

*SIGNAL LOCATION AND COST SHARING  
REPORT*

Southern Grove and Western Grove  
DRI  
Port St. Lucie, FL

*Prepared for:*  
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## ***EXECUTIVE SUMMARY***

Future traffic signals or roundabouts are needed throughout Southern Grove and Western Grove to support future development and roadway connections. Up to 13 future traffic signals and/or roundabouts are projected to be warranted in Southern Grove. Four of the traffic signals are a direct result of the Riverland/Kennedy connections to Southern Grove. This study does not contemplate a Riverland Pro Rata Share allocation of cost to 10 of the traffic signals listed plus traffic signals previously constructed. In addition, Mattamy Homes is constructing one of the four traffic signals required on its western border, which is warranted as a result of Riverland traffic and connections. The anticipated responsibility for the signals are as follows:

- Mattamy Homes – 2 Traffic Signals
- St. Lucie County School Board – 1 Traffic Signal (if needed)
- St. Lucie County Fire Rescue – 1 Traffic Signal
- Master Developer – Pro Rata Share – 6 Traffic Signals
- Riverland – 3 Traffic Signals or Roundabouts

Western Grove is anticipated to need six traffic signals or roundabouts. One of the locations is a direct result of the Riverland/Kennedy connections to Western Grove and it is recommended that Riverland/Kennedy be responsible for the traffic signal or roundabout at Discovery Way and N/S A.

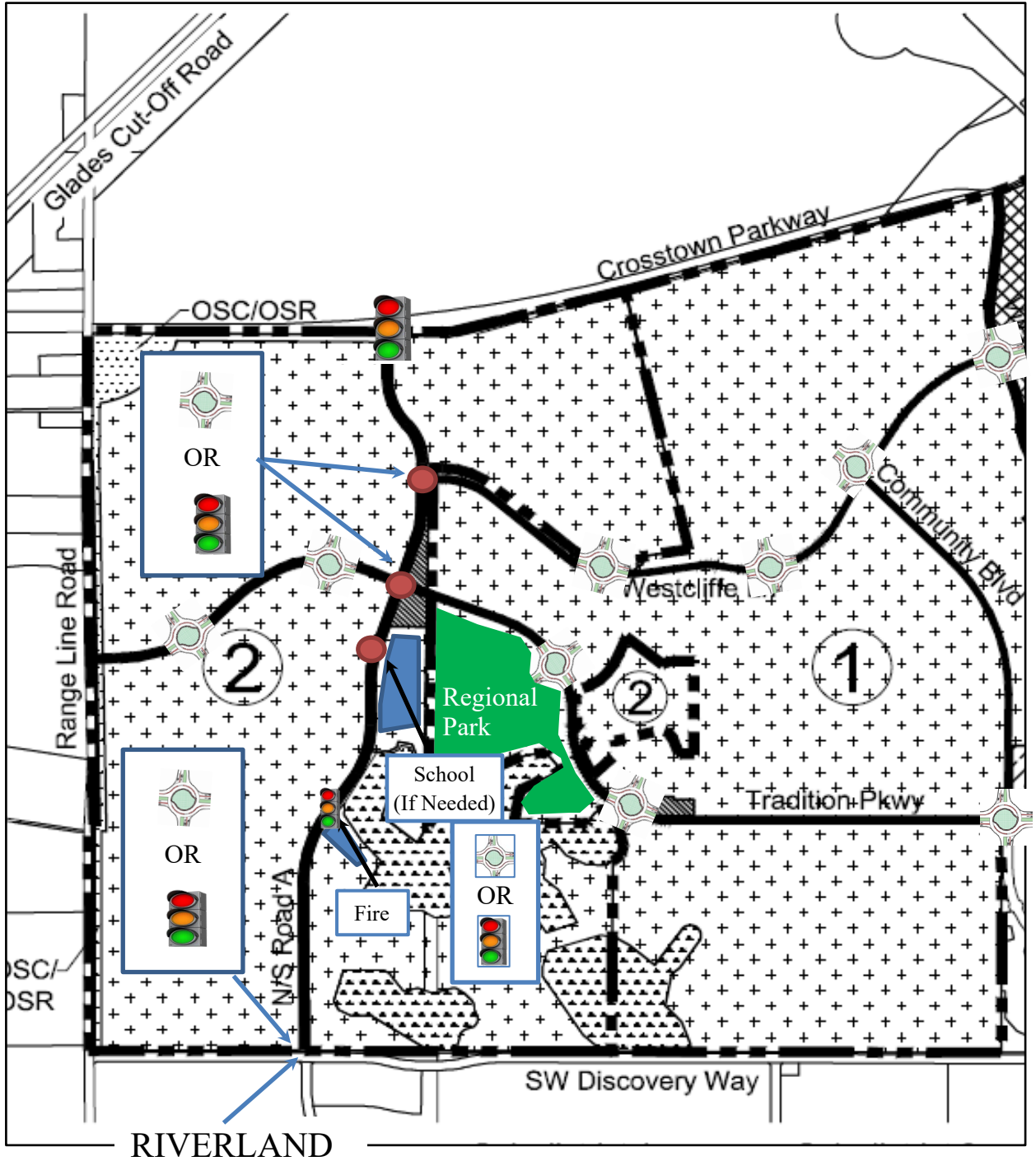
The study utilized a pro rata share methodology to assign costs to various benefitting property owners for six traffic signals.

