvements, the following recommendations have been identified for the Schaad Road commercial development:

1. Modify the existing median opening on Schaad Road to align with the proposed east project access. Align the left turn lanes on Schaad Road per County request to improve line of sight for turning vehicles.
2. Provide a 100' eastbound right turn lane on Schaad Road at the proposed east project access.
3. Provide a 100' eastbound right turn lane on Schaad Road at the proposed west project access (right-only).
4. Remove vegetation and grade the project site to ensure adequate sight distance can be provided at each proposed site access driveway on Bakertown Road.
5. Knox County should consider installing all-way stop control to improve the projected levels of service at the intersection of Ball Camp Pike and Bakertown Road.

The project recommendations are conceptually shown on the following page in Figure 8.



SCHAAD ROAD
SCHAAD ROAD
TRAFFIC SIGNAL INSTALLATION AND RELATED INTERSECTION IMPROVEMENTS BY OTHERS
(1) MODIFY MEDIAN OPENING TO ALIGN WITH PROPOSED EAST ACCESS ON SCHAAD ROAD. ALIGN LEFT TURN LANES PER COUNTY REQUEST TO IMPROVE LINE OF SIGHT FOR TURNING VEHICLES.
(2) PROVIDE 100' EASTBOUND RIGHT TURN LANE ON SCHAAD ROAD AT EAST PROJECT ACCESS.
(3) PROVIDE 100' EASTBOUND RIGHT TURN LANE ON SCHAAD ROAD AT WEST PROJECT ACCESS (RIGHT-ONLY).
WEST ACCESS (RIGHT-ONLY)
EAST ACCESS
NORTH ACCESS
MIDDLE ACCESS
SOUTH ACCESS
(4) REMOVE VEGETATION AND GRADE SITE TO ENSURE ADEQUATE SIGHT DISTANCE CAN BE PROVIDED AT EACH PROPOSED SITE ACCESS DRIVEWAY ON BAKERTOWN ROAD.
ROADWAY IMPROVEMENTS ON BAKERTOWN ROAD BY OTHERS
BAKERTOWN ROAD
(5) COUNTY SHOULD CONSIDER INSTALLING ALL-WAY STOP CONTROL TO IMPROVE PROJECTED LEVELS OF SERVICE AT THE INTERSECTION OF BALL CAMP PIKE AND BAKERTOWN ROAD.
BALL CAMP PIKE
TRUN LANE IMPROVEMENTS ON BALL CAMP PIKE AT BAKERTOWN ROAD BY OTHERS
BALL CAMP PIKE

Traffic Impact Study for Walmart Neighborhood Market, Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

Figure 8.

Conceptual Sketch of Recommended Improvements

APPENDIX A

TRAFFIC COUNT DATA

INTERSECTION TURNING

MOVEMENT COUNTS

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #1 - Ball Road & Bakertown Road
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road						Ball Road			Ball Road			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM	13		34					21	6	19	44		
7:15 AM - 7:30 AM	18		27					38	7	22	66		
7:30 AM - 7:45 AM	12		41					45	9	46	61		
7:45 AM - 8:00 AM	13		38					45	5	61	70		
8:00 AM - 8:15 AM	14		17					44	7	46	95		
8:15 AM - 8:30 AM	5		11					33	8	35	60		
8:30 AM - 8:45 AM	3		10					21	5	32	31		
8:45 AM - 9:00 AM	1		15					21	4	23	32		
4:00 PM - 4:15 PM	7		38					39	4	23	26		
4:15 PM - 4:30 PM	5		30					48	5	17	27		
4:30 PM - 4:45 PM	5		23					48	9	17	22		
4:45 PM - 5:00 PM	10		20					48	1	22	25		
5:00 PM - 5:15 PM	13		35					51	2	22	27		
5:15 PM - 5:30 PM	9		38					64	3	12	34		
5:30 PM - 5:45 PM	11		39					68	1	29	31		
5:45 PM - 6:00 PM	4		37					59	2	16	30		PHF
AM Peak Hour (7:15 AM - 8:15 AM)	57	0	123	0	0	0	0	172	28	175	292	0	0.91
PM Peak Hour (5:00 PM - 6:00 PM)	37	0	149	0	0	0	0	242	8	79	122	0	0.89

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #2 - Schaad Road & Bakertown Road
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM	1	29	4	4	10	11	9	76	0	5	109	5	
7:15 AM - 7:30 AM	1	31	13	5	16	11	6	86	1	6	137	11	
7:30 AM - 7:45 AM	2	30	8	9	23	20	14	90	2	13	162	10	
7:45 AM - 8:00 AM	1	26	0	2	37	29	12	107	1	6	205	10	
8:00 AM - 8:15 AM	8	18	2	3	35	13	9	123	1	5	196	4	
8:15 AM - 8:30 AM	0	10	9	7	29	11	3	100	1	4	192	3	
8:30 AM - 8:45 AM	2	13	2	6	12	19	3	93	1	6	151	0	
8:45 AM - 9:00 AM	4	10	5	2	15	8	5	76	0	3	135	1	
4:00 PM - 4:15 PM	0	18	7	3	12	10	23	169	2	4	95	3	
4:15 PM - 4:30 PM	1	16	7	1	14	8	17	181	0	5	105	5	
4:30 PM - 4:45 PM	1	11	9	6	14	6	8	182	1	4	120	6	
4:45 PM - 5:00 PM	2	10	10	0	15	9	14	211	0	3	167	6	
5:00 PM - 5:15 PM	1	25	8	0	13	11	18	234	0	7	139	9	
5:15 PM - 5:30 PM	0	17	20	0	8	8	17	246	1	7	133	7	
5:30 PM - 5:45 PM	0	14	8	0	11	14	27	200	1	8	154	8	
5:45 PM - 6:00 PM	0	14	6	3	13	9	17	169	2	10	115	9	PHF
AM Peak Hour (7:30 AM - 8:30 AM)	11	84	19	21	124	73	38	420	5	28	755	27	0.92
PM Peak Hour (4:45 PM - 5:45 PM)	3	66	46	0	47	42	76	891	2	25	593	30	0.98

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #3 - Bakertown Road & Proposed North Project Access
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road			Bakertown Road						Proposed North Project Access			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM		34			15								
7:15 AM - 7:30 AM		45			23								
7:30 AM - 7:45 AM		40			38								
7:45 AM - 8:00 AM		27			44								
8:00 AM - 8:15 AM		28			41								
8:15 AM - 8:30 AM		19			34								
8:30 AM - 8:45 AM		17			19								
8:45 AM - 9:00 AM		19			18								
4:00 PM - 4:15 PM		25			18								
4:15 PM - 4:30 PM		24			19								
4:30 PM - 4:45 PM		21			19								
4:45 PM - 5:00 PM		22			18								
5:00 PM - 5:15 PM		34			20								
5:15 PM - 5:30 PM		37			16								
5:30 PM - 5:45 PM		22			20								
5:45 PM - 6:00 PM		20			25								PHF
AM Peak Hour (7:30 AM - 8:30 AM)	0	114	0	0	157	0	0	0	0	0	0	0	0.87
PM Peak Hour (4:45 PM - 5:45 PM)	0	115	0	0	74	0	0	0	0	0	0	0	0.88

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #4 - Bakertown Road & Proposed Middle Project Access
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road			Bakertown Road						Proposed Middle Project Access			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM		34			15								
7:15 AM - 7:30 AM		45			23								
7:30 AM - 7:45 AM		40			38								
7:45 AM - 8:00 AM		27			44								
8:00 AM - 8:15 AM		28			41								
8:15 AM - 8:30 AM		19			34								
8:30 AM - 8:45 AM		17			19								
8:45 AM - 9:00 AM		19			18								
4:00 PM - 4:15 PM		25			18								
4:15 PM - 4:30 PM		24			19								
4:30 PM - 4:45 PM		21			19								
4:45 PM - 5:00 PM		22			18								
5:00 PM - 5:15 PM		34			20								
5:15 PM - 5:30 PM		37			16								
5:30 PM - 5:45 PM		22			20								
5:45 PM - 6:00 PM		20			25								PHF
AM Peak Hour (7:30 AM - 8:30 AM)	0	114	0	0	157	0	0	0	0	0	0	0	0.87
PM Peak Hour (4:45 PM - 5:45 PM)	0	115	0	0	74	0	0	0	0	0	0	0	0.88

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #5 - Bakertown Road & Proposed South Project (Service) Access
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road			Bakertown Road						Proposed South Project (Service) Access			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM		34			15								
7:15 AM - 7:30 AM		45			23								
7:30 AM - 7:45 AM		40			38								
7:45 AM - 8:00 AM		27			44								
8:00 AM - 8:15 AM		28			41								
8:15 AM - 8:30 AM		19			34								
8:30 AM - 8:45 AM		17			19								
8:45 AM - 9:00 AM		19			18								
4:00 PM - 4:15 PM		25			18								
4:15 PM - 4:30 PM		24			19								
4:30 PM - 4:45 PM		21			19								
4:45 PM - 5:00 PM		22			18								
5:00 PM - 5:15 PM		34			20								
5:15 PM - 5:30 PM		37			16								
5:30 PM - 5:45 PM		22			20								
5:45 PM - 6:00 PM		20			25								PHF
AM Peak Hour (7:30 AM - 8:30 AM)	0	114	0	0	157	0	0	0	0	0	0	0	0.87
PM Peak Hour (4:45 PM - 5:45 PM)	0	115	0	0	74	0	0	0	0	0	0	0	0.88

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #6 - Ball Camp Pike & Bakertown Road
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Bakertown Road			Bakertown Road			Ball Camp Pike			Ball Camp Pike			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM	14	31	10	2	10	1	2	9	2	10	26	1	
7:15 AM - 7:30 AM	12	42	15	0	18	0	0	19	9	16	41	2	
7:30 AM - 7:45 AM	12	33	20	3	28	3	3	27	18	15	45	2	
7:45 AM - 8:00 AM	8	24	11	2	41	3	3	31	12	22	37	2	
8:00 AM - 8:15 AM	8	17	14	1	36	2	0	35	13	18	40	5	
8:15 AM - 8:30 AM	9	17	16	1	34	1	0	18	9	22	38	0	
8:30 AM - 8:45 AM	3	14	15	1	15	2	0	14	5	18	30	1	
8:45 AM - 9:00 AM	10	17	12	1	16	1	1	14	5	24	20	2	
4:00 PM - 4:15 PM	8	22	23	0	16	0	6	39	13	11	20	0	
4:15 PM - 4:30 PM	5	23	17	2	16	1	0	39	8	8	28	1	
4:30 PM - 4:45 PM	3	18	12	1	18	1	0	28	11	12	25	2	
4:45 PM - 5:00 PM	8	22	23	0	18	0	1	27	16	8	26	3	
5:00 PM - 5:15 PM	8	28	12	0	19	1	1	36	20	17	34	2	
5:15 PM - 5:30 PM	13	32	22	0	11	0	2	42	13	13	27	2	
5:30 PM - 5:45 PM	7	16	18	2	18	2	1	37	11	15	32	3	
5:45 PM - 6:00 PM	4	17	13	2	20	1	0	36	9	12	18	0	PHF
AM Peak Hour (7:15 AM - 8:15 AM)	40	116	60	6	123	8	6	112	52	71	163	11	0.92
PM Peak Hour (4:45 PM - 5:45 PM)	36	98	75	2	66	3	5	142	60	53	119	10	0.94

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #7 - Schaad Road & Proposed West Project Access
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Proposed West Project Access						Schaad Road			Schaad Road			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM								84			119		
7:15 AM - 7:30 AM								104			154		
7:30 AM - 7:45 AM								107			185		
7:45 AM - 8:00 AM								109			221		
8:00 AM - 8:15 AM								128			205		
8:15 AM - 8:30 AM								116			199		
8:30 AM - 8:45 AM								101			157		
8:45 AM - 9:00 AM								83			139		
4:00 PM - 4:15 PM								179			102		
4:15 PM - 4:30 PM								189			115		
4:30 PM - 4:45 PM								197			130		
4:45 PM - 5:00 PM								221			176		
5:00 PM - 5:15 PM								242			155		
5:15 PM - 5:30 PM								266			147		
5:30 PM - 5:45 PM								208			170		
5:45 PM - 6:00 PM								178			134		PHF
AM Peak Hour (7:30 AM - 8:30 AM)	0	0	0	0	0	0	0	460	0	0	810	0	0.95
PM Peak Hour (4:45 PM - 5:45 PM)	0	0	0	0	0	0	0	937	0	0	648	0	0.96

INTERSECTION VEHICULAR TURNING MOVEMENT COUNTS

LOCATION: #8 - Schaad Road & Proposed East Project Access
PROJECT: Schaad Road Commercial Development
DATE: Wednesday, January 21, 2026

LOCATION	Northbound			Southbound			Eastbound			Westbound			
	Proposed East Project Access						Schaad Road			Schaad Road			
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM - 7:15 AM								84			119		
7:15 AM - 7:30 AM								104			154		
7:30 AM - 7:45 AM								107			185		
7:45 AM - 8:00 AM								109			221		
8:00 AM - 8:15 AM								128			205		
8:15 AM - 8:30 AM								116			199		
8:30 AM - 8:45 AM								101			157		
8:45 AM - 9:00 AM								83			139		
4:00 PM - 4:15 PM								179			102		
4:15 PM - 4:30 PM								189			115		
4:30 PM - 4:45 PM								197			130		
4:45 PM - 5:00 PM								221			176		
5:00 PM - 5:15 PM								242			155		
5:15 PM - 5:30 PM								266			147		
5:30 PM - 5:45 PM								208			170		
5:45 PM - 6:00 PM								178			134		PHF
AM Peak Hour (7:30 AM - 8:30 AM)	0	0	0	0	0	0	0	460	0	0	810	0	0.95
PM Peak Hour (4:45 PM - 5:45 PM)	0	0	0	0	0	0	0	937	0	0	648	0	0.96

QUALITY COUNTS

TMC REPORTS

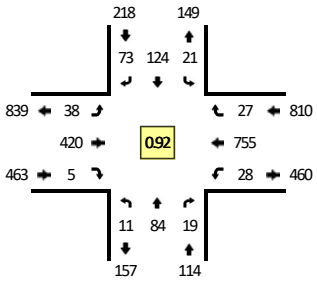
Type of peak hour being reported: User-Defined

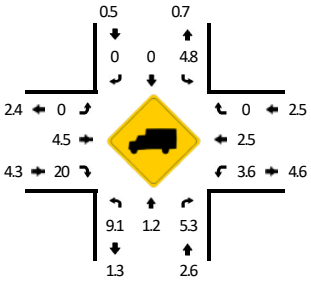
Method for determining peak hour: Total Entering Volume

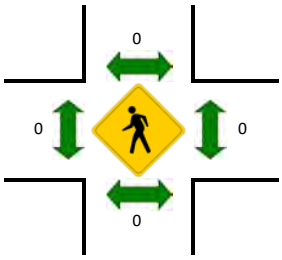
LOCATION: Bakertown Road -- Schaad Road
CITY/STATE: Knoxville, TN

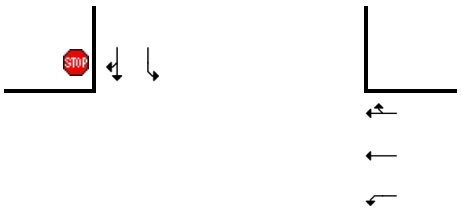
QC JOB #: 17407901
DATE: Wed, Jan 21 2026

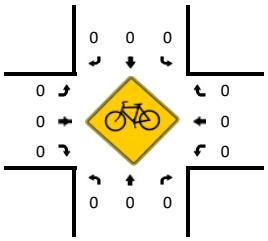
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

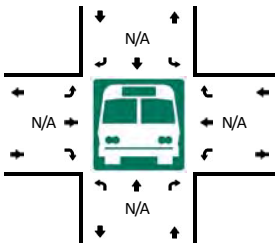


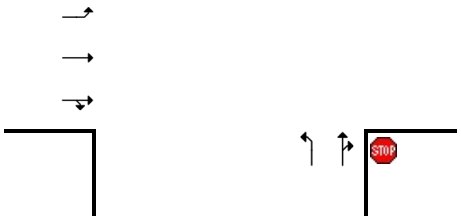


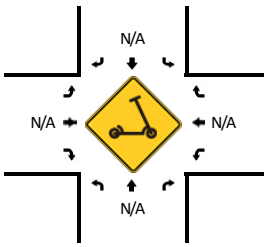












15-Min Count Period Beginning At	Bakertown Road (Northbound)				Bakertown Road (Southbound)				Schaad Road (Eastbound)				Schaad Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	2	3	2	0	1	1	2	0	0	28	0	0	0	38	1	0	78	
6:15 AM	3	3	3	0	2	6	6	0	1	24	0	0	0	63	0	0	111	
6:30 AM	1	5	4	0	0	2	7	0	5	33	0	0	1	76	3	0	137	
6:45 AM	4	13	8	0	1	5	8	0	2	52	0	0	4	88	1	0	186	512
7:00 AM	1	29	4	0	4	10	11	0	9	76	0	0	5	109	5	0	263	697
7:15 AM	1	31	13	0	5	16	11	0	6	86	1	0	6	137	11	0	324	910
7:30 AM	2	30	8	0	9	23	20	0	14	90	2	0	13	162	10	0	383	1156
7:45 AM	1	26	0	0	2	37	29	0	12	107	1	0	6	205	10	0	436	1406
8:00 AM	8	18	2	0	3	35	13	0	9	123	1	0	5	196	4	0	417	1560
8:15 AM	0	10	9	0	7	29	11	0	3	100	1	0	4	192	3	0	369	1605
8:30 AM	2	13	2	0	6	12	19	0	3	93	1	0	6	151	0	0	308	1530
8:45 AM	4	10	5	0	2	15	8	0	5	76	0	0	3	135	1	0	264	1358
9:00 AM	1	8	4	0	2	16	13	0	2	65	0	0	1	87	1	0	200	1141
9:15 AM	0	13	4	0	3	15	8	0	1	69	2	0	7	99	4	0	225	997
9:30 AM	1	8	7	0	4	8	7	0	6	65	0	0	5	111	5	0	227	916
9:45 AM	1	7	3	0	3	4	7	0	7	53	0	0	7	75	1	0	168	820
10:00 AM	1	14	6	1	2	5	3	0	8	53	1	0	3	58	2	0	157	777
10:15 AM	1	8	3	0	1	8	10	0	6	65	2	0	2	60	1	0	167	719
10:30 AM	2	4	7	0	0	8	7	0	6	52	1	0	3	59	5	0	154	646
10:45 AM	2	9	3	0	5	11	7	0	5	48	0	0	4	59	4	0	157	635
11:00 AM	7	10	5	0	1	14	10	0	4	65	0	0	4	53	0	0	173	651
11:15 AM	0	11	8	0	3	5	5	0	8	64	0	0	3	64	3	0	174	658
11:30 AM	2	6	6	0	4	6	6	0	2	51	0	0	4	59	2	0	148	652
11:45 AM	1	4	6	0	3	8	6	0	5	61	3	0	1	72	5	0	175	670
12:00 PM	1	8	5	0	1	8	9	0	6	67	0	0	3	49	8	0	165	662
12:15 PM	0	7	8	0	2	8	14	0	2	76	1	0	6	75	3	0	202	690
12:30 PM	3	13	3	0	3	11	14	0	7	78	0	0	4	69	3	0	208	750
12:45 PM	0	16	6	0	2	7	7	0	11	86	2	0	3	61	11	0	212	787
1:00 PM	0	17	5	0	4	10	3	0	4	66	0	0	1	67	2	0	179	801
1:15 PM	6	11	3	0	1	16	7	0	9	85	2	0	4	77	3	0	224	823
1:30 PM	3	23	9	0	2	10	10	0	12	79	0	0	7	72	3	0	230	845
1:45 PM	2	14	6	0	1	14	9	0	14	66	2	0	5	69	4	0	206	839
2:00 PM	2	18	8	0	3	26	17	0	16	98	2	0	6	72	4	0	272	932
2:15 PM	1	15	2	0	2	14	18	0	10	89	2	0	2	71	5	0	231	939
2:30 PM	3	8	9	0	0	11	13	0	8	104	0	0	6	56	6	0	224	933
2:45 PM	0	11	6	0	3	13	11	0	3	97	1	0	5	93	5	0	248	975
3:00 PM	1	18	4	0	3	16	10	0	6	114	1	0	10	83	5	0	271	974
3:15 PM	1	10	3	0	4	10	13	0	6	147	0	0	6	112	6	0	318	1061

15-Min Count Period Beginning At	Bakertown Road (Northbound)				Bakertown Road (Southbound)				Schaad Road (Eastbound)				Schaad Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	2	12	7	0	2	15	9	0	11	139	3	0	8	118	10	0	336	1173
3:45 PM	1	8	10	0	8	19	11	0	13	164	1	0	6	104	9	0	354	1279
4:00 PM	0	18	7	0	3	12	10	0	23	169	2	0	4	95	3	0	346	1354
4:15 PM	1	16	7	0	1	14	8	0	17	181	0	0	5	105	5	0	360	1396
4:30 PM	1	11	9	0	6	14	6	0	8	182	1	0	4	120	6	0	368	1428
4:45 PM	2	10	10	0	0	15	9	0	14	211	0	0	3	167	6	0	447	1521
5:00 PM	1	25	8	0	0	13	11	0	18	234	0	0	7	139	9	0	465	1640
5:15 PM	0	17	20	0	0	8	8	0	17	246	1	0	7	133	7	0	464	1744
5:30 PM	0	14	8	0	0	11	14	0	27	200	1	0	8	154	8	0	445	1821
5:45 PM	0	14	6	0	3	13	9	0	17	169	2	0	10	115	9	0	367	1741

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	104	0	0	8	148	116	0	48	428	4	0	24	820	40	0	1744
Heavy Trucks	0	4	0		0	0	0		0	12	0		4	24	0		44
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 2/13/2026 1:21 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

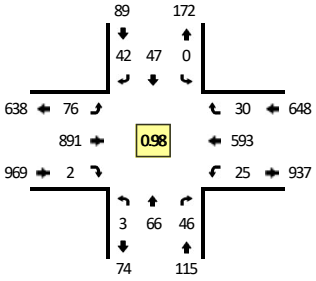
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

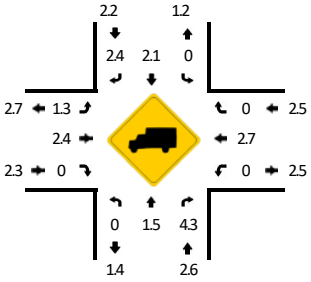
LOCATION: Bakertown Road -- Schaad Road
CITY/STATE: Knoxville, TN

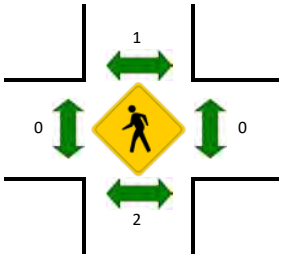
QC JOB #: 17407901
DATE: Wed, Jan 21 2026

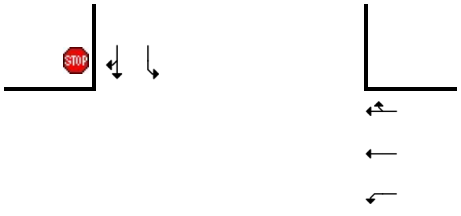
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

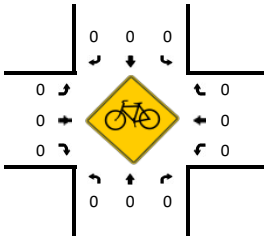


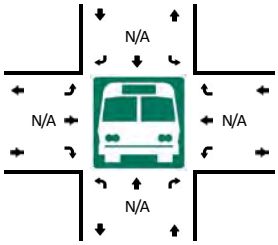
TRUE DATA TO IMPROVE MOBILITY

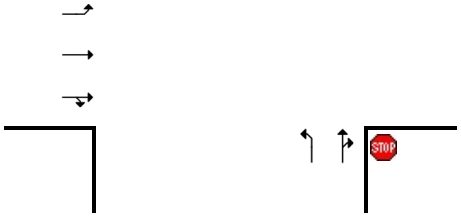


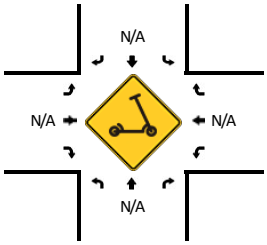












15-Min Count Period Beginning At	Bakertown Road (Northbound)				Bakertown Road (Southbound)				Schaad Road (Eastbound)				Schaad Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	2	3	2	0	1	1	2	0	0	28	0	0	0	38	1	0	78	
6:15 AM	3	3	3	0	2	6	6	0	1	24	0	0	0	63	0	0	111	
6:30 AM	1	5	4	0	0	2	7	0	5	33	0	0	1	76	3	0	137	
6:45 AM	4	13	8	0	1	5	8	0	2	52	0	0	4	88	1	0	186	512
7:00 AM	1	29	4	0	4	10	11	0	9	76	0	0	5	109	5	0	263	697
7:15 AM	1	31	13	0	5	16	11	0	6	86	1	0	6	137	11	0	324	910
7:30 AM	2	30	8	0	9	23	20	0	14	90	2	0	13	162	10	0	383	1156
7:45 AM	1	26	0	0	2	37	29	0	12	107	1	0	6	205	10	0	436	1406
8:00 AM	8	18	2	0	3	35	13	0	9	123	1	0	5	196	4	0	417	1560
8:15 AM	0	10	9	0	7	29	11	0	3	100	1	0	4	192	3	0	369	1605
8:30 AM	2	13	2	0	6	12	19	0	3	93	1	0	6	151	0	0	308	1530
8:45 AM	4	10	5	0	2	15	8	0	5	76	0	0	3	135	1	0	264	1358
9:00 AM	1	8	4	0	2	16	13	0	2	65	0	0	1	87	1	0	200	1141
9:15 AM	0	13	4	0	3	15	8	0	1	69	2	0	7	99	4	0	225	997
9:30 AM	1	8	7	0	4	8	7	0	6	65	0	0	5	111	5	0	227	916
9:45 AM	1	7	3	0	3	4	7	0	7	53	0	0	7	75	1	0	168	820
10:00 AM	1	14	6	1	2	5	3	0	8	53	1	0	3	58	2	0	157	777
10:15 AM	1	8	3	0	1	8	10	0	6	65	2	0	2	60	1	0	167	719
10:30 AM	2	4	7	0	0	8	7	0	6	52	1	0	3	59	5	0	154	646
10:45 AM	2	9	3	0	5	11	7	0	5	48	0	0	4	59	4	0	157	635
11:00 AM	7	10	5	0	1	14	10	0	4	65	0	0	4	53	0	0	173	651
11:15 AM	0	11	8	0	3	5	5	0	8	64	0	0	3	64	3	0	174	658
11:30 AM	2	6	6	0	4	6	6	0	2	51	0	0	4	59	2	0	148	652
11:45 AM	1	4	6	0	3	8	6	0	5	61	3	0	1	72	5	0	175	670
12:00 PM	1	8	5	0	1	8	9	0	6	67	0	0	3	49	8	0	165	662
12:15 PM	0	7	8	0	2	8	14	0	2	76	1	0	6	75	3	0	202	690
12:30 PM	3	13	3	0	3	11	14	0	7	78	0	0	4	69	3	0	208	750
12:45 PM	0	16	6	0	2	7	7	0	11	86	2	0	3	61	11	0	212	787
1:00 PM	0	17	5	0	4	10	3	0	4	66	0	0	1	67	2	0	179	801
1:15 PM	6	11	3	0	1	16	7	0	9	85	2	0	4	77	3	0	224	823
1:30 PM	3	23	9	0	2	10	10	0	12	79	0	0	7	72	3	0	230	845
1:45 PM	2	14	6	0	1	14	9	0	14	66	2	0	5	69	4	0	206	839
2:00 PM	2	18	8	0	3	26	17	0	16	98	2	0	6	72	4	0	272	932
2:15 PM	1	15	2	0	2	14	18	0	10	89	2	0	2	71	5	0	231	939
2:30 PM	3	8	9	0	0	11	13	0	8	104	0	0	6	56	6	0	224	933
2:45 PM	0	11	6	0	3	13	11	0	3	97	1	0	5	93	5	0	248	975
3:00 PM	1	18	4	0	3	16	10	0	6	114	1	0	10	83	5	0	271	974
3:15 PM	1	10	3	0	4	10	13	0	6	147	0	0	6	112	6	0	318	1061

15-Min Count Period Beginning At	Bakertown Road (Northbound)				Bakertown Road (Southbound)				Schaad Road (Eastbound)				Schaad Road (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	2	12	7	0	2	15	9	0	11	139	3	0	8	118	10	0	336	1173
3:45 PM	1	8	10	0	8	19	11	0	13	164	1	0	6	104	9	0	354	1279
4:00 PM	0	18	7	0	3	12	10	0	23	169	2	0	4	95	3	0	346	1354
4:15 PM	1	16	7	0	1	14	8	0	17	181	0	0	5	105	5	0	360	1396
4:30 PM	1	11	9	0	6	14	6	0	8	182	1	0	4	120	6	0	368	1428
4:45 PM	2	10	10	0	0	15	9	0	14	211	0	0	3	167	6	0	447	1521
5:00 PM	1	25	8	0	0	13	11	0	18	234	0	0	7	139	9	0	465	1640
5:15 PM	0	17	20	0	0	8	8	0	17	246	1	0	7	133	7	0	464	1744
5:30 PM	0	14	8	0	0	11	14	0	27	200	1	0	8	154	8	0	445	1821
5:45 PM	0	14	6	0	3	13	9	0	17	169	2	0	10	115	9	0	367	1741

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	100	32	0	0	52	44	0	72	936	0	0	28	556	36	0	1860
Heavy Trucks	0	0	0		0	0	0		0	20	0		0	20	0		40
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 1/27/2026 12:27 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

TDOT TRAFFIC DATA

TDOT Traffic Count Historical Data

Knox County Stations #79, #568, #569, #574, #578

Average Annual Growth, 2019-2024: 4.5% Per Year

	Station #79	Station #568	Station #569	Station #574	Station #578	Total	Average Per Year
2024	6,957	1,640	4,002	3,815	9,750	26,164	
							14.6%
2023	7,912	1,389	3,531	2,866	7,134	22,832	
							14.6%
2022	7,632	1,400	2,730	2,227	5,932	19,921	
							-6.6%
2021	7,173	1,416	3,485	2,252	7,000	21,326	
							2.1%
2020	7,147	1,349	3,513	2,360	6,524	20,893	
							-2.3%
2019	7,752	1,366	3,547	2,298	6,421	21,384	

APPENDIX B

TRAFFIC ANALYSES

EXISTING TRAFFIC CONDITIONS (2026)

AM PEAK

Intersection	
Int Delay, s/veh	5.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	28	175	292	57	123
Future Vol, veh/h	172	28	175	292	57	123
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	189	31	192	321	63	135

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	220	0	910	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	705	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1344	-	304	834
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	488	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1344	-	251	834
Mov Cap-2 Maneuver	-	-	-	-	251	-
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	403	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.05	17.65
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	480	-	-	675	-
HCM Lane V/C Ratio	0.412	-	-	0.143	-
HCM Ctrl Dly (s/v)	17.6	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2	-	-	0.5	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	420	5	28	755	27	11	84	19	21	124	73
Future Vol, veh/h	38	420	5	28	755	27	11	84	19	21	124	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	125	-	-	100	-	-
Veh in Median Storage, #		0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	5	3	3	5	3	3	3	3	3	3	3
Mvmt Flow	41	457	5	30	821	29	12	91	21	23	135	79

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	850	0	0	462	0	0	1080	1453	231	1253	1441	425
Stage 1	-	-	-	-	-	-	542	542	-	896	896	-
Stage 2	-	-	-	-	-	-	539	911	-	357	545	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	778	-	-	1088	-	-	171	128	768	128	~ 130	575
Stage 1	-	-	-	-	-	-	490	516	-	299	355	-
Stage 2	-	-	-	-	-	-	492	349	-	631	515	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	778	-	-	1088	-	-	60	118	768	69	~ 120	575
Mov Cap-2 Maneuver	-	-	-	-	-	-	154	218	-	190	232	-
Stage 1	-	-	-	-	-	-	464	489	-	291	345	-
Stage 2	-	-	-	-	-	-	251	339	-	473	487	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.81	0.29	30.32	41.06
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	154	251	778	-	-	1088	-	-	190	298
HCM Lane V/C Ratio	0.077	0.445	0.053	-	-	0.028	-	-	0.12	0.718
HCM Ctrl Dly (s/v)	30.3	30.3	9.9	-	-	8.4	-	-	26.5	42.6
HCM Lane LOS	D	D	A	-	-	A	-	-	D	E
HCM 95th %tile Q(veh)	0.2	2.1	0.2	-	-	0.1	-	-	0.4	5.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s
+: Computation Not Defined *: All major volume in platoon

Intersection												
Int Delay, s/veh	9.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	112	52	71	163	11	40	116	60	6	123	8
Future Vol, veh/h	6	112	52	71	163	11	40	116	60	6	123	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	7	122	57	77	177	12	43	126	65	7	134	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	178	0	0	561	507	150	535	529	183
Stage 1	-	-	-	-	-	-	163	163	-	337	337	-
Stage 2	-	-	-	-	-	-	398	343	-	198	191	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1379	-	-	1392	-	-	436	467	894	454	454	857
Stage 1	-	-	-	-	-	-	837	761	-	675	639	-
Stage 2	-	-	-	-	-	-	626	635	-	802	740	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1379	-	-	1392	-	-	282	436	894	285	423	857
Mov Cap-2 Maneuver	-	-	-	-	-	-	282	436	-	285	423	-
Stage 1	-	-	-	-	-	-	832	757	-	633	599	-
Stage 2	-	-	-	-	-	-	451	596	-	616	736	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.27	2.24	21.07	17.88
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	455	60	-	-	515	-	-	427
HCM Lane V/C Ratio	0.516	0.005	-	-	0.055	-	-	0.349
HCM Ctrl Dly (s/v)	21.1	7.6	0	-	7.7	0	-	17.9
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	2.9	0	-	-	0.2	-	-	1.5

EXISTING TRAFFIC CONDITIONS (2026)

PM PEAK

Intersection	
Int Delay, s/veh	4.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	242	8	79	122	37	149
Future Vol, veh/h	242	8	79	122	37	149
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	272	9	89	137	42	167

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	281	0	591	276
Stage 1	-	-	-	-	276	-
Stage 2	-	-	-	-	315	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1276	-	468	760
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	738	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1276	-	433	760
Mov Cap-2 Maneuver	-	-	-	-	433	-
Stage 1	-	-	-	-	768	-
Stage 2	-	-	-	-	682	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.16	12.95
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	661	-	-	707	-
HCM Lane V/C Ratio	0.316	-	-	0.07	-
HCM Ctrl Dly (s/v)	13	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.2	-

Intersection												
Int Delay, s/veh	3.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	76	891	2	25	593	30	3	66	46	1	47	42
Future Vol, veh/h	76	891	2	25	593	30	3	66	46	1	47	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	125	-	-	100	-	-
Veh in Median Storage, #		0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	3	5	3	3	5	3	3	3	3	3	3	3
Mvmt Flow	78	909	2	26	605	31	3	67	47	1	48	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	636	0	0	911	0	0	1443	1752	456	1315	1738	318
Stage 1	-	-	-	-	-	-	1065	1065	-	671	671	-
Stage 2	-	-	-	-	-	-	378	687	-	643	1066	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	937	-	-	737	-	-	92	84	549	115	85	675
Stage 1	-	-	-	-	-	-	236	295	-	410	450	-
Stage 2	-	-	-	-	-	-	613	443	-	426	295	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	937	-	-	737	-	-	57	74	549	59	76	675
Mov Cap-2 Maneuver	-	-	-	-	-	-	153	172	-	162	174	-
Stage 1	-	-	-	-	-	-	216	271	-	395	435	-
Stage 2	-	-	-	-	-	-	493	428	-	268	270	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.72	0.39	32.8	25.2
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	153	240	937	-	-	737	-	-	162	268
HCM Lane V/C Ratio	0.02	0.476	0.083	-	-	0.035	-	-	0.006	0.339
HCM Ctrl Dly (s/v)	29	32.9	9.2	-	-	10.1	-	-	27.3	25.2
HCM Lane LOS	D	D	A	-	-	B	-	-	D	D
HCM 95th %tile Q(veh)	0.1	2.4	0.3	-	-	0.1	-	-	0	1.4

Intersection												
Int Delay, s/veh	7.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	142	60	53	119	10	36	98	75	2	66	3
Future Vol, veh/h	5	142	60	53	119	10	36	98	75	2	66	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	5	151	64	56	127	11	38	104	80	2	70	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	137	0	0	215	0	0	468	444	183	459	470	132
Stage 1	-	-	-	-	-	-	194	194	-	245	245	-
Stage 2	-	-	-	-	-	-	274	250	-	214	226	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1440	-	-	1349	-	-	504	507	857	511	490	915
Stage 1	-	-	-	-	-	-	806	738	-	757	702	-
Stage 2	-	-	-	-	-	-	729	698	-	786	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1349	-	-	408	482	857	349	466	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	408	482	-	349	466	-
Stage 1	-	-	-	-	-	-	802	735	-	722	670	-
Stage 2	-	-	-	-	-	-	621	666	-	609	712	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.18	2.27	15.87	14.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	551	41	-	-	516	-	-	471
HCM Lane V/C Ratio	0.403	0.004	-	-	0.042	-	-	0.16
HCM Ctrl Dly (s/v)	15.9	7.5	0	-	7.8	0	-	14.1
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.9	0	-	-	0.1	-	-	0.6

BACKGROUND TRAFFIC CONDITIONS (2030)

AM PEAK

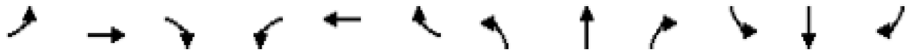
Intersection	
Int Delay, s/veh	9.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	203	43	217	345	77	155
Future Vol, veh/h	203	43	217	345	77	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	223	47	238	379	85	170

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	1103	247
Stage 1	-	-	-	-	247	-
Stage 2	-	-	-	-	856	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1287	-	233	790
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	415	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1287	-	178	790
Mov Cap-2 Maneuver	-	-	-	-	178	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	317	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.26	33.87
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	369	-	-	695	-
HCM Lane V/C Ratio	0.69	-	-	0.185	-
HCM Ctrl Dly (s/v)	33.9	-	-	8.4	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	5	-	-	0.7	-



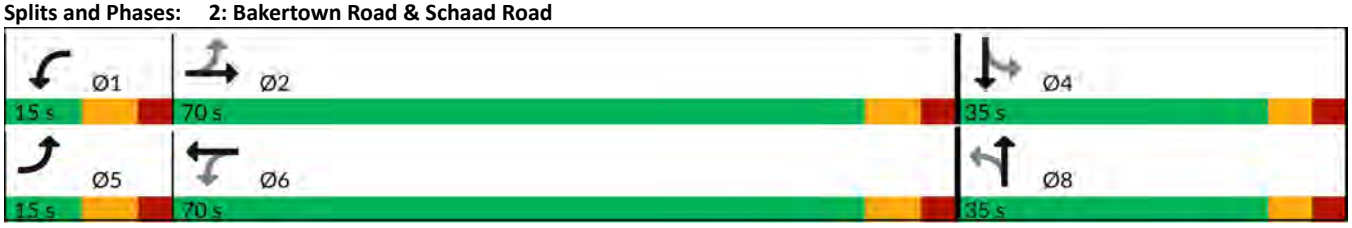
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	497	12	33	901	52	15	109	22	98	156	120
Future Volume (vph)	118	497	12	33	901	52	15	109	22	98	156	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	125		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.992			0.975			0.935	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3426	0	1752	3414	0	1752	1799	0	1752	1725	0
Flt Permitted	0.159			0.445			0.382			0.666		
Satd. Flow (perm)	293	3426	0	821	3414	0	705	1799	0	1229	1725	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			7			8			30	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		750			1000			1420			930	
Travel Time (s)		11.4			15.2			32.3			21.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	3%	3%	5%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	128	540	13	36	979	57	16	118	24	107	170	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	553	0	36	1036	0	16	142	0	107	300	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	50	50		50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	30.0		15.0	30.0		34.0	34.0		34.0	34.0	
Total Split (s)	15.0	70.0		15.0	70.0		35.0	35.0		35.0	35.0	
Total Split (%)	12.5%	58.3%		12.5%	58.3%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	7.0	62.0		7.0	62.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

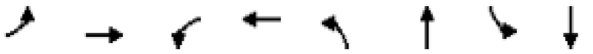
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.0	8.0		8.0	8.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		15.0			15.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	43.1	39.3		38.2	31.8		18.3	18.3		18.3	18.3	
Actuated g/C Ratio	0.53	0.49		0.47	0.39		0.23	0.23		0.23	0.23	
v/c Ratio	0.45	0.33		0.08	0.77		0.10	0.35		0.39	0.73	
Control Delay (s/veh)	14.3	15.8		9.0	25.9		28.5	28.4		32.6	38.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.3	15.8		9.0	25.9		28.5	28.4		32.6	38.1	
LOS	B	B		A	C		C	C		C	D	
Approach Delay (s/veh)		15.5			25.3			28.4			36.6	
Approach LOS		B			C			C			D	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 81			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay (s/veh): 24.6		Intersection LOS: C	
Intersection Capacity Utilization 77.8%		ICU Level of Service D	
Analysis Period (min) 15			

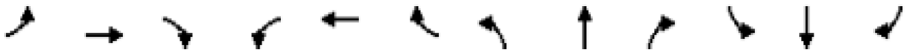
Splits and Phases: 2: Bakertown Road & Schaad Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	128	553	36	1036	16	142	107	300
v/c Ratio	0.45	0.33	0.08	0.77	0.10	0.35	0.39	0.73
Control Delay (s/veh)	14.3	15.8	9.0	25.9	28.5	28.4	32.6	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.3	15.8	9.0	25.9	28.5	28.4	32.6	38.1
Queue Length 50th (ft)	26	98	7	226	6	56	45	125
Queue Length 95th (ft)	63	167	23	356	25	121	104	243
Internal Link Dist (ft)		670		920		1340		850
Turn Bay Length (ft)	150		150		125		100	
Base Capacity (vph)	285	2701	478	2692	251	646	437	633
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.20	0.08	0.38	0.06	0.22	0.24	0.47

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	497	12	33	901	52	15	109	22	98	156	120
Future Volume (veh/h)	118	497	12	33	901	52	15	109	22	98	156	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1826	1856	1856	1826	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	128	540	13	36	979	57	16	118	24	107	170	130
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	5	3	3	5	3	3	3	3	3	3	3
Cap, veh/h	284	1374	33	416	1216	71	166	327	67	297	213	163
Arrive On Green	0.07	0.40	0.40	0.04	0.36	0.36	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1767	3462	83	1767	3332	194	1071	1496	304	1237	975	746
Grp Volume(v), veh/h	128	270	283	36	510	526	16	0	142	107	0	300
Grp Sat Flow(s),veh/h/ln	1767	1735	1811	1767	1735	1791	1071	0	1801	1237	0	1721
Q Serve(g_s), s	2.9	7.4	7.4	0.8	17.5	17.5	0.9	0.0	4.4	5.3	0.0	10.9
Cycle Q Clear(g_c), s	2.9	7.4	7.4	0.8	17.5	17.5	11.8	0.0	4.4	9.7	0.0	10.9
Prop In Lane	1.00		0.05	1.00		0.11	1.00		0.17	1.00		0.43
Lane Grp Cap(c), veh/h	284	688	719	416	633	654	166	0	394	297	0	376
V/C Ratio(X)	0.45	0.39	0.39	0.09	0.81	0.81	0.10	0.00	0.36	0.36	0.00	0.80
Avail Cap(c_a), veh/h	350	1627	1699	538	1627	1680	386	0	763	550	0	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.5	14.2	14.2	12.3	18.9	18.9	30.0	0.0	21.9	26.0	0.0	24.4
Incr Delay (d2), s/veh	1.1	0.4	0.4	0.1	2.5	2.4	0.2	0.0	0.6	0.7	0.0	3.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.5	2.6	0.3	6.3	6.5	0.2	0.0	1.8	1.5	0.0	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	15.6	14.6	14.6	12.4	21.3	21.3	30.3	0.0	22.5	26.8	0.0	28.3
LnGrp LOS	B	B	B	B	C	C	C		C	C		C
Approach Vol, veh/h		681			1072			158			407	
Approach Delay, s/veh		14.8			21.0			23.3			27.9	
Approach LOS		B			C			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	34.2		21.4	12.5	32.1		21.4				
Change Period (Y+Rc), s	8.0	8.0		7.0	8.0	8.0		7.0				
Max Green Setting (Gmax), s	7.0	62.0		28.0	7.0	62.0		28.0				
Max Q Clear Time (g_c+I1), s	2.8	9.4		12.9	4.9	19.5		13.8				
Green Ext Time (p_c), s	0.0	2.1		1.5	0.1	4.6		0.5				

Intersection Summary	
HCM 7th Control Delay, s/veh	20.5
HCM 7th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	17.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	132	61	84	192	13	47	149	71	7	161	9
Future Vol, veh/h	7	132	61	84	192	13	47	149	71	7	161	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	150	-	150	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	8	143	66	91	209	14	51	162	77	8	175	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	223	0	0	210	0	0	671	597	177	631	616	209
Stage 1	-	-	-	-	-	-	192	192	-	391	391	-
Stage 2	-	-	-	-	-	-	479	405	-	240	225	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1340	-	-	1355	-	-	369	415	864	392	405	829
Stage 1	-	-	-	-	-	-	808	740	-	631	605	-
Stage 2	-	-	-	-	-	-	566	597	-	761	716	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1340	-	-	1355	-	-	187	385	864	198	375	829
Mov Cap-2 Maneuver	-	-	-	-	-	-	187	385	-	198	375	-
Stage 1	-	-	-	-	-	-	803	736	-	589	564	-
Stage 2	-	-	-	-	-	-	360	556	-	538	712	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.27	2.28	42.24	24.56
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	370	1340	-	-	1355	-	-	372
HCM Lane V/C Ratio	0.784	0.006	-	-	0.067	-	-	0.517
HCM Ctrl Dly (s/v)	42.2	7.7	-	-	7.8	-	-	24.6
HCM Lane LOS	E	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	6.6	0	-	-	0.2	-	-	2.8

Intersection	
Intersection Delay, s/veh	14.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	132	61	84	192	13	47	149	71	7	161	9
Future Vol, veh/h	7	132	61	84	192	13	47	149	71	7	161	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	8	143	66	91	209	14	51	162	77	8	175	10
Number of Lanes	1	1	0	1	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	3	2
HCM Control Delay, s/veh	14.6	12.8	16.5	13.5
HCM LOS	B	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	18%	100%	0%	100%	0%	0%	4%
Vol Thru, %	56%	0%	68%	0%	100%	0%	91%
Vol Right, %	27%	0%	32%	0%	0%	100%	5%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	267	7	193	84	192	13	177
LT Vol	47	7	0	84	0	0	7
Through Vol	149	0	132	0	192	0	161
RT Vol	71	0	61	0	0	13	9
Lane Flow Rate	290	8	210	91	209	14	192
Geometry Grp	5	6	6	5	5	5	5
Degree of Util (X)	0.53	0.016	0.411	0.182	0.387	0.023	0.365
Departure Headway (Hd)	6.58	7.801	7.059	7.19	6.679	5.98	6.838
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	551	459	510	499	538	600	527
Service Time	4.28	5.542	4.8	4.926	4.414	3.698	4.574
HCM Lane V/C Ratio	0.526	0.017	0.412	0.182	0.388	0.023	0.364
HCM Control Delay, s/veh	16.5	10.7	14.7	11.5	13.6	8.8	13.5
HCM Lane LOS	C	B	B	B	B	A	B
HCM 95th-tile Q	3.1	0	2	0.7	1.8	0.1	1.7

BACKGROUND TRAFFIC CONDITIONS (2030)

PM PEAK

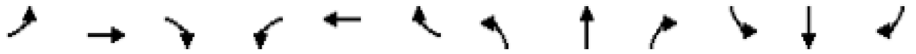
Intersection	
Int Delay, s/veh	6.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	286	18	102	144	53	185
Future Vol, veh/h	286	18	102	144	53	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	321	20	115	162	60	208

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	342	0	722	331
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	391	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1212	-	392	708
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	681	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1212	-	351	708
Mov Cap-2 Maneuver	-	-	-	-	351	-
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	610	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.43	16.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	577	-	-	746	-
HCM Lane V/C Ratio	0.463	-	-	0.095	-
HCM Ctrl Dly (s/v)	16.5	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0.3	-



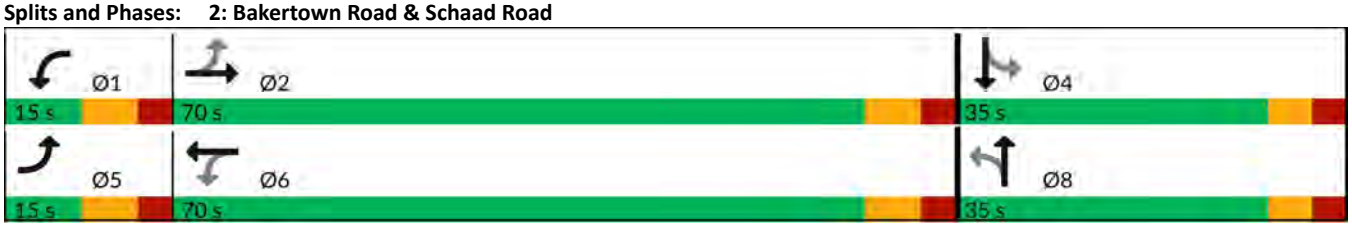
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	1048	7	30	741	53	10	87	54	69	64	82
Future Volume (vph)	158	1048	7	30	741	53	10	87	54	69	64	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	125		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.990			0.943			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3435	0	1752	3408	0	1752	1740	0	1752	1688	0
Flt Permitted	0.248			0.237			0.662			0.665		
Satd. Flow (perm)	457	3435	0	437	3408	0	1221	1740	0	1227	1688	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			9			24			51	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		750			1000			1420			930	
Travel Time (s)		11.4			15.2			32.3			21.1	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	5%	3%	3%	5%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	161	1069	7	31	756	54	10	89	55	70	65	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	161	1076	0	31	810	0	10	144	0	70	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	50	50		50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	30.0		15.0	30.0		34.0	34.0		34.0	34.0	
Total Split (s)	15.0	70.0		15.0	70.0		35.0	35.0		35.0	35.0	
Total Split (%)	12.5%	58.3%		12.5%	58.3%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	7.0	62.0		7.0	62.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

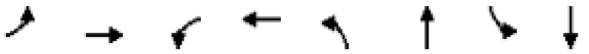
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.0	8.0		8.0	8.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		15.0			15.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	37.1	34.8		30.2	24.0		10.6	10.6		10.6	10.6	
Actuated g/C Ratio	0.56	0.53		0.46	0.37		0.16	0.16		0.16	0.16	
v/c Ratio	0.40	0.59		0.10	0.65		0.05	0.48		0.36	0.47	
Control Delay (s/veh)	9.4	14.2		6.7	19.3		27.7	28.9		32.8	24.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	9.4	14.2		6.7	19.3		27.7	28.9		32.8	24.4	
LOS	A	B		A	B		C	C		C	C	
Approach Delay (s/veh)		13.5			18.8			28.8			27.1	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 65.7			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay (s/veh): 17.5		Intersection LOS: B	
Intersection Capacity Utilization 70.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Bakertown Road & Schaad Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	161	1076	31	810	10	144	70	149
v/c Ratio	0.40	0.59	0.10	0.65	0.05	0.48	0.36	0.47
Control Delay (s/veh)	9.4	14.2	6.7	19.3	27.7	28.9	32.8	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	9.4	14.2	6.7	19.3	27.7	28.9	32.8	24.4
Queue Length 50th (ft)	24	111	4	132	3	40	23	32
Queue Length 95th (ft)	55	297	15	205	18	113	72	102
Internal Link Dist (ft)		670		920		1340		850
Turn Bay Length (ft)	150		150		125		100	
Base Capacity (vph)	401	3125	353	3101	539	782	542	774
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.34	0.09	0.26	0.02	0.18	0.13	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	1048	7	30	741	53	10	87	54	69	64	82
Future Volume (veh/h)	158	1048	7	30	741	53	10	87	54	69	64	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1826	1856	1856	1826	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	161	1069	7	31	756	54	10	89	55	70	65	84
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	3	3	5	3	3	3	3	3	3	3
Cap, veh/h	369	1365	9	249	1094	78	246	190	117	253	130	168
Arrive On Green	0.09	0.39	0.39	0.03	0.33	0.33	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1767	3533	23	1767	3284	234	1229	1073	663	1234	735	950
Grp Volume(v), veh/h	161	525	551	31	399	411	10	0	144	70	0	149
Grp Sat Flow(s),veh/h/ln	1767	1735	1822	1767	1735	1784	1229	0	1736	1234	0	1685
Q Serve(g_s), s	3.3	15.2	15.2	0.6	11.4	11.4	0.4	0.0	4.3	3.1	0.0	4.6
Cycle Q Clear(g_c), s	3.3	15.2	15.2	0.6	11.4	11.4	5.0	0.0	4.3	7.3	0.0	4.6
Prop In Lane	1.00		0.01	1.00		0.13	1.00		0.38	1.00		0.56
Lane Grp Cap(c), veh/h	369	670	704	249	578	594	246	0	308	253	0	298
V/C Ratio(X)	0.44	0.78	0.78	0.12	0.69	0.69	0.04	0.00	0.47	0.28	0.00	0.50
Avail Cap(c_a), veh/h	432	1882	1976	405	1882	1935	630	0	851	639	0	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.1	15.4	15.4	13.0	16.5	16.5	23.5	0.0	21.1	24.4	0.0	21.2
Incr Delay (d2), s/veh	0.8	2.1	2.0	0.2	1.5	1.4	0.1	0.0	1.1	0.6	0.0	1.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	5.0	5.3	0.2	3.9	4.0	0.1	0.0	1.7	0.9	0.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.9	17.5	17.4	13.2	18.0	18.0	23.5	0.0	22.2	25.0	0.0	22.5
LnGrp LOS	B	B	B	B	B	B	C		C	C		C
Approach Vol, veh/h		1237			841			154			219	
Approach Delay, s/veh		16.8			17.8			22.3			23.3	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.9	30.1		17.1	13.0	27.0		17.1				
Change Period (Y+Rc), s	8.0	8.0		7.0	8.0	8.0		7.0				
Max Green Setting (Gmax), s	7.0	62.0		28.0	7.0	62.0		28.0				
Max Q Clear Time (g_c+I1), s	2.6	17.2		9.3	5.3	13.4		7.0				
Green Ext Time (p_c), s	0.0	4.9		0.8	0.1	3.4		0.5				

Intersection Summary

HCM 7th Control Delay, s/veh	18.1
HCM 7th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	9.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	168	71	63	140	12	42	131	89	2	92	4
Future Vol, veh/h	6	168	71	63	140	12	42	131	89	2	92	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	150	-	150	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	179	76	67	149	13	45	139	95	2	98	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	162	0	0	254	0	0	561	525	216	544	550	149
Stage 1	-	-	-	-	-	-	229	229	-	283	283	-
Stage 2	-	-	-	-	-	-	332	296	-	261	267	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1411	-	-	1305	-	-	437	456	821	448	441	895
Stage 1	-	-	-	-	-	-	771	713	-	722	675	-
Stage 2	-	-	-	-	-	-	679	667	-	742	686	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1411	-	-	1305	-	-	318	431	821	258	417	895
Mov Cap-2 Maneuver	-	-	-	-	-	-	318	431	-	258	417	-
Stage 1	-	-	-	-	-	-	768	709	-	685	641	-
Stage 2	-	-	-	-	-	-	543	632	-	525	683	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.19	2.32	22.28	16.35
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	481	1411	-	-	1305	-	-	421
HCM Lane V/C Ratio	0.579	0.005	-	-	0.051	-	-	0.248
HCM Ctrl Dly (s/v)	22.3	7.6	-	-	7.9	-	-	16.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	3.6	0	-	-	0.2	-	-	1

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	168	71	63	140	12	42	131	89	2	92	4
Future Vol, veh/h	6	168	71	63	140	12	42	131	89	2	92	4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	6	179	76	67	149	13	45	139	95	2	98	4
Number of Lanes	1	1	0	1	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	3	2
HCM Control Delay, s/veh	13.9	10.7	13.9	10.7
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	16%	100%	0%	100%	0%	0%	2%
Vol Thru, %	50%	0%	70%	0%	100%	0%	94%
Vol Right, %	34%	0%	30%	0%	0%	100%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	262	6	239	63	140	12	98
LT Vol	42	6	0	63	0	0	2
Through Vol	131	0	168	0	140	0	92
RT Vol	89	0	71	0	0	12	4
Lane Flow Rate	279	6	254	67	149	13	104
Geometry Grp	5	6	6	5	5	5	5
Degree of Util (X)	0.465	0.012	0.444	0.125	0.256	0.019	0.187
Departure Headway (Hd)	6.01	7.003	6.281	6.707	6.198	5.486	6.468
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	599	510	572	533	578	650	553
Service Time	3.76	4.761	4.038	4.463	3.953	3.241	4.232
HCM Lane V/C Ratio	0.466	0.012	0.444	0.126	0.258	0.02	0.188
HCM Control Delay, s/veh	13.9	9.8	14	10.4	11.1	8.3	10.7
HCM Lane LOS	B	A	B	B	B	A	B
HCM 95th-tile Q	2.5	0	2.3	0.4	1	0.1	0.7

PROJECTED TRAFFIC CONDITIONS (2030)

AM PEAK

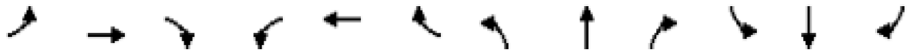
Intersection	
Int Delay, s/veh	11.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	203	50	224	345	83	161
Future Vol, veh/h	203	50	224	345	83	161
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	223	55	246	379	91	177

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	278	0	1122	251
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	871	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1279	-	227	786
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	408	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1279	-	171	786
Mov Cap-2 Maneuver	-	-	-	-	171	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	308	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.34	40.81
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	354	-	-	709	-
HCM Lane V/C Ratio	0.757	-	-	0.192	-
HCM Ctrl Dly (s/v)	40.8	-	-	8.5	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	6	-	-	0.7	-



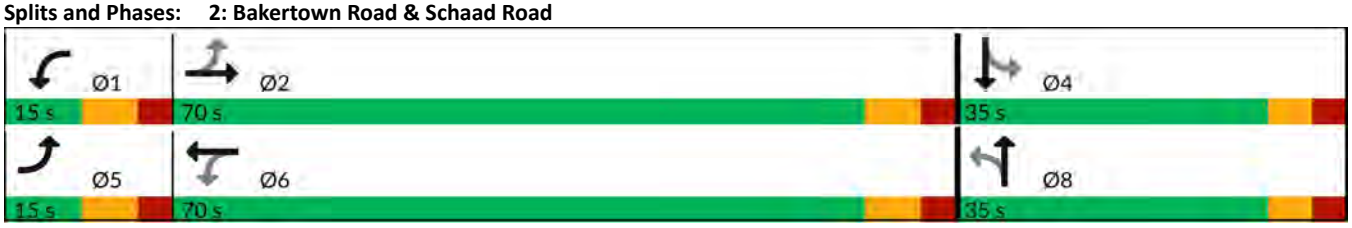
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	550	19	51	883	54	81	120	22	106	163	120
Future Volume (vph)	118	550	19	51	883	54	81	120	22	106	163	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	125		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.991			0.977			0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3423	0	1752	3411	0	1752	1802	0	1752	1727	0
Flt Permitted	0.164			0.414			0.386			0.659		
Satd. Flow (perm)	303	3423	0	764	3411	0	712	1802	0	1216	1727	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			8			7			29	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		750			525			360			930	
Travel Time (s)		11.4			8.0			8.2			21.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	3%	3%	5%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	128	598	21	55	960	59	88	130	24	115	177	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	619	0	55	1019	0	88	154	0	115	307	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	50	50		50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	30.0		15.0	30.0		34.0	34.0		34.0	34.0	
Total Split (s)	15.0	70.0		15.0	70.0		35.0	35.0		35.0	35.0	
Total Split (%)	12.5%	58.3%		12.5%	58.3%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	7.0	62.0		7.0	62.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

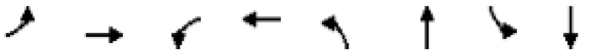
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.0	8.0		8.0	8.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		15.0			15.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	41.0	35.6		38.0	31.4		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.51	0.44		0.47	0.39		0.23	0.23		0.23	0.23	
v/c Ratio	0.45	0.41		0.13	0.77		0.54	0.37		0.41	0.73	
Control Delay (s/veh)	14.7	18.2		9.5	26.0		42.3	28.7		32.8	38.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	14.7	18.2		9.5	26.0		42.3	28.7		32.8	38.0	
LOS	B	B		A	C		D	C		C	D	
Approach Delay (s/veh)		17.6			25.2			33.7			36.5	
Approach LOS		B			C			C			D	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 81			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay (s/veh): 25.6		Intersection LOS: C	
Intersection Capacity Utilization 78.1%		ICU Level of Service D	
Analysis Period (min) 15			

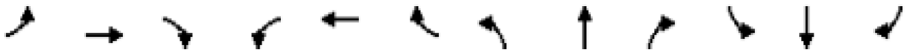
Splits and Phases: 2: Bakertown Road & Schaad Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	128	619	55	1019	88	154	115	307
v/c Ratio	0.45	0.41	0.13	0.77	0.54	0.37	0.41	0.73
Control Delay (s/veh)	14.7	18.2	9.5	26.0	42.3	28.7	32.8	38.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.7	18.2	9.5	26.0	42.3	28.7	32.8	38.0
Queue Length 50th (ft)	26	115	11	223	39	62	49	129
Queue Length 95th (ft)	63	190	32	349	97	130	110	247
Internal Link Dist (ft)		670		445		280		850
Turn Bay Length (ft)	150		150		125		100	
Base Capacity (vph)	282	2697	452	2689	253	645	432	633
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.23	0.12	0.38	0.35	0.24	0.27	0.48

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	550	19	51	883	54	81	120	22	106	163	120
Future Volume (veh/h)	118	550	19	51	883	54	81	120	22	106	163	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1826	1856	1856	1826	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	128	598	21	55	960	59	88	130	24	115	177	130
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	5	3	3	5	3	3	3	3	3	3	3
Cap, veh/h	264	1277	45	369	1167	72	219	415	77	347	271	199
Arrive On Green	0.07	0.37	0.37	0.05	0.35	0.35	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	1767	3419	120	1767	3320	204	1064	1524	281	1223	994	730
Grp Volume(v), veh/h	128	303	316	55	502	517	88	0	154	115	0	307
Grp Sat Flow(s),veh/h/ln	1767	1735	1804	1767	1735	1789	1064	0	1805	1223	0	1724
Q Serve(g_s), s	3.4	9.9	9.9	1.4	19.7	19.7	6.0	0.0	5.1	6.2	0.0	11.8
Cycle Q Clear(g_c), s	3.4	9.9	9.9	1.4	19.7	19.7	17.7	0.0	5.1	11.2	0.0	11.8
Prop In Lane	1.00		0.07	1.00		0.11	1.00		0.16	1.00		0.42
Lane Grp Cap(c), veh/h	264	648	674	369	610	629	219	0	492	347	0	470
V/C Ratio(X)	0.48	0.47	0.47	0.15	0.82	0.82	0.40	0.00	0.31	0.33	0.00	0.65
Avail Cap(c_a), veh/h	310	1441	1499	454	1441	1487	328	0	677	472	0	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.0	17.7	17.7	14.5	22.1	22.1	31.9	0.0	21.6	26.0	0.0	24.0
Incr Delay (d2), s/veh	1.4	0.5	0.5	0.2	2.9	2.8	1.2	0.0	0.4	0.6	0.0	1.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	3.6	3.7	0.5	7.4	7.7	1.6	0.0	2.1	1.8	0.0	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	18.3	18.3	18.3	14.7	24.9	24.9	33.0	0.0	21.9	26.6	0.0	25.6
LnGrp LOS	B	B	B	B	C	C	C		C	C		C
Approach Vol, veh/h		747			1074			242			422	
Approach Delay, s/veh		18.3			24.4			26.0			25.8	
Approach LOS		B			C			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	35.9		27.3	13.1	34.2		27.3				
Change Period (Y+Rc), s	8.0	8.0		7.0	8.0	8.0		7.0				
Max Green Setting (Gmax), s	7.0	62.0		28.0	7.0	62.0		28.0				
Max Q Clear Time (g_c+I1), s	3.4	11.9		13.8	5.4	21.7		19.7				
Green Ext Time (p_c), s	0.0	2.4		1.6	0.1	4.5		0.6				

Intersection Summary	
HCM 7th Control Delay, s/veh	22.9
HCM 7th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	77	148	20	32	202
Future Vol, veh/h	18	77	148	20	32	202
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	21	89	170	23	37	232

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	487	182	0	0	193	0
Stage 1	182	-	-	-	-	-
Stage 2	306	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	538	858	-	-	1374	-
Stage 1	847	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	521	858	-	-	1374	-
Mov Cap-2 Maneuver	521	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.15	0	1.05
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	521	858	246	-
HCM Lane V/C Ratio	-	-	0.04	0.103	0.027	-
HCM Ctrl Dly (s/v)	-	-	12.2	9.7	7.7	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	8	160	16	7	213
Future Vol, veh/h	13	8	160	16	7	213
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	15	9	184	18	8	245

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	454	193	0	0	202	0
Stage 1	193	-	-	-	-	-
Stage 2	261	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	562	846	-	-	1364	-
Stage 1	837	-	-	-	-	-
Stage 2	780	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	558	846	-	-	1364	-
Mov Cap-2 Maneuver	558	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	775	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.74	0	0.24
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	558	846	57	-
HCM Lane V/C Ratio	-	-	0.027	0.011	0.006	-
HCM Ctrl Dly (s/v)	-	-	11.6	9.3	7.7	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	2	174	3	3	225
Future Vol, veh/h	2	2	174	3	3	225
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	2	2	200	3	3	259