Signal design and installation procedures are recommended upon a project or accumulation of projects reaching 75 projected peak hour left-turns on roads with 45 MPH or greater speed limits and 100 projected peak hour left-turns on roads with 40 MPH or lower speeds limits.

<b>Signal Cost Assigned West and East of Village Parkway and North and South of Becker Road</b>					
<b>Signal Location</b>	<b>Signal Share</b>				
	GFC	Legacy Park	Mattamy	SLCSB	Total
Trade Center Drive	\$418,000	-	\$82,000	-	\$500,000
E/W 2 & Village Pkwy	\$358,500			\$141,500	\$500,000
Marshall Pkwy & Village Pkwy	\$142,000	\$69,500	\$288,500		\$500,000
Paar Dr & Village Pkwy	-	\$122,500	\$377,500		\$500,000
Legacy Park Dr & Village Pkwy	-	\$193,500	\$306,500		\$500,000
N/S 1 & Becker Rd	-	\$210,000	\$290,000		\$500,000
<b>Total</b>	\$918,500 30.6%	\$595,500 19.9%	\$1,344,500 44.8%	\$141,500 4.7%	\$3,000,000



Western Grove Traffic Control Devices



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## **INTRODUCTION**

The Southern Grove Development of Regional Impact (DRI) (the "Project") is generally located west of I-95 and south of Tradition Parkway, east of Community Boulevard, west of I-95 and north of the C-23 canal in the City of Port Saint Lucie, Florida (see Figure 1). Traffic signals will be needed throughout the DRI for both regional benefit and local parcel benefit. The study has been performed to:

- Locate all traffic signals that will be needed within the DRI boundaries
- Assign a proportionate share cost to east parcel for traffic signal construction

## **DATA**

The information contained below was used to develop the foregoing traffic analysis.

- Sansone PUD Traffic Study
- Southern Grove DRI Application for Development Approval
- Southern Grove Master Plan
- *Trip Generation, 11<sup>th</sup> Edition* (ITE report)
- Southern Grove – North
- Legacy Park at Tradition Master Plan
- SG 4a Traffic Study
- Farrell Southern Grove Traffic Study
- Telaro Traffic Study
- Eden Multi-family Traffic Study
- Capstone Traffic Study
- Kenley Traffic Study