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	467	202	0	0	203	0
Stage 1	202	-	-	-	-	-
Stage 2	266	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	552	837	-	-	1362	-
Stage 1	830	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	551	837	-	-	1362	-
Mov Cap-2 Maneuver	551	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	774	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.46	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	664	24	-
HCM Lane V/C Ratio	-	-	0.007	0.003	-
HCM Ctrl Dly (s/v)	-	-	10.5	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection												
Int Delay, s/veh	23.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	132	61	84	192	20	47	164	71	13	174	15
Future Vol, veh/h	14	132	61	84	192	20	47	164	71	13	174	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	150	-	150	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	15	143	66	91	209	22	51	178	77	14	189	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	230	0	0	210	0	0	693	620	177	654	632	209
Stage 1	-	-	-	-	-	-	207	207	-	391	391	-
Stage 2	-	-	-	-	-	-	486	413	-	263	240	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1332	-	-	1355	-	-	356	403	864	378	396	829
Stage 1	-	-	-	-	-	-	793	729	-	631	605	-
Stage 2	-	-	-	-	-	-	561	592	-	740	705	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1332	-	-	1355	-	-	162	371	864	171	366	829
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	371	-	171	366	-
Stage 1	-	-	-	-	-	-	784	720	-	589	564	-
Stage 2	-	-	-	-	-	-	341	552	-	501	697	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.52	2.23	58.87	30.34
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	346	1332	-	-	1355	-	-	354
HCM Lane V/C Ratio	0.885	0.011	-	-	0.067	-	-	0.619
HCM Ctrl Dly (s/v)	58.9	7.7	-	-	7.8	-	-	30.3
HCM Lane LOS	F	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	8.5	0	-	-	0.2	-	-	4

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	132	61	84	192	20	47	164	71	13	174	15
Future Vol, veh/h	14	132	61	84	192	20	47	164	71	13	174	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	15	143	66	91	209	22	51	178	77	14	189	16
Number of Lanes	1	1	0	1	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	3	2
HCM Control Delay, s/veh	15.1	13.2	18.1	14.8
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	17%	100%	0%	100%	0%	0%	6%
Vol Thru, %	58%	0%	68%	0%	100%	0%	86%
Vol Right, %	25%	0%	32%	0%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	282	14	193	84	192	20	202
LT Vol	47	14	0	84	0	0	13
Through Vol	164	0	132	0	192	0	174
RT Vol	71	0	61	0	0	20	15
Lane Flow Rate	307	15	210	91	209	22	220
Geometry Grp	5	6	6	5	5	5	5
Degree of Util (X)	0.572	0.034	0.426	0.188	0.401	0.037	0.426
Departure Headway (Hd)	6.72	8.054	7.309	7.423	6.911	6.193	6.982
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	536	445	493	483	520	577	516
Service Time	4.462	5.804	5.059	5.169	4.656	3.938	4.727
HCM Lane V/C Ratio	0.573	0.034	0.426	0.188	0.402	0.038	0.426
HCM Control Delay, s/veh	18.1	11.1	15.4	11.9	14.2	9.2	14.8
HCM Lane LOS	C	B	C	B	B	A	B
HCM 95th-tile Q	3.6	0.1	2.1	0.7	1.9	0.1	2.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	81	0	1003	0	54
Future Vol, veh/h	596	81	0	1003	0	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	627	85	0	1056	0	57

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	356
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	-	-	0	-	0	637
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	637
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	637	-	-	-
HCM Lane V/C Ratio	0.089	-	-	-
HCM Ctrl Dly (s/v)	11.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	81	0	1003	0	54
Future Vol, veh/h	596	81	0	1003	0	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	627	85	0	1056	0	57

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	314
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	-	-	0	-	0	679
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	679
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	10.78
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	679	-	-	-
HCM Lane V/C Ratio	0.084	-	-	-
HCM Ctrl Dly (s/v)	10.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	636	14	61	984	19	19
Future Vol, veh/h	636	14	61	984	19	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	75	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	669	15	64	1036	20	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	684	0	1323	342
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	646	-
Critical Hdwy	-	-	4.16	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	-	-	2.23	-	3.53	3.33
Pot Cap-1 Maneuver	-	-	898	-	146	651
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	481	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	898	-	136	651
Mov Cap-2 Maneuver	-	-	-	-	270	-
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	446	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.54	15.06
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	270	651	-	-	898	-
HCM Lane V/C Ratio	0.074	0.031	-	-	0.071	-
HCM Ctrl Dly (s/v)	19.4	10.7	-	-	9.3	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	636	14	61	984	19	19
Future Vol, veh/h	636	14	61	984	19	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	75	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	669	15	64	1036	20	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	684	0	1316	335
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	646	-
Critical Hdwy	-	-	4.16	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	-	-	2.23	-	3.53	3.33
Pot Cap-1 Maneuver	-	-	898	-	148	658
Stage 1	-	-	-	-	468	-
Stage 2	-	-	-	-	481	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	898	-	137	658
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	468	-
Stage 2	-	-	-	-	446	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.54	14.99
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	271	658	-	-	898	-
HCM Lane V/C Ratio	0.074	0.03	-	-	0.071	-
HCM Ctrl Dly (s/v)	19.3	10.6	-	-	9.3	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.2	-

PROJECTED TRAFFIC CONDITIONS (2030)

PM PEAK

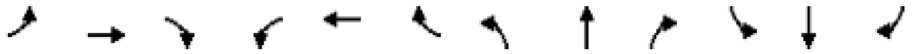
Intersection	
Int Delay, s/veh	7.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	286	32	116	144	67	199
Future Vol, veh/h	286	32	116	144	67	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	321	36	130	162	75	224

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	357	0	762	339
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	422	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1196	-	372	701
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	659	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1196	-	327	701
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	580	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	3.74	19.38
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	544	-	-	803	-
HCM Lane V/C Ratio	0.549	-	-	0.109	-
HCM Ctrl Dly (s/v)	19.4	-	-	8.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	3.3	-	-	0.4	-



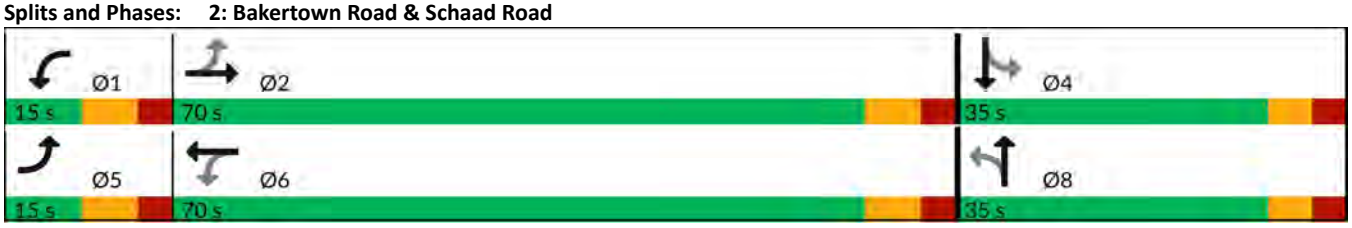
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	158	1137	24	58	730	57	127	110	54	79	81	82
Future Volume (vph)	158	1137	24	58	730	57	127	110	54	79	81	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	125		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.989			0.951			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3429	0	1752	3405	0	1752	1754	0	1752	1706	0
Flt Permitted	0.270			0.153			0.651			0.651		
Satd. Flow (perm)	498	3429	0	282	3405	0	1201	1754	0	1201	1706	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			10			19			40	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		750			525			360			930	
Travel Time (s)		11.4			8.0			8.2			21.1	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	3%	5%	3%	3%	5%	3%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	161	1160	24	59	745	58	130	112	55	81	83	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	161	1184	0	59	803	0	130	167	0	81	167	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	50	50		50	50		50	50		50	50	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	30.0		15.0	30.0		35.0	35.0		35.0	35.0	
Total Split (s)	15.0	70.0		15.0	70.0		35.0	35.0		35.0	35.0	
Total Split (%)	12.5%	58.3%		12.5%	58.3%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	7.0	62.0		7.0	62.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

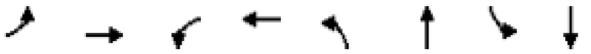
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	8.0	8.0		8.0	8.0		7.0	7.0		7.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)		15.0			15.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	43.0	37.7		39.5	32.8		15.4	15.4		15.4	15.4	
Actuated g/C Ratio	0.54	0.47		0.49	0.41		0.19	0.19		0.19	0.19	
v/c Ratio	0.42	0.73		0.23	0.57		0.57	0.47		0.35	0.46	
Control Delay (s/veh)	11.2	21.9		9.5	19.2		42.4	32.3		35.6	28.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	11.2	21.9		9.5	19.2		42.4	32.3		35.6	28.3	
LOS	B	C		A	B		D	C		D	C	
Approach Delay (s/veh)		20.6			18.5			36.7			30.7	
Approach LOS		C			B			D			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 80			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay (s/veh): 22.6		Intersection LOS: C	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	
Analysis Period (min) 15			

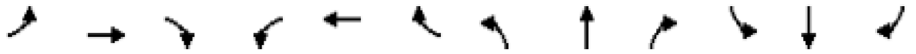
Splits and Phases: 2: Bakertown Road & Schaad Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	161	1184	59	803	130	167	81	167
v/c Ratio	0.42	0.73	0.23	0.57	0.57	0.47	0.35	0.46
Control Delay (s/veh)	11.2	21.9	9.5	19.2	42.4	32.3	35.6	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	11.2	21.9	9.5	19.2	42.4	32.3	35.6	28.3
Queue Length 50th (ft)	30	256	10	148	59	66	35	56
Queue Length 95th (ft)	71	407	31	241	138	150	91	136
Internal Link Dist (ft)		670		445		280		850
Turn Bay Length (ft)	150		150		125		100	
Base Capacity (vph)	383	2772	278	2754	445	663	445	658
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.43	0.21	0.29	0.29	0.25	0.18	0.25

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	1137	24	58	730	57	127	110	54	79	81	82
Future Volume (veh/h)	158	1137	24	58	730	57	127	110	54	79	81	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1826	1856	1856	1826	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	161	1160	24	59	745	58	130	112	55	81	83	84
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	3	5	3	3	5	3	3	3	3	3	3	3
Cap, veh/h	367	1404	29	234	1213	94	275	269	132	278	193	196
Arrive On Green	0.08	0.40	0.40	0.05	0.37	0.37	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1767	3476	72	1767	3261	254	1209	1175	577	1209	846	856
Grp Volume(v), veh/h	161	579	605	59	396	407	130	0	167	81	0	167
Grp Sat Flow(s),veh/h/ln	1767	1735	1813	1767	1735	1780	1209	0	1752	1209	0	1701
Q Serve(g_s), s	4.0	21.5	21.5	1.4	13.4	13.4	7.4	0.0	5.9	4.4	0.0	6.0
Cycle Q Clear(g_c), s	4.0	21.5	21.5	1.4	13.4	13.4	13.5	0.0	5.9	10.3	0.0	6.0
Prop In Lane	1.00		0.04	1.00		0.14	1.00		0.33	1.00		0.50
Lane Grp Cap(c), veh/h	367	701	732	234	645	662	275	0	400	278	0	389
V/C Ratio(X)	0.44	0.83	0.83	0.25	0.61	0.61	0.47	0.00	0.42	0.29	0.00	0.43
Avail Cap(c_a), veh/h	397	1493	1560	321	1493	1532	468	0	681	472	0	661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.5	19.2	19.2	15.5	18.4	18.4	29.5	0.0	23.7	28.1	0.0	23.8
Incr Delay (d2), s/veh	0.8	2.5	2.4	0.6	1.0	0.9	1.3	0.0	0.7	0.6	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	7.8	8.1	0.5	4.8	4.9	2.2	0.0	2.4	1.3	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.4	21.7	21.6	16.0	19.4	19.3	30.8	0.0	24.4	28.6	0.0	24.5
LnGrp LOS	B	C	C	B	B	B	C		C	C		C
Approach Vol, veh/h		1345			862			297			248	
Approach Delay, s/veh		20.8			19.1			27.2			25.9	
Approach LOS		C			B			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.5	37.1		23.5	13.8	34.8		23.5				
Change Period (Y+Rc), s	8.0	8.0		7.0	8.0	8.0		7.0				
Max Green Setting (Gmax), s	7.0	62.0		28.0	7.0	62.0		28.0				
Max Q Clear Time (g_c+I1), s	3.4	23.5		12.3	6.0	15.4		15.5				
Green Ext Time (p_c), s	0.0	5.6		0.9	0.1	3.3		1.0				

Intersection Summary

HCM 7th Control Delay, s/veh	21.4	
HCM 7th LOS	C	

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	121	170	26	48	113
Future Vol, veh/h	26	121	170	26	48	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	30	138	193	30	55	128

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	445	208	0	0	223	0
Stage 1	208	-	-	-	-	-
Stage 2	238	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	568	830	-	-	1340	-
Stage 1	824	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	544	830	-	-	1340	-
Mov Cap-2 Maneuver	544	-	-	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	765	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.52	0	2.33
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	544	830	537	-
HCM Lane V/C Ratio	-	-	0.054	0.166	0.041	-
HCM Ctrl Dly (s/v)	-	-	12	10.2	7.8	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.6	0.1	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	26	170	35	20	120
Future Vol, veh/h	35	26	170	35	20	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	40	30	193	40	23	136

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	395	213	0	0	233	0
Stage 1	213	-	-	-	-	-
Stage 2	182	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	608	824	-	-	1329	-
Stage 1	820	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	597	824	-	-	1329	-
Mov Cap-2 Maneuver	597	-	-	-	-	-
Stage 1	820	-	-	-	-	-
Stage 2	831	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.64	0	1.11
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	597	824	257	-
HCM Lane V/C Ratio	-	-	0.067	0.036	0.017	-
HCM Ctrl Dly (s/v)	-	-	11.5	9.5	7.8	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	7	196	7	7	146
Future Vol, veh/h	7	7	196	7	7	146
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	8	8	223	8	8	166

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	409	227	0	0	231	0
Stage 1	227	-	-	-	-	-
Stage 2	182	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	597	810	-	-	1331	-
Stage 1	809	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	593	810	-	-	1331	-
Mov Cap-2 Maneuver	593	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	841	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.38	0	0.35
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	685	82	-
HCM Lane V/C Ratio	-	-	0.023	0.006	-
HCM Ctrl Dly (s/v)	-	-	10.4	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection												
Int Delay, s/veh	13.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	168	71	63	140	26	42	158	89	16	119	18
Future Vol, veh/h	20	168	71	63	140	26	42	158	89	16	119	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	150	-	150	-	-	-	-	-	-
Veh in Median Storage, #		0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	179	76	67	149	28	45	168	95	17	127	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	177	0	0	254	0	0	605	570	216	588	580	149
Stage 1	-	-	-	-	-	-	259	259	-	283	283	-
Stage 2	-	-	-	-	-	-	346	311	-	305	297	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1393	-	-	1305	-	-	408	430	821	419	424	895
Stage 1	-	-	-	-	-	-	743	692	-	722	675	-
Stage 2	-	-	-	-	-	-	667	657	-	702	666	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1393	-	-	1305	-	-	259	402	821	207	397	895
Mov Cap-2 Maneuver	-	-	-	-	-	-	259	402	-	207	397	-
Stage 1	-	-	-	-	-	-	732	681	-	685	641	-
Stage 2	-	-	-	-	-	-	497	623	-	461	656	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.59	2.18	30.79	21.03
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	436	1393	-	-	1305	-	-	385
HCM Lane V/C Ratio	0.706	0.015	-	-	0.051	-	-	0.423
HCM Ctrl Dly (s/v)	30.8	7.6	-	-	7.9	-	-	21
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	5.4	0	-	-	0.2	-	-	2

Intersection	
Intersection Delay, s/veh	14.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	168	71	63	140	26	42	158	89	16	119	18
Future Vol, veh/h	20	168	71	63	140	26	42	158	89	16	119	18
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	21	179	76	67	149	28	45	168	95	17	127	19
Number of Lanes	1	1	0	1	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	3	2
HCM Control Delay, s/veh	15.3	11.4	16.3	12.5
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1
Vol Left, %	15%	100%	0%	100%	0%	0%	10%
Vol Thru, %	55%	0%	70%	0%	100%	0%	78%
Vol Right, %	31%	0%	30%	0%	0%	100%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	289	20	239	63	140	26	153
LT Vol	42	20	0	63	0	0	16
Through Vol	158	0	168	0	140	0	119
RT Vol	89	0	71	0	0	26	18
Lane Flow Rate	307	21	254	67	149	28	163
Geometry Grp	5	6	6	5	5	5	5
Degree of Util (X)	0.538	0.044	0.481	0.135	0.278	0.046	0.307
Departure Headway (Hd)	6.413	7.527	6.808	7.226	6.714	5.998	6.791
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	566	477	531	499	538	600	531
Service Time	4.113	5.245	4.518	4.935	4.424	3.707	4.518
HCM Lane V/C Ratio	0.542	0.044	0.478	0.134	0.277	0.047	0.307
HCM Control Delay, s/veh	16.3	10.6	15.7	11.1	12	9	12.5
HCM Lane LOS	C	B	C	B	B	A	B
HCM 95th-tile Q	3.2	0.1	2.6	0.5	1.1	0.1	1.3

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1146	124	0	859	0	84
Future Vol, veh/h	1146	124	0	859	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	1194	129	0	895	0	88

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	661
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	-	-	0	-	0	402
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	402
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	16.42
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	402	-	-	-
HCM Lane V/C Ratio	0.217	-	-	-
HCM Ctrl Dly (s/v)	16.4	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.8	-	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1146	124	0	859	0	84
Future Vol, veh/h	1146	124	0	859	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	1194	129	0	895	0	88

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	597
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.33
Pot Cap-1 Maneuver	-	-	0	-	0	444
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	444
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	444	-	-	-
HCM Lane V/C Ratio	0.197	-	-	-
HCM Ctrl Dly (s/v)	15.1	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.7	-	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1200	31	107	811	48	65
Future Vol, veh/h	1200	31	107	811	48	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	75	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	1250	32	111	845	50	68

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1282	0	1911	641
Stage 1	-	-	-	-	1266	-
Stage 2	-	-	-	-	645	-
Critical Hdwy	-	-	4.16	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	-	-	2.23	-	3.53	3.33
Pot Cap-1 Maneuver	-	-	532	-	59	415
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	481	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	532	-	~ 47	415
Mov Cap-2 Maneuver	-	-	-	-	149	-
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	380	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.58	26.15
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	149	415	-	-	532	-
HCM Lane V/C Ratio	0.335	0.163	-	-	0.21	-
HCM Ctrl Dly (s/v)	40.8	15.4	-	-	13.6	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q(veh)	1.4	0.6	-	-	0.8	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s
+: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1200	31	107	811	48	65
Future Vol, veh/h	1200	31	107	811	48	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	75	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	3	3
Mvmt Flow	1250	32	111	845	50	68

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1282	0	1895	625
Stage 1	-	-	-	-	1250	-
Stage 2	-	-	-	-	645	-
Critical Hdwy	-	-	4.16	-	6.86	6.96
Critical Hdwy Stg 1	-	-	-	-	5.86	-
Critical Hdwy Stg 2	-	-	-	-	5.86	-
Follow-up Hdwy	-	-	2.23	-	3.53	3.33
Pot Cap-1 Maneuver	-	-	532	-	61	425
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	481	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	532	-	~ 48	425
Mov Cap-2 Maneuver	-	-	-	-	152	-
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	380	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	1.58	25.66
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	152	425	-	-	532	-
HCM Lane V/C Ratio	0.33	0.159	-	-	0.21	-
HCM Ctrl Dly (s/v)	40	15.1	-	-	13.6	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q(veh)	1.3	0.6	-	-	0.8	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s
+: Computation Not Defined *: All major volume in platoon

APPENDIX C

TRIP GENERATION

PROJECT TRIP GENERATION SUMMARY

	Trip Generation			
	AM		PM	
Land Use	**Enter**	**Exit**	**Enter**	**Exit**
Grocery Store (49,305 S.F.)	86	60	216	216
Fuel Center with Market (16 Fueling Positions)	109	109	127	127
Outlot #1 - Retail (18,513 S.F.)	40	33	58	58
Outlot #2 - Retail (13,177 S.F.)	28	23	46	46
Totals	**263**	**225**	**447**	**447**

	Internal Trip Reduction			
	AM		PM	
Land Use	**Enter**	**Exit**	**Enter**	**Exit**
Grocery Store (49,305 S.F.)	9	6	22	22
Fuel Center with Market (16 Fueling Positions)	11	11	13	13
Outlot #1 - Retail (18,513 S.F.)	4	3	6	6
Outlot #2 - Retail (13,177 S.F.)	3	2	5	5
Totals	**27**	**22**	**46**	**46**

Internal Trip Reduction	
AM %	**PM %**
10%	10%
10%	10%
10%	10%
10%	10%

	Total External Trips			
	AM		PM	
Land Use	**Enter**	**Exit**	**Enter**	**Exit**
Grocery Store (49,305 S.F.)	77	54	194	194
Fuel Center with Market (16 Fueling Positions)	98	98	114	114
Outlot #1 - Retail (18,513 S.F.)	36	30	52	52
Outlot #2 - Retail (13,177 S.F.)	25	21	41	41
Totals	**236**	**203**	**401**	**401**

	Primary - External Trips			
	AM		PM	
Land Use	**Enter**	**Exit**	**Enter**	**Exit**
Grocery Store (49,305 S.F.)	54	38	136	136
Fuel Center with Market (16 Fueling Positions)	49	49	57	57
Outlot #1 - Retail (18,513 S.F.)	27	23	39	39
Outlot #2 - Retail (13,177 S.F.)	19	16	31	31
Total Primary Trips	**149**	**126**	**263**	**263**

Primary	
AM %	**PM %**
70%	70%
50%	50%
75%	75%
75%	75%

	Pass-By - External Trips			
	AM		PM	
Land Use	**Enter**	**Exit**	**Enter**	**Exit**
Grocery Store (49,305 S.F.)	23	16	58	58
Fuel Center with Market (16 Fueling Positions)	49	49	57	57
Outlot #1 - Retail (18,513 S.F.)	9	7	13	13
Outlot #2 - Retail (13,177 S.F.)	6	5	10	10
Total Pass-By Trips	**87**	**77**	**138**	**138**

Pass-By	
AM %	**PM %**
30%	30%
50%	50%
25%	25%
25%	25%

Land Use: 850
Supermarket

Description

A supermarket is a free-standing retail store that sells a complete assortment of food, beverage, food preparation materials, and household products. A supermarket may also provide additional products and services such as a bakery, dry cleaning, floral arrangements, greeting cards, a limited-service bank, and a pharmacy.

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Kentucky, Maryland, Minnesota, New Jersey, New York, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Texas, Vermont, Virginia, Washington, and Wisconsin.

Source Numbers

359, 365, 438, 440, 442, 447, 448, 514, 520, 537, 552, 566, 577, 610, 715, 716, 728, 738, 854, 870, 882, 893, 917, 926, 935, 946, 959, 961, 966, 1004, 1009, 1025, 1058, 1063, 1064, 1235, 1258

Land Use: 945
Convenience Store/Gas Station

Description

A convenience store/gas station is a facility with a co-located convenience store and gas station. The convenience store sells groceries and other everyday items that a person may need or want as a matter of convenience. The gas station sells automotive fuels such as gasoline and diesel. The sites in this land use include both self-pump and attendant-pumped fueling positions and both pre-pay and post-pay operations.

A convenience store/gas station is typically located along a major thoroughfare to optimize motorist convenience. Extended hours of operation (with many open 24 hours, 7 days a week) are common at these facilities.

The convenience store product mix typically includes pre-packaged grocery items, beverages, dairy products, snack foods, confectionary, tobacco products, over-the-counter drugs, and toiletries. A convenience store may sell alcohol, often limited to beer and wine. Coffee and premade sandwiches are also commonly sold at a convenience store. Made-to-order food orders are sometimes offered. Some stores offer limited seating.

Convenience store (Land Use 851) is a related use.

Land Use Subcategory

Multiple subcategories were added to this land use to allow for multi-variable evaluation of sites with single-variable data plots. All study sites are assigned to one of four subcategories, based on the number of vehicle fueling positions (VFP) at the site: (1) between 2 and 8 VFP, (2) between 9 and 15 VFP, (3) between 16 and 24 VFP, and (4) more than 24 VFP. For each VFP range subcategory, data plots are presented with GFA as the independent variable for all time periods and trip types for which data are available. The use of both GFA and VFP (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

Further, the study sites were also assigned to one of four other subcategories, based on the gross floor area (GFA) of the convenience store at the site: (1) between 2,000 and 4,000 square feet, (2) between 4,000 and 5,500 square feet, (3) between 5,500 and 10,000 square feet, and (4) greater than 10,000 square feet. For each GFA subcategory range, data plots are presented with VFP as the independent variable for all time periods and trip types for which data are available. The use of both VFP and GFA (as the independent variable and land use subcategory, respectively) provides a significant improvement in the reliability of a trip generation estimate when compared to the single-variable data plots in prior editions of *Trip Generation Manual*.

When analyzing the convenience store/gas station land use with each combination of GFA and VFP values as described above, the two sets of data plots will produce two estimates of site generated trips. Both values can be considered when determining a site trip generation estimate.

Data plots are also provided for three additional independent variables: AM peak hour traffic on adjacent street, PM peak hour traffic on adjacent street, and employees. These independent variables are intended to be analyzed as single independent variables and do not have subcategories associated with them. Within the data plots and within the ITETripGen web app, these plots are found under the land use subcategory “none.”

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Arizona, Arkansas, California, Delaware, Florida, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, Ohio, Pennsylvania, South Dakota, Texas, Utah, Vermont, Washington, and Wisconsin.

Source Numbers

340, 350, 355, 359, 385, 617, 718, 810, 813, 844, 850, 853, 864, 865, 867, 869, 882, 883, 888, 904, 926, 927, 936, 938, 954, 960, 962, 1004, 1024, 1025, 1027, 1052, 1219, 1224, 1227, 1238, 1267

Land Use: 822
Strip Retail Plaza (<40k)

Description

A strip retail plaza is an integrated group of commercial establishments planned, developed, owned, and managed as a unit. Each study site in this land use has less than 40,000 square feet of gross leasable area (GLA). Because a strip retail plaza is open-air, its GLA is the same as the gross floor area of the building.

The 40,000-square-foot GLA threshold between strip retail plaza and shopping plaza (Land Use 821) was selected based on an examination of the overall shopping center/plaza database. All shopping plazas in the database with a supermarket as their anchor are larger than 40,000 square feet GLA.

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Delaware, Florida, New Jersey, Ontario (CAN), Pennsylvania, South Dakota, Vermont, and Wisconsin.

Users should exercise caution when applying statistics during the AM peak periods, as the sites contained in the database for this land use may or may not contain retail that would generate significant trips during this period (for example, a coffee/donut shop).

Source Numbers

358, 428, 437, 507, 728, 936, 960, 961, 1009, 1219

Schaad Road Commercial Development
Trip Generation
Weekday

VEHICLE TRIPS							
Land Use & Data Source	Independent Variable	Size	Time Period	Method Rate/Equation	Entry Split%	Exit Split%	Total
850 - Supermarket	1000 Sq. Ft. GFA	49.31	Weekday	Best Fit (LIN) T = 85.95(X) + 336.45	2287 50%	2287 50%	4574
945 - Convenience Store/Gas Station - GFA (2-4k)	Vehicle Fueling Positions	16	Weekday	Best Fit (LIN) T = 173.51(X) + 353.51	1565 50%	1565 50%	3130
822 - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	18.51	Weekday	Average 54.45	504 50%	504 50%	1008
822(1) - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	13.18	Weekday	Best Fit (LIN) T = 42.20(X) + 229.68	393 50%	393 50%	786

RESULTS			
Site Totals	Entry	Exit	Total
New Vehicle Trips	4749	4749	9498

Data Source: Trip Generation Manual, 12th Ed

Schaad Road Commercial Development
Trip Generation
AM Peak Hour

VEHICLE TRIPS							
Land Use & Data Source	Independent Variable	Size	Time Period	Method / Rate/Equation	Entry Split%	Exit Split%	Total
850 - Supermarket	1000 Sq. Ft. GFA	49.31	AM Peak Hour	Average / 2.95	86 / 59%	60 / 41%	146
945 - Convenience Store/Gas Station - GFA (2-4k)	Vehicle Fueling Positions	16	AM Peak Hour	Average / 13.65	109 / 50%	109 / 50%	218
822 - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	18.51	AM Peak Hour	Average / 3.93	40 / 55%	33 / 45%	73
822(1) - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	13.18	AM Peak Hour	Average / 3.93	28 / 55%	23 / 45%	51

RESULTS			
Site Totals	Entry	Exit	Total
New Vehicle Trips	263	225	488

Data Source: Trip Generation Manual, 12th Ed

Schaad Road Commercial Development
Trip Generation
PM Peak Hour

VEHICLE TRIPS							
Land Use & Data Source	Independent Variable	Size	Time Period	Method / Rate/Equation	Entry Split%	Exit Split%	Total
850 - Supermarket	1000 Sq. Ft. GFA	49.31	PM Peak Hour	Best Fit (LOG)	216	216	432
				Ln(T) =0.82Ln(X) + 2.87	50%	50%	
945 - Convenience Store/Gas Station - GFA (2-4k)	Vehicle Fueling Positions	16	PM Peak Hour	Average	127	127	254
				15.85	50%	50%	
822 - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	18.51	PM Peak Hour	Best Fit (LOG)	58	58	116
				Ln(T) =0.68Ln(X) + 2.77	50%	50%	
822(1) - Strip Retail Plaza (<40k)	1000 Sq. Ft. GLA	13.18	PM Peak Hour	Best Fit (LOG)	46	46	92
				Ln(T) =0.68Ln(X) + 2.77	50%	50%	

RESULTS			
Site Totals	Entry	Exit	Total
New Vehicle Trips	447	447	894

Data Source: Trip Generation Manual, 12th Ed

Supermarket
(850)

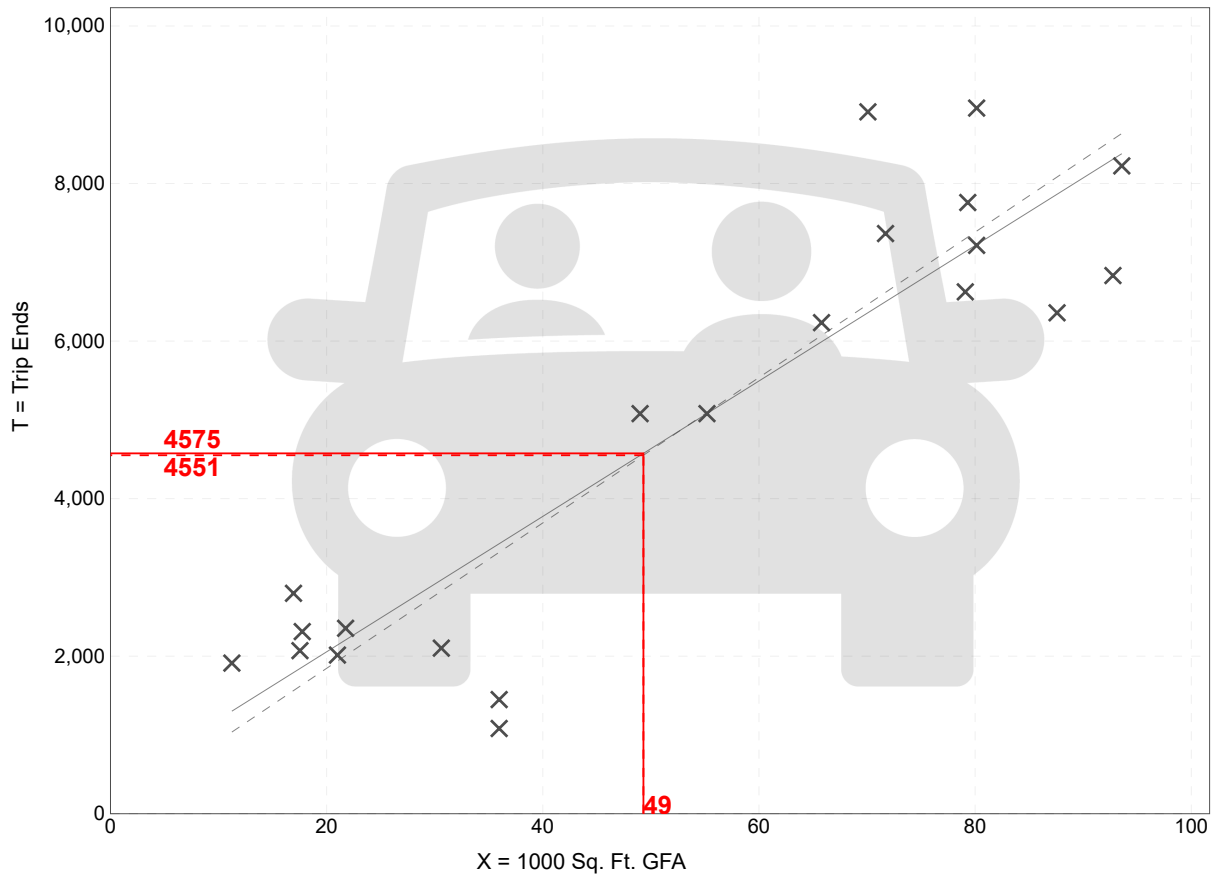
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 53
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
92.29	30.09 - 170.24	24.98

Data Plot and Equation



Fitted Curve Equation: T = 85.95(X) + 336.45

R^2= 0.82

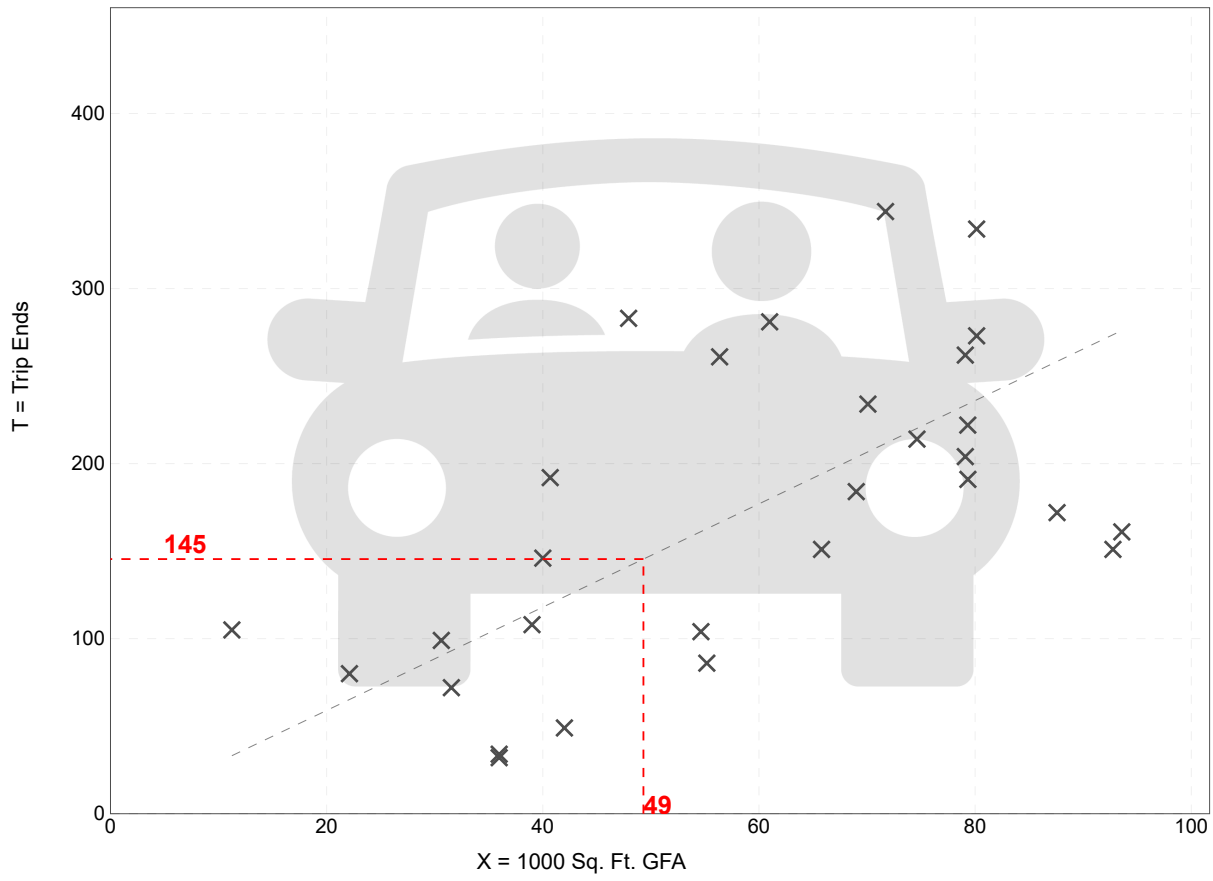
Supermarket
(850)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	29
Avg. 1000 Sq. Ft. GFA:	59
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.95	0.89 - 9.35	1.31

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

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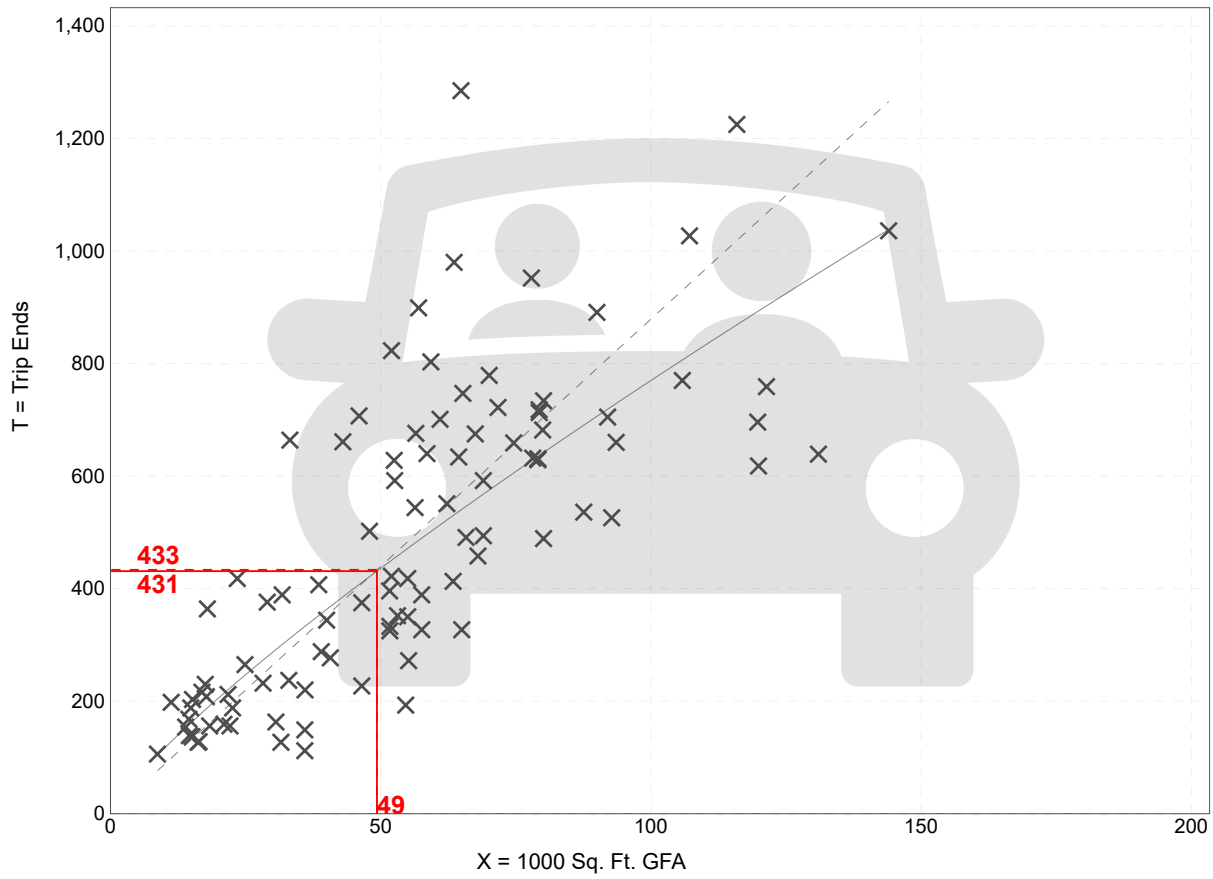
Supermarket
(850)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	97
Avg. 1000 Sq. Ft. GFA:	55
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
8.79	3.11 - 20.30	3.31

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.82 Ln(X) + 2.87

R^2= 0.67

Convenience Store/Gas Station - GFA (2-4k)
(945)

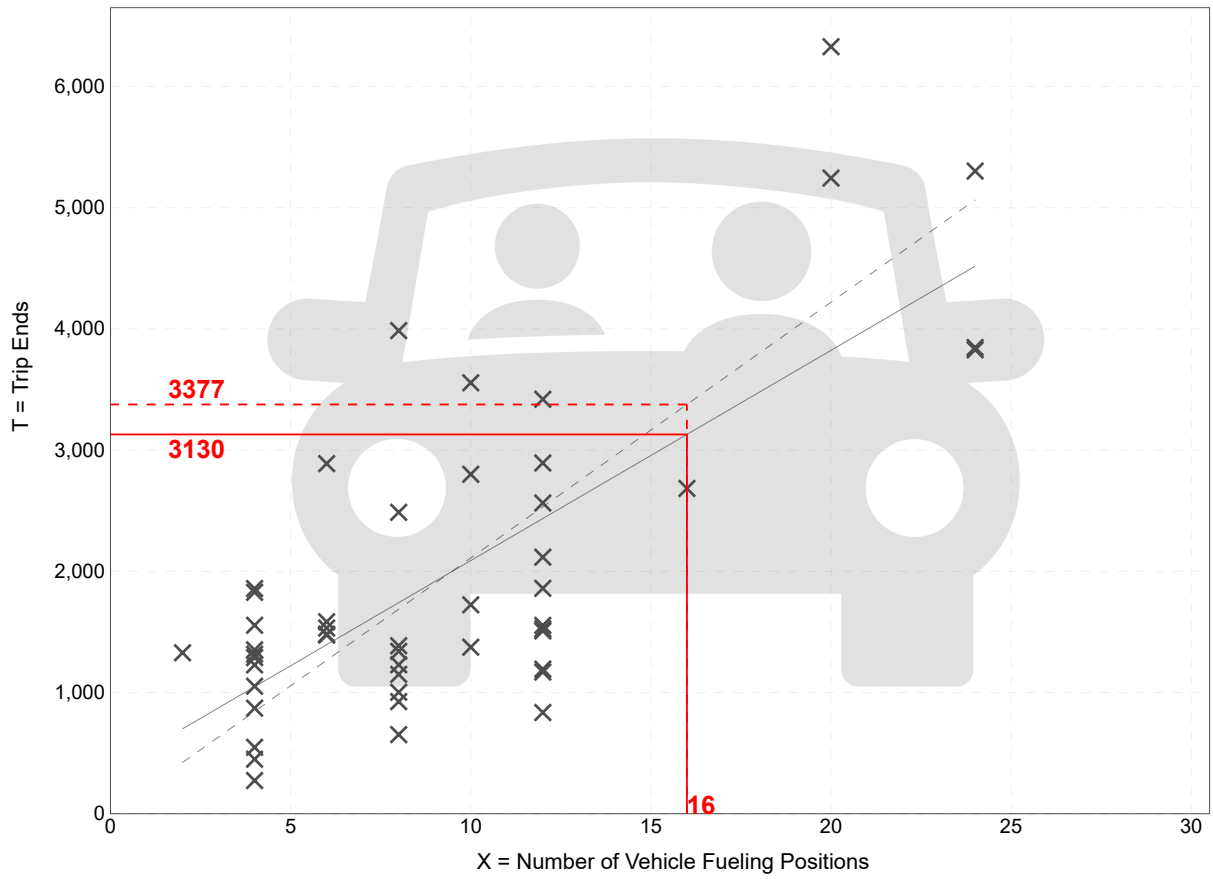
Vehicle Trip Ends vs: **Vehicle Fueling Positions**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 48
Avg. Num. of Vehicle Fueling Positions: 9
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
211.05	68.50 - 664.00	102.55

Data Plot and Equation



Fitted Curve Equation: T = 173.51(X) + 353.51

R^2= 0.54

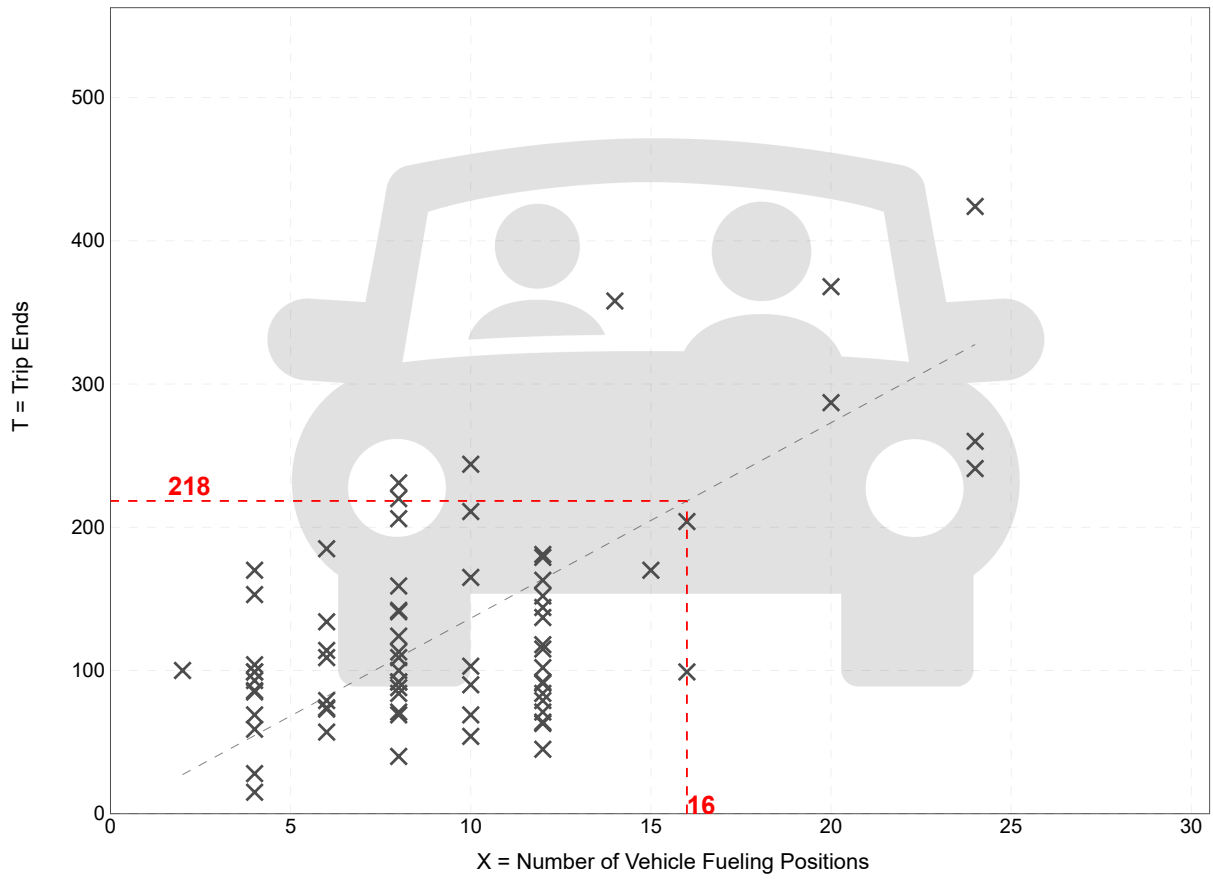
Convenience Store/Gas Station - GFA (2-4k)
(945)

Vehicle Trip Ends vs:	**Vehicle Fueling Positions**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	71
Avg. Num. of Vehicle Fueling Positions:	10
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
13.65	3.75 - 50.00	7.16

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

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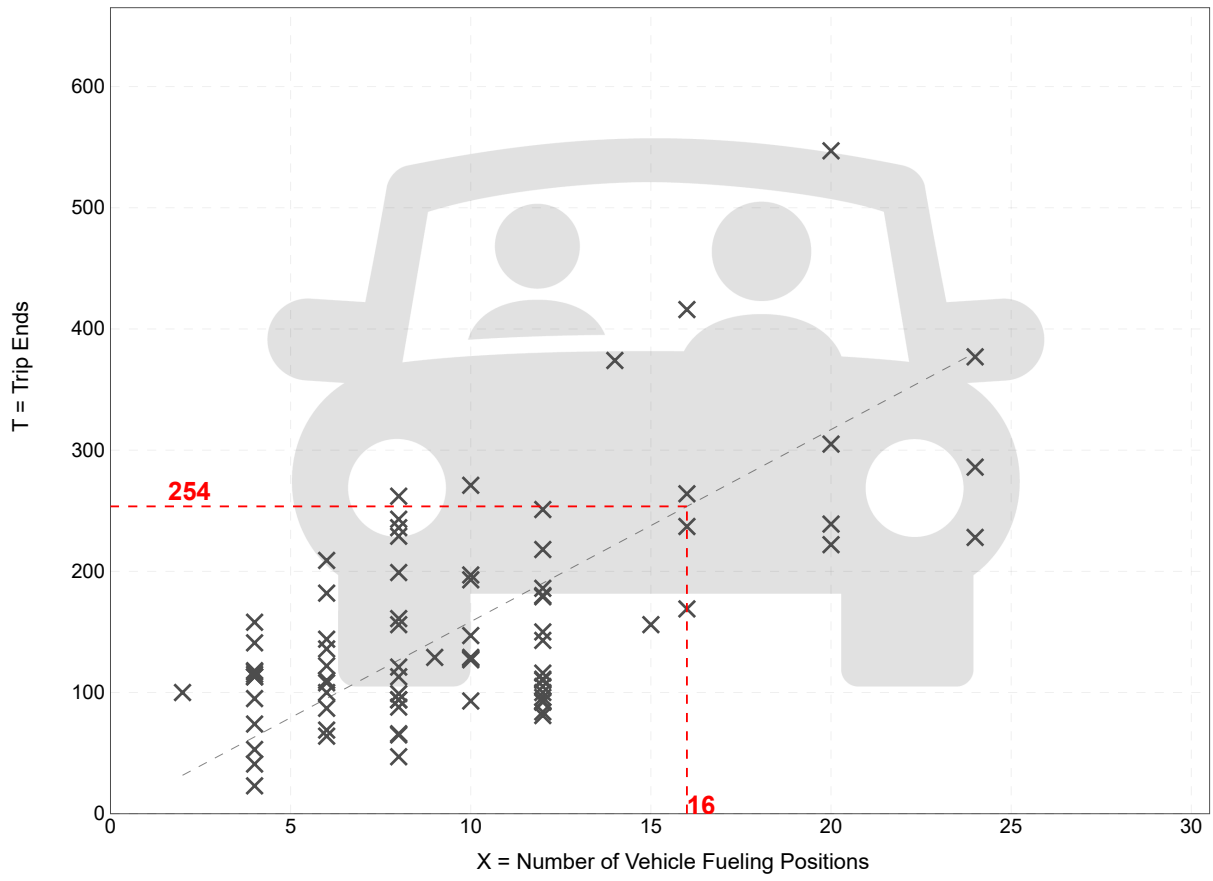
Convenience Store/Gas Station - GFA (2-4k)
(945)

Vehicle Trip Ends vs:	**Vehicle Fueling Positions**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	79
Avg. Num. of Vehicle Fueling Positions:	10
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
15.85	5.75 - 50.00	7.54

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

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Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday**

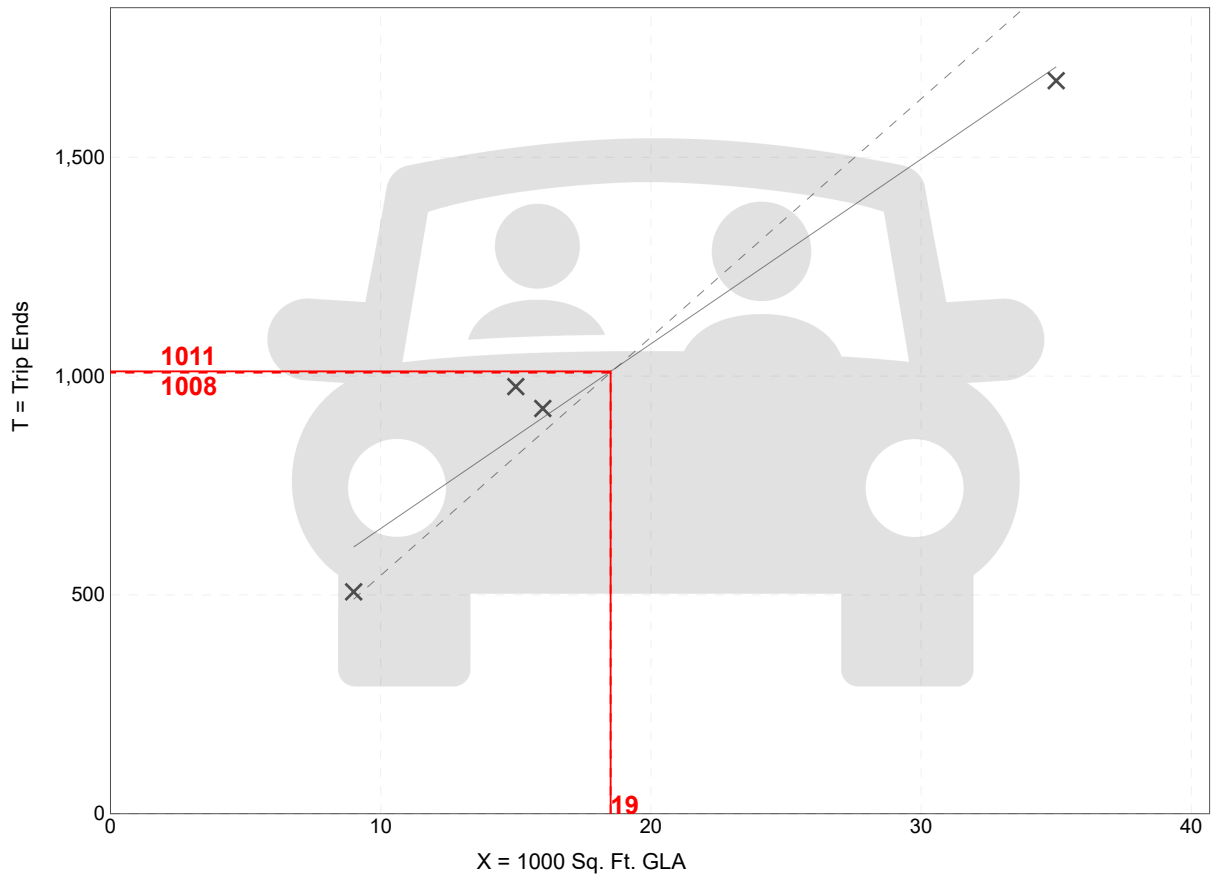
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: T = 42.20(X) + 229.68

R^2= 0.96

Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

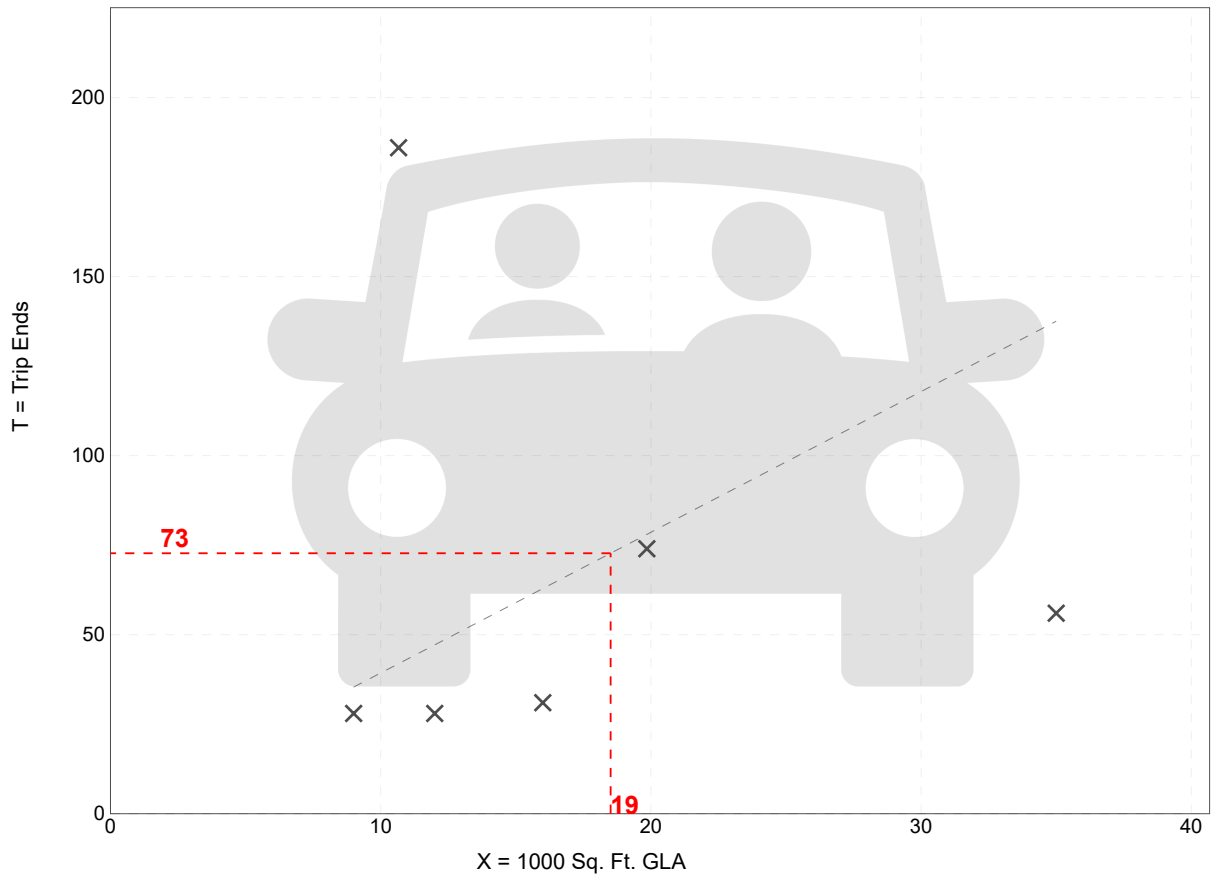
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. 1000 Sq. Ft. GLA: 17
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.93	1.60 - 17.44	5.12

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

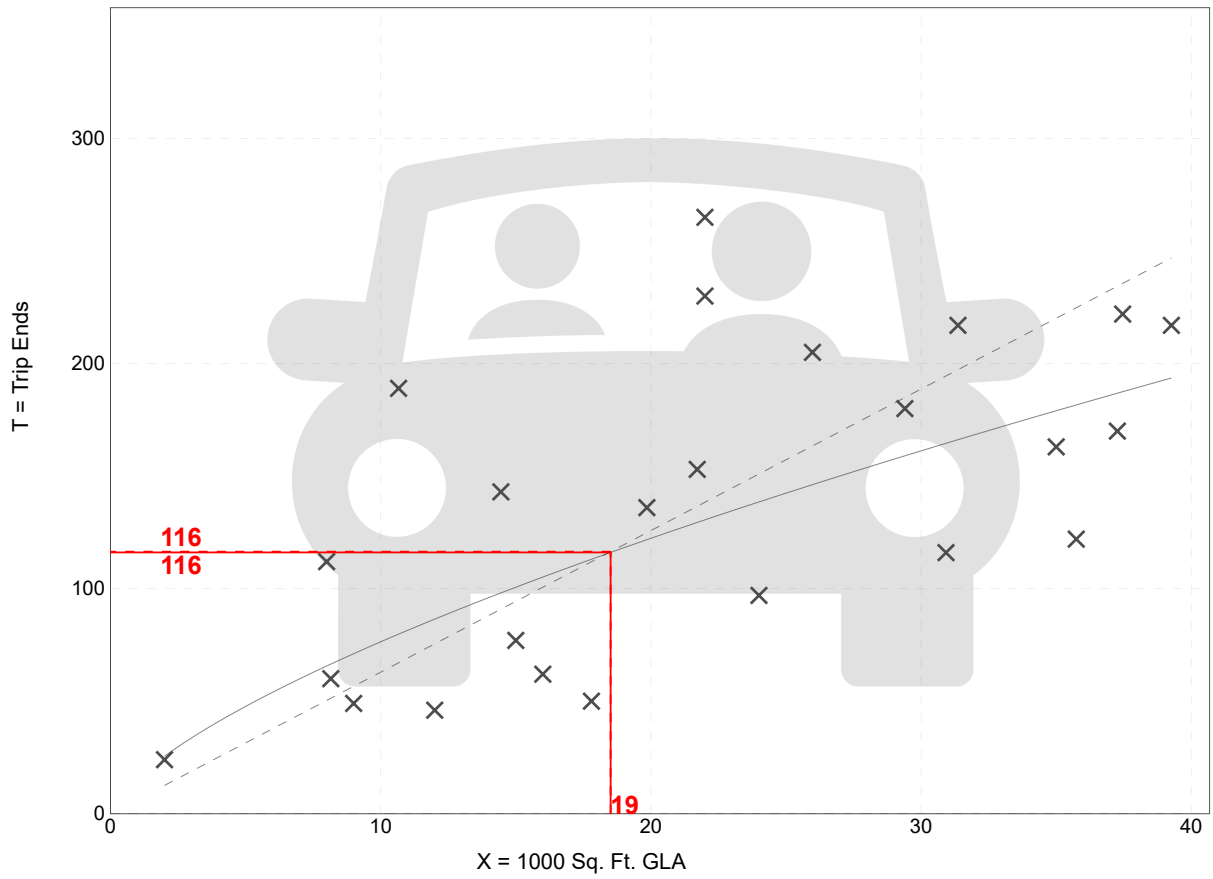
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 24
Avg. 1000 Sq. Ft. GLA: 22
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.29	2.81 - 17.72	3.02

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.68 Ln(X) + 2.77

R^2= 0.54

Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday**

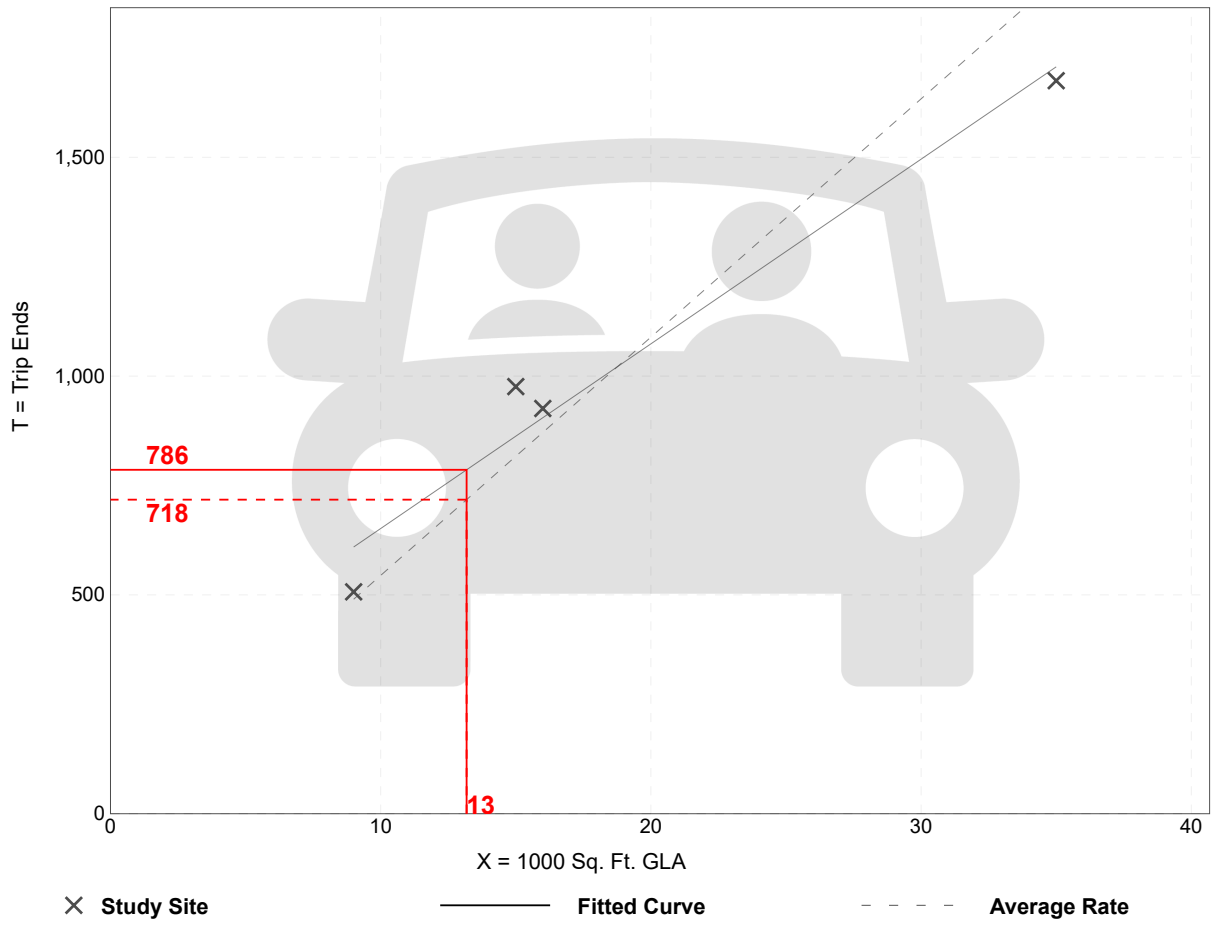
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: T = 42.20(X) + 229.68

R^2= 0.96

Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

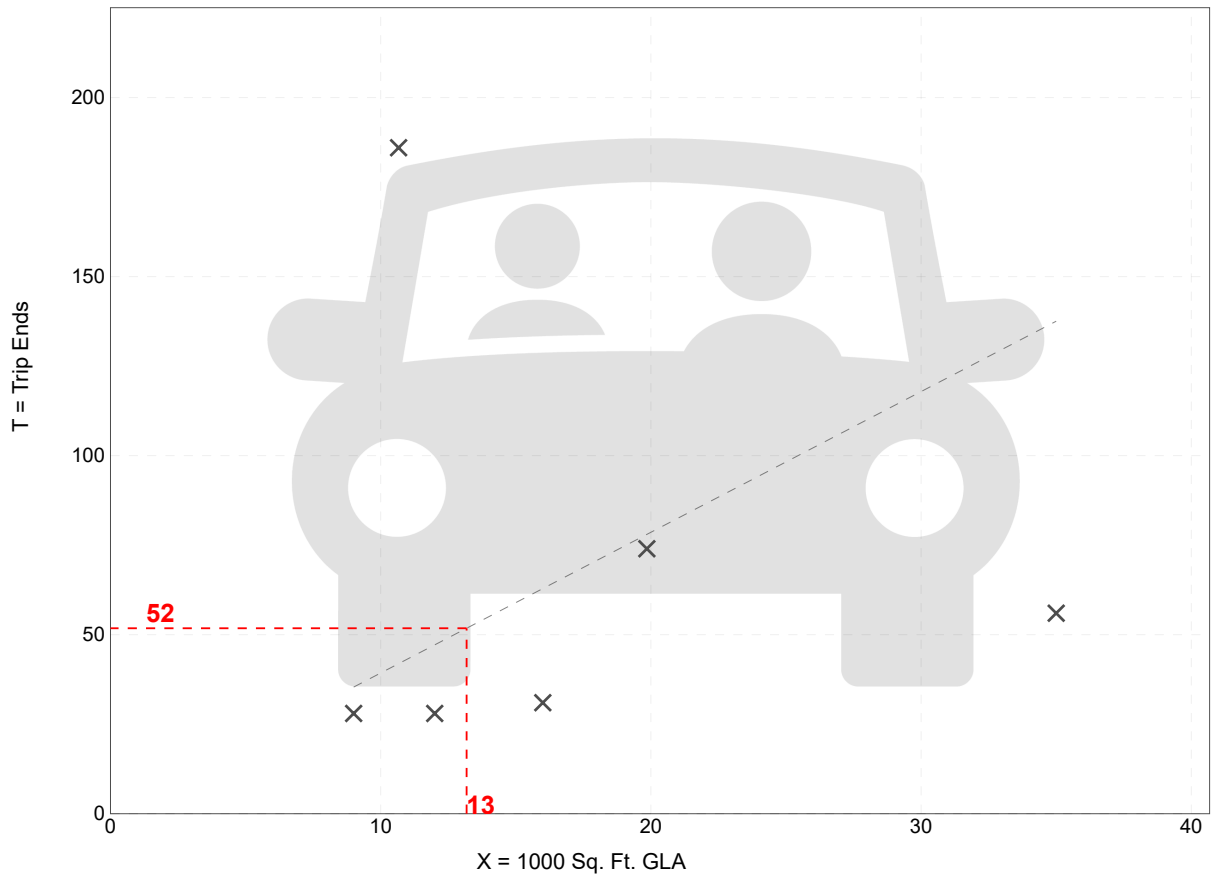
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. 1000 Sq. Ft. GLA: 17
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.93	1.60 - 17.44	5.12

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

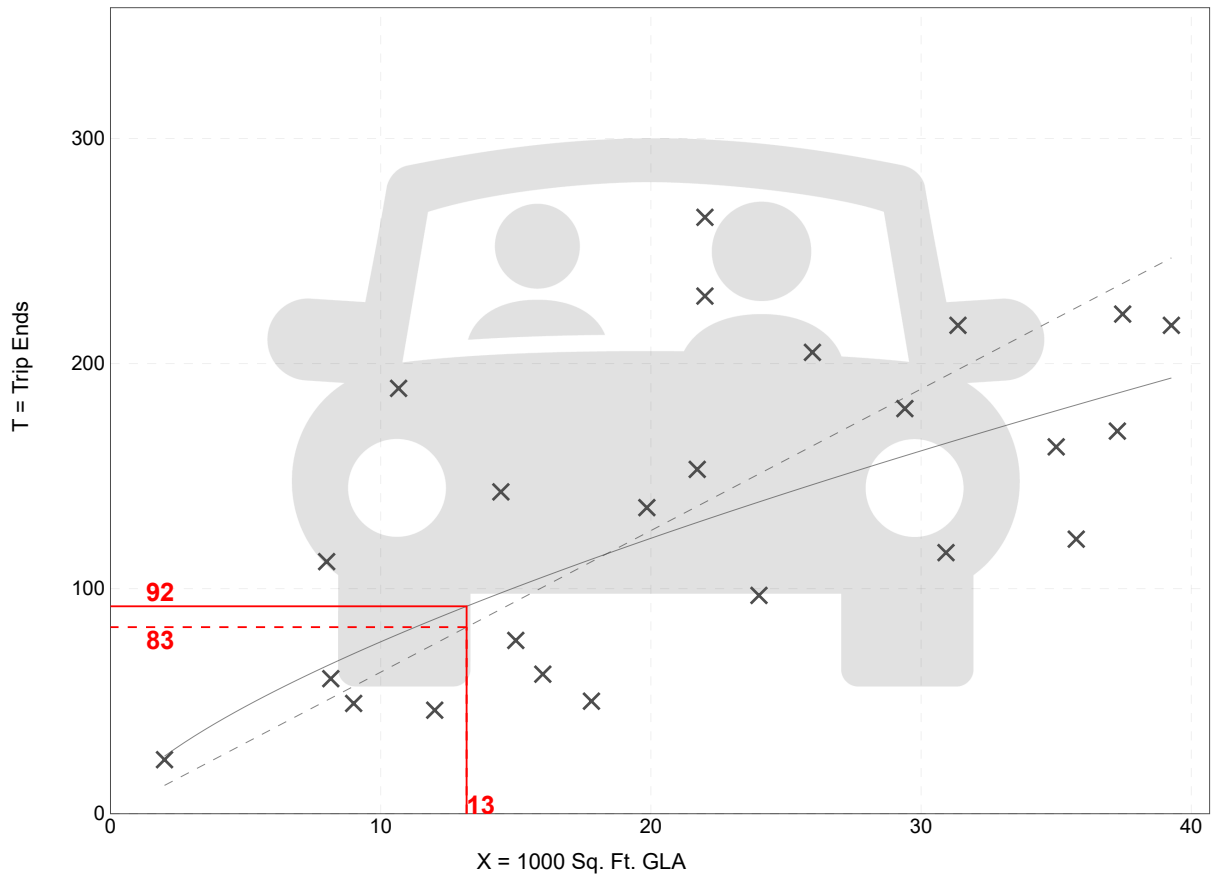
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 24
Avg. 1000 Sq. Ft. GLA: 22
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.29	2.81 - 17.72	3.02

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.68 Ln(X) + 2.77

R^2= 0.54

OFFSITE

TRIP GENERATION

PAGES FROM OCTOBER 2025 TIS BY CEC FOR

SCHAAD ROAD APARTMENTS DEVELOPMENT

Revised October 27, 2025

TRAFFIC IMPACT ANALYSIS FOR THE PROPOSED SCHAAD ROAD APARTMENTS

8007 Ball Camp Pike

Knoxville, Knox County, Tennessee

Prepared for:

Thompson Thrift Development, Inc.
Mr. Tyler Royalty
111 Monument Circle
Suite 1600
Indianapolis IN
3178535430
troyalty@thompsonthrift.com

Prepared by:

Civil & Environmental Consultants, Inc.
2704 Cherokee Farm Way
Knoxville, TN 37920
(865) 977-9997

TABLE 3

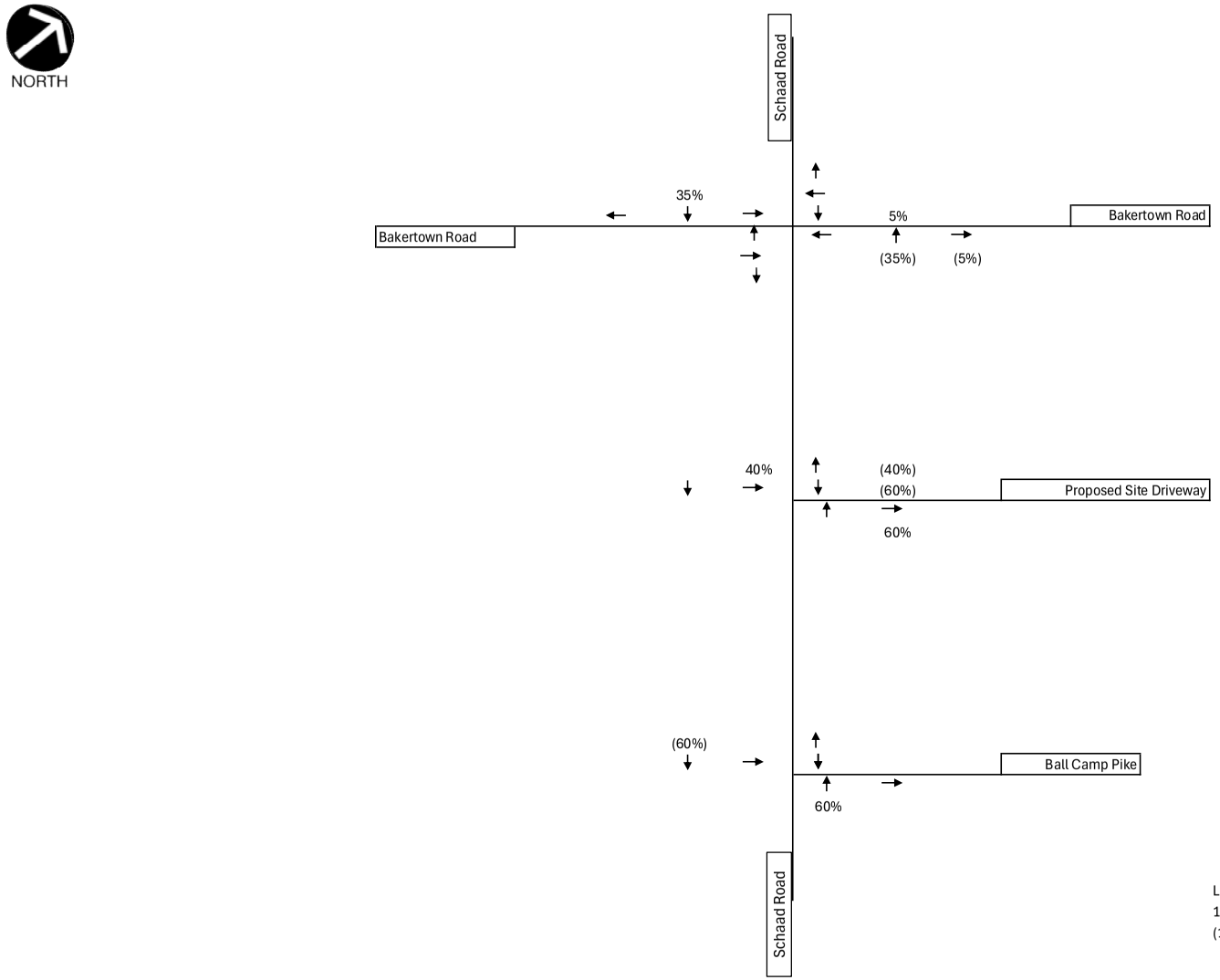
ANTICIPATED TRIP GENERATION [1]

Traffic Impact Analysis for the Proposed Schaad Road Apartments

Knoxville, Knox County, Tennessee

Land Use Code	Description	Size	Trip Generation [1]					
			Weekday 24-Hour	Weekday A.M. Peak Hour			Weekday P.M. Peak Hour	
				Enter	Exit	Total	Enter	Exit	Total
N/A	Local Apartment - Trip Generation Study	300 units	2,562	32	115	147	116	95	211

(1) Anticipated trip generation calculated based on the rates published by Knoxville/Knox Co. MPC, December 1999.



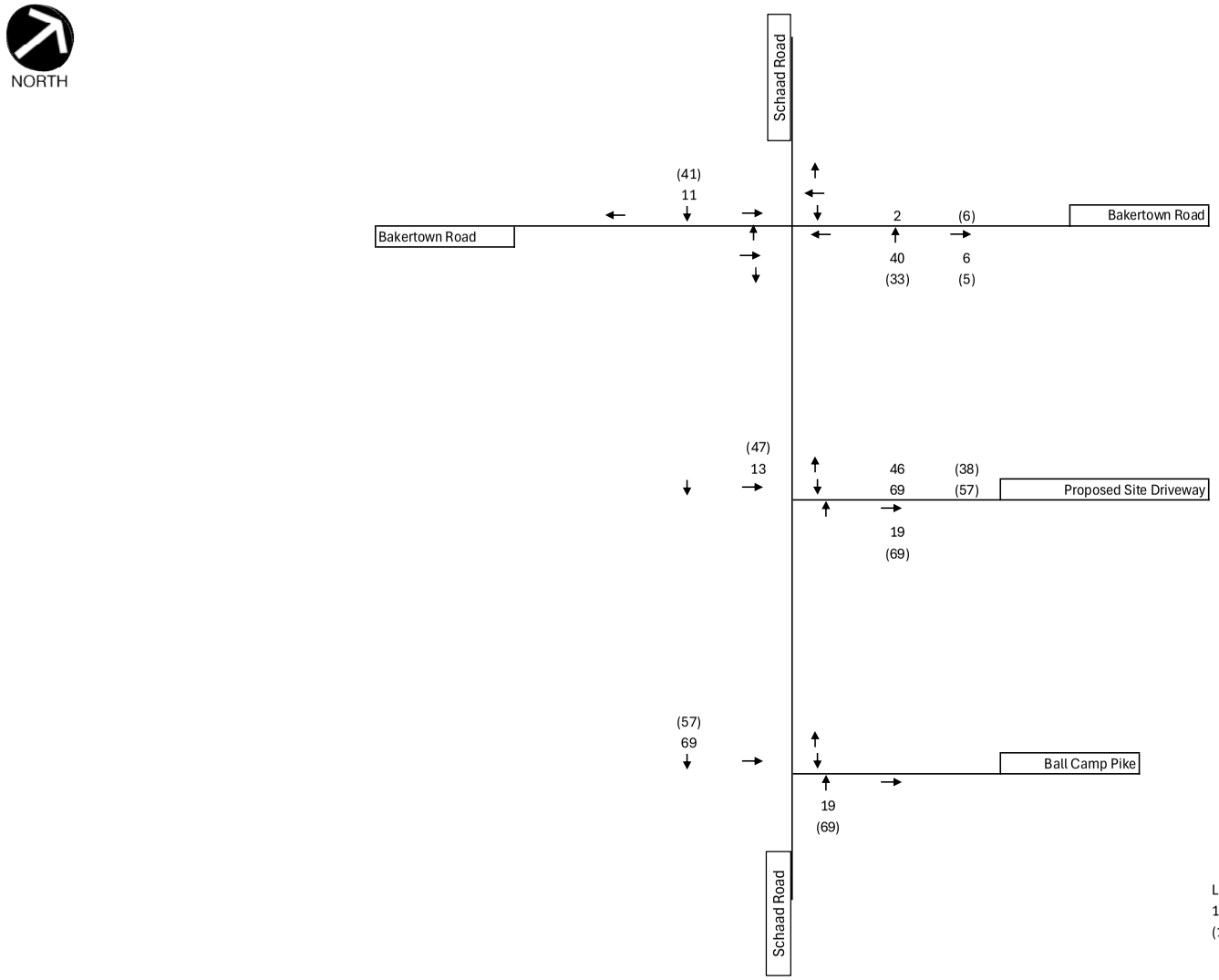
Legend:
12% - Trip Distribution Arrival %
(12%) - Trip Distribution Departure %

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway · Moon Township, PA 15108
412-429-2324 · 800-365-2324
www.cecinc.com

Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Forecasted Trip Distribution

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 6
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



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www.cecinc.com

Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Forecasted Trip Additions

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 7
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	

SUMMARY OF TRIP GENERATION PROJECTIONS FOR

WEIGEL'S CONVENIENCE MARKET WITH FUEL CENTER AND CAR WASH

Offsite Development
Trip Generation Summary for Weigel's Convenience Market with Fuel Center and Car Wash

Weekday

Land Use	Independent Variable	Size	Time Period	Method	Vehicle Trips		
					Entry	Exit	Total
945 - Convenience Store/Gas Station	Vehicle Fueling Position:	16	Weekday	Average (203.35)	1627	1627	3254
948 - Automated Car Wash	1000 Sq. Ft. GFA	1.07	Weekday	Average (253.51)	136	136	272

AM Peak Hour

Land Use	Independent Variable	Size	Time Period	Method	Vehicle Trips		
					Entry	Exit	Total
945 - Convenience Store/Gas Station	Vehicle Fueling Position:	16	Weekday, Peak Hour of	Average (23.21)	186	186	372
948 - Automated Car Wash	1000 Sq. Ft. GFA	1.07	Weekday, Peak Hour of	Average (14.89)	9	7	16

PM Peak Hour

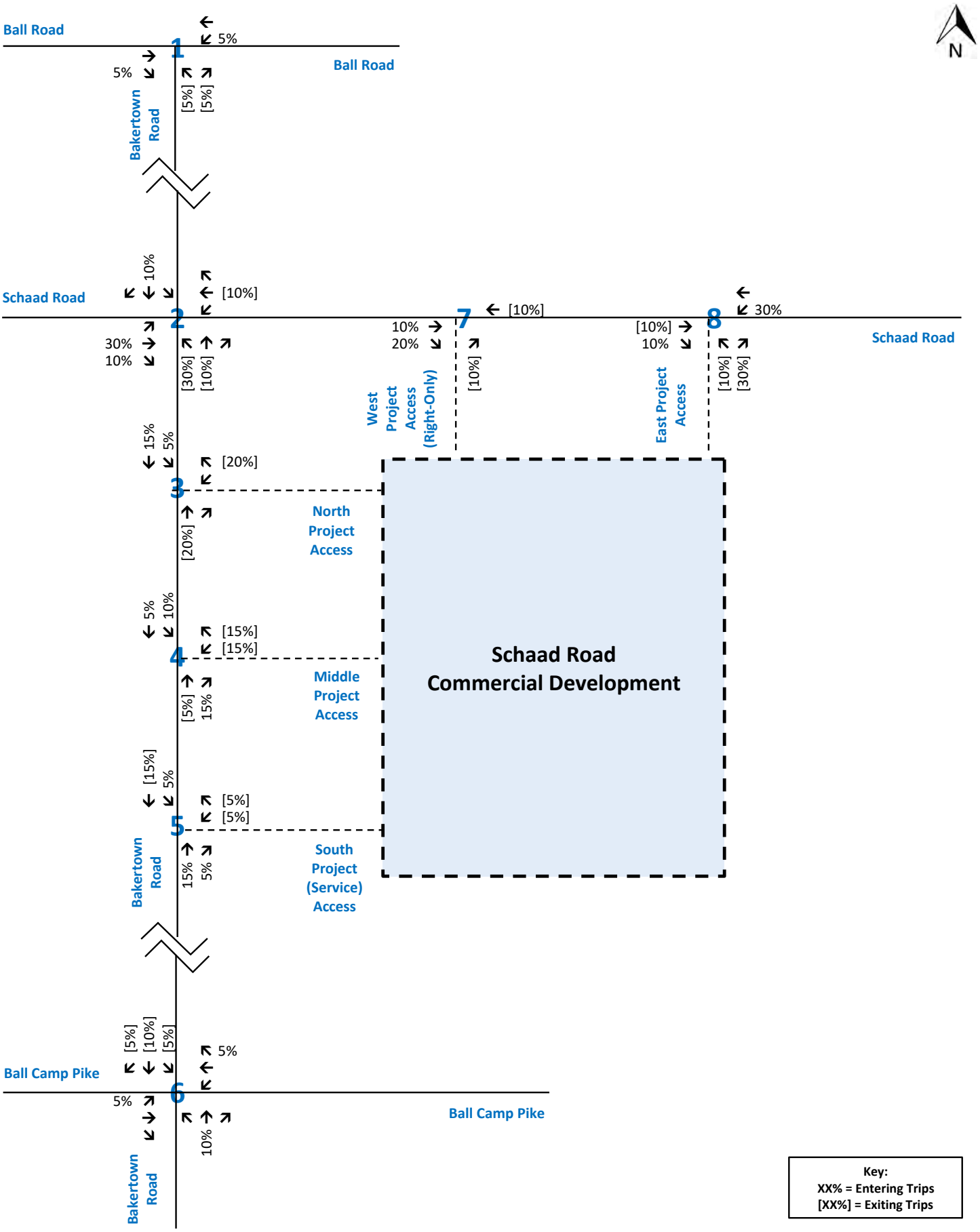
Land Use	Independent Variable	Size	Time Period	Method	Vehicle Trips		
					Entry	Exit	Total
945 - Convenience Store/Gas Station	Vehicle Fueling Position:	16	Weekday, Peak Hour of	Average (21.08)	169	169	338
948 - Automated Car Wash	1000 Sq. Ft. GFA	1.07	Weekday, Peak Hour of	Average (24.40)	13	13	26

APPENDIX D

TRIP DISTRIBUTION

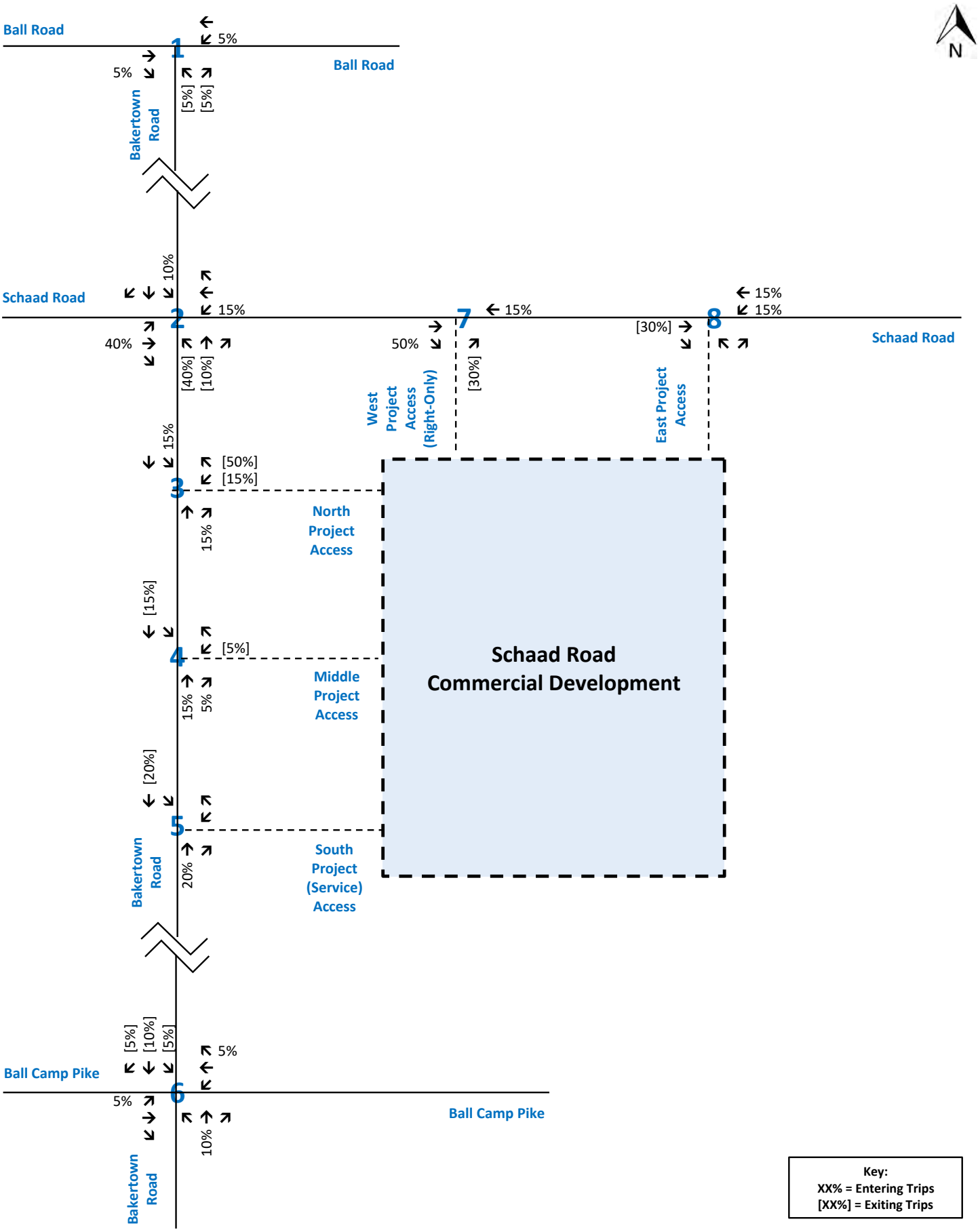
TRIP DISTRIBUTION

SITE DEVELOPMENT



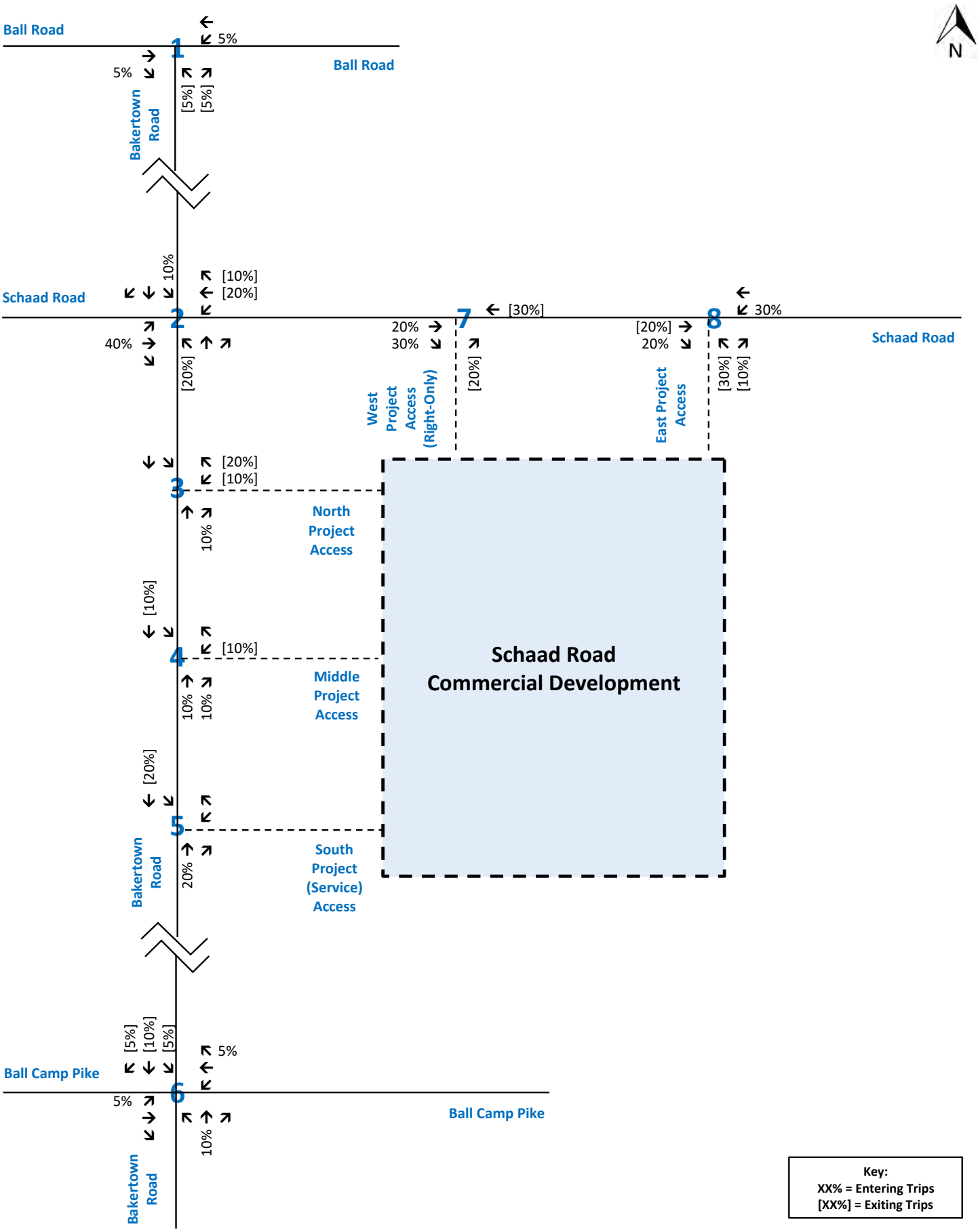
Trip Distribution Worksheet
Primary Trip Distribution - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



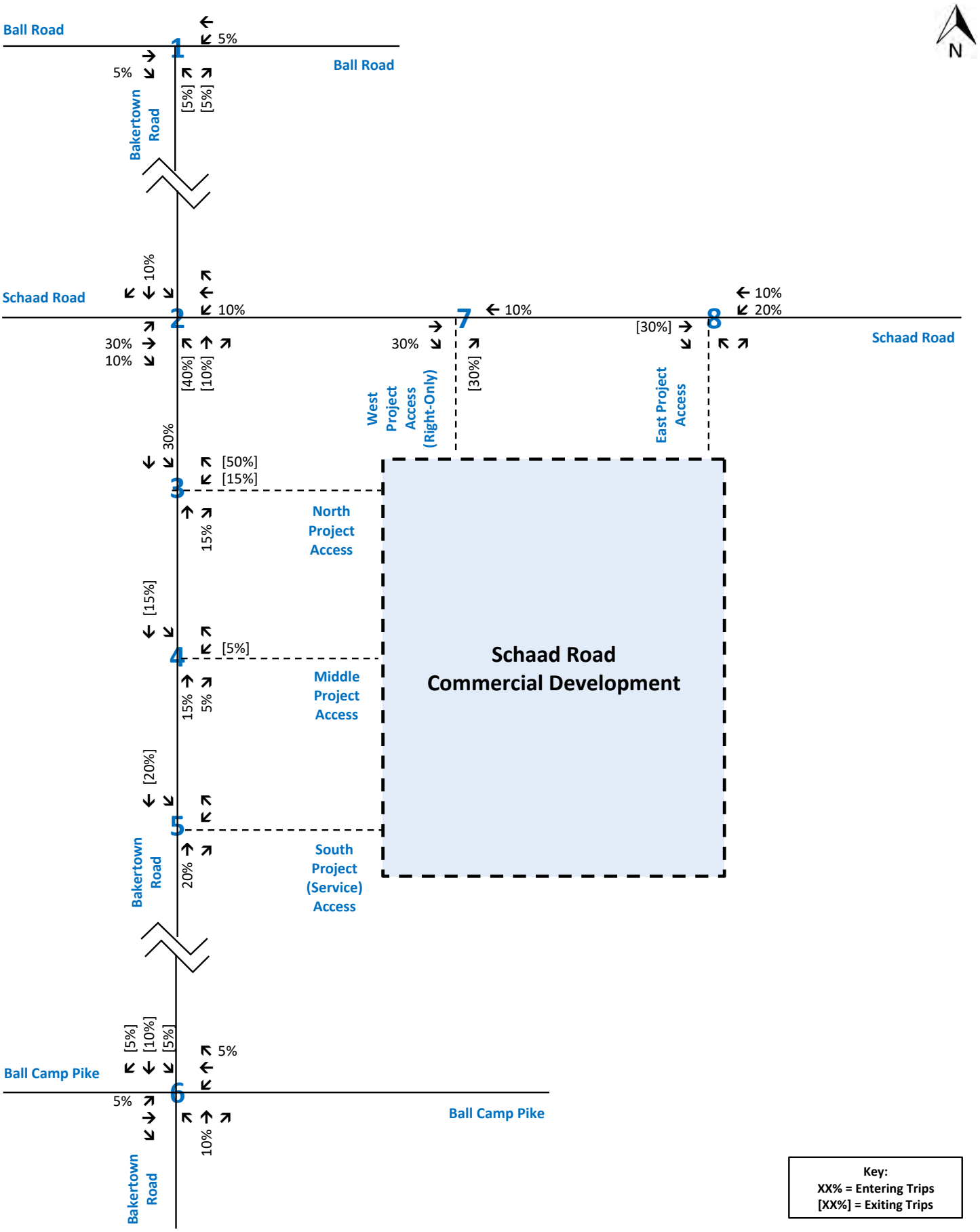
Trip Distribution Worksheet
Primary Trip Distribution - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



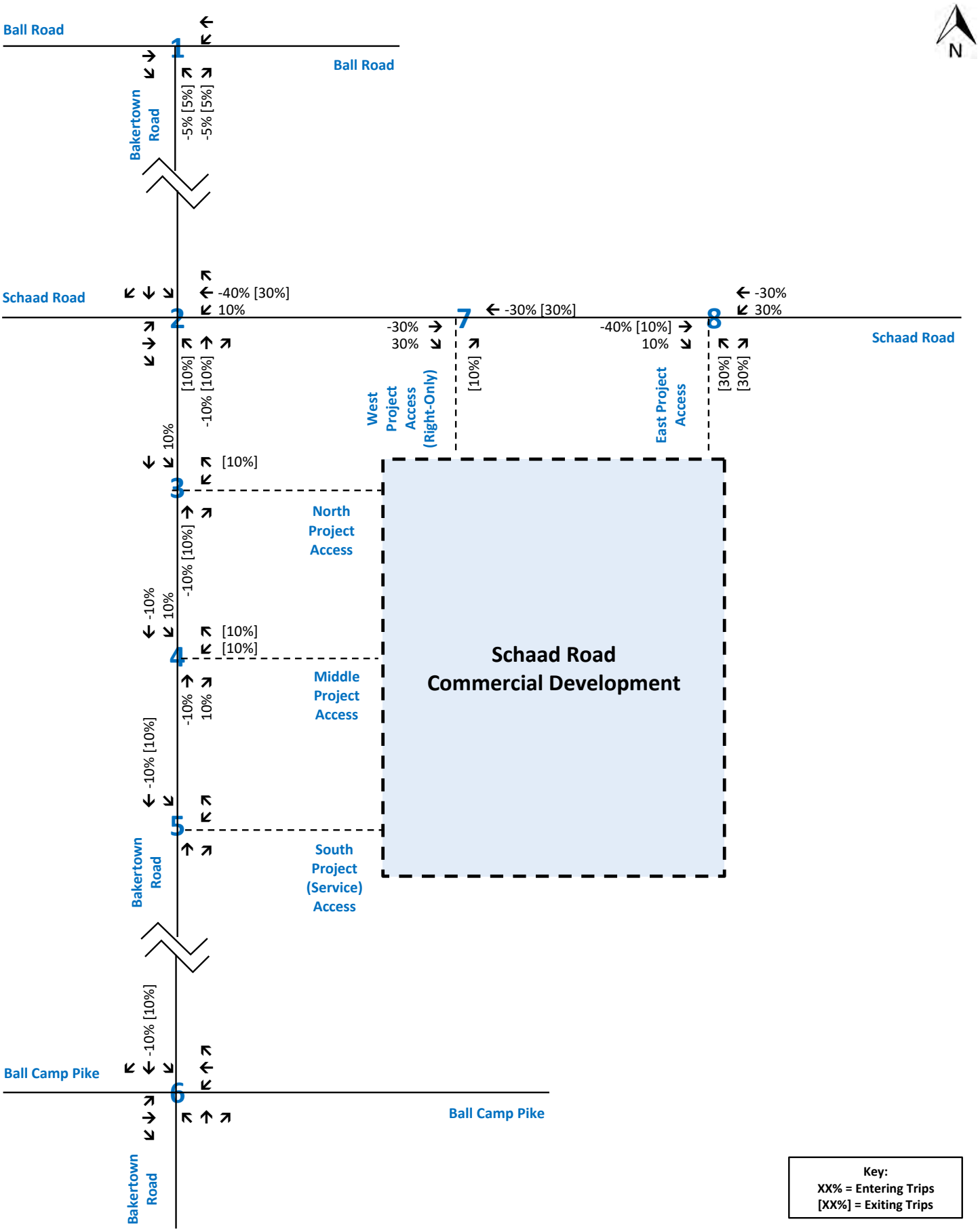
Trip Distribution Worksheet
Primary Trip Distribution - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



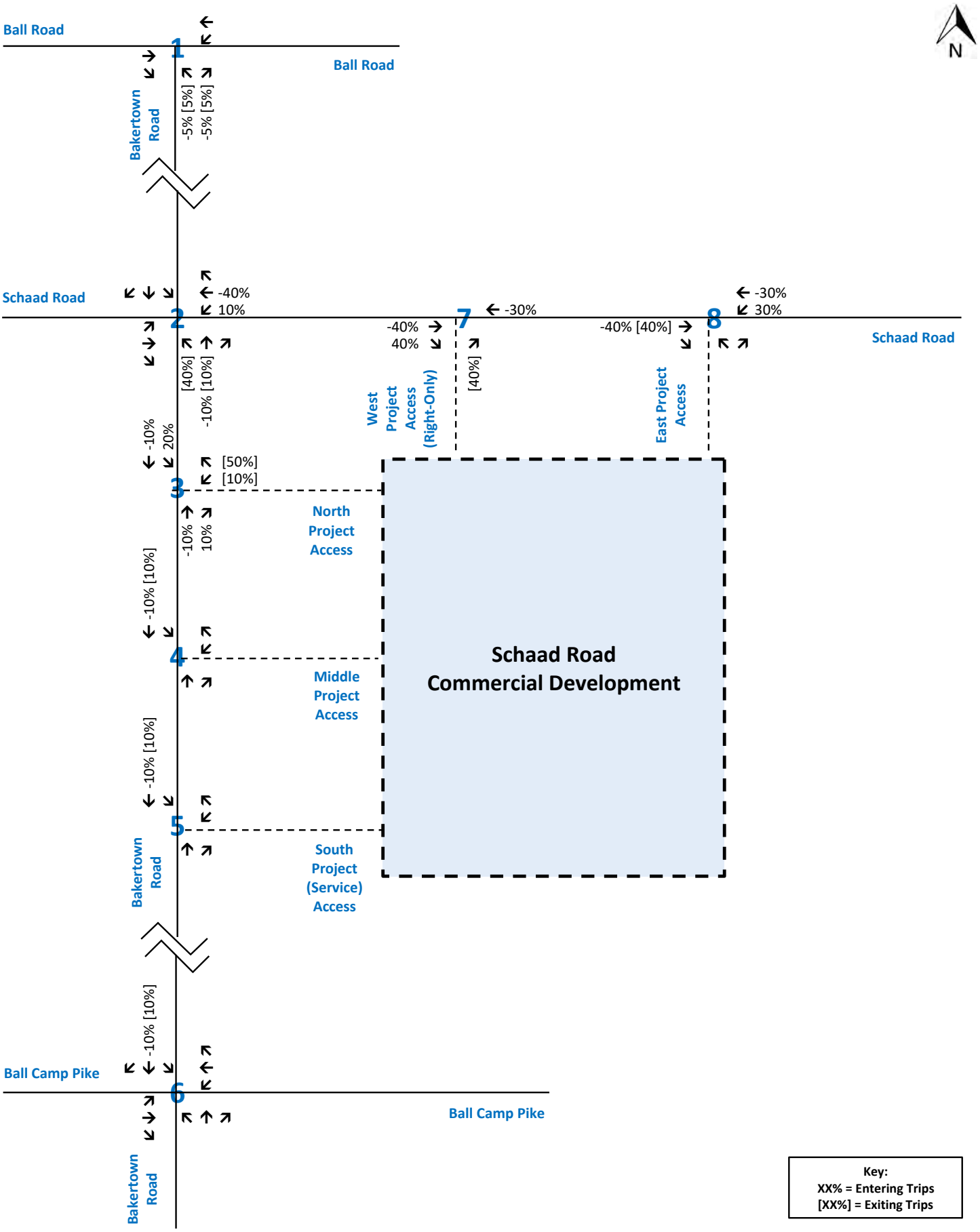
Trip Distribution Worksheet
Primary Trip Distribution - Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



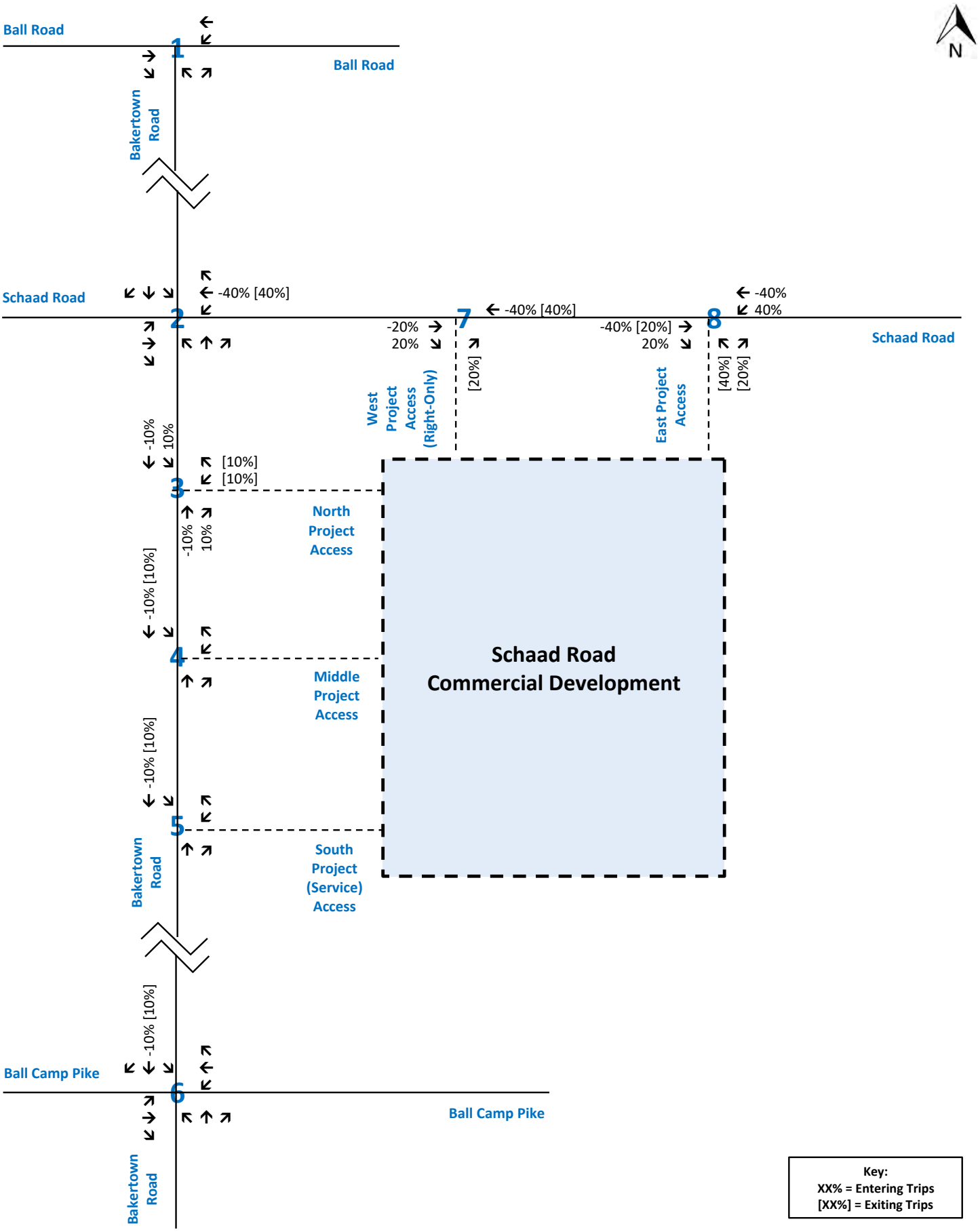
Trip Distribution Worksheet
Pass-By Trip Distribution - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



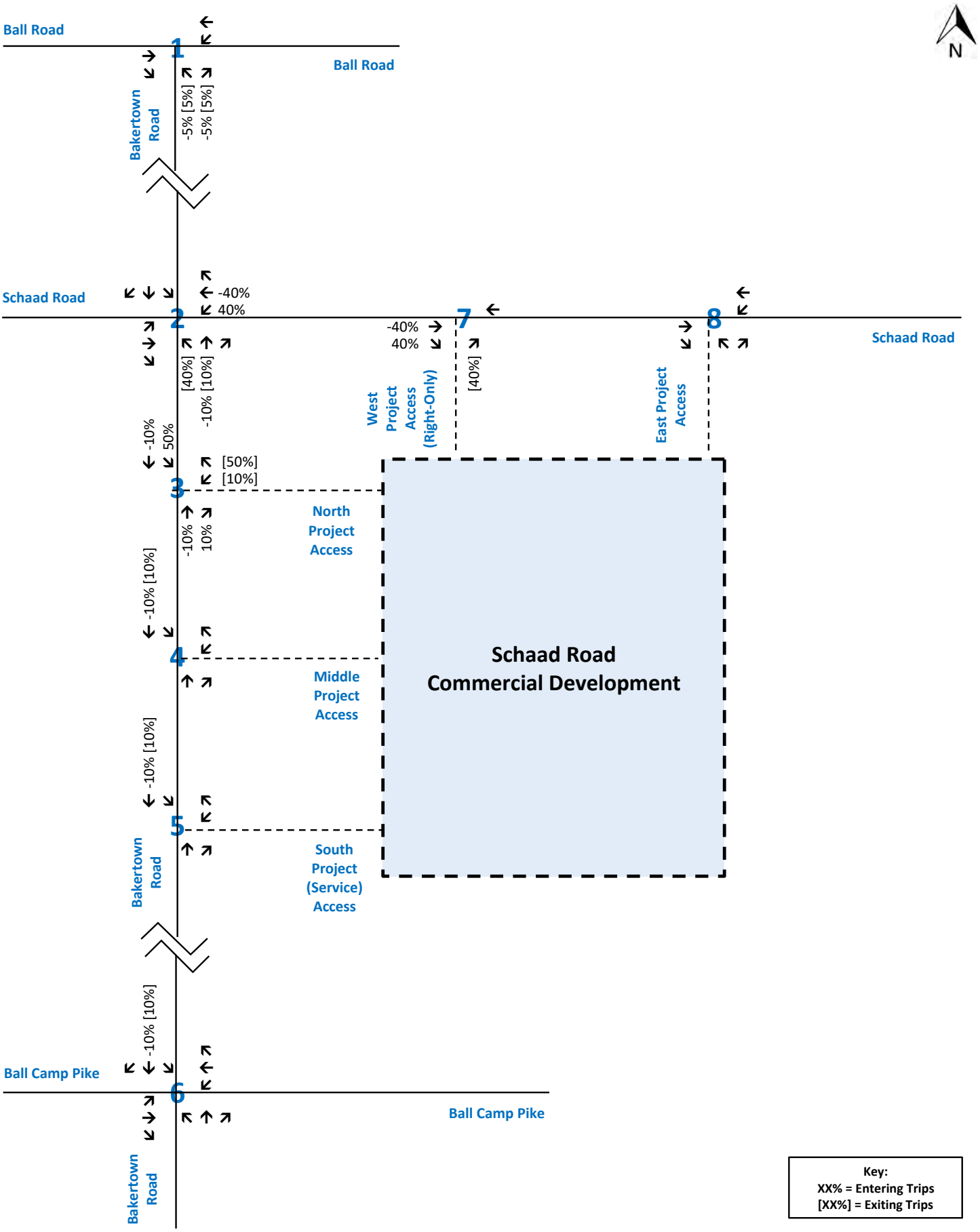
Trip Distribution Worksheet
Pass-By Trip Distribution - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Trip Distribution Worksheet
Pass-By Trip Distribution - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

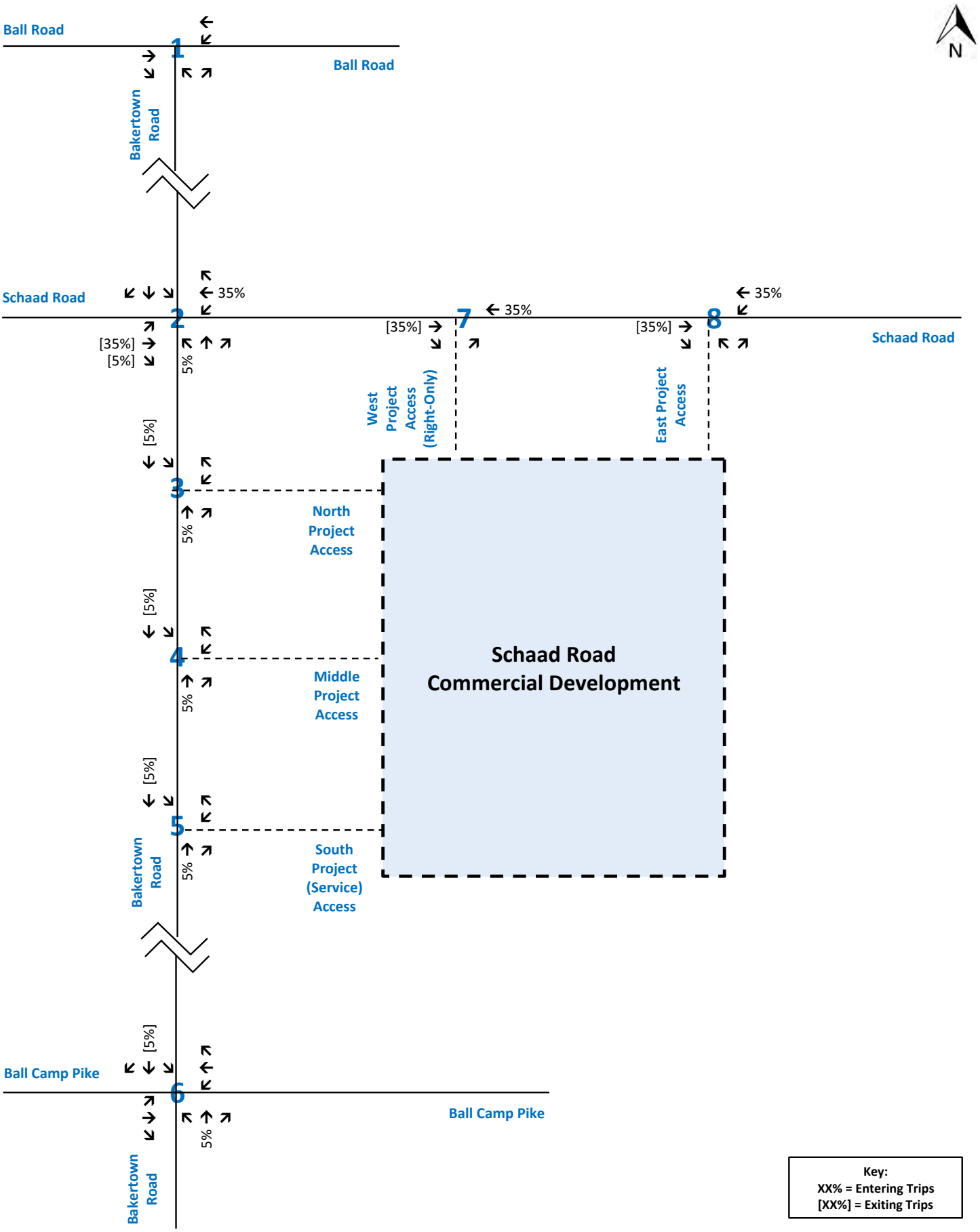


Trip Distribution Worksheet
Pass-By Trip Distribution - Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

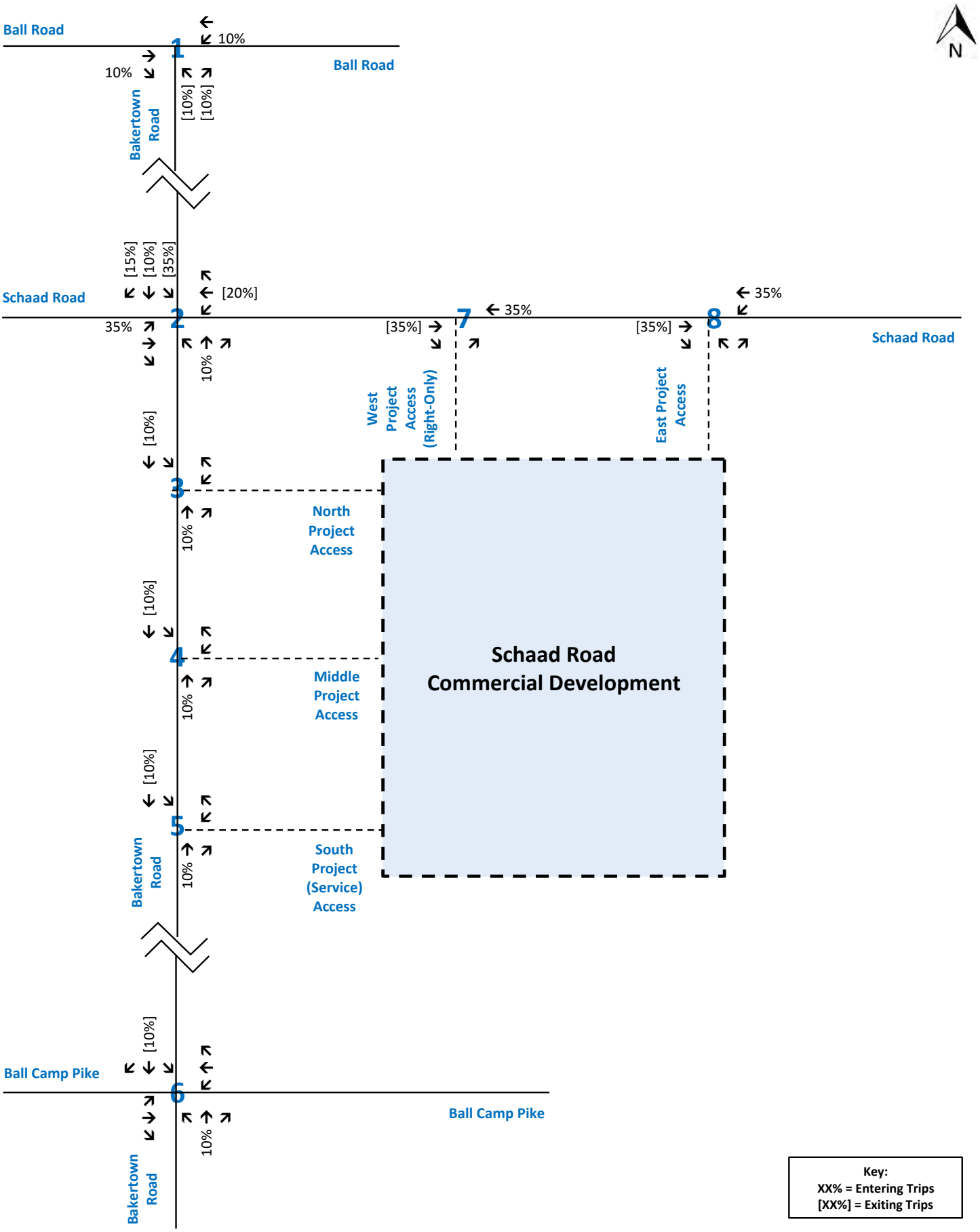
TRIP DISTRIBUTION

OFF-SITE DEVELOPMENT



Trip Distribution Worksheet
Offsite Trip Distribution - Schaad Road Apartments
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Trip Distribution Worksheet
Offsite Trip Distribution - Weigel's (Primary Trips)
Schaad Road Commercial Development
Knox County, Tennessee

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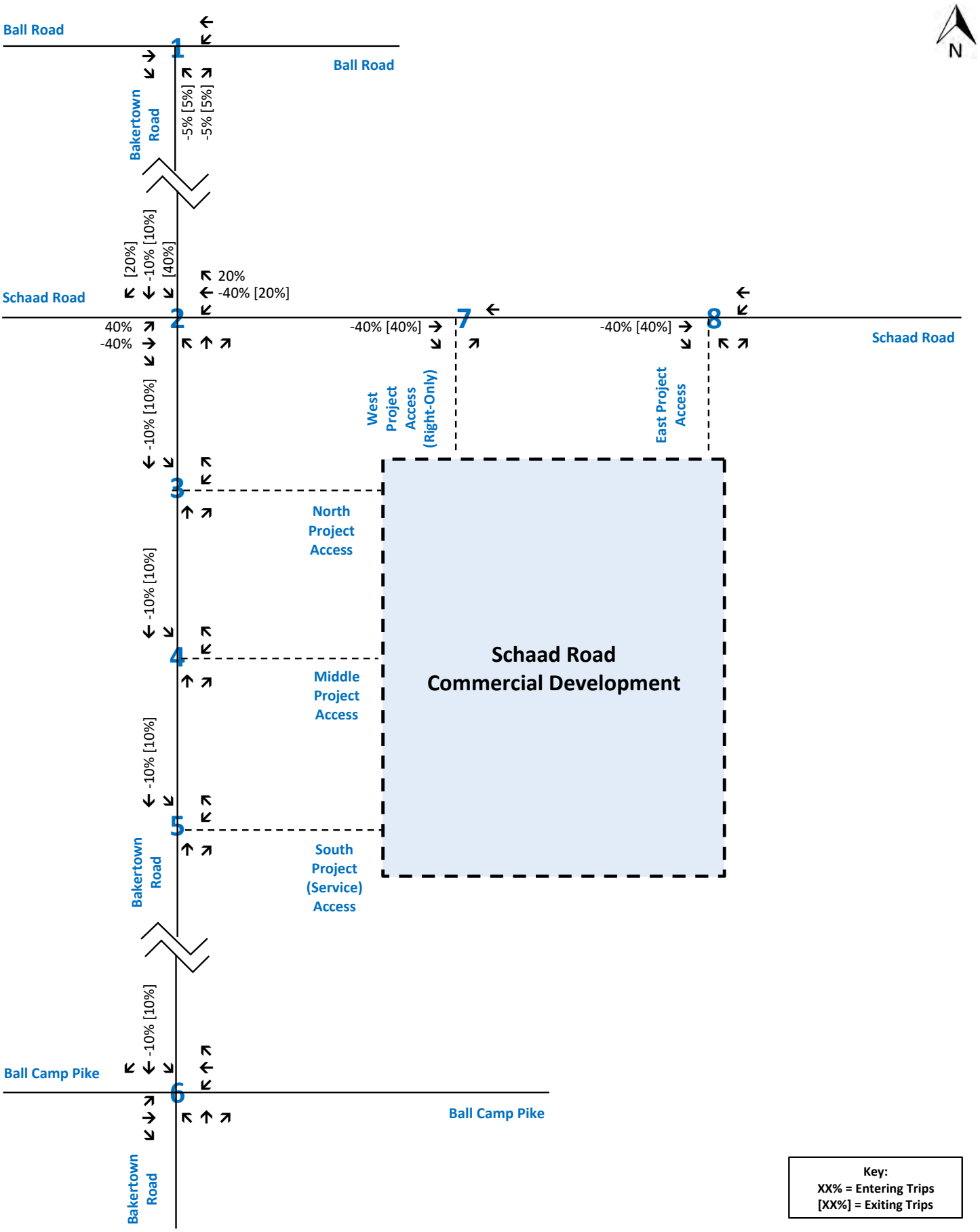
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Trip Distribution Worksheet
Offsite Trip Distribution - Weigel's (Pass-By Trips)
Schaad Road Commercial Development
Knox County, Tennessee

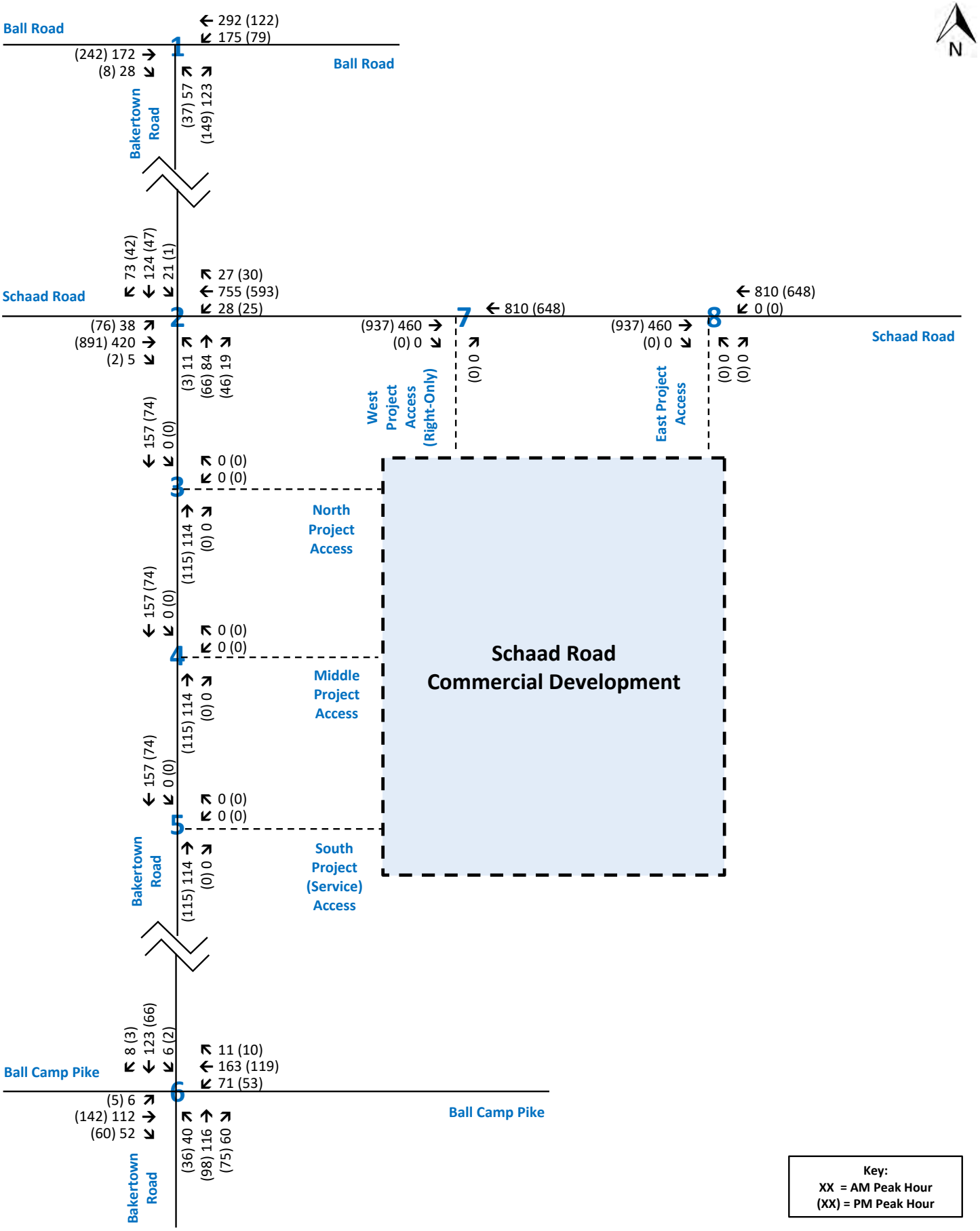
RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

APPENDIX E

TRAFFIC ASSIGNMENT

TRAFFIC ASSIGNMENT WORKSHEETS

AM & PM PEAK HOURS



Traffic Assignment Worksheet
Existing Traffic Volumes (2026)
Schaad Road Commercial Development
Knox County, Tennessee

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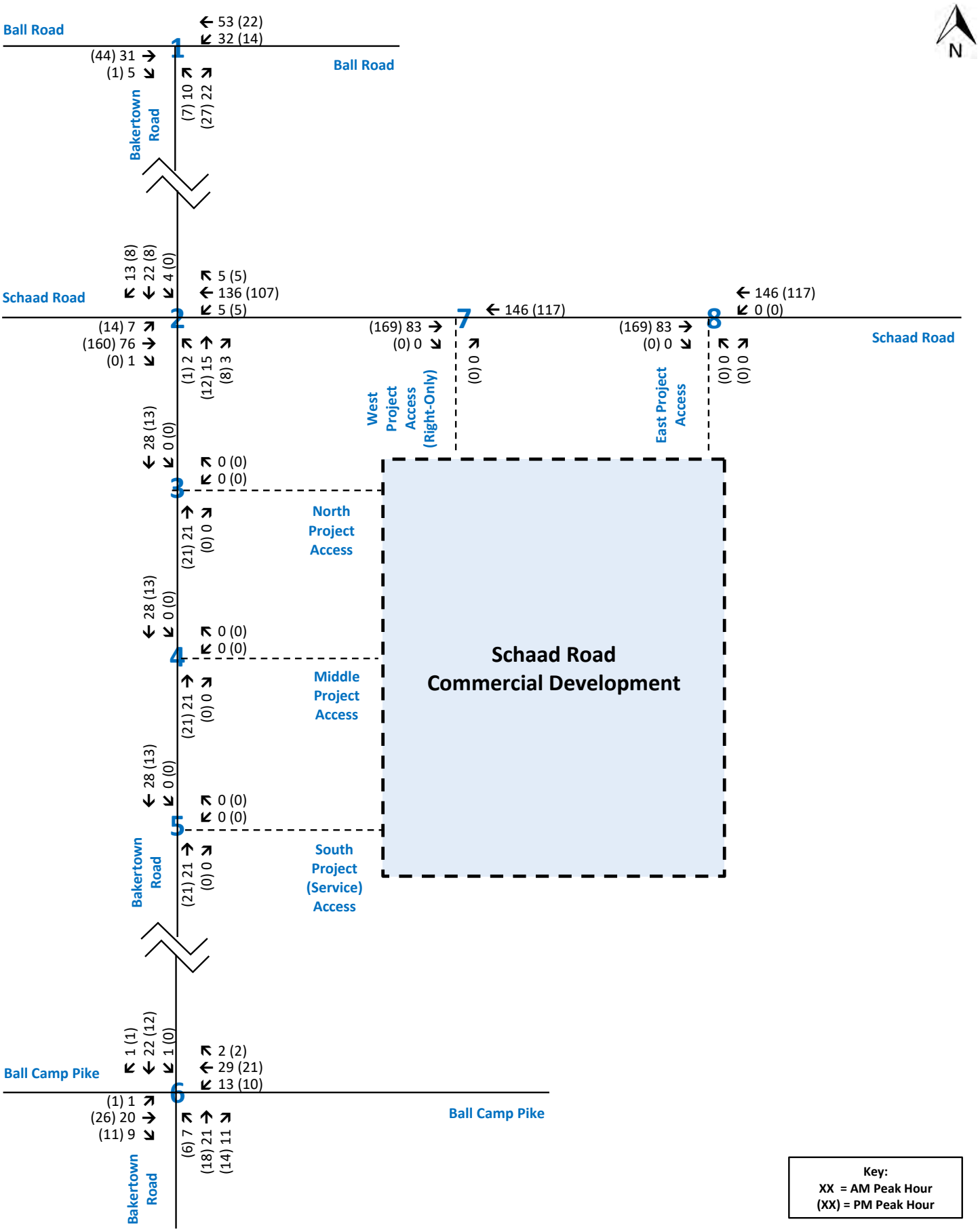
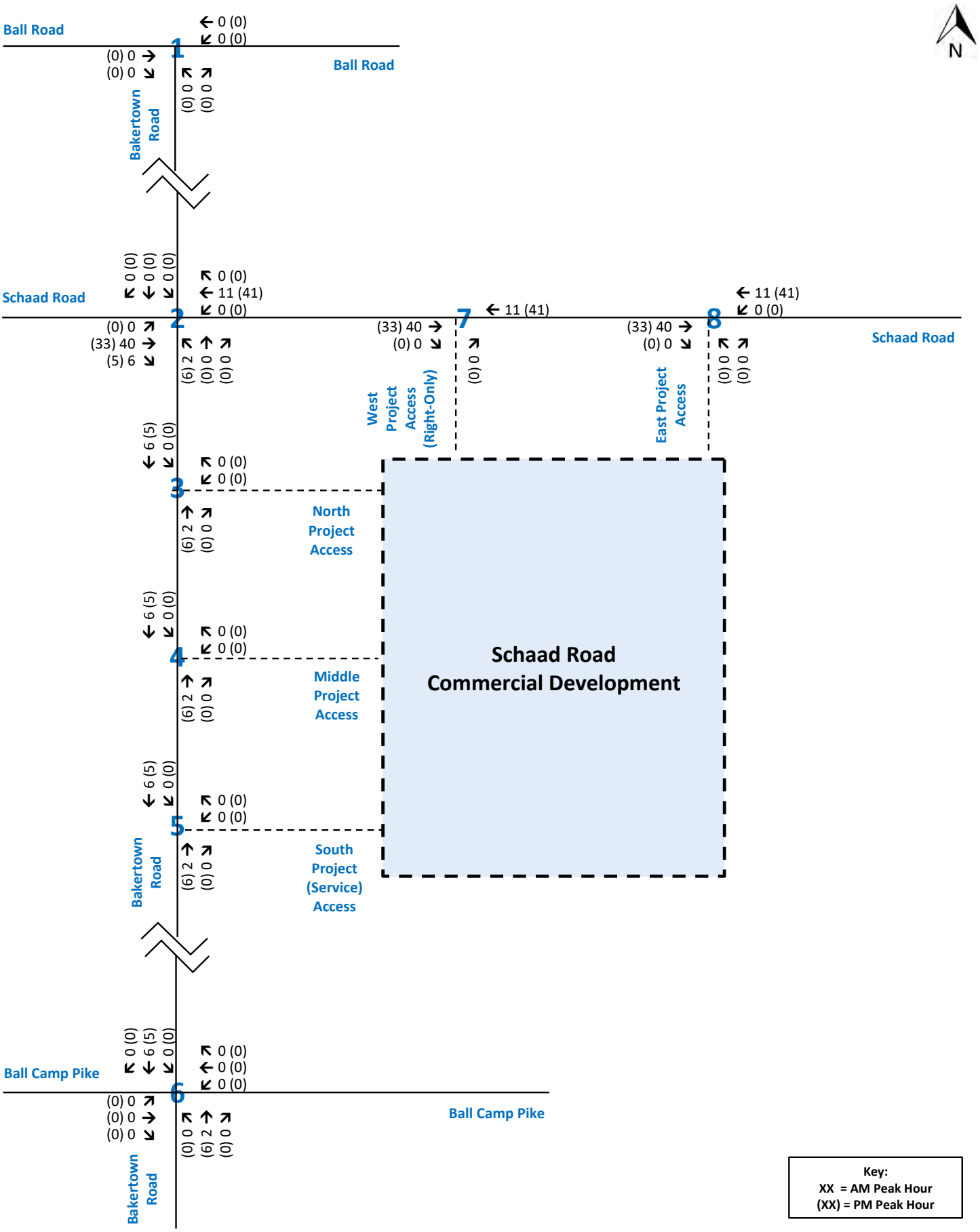
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