## **STUDY AREA**

The Study area is Southern Grove, Western Grove and Tradition



**Figure 1. Site Location Map-Southern Grove**

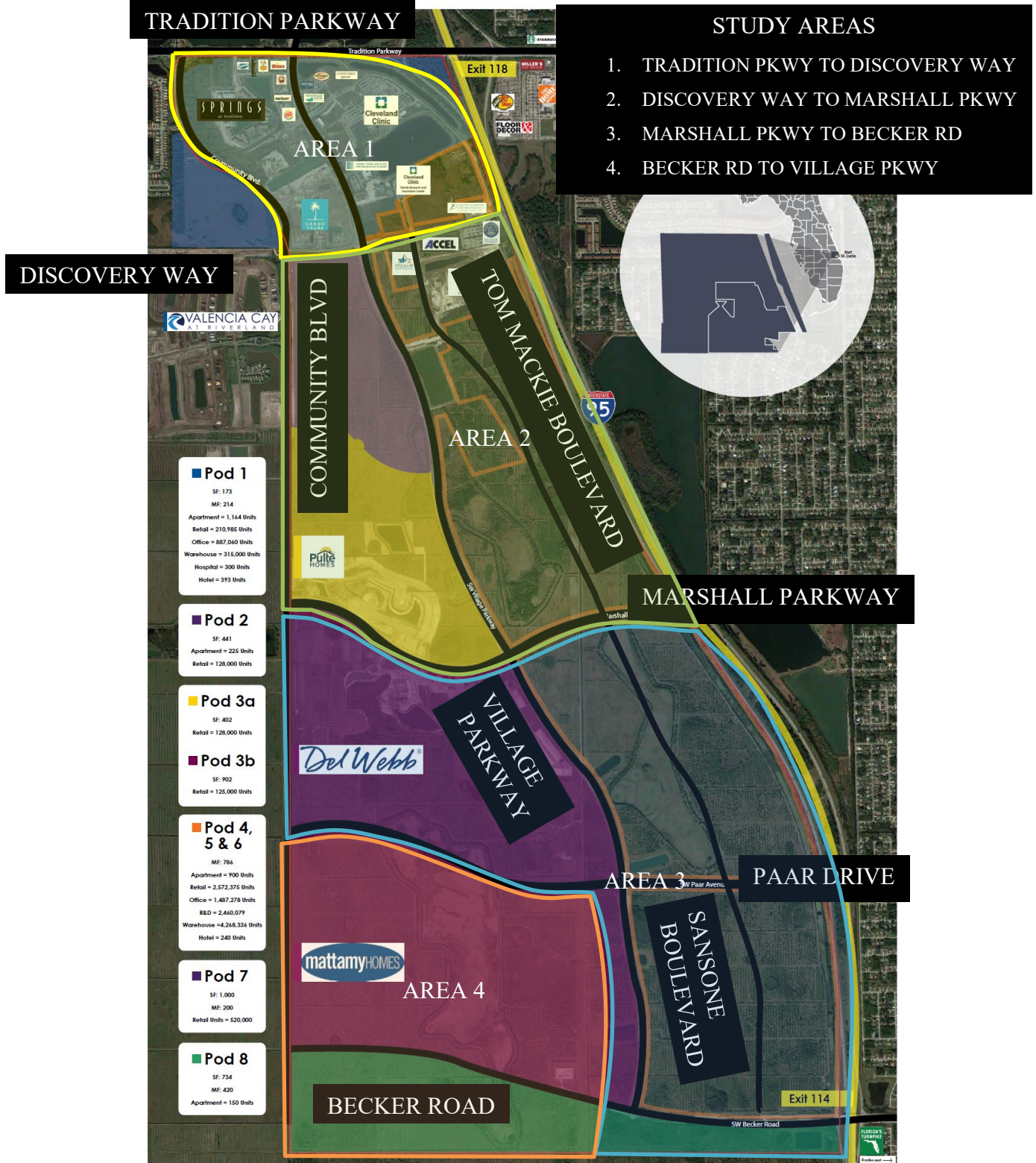
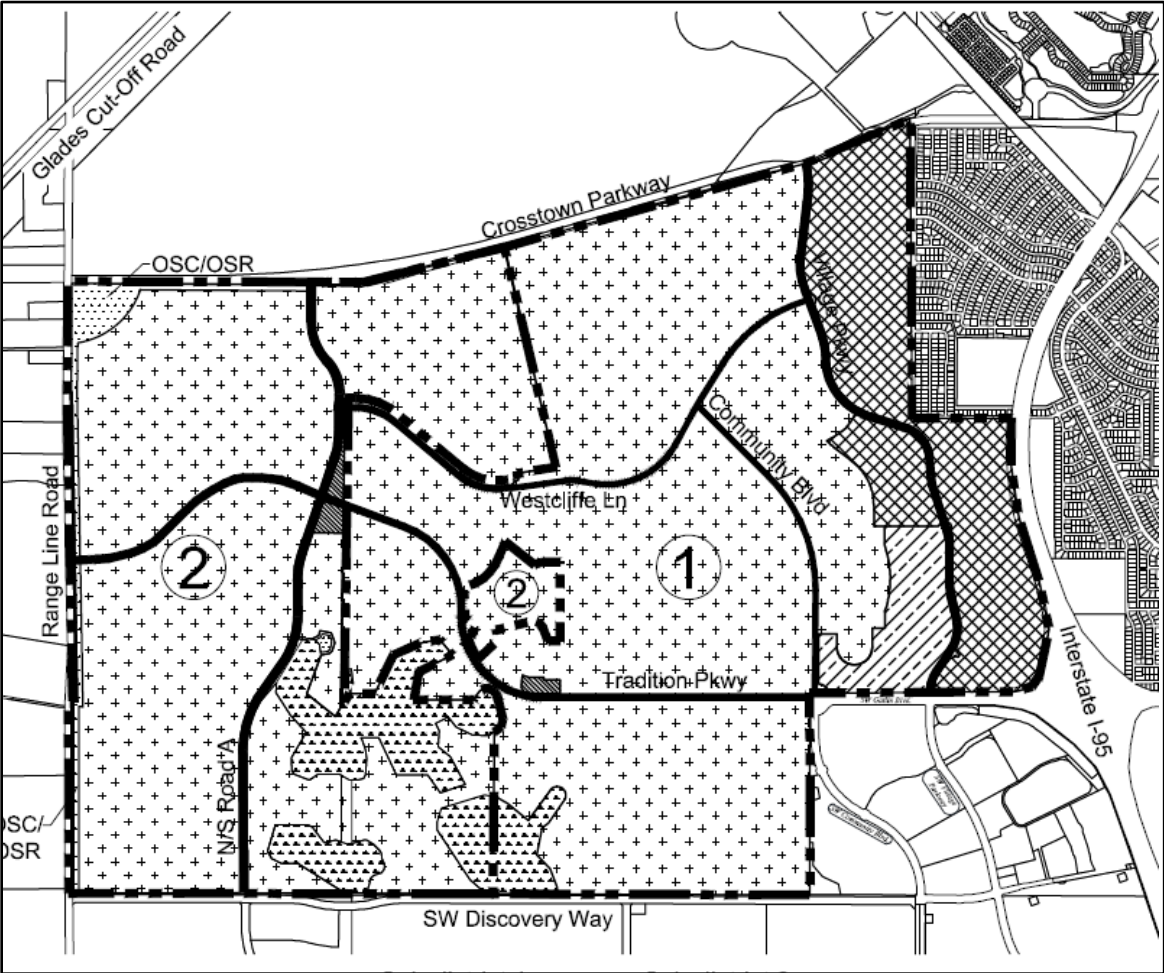


Figure 2. Site Location Map-Tradition & Western Grove



## **PROCESS**

### **Southern Grove**

Southern Grove was divided into study areas.

Study Areas:

1. Tradition Parkway to Discovery Way
2. Discovery Way to Marshall Parkway
3. Marshall Parkway to Becker Road
4. Becker Road West of Village Parkway

Area 1 is essentially built out or approvals/permits have been issued. Most of the Area 2 land west of Village Parkway is approved. The Area 2 land east of Village Parkway is master planned with only a small percentage of area developed. The Area 3 land west of Village Parkway is mostly permitted or in the permitting and approval process. The Area 3 land east of Village Parkway is master planned with several hundred acres of industrial under construction and/or operational. The Area 4 land is currently being designed and permitted.

All major intersections (intersection of two arterial roadways) will need traffic signals or roundabouts. The intersections include:

- Discovery Way & Village Parkway – Signalized
- Discovery Way & Community Boulevard – Future Signal
- Marshall Parkway & Village Parkway – Future Signal
- Marshall Parkway & Community Boulevard – Future Signal or Roundabout
- Paar Drive & Village Parkway & – Installed – Signalized
- Paar Drive & Community Boulevard – Future Signal or Roundabout
- Becker Road & Village Parkway – Signalized
- Becker Road & Community Blvd – Future Signal

For other median openings on the major roadway network, daily or peak hour left-turn volumes were projected. The left-turn volumes were compared to the Warrant 1 criteria within the Manual on Uniform Traffic Control Devices. In order to satisfy Warrant 1, certain minimum levels of traffic must be present on the major street and minor street. Based on the 2040 Southern Grove DRI model projections, it is estimated that major warranting volumes are present on Village Parkway, Discovery Way (west of Village Parkway), Community Boulevard, Marshall Parkway (west of Village Parkway), Becker Road and Paar Drive (west of Village Parkway). Therefore, because the major street is projected to meet traffic signal warrants, only minor street volumes are necessary to project. The lowest threshold for warranting a traffic signal is 53 left-turning movements from the side street for any eight hours of a typical day on roads with an 85<sup>th</sup> percentile speed of 40 miles per hour or greater. This assumes the through traffic is minimal to negligible and that right-turning movements enter the major street without significant delay. Based on past experience in Port St. Lucie and throughout Florida, the eighth highest of hour of traffic is 50 to 80 percent of the peak hour traffic. This study used 70 percent of the peak hour volumes to estimate the 8<sup>th</sup> highest hour of traffic. Seventy-five peak hour left-turns during the peak hour yields an estimated 53 left-turns during the 8<sup>th</sup> highest hour. Therefore, 75 peak hour left-turns from the side (minor) street is the threshold used in the study to determine if a signal will be warranted.

### *Western Grove and Tradition*

Western Grove and Tradition were examined from a regional perspective to look at connectivity. Almost all of the land in Tradition is built out. Any new traffic signals needed in Tradition will be development driven and the responsibility of an individual applicant/landowner.

Traffic signals in Western Grove are expected to be needed at the major roadway intersections. Other traffic signals in Western Grove will be the responsibility of individual landowners or developers.