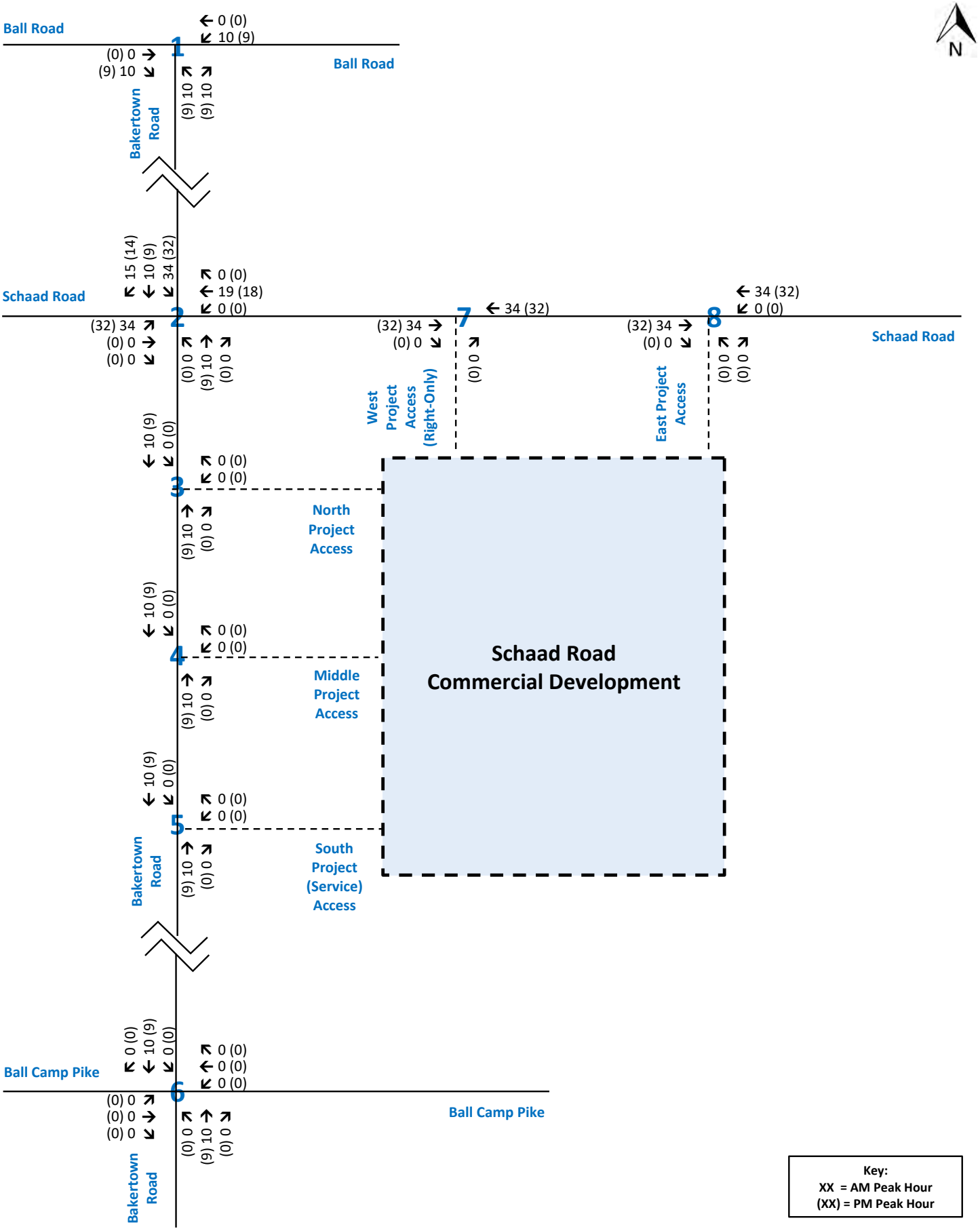


Traffic Assignment Worksheet
Background - Historical Growth Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

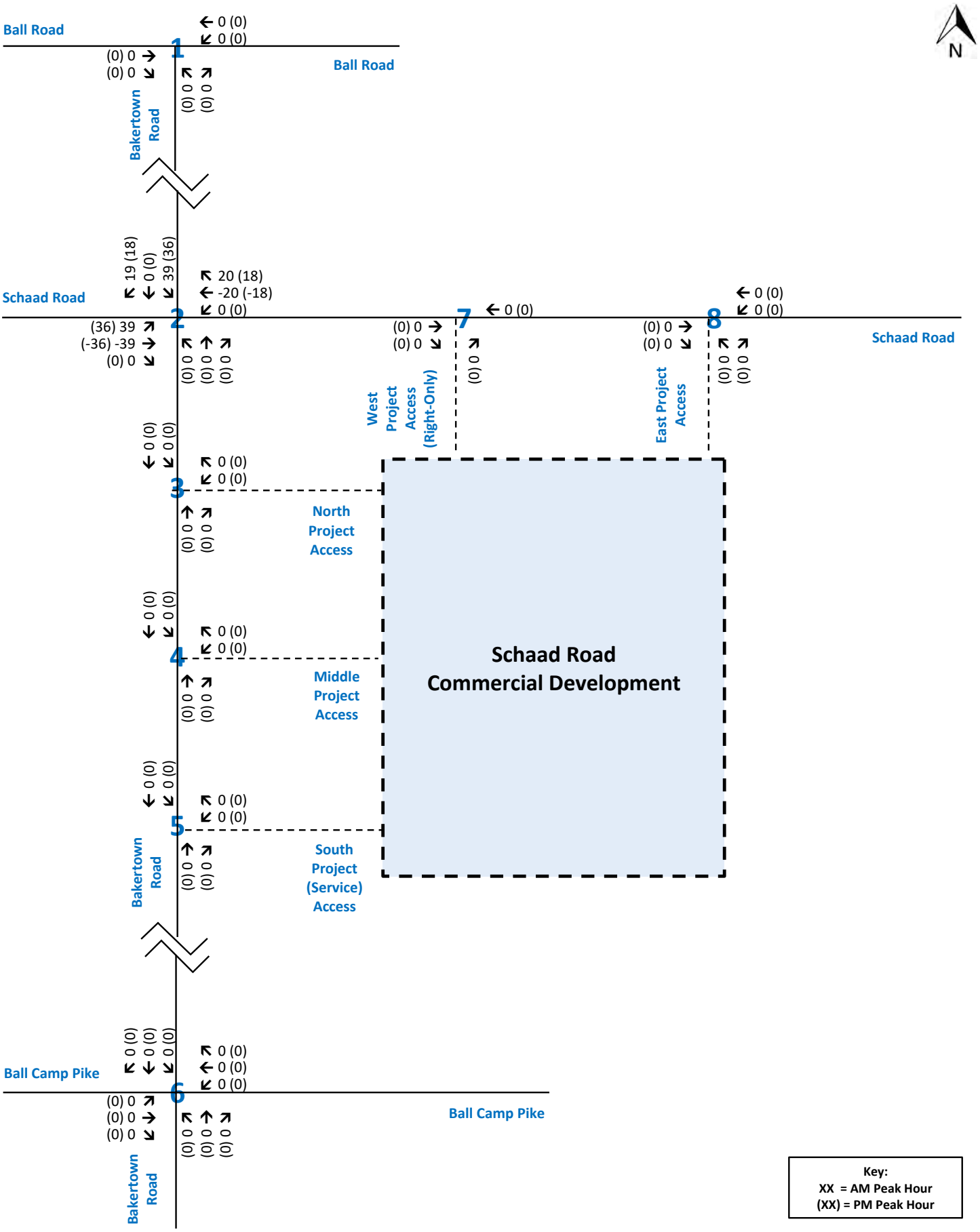


Traffic Assignment Worksheet
Offsite Traffic Assignment - Schaad Road Apartments
Schaad Road Commercial Development
Knox County, Tennessee



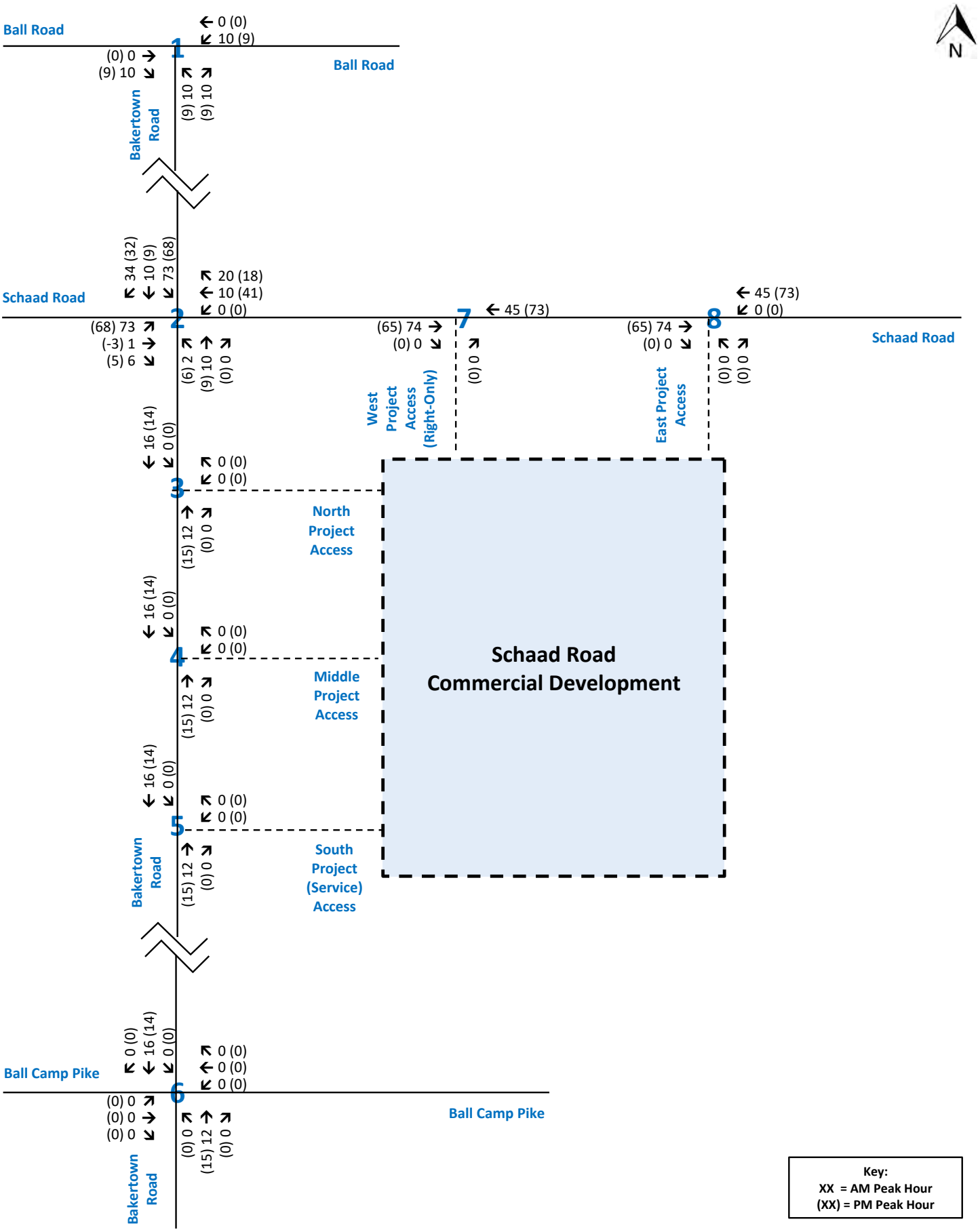
Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Primary Trips)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



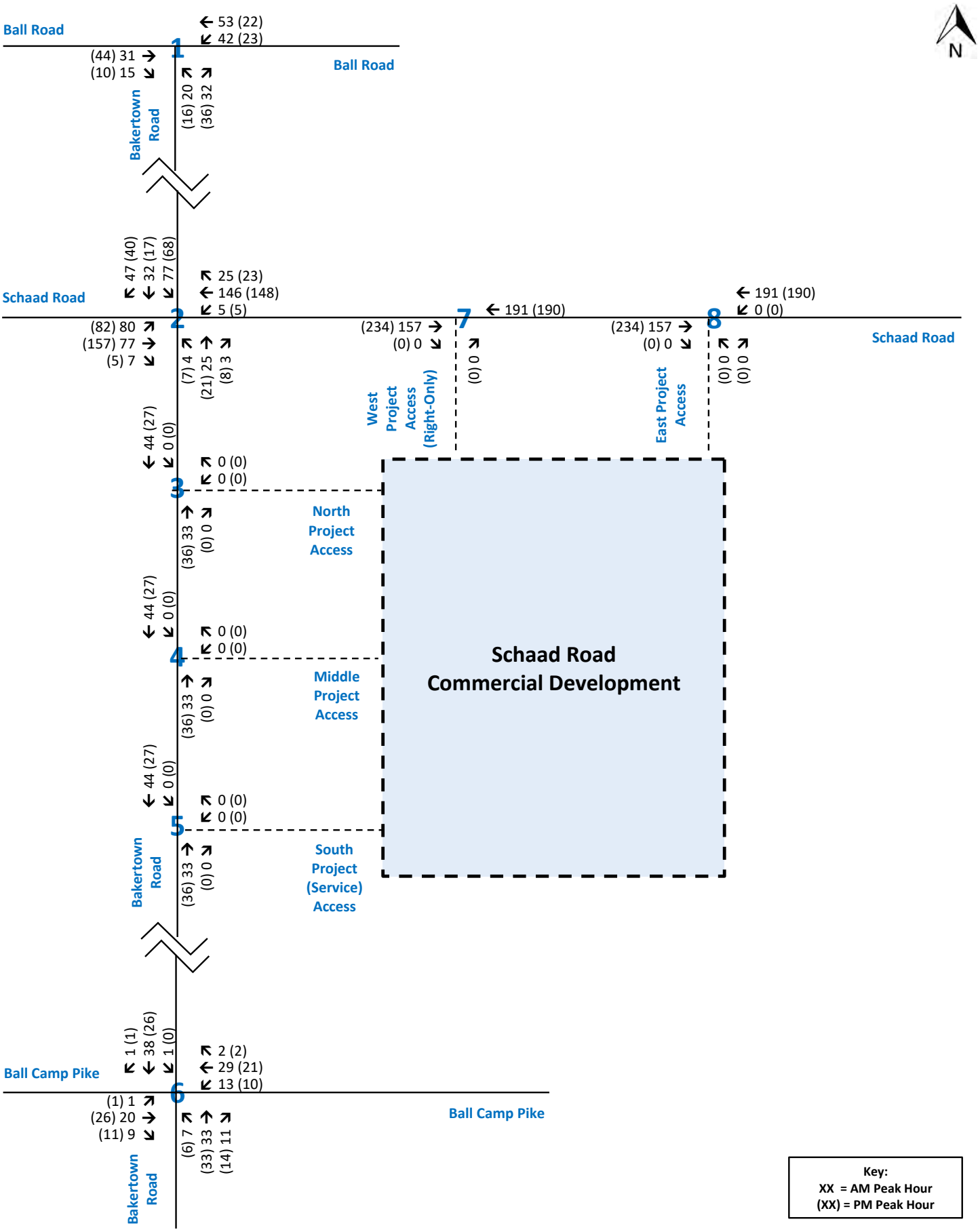
Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Pass-By Trips)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



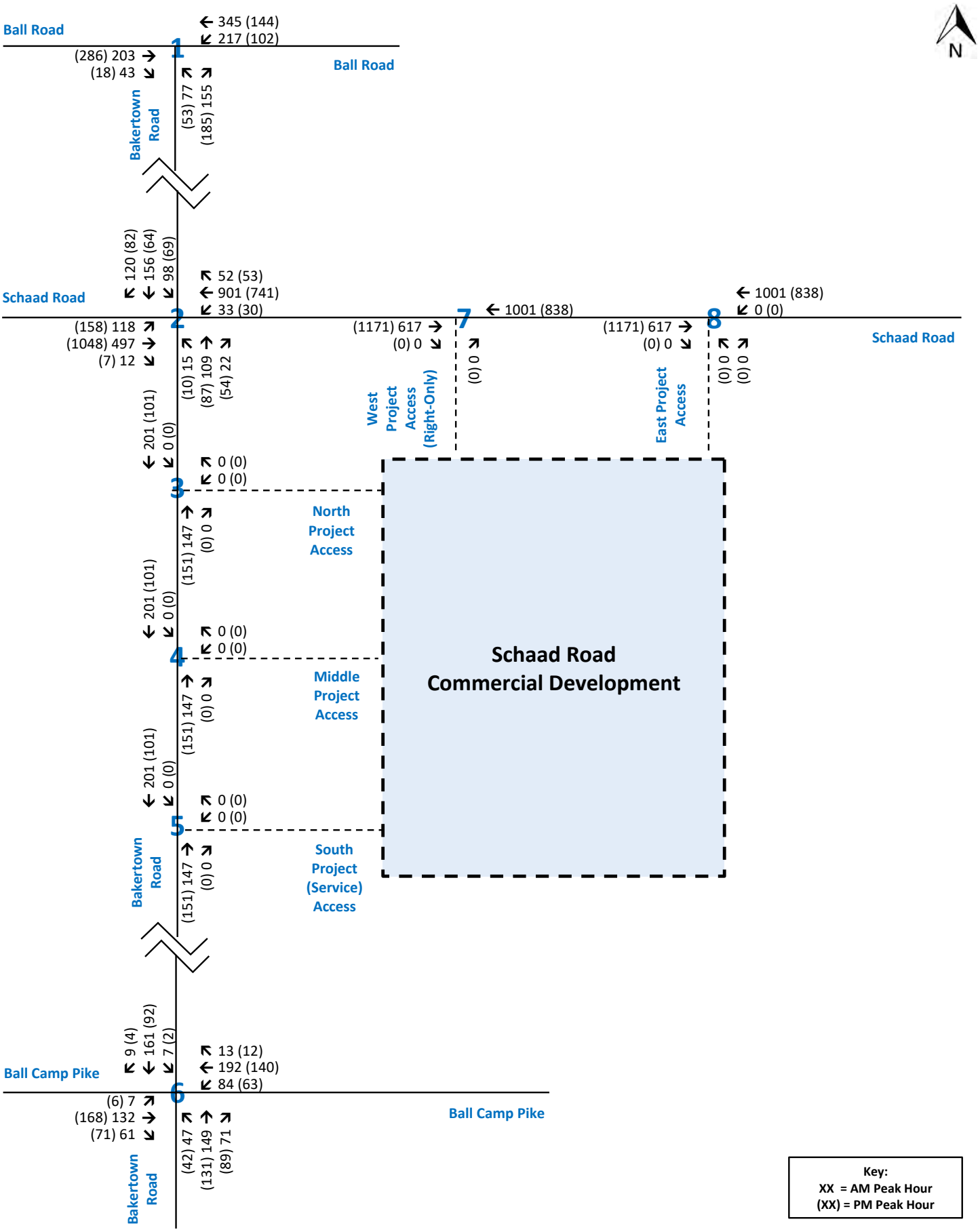
Traffic Assignment Worksheet
Background - Offsite Development Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

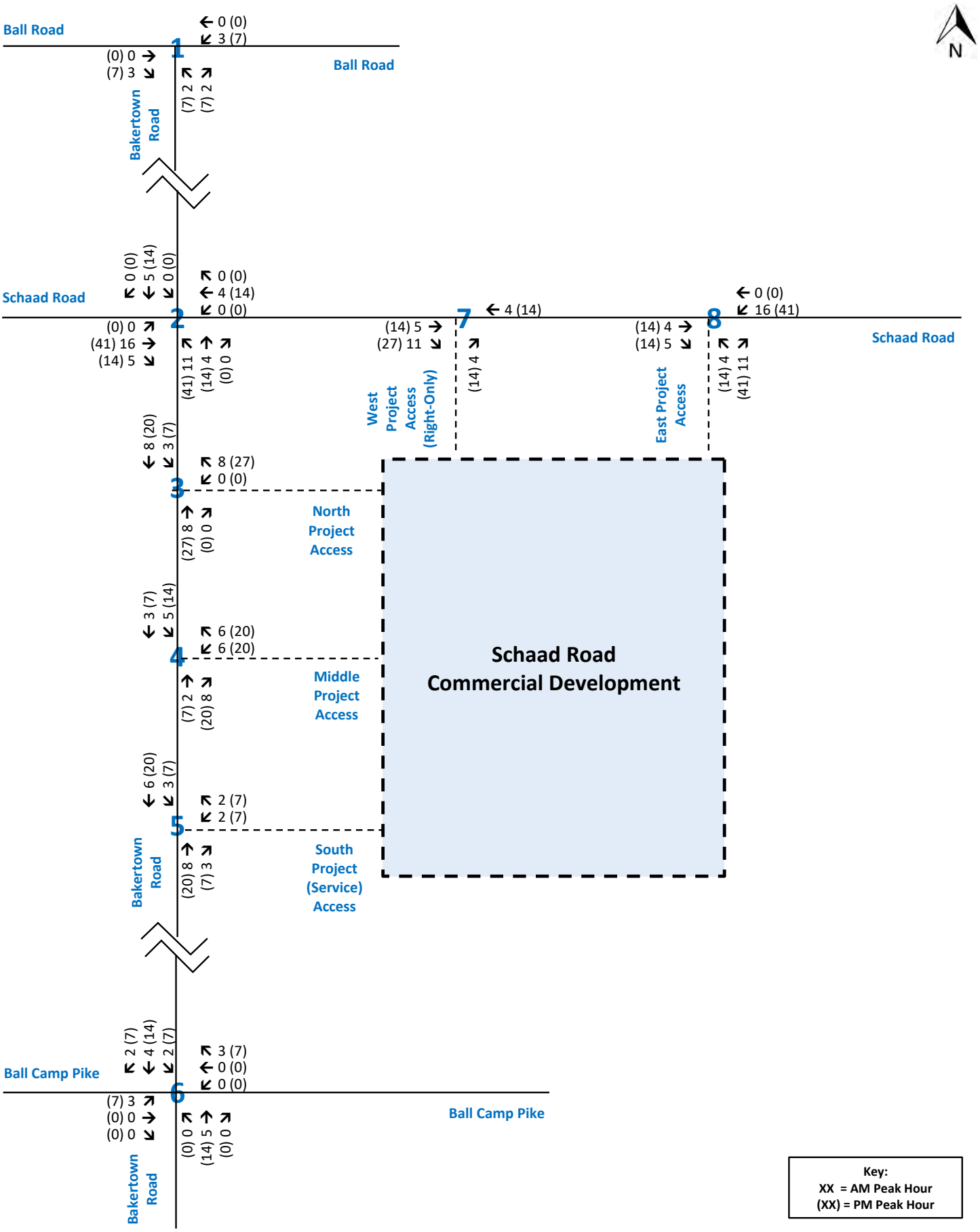


Traffic Assignment Worksheet
Background (Growth + Offsite)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

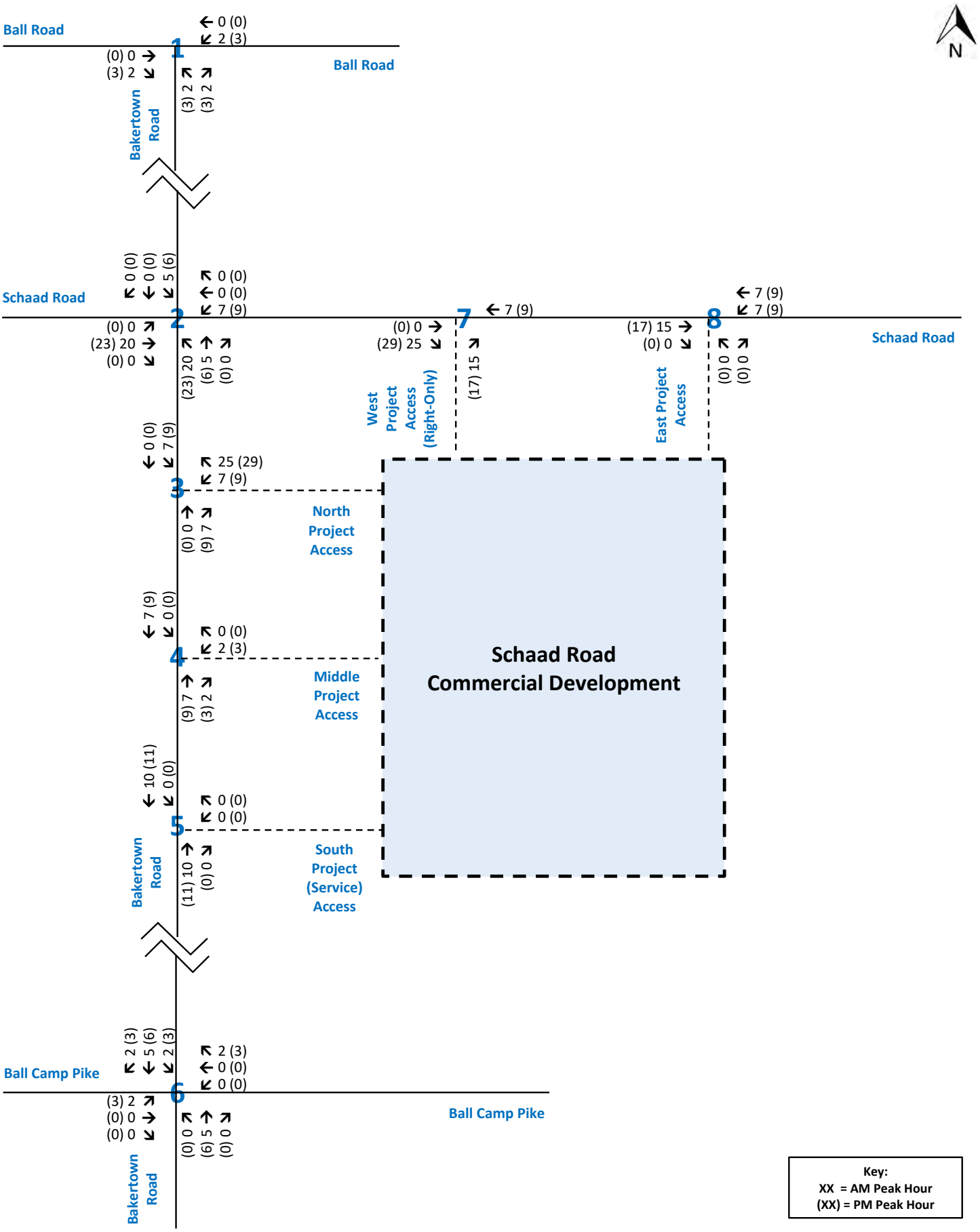


Traffic Assignment Worksheet
Background Traffic Volumes (2030)
Schaad Road Commercial Development
Knox County, Tennessee

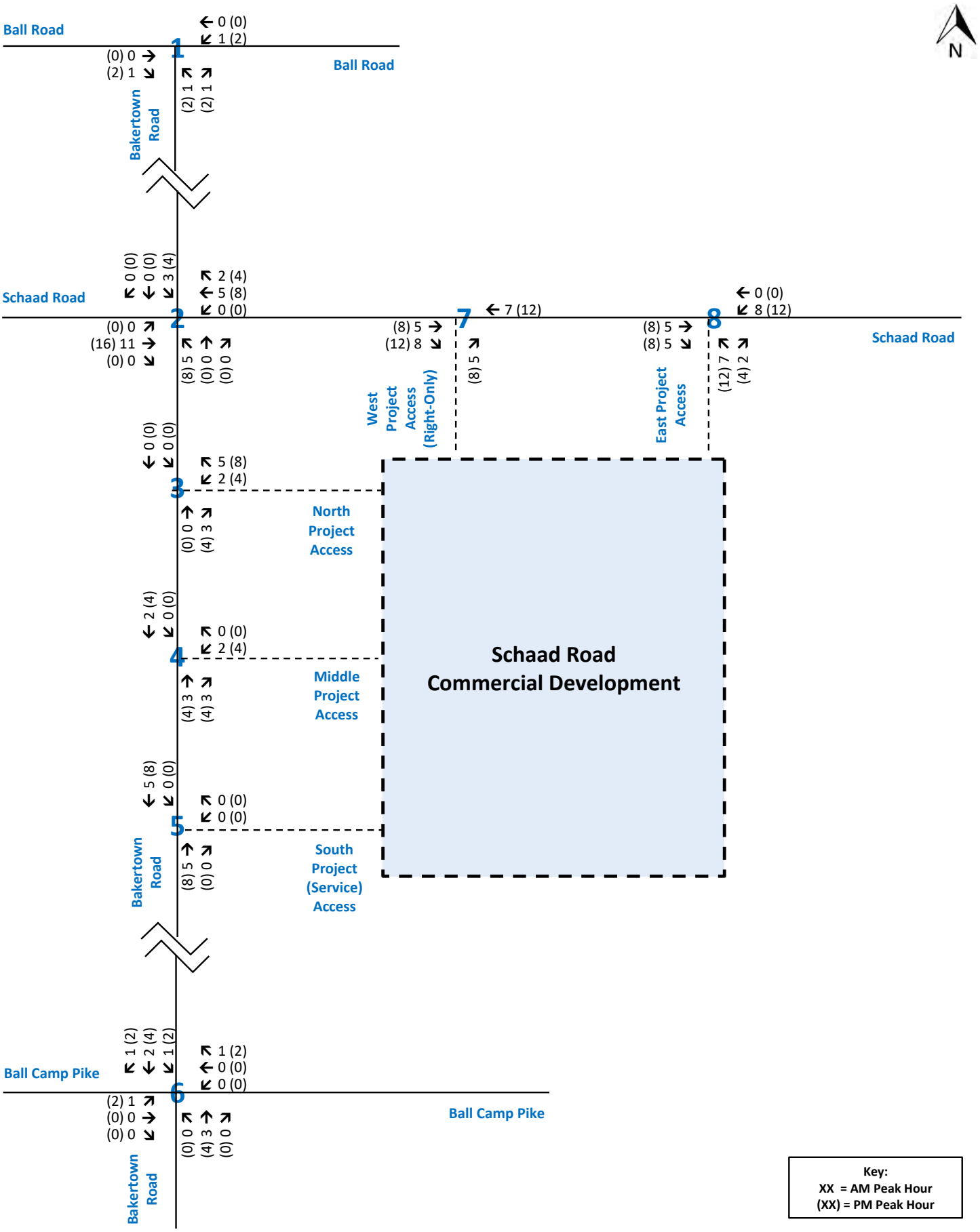


Traffic Assignment Worksheet
Primary Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

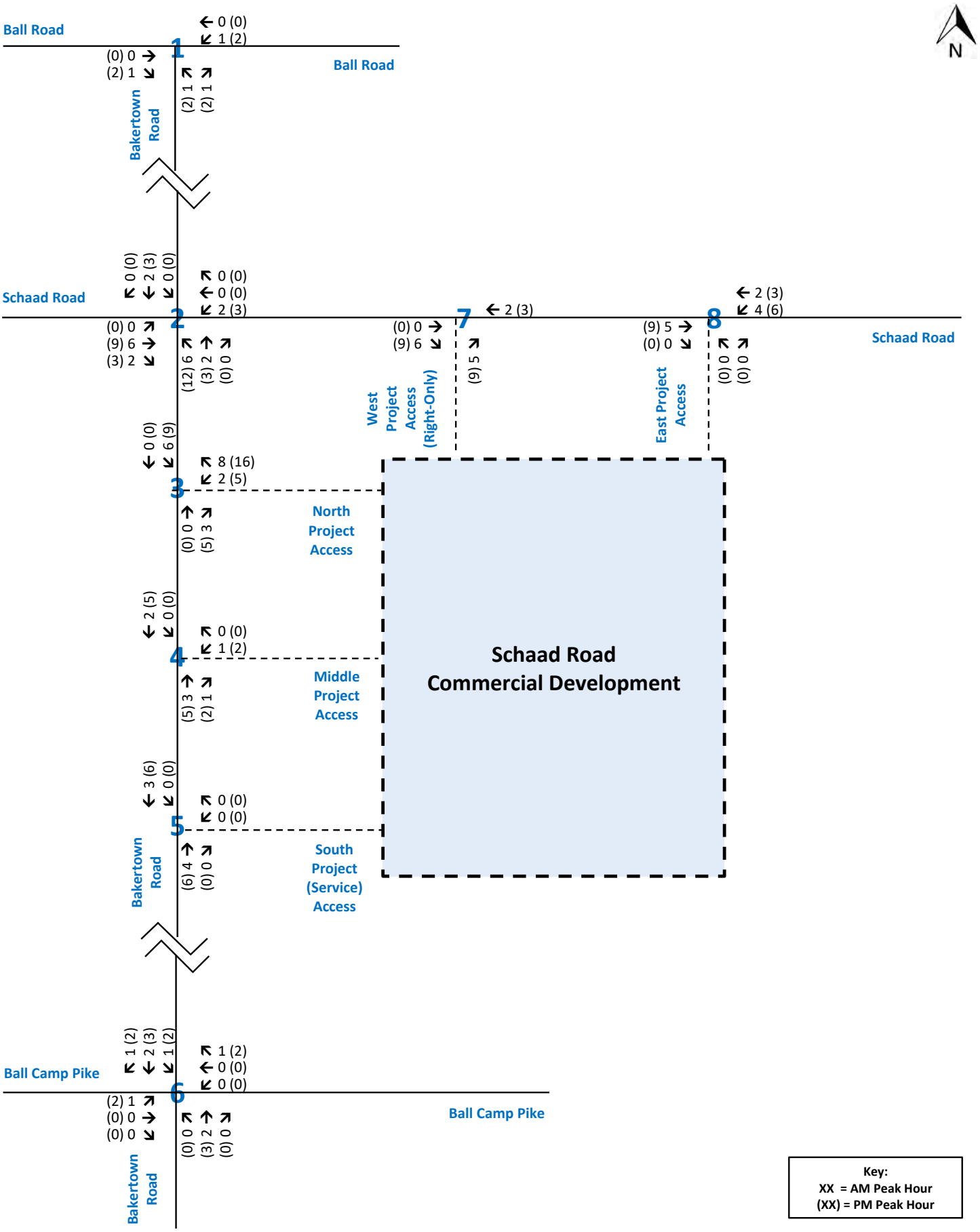


Traffic Assignment Worksheet
Primary Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee



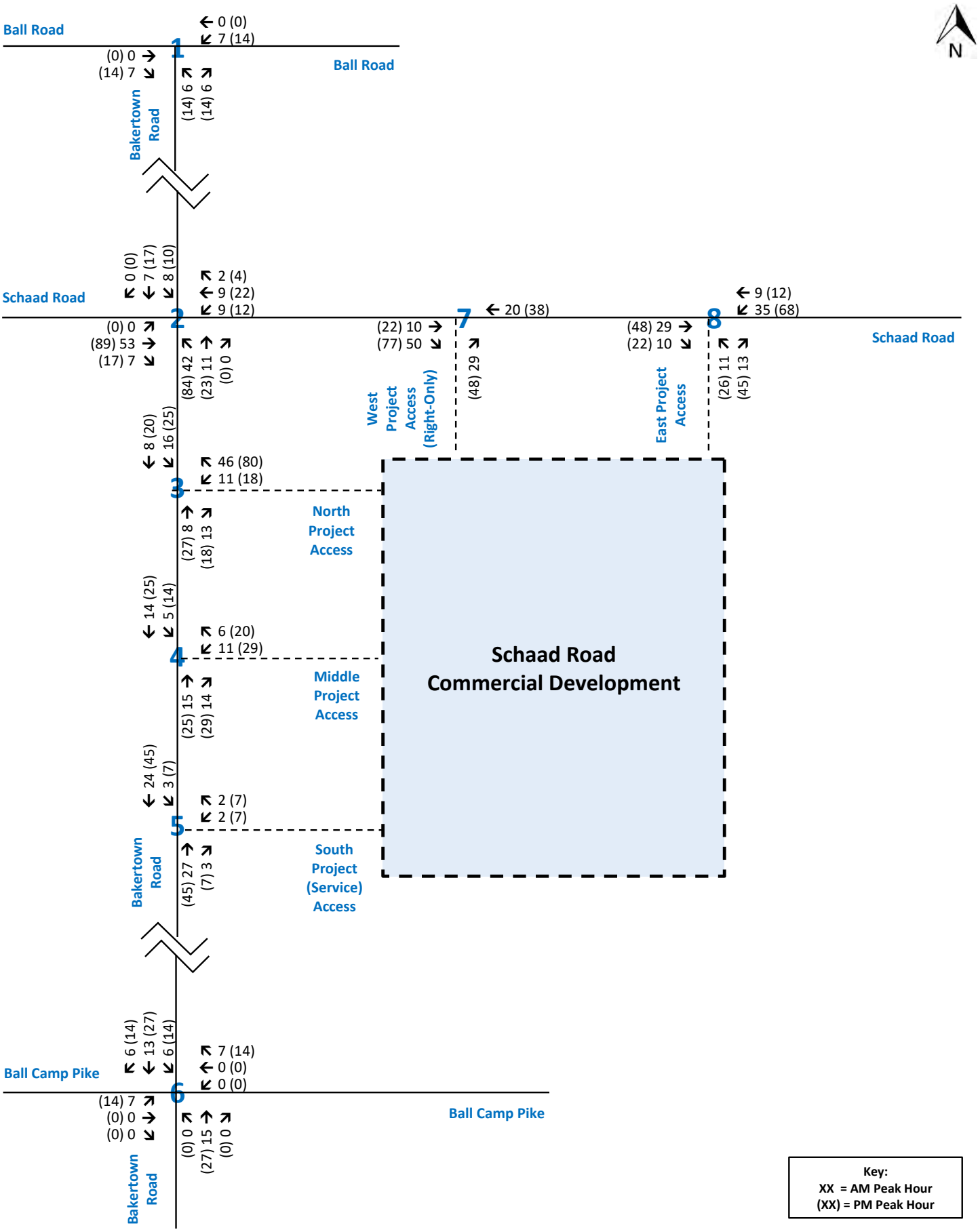
Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

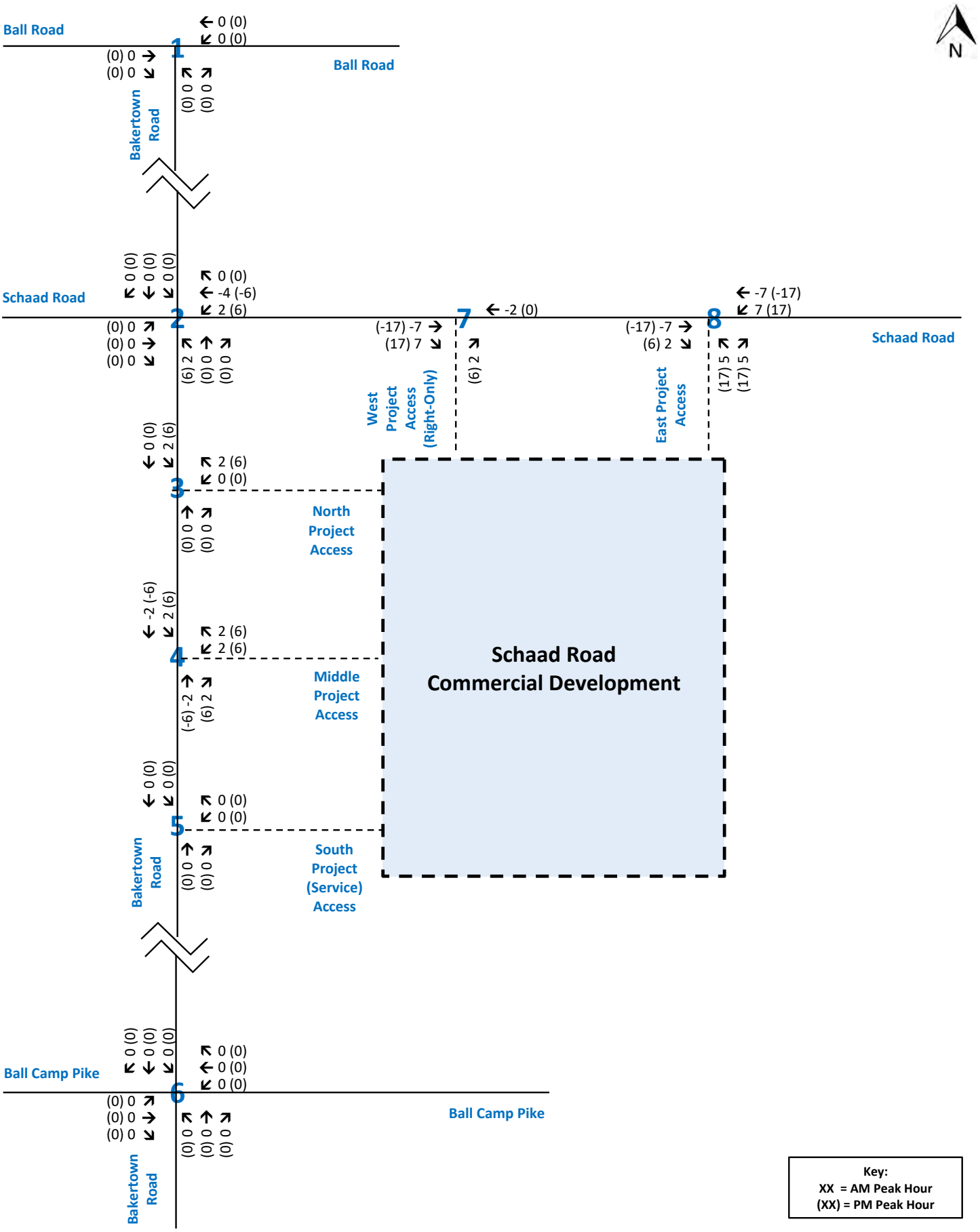


Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

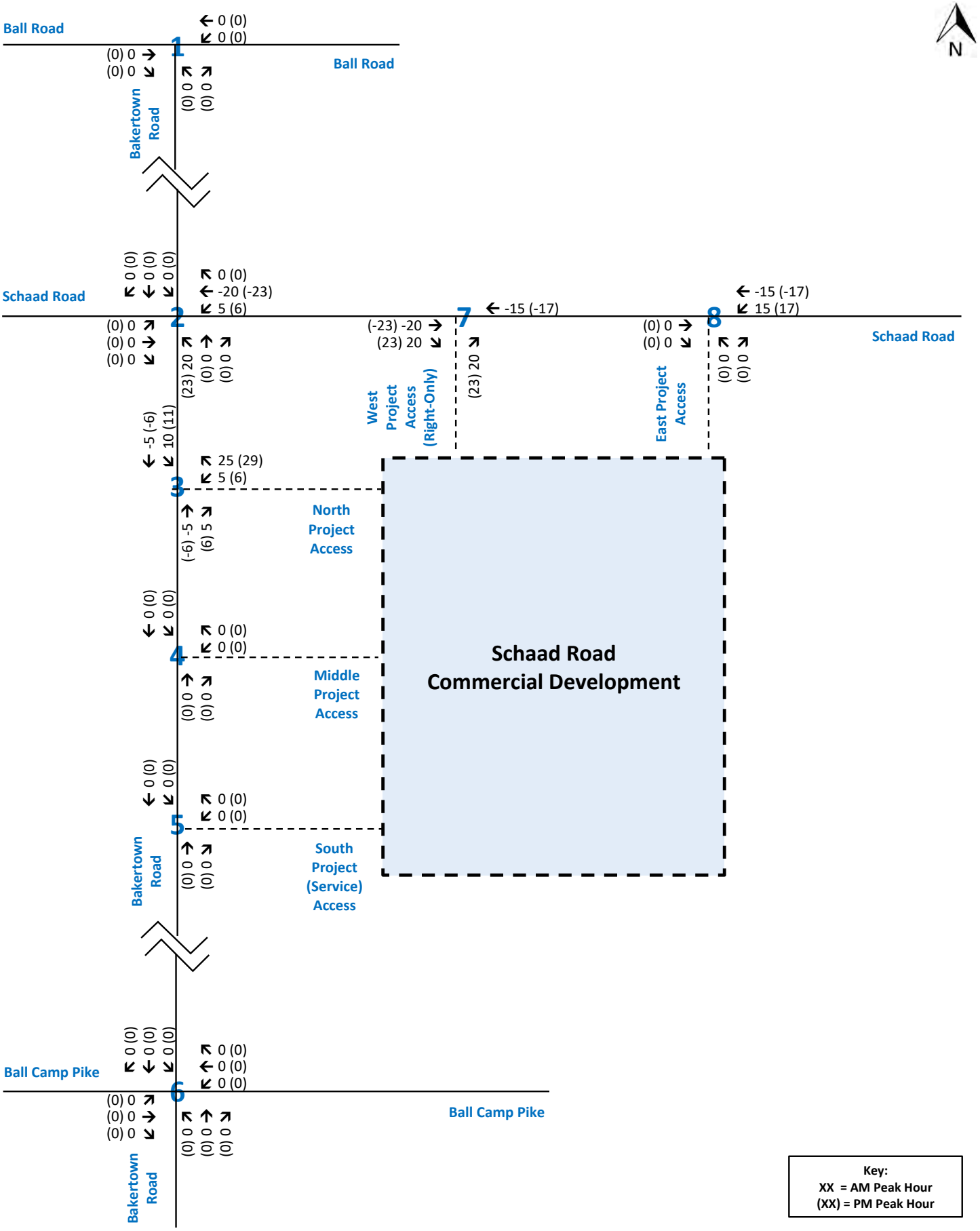
RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Total Primary Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

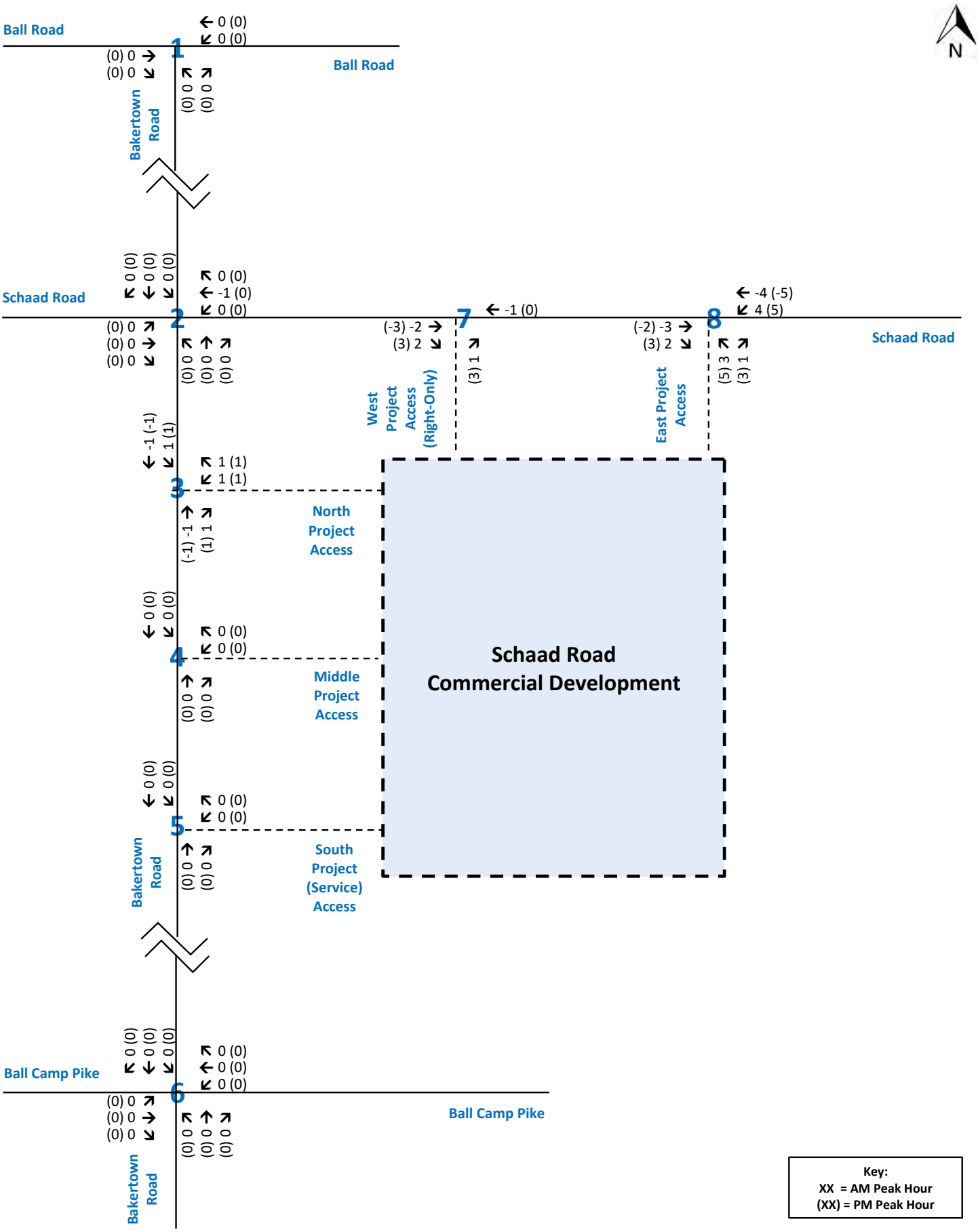


Traffic Assignment Worksheet
Pass-By Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee



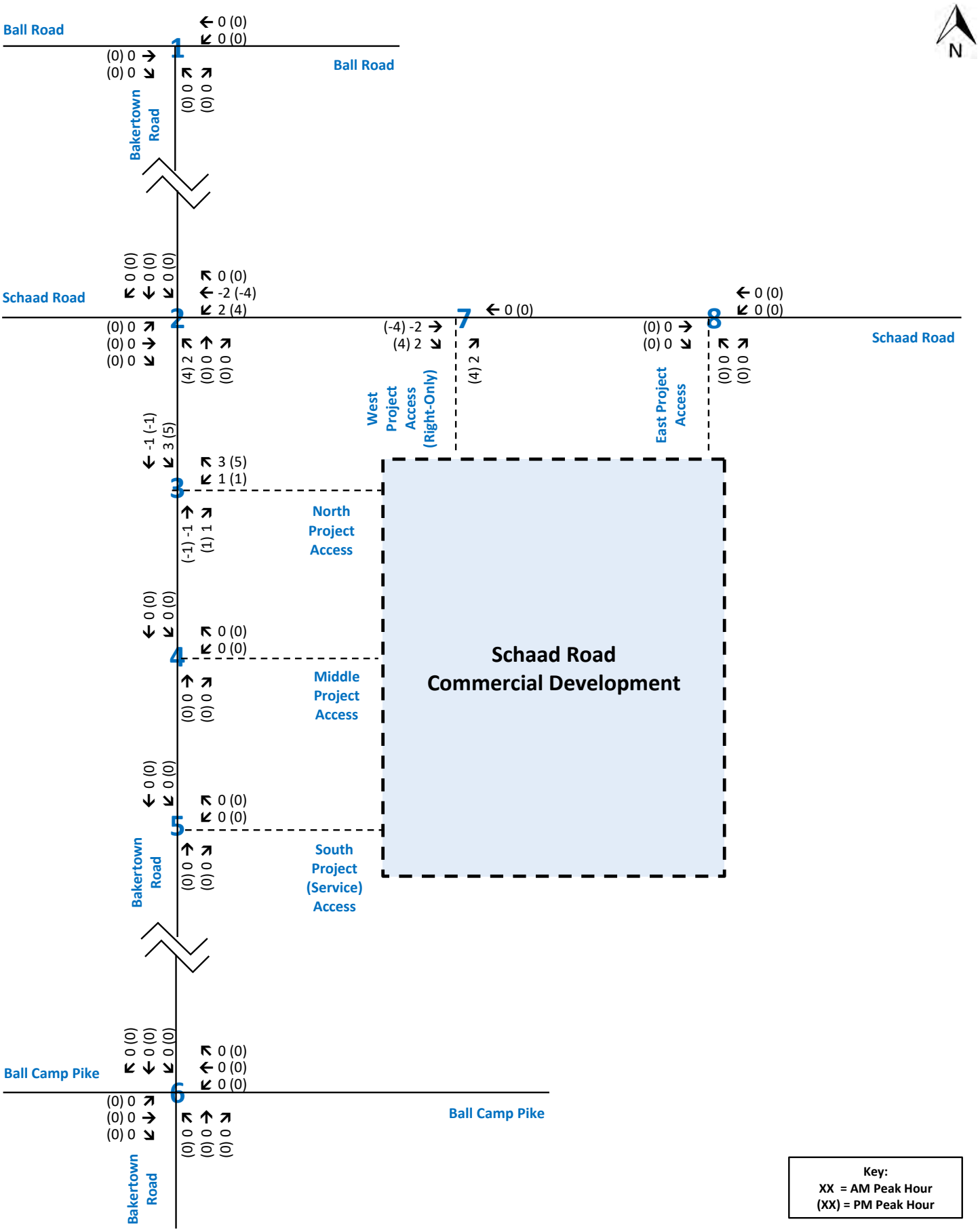
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

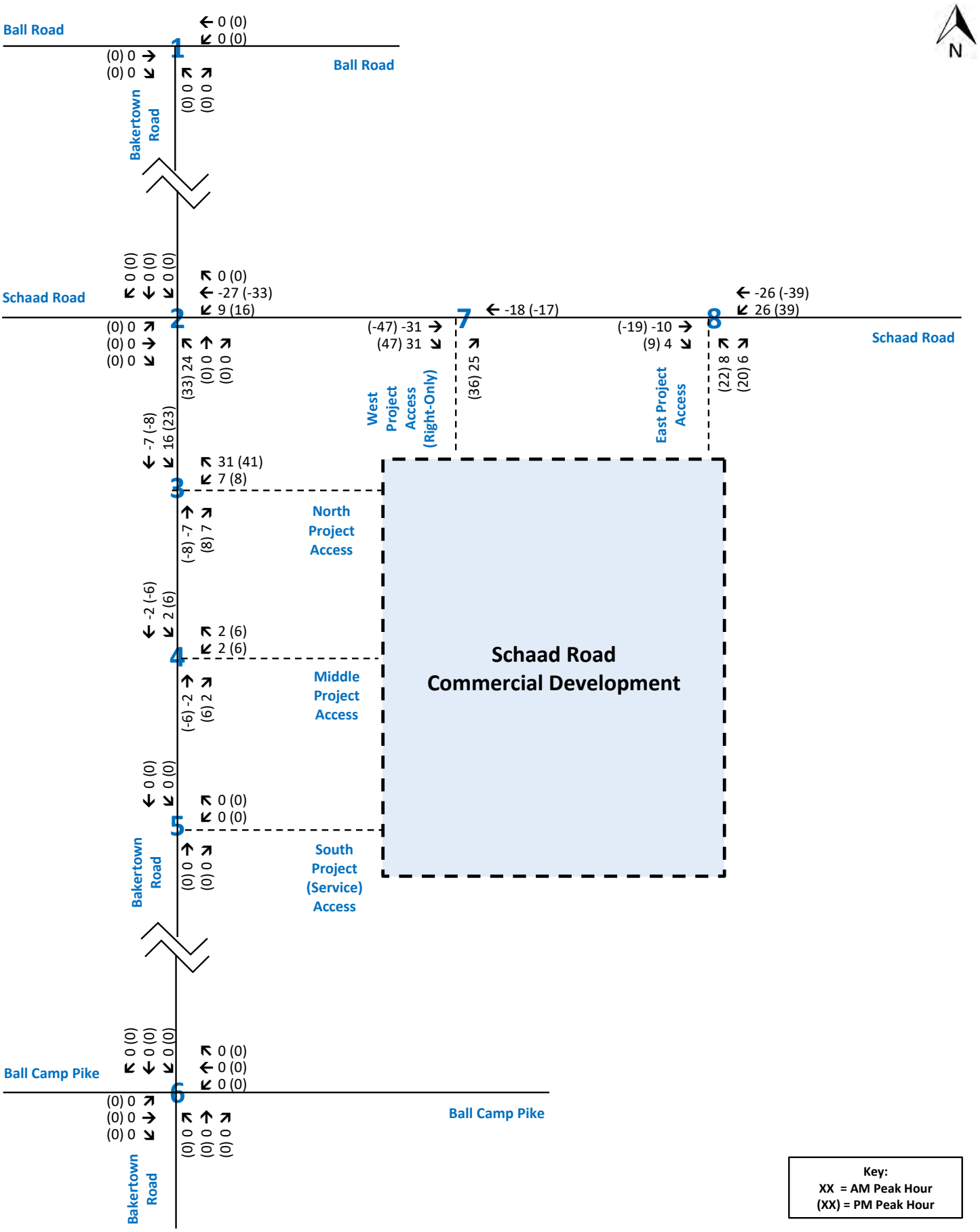


Traffic Assignment Worksheet
Pass-By Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

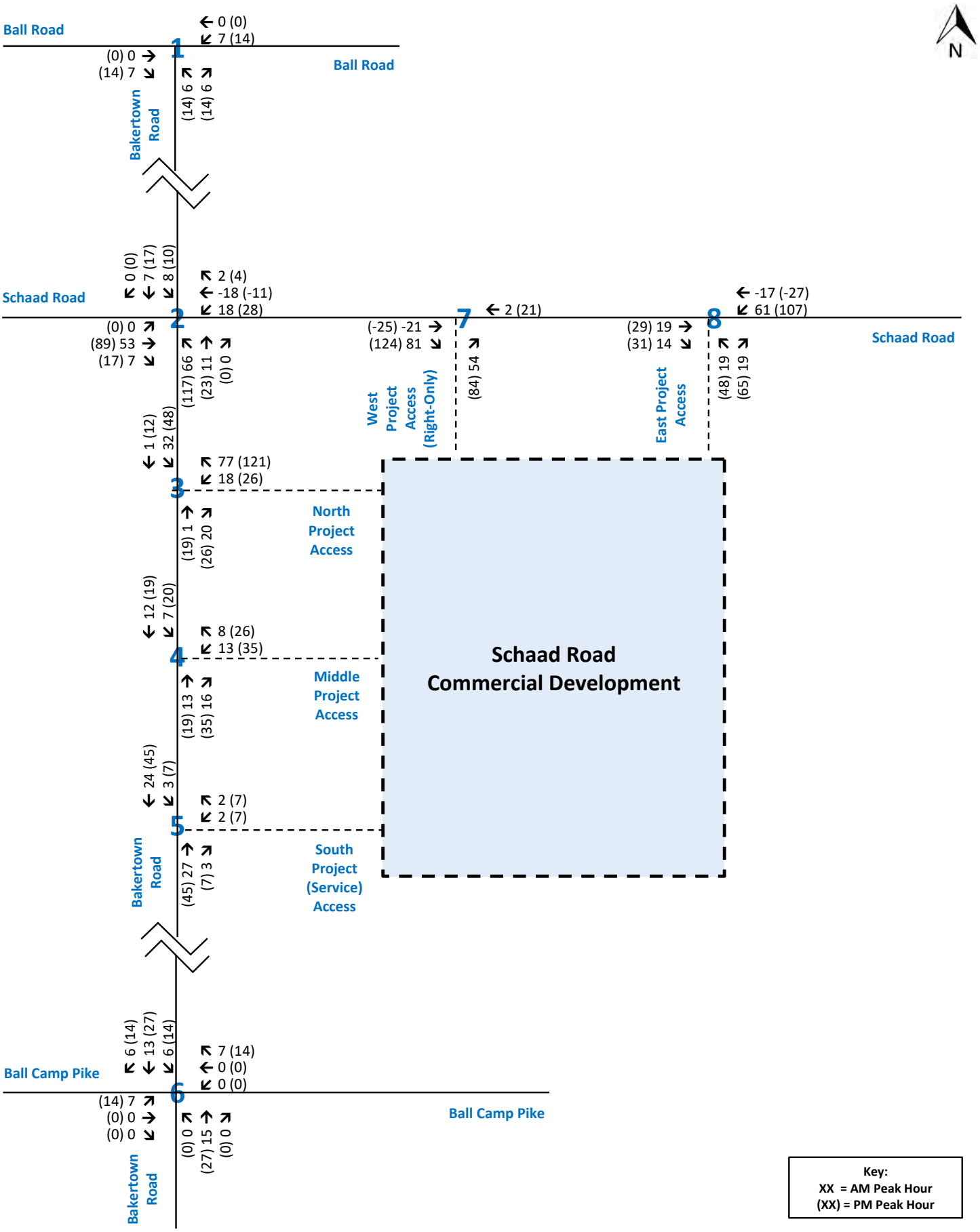


Traffic Assignment Worksheet
Pass-By Traffic Assignment - Site Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

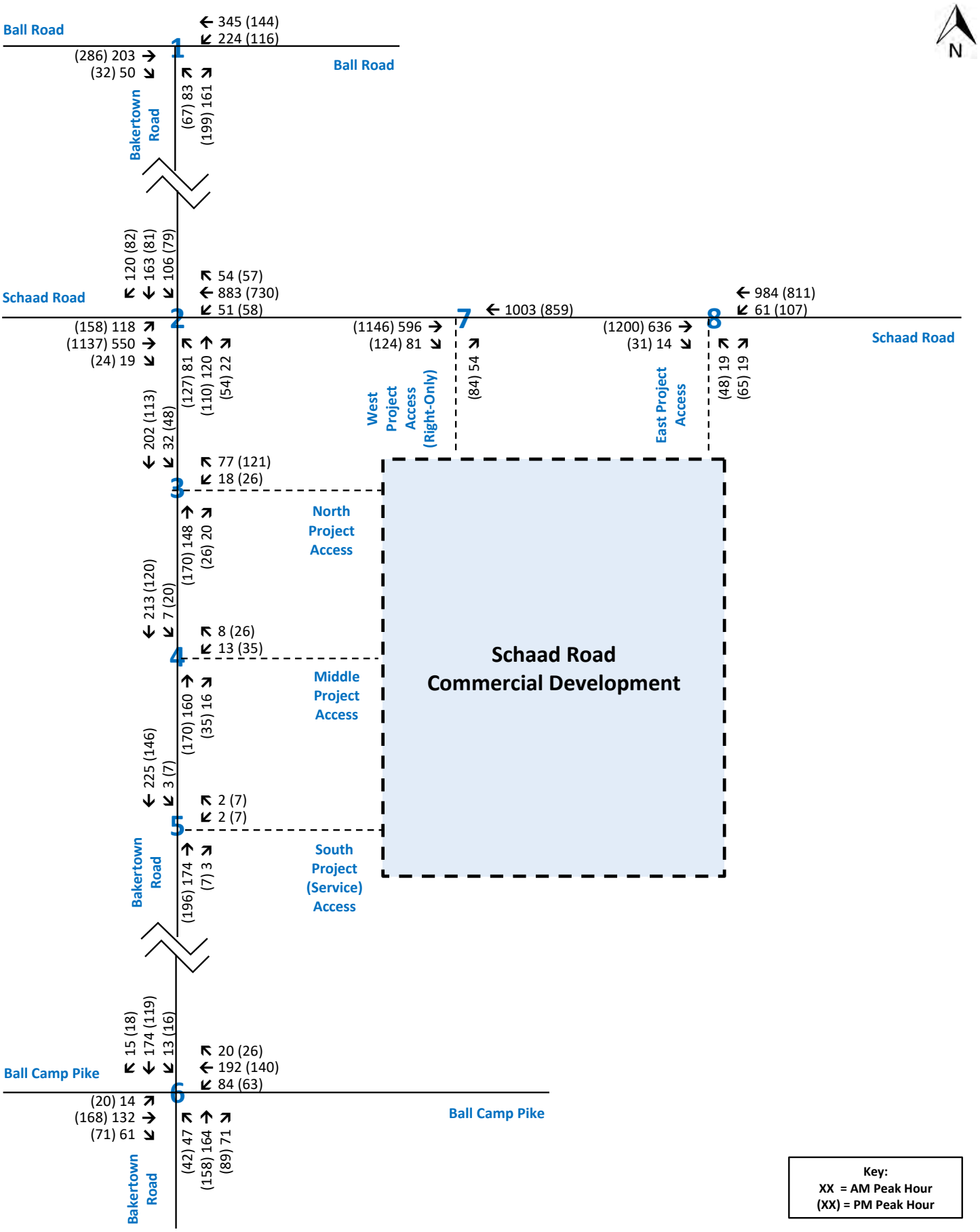


Traffic Assignment Worksheet
Total Pass-By Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Site-Generated Traffic
Schaad Road Commercial Development
Knox County, Tennessee

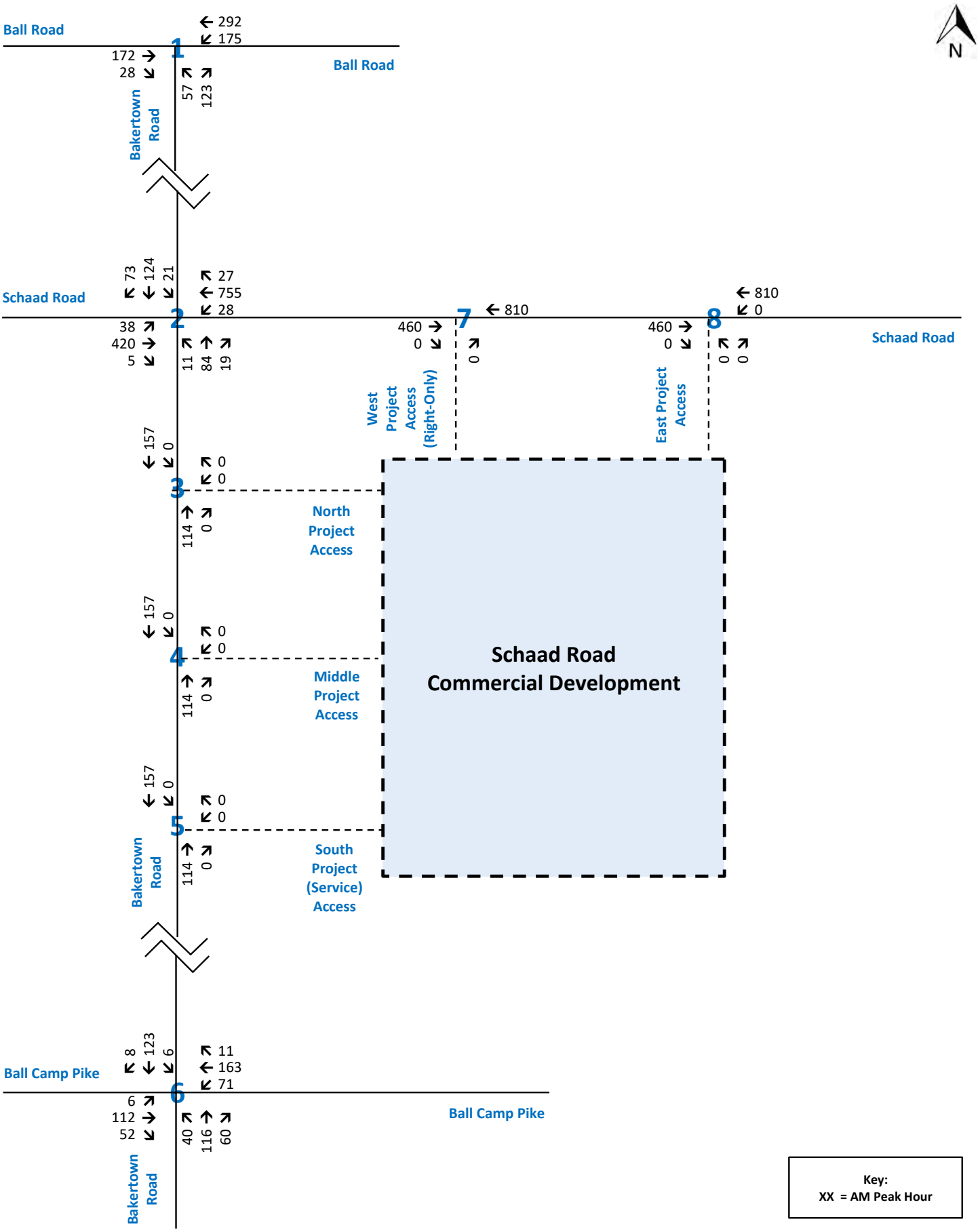


Traffic Assignment Worksheet
Total Projected Traffic at Buildout (2030)
Schaad Road Commercial Development
Knox County, Tennessee

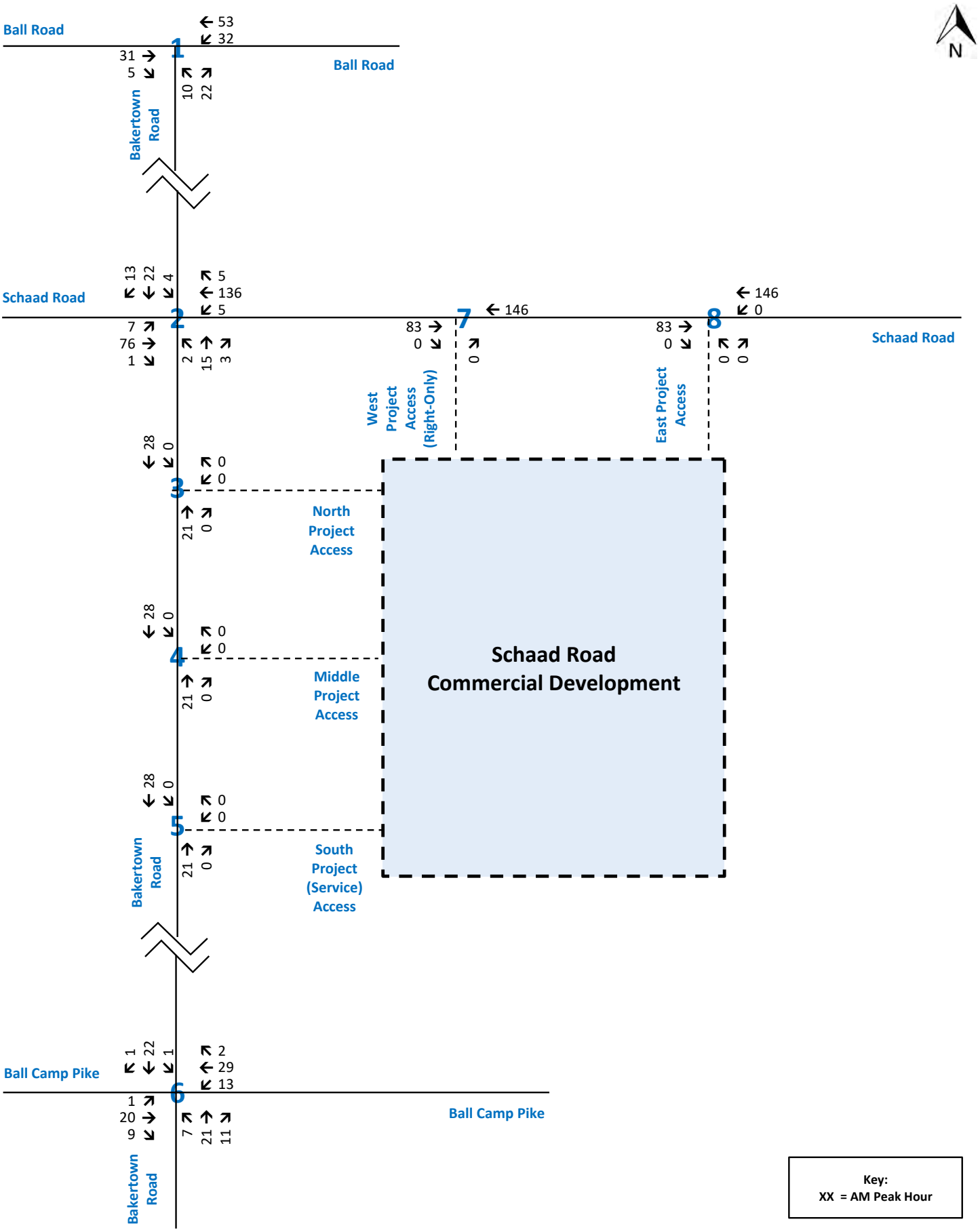
RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

TRAFFIC ASSIGNMENT WORKSHEETS

AM PEAK HOUR

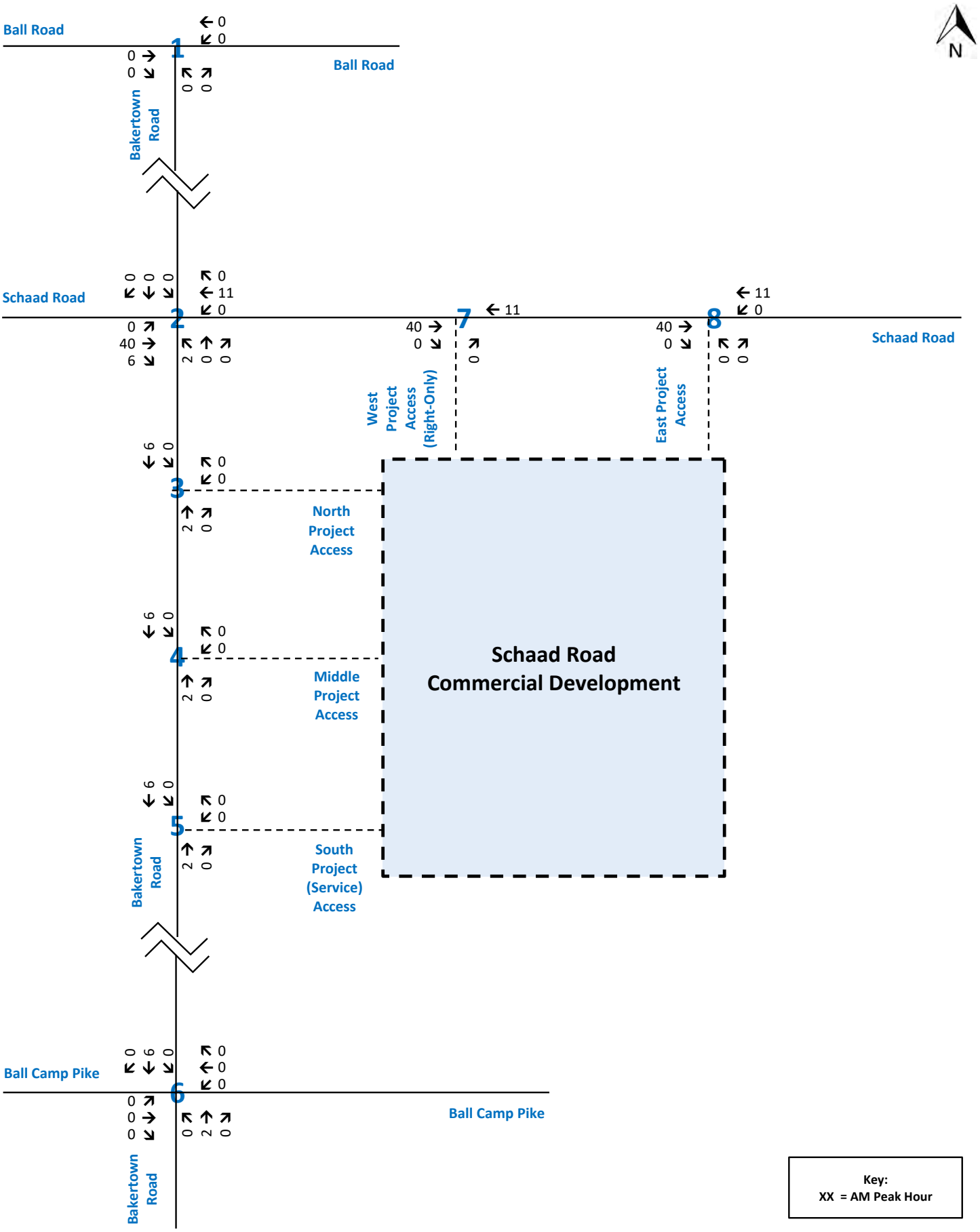


Traffic Assignment Worksheet
Existing Traffic Volumes (2026)
Schaad Road Commercial Development
Knox County, Tennessee



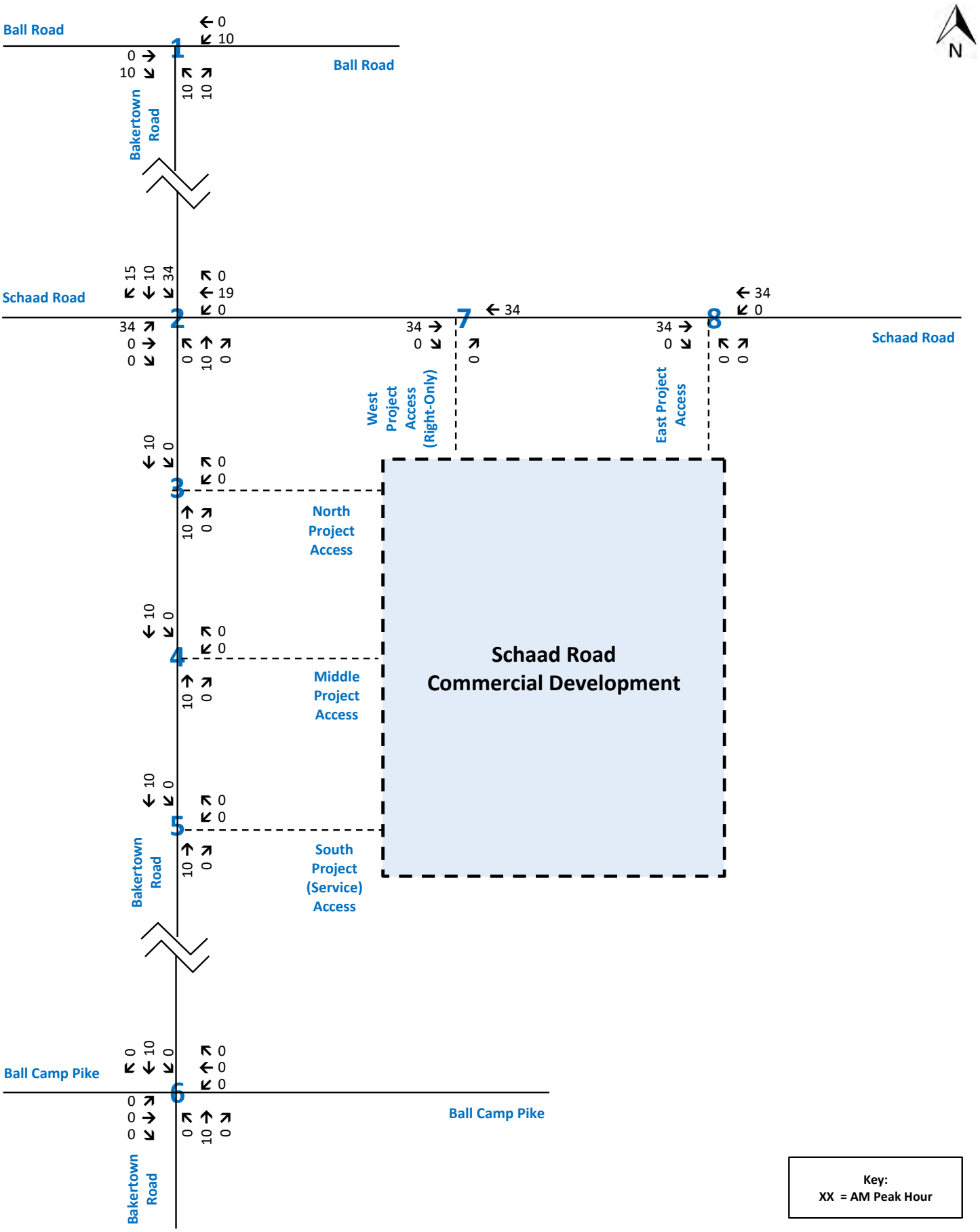
Traffic Assignment Worksheet
Background - Historical Growth Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



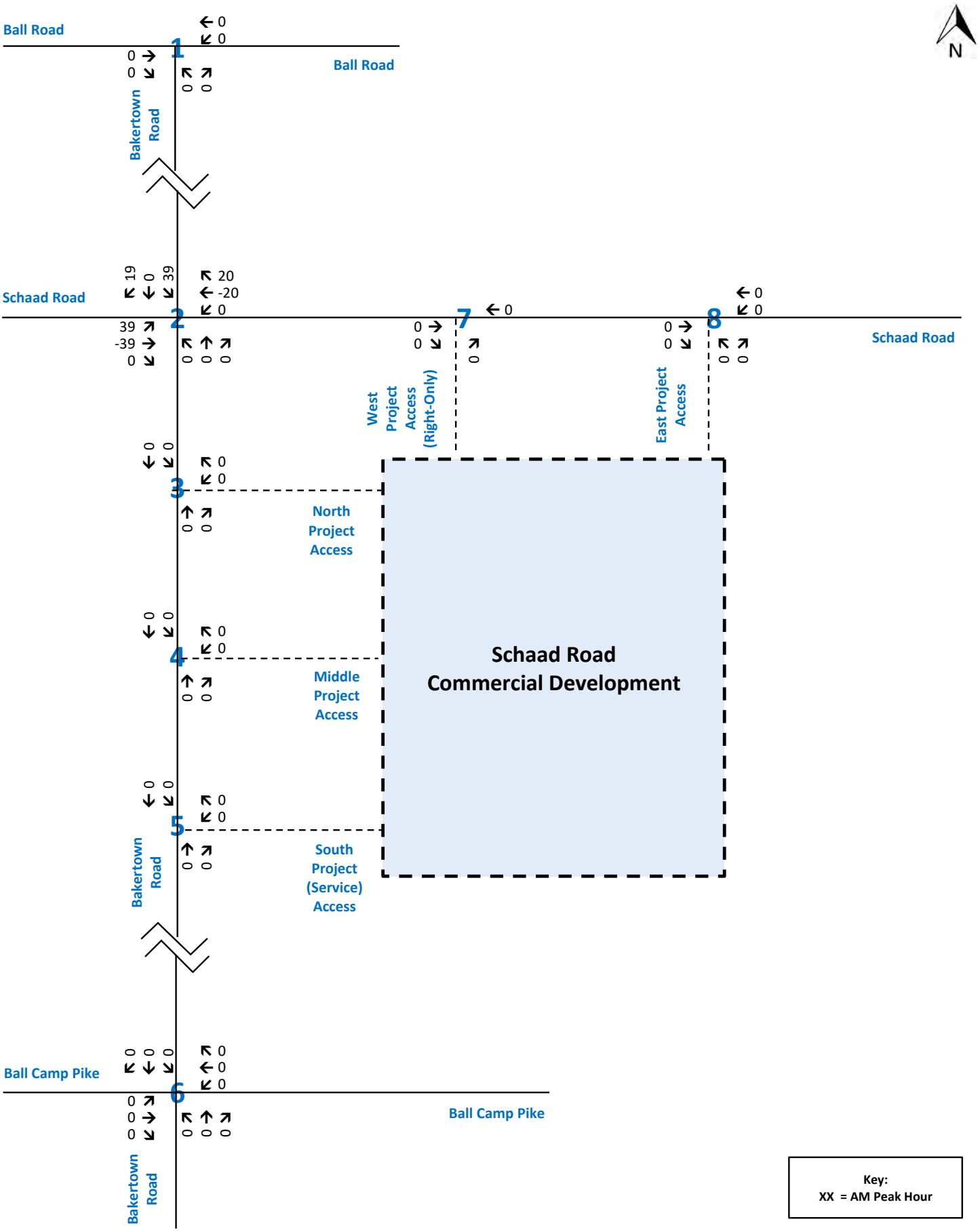
Traffic Assignment Worksheet
Offsite Traffic Assignment - Schaad Road Apartments
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



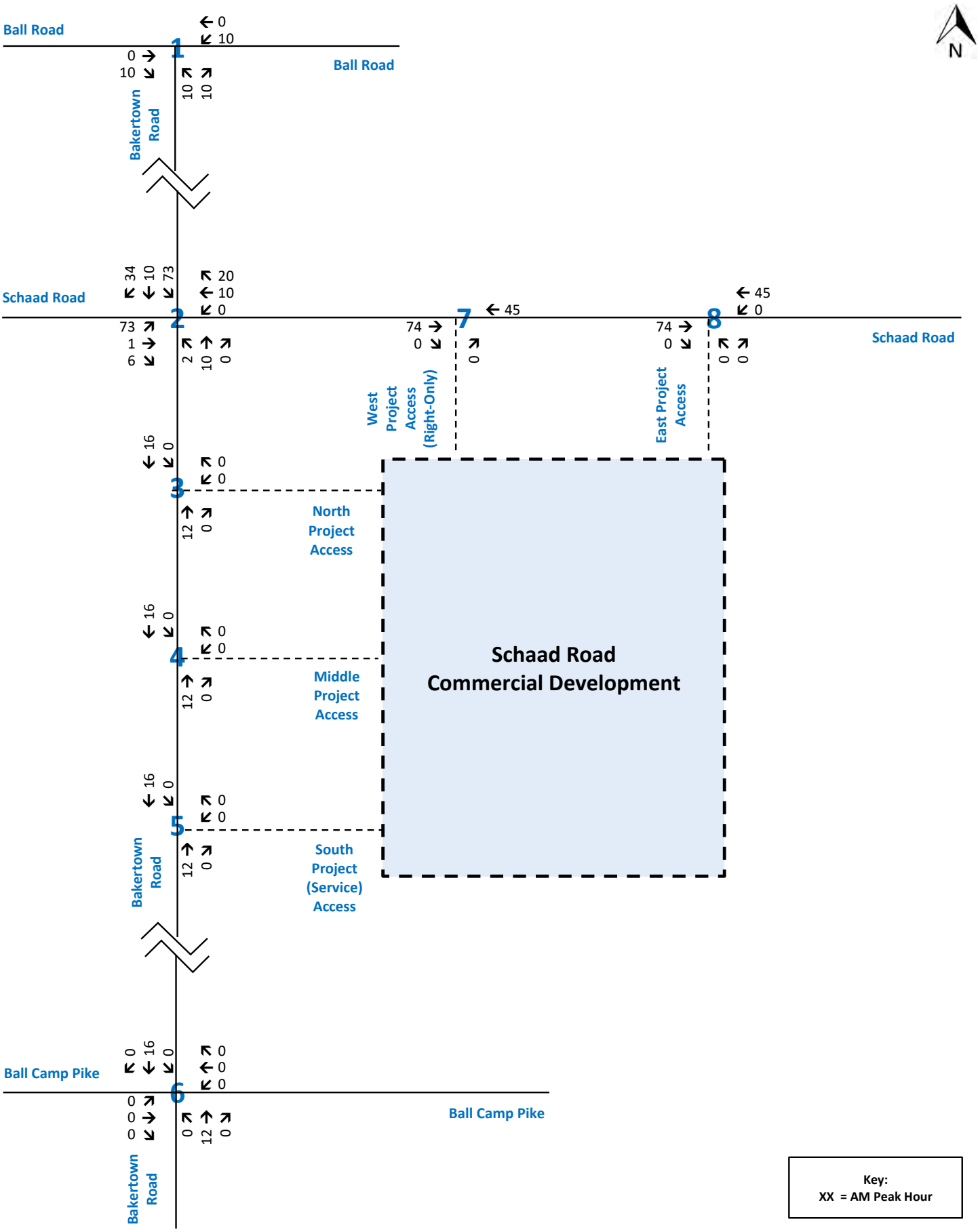
Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Primary Trips)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



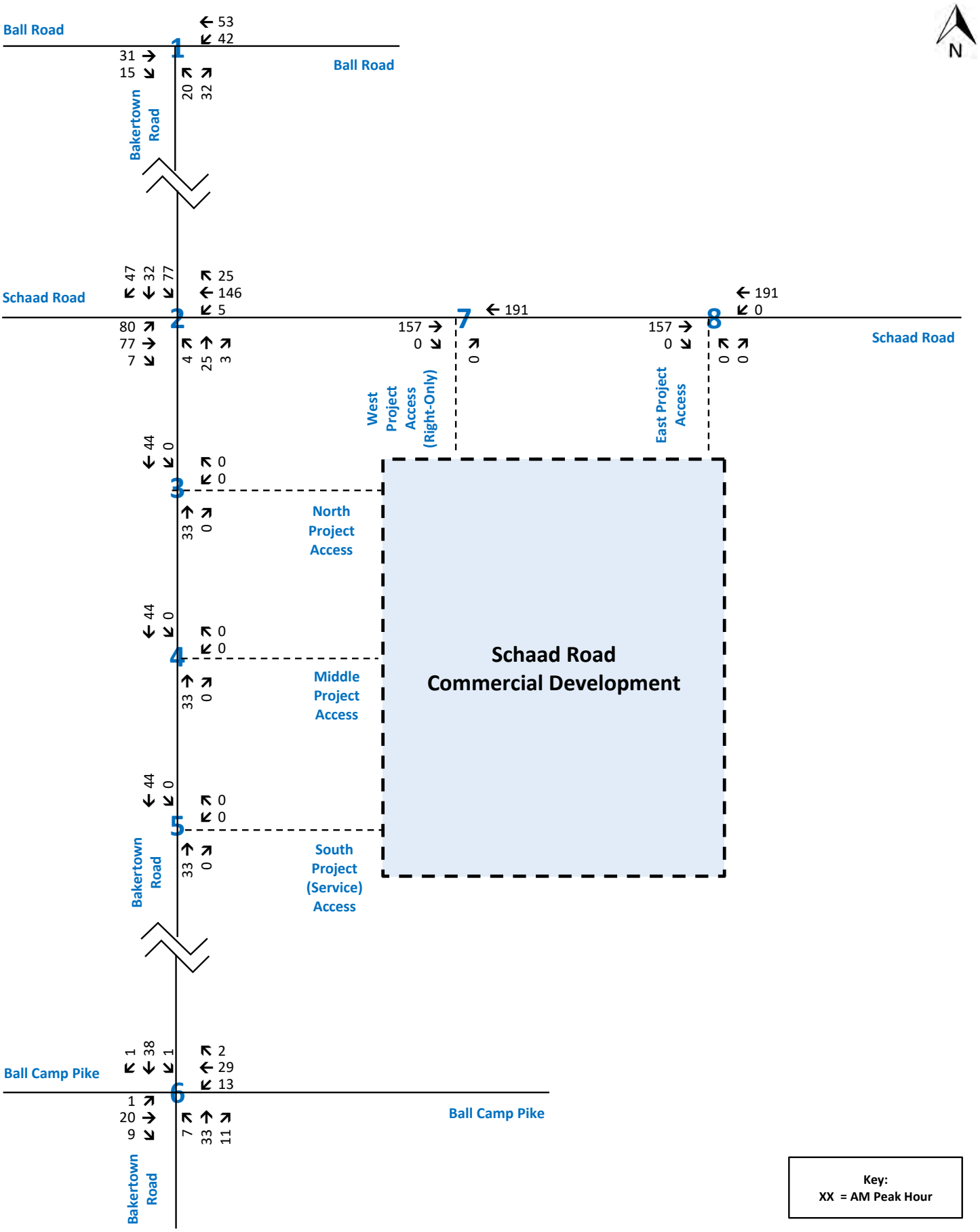
Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Pass-By Trips)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



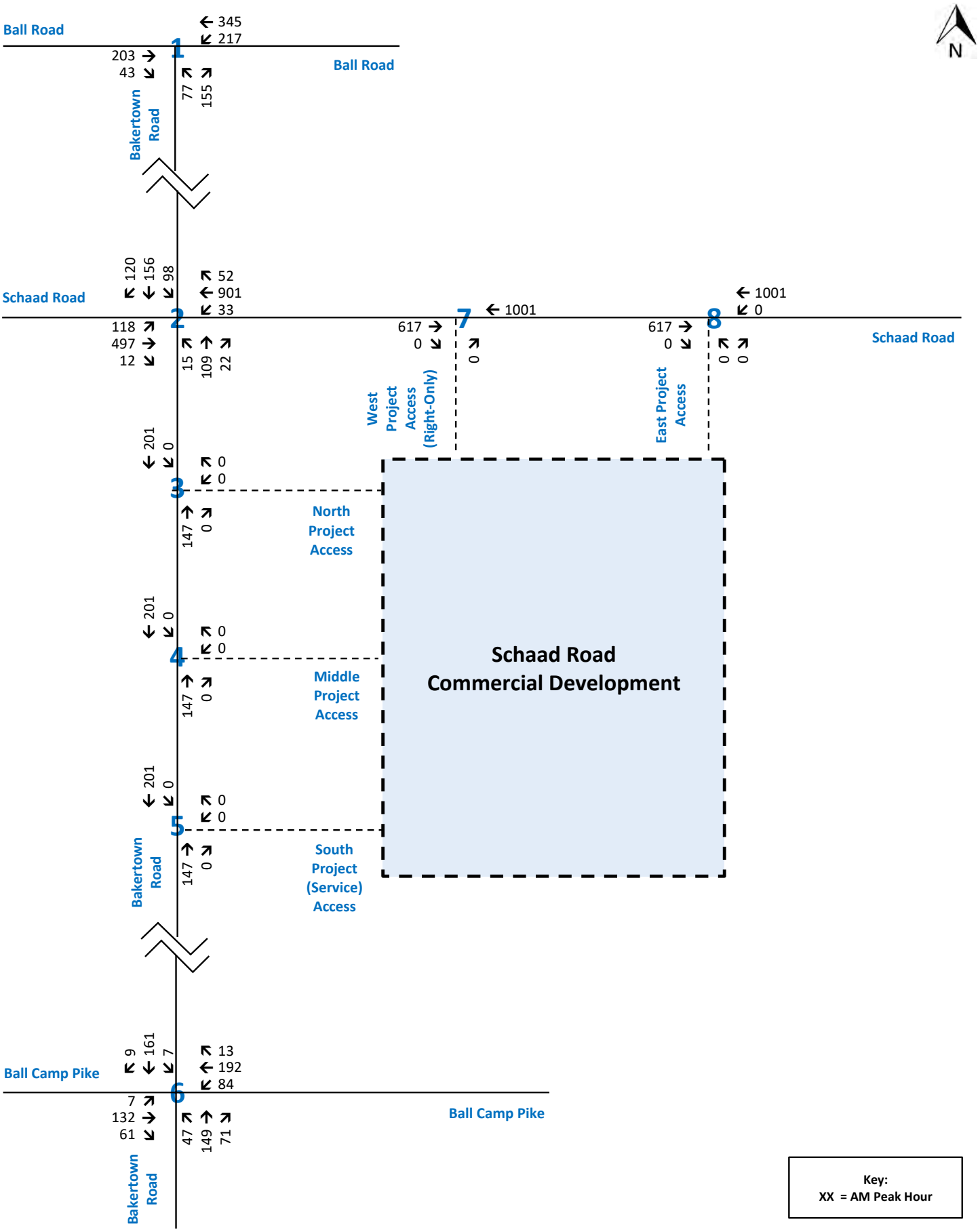
Traffic Assignment Worksheet
Background - Offsite Development Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

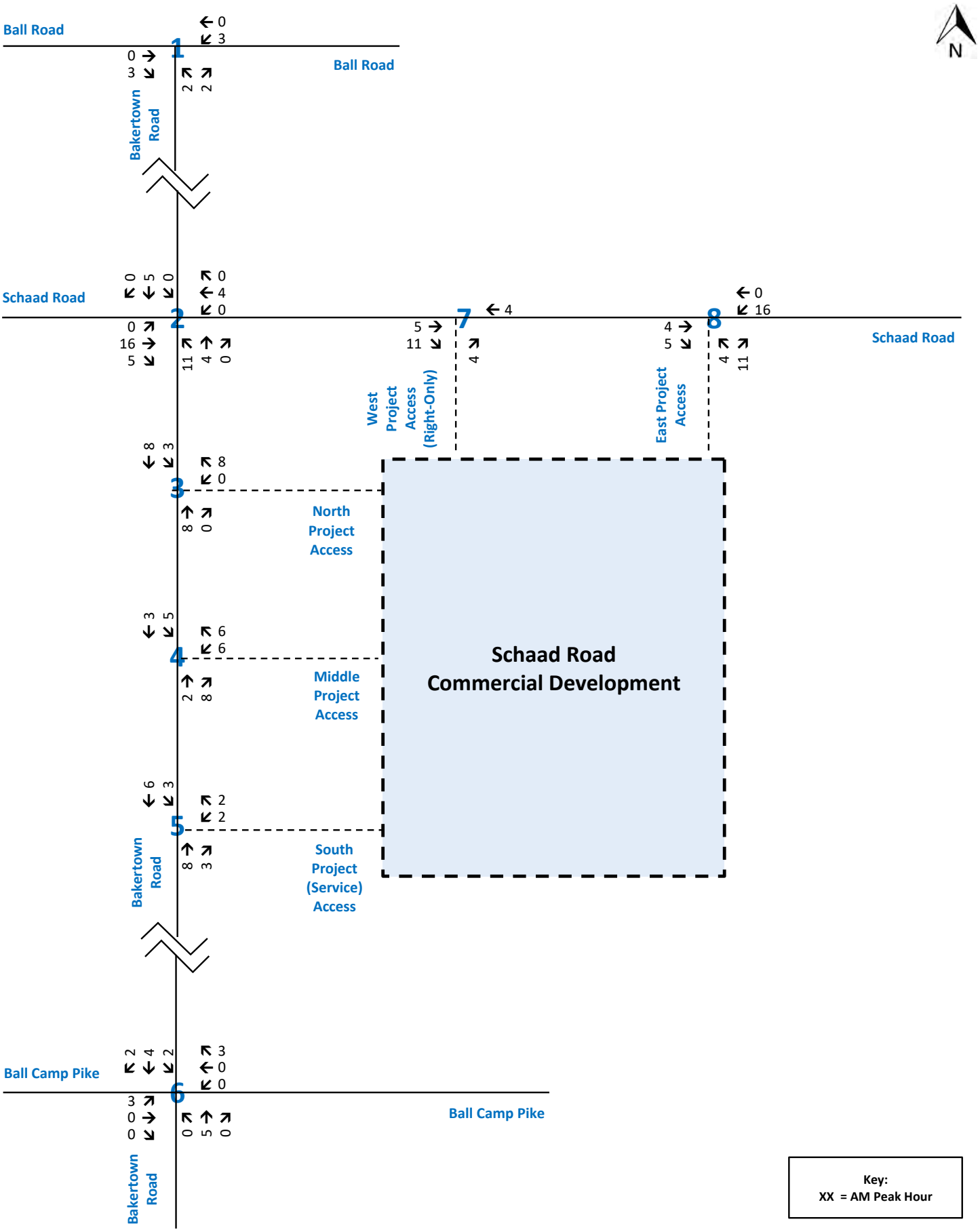


Traffic Assignment Worksheet
Background (Growth + Offsite)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

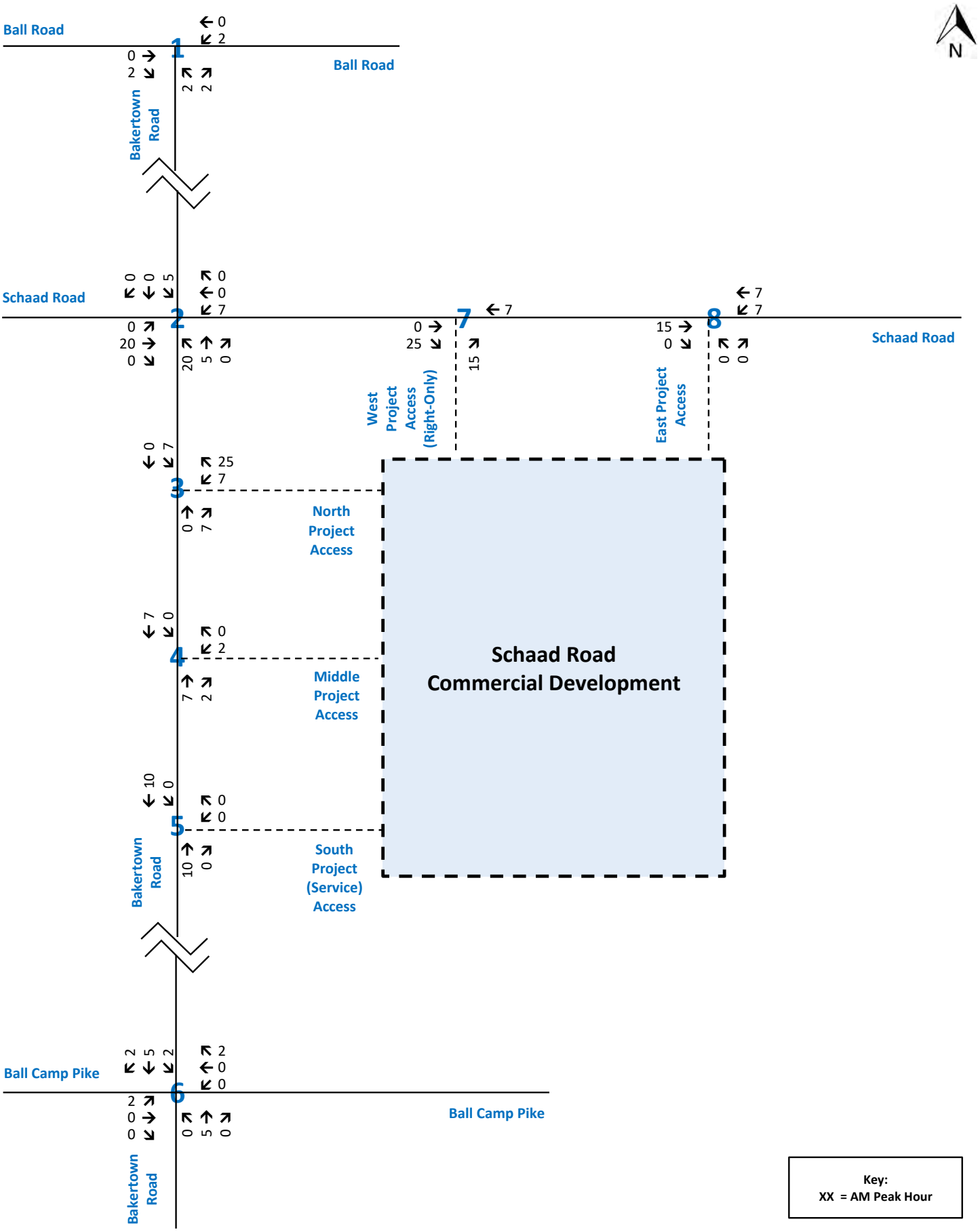


Traffic Assignment Worksheet
Background Traffic Volumes (2030)
Schaad Road Commercial Development
Knox County, Tennessee



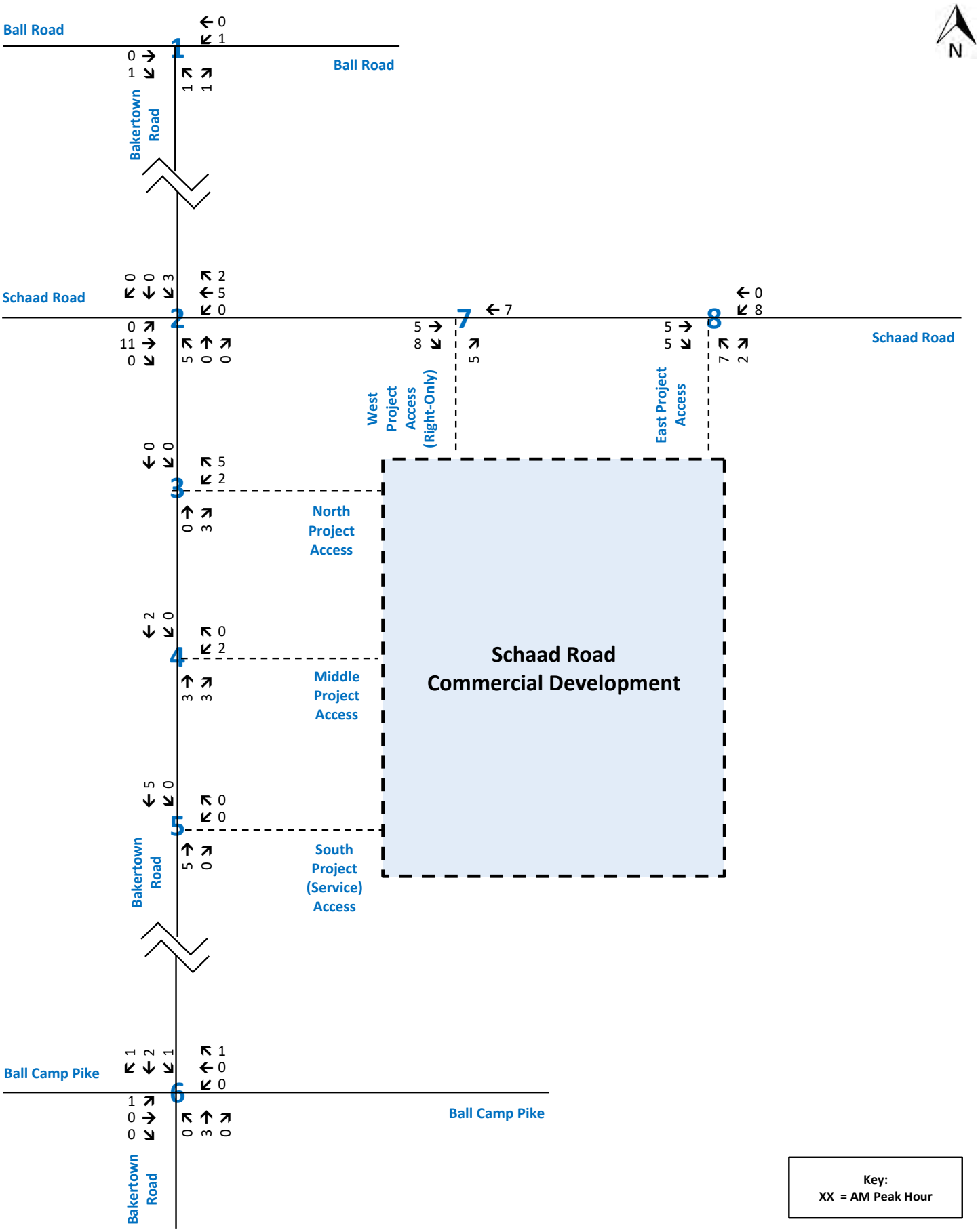
Traffic Assignment Worksheet
Primary Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



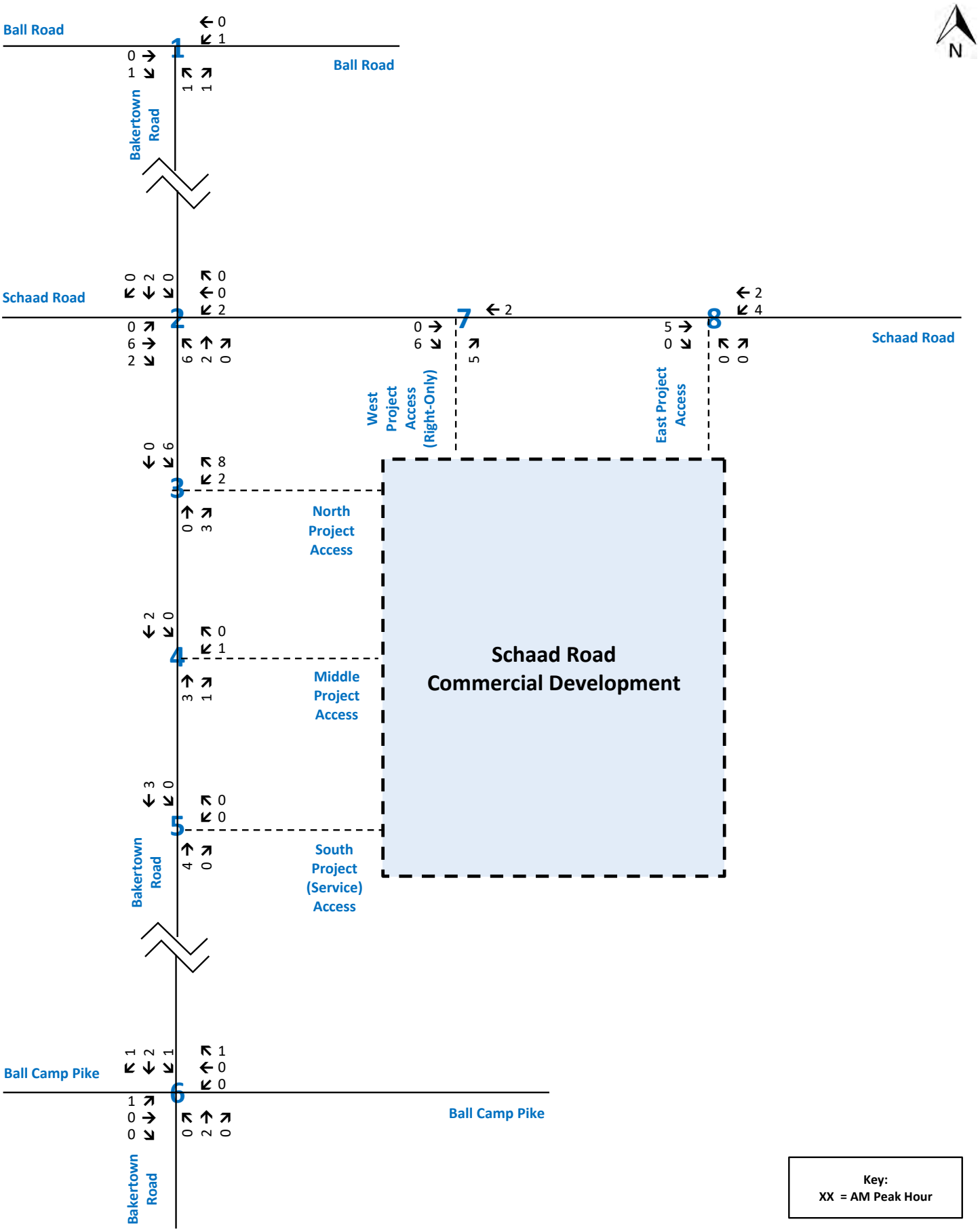
Traffic Assignment Worksheet
Primary Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



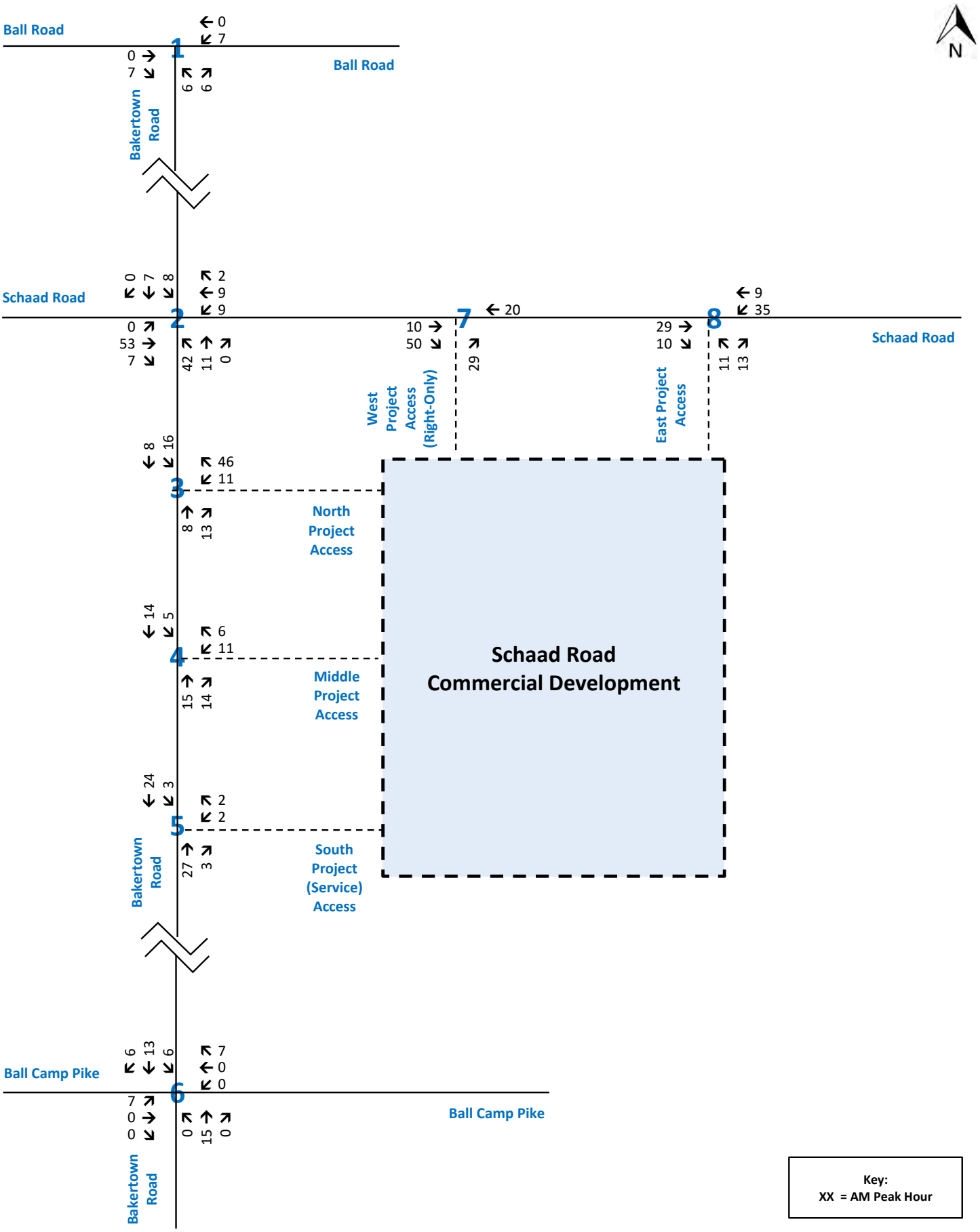
Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



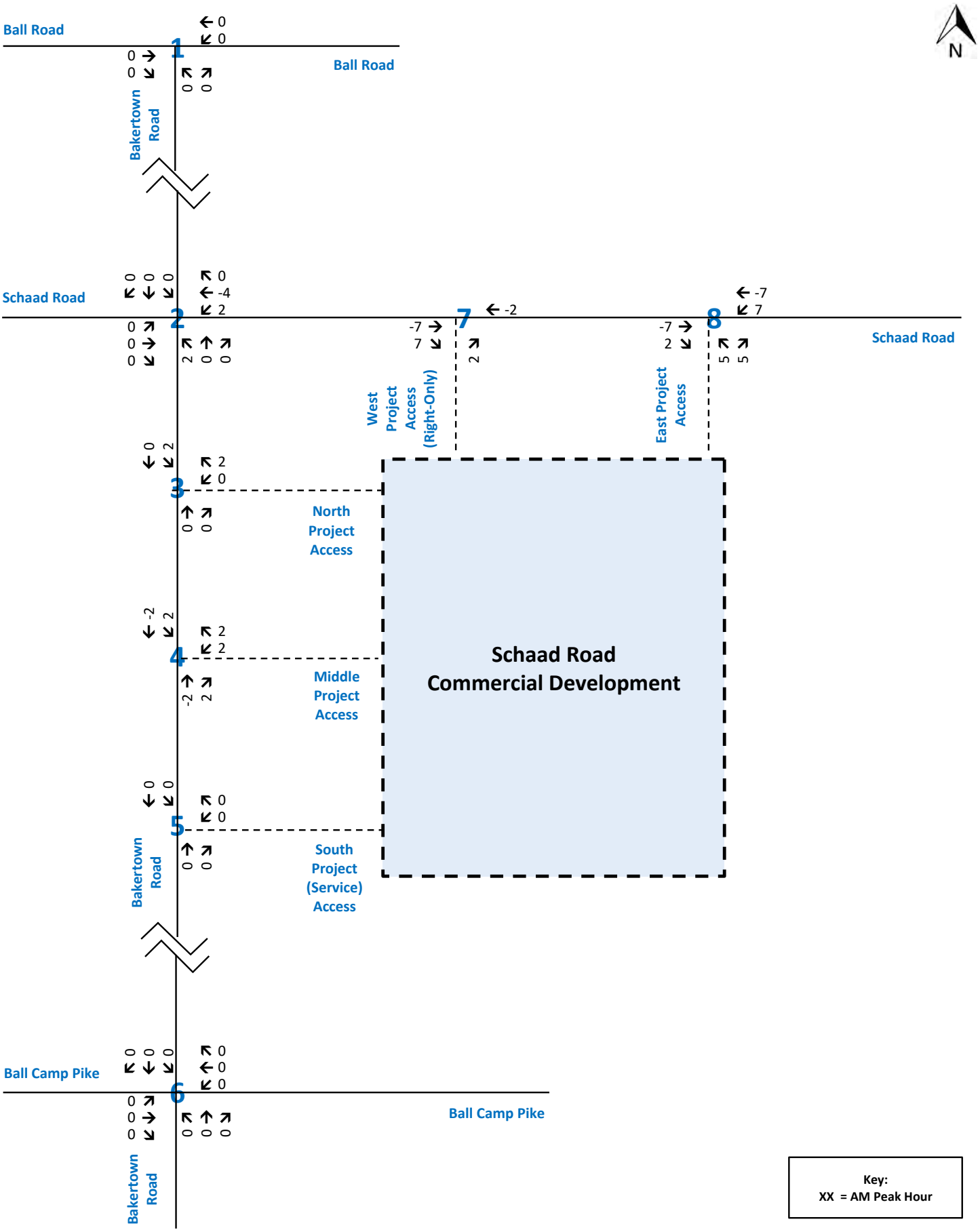
Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



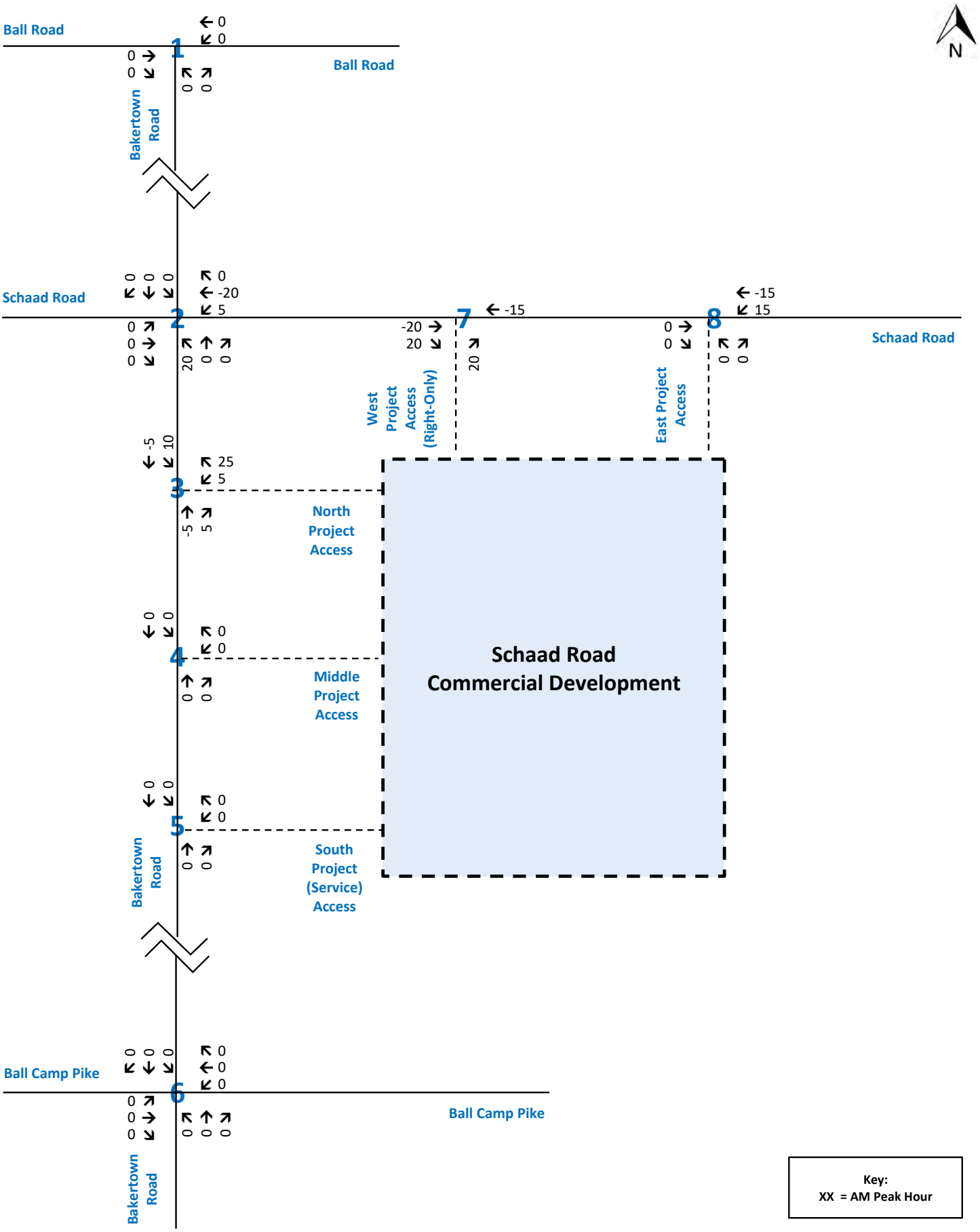
Traffic Assignment Worksheet
Total Primary Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



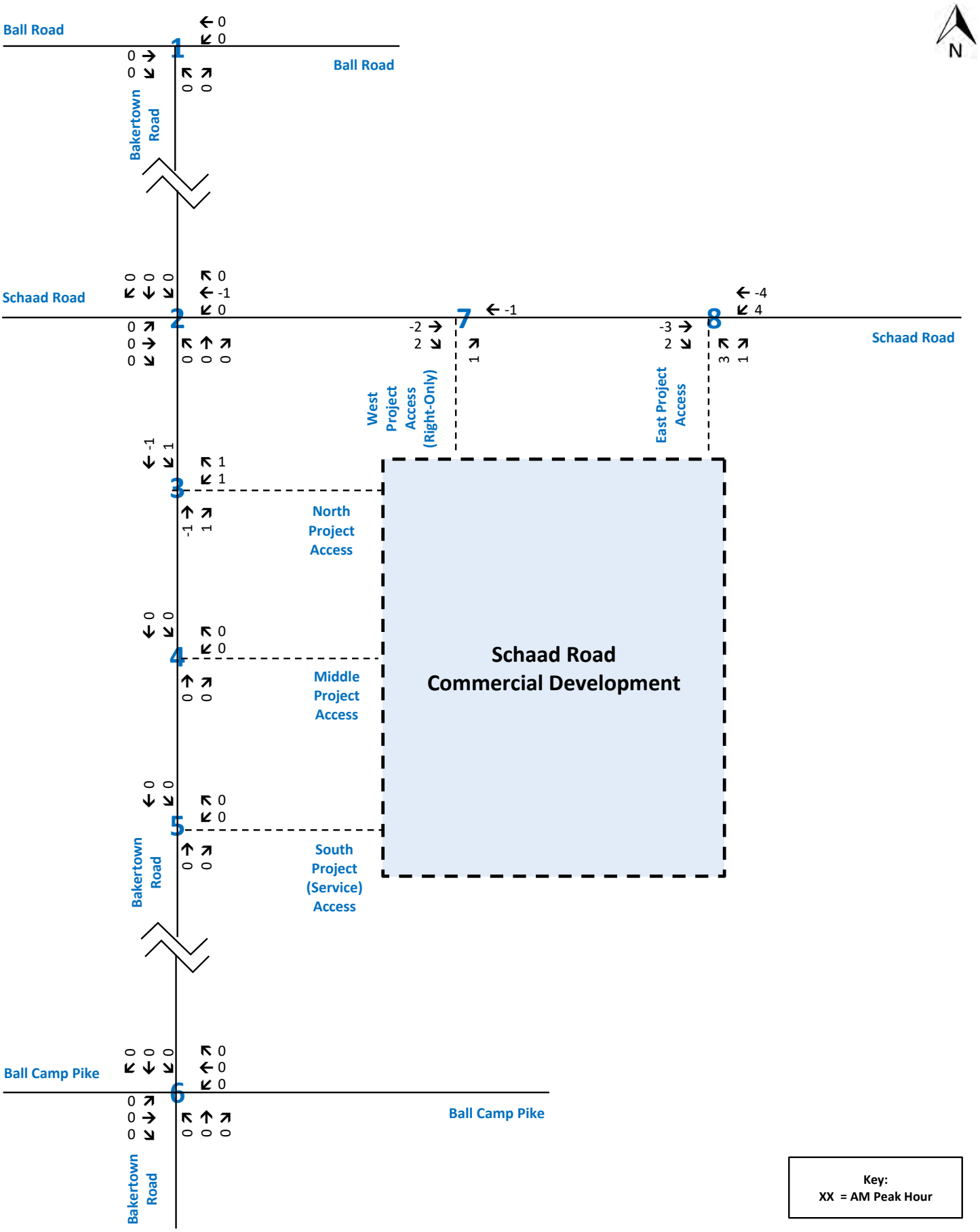
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



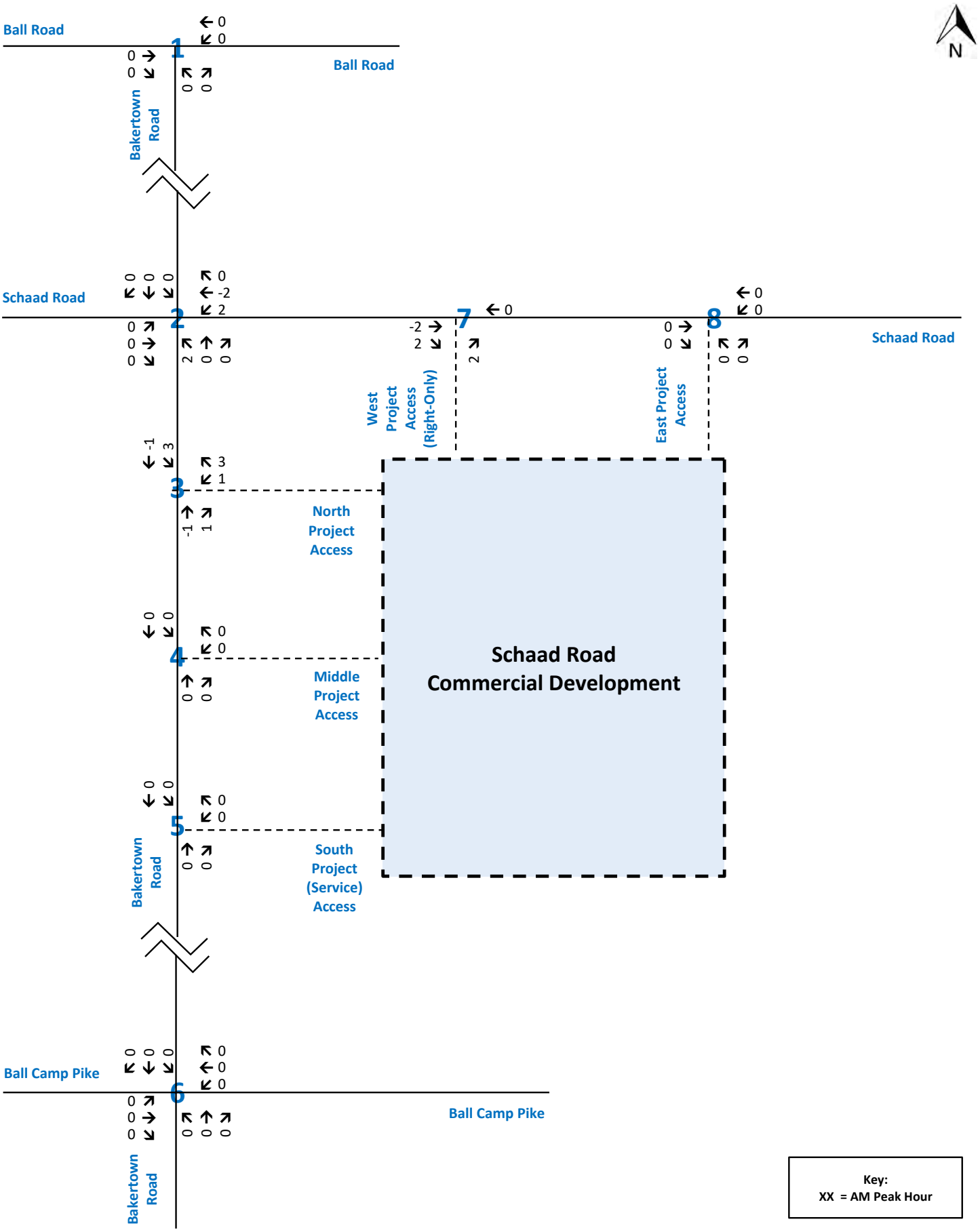
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



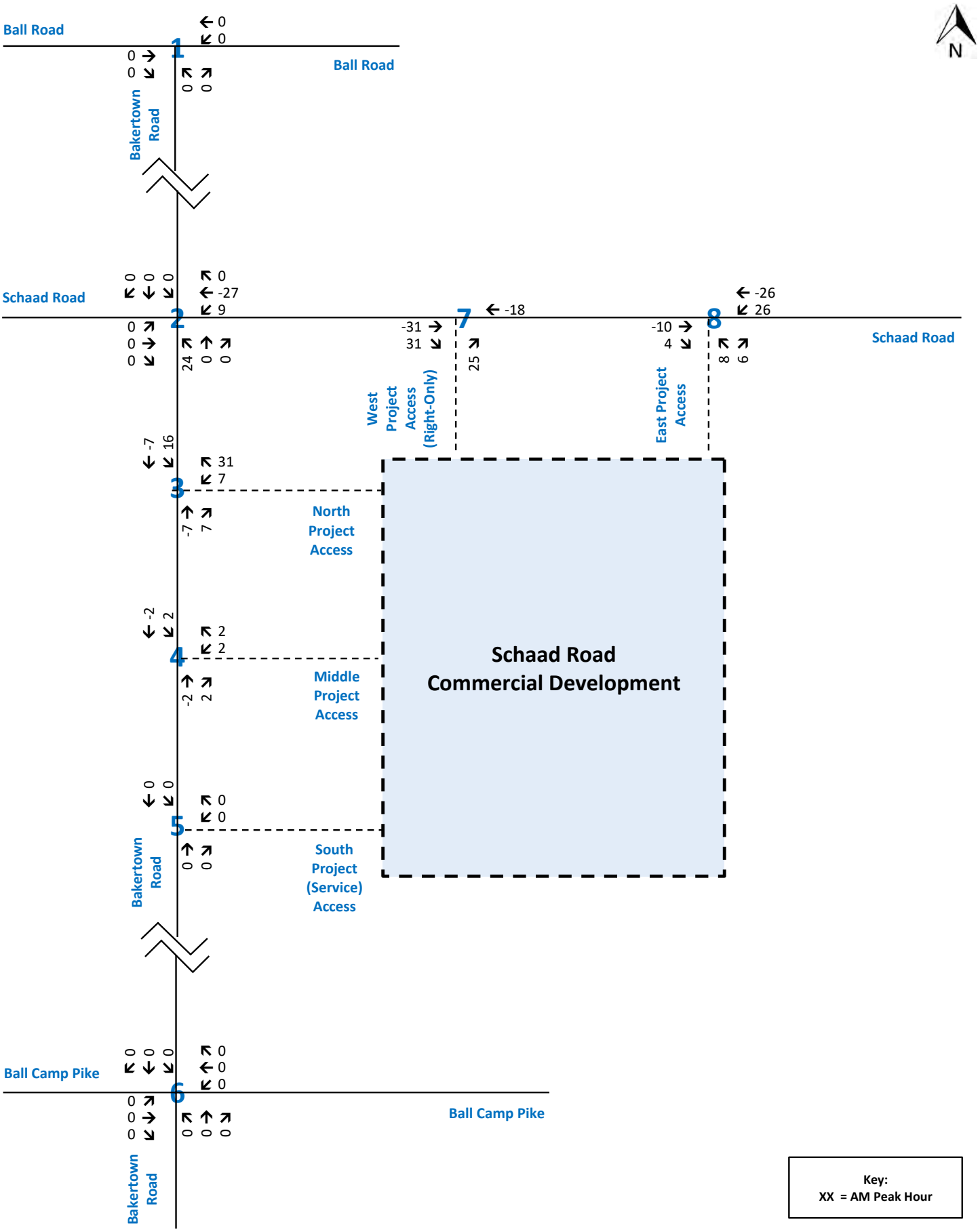
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



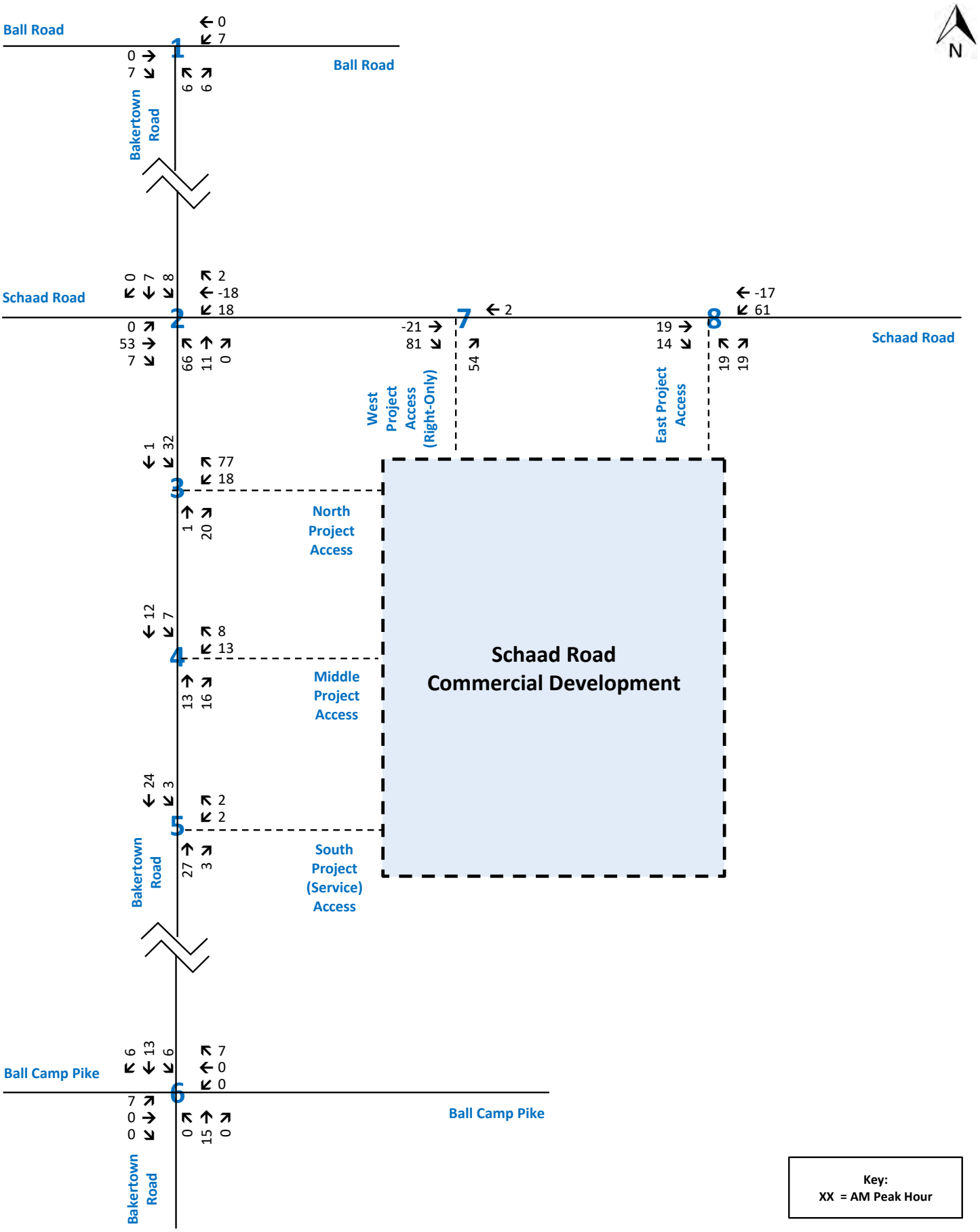
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Site Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



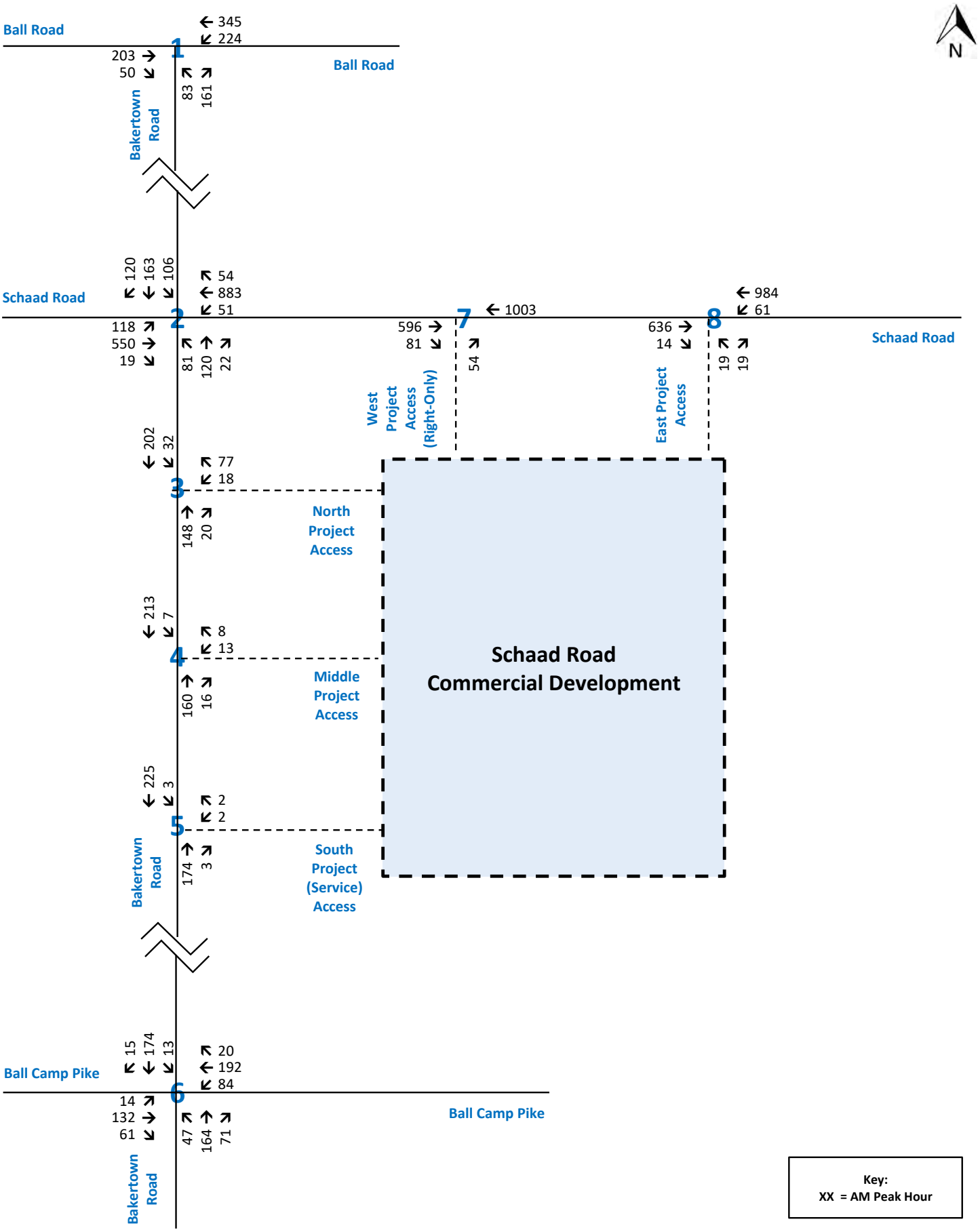
Traffic Assignment Worksheet
Total Pass-By Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Site-Generated Traffic
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

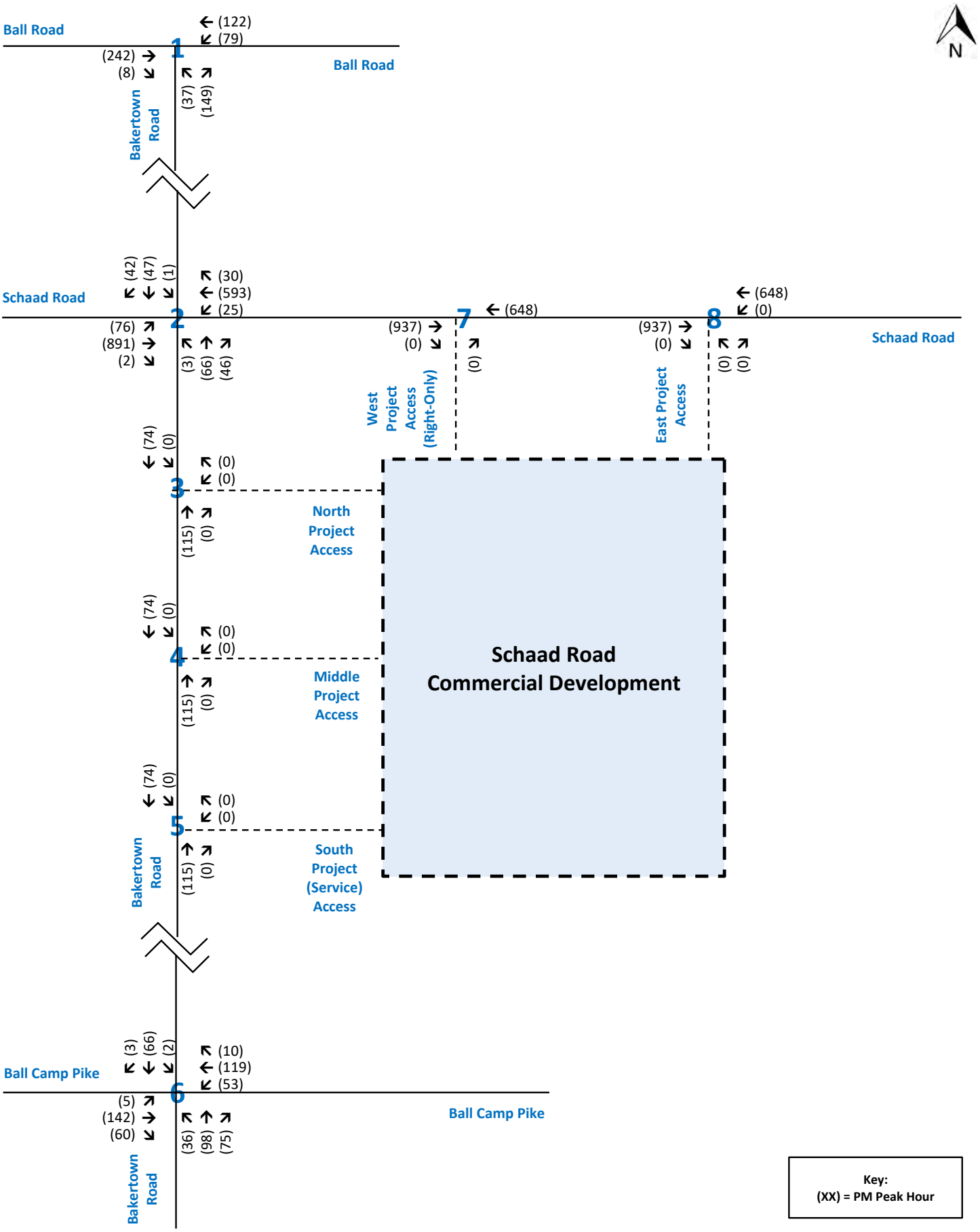


Traffic Assignment Worksheet
Total Projected Traffic at Buildout (2030)
Schaad Road Commercial Development
Knox County, Tennessee

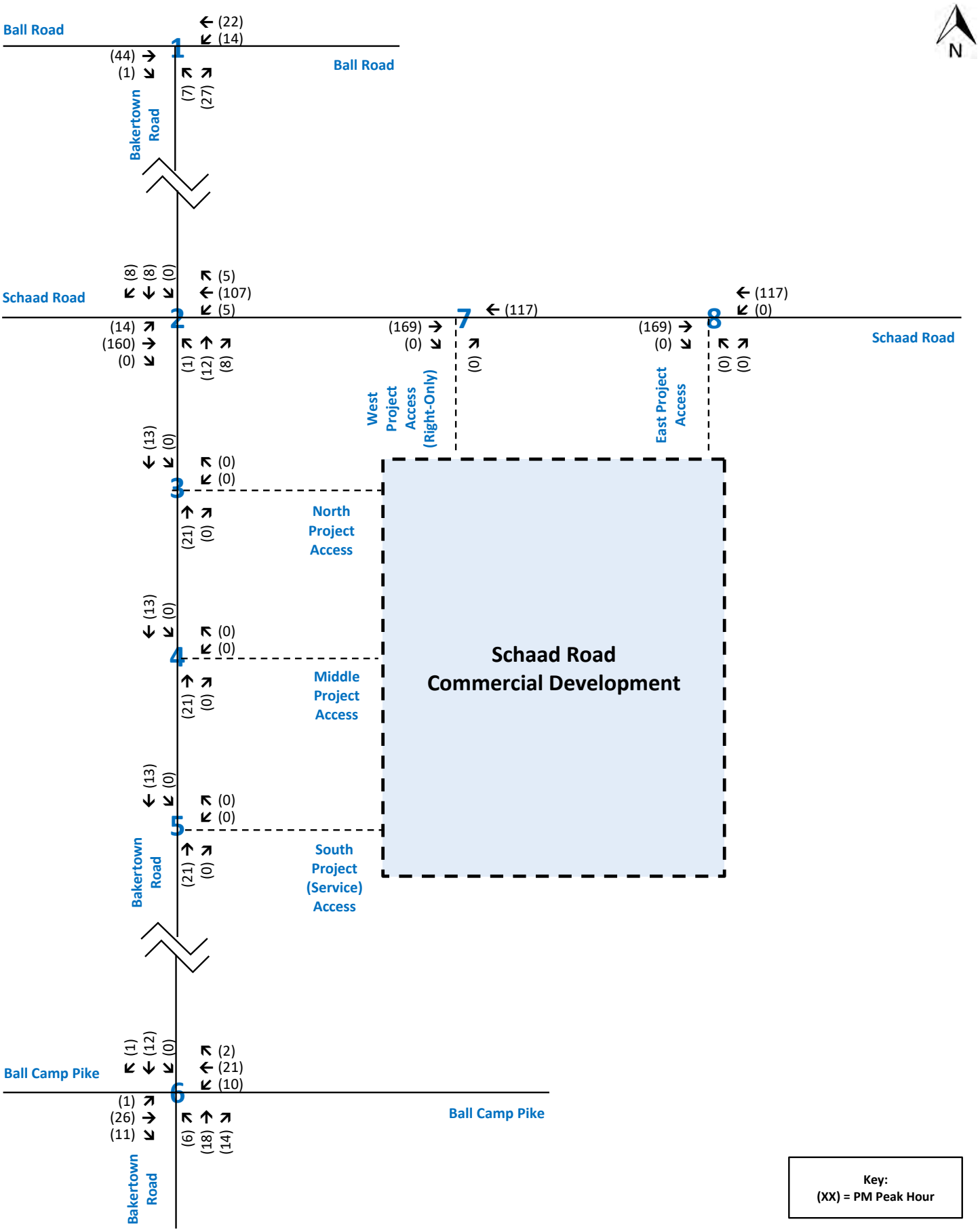
RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

TRAFFIC ASSIGNMENT WORKSHEETS

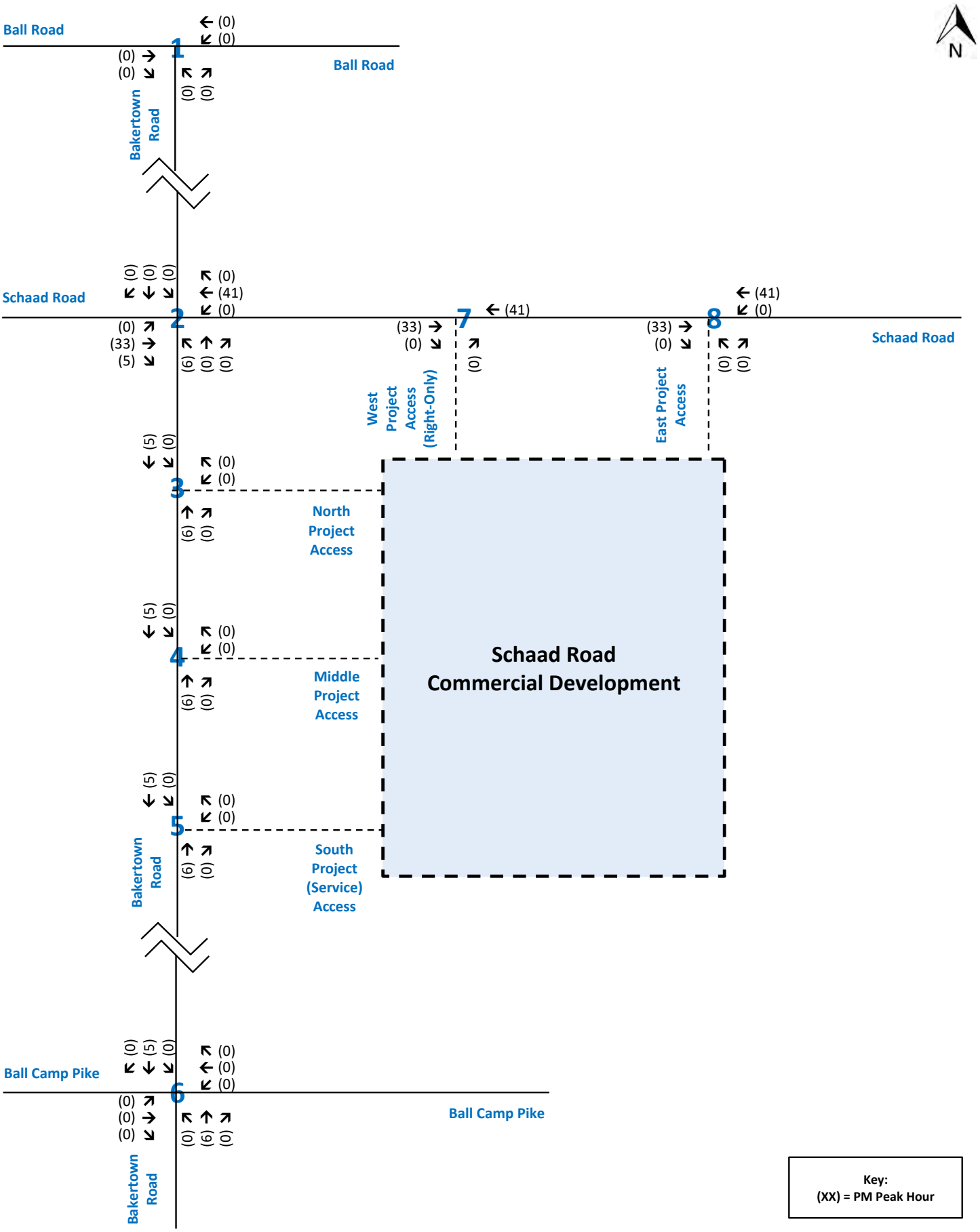
PM PEAK HOUR



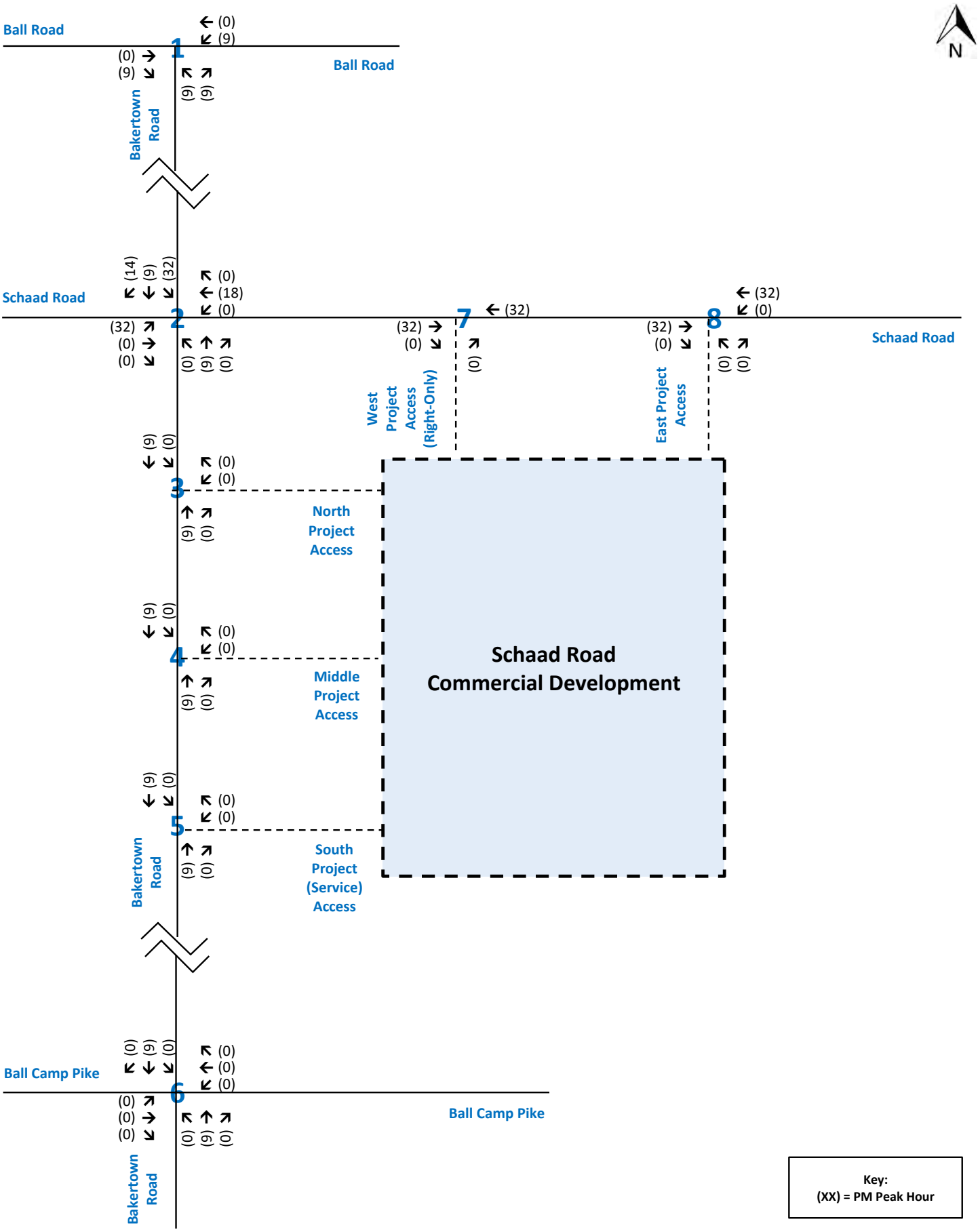
Traffic Assignment Worksheet
Existing Traffic Volumes (2026)
Schaad Road Commercial Development
Knox County, Tennessee



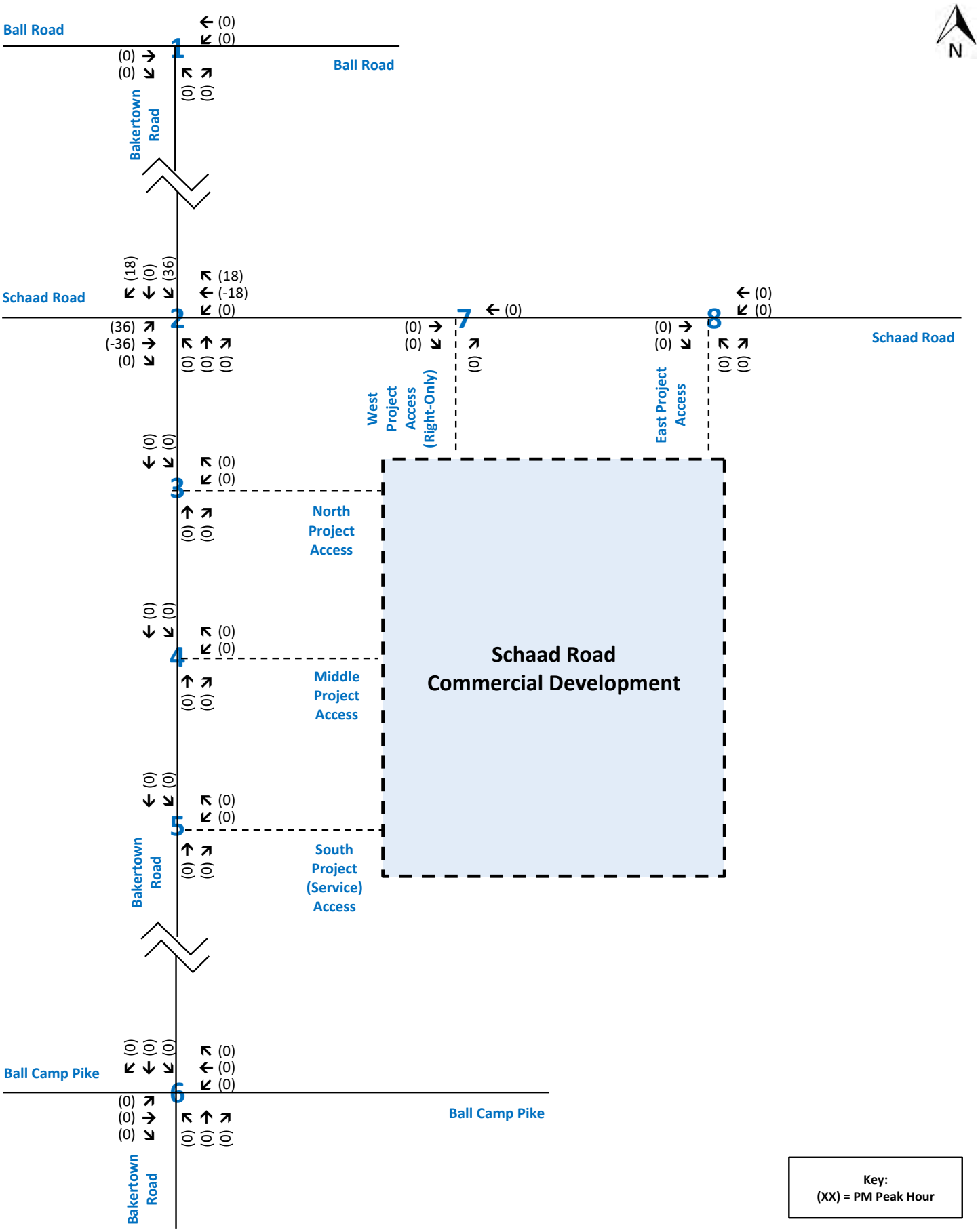
Traffic Assignment Worksheet
Background - Historical Growth Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee



Traffic Assignment Worksheet
Offsite Traffic Assignment - Schaad Road Apartments
Schaad Road Commercial Development
Knox County, Tennessee

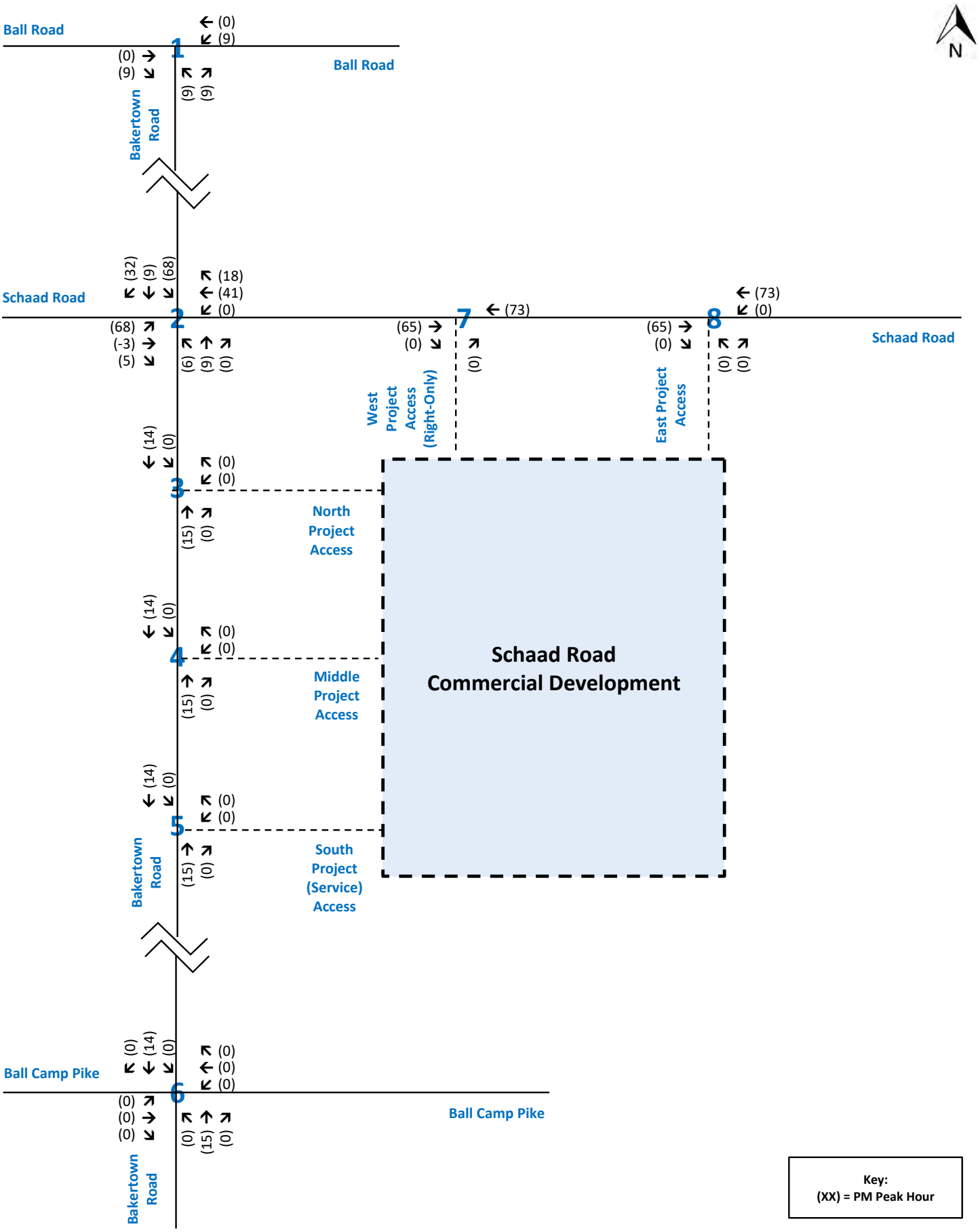


Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Primary Trips)
Schaad Road Commercial Development
Knox County, Tennessee



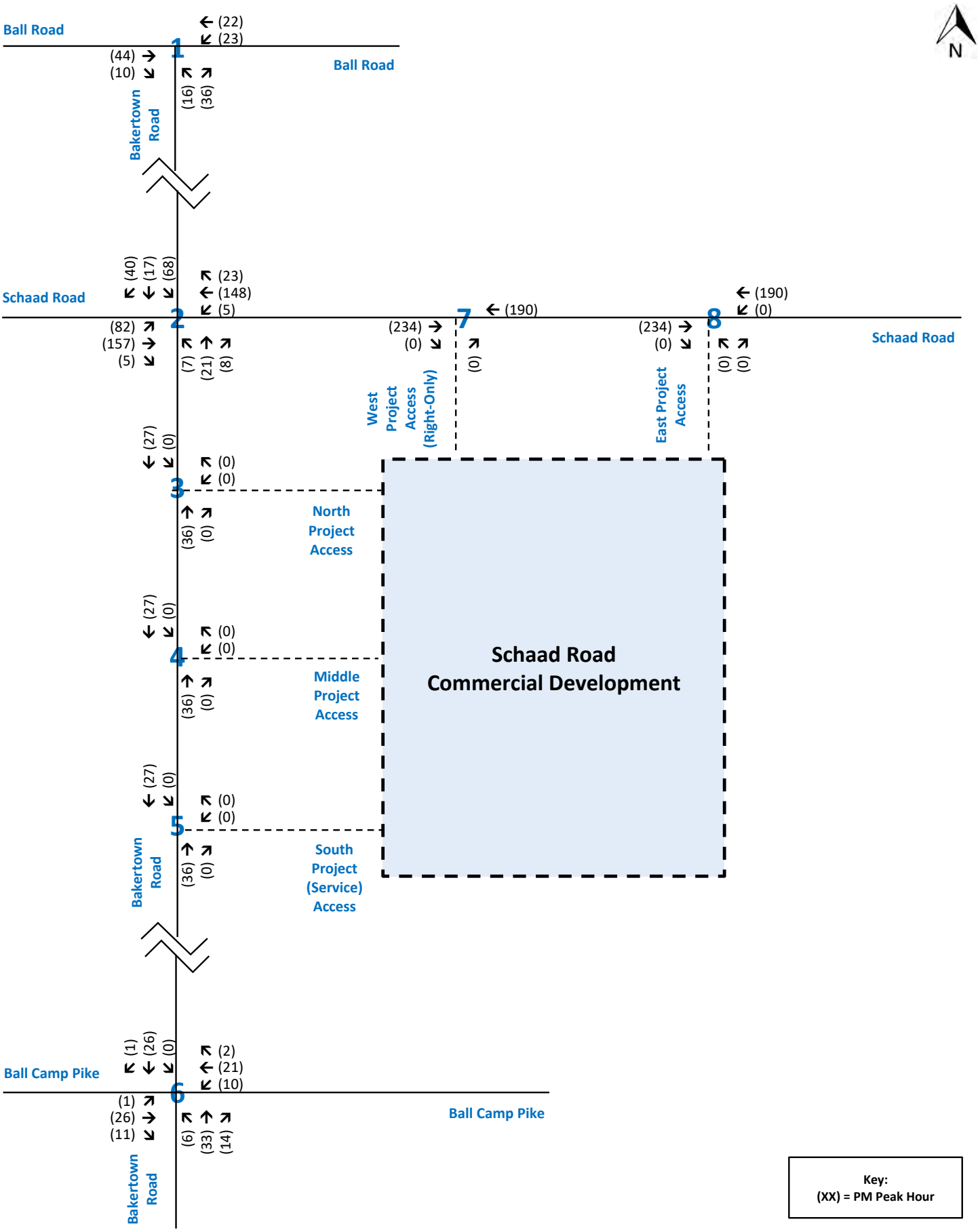
Traffic Assignment Worksheet
Offsite Traffic Assignment - Weigel's (Pass-By Trips)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Background - Offsite Development Only (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Background (Growth + Offsite)
Schaad Road Commercial Development
Knox County, Tennessee

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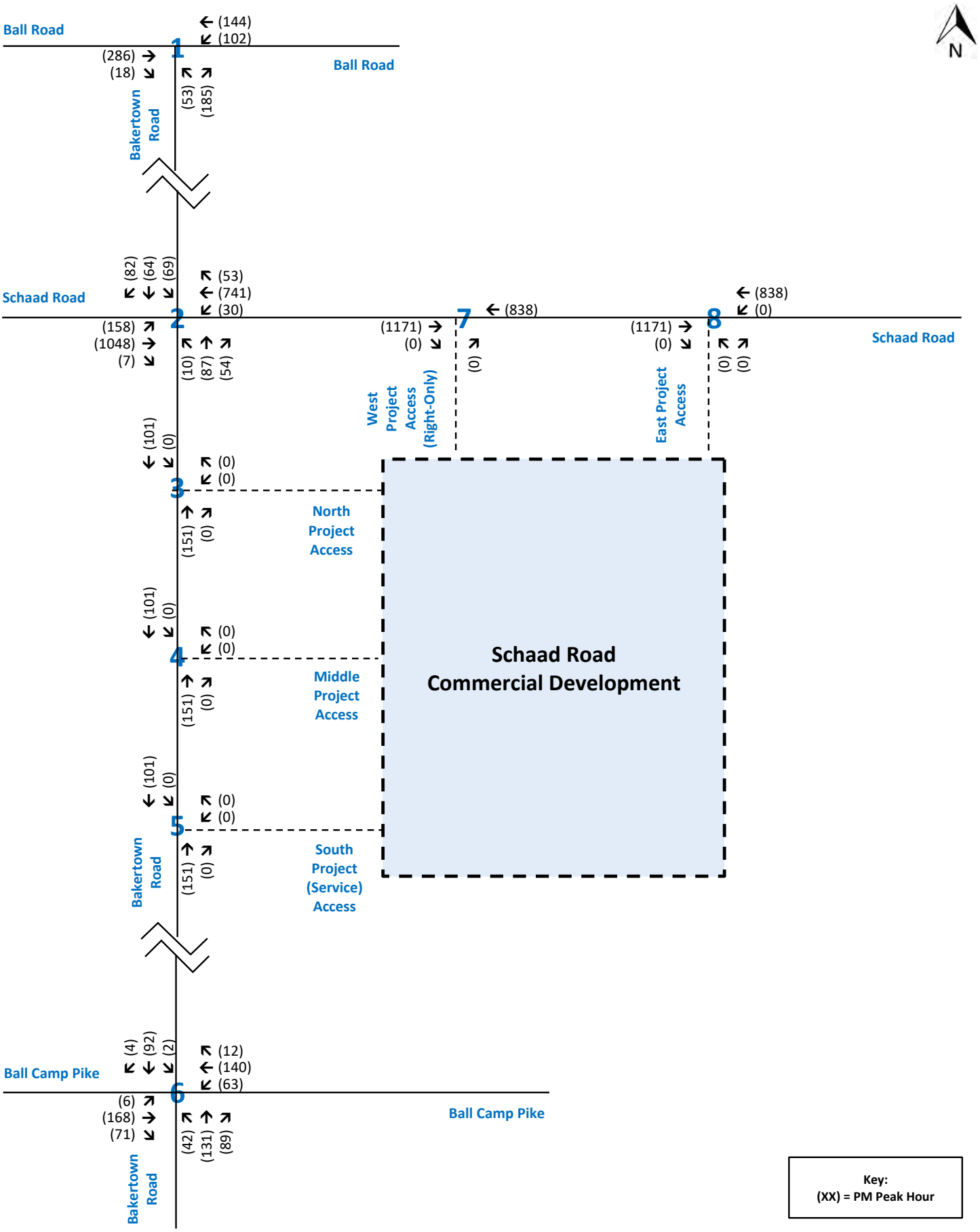
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Background Traffic Volumes (2030)
Schaad Road Commercial Development
Knox County, Tennessee

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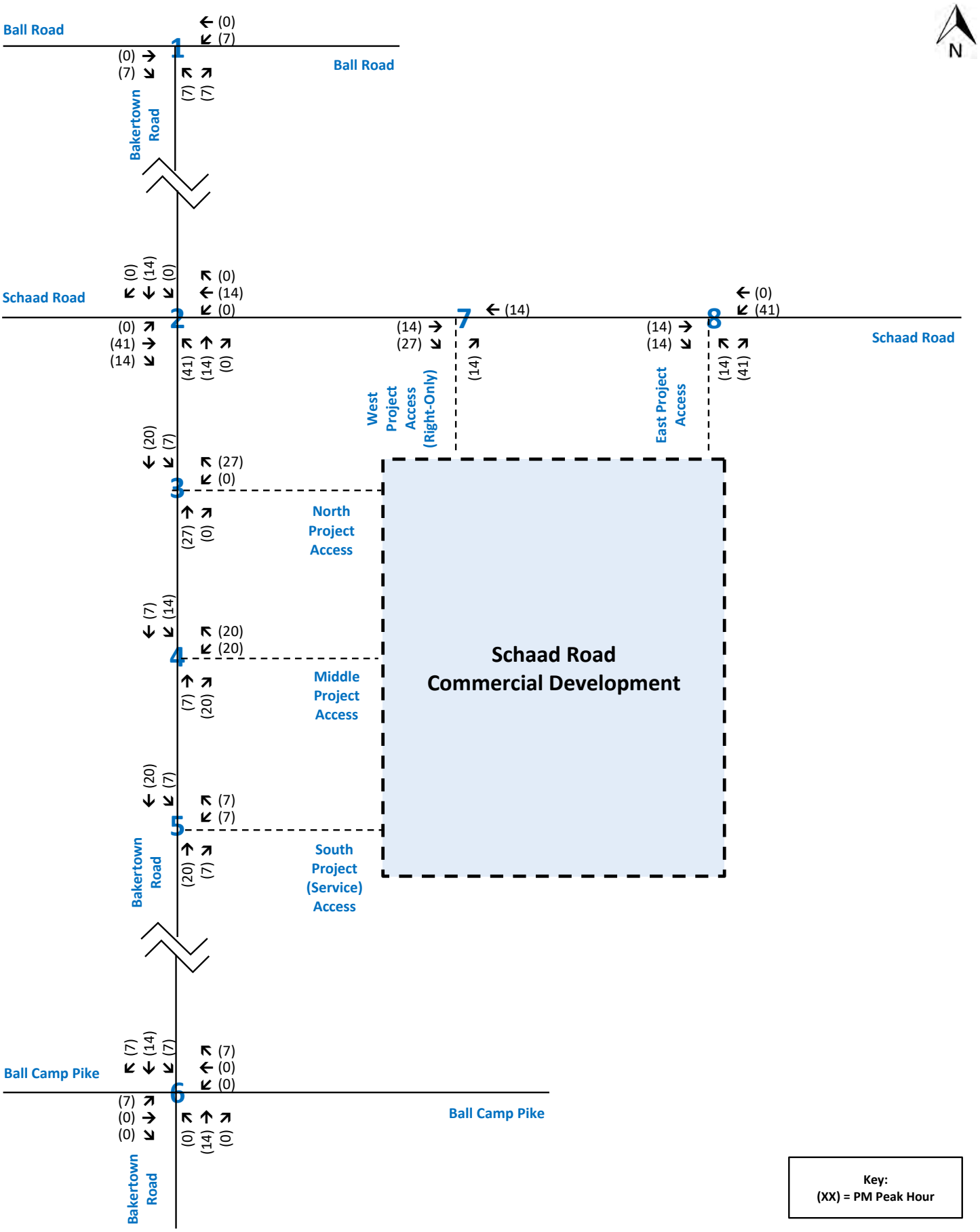
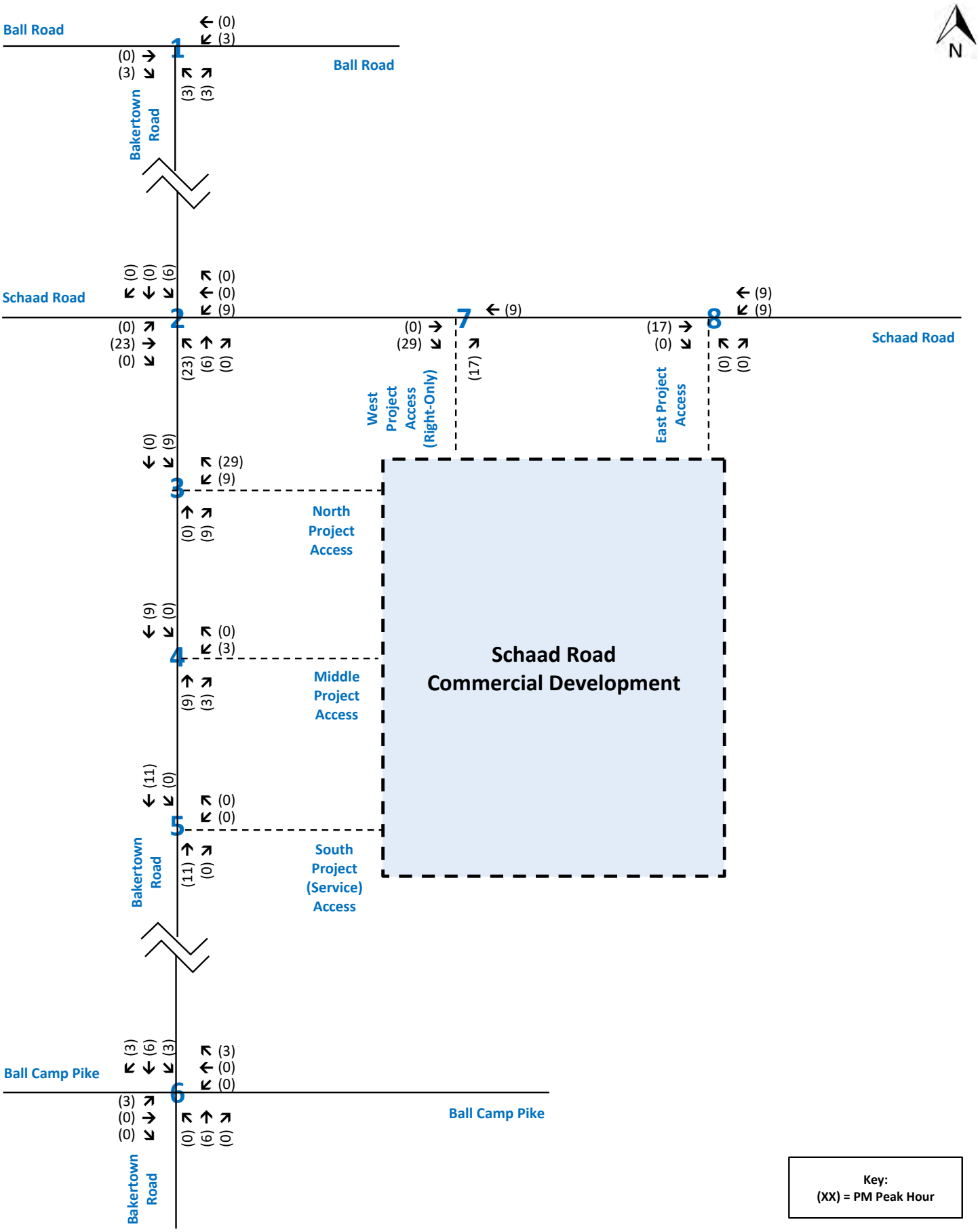
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



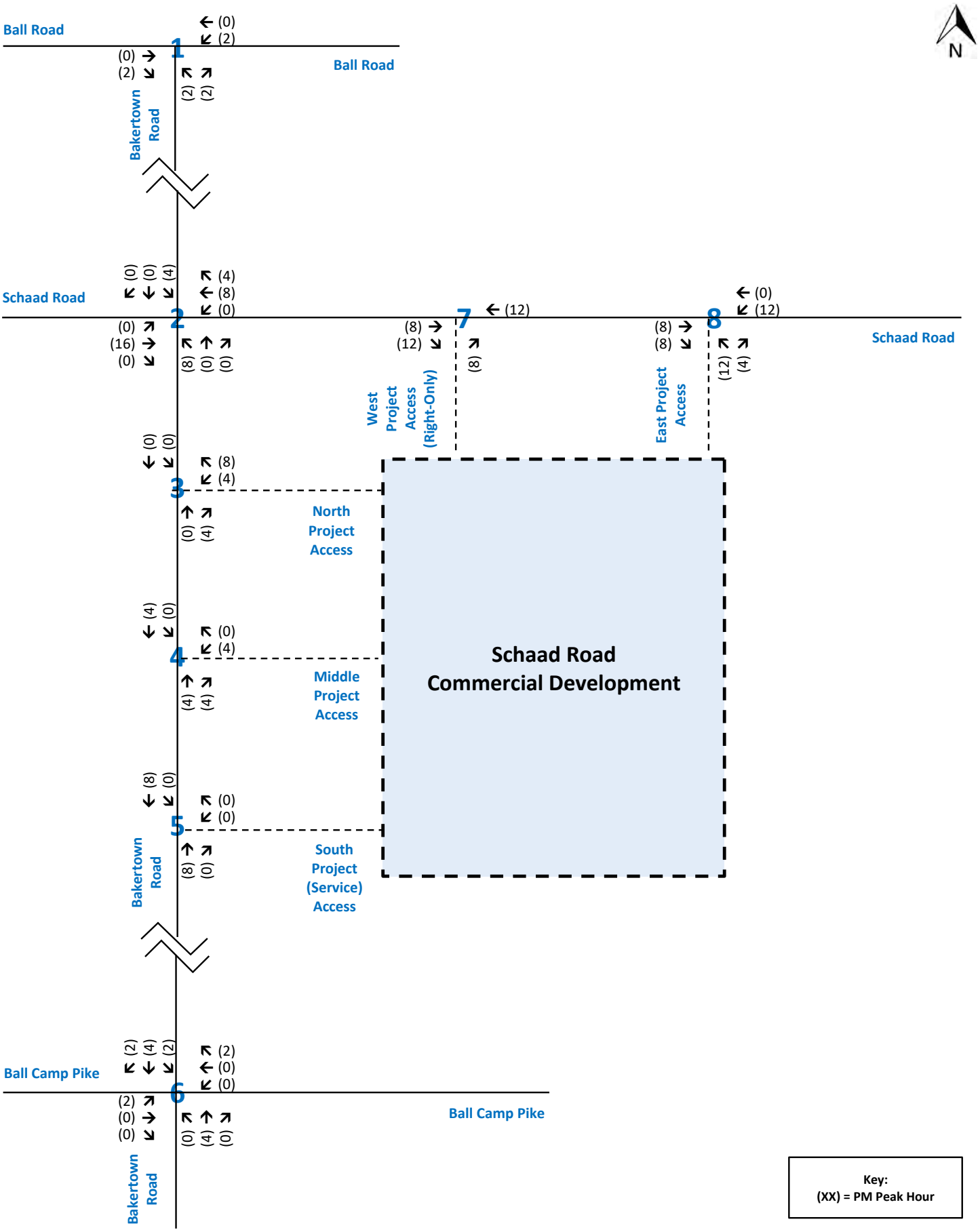
Traffic Assignment Worksheet
Primary Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



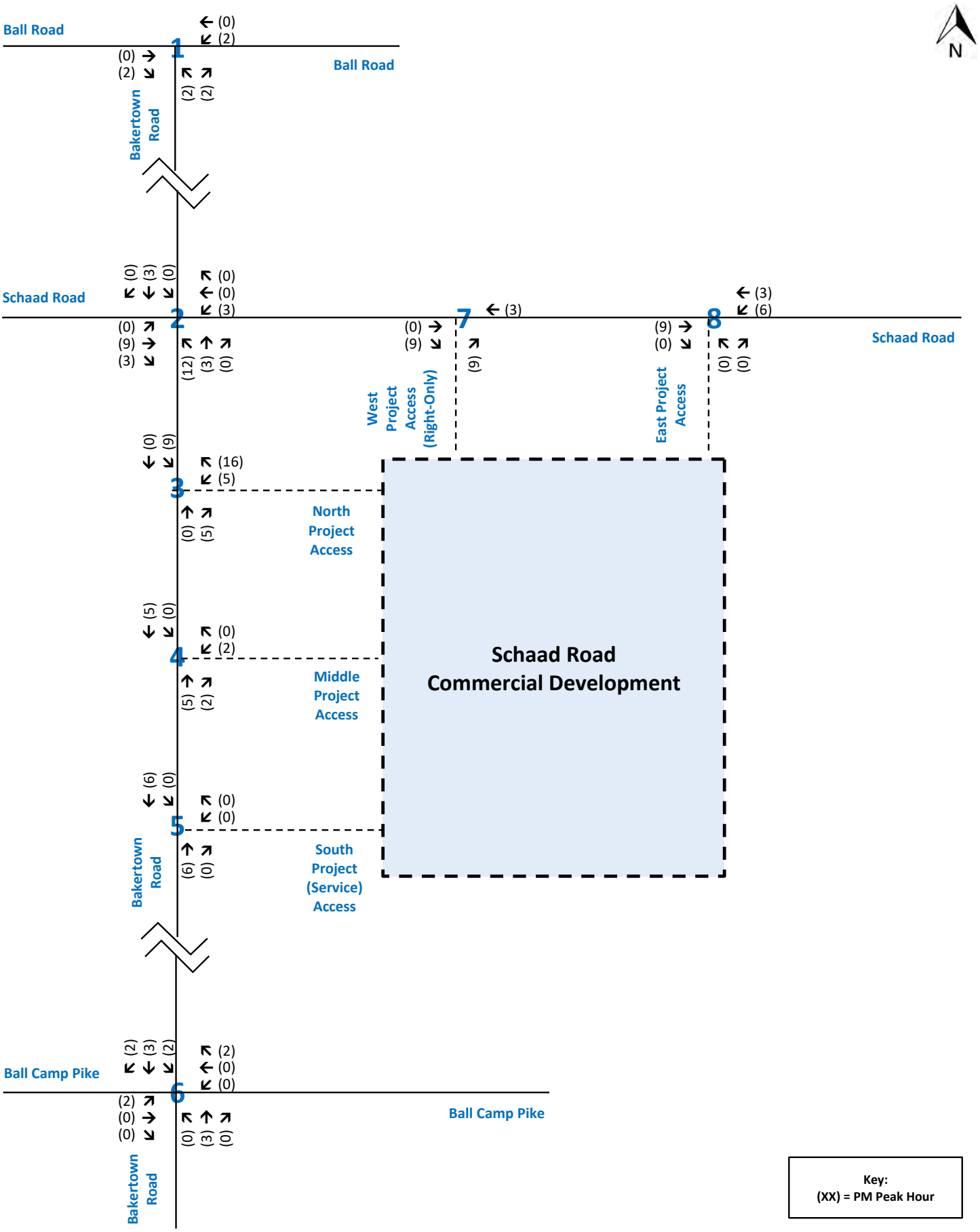
Traffic Assignment Worksheet
Primary Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



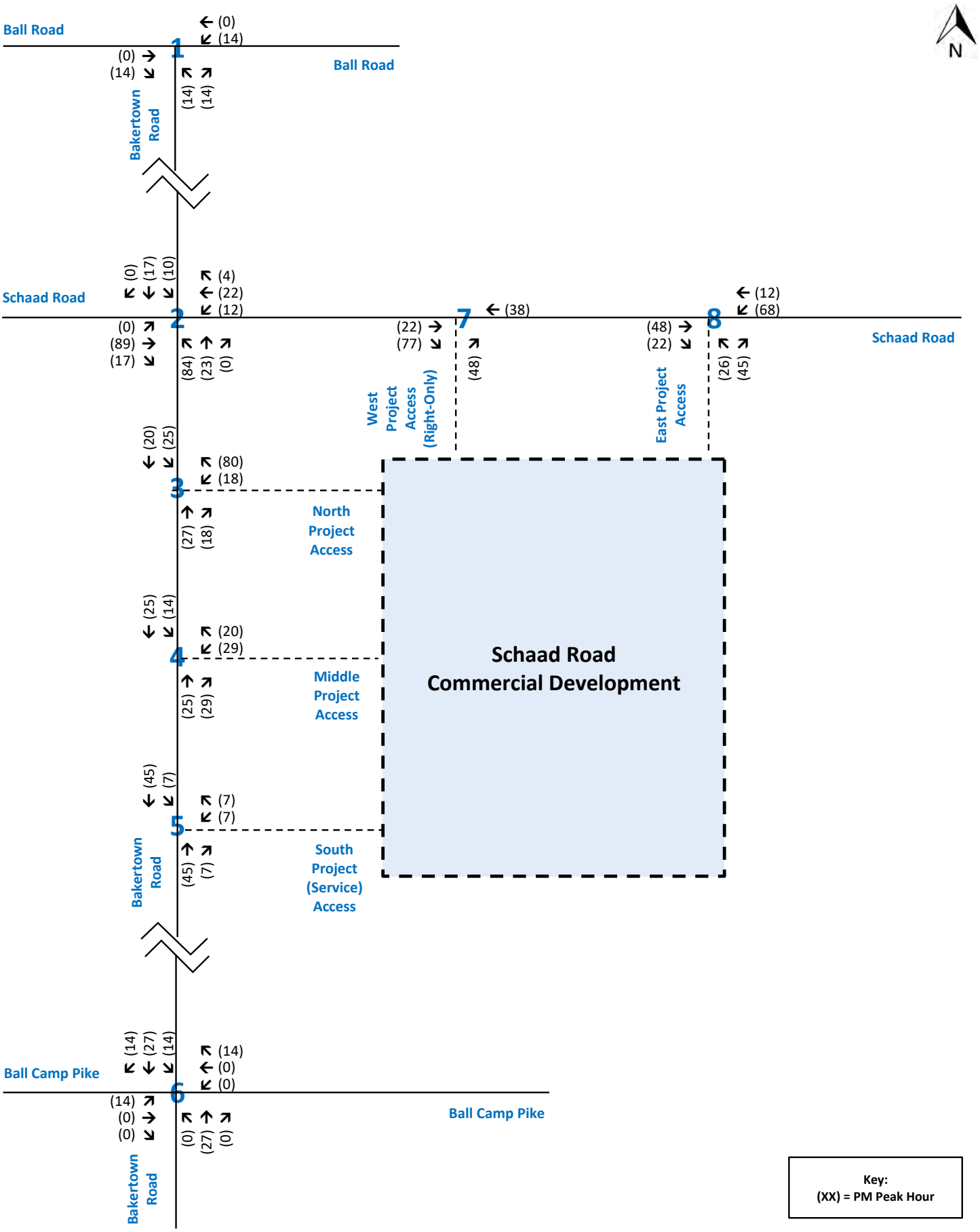
Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



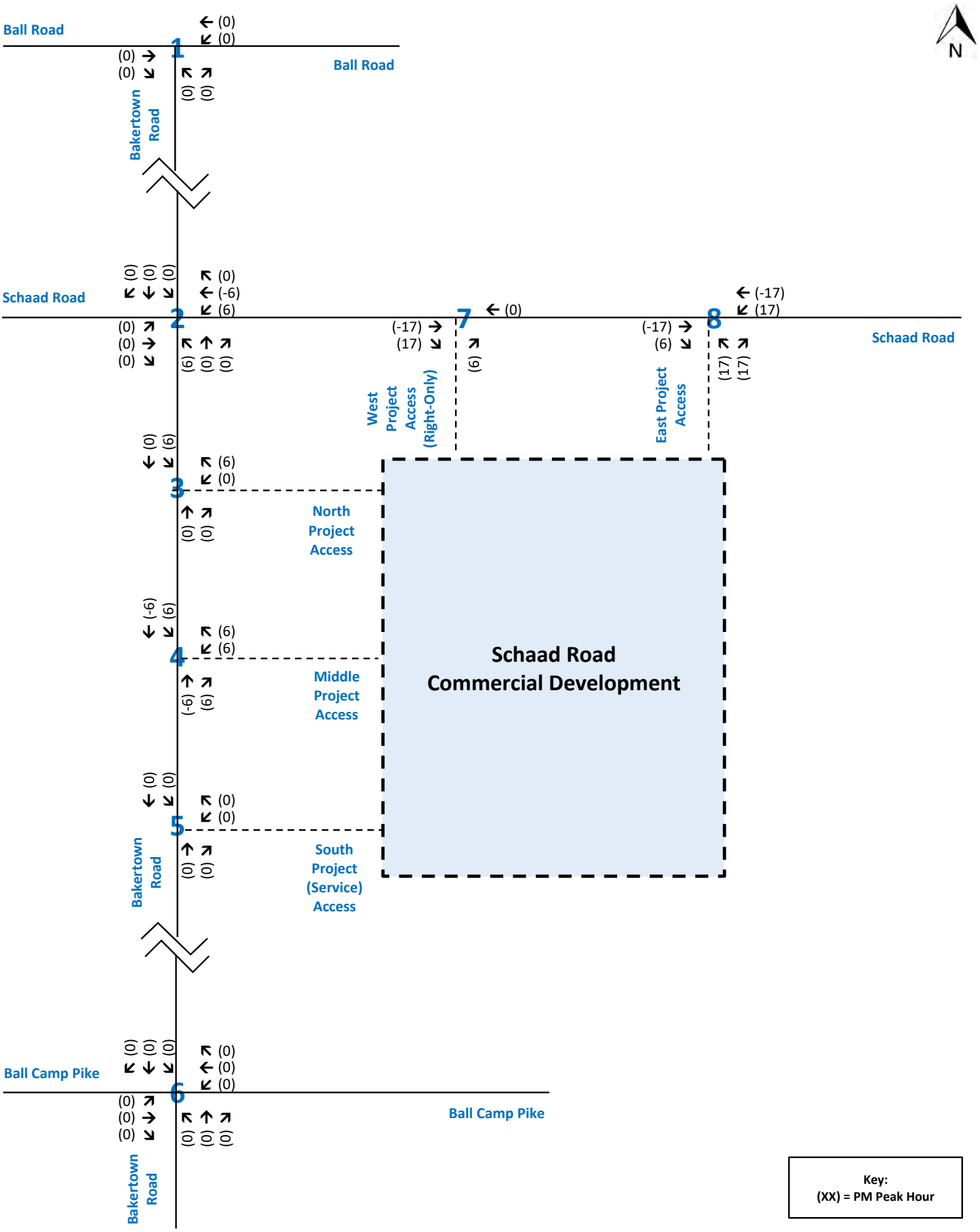
Traffic Assignment Worksheet
Primary Traffic Assignment - Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



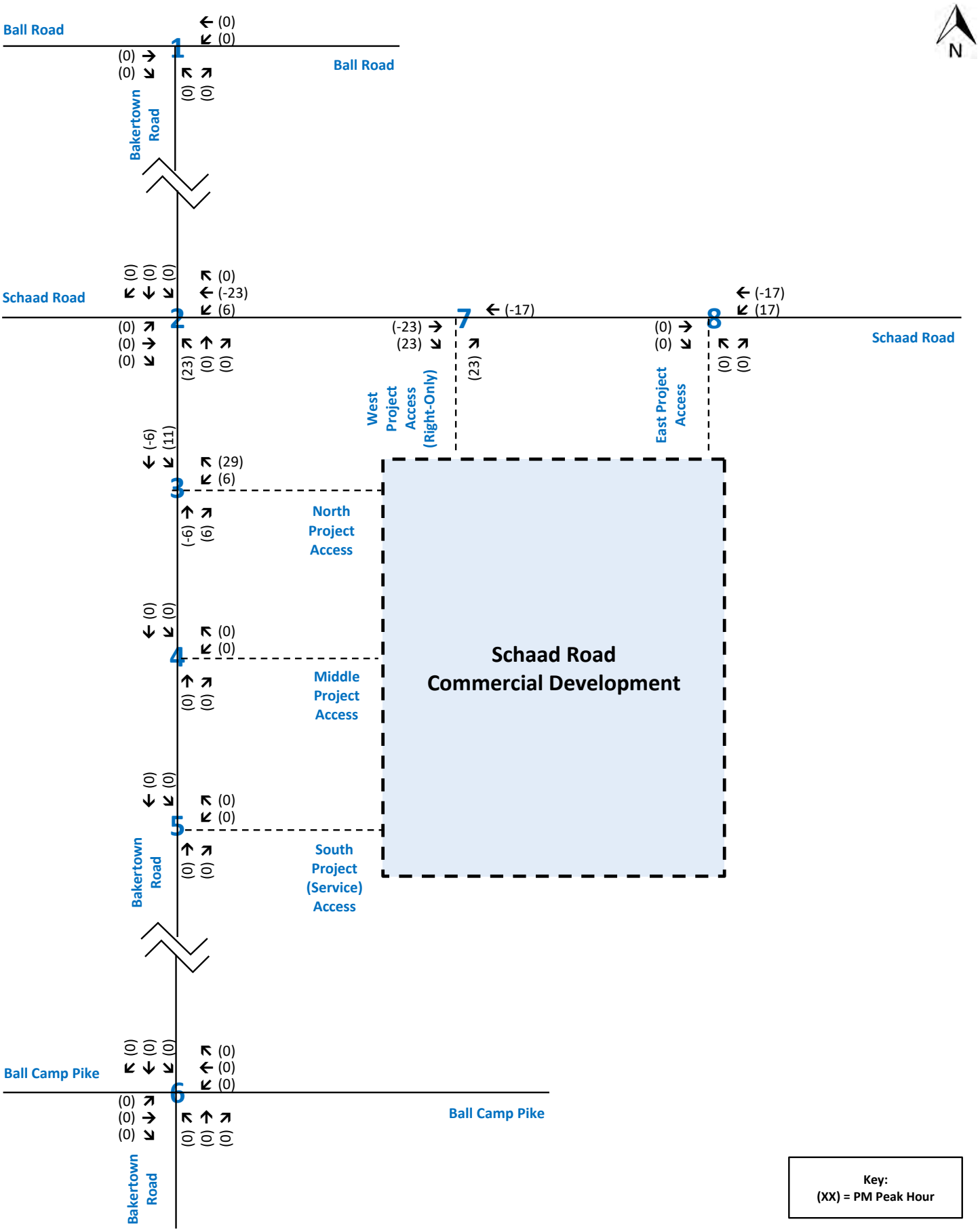
Traffic Assignment Worksheet
Total Primary Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



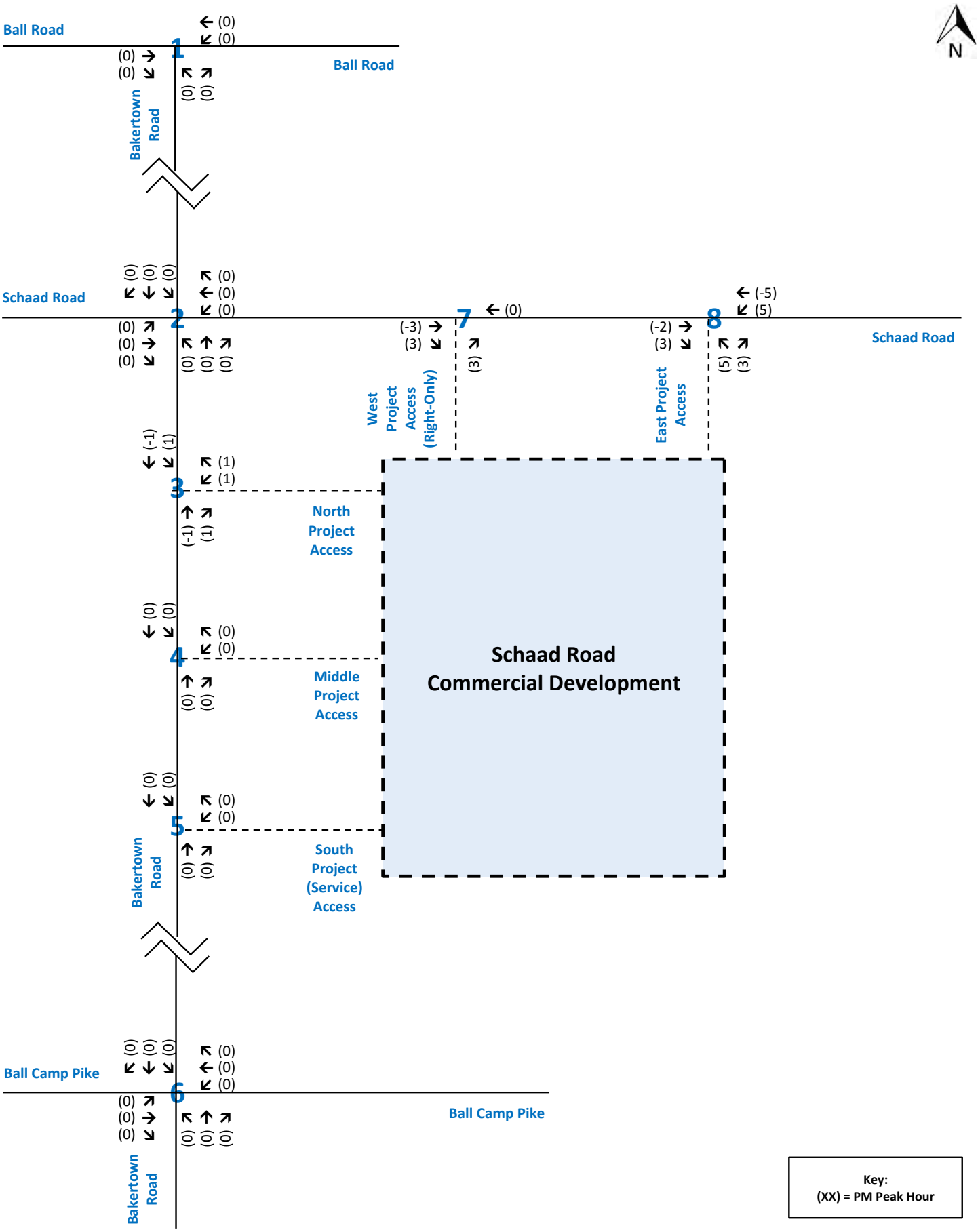
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Grocery Store (49,305 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



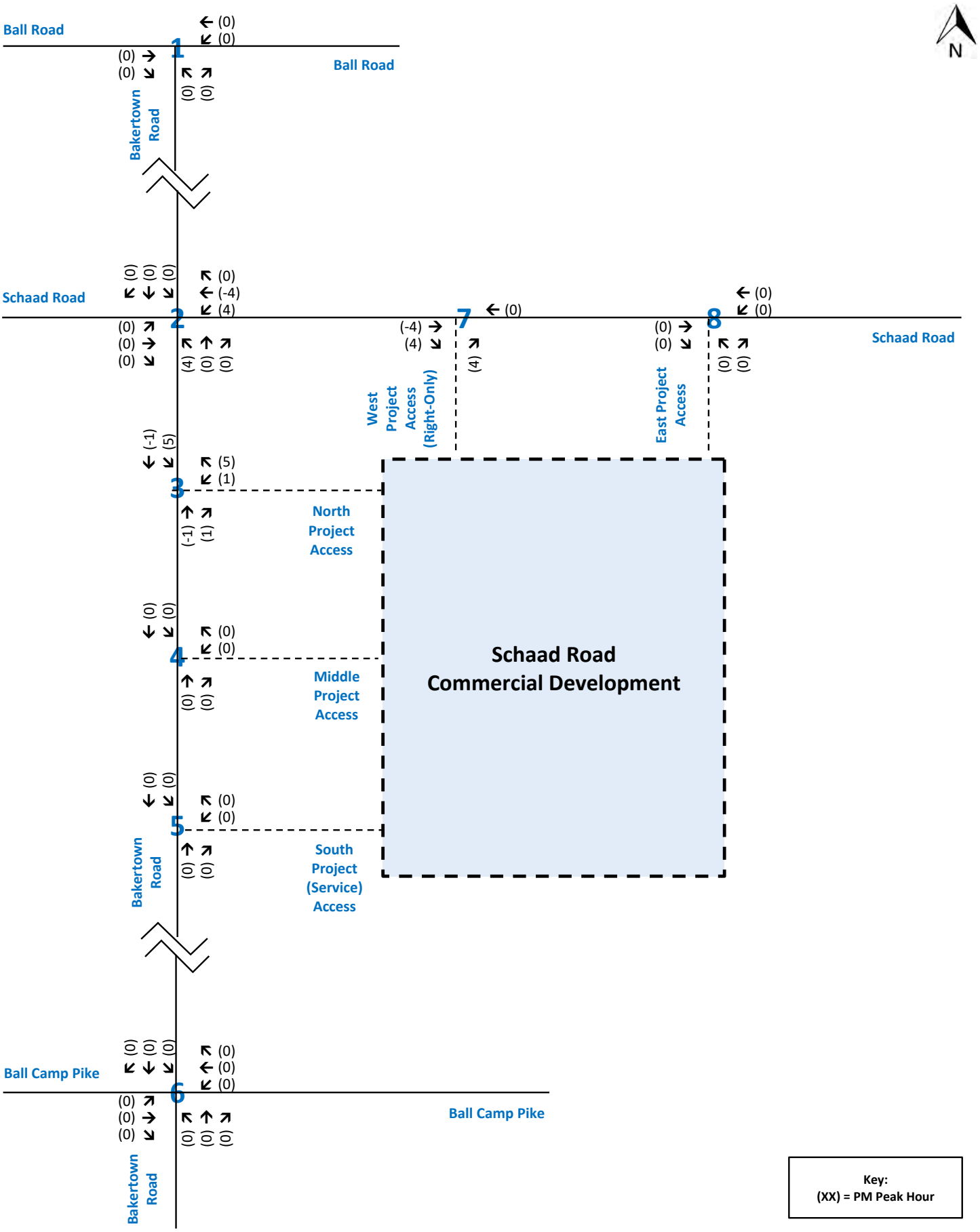
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Fuel Center with Market (16 Fueling Positions)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



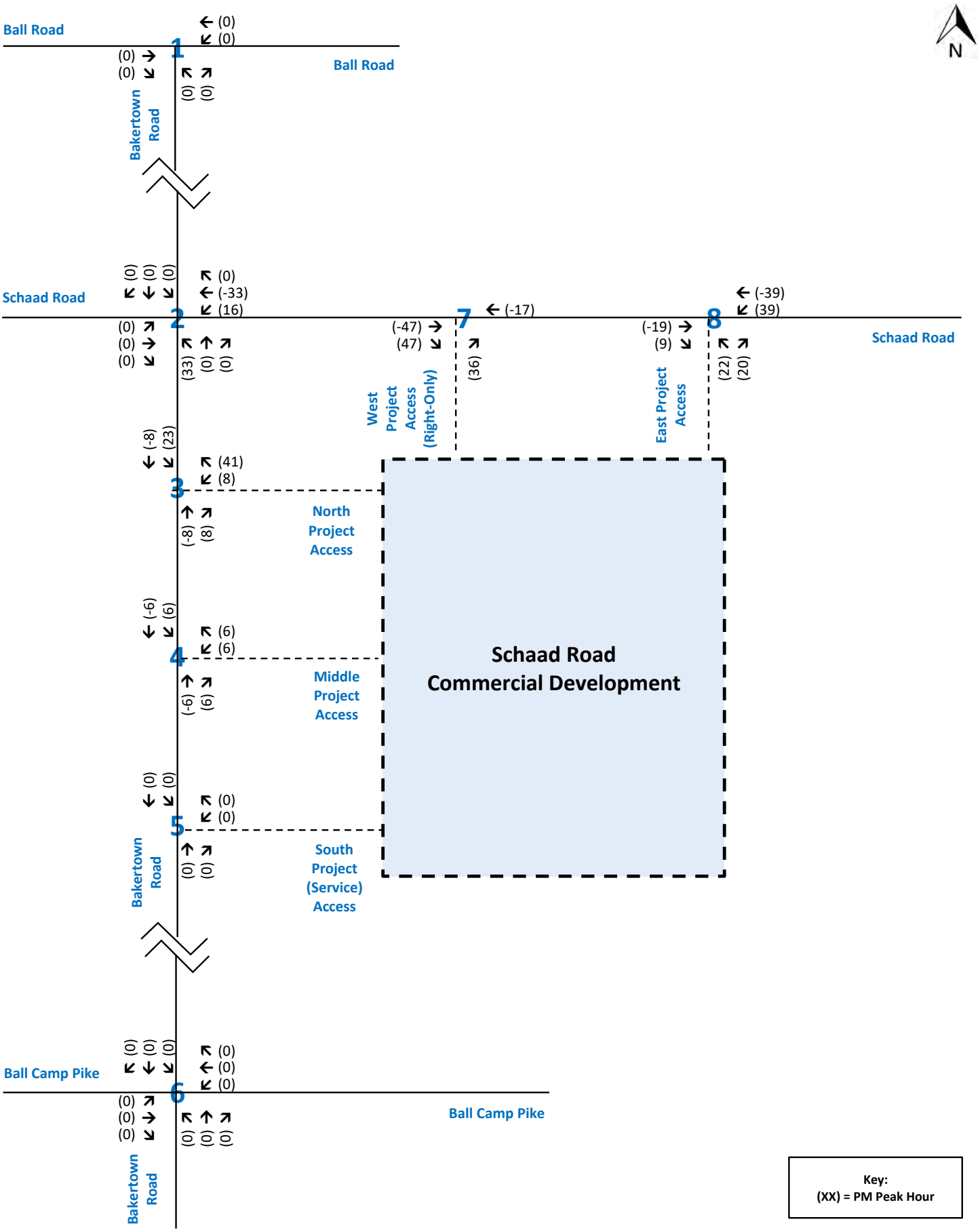
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Outlot #1 - Retail (18,513 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



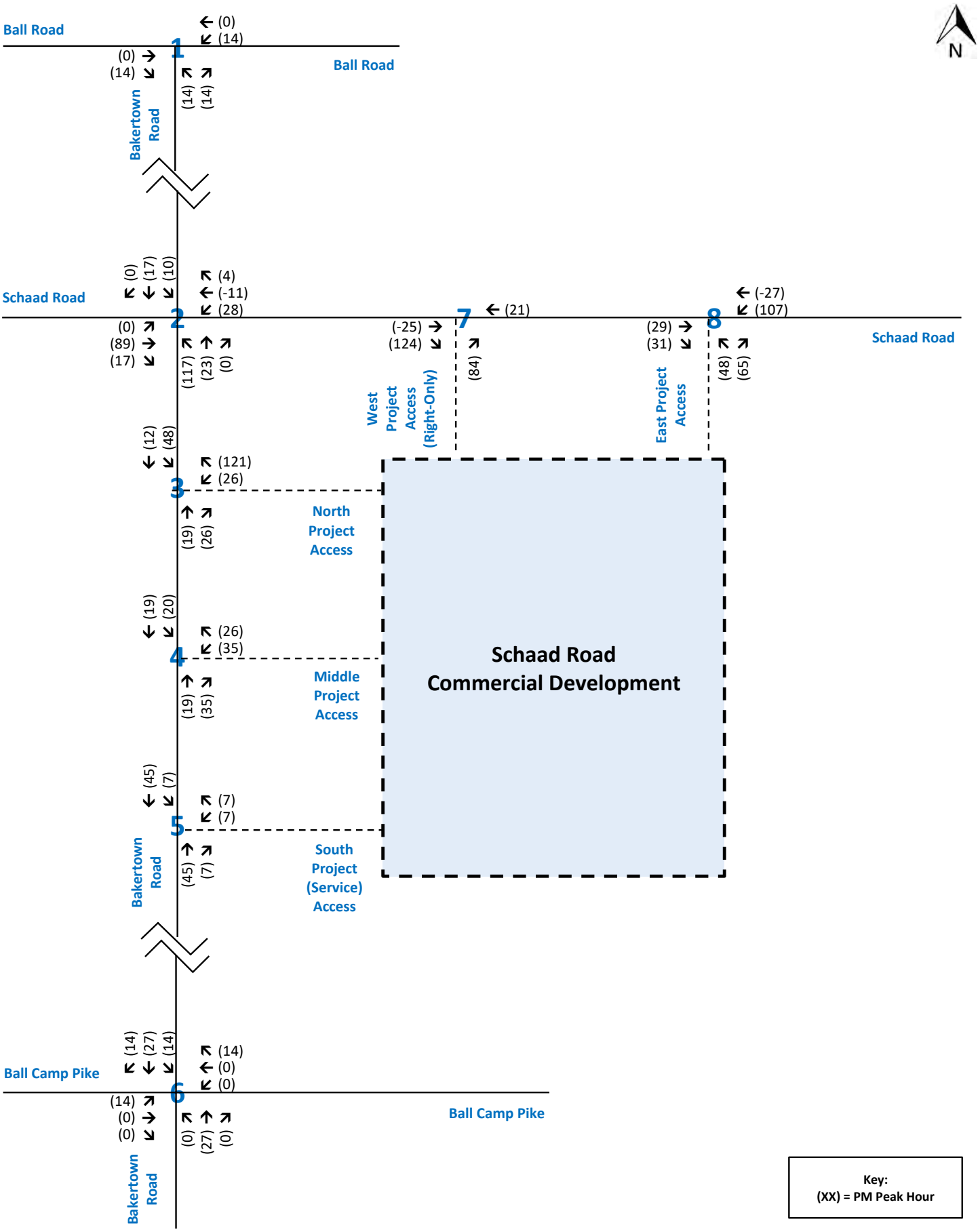
Traffic Assignment Worksheet
Pass-By Traffic Assignment - Site Outlot #2 - Retail (13,177 S.F.)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



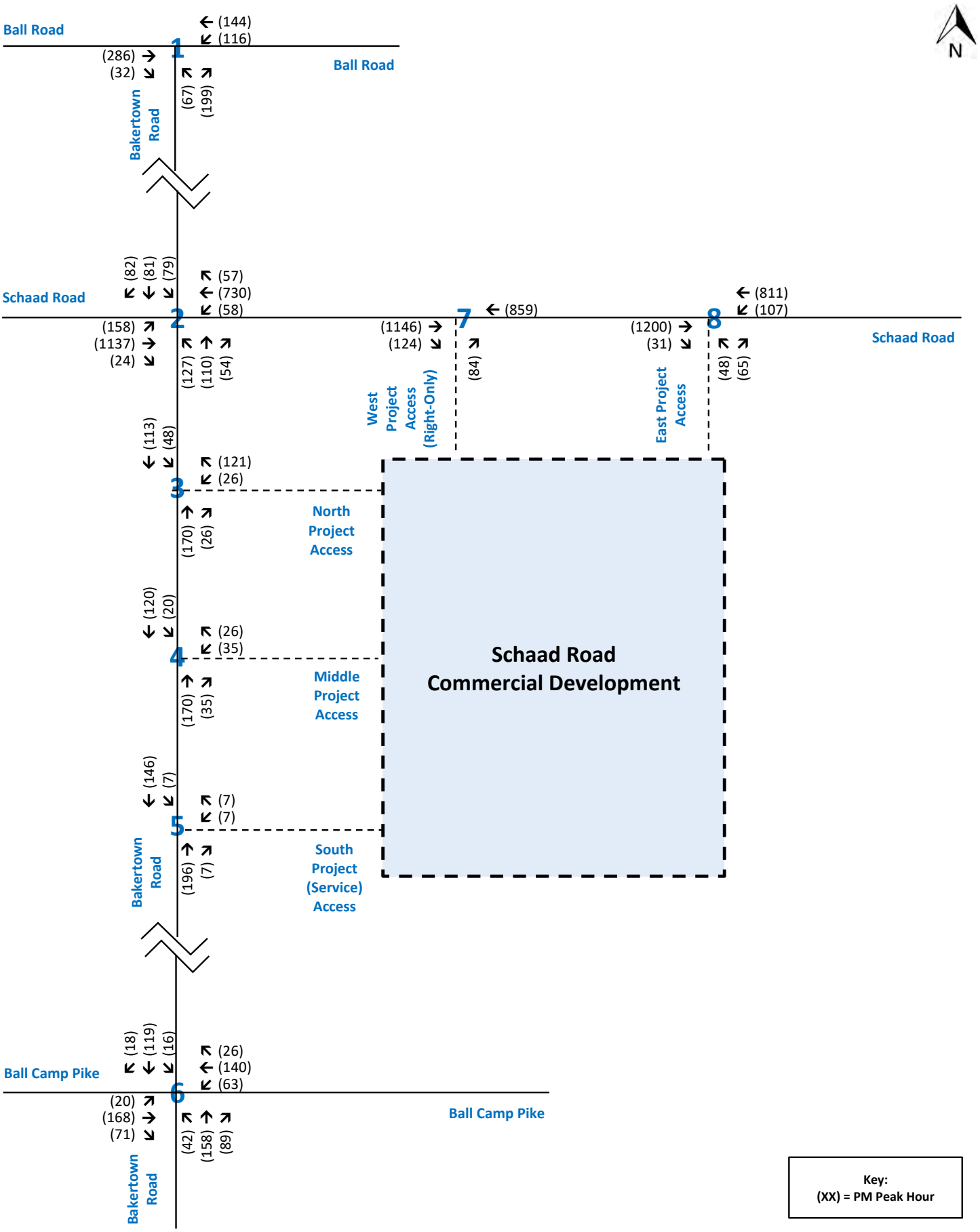
Traffic Assignment Worksheet
Total Pass-By Traffic Assignment
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Site-Generated Traffic
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING



Traffic Assignment Worksheet
Total Projected Traffic at Buildout (2030)
Schaad Road Commercial Development
Knox County, Tennessee

RGPHILLIPS CONSULTING
TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

APPENDIX F

TURN LANE

EVALUATIONS

LEFT TURN LANE

WARRANTS

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#3 - Bakertown Road & North Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Southbound**

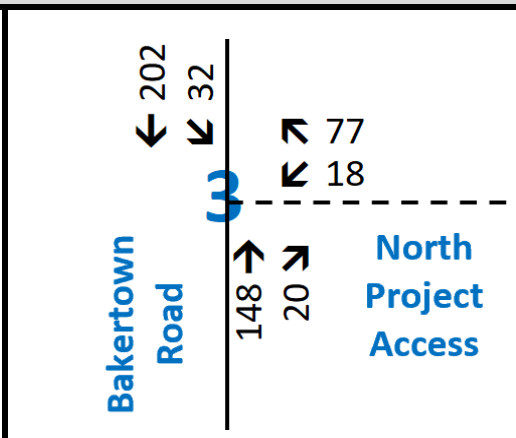


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

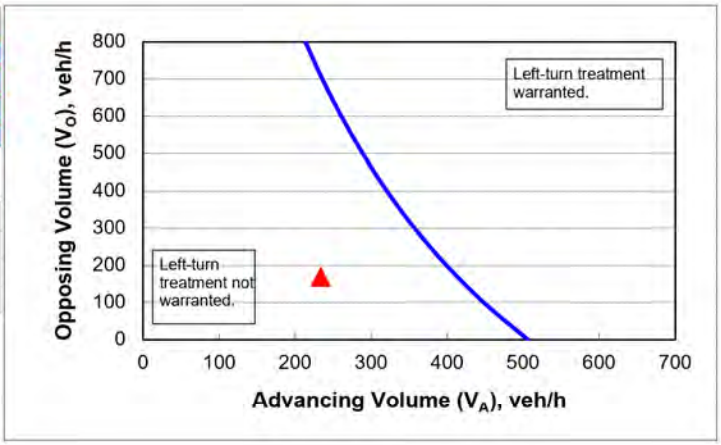
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	14%
Advancing volume (V_A), veh/h:	234
Opposing volume (V_O), veh/h:	168

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	414
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#3 - Bakertown Road & North Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **PM Peak Hour**

DIRECTION: **Southbound**

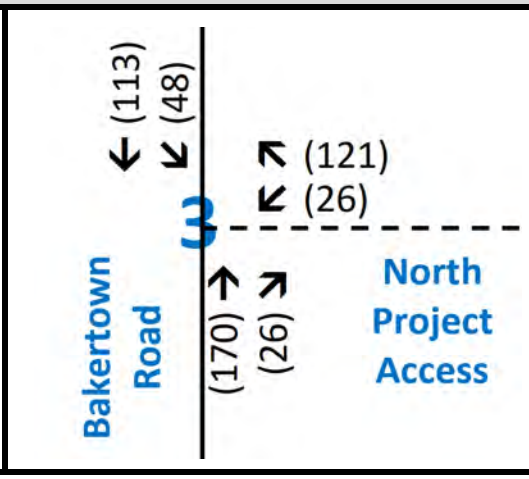


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

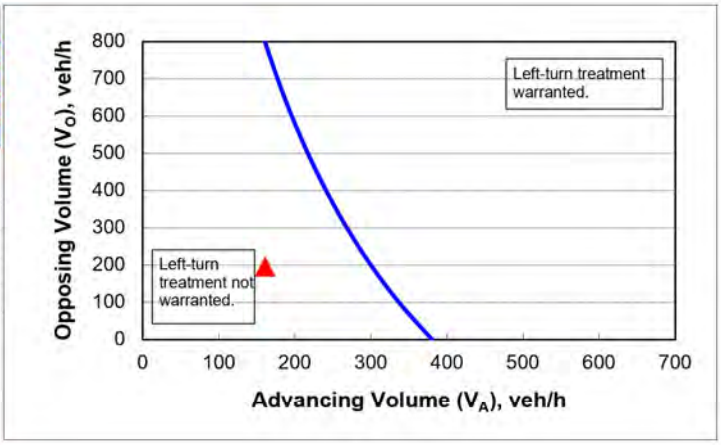
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	30%
Advancing volume (V_A), veh/h:	161
Opposing volume (V_O), veh/h:	196

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	302
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#4 - Bakertown Road & Middle Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Southbound**

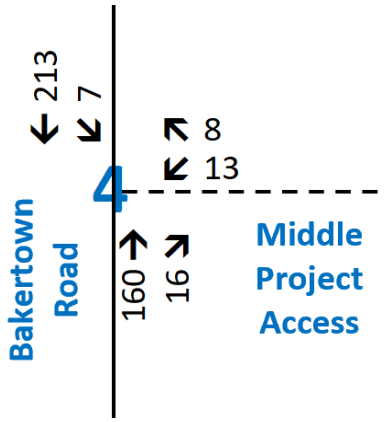


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

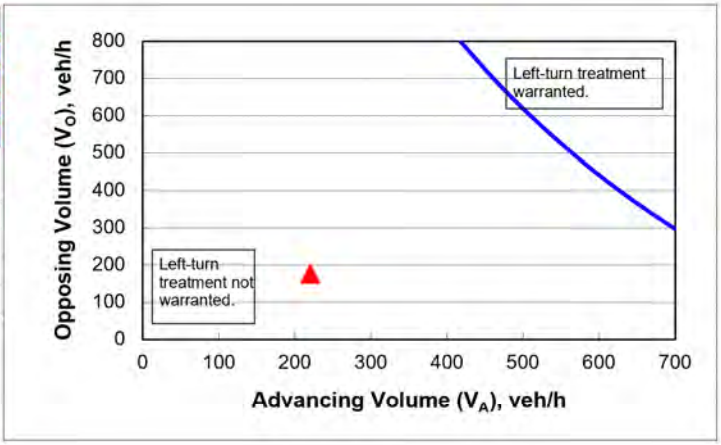
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	3%
Advancing volume (V_A), veh/h:	220
Opposing volume (V_O), veh/h:	176

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	802
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#4 - Bakertown Road & Middle Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **PM Peak Hour**

DIRECTION: **Southbound**

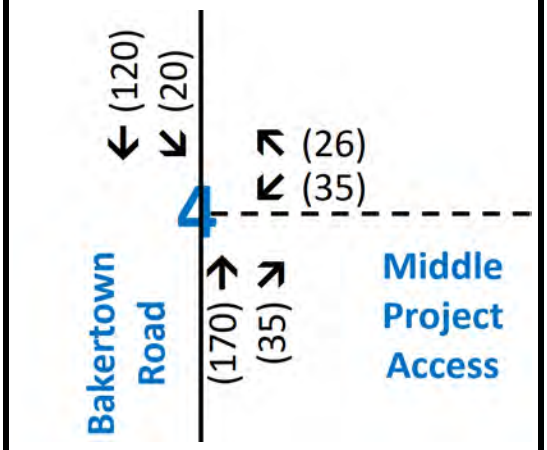


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

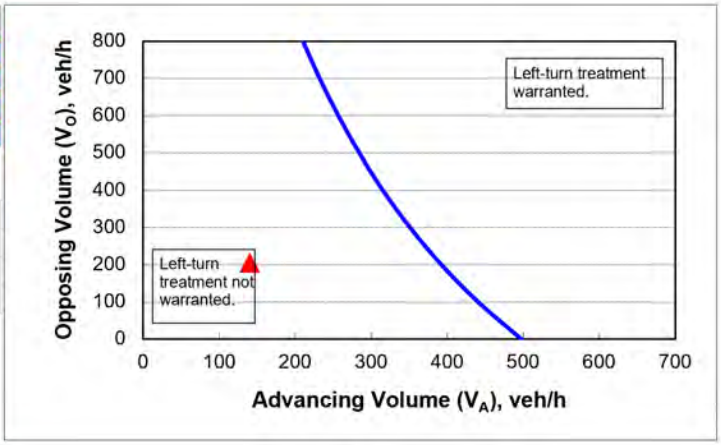
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	14%
Advancing volume (V_A), veh/h:	140
Opposing volume (V_O), veh/h:	205

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	390
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#5 - Bakertown Road & South Project Access (Service)**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Southbound**

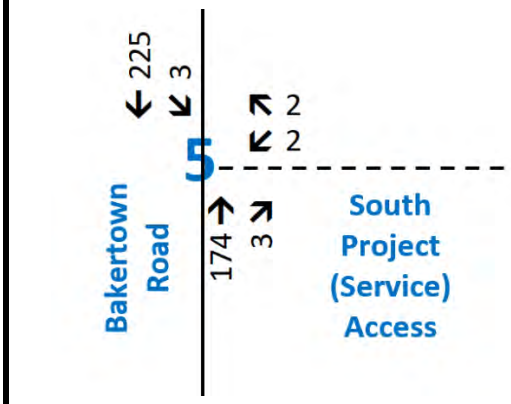


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

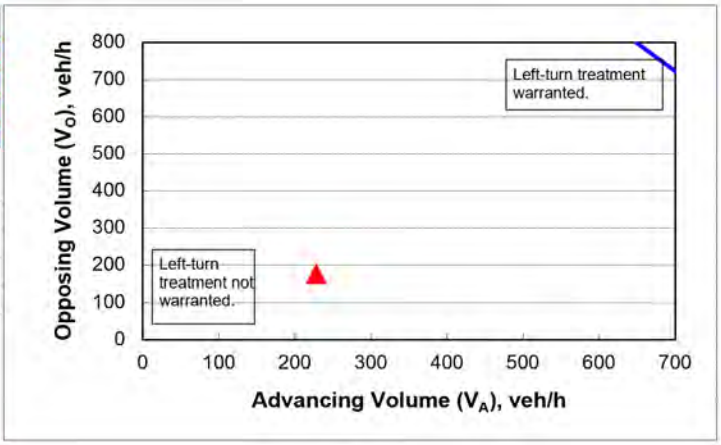
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	228
Opposing volume (V_O), veh/h:	177

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1244
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

LEFT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#5 - Bakertown Road & South Project Access (Service)**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **PM Peak Hour**

DIRECTION: **Southbound**

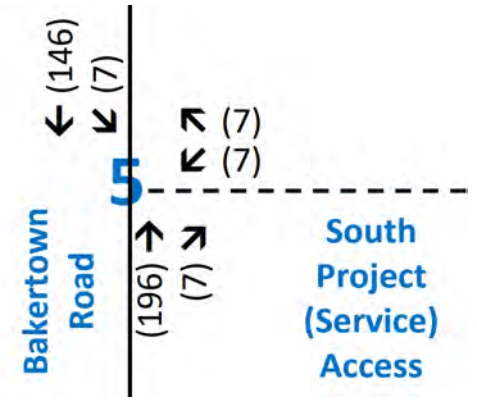


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

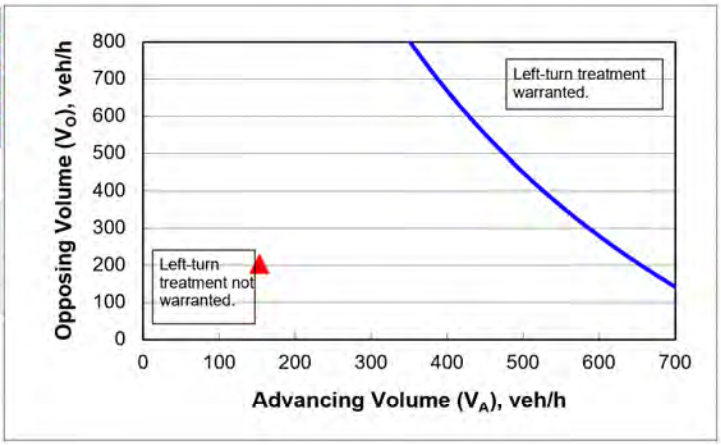
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	5%
Advancing volume (V_A), veh/h:	153
Opposing volume (V_O), veh/h:	203

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	653
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

RIGHT TURN LANE

EVALUATIONS

RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT:	**Schaad Road Commercial Development**
LOCATION:	**#3 - Bakertown Road & North Project Access**
SECENARIO:	**2030 Projected Traffic Volumes**
TIME PERIOD:	**AM Peak Hour**
DIRECTION:	**Northbound**

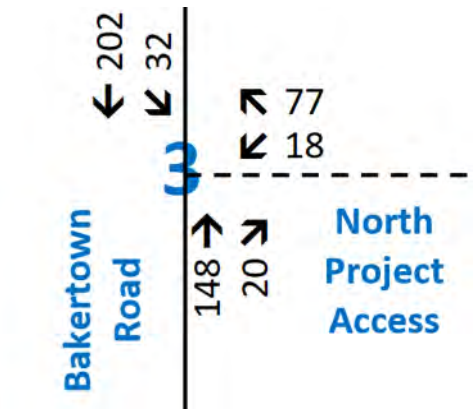


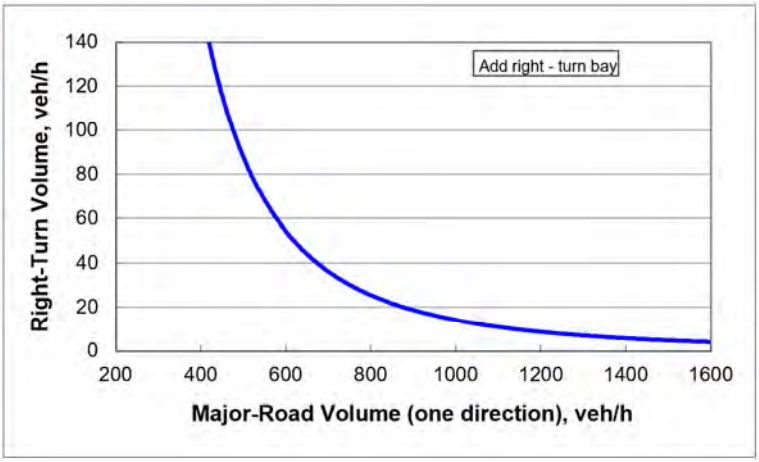
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	168
Right-turn volume, veh/h:	20

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1566
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT:	**Schaad Road Commercial Development**
LOCATION:	**#3 - Bakertown Road & North Project Access**
SECENARIO:	**2030 Projected Traffic Volumes**
TIME PERIOD:	**PM Peak Hour**
DIRECTION:	**Northbound**

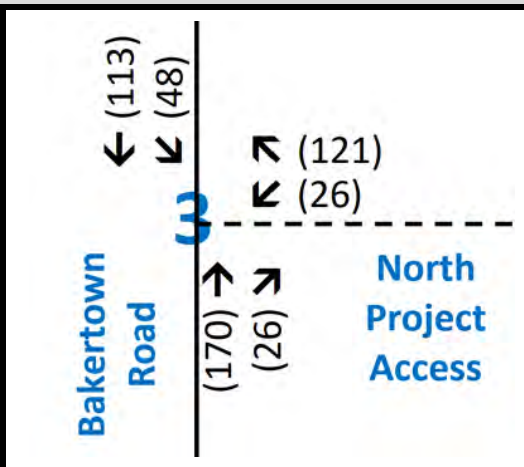


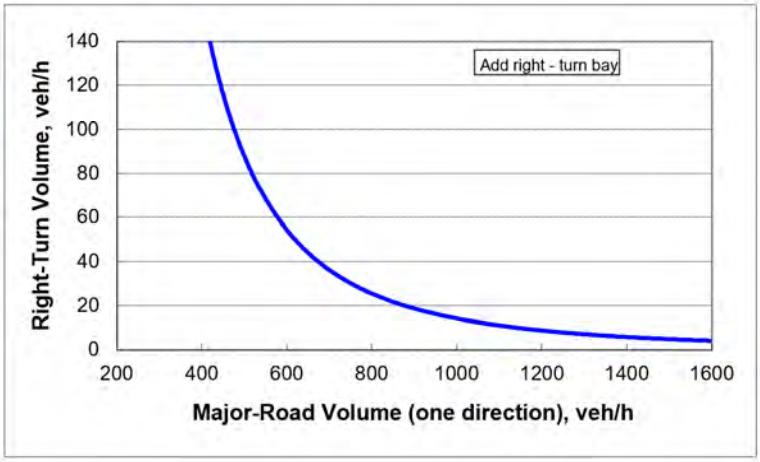
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	196
Right-turn volume, veh/h:	26

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1043
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#4 - Bakertown Road & Middle Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Northbound**

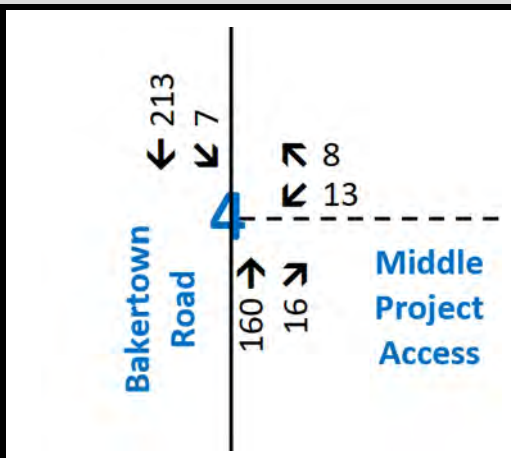


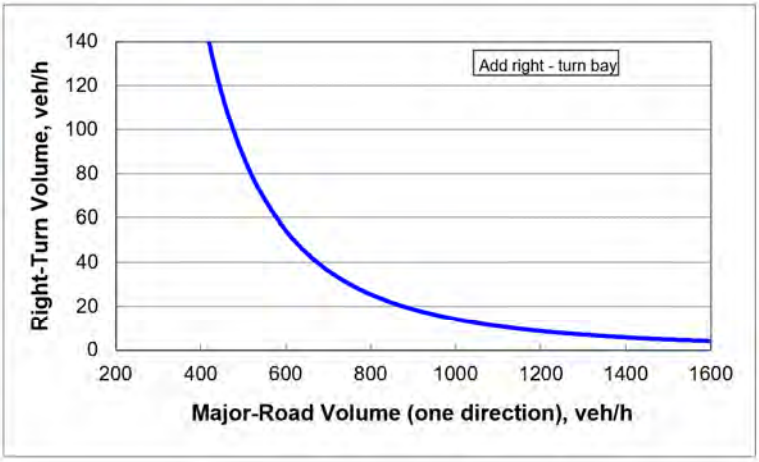
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	176
Right-turn volume, veh/h:	16

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1385
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT:	**Schaad Road Commercial Development**
LOCATION:	**#4 - Bakertown Road & Middle Project Access**
SECENARIO:	**2030 Projected Traffic Volumes**
TIME PERIOD:	**PM Peak Hour**
DIRECTION:	**Northbound**

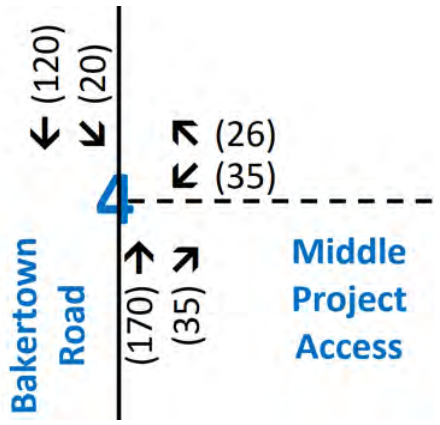


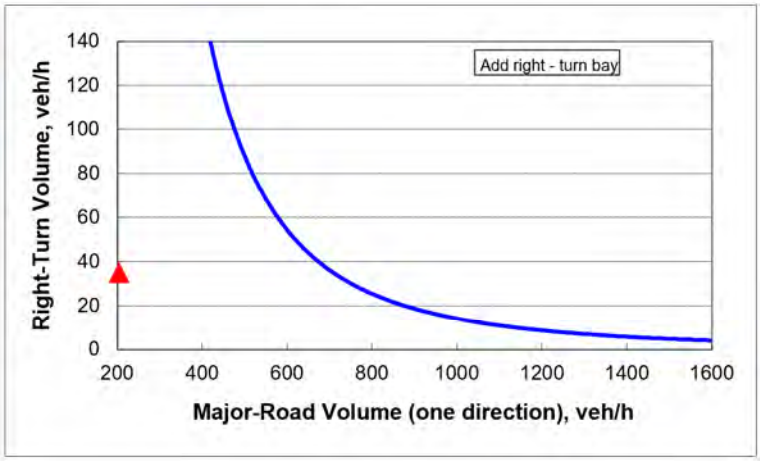
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	205
Right-turn volume, veh/h:	35

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	926
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#5 - Bakertown Road & South Project Access (Service)**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Northbound**

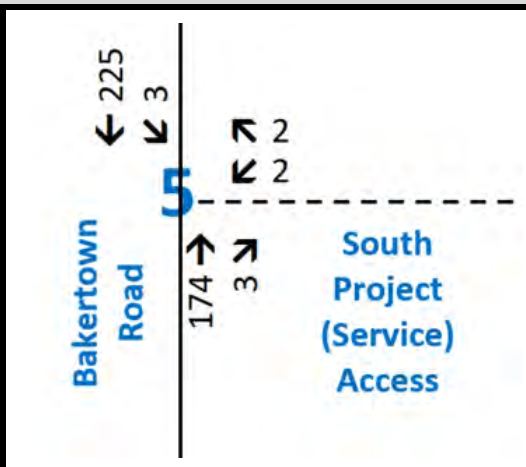


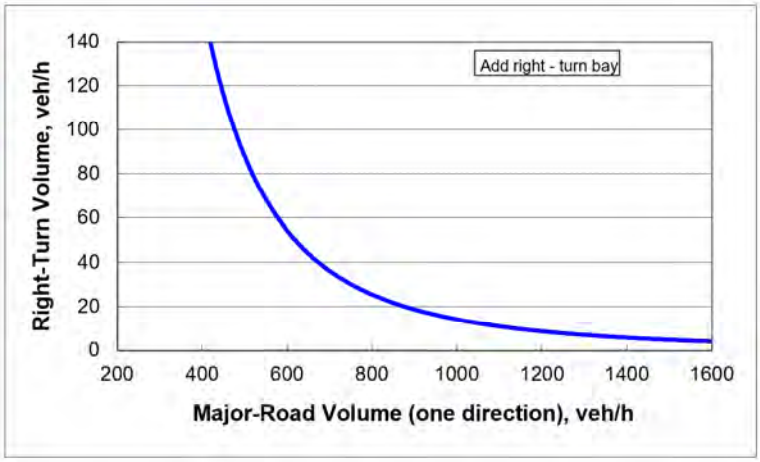
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	177
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1365
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT:	**Schaad Road Commercial Development**
LOCATION:	**#5 - Bakertown Road & South Project Access (Service)**
SECENARIO:	**2030 Projected Traffic Volumes**
TIME PERIOD:	**PM Peak Hour**
DIRECTION:	**Northbound**

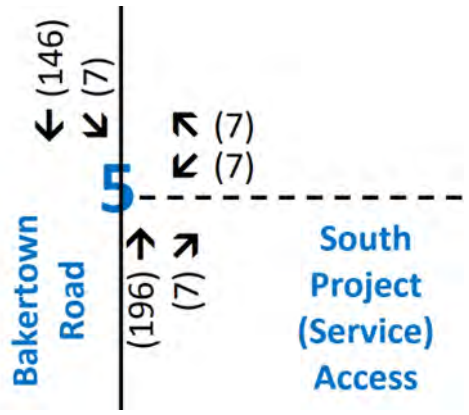


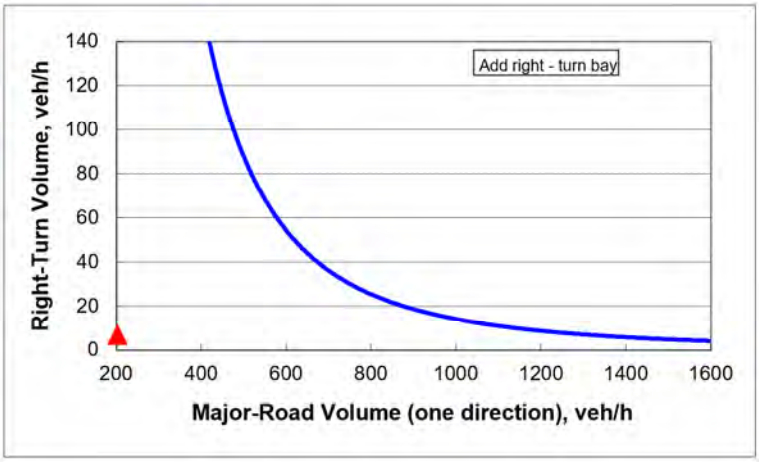
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	203
Right-turn volume, veh/h:	7

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	950
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#7 - Schaad Road & West Project Access (Right-Only)**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Eastbound**

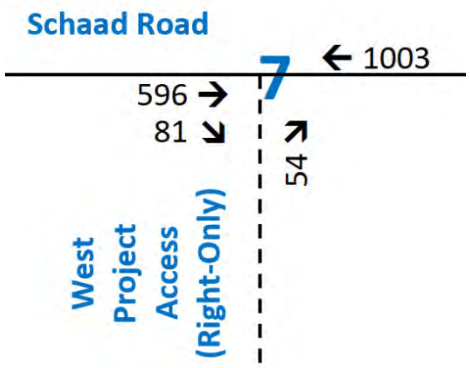


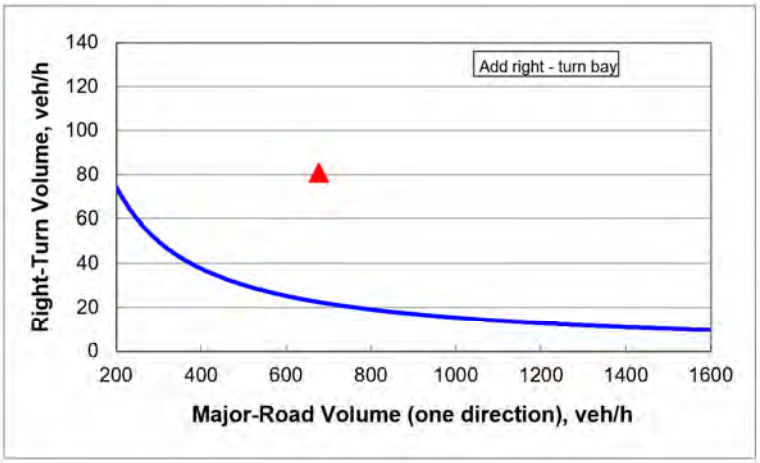
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	677
Right-turn volume, veh/h:	81

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	22
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#7 - Schaad Road & West Project Access (Right-Only)**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **PM Peak Hour**

DIRECTION: **Eastbound**

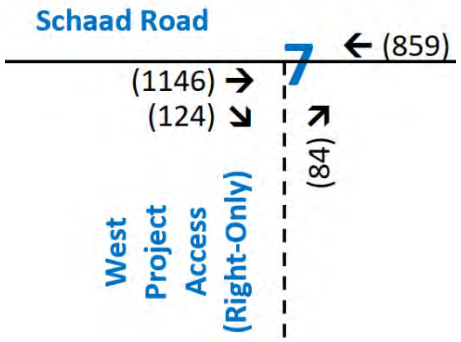


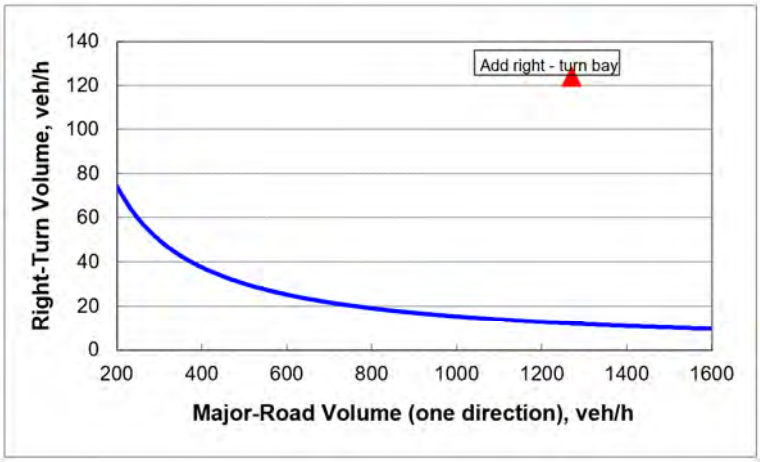
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	1270
Right-turn volume, veh/h:	124

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	12
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT: **Schaad Road Commercial Development**

LOCATION: **#8 - Schaad Road & East Project Access**

SECENARIO: **2030 Projected Traffic Volumes**

TIME PERIOD: **AM Peak Hour**

DIRECTION: **Eastbound**

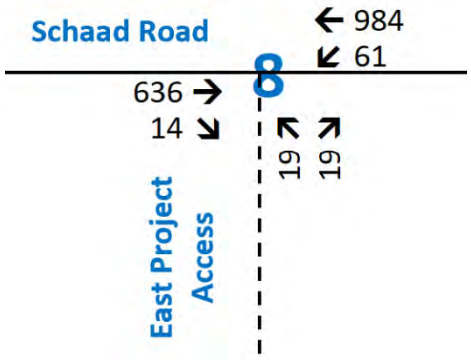


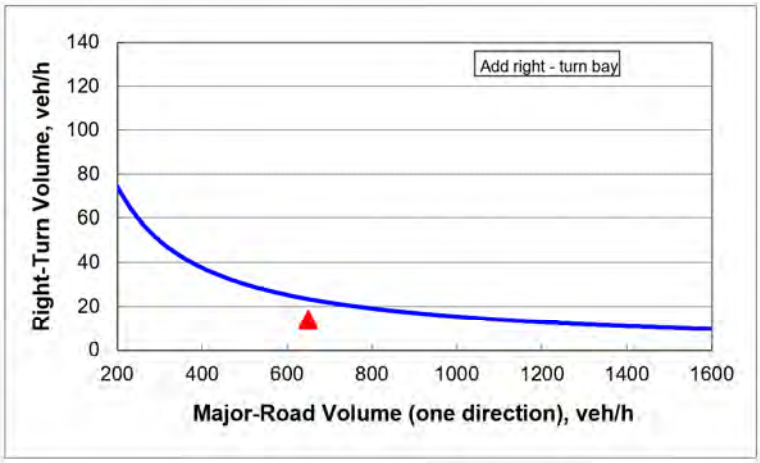
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	650
Right-turn volume, veh/h:	14

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	23
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



RIGHT TURN LANE EVALUATION

Based on NCHRP 457

PROJECT:	**Schaad Road Commercial Development**
LOCATION:	**#8 - Schaad Road & East Project Access**
SECENARIO:	**2030 Projected Traffic Volumes**
TIME PERIOD:	**PM Peak Hour**
DIRECTION:	**Eastbound**

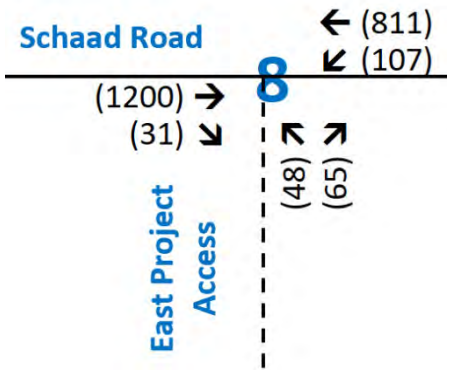


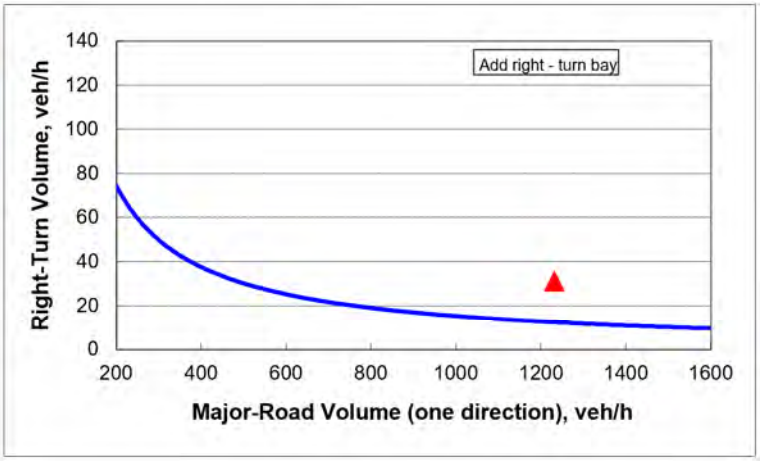
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	1231
Right-turn volume, veh/h:	31

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	12
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



APPENDIX G

SIGHT DISTANCE PHOTOS

Sight Distance Photos
Schaad Road Commercial Development

Location: **#3 - Bakertown Road at Proposed North Driveway Access**

Direction: **Looking Right from Driveway (North)**

Comment: 320' of SD, visibility to Schaad Rd

Location: **#3 - Bakertown Road at Proposed North Driveway Access**

Direction: **Looking Left from Driveway (South)**

Comment: 350' of SD available.

Location: **#4 - Bakertown Road at Proposed Middle Driveway Access**

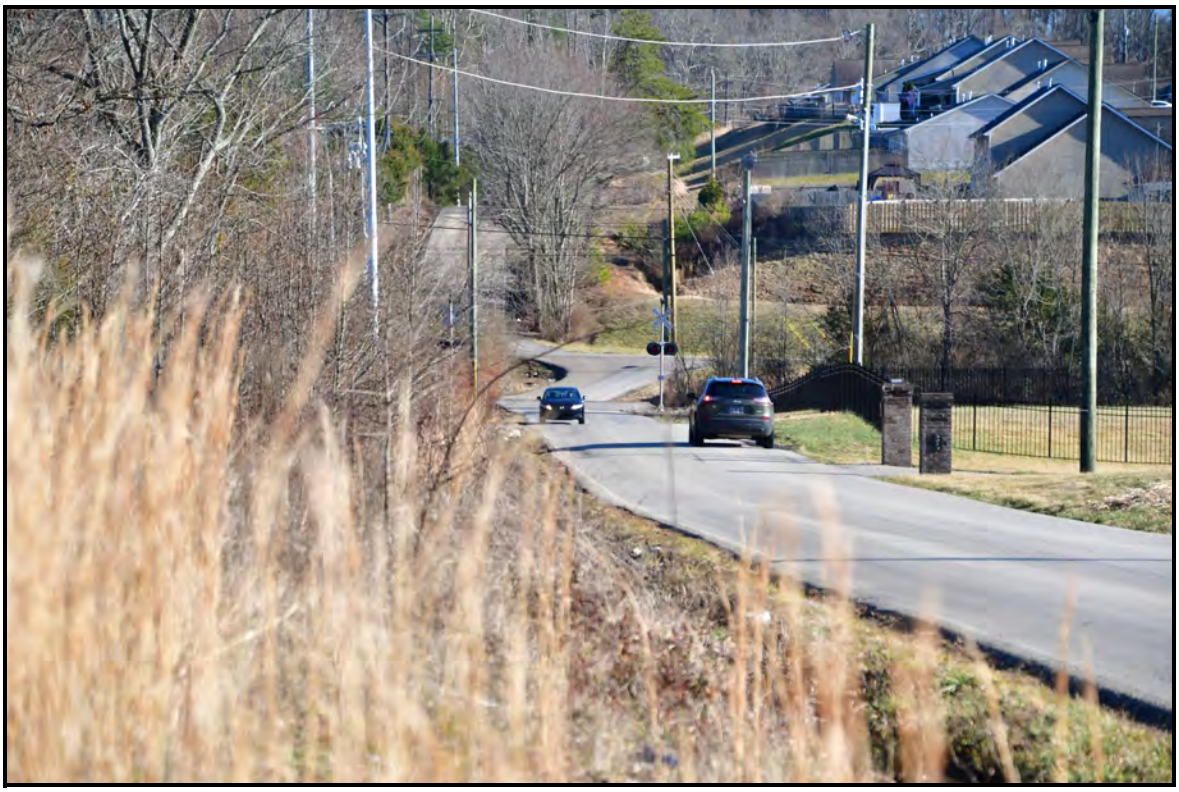
Direction: **Looking Right from Driveway (North)**

Comment: 500'+ of SD, visibility to Schaad Rd (partial obstruction from vegetation)

Location: **#4 - Bakertown Road at Proposed Middle Driveway Access**

Direction: **Looking Left from Driveway (South)**

Comment: 750'+ of SD, visibility to RR Crossing (partial obstruction from vegetation)



Sight Distance Photos
Schaad Road Commercial Development

Location: **#5 - Bakertown Road at Proposed South Driveway Access**

Direction: **Looking Right from Driveway (North)**

Comment: 350' of SD with removal of vegetation (see additional photo)

Location: **#5 - Bakertown Road at Proposed South Driveway Access**

Direction: **Looking Left from Driveway (South)**

Comment: 550'+ of SD with removal of vegetation (see additional photo)

Location: **#5 - Bakertown Road at Proposed South Driveway Access**

Direction: **Looking Right from Driveway (North)**

Comment: Additional photo taken 5' off edge of pavement due to dense vegetation.

Location: **#5 - Bakertown Road at Proposed South Driveway Access**

Direction: **Looking Left from Driveway (South)**

Comment: Additional photo taken 5' off edge of pavement due to dense vegetation.

Location: **#7 - Schaad Road at Proposed West Driveway Access (Right Only)**

Direction: **Looking Right from Driveway (East)**

Comment: Median divided roadway, sight distance not applicable when looking east

Not Applicable

Location: **#7 - Schaad Road at Proposed West Driveway Access (Right Only)**

Direction: **Looking Left from Driveway (West)**

Comment: 2,800'+ of SD, visibility to bridge (RR overpass)

Sight Distance Photos
Schaad Road Commercial Development

Location: **#8 - Schaad Road at Proposed East Driveway Access**

Direction: **Looking Right from Driveway (East)**

Comment: 900'+ of SD, visibility to Lobetti Rd

Location: **#8 - Schaad Road at Proposed East Driveway Access**

Direction: **Looking Left from Driveway (West)**

Comment: 3,000'+ of SD, visibility to bridge (RR overpass)

APPENDIX H

TRAFFIC SIGNAL WARRANT ANALYSES

MUTCD REQUIREMENTS

PART 4
HIGHWAY TRAFFIC SIGNALS

CHAPTER 4A. GENERAL

Section 4A.01 Types

Support:

01 The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals; pedestrian signals; hybrid beacons; emergency-vehicle signals; traffic control signals for one-lane, two-way facilities; traffic control signals for freeway entrance ramps; traffic control signals for movable bridges; toll plaza traffic signals; flashing beacons; lane-use control signals; and in-roadway lights.

Section 4A.02 Definitions Relating to Highway Traffic Signals

Support:

01 Definitions and acronyms pertaining to Part 4 are provided in Sections 1A.13 and 1A.14.

CHAPTER 4B. TRAFFIC CONTROL SIGNALS—GENERAL

Section 4B.01 General

Support:

01 Words such as pedestrians and bicyclists are used redundantly in selected Sections of Part 4 to encourage sensitivity to these elements of "traffic."

02 Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.

Section 4B.02 Basis of Installation or Removal of Traffic Control Signals

Guidance:

01 *The selection and use of traffic control signals should be based on an engineering study of roadway, traffic, and other conditions.*

Support:

02 A careful analysis of traffic operations, pedestrian and bicyclist needs, and other factors at a large number of signalized and unsignalized locations, coupled with engineering judgment, has provided a series of signal warrants, described in Chapter 4C, that define the minimum conditions under which installing traffic control signals might be justified.

Guidance:

03 *Engineering judgment should be applied in the review of operating traffic control signals to determine whether the type of installation and the timing program meet the current requirements of all forms of traffic.*

04 *If changes in traffic patterns eliminate the need for a traffic control signal, consideration should be given to removing it and replacing it with appropriate alternative traffic control devices, if any are needed.*

05 *If the engineering study indicates that the traffic control signal is no longer justified, and a decision is made to remove the signal, removal should be accomplished using the following steps:*

A. Determine the appropriate traffic control to be used after removal of the signal.
B. Remove any sight-distance restrictions as necessary.
C. Inform the public of the removal study.
D. Flash or cover the signal heads for a minimum of 90 days, and install the appropriate stop control or other traffic control devices.
E. Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer needed.

Option:

06 Because Items C, D, and E in Paragraph 5 are not relevant when a temporary traffic control signal (see Section 4D.32) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.

07 Instead of total removal of a traffic control signal, the poles, controller cabinet, and cables may remain in place after removal of the signal heads for continued analysis.

Section 4B.03 Advantages and Disadvantages of Traffic Control Signals

Support:

01 When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.

02 Traffic control signals that are properly designed, located, operated, and maintained will have one or more of the following advantages:

A. They provide for the orderly movement of traffic.
B. They increase the traffic-handling capacity of the intersection if:
   1. Proper physical layouts and control measures are used, and
   2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.
C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.
D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.
E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.

03 Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.

04 Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:

A. Excessive delay,
B. Excessive disobedience of the signal indications,
C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals, and
D. Significant increases in the frequency of collisions (especially rear-end collisions).

Section 4B.04 Alternatives to Traffic Control Signals

Guidance:

01 *Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.*

Option:

02 These alternatives may include, but are not limited to, the following:

A. Installing signs along the major street to warn road users approaching the intersection;
B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;
C. Installing measures designed to reduce speeds on the approaches;
D. Installing a flashing beacon at the intersection to supplement STOP sign control;
E. Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on major- and/or minor-street approaches;
F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;
G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;
H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb extensions;
I. Installing roadway lighting if a disproportionate number of crashes occur at night;
J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;
K. If the warrant is satisfied, installing multi-way STOP sign control;
L. Installing a pedestrian hybrid beacon (see Chapter 4F) or In-Roadway Warning Lights (see Chapter 4N) if pedestrian safety is the major concern;
M. Installing a roundabout; and
N. Employing other alternatives, depending on conditions at the intersection.

Section 4B.05 Adequate Roadway Capacity

Support:

01 The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic control signals can frequently be reduced by widening the major roadway, the minor roadway, or both roadways. Widening the minor roadway often benefits the operations on the major roadway, because it reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes for moving traffic on each approach to a signalized location. Additional width on the departure side of the intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection effectively.

Guidance:

02 *Adequate roadway capacity should be provided at a signalized location. Before an intersection is widened, the additional green time pedestrians need to cross the widened roadways should be considered to determine if it will exceed the green time saved through improved vehicular flow.*

03 *Other methods of increasing the roadway capacity at signalized locations that do not involve roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use assignments (including varying the lane use by time of day), should be considered where appropriate. Such consideration should include evaluation of any impacts that changes to pavement markings and lane assignments will have on bicycle travel.*

CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

Standard:

01 **An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.**

02 **The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:**

Warrant 1, Eight-Hour Vehicular Volume
Warrant 2, Four-Hour Vehicular Volume
Warrant 3, Peak Hour
Warrant 4, Pedestrian Volume
Warrant 5, School Crossing
Warrant 6, Coordinated Signal System
Warrant 7, Crash Experience
Warrant 8, Roadway Network
Warrant 9, Intersection Near a Grade Crossing

03 **The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.**

Support:

04 Sections 8C.09 and 8C.10 contain information regarding the use of traffic control signals instead of gates and/or flashing-light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.

Guidance:

05 *A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.*

06 *A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.*

07 *A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.*

08 *The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants listed in Paragraph 2.*

09 *Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.*

10 *Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.*

11 *At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.*

12 *For signal warrant analysis, a location with a wide median, even if the median width is greater than 30 feet, should be considered as one intersection.*

Option:

13 At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major-street" volume.

14 For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.

15 For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

Support:

16 When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.

Option:

17 Engineering study data may include the following:

A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.
C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.

18 The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of Paragraph 17:

A. Vehicle-hours of stopped time delay determined separately for each approach.
B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.
D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
E. Queue length on stop-controlled approaches.

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

01 The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

02 The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

03 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

Standard:

04 **The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:**

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or

B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

Option:

05 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Guidance:

06 *The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.*

Standard:

07 **The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:**

A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and

B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Option:

08 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.03 Warrant 2, Four-Hour Vehicular Volume

Support:

01 The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

Standard:

02 **The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.**

Option:

03 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Section 4C.04 Warrant 3, Peak Hour

Support:

01 The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

Standard:

02 **This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.**

03 **The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:**

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and

2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and

3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Option:

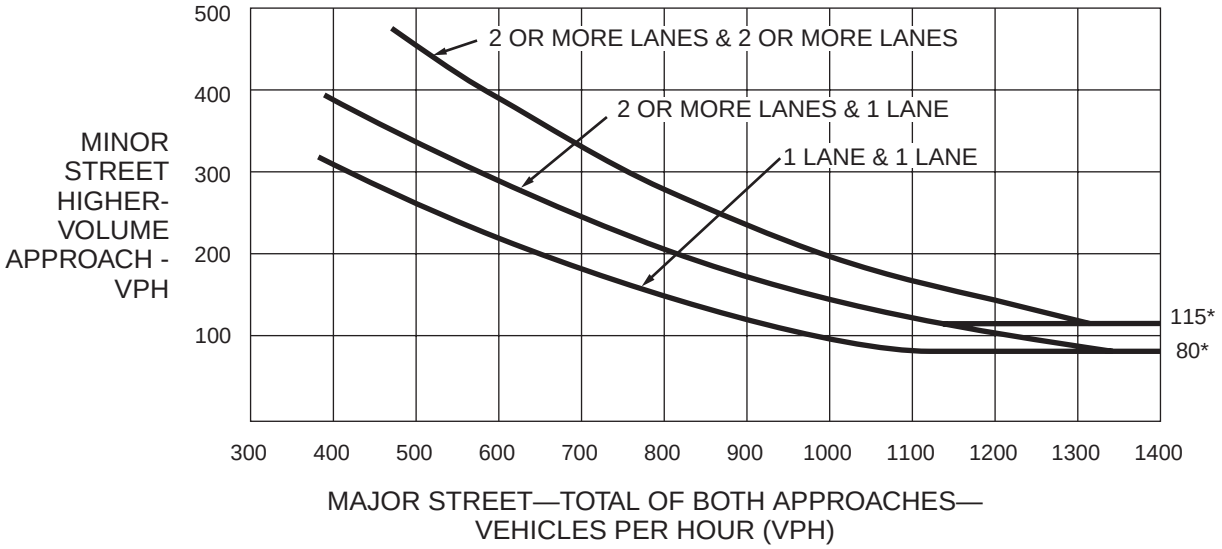
04 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the criteria in the second category of the Standard.

05 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.

Guidance:

06 *If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.*

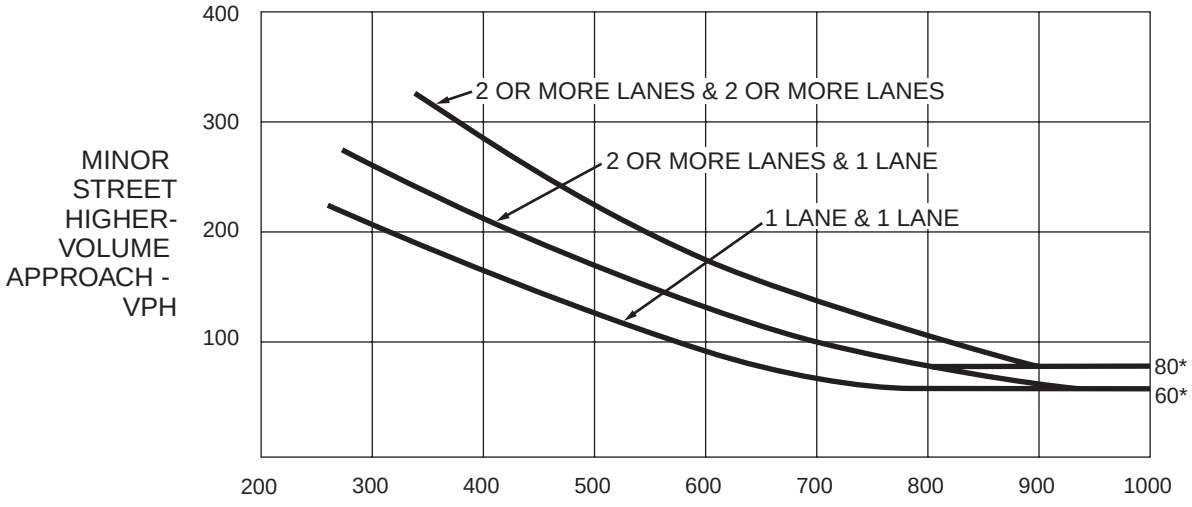
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

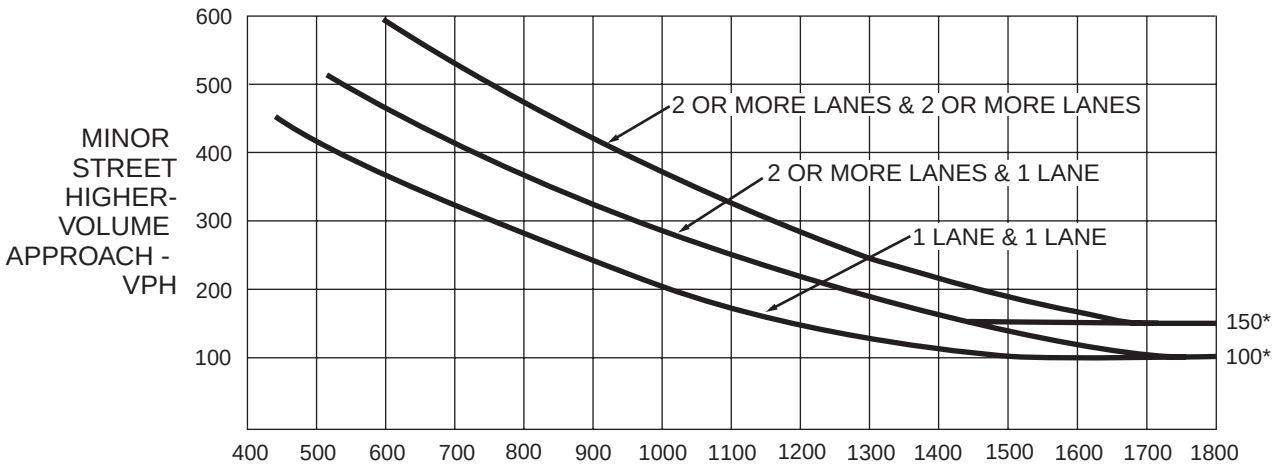
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

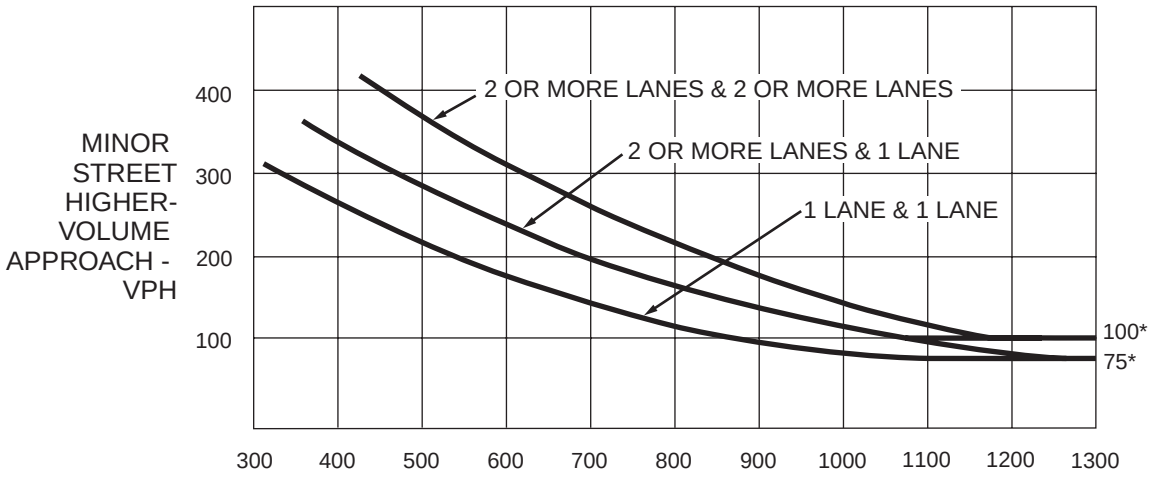
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

TRAFFIC SIGNAL WARRANT ANALYSES

2026 EXISTING TRAFFIC VOLUMES

SCHAAD ROAD AND BAKERTOWN ROAD

Traffic Signal Warrant Analysis

2026 Existing Traffic Volumes

Schaad Road and Bakertown Road

Warrant 1: Eight - Hour Vehicular Volume

Warrant 1A Min. Veh. Volume	
Volume Level	70%
Major Rd. Req	420
Minor Rd. Req	140
Number of Hours	2
Warrant 1A Satisfied?	**No**

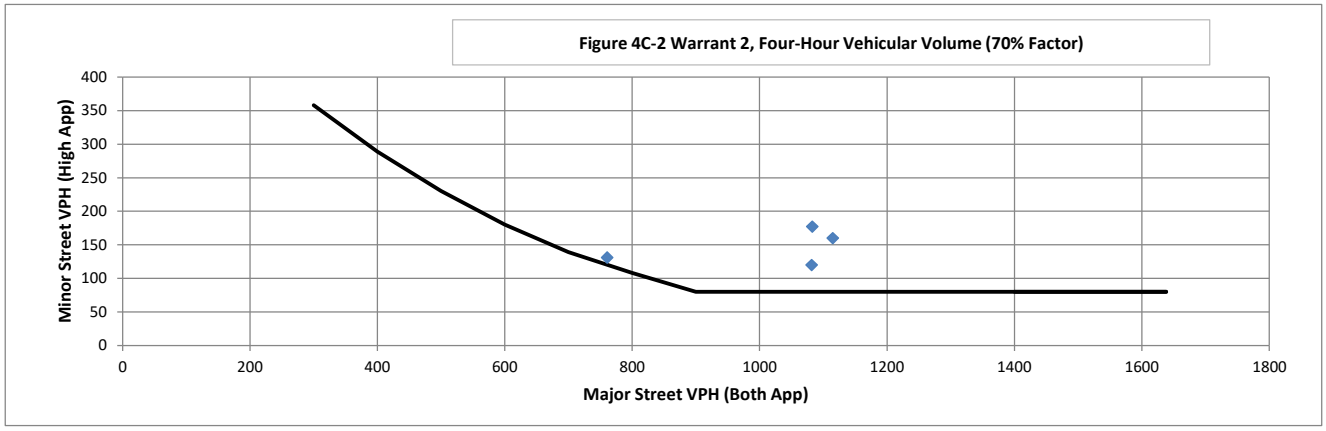
Warrant 1B Interruption of Continuous Traffic	
Volume Level	70%
Major Rd. Req	630
Minor Rd. Req	70
Number of Hours	9
Warrant 1B Satisfied?	**Yes**

	Warrant 1A					Warrant 1B				
Hour Start	Major Road (vph)	% of Required 420 vph	Minor Road (VPH)	% of Required 140 vph	1A Met for Hour	Major Road (VPH)	% of Required 630 vph	Minor Road (VPH)	% of Required 70 vph	1B Met for Hour
6:00	420	100%	51	36%	No	420	67%	51	73%	No
7:00	1083	258%	177	126%	Yes	1083	172%	177	253%	Yes
8:00	1115	265%	160	114%	Yes	1115	177%	160	229%	Yes
9:00	673	160%	90	64%	No	673	107%	90	129%	Yes
10:00	507	121%	67	48%	No	507	80%	67	96%	No
11:00	533	127%	71	51%	No	533	85%	71	101%	No
12:00	631	150%	86	61%	No	631	100%	86	123%	Yes
13:00	653	155%	99	71%	No	653	104%	99	141%	Yes
14:00	761	181%	131	94%	No	761	121%	131	187%	Yes
15:00	1082	258%	120	86%	No	1082	172%	120	171%	Yes
16:00	1331	317%	98	70%	No	1331	211%	98	140%	Yes
17:00	1538	366%	113	81%	No	1538	244%	113	161%	Yes

Warrant 2: Four-Hour Volume

Hour Start	7:00	8:00	14:00	15:00
Major Road Vol.	1083	1115	761	1082
Minor Road Vol.	177	160	131	120

Warrant Satisfied? Yes

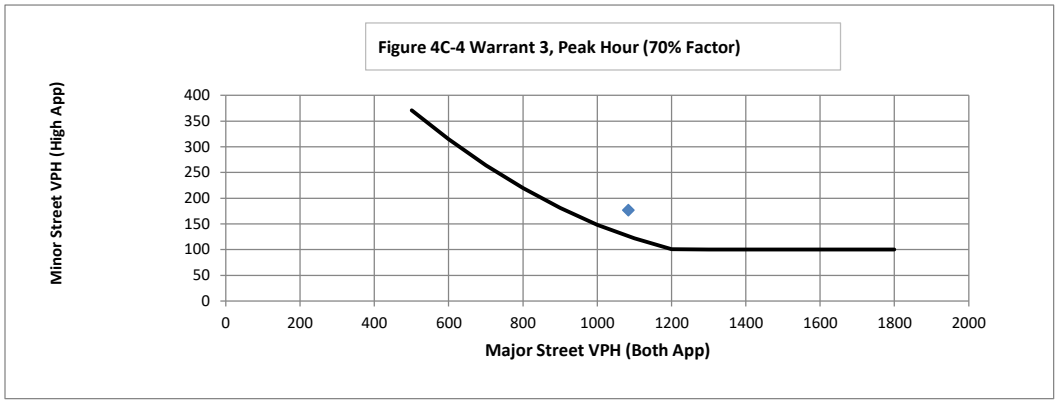


Warrant 3: Peak Hour Volume

Peak Hour	Major Rd Vol. (Both App.)	Minor Rd Vol. (High App.)
7:00	1083	177

Warrant Satisfied? Yes

.



Hourly Traffic Volumes for Signal Warrant Analysis
2026 Existing Traffic Volumes
Schaad Road and Bakertown Road

2026 Existing Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	10	24	17	4	14	23	8	137	0	5	265	5
7 AM-8 AM	5	116	25	20	86	71	41	359	4	30	613	36
8 AM-9 AM	14	51	18	18	91	51	20	392	3	18	674	8
9 AM-10 AM	3	36	18	12	43	35	16	252	2	20	372	11
10 AM-11 AM	6	35	19	8	32	27	25	218	4	12	236	12
11 AM-12 PM	10	31	25	11	33	27	19	241	3	12	248	10
12 PM-1 PM	4	44	22	8	34	44	26	307	3	16	254	25
1 PM-2 PM	11	65	23	8	50	29	39	296	4	17	285	12
2 PM-3 PM	6	52	25	8	64	59	37	388	5	19	292	20
3 PM-4 PM	5	48	24	17	60	43	36	564	5	30	417	30
4 PM-5 PM	4	55	33	10	55	33	62	743	3	16	487	20
5 PM-6 PM	1	70	42	3	45	42	79	849	4	32	541	33

TRAFFIC SIGNAL WARRANT ANALYSES

2030 BACKGROUND TRAFFIC VOLUMES

SCHAAD ROAD AND BAKERTOWN ROAD

Traffic Signal Warrant Analysis

2030 Background Traffic Volumes

Schaad Road and Bakertown Road

Warrant 1: Eight - Hour Vehicular Volume

Warrant 1A Min. Veh. Volume	
Volume Level	70%
Major Rd. Req	420
Minor Rd. Req	140
Number of Hours	10

Warrant 1A Satisfied? Yes

Warrant 1B Interruption of Continuous Traffic	
Volume Level	70%
Major Rd. Req	630
Minor Rd. Req	70
Number of Hours	11

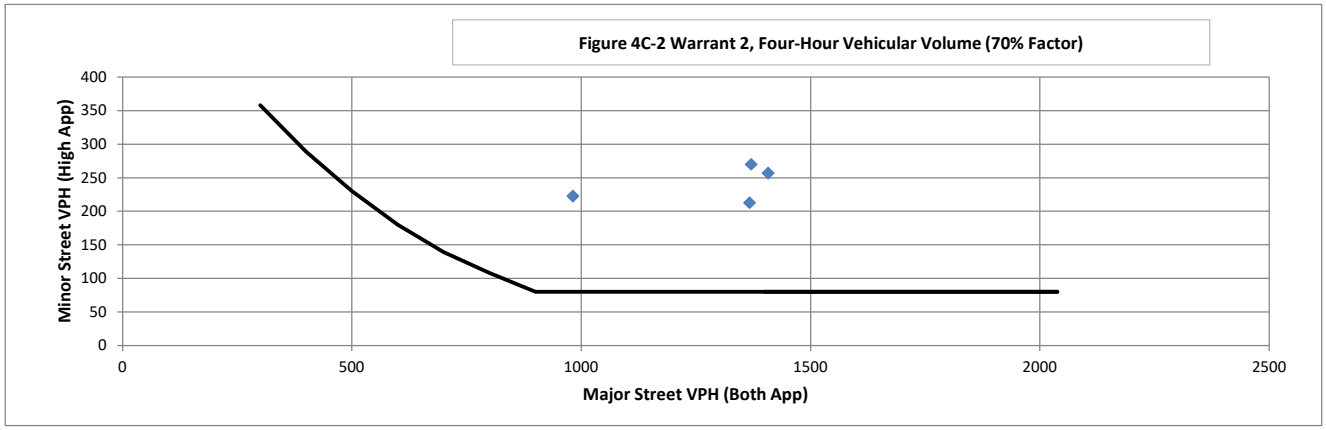
Warrant 1B Satisfied? Yes

	Warrant 1A					Warrant 1B				
Hour Start	Major Road (vph)	% of Required 420 vph	Minor Road (VPH)	% of Required 140 vph	1A Met for Hour	Major Road (VPH)	% of Required 630 vph	Minor Road (VPH)	% of Required 70 vph	1B Met for Hour
6:00	560	133%	98	70%	No	560	89%	98	140%	No
7:00	1371	326%	270	193%	Yes	1371	218%	270	386%	Yes
8:00	1408	335%	257	184%	Yes	1408	223%	257	367%	Yes
9:00	861	205%	165	118%	Yes	861	137%	165	236%	Yes
10:00	661	157%	134	96%	No	661	105%	134	191%	Yes
11:00	701	167%	145	104%	Yes	701	111%	145	207%	Yes
12:00	824	196%	170	121%	Yes	824	131%	170	243%	Yes
13:00	843	201%	166	119%	Yes	843	134%	166	237%	Yes
14:00	982	234%	223	159%	Yes	982	156%	223	319%	Yes
15:00	1367	325%	213	152%	Yes	1367	217%	213	304%	Yes
16:00	1678	400%	186	133%	Yes	1678	266%	186	266%	Yes
17:00	1938	461%	179	128%	Yes	1938	308%	179	256%	Yes

Warrant 2: Four-Hour Volume

Hour Start	7:00	8:00	14:00	15:00
Major Road Vol.	1371	1408	982	1367
Minor Road Vol.	270	257	223	213

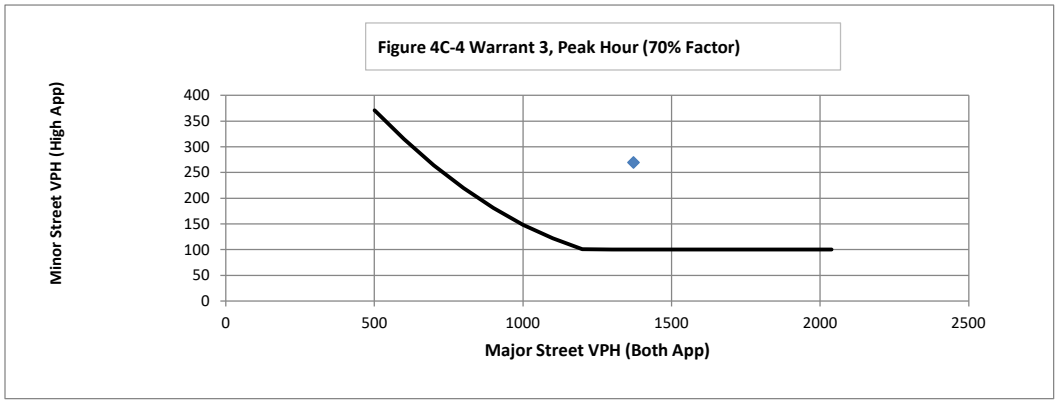
Warrant Satisfied? Yes



Warrant 3: Peak Hour Volume

Peak Hour	Major Rd Vol. (Both App.)	Minor Rd Vol. (High App.)
7:00	1371	270

Warrant Satisfied? Yes



Hourly Traffic Volumes for Signal Warrant Analysis
2030 Background Traffic Volumes
Schaad Road and Bakertown Road

2026 Existing Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	10	24	17	4	14	23	8	137	0	5	265	5
7 AM-8 AM	5	116	25	20	86	71	41	359	4	30	613	36
8 AM-9 AM	14	51	18	18	91	51	20	392	3	18	674	8
9 AM-10 AM	3	36	18	12	43	35	16	252	2	20	372	11
10 AM-11 AM	6	35	19	8	32	27	25	218	4	12	236	12
11 AM-12 PM	10	31	25	11	33	27	19	241	3	12	248	10
12 PM-1 PM	4	44	22	8	34	44	26	307	3	16	254	25
1 PM-2 PM	11	65	23	8	50	29	39	296	4	17	285	12
2 PM-3 PM	6	52	25	8	64	59	37	388	5	19	292	20
3 PM-4 PM	5	48	24	17	60	43	36	564	5	30	417	30
4 PM-5 PM	4	55	33	10	55	33	62	743	3	16	487	20
5 PM-6 PM	1	70	42	3	45	42	79	849	4	32	541	33

Offsite Development Trips												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	1	4	0	31	4	14	32	13	4	0	7	8
7 AM-8 AM	2	5	0	38	5	18	38	28	7	0	11	10
8 AM-9 AM	2	6	0	43	6	20	43	16	6	0	16	11
9 AM-10 AM	2	5	0	37	5	17	37	4	3	0	13	10
10 AM-11 AM	2	5	0	34	5	16	34	4	3	0	13	9
11 AM-12 PM	3	5	0	38	5	18	38	1	3	0	20	10
12 PM-1 PM	3	6	0	43	6	20	43	-1	3	0	22	11
1 PM-2 PM	3	6	0	40	5	19	41	-1	3	0	19	11
2 PM-3 PM	4	5	0	42	6	20	40	1	3	0	28	11
3 PM-4 PM	5	6	0	44	6	21	44	0	3	0	32	12
4 PM-5 PM	6	6	0	44	6	20	41	4	4	0	46	11
5 PM-6 PM	7	6	0	45	6	21	45	11	5	0	50	12

2030 Background Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	13	32	20	36	21	41	41	175	4	6	320	14
7 AM-8 AM	8	142	30	62	106	102	86	452	12	35	734	52
8 AM-9 AM	19	66	21	64	113	80	67	479	10	21	811	20
9 AM-10 AM	6	47	21	51	56	58	56	301	5	24	452	23
10 AM-11 AM	9	46	22	43	43	48	64	261	8	14	291	23
11 AM-12 PM	15	42	30	51	44	50	60	285	7	14	313	22
12 PM-1 PM	8	58	26	52	46	72	74	361	7	19	322	41
1 PM-2 PM	16	83	27	49	64	53	87	348	8	20	355	25
2 PM-3 PM	11	66	30	51	82	90	84	459	9	22	373	35
3 PM-4 PM	11	63	28	64	77	72	86	666	9	35	524	47
4 PM-5 PM	11	71	39	56	71	59	114	881	8	19	621	35
5 PM-6 PM	8	89	50	49	59	71	138	1013	10	38	688	51

Hourly Traffic Assignments For Signal Warrant Analysis
Off-Site Development - Schaad Road Apartments

300 Apartments
Data from CEC Traffic Study
Total Daily Trips = 2,562

					0%				100%		0%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	4.2%	107	20%	80%	0	0	21	86	21	86	0	0
7 AM-8 AM	6.6%	169	19%	81%	0	0	32	137	32	137	0	0
8 AM-9 AM	6.0%	155	29%	71%	0	0	45	110	45	110	0	0
9 AM-10 AM	4.1%	106	36%	64%	0	0	38	68	38	68	0	0
10 AM-11 AM	3.9%	101	37%	63%	0	0	37	64	37	64	0	0
11 AM-12 PM	4.6%	118	49%	51%	0	0	58	60	58	60	0	0
12 PM-1 PM	5.0%	127	50%	50%	0	0	64	63	64	63	0	0
1 PM-2 PM	4.6%	118	48%	52%	0	0	57	61	57	61	0	0
2 PM-3 PM	5.5%	140	54%	46%	0	0	76	64	76	64	0	0
3 PM-4 PM	6.2%	158	57%	43%	0	0	90	68	90	68	0	0
4 PM-5 PM	7.9%	202	64%	36%	0	0	129	73	129	73	0	0
5 PM-6 PM	9.5%	244	59%	41%	0	0	144	100	144	100	0	0
TOTAL	**68.0%**	**1,745**			**0**	**0**	**791**	**954**	**791**	**954**	**0**	**0**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter	5%										35%	
% Exit								35%	5%			
6 AM-7 AM	1	0	0	0	0	0	0	30	4	0	7	0
7 AM-8 AM	2	0	0	0	0	0	0	48	7	0	11	0
8 AM-9 AM	2	0	0	0	0	0	0	39	6	0	16	0
9 AM-10 AM	2	0	0	0	0	0	0	24	3	0	13	0
10 AM-11 AM	2	0	0	0	0	0	0	22	3	0	13	0
11 AM-12 PM	3	0	0	0	0	0	0	21	3	0	20	0
12 PM-1 PM	3	0	0	0	0	0	0	22	3	0	22	0
1 PM-2 PM	3	0	0	0	0	0	0	21	3	0	20	0
2 PM-3 PM	4	0	0	0	0	0	0	22	3	0	27	0
3 PM-4 PM	5	0	0	0	0	0	0	24	3	0	32	0
4 PM-5 PM	6	0	0	0	0	0	0	26	4	0	45	0
5 PM-6 PM	7	0	0	0	0	0	0	35	5	0	50	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter												
% Exit												
6 AM-7 AM	0	0	0	0	0	0	0	0	0	0	0	0
7 AM-8 AM	0	0	0	0	0	0	0	0	0	0	0	0
8 AM-9 AM	0	0	0	0	0	0	0	0	0	0	0	0
9 AM-10 AM	0	0	0	0	0	0	0	0	0	0	0	0
10 AM-11 AM	0	0	0	0	0	0	0	0	0	0	0	0
11 AM-12 PM	0	0	0	0	0	0	0	0	0	0	0	0
12 PM-1 PM	0	0	0	0	0	0	0	0	0	0	0	0
1 PM-2 PM	0	0	0	0	0	0	0	0	0	0	0	0
2 PM-3 PM	0	0	0	0	0	0	0	0	0	0	0	0
3 PM-4 PM	0	0	0	0	0	0	0	0	0	0	0	0
4 PM-5 PM	0	0	0	0	0	0	0	0	0	0	0	0
5 PM-6 PM	0	0	0	0	0	0	0	0	0	0	0	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	1	0	0	0	0	0	0	30	4	0	7	0
7 AM-8 AM	2	0	0	0	0	0	0	48	7	0	11	0
8 AM-9 AM	2	0	0	0	0	0	0	39	6	0	16	0
9 AM-10 AM	2	0	0	0	0	0	0	24	3	0	13	0
10 AM-11 AM	2	0	0	0	0	0	0	22	3	0	13	0
11 AM-12 PM	3	0	0	0	0	0	0	21	3	0	20	0
12 PM-1 PM	3	0	0	0	0	0	0	22	3	0	22	0
1 PM-2 PM	3	0	0	0	0	0	0	21	3	0	20	0
2 PM-3 PM	4	0	0	0	0	0	0	22	3	0	27	0
3 PM-4 PM	5	0	0	0	0	0	0	24	3	0	32	0
4 PM-5 PM	6	0	0	0	0	0	0	26	4	0	45	0
5 PM-6 PM	7	0	0	0	0	0	0	35	5	0	50	0

(1) Data utilized from Trip Generation, 12th Edition where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Off-Site Development - Weigels Mkt with Fuel Center & Carwash

16 Position Fuel Center with Conv. Mkt (~7,000 SF) and Carwash
Land Use Codes 945 & 948
Total Daily Trips = 3,526

					0%				50%		50%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	4.7%	165	51%	49%	0	0	84	81	42	41	42	41
7 AM-8 AM	5.8%	204	50%	50%	0	0	102	102	51	51	51	51
8 AM-9 AM	6.4%	226	50%	50%	0	0	113	113	57	57	57	57
9 AM-10 AM	5.5%	195	50%	50%	0	0	98	97	49	49	49	49
10 AM-11 AM	5.1%	180	50%	50%	0	0	90	90	45	45	45	45
11 AM-12 PM	5.8%	204	50%	50%	0	0	102	102	51	51	51	51
12 PM-1 PM	6.4%	226	50%	50%	0	0	113	113	57	57	57	57
1 PM-2 PM	6.1%	216	51%	49%	0	0	110	106	55	53	55	53
2 PM-3 PM	6.1%	217	49%	51%	0	0	106	111	53	56	53	56
3 PM-4 PM	6.7%	235	50%	50%	0	0	118	117	59	59	59	59
4 PM-5 PM	6.4%	225	49%	51%	0	0	110	115	55	58	55	58
5 PM-6 PM	6.8%	239	50%	50%	0	0	120	119	60	60	60	60
TOTAL	**71.8%**	**2,532**			**0**	**0**	**1,266**	**1,266**	**634**	**637**	**634**	**637**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter		10%					35%					
% Exit				35%	10%	15%					20%	
6 AM-7 AM	0	4	0	14	4	6	15	0	0	0	8	0
7 AM-8 AM	0	5	0	18	5	8	18	0	0	0	10	0
8 AM-9 AM	0	6	0	20	6	9	20	0	0	0	11	0
9 AM-10 AM	0	5	0	17	5	7	17	0	0	0	10	0
10 AM-11 AM	0	5	0	16	5	7	16	0	0	0	9	0
11 AM-12 PM	0	5	0	18	5	8	18	0	0	0	10	0
12 PM-1 PM	0	6	0	20	6	9	20	0	0	0	11	0
1 PM-2 PM	0	6	0	19	5	8	19	0	0	0	11	0
2 PM-3 PM	0	5	0	20	6	8	19	0	0	0	11	0
3 PM-4 PM	0	6	0	21	6	9	21	0	0	0	12	0
4 PM-5 PM	0	6	0	20	6	9	19	0	0	0	12	0
5 PM-6 PM	0	6	0	21	6	9	21	0	0	0	12	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter					-10%		40%	-40%			-40%	20%
% Exit				40%	10%	20%					20%	
6 AM-7 AM	0	0	0	16	0	8	17	-17	0	0	-9	8
7 AM-8 AM	0	0	0	20	0	10	20	-20	0	0	-10	10
8 AM-9 AM	0	0	0	23	0	11	23	-23	0	0	-11	11
9 AM-10 AM	0	0	0	20	0	10	20	-20	0	0	-10	10
10 AM-11 AM	0	0	0	18	0	9	18	-18	0	0	-9	9
11 AM-12 PM	0	0	0	20	0	10	20	-20	0	0	-10	10
12 PM-1 PM	0	0	0	23	0	11	23	-23	0	0	-11	11
1 PM-2 PM	0	0	0	21	0	11	22	-22	0	0	-11	11
2 PM-3 PM	0	0	0	22	0	11	21	-21	0	0	-10	11
3 PM-4 PM	0	0	0	24	0	12	24	-24	0	0	-12	12
4 PM-5 PM	0	0	0	23	0	12	22	-22	0	0	-10	11
5 PM-6 PM	0	0	0	24	0	12	24	-24	0	0	-12	12

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	0	4	0	31	4	14	32	-17	0	0	0	8
7 AM-8 AM	0	5	0	38	5	18	38	-20	0	0	0	10
8 AM-9 AM	0	6	0	43	6	20	43	-23	0	0	0	11
9 AM-10 AM	0	5	0	37	5	17	37	-20	0	0	0	10
10 AM-11 AM	0	5	0	34	5	16	34	-18	0	0	0	9
11 AM-12 PM	0	5	0	38	5	18	38	-20	0	0	0	10
12 PM-1 PM	0	6	0	43	6	20	43	-23	0	0	0	11
1 PM-2 PM	0	6	0	40	5	19	41	-22	0	0	-1	11
2 PM-3 PM	0	5	0	42	6	20	40	-21	0	0	1	11
3 PM-4 PM	0	6	0	44	6	21	44	-24	0	0	0	12
4 PM-5 PM	0	6	0	44	6	20	41	-22	0	0	1	11
5 PM-6 PM	0	6	0	45	6	21	45	-24	0	0	0	12

(1) Data utilized from Trip Generation, 12th Edition where available.

TRAFFIC SIGNAL WARRANT ANALYSES

2030 PROJECTED TRAFFIC VOLUMES

SCHAAD ROAD AND BAKERTOWN ROAD

Traffic Signal Warrant Analysis

2030 Projected Traffic Volumes

Schaad Road and Bakertown Road

Warrant 1: Eight - Hour Vehicular Volume

Warrant 1A Min. Veh. Volume	
Volume Level	70%
Major Rd. Req	420
Minor Rd. Req	140
Number of Hours	11

Warrant 1A Satisfied? Yes

Warrant 1B Interruption of Continuous Traffic	
Volume Level	70%
Major Rd. Req	630
Minor Rd. Req	70
Number of Hours	11

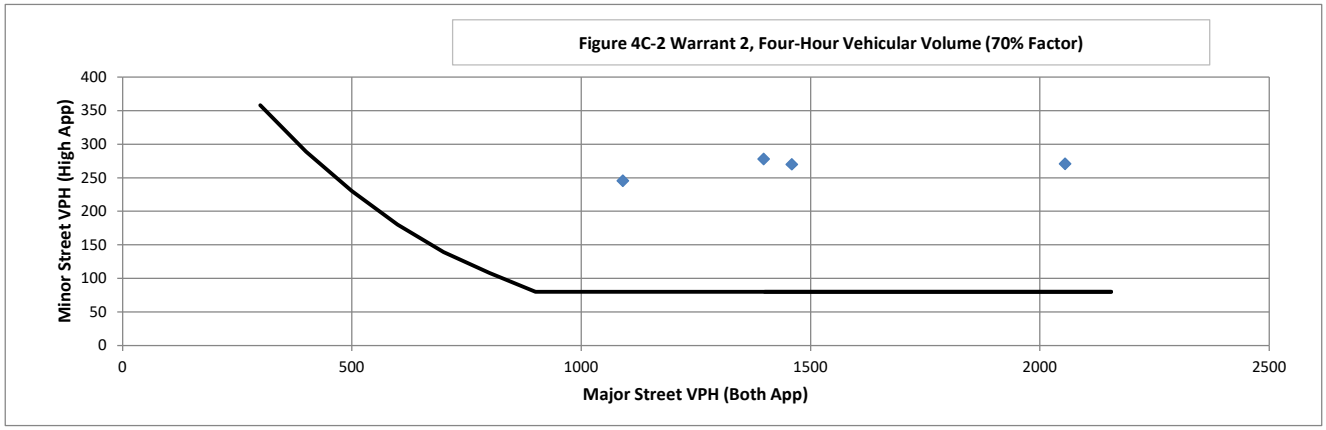
Warrant 1B Satisfied? Yes

	Warrant 1A					Warrant 1B				
Hour Start	Major Road (vph)	% of Required 420 vph	Minor Road (VPH)	% of Required 140 vph	1A Met for Hour	Major Road (VPH)	% of Required 630 vph	Minor Road (VPH)	% of Required 70 vph	1B Met for Hour
6:00	571	136%	102	73%	No	571	91%	102	146%	No
7:00	1398	333%	278	199%	Yes	1398	222%	278	397%	Yes
8:00	1459	347%	270	193%	Yes	1459	232%	270	386%	Yes
9:00	922	220%	179	128%	Yes	922	146%	179	256%	Yes
10:00	739	176%	156	111%	Yes	739	117%	156	223%	Yes
11:00	796	190%	183	131%	Yes	796	126%	183	261%	Yes
12:00	941	224%	214	153%	Yes	941	149%	214	306%	Yes
13:00	946	225%	227	162%	Yes	946	150%	227	324%	Yes
14:00	1091	260%	246	176%	Yes	1091	173%	246	351%	Yes
15:00	1473	351%	236	169%	Yes	1473	234%	236	337%	Yes
16:00	1796	428%	245	175%	Yes	1796	285%	245	350%	Yes
17:00	2055	489%	271	194%	Yes	2055	326%	271	387%	Yes

Warrant 2: Four-Hour Volume

Hour Start	7:00	17:00	8:00	14:00
Major Road Vol.	1398	2055	1459	1091
Minor Road Vol.	278	271	270	246

Warrant Satisfied? Yes

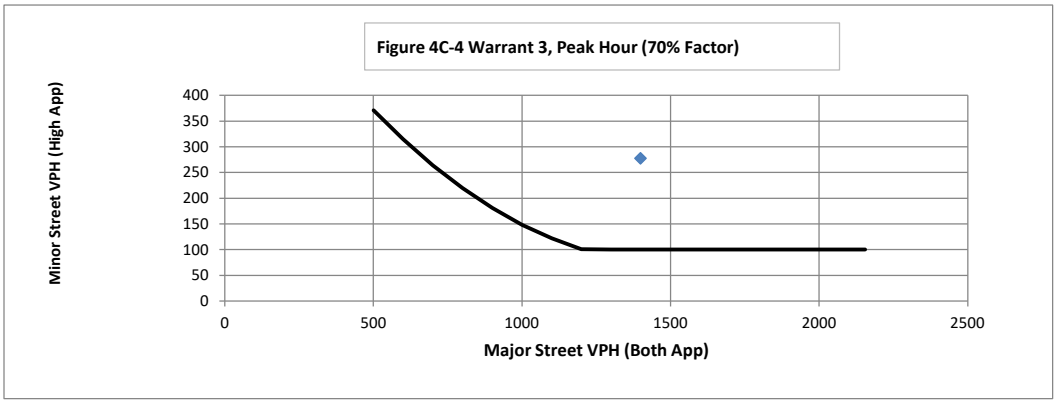


Warrant 3: Peak Hour Volume

Peak Hour	Major Rd Vol. (Both App.)	Minor Rd Vol. (High App.)
7:00	1398	278

Warrant Satisfied? Yes

.



Hourly Traffic Volumes for Signal Warrant Analysis
2030 Projected Traffic Volumes
Schaad Road and Bakertown Road

2026 Existing Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	10	24	17	4	14	23	8	137	0	5	265	5
7 AM-8 AM	5	116	25	20	86	71	41	359	4	30	613	36
8 AM-9 AM	14	51	18	18	91	51	20	392	3	18	674	8
9 AM-10 AM	3	36	18	12	43	35	16	252	2	20	372	11
10 AM-11 AM	6	35	19	8	32	27	25	218	4	12	236	12
11 AM-12 PM	10	31	25	11	33	27	19	241	3	12	248	10
12 PM-1 PM	4	44	22	8	34	44	26	307	3	16	254	25
1 PM-2 PM	11	65	23	8	50	29	39	296	4	17	285	12
2 PM-3 PM	6	52	25	8	64	59	37	388	5	19	292	20
3 PM-4 PM	5	48	24	17	60	43	36	564	5	30	417	30
4 PM-5 PM	4	55	33	10	55	33	62	743	3	16	487	20
5 PM-6 PM	1	70	42	3	45	42	79	849	4	32	541	33

Offsite Development Trips												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	1	4	0	31	4	14	32	13	4	0	7	8
7 AM-8 AM	2	5	0	38	5	18	38	28	7	0	11	10
8 AM-9 AM	2	6	0	43	6	20	43	16	6	0	16	11
9 AM-10 AM	2	5	0	37	5	17	37	4	3	0	13	10
10 AM-11 AM	2	5	0	34	5	16	34	4	3	0	13	9
11 AM-12 PM	3	5	0	38	5	18	38	1	3	0	20	10
12 PM-1 PM	3	6	0	43	6	20	43	-1	3	0	22	11
1 PM-2 PM	3	6	0	40	5	19	41	-1	3	0	19	11
2 PM-3 PM	4	5	0	42	6	20	40	1	3	0	28	11
3 PM-4 PM	5	6	0	44	6	21	44	0	3	0	32	12
4 PM-5 PM	6	6	0	44	6	20	41	4	4	0	46	11
5 PM-6 PM	7	6	0	45	6	21	45	11	5	0	50	12

2030 Background Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	13	32	20	36	21	41	41	175	4	6	320	14
7 AM-8 AM	8	142	30	62	106	102	86	452	12	35	734	52
8 AM-9 AM	19	66	21	64	113	80	67	479	10	21	811	20
9 AM-10 AM	6	47	21	51	56	58	56	301	5	24	452	23
10 AM-11 AM	9	46	22	43	43	48	64	261	8	14	291	23
11 AM-12 PM	15	42	30	51	44	50	60	285	7	14	313	22
12 PM-1 PM	8	58	26	52	46	72	74	361	7	19	322	41
1 PM-2 PM	16	83	27	49	64	53	87	348	8	20	355	25
2 PM-3 PM	11	66	30	51	82	90	84	459	9	22	373	35
3 PM-4 PM	11	63	28	64	77	72	86	666	9	35	524	47
4 PM-5 PM	11	71	39	56	71	59	114	881	8	19	621	35
5 PM-6 PM	8	89	50	49	59	71	138	1013	10	38	688	51

Site Generated Trips												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	26	3	0	3	1	0	0	16	1	9	-15	0
7 AM-8 AM	44	7	0	5	3	0	0	28	3	13	-17	0
8 AM-9 AM	54	8	0	5	8	0	0	44	8	16	-19	1
9 AM-10 AM	57	10	0	5	9	0	0	49	9	15	-13	1
10 AM-11 AM	67	12	0	6	12	0	0	60	12	18	-14	2
11 AM-12 PM	81	15	0	7	14	0	0	69	14	20	-10	2
12 PM-1 PM	101	21	0	7	17	0	0	81	17	22	-6	3
1 PM-2 PM	86	15	0	7	16	0	0	75	16	21	-12	3
2 PM-3 PM	96	19	0	7	16	0	0	76	16	22	-8	3
3 PM-4 PM	96	18	0	7	16	0	0	77	16	22	-12	3
4 PM-5 PM	104	20	0	8	18	0	0	86	18	25	-14	3
5 PM-6 PM	104	20	0	8	18	0	0	84	18	24	-12	3

2030 Projected Traffic Volumes												
	Northbound			Southbound			Eastbound			Westbound		
LOCATION	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road		
TIME	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6 AM-7 AM	39	35	20	39	22	41	41	191	5	15	305	14
7 AM-8 AM	52	149	30	67	109	102	86	480	15	48	717	52
8 AM-9 AM	73	74	21	69	121	80	67	523	18	37	793	21
9 AM-10 AM	63	57	21	56	65	58	56	350	14	39	439	24
10 AM-11 AM	76	58	22	49	55	48	64	321	20	32	277	25
11 AM-12 PM	96	57	30	58	58	50	60	354	21	34	303	24
12 PM-1 PM	109	79	26	59	63	72	74	442	24	41	316	44
1 PM-2 PM	102	98	27	56	80	53	87	423	24	41	343	28
2 PM-3 PM	107	85	30	58	98	90	84	535	25	44	365	38
3 PM-4 PM	107	81	28	71	93	72	86	743	25	57	512	50
4 PM-5 PM	115	91	39	64	89	59	114	967	26	44	607	38
5 PM-6 PM	112	109	50	57	77	71	138	1097	28	62	676	54

Hourly Traffic Assignments For Signal Warrant Analysis
Off-Site Development - Schaad Road Apartments

300 Apartments
Data from CEC Traffic Study
Total Daily Trips = 2,562

					0%				100%		0%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	4.2%	107	20%	80%	0	0	21	86	21	86	0	0
7 AM-8 AM	6.6%	169	19%	81%	0	0	32	137	32	137	0	0
8 AM-9 AM	6.0%	155	29%	71%	0	0	45	110	45	110	0	0
9 AM-10 AM	4.1%	106	36%	64%	0	0	38	68	38	68	0	0
10 AM-11 AM	3.9%	101	37%	63%	0	0	37	64	37	64	0	0
11 AM-12 PM	4.6%	118	49%	51%	0	0	58	60	58	60	0	0
12 PM-1 PM	5.0%	127	50%	50%	0	0	64	63	64	63	0	0
1 PM-2 PM	4.6%	118	48%	52%	0	0	57	61	57	61	0	0
2 PM-3 PM	5.5%	140	54%	46%	0	0	76	64	76	64	0	0
3 PM-4 PM	6.2%	158	57%	43%	0	0	90	68	90	68	0	0
4 PM-5 PM	7.9%	202	64%	36%	0	0	129	73	129	73	0	0
5 PM-6 PM	9.5%	244	59%	41%	0	0	144	100	144	100	0	0
TOTAL	**68.0%**	**1,745**			**0**	**0**	**791**	**954**	**791**	**954**	**0**	**0**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter	5%										35%	
% Exit								35%	5%			
6 AM-7 AM	1	0	0	0	0	0	0	30	4	0	7	0
7 AM-8 AM	2	0	0	0	0	0	0	48	7	0	11	0
8 AM-9 AM	2	0	0	0	0	0	0	39	6	0	16	0
9 AM-10 AM	2	0	0	0	0	0	0	24	3	0	13	0
10 AM-11 AM	2	0	0	0	0	0	0	22	3	0	13	0
11 AM-12 PM	3	0	0	0	0	0	0	21	3	0	20	0
12 PM-1 PM	3	0	0	0	0	0	0	22	3	0	22	0
1 PM-2 PM	3	0	0	0	0	0	0	21	3	0	20	0
2 PM-3 PM	4	0	0	0	0	0	0	22	3	0	27	0
3 PM-4 PM	5	0	0	0	0	0	0	24	3	0	32	0
4 PM-5 PM	6	0	0	0	0	0	0	26	4	0	45	0
5 PM-6 PM	7	0	0	0	0	0	0	35	5	0	50	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter												
% Exit												
6 AM-7 AM	0	0	0	0	0	0	0	0	0	0	0	0
7 AM-8 AM	0	0	0	0	0	0	0	0	0	0	0	0
8 AM-9 AM	0	0	0	0	0	0	0	0	0	0	0	0
9 AM-10 AM	0	0	0	0	0	0	0	0	0	0	0	0
10 AM-11 AM	0	0	0	0	0	0	0	0	0	0	0	0
11 AM-12 PM	0	0	0	0	0	0	0	0	0	0	0	0
12 PM-1 PM	0	0	0	0	0	0	0	0	0	0	0	0
1 PM-2 PM	0	0	0	0	0	0	0	0	0	0	0	0
2 PM-3 PM	0	0	0	0	0	0	0	0	0	0	0	0
3 PM-4 PM	0	0	0	0	0	0	0	0	0	0	0	0
4 PM-5 PM	0	0	0	0	0	0	0	0	0	0	0	0
5 PM-6 PM	0	0	0	0	0	0	0	0	0	0	0	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	1	0	0	0	0	0	0	30	4	0	7	0
7 AM-8 AM	2	0	0	0	0	0	0	48	7	0	11	0
8 AM-9 AM	2	0	0	0	0	0	0	39	6	0	16	0
9 AM-10 AM	2	0	0	0	0	0	0	24	3	0	13	0
10 AM-11 AM	2	0	0	0	0	0	0	22	3	0	13	0
11 AM-12 PM	3	0	0	0	0	0	0	21	3	0	20	0
12 PM-1 PM	3	0	0	0	0	0	0	22	3	0	22	0
1 PM-2 PM	3	0	0	0	0	0	0	21	3	0	20	0
2 PM-3 PM	4	0	0	0	0	0	0	22	3	0	27	0
3 PM-4 PM	5	0	0	0	0	0	0	24	3	0	32	0
4 PM-5 PM	6	0	0	0	0	0	0	26	4	0	45	0
5 PM-6 PM	7	0	0	0	0	0	0	35	5	0	50	0

(1) Data utilized from Trip Generation, 12th Edition where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Off-Site Development - Weigels Mkt with Fuel Center & Carwash

16 Position Fuel Center with Conv. Mkt (~7,000 SF) and Carwash
Land Use Codes 945 & 948
Total Daily Trips = 3,526

					0%				50%		50%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	4.7%	165	51%	49%	0	0	84	81	42	41	42	41
7 AM-8 AM	5.8%	204	50%	50%	0	0	102	102	51	51	51	51
8 AM-9 AM	6.4%	226	50%	50%	0	0	113	113	57	57	57	57
9 AM-10 AM	5.5%	195	50%	50%	0	0	98	97	49	49	49	49
10 AM-11 AM	5.1%	180	50%	50%	0	0	90	90	45	45	45	45
11 AM-12 PM	5.8%	204	50%	50%	0	0	102	102	51	51	51	51
12 PM-1 PM	6.4%	226	50%	50%	0	0	113	113	57	57	57	57
1 PM-2 PM	6.1%	216	51%	49%	0	0	110	106	55	53	55	53
2 PM-3 PM	6.1%	217	49%	51%	0	0	106	111	53	56	53	56
3 PM-4 PM	6.7%	235	50%	50%	0	0	118	117	59	59	59	59
4 PM-5 PM	6.4%	225	49%	51%	0	0	110	115	55	58	55	58
5 PM-6 PM	6.8%	239	50%	50%	0	0	120	119	60	60	60	60
TOTAL	**71.8%**	**2,532**			**0**	**0**	**1,266**	**1,266**	**634**	**637**	**634**	**637**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter		10%					35%					
% Exit				35%	10%	15%					20%	
6 AM-7 AM	0	4	0	14	4	6	15	0	0	0	8	0
7 AM-8 AM	0	5	0	18	5	8	18	0	0	0	10	0
8 AM-9 AM	0	6	0	20	6	9	20	0	0	0	11	0
9 AM-10 AM	0	5	0	17	5	7	17	0	0	0	10	0
10 AM-11 AM	0	5	0	16	5	7	16	0	0	0	9	0
11 AM-12 PM	0	5	0	18	5	8	18	0	0	0	10	0
12 PM-1 PM	0	6	0	20	6	9	20	0	0	0	11	0
1 PM-2 PM	0	6	0	19	5	8	19	0	0	0	11	0
2 PM-3 PM	0	5	0	20	6	8	19	0	0	0	11	0
3 PM-4 PM	0	6	0	21	6	9	21	0	0	0	12	0
4 PM-5 PM	0	6	0	20	6	9	19	0	0	0	12	0
5 PM-6 PM	0	6	0	21	6	9	21	0	0	0	12	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter					-10%		40%	-40%			-40%	20%
% Exit				40%	10%	20%					20%	
6 AM-7 AM	0	0	0	16	0	8	17	-17	0	0	-9	8
7 AM-8 AM	0	0	0	20	0	10	20	-20	0	0	-10	10
8 AM-9 AM	0	0	0	23	0	11	23	-23	0	0	-11	11
9 AM-10 AM	0	0	0	20	0	10	20	-20	0	0	-10	10
10 AM-11 AM	0	0	0	18	0	9	18	-18	0	0	-9	9
11 AM-12 PM	0	0	0	20	0	10	20	-20	0	0	-10	10
12 PM-1 PM	0	0	0	23	0	11	23	-23	0	0	-11	11
1 PM-2 PM	0	0	0	21	0	11	22	-22	0	0	-11	11
2 PM-3 PM	0	0	0	22	0	11	21	-21	0	0	-10	11
3 PM-4 PM	0	0	0	24	0	12	24	-24	0	0	-12	12
4 PM-5 PM	0	0	0	23	0	12	22	-22	0	0	-10	11
5 PM-6 PM	0	0	0	24	0	12	24	-24	0	0	-12	12

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	0	4	0	31	4	14	32	-17	0	0	0	8
7 AM-8 AM	0	5	0	38	5	18	38	-20	0	0	0	10
8 AM-9 AM	0	6	0	43	6	20	43	-23	0	0	0	11
9 AM-10 AM	0	5	0	37	5	17	37	-20	0	0	0	10
10 AM-11 AM	0	5	0	34	5	16	34	-18	0	0	0	9
11 AM-12 PM	0	5	0	38	5	18	38	-20	0	0	0	10
12 PM-1 PM	0	6	0	43	6	20	43	-23	0	0	0	11
1 PM-2 PM	0	6	0	40	5	19	41	-22	0	0	-1	11
2 PM-3 PM	0	5	0	42	6	20	40	-21	0	0	1	11
3 PM-4 PM	0	6	0	44	6	21	44	-24	0	0	0	12
4 PM-5 PM	0	6	0	44	6	20	41	-22	0	0	1	11
5 PM-6 PM	0	6	0	45	6	21	45	-24	0	0	0	12

(1) Data utilized from Trip Generation, 12th Edition where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Schaad Road WM NHM Development

Walmart Neighborhood Market
49,305 SF Grocery Store
Land Use Code 850
Total Daily Trips = 4,574

					10%				70%		30%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	0.3%	14	93%	7%	1	0	12	1	8	1	4	0
7 AM-8 AM	1.5%	68	52%	48%	4	3	31	30	22	21	9	9
8 AM-9 AM	3.8%	174	57%	43%	10	8	99	67	69	47	30	20
9 AM-10 AM	4.7%	217	53%	47%	12	10	115	92	81	64	35	28
10 AM-11 AM	5.9%	270	54%	46%	15	12	146	112	102	78	44	34
11 AM-12 PM	7.4%	338	50%	50%	17	17	169	152	118	106	51	46
12 PM-1 PM	9.6%	439	48%	52%	21	23	211	205	148	144	63	62
1 PM-2 PM	8.1%	369	54%	46%	20	17	199	153	139	107	60	46
2 PM-3 PM	9.0%	410	49%	51%	20	21	201	188	141	132	60	56
3 PM-4 PM	8.7%	397	51%	49%	20	20	202	175	141	123	61	53
4 PM-5 PM	9.7%	445	50%	50%	22	22	223	200	156	140	67	60
5 PM-6 PM	9.5%	433	50%	50%	22	22	217	194	152	136	65	58
TOTAL	**78.1%**	**3,574**			**184**	**175**	**1,825**	**1,569**	**1,277**	**1,099**	**549**	**472**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter					10%			30%	10%			
% Exit	30%	10%									10%	
6 AM-7 AM	0	0	0	0	1	0	0	2	1	0	0	0
7 AM-8 AM	6	2	0	0	2	0	0	7	2	0	2	0
8 AM-9 AM	14	5	0	0	7	0	0	21	7	0	5	0
9 AM-10 AM	19	6	0	0	8	0	0	24	8	0	6	0
10 AM-11 AM	23	8	0	0	10	0	0	31	10	0	8	0
11 AM-12 PM	32	11	0	0	12	0	0	35	12	0	11	0
12 PM-1 PM	43	14	0	0	15	0	0	44	15	0	14	0
1 PM-2 PM	32	11	0	0	14	0	0	42	14	0	11	0
2 PM-3 PM	40	13	0	0	14	0	0	42	14	0	13	0
3 PM-4 PM	37	12	0	0	14	0	0	42	14	0	12	0
4 PM-5 PM	42	14	0	0	16	0	0	47	16	0	14	0
5 PM-6 PM	41	14	0	0	15	0	0	46	15	0	14	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter		-10%								10%	-40%	
% Exit	10%	10%									30%	
6 AM-7 AM	0	0	0	0	0	0	0	0	0	0	-2	0
7 AM-8 AM	1	0	0	0	0	0	0	0	0	1	-1	0
8 AM-9 AM	2	-1	0	0	0	0	0	0	0	3	-6	0
9 AM-10 AM	3	-1	0	0	0	0	0	0	0	4	-6	0
10 AM-11 AM	3	-1	0	0	0	0	0	0	0	4	-7	0
11 AM-12 PM	5	-1	0	0	0	0	0	0	0	5	-7	0
12 PM-1 PM	6	0	0	0	0	0	0	0	0	6	-7	0
1 PM-2 PM	5	-1	0	0	0	0	0	0	0	6	-10	0
2 PM-3 PM	6	0	0	0	0	0	0	0	0	6	-7	0
3 PM-4 PM	5	-1	0	0	0	0	0	0	0	6	-9	0
4 PM-5 PM	6	-1	0	0	0	0	0	0	0	7	-9	0
5 PM-6 PM	6	-1	0	0	0	0	0	0	0	7	-9	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	0	0	0	0	1	0	0	2	1	0	-2	0
7 AM-8 AM	7	2	0	0	2	0	0	7	2	1	1	0
8 AM-9 AM	16	4	0	0	7	0	0	21	7	3	-1	0
9 AM-10 AM	22	6	0	0	8	0	0	24	8	4	1	0
10 AM-11 AM	27	7	0	0	10	0	0	31	10	4	0	0
11 AM-12 PM	36	10	0	0	12	0	0	35	12	5	4	0
12 PM-1 PM	49	14	0	0	15	0	0	44	15	6	8	0
1 PM-2 PM	37	9	0	0	14	0	0	42	14	6	1	0
2 PM-3 PM	45	13	0	0	14	0	0	42	14	6	6	0
3 PM-4 PM	42	12	0	0	14	0	0	42	14	6	4	0
4 PM-5 PM	48	13	0	0	16	0	0	47	16	7	5	0
5 PM-6 PM	47	13	0	0	15	0	0	46	15	7	5	0

(1) Data utilized from Trip Generation, 12th Edition where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Schaad Road WM NHM Development

Fuel Center with Conv. Mkt (16 Fueling Positions with 1,618 S.F. Mkt)
Land Use Code 945
Total Daily Trips = 3,130

					10%				50%		50%	
	% of Daily	Total	%	%	Internal Trip Reduction		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	4.6%	145	51%	49%	7	7	67	64	34	32	34	32
7 AM-8 AM	6.2%	193	50%	50%	10	10	87	86	44	43	44	43
8 AM-9 AM	5.9%	184	50%	50%	9	9	83	83	42	42	42	42
9 AM-10 AM	5.0%	158	50%	50%	8	8	71	71	36	36	36	36
10 AM-11 AM	5.2%	161	50%	50%	8	8	73	72	37	36	37	36
11 AM-12 PM	5.3%	165	51%	49%	8	8	76	73	38	37	38	37
12 PM-1 PM	5.8%	180	50%	50%	9	9	81	81	41	41	41	41
1 PM-2 PM	5.4%	168	50%	50%	8	8	76	76	38	38	38	38
2 PM-3 PM	5.9%	186	51%	49%	10	9	85	82	43	41	43	41
3 PM-4 PM	6.5%	202	50%	50%	10	10	91	91	46	46	46	46
4 PM-5 PM	7.1%	223	51%	49%	11	11	103	98	52	49	52	49
5 PM-6 PM	6.9%	217	50%	50%	11	11	98	97	49	49	49	49
TOTAL	**69.7%**	**2,182**			**109**	**108**	**991**	**974**	**500**	**490**	**500**	**490**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter				10%				40%		15%		
% Exit	40%	10%										
6 AM-7 AM	13	3	0	3	0	0	0	14	0	5	0	0
7 AM-8 AM	17	4	0	4	0	0	0	18	0	7	0	0
8 AM-9 AM	17	4	0	4	0	0	0	17	0	6	0	0
9 AM-10 AM	14	4	0	4	0	0	0	14	0	5	0	0
10 AM-11 AM	14	4	0	4	0	0	0	15	0	6	0	0
11 AM-12 PM	15	4	0	4	0	0	0	15	0	6	0	0
12 PM-1 PM	16	4	0	4	0	0	0	16	0	6	0	0
1 PM-2 PM	15	4	0	4	0	0	0	15	0	6	0	0
2 PM-3 PM	16	4	0	4	0	0	0	17	0	6	0	0
3 PM-4 PM	18	5	0	5	0	0	0	18	0	7	0	0
4 PM-5 PM	20	5	0	5	0	0	0	21	0	8	0	0
5 PM-6 PM	20	5	0	5	0	0	0	20	0	7	0	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter		-10%								10%	-40%	
% Exit	40%	10%										
6 AM-7 AM	13	0	0	0	0	0	0	0	0	3	-14	0
7 AM-8 AM	17	0	0	0	0	0	0	0	0	4	-18	0
8 AM-9 AM	17	0	0	0	0	0	0	0	0	4	-17	0
9 AM-10 AM	14	0	0	0	0	0	0	0	0	4	-14	0
10 AM-11 AM	14	0	0	0	0	0	0	0	0	4	-15	0
11 AM-12 PM	15	0	0	0	0	0	0	0	0	4	-15	0
12 PM-1 PM	16	0	0	0	0	0	0	0	0	4	-16	0
1 PM-2 PM	15	0	0	0	0	0	0	0	0	4	-15	0
2 PM-3 PM	16	0	0	0	0	0	0	0	0	4	-17	0
3 PM-4 PM	18	0	0	0	0	0	0	0	0	5	-18	0
4 PM-5 PM	20	0	0	0	0	0	0	0	0	5	-21	0
5 PM-6 PM	20	0	0	0	0	0	0	0	0	5	-20	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
6 AM-7 AM	26	3	0	3	0	0	0	14	0	9	-14	0
7 AM-8 AM	34	4	0	4	0	0	0	18	0	11	-18	0
8 AM-9 AM	34	4	0	4	0	0	0	17	0	11	-17	0
9 AM-10 AM	29	4	0	4	0	0	0	14	0	9	-14	0
10 AM-11 AM	29	4	0	4	0	0	0	15	0	9	-15	0
11 AM-12 PM	30	4	0	4	0	0	0	15	0	10	-15	0
12 PM-1 PM	33	4	0	4	0	0	0	16	0	10	-16	0
1 PM-2 PM	30	4	0	4	0	0	0	15	0	10	-15	0
2 PM-3 PM	33	4	0	4	0	0	0	17	0	11	-17	0
3 PM-4 PM	37	5	0	5	0	0	0	18	0	12	-18	0
4 PM-5 PM	39	5	0	5	0	0	0	21	0	13	-21	0
5 PM-6 PM	39	5	0	5	0	0	0	20	0	12	-20	0

[1] Data utilized from Trip Generation, 12th Ed. where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Schaad Road WM NHM Development

Outlot #1: Stip Retail 18,513 S.F.
Land Use Code 822
Total Daily Trips = 1,008

					10%				75%		25%	
	% of Daily	Total	%	%	Interal Trip Reduction [2]		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	0.6%	7	63%	37%	0	0	4	3	3	2	1	1
7 AM-8 AM	1.5%	15	60%	40%	1	1	8	5	6	4	2	1
8 AM-9 AM	2.3%	23	61%	39%	1	1	13	8	10	6	3	2
9 AM-10 AM	3.9%	39	60%	40%	2	2	21	14	16	11	5	4
10 AM-11 AM	6.0%	60	57%	43%	3	3	31	23	23	17	8	6
11 AM-12 PM	7.7%	78	54%	46%	4	4	38	32	29	24	10	8
12 PM-1 PM	9.0%	91	52%	48%	5	4	42	40	32	30	11	10
1 PM-2 PM	8.6%	87	49%	51%	4	4	39	40	29	30	10	10
2 PM-3 PM	8.0%	80	48%	52%	4	4	34	38	26	29	9	10
3 PM-4 PM	7.9%	80	49%	51%	4	4	35	37	26	28	9	9
4 PM-5 PM	8.3%	83	50%	50%	4	4	38	37	29	28	10	9
5 PM-6 PM	8.4%	84	50%	50%	4	4	38	38	29	29	10	10
TOTAL	**72.2%**	**727**			**36**	**35**	**341**	**315**	**258**	**238**	**88**	**80**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter				10%				40%				
% Exit	20%										20%	10%
6 AM-7 AM	0	0	0	0	0	0	0	1	0	0	0	0
7 AM-8 AM	1	0	0	1	0	0	0	2	0	0	1	0
8 AM-9 AM	1	0	0	1	0	0	0	4	0	0	1	1
9 AM-10 AM	2	0	0	2	0	0	0	6	0	0	2	1
10 AM-11 AM	3	0	0	2	0	0	0	9	0	0	3	2
11 AM-12 PM	5	0	0	3	0	0	0	12	0	0	5	2
12 PM-1 PM	6	0	0	3	0	0	0	13	0	0	6	3
1 PM-2 PM	6	0	0	3	0	0	0	12	0	0	6	3
2 PM-3 PM	6	0	0	3	0	0	0	10	0	0	6	3
3 PM-4 PM	6	0	0	3	0	0	0	10	0	0	6	3
4 PM-5 PM	6	0	0	3	0	0	0	12	0	0	6	3
5 PM-6 PM	6	0	0	3	0	0	0	12	0	0	6	3

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter											-40%	
% Exit											40%	
6 AM-7 AM	0	0	0	0	0	0	0	0	0	0	0	0
7 AM-8 AM	0	0	0	0	0	0	0	0	0	0	0	0
8 AM-9 AM	0	0	0	0	0	0	0	0	0	0	0	0
9 AM-10 AM	0	0	0	0	0	0	0	0	0	0	0	0
10 AM-11 AM	0	0	0	0	0	0	0	0	0	0	-1	0
11 AM-12 PM	0	0	0	0	0	0	0	0	0	0	-1	0
12 PM-1 PM	0	0	0	0	0	0	0	0	0	0	0	0
1 PM-2 PM	0	0	0	0	0	0	0	0	0	0	0	0
2 PM-3 PM	0	0	0	0	0	0	0	0	0	0	0	0
3 PM-4 PM	0	0	0	0	0	0	0	0	0	0	0	0
4 PM-5 PM	0	0	0	0	0	0	0	0	0	0	0	0
5 PM-6 PM	0	0	0	0	0	0	0	0	0	0	0	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
7 AM-8 AM	1	0	0	1	0	0	0	2	0	0	0	0
8 AM-9 AM	1	0	0	1	0	0	0	4	0	0	1	1
9 AM-10 AM	2	0	0	2	0	0	0	6	0	0	2	1
10 AM-11 AM	3	0	0	2	0	0	0	9	0	0	3	2
11 AM-12 PM	5	0	0	3	0	0	0	12	0	0	4	2
12 PM-1 PM	6	0	0	3	0	0	0	13	0	0	6	3
1 PM-2 PM	6	0	0	3	0	0	0	12	0	0	6	3
2 PM-3 PM	6	0	0	3	0	0	0	10	0	0	6	3
3 PM-4 PM	6	0	0	3	0	0	0	10	0	0	6	3
4 PM-5 PM	6	0	0	3	0	0	0	12	0	0	5	3
5 PM-6 PM	6	0	0	3	0	0	0	12	0	0	6	3

[1] Data utilized from Trip Generation, 12th Ed. where available.

Hourly Traffic Assignments For Signal Warrant Analysis
Schaad Road WM NHM Development

Outlot #2: Stip Retail 13,177 S.F.
Land Use Code 822
Total Daily Trips = 786

					10%				75%		25%	
	% of Daily	Total	%	%	Interal Trip Reduction [2]		External Trips		Primary Trips		Pass-by Trips	
HOUR	Traffic [1]	Traffic	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
6 AM-7 AM	0.6%	5	63%	37%	0	0	3	2	2	2	1	1
7 AM-8 AM	1.5%	12	60%	40%	1	1	6	4	5	3	2	1
8 AM-9 AM	2.3%	18	61%	39%	1	1	10	6	8	5	3	2
9 AM-10 AM	3.9%	31	60%	40%	2	1	17	11	13	8	4	3
10 AM-11 AM	6.0%	47	57%	43%	3	2	24	18	18	14	6	5
11 AM-12 PM	7.7%	61	54%	46%	3	3	30	25	23	19	8	6
12 PM-1 PM	9.0%	71	52%	48%	4	3	33	31	25	23	8	8
1 PM-2 PM	8.6%	68	49%	51%	3	4	30	31	23	23	8	8
2 PM-3 PM	8.0%	63	48%	52%	3	3	27	30	20	23	7	8
3 PM-4 PM	7.9%	62	49%	51%	3	3	27	29	20	22	7	7
4 PM-5 PM	8.3%	65	50%	50%	3	3	30	29	23	22	8	7
5 PM-6 PM	8.4%	66	50%	50%	3	3	30	30	23	23	8	8
TOTAL	**72.2%**	**569**			**29**	**27**	**267**	**246**	**203**	**187**	**70**	**64**

Primary Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter					10%			30%	10%	10%		
% Exit	40%	10%										
6 AM-7 AM	1	0	0	0	0	0	0	1	0	0	0	0
7 AM-8 AM	1	0	0	0	1	0	0	2	1	1	0	0
8 AM-9 AM	2	1	0	0	1	0	0	2	1	1	0	0
9 AM-10 AM	3	1	0	0	1	0	0	4	1	1	0	0
10 AM-11 AM	6	1	0	0	2	0	0	5	2	2	0	0
11 AM-12 PM	8	2	0	0	2	0	0	7	2	2	0	0
12 PM-1 PM	9	2	0	0	3	0	0	8	3	3	0	0
1 PM-2 PM	9	2	0	0	2	0	0	7	2	2	0	0
2 PM-3 PM	9	2	0	0	2	0	0	6	2	2	0	0
3 PM-4 PM	9	2	0	0	2	0	0	6	2	2	0	0
4 PM-5 PM	9	2	0	0	2	0	0	7	2	2	0	0
5 PM-6 PM	9	2	0	0	2	0	0	7	2	2	0	0

Pass-by Trips												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
% Enter		-10%								40%	-40%	
% Exit	40%	10%										
6 AM-7 AM	0	0	0	0	0	0	0	0	0	0	0	0
7 AM-8 AM	0	0	0	0	0	0	0	0	0	1	-1	0
8 AM-9 AM	1	0	0	0	0	0	0	0	0	1	-1	0
9 AM-10 AM	1	0	0	0	0	0	0	0	0	2	-2	0
10 AM-11 AM	2	0	0	0	0	0	0	0	0	2	-2	0
11 AM-12 PM	2	0	0	0	0	0	0	0	0	3	-3	0
12 PM-1 PM	3	0	0	0	0	0	0	0	0	3	-3	0
1 PM-2 PM	3	0	0	0	0	0	0	0	0	3	-3	0
2 PM-3 PM	3	0	0	0	0	0	0	0	0	3	-3	0
3 PM-4 PM	3	0	0	0	0	0	0	0	0	3	-3	0
4 PM-5 PM	3	0	0	0	0	0	0	0	0	3	-3	0
5 PM-6 PM	3	0	0	0	0	0	0	0	0	3	-3	0

Total Trips (Primary + Pass-by)												
Movement	NB L/T	NB TR	NB R/T	SB L/T	SB TR	SB R/T	EB L/T	EB TR	EB R/T	WB L/T	WB TR	WB R/T
7 AM-8 AM	2	0	0	0	1	0	0	2	1	1	-1	0
8 AM-9 AM	3	0	0	0	1	0	0	2	1	2	-1	0
9 AM-10 AM	4	1	0	0	1	0	0	4	1	3	-2	0
10 AM-11 AM	8	1	0	0	2	0	0	5	2	4	-2	0
11 AM-12 PM	10	2	0	0	2	0	0	7	2	6	-3	0
12 PM-1 PM	12	2	0	0	3	0	0	8	3	6	-3	0
1 PM-2 PM	12	2	0	0	2	0	0	7	2	6	-3	0
2 PM-3 PM	12	2	0	0	2	0	0	6	2	5	-3	0
3 PM-4 PM	12	2	0	0	2	0	0	6	2	5	-3	0
4 PM-5 PM	12	2	0	0	2	0	0	7	2	6	-3	0
5 PM-6 PM	12	2	0	0	2	0	0	7	2	6	-3	0

[1] Data utilized from Trip Generation, 12th Ed. where available.