## ***TRIP GENERATION-SOUTHERN GROVE***

Trip Generation was performed on parcels within Area 2, 3 and 4 that directly access Village Parkway and Becker Road. Trip generation was also performed on parcels that are expected to utilize median openings along Village Parkway via Trade Center Drive, E/W 2, Legacy Park Drive, E/W B or other future local or collector roadways. Trip generation for the parcels are based on Institute of Transportation Engineering's (ITE) manual, *Trip Generation Manual (11<sup>th</sup> Edition)*.

### *Internal Capture (Within Areas)*

Internal capture within area is estimated but is generally relatively small at two percent or less.

### *Pass-by Capture*

The pass-by capture for each use is based on *Trip Generation (11th Edition)*.

### *Area 1*

No trip generation was performed in Area 1. Area 1 has existing traffic signals.

### *Area 2*

Area 2 external trip generation is shown in Exhibits 1A and 1B. Traffic from each parcel is assigned to the roadway network based on the expected distribution of traffic. The parcel location and use for Area 2 is shown on Exhibit 2. The total projected traffic on each side street and driveway is shown in Exhibit 3, Sheet 1. The remainder of Exhibit 3 shows the daily trips and traffic assignment for each parcel. Exhibit 3, Sheet 1 also more generally shows the location of each parcel in Area 2.

### Area 3

Area 3 external trip generation is shown in Exhibits 4A through 4G. Traffic from each parcel is assigned to the roadway network based on the expected distribution of traffic. The parcel location and use for Area 2 is shown on Exhibit 5. The total projected traffic on each side street and driveway is shown in Exhibit 6, Sheet 1. The remainder of Exhibit 6 shows the daily trips and traffic assignment for each parcel. Exhibit 6, Sheet 1 also more generally shows the location of each parcel in Area 3.

### Area 4

Area 4 only has two parcels of concern; a school site and SG 4a. There are parcels south of Becker Road, but traffic distribution is the to the east, so those parcels are expected to have left-turns into their property and right-turns out of their property and therefore not warrant signalization. SG 4a is bounded by Becker Road in the south, Paar Drive in the north, Community Boulevard in the west and the FPL power lines west of Village Parkway. The school site is located on the north side of Becker Road west of the FPL power lines. Trip generation for the school was not performed. The school will require a traffic signal or will require traffic control officers during school arrival and dismissal periods.

## **RECOMMENDATIONS**

### **Southern Grove - Area 1**

Area 1 was reviewed. A traffic signal exists at SW Innovation Way and Village Parkway serving the major parcels east of Village Parkway and many parcels west of Village Parkway, including the commercial area west of Village Parkway. If SW innovation Way is extended to intersect with Community Boulevard, a signal is expected to be required in the future. A traffic signal is not warranted at the Thompson-Thrift / Stockton Place median opening or the Community Boulevard median opening located 1,000 feet north of Discovery Way. A traffic signal will be needed at Community Boulevard & Discovery Way. Figure 3 displays the Area 1 summary and recommendations.

#### Summary:

- Budget for future traffic signal at Innovation Way & Community Boulevard if Innovation Way is extended to Community Boulevard
- Community Boulevard & Discovery Way - Riverland Kennedy is recommended to construct the Community Boulevard & Discovery Way traffic signal because it is a northern/eastern traffic signal on their boundary and Riverland is not contributing to traffic signals or roads east of Community Boulevard or north of Discovery Way, but 100 percent of the Riverland traffic utilizes the roads and traffic signals to their east and north

**Figure 3. Area 1 Summary**



*Southern Grove - Area 2*

Area 2 was reviewed. Marshall Parkway and Village Parkway requires a traffic signal and will be a requirement of the master developer. A traffic signal may be needed at a median opening located 1,000 feet south of Discovery Way due to 39,000 square feet (SF) of retail/office use on Parcel 7. A traffic signal at this location will require a 30 percent deviation from the City’s minimum signal spacing of ¼ mile. Further, a traffic signal may be required 1,000 feet to the south at Trade Center Drive. Therefore, a signal at this driveway is not recommended. However, the specific use on Parcel 7 is not yet identified and therefore the actual use and trip generation on Parcel 7 is not known. If a signal is warranted at this location and the City approves the traffic signal spacing deviation, we recommend that Parcel 7 be responsible. However, if a full median opening is not deemed safe at the time of application, then we recommend installation of directional median opening at this location to prevent the side street left-turn movement.

A full median opening is located at Trade Center Drive, 2,000 feet south of Discovery Way. A traffic signal is recommended at this location due to traffic from east of Village Parkway.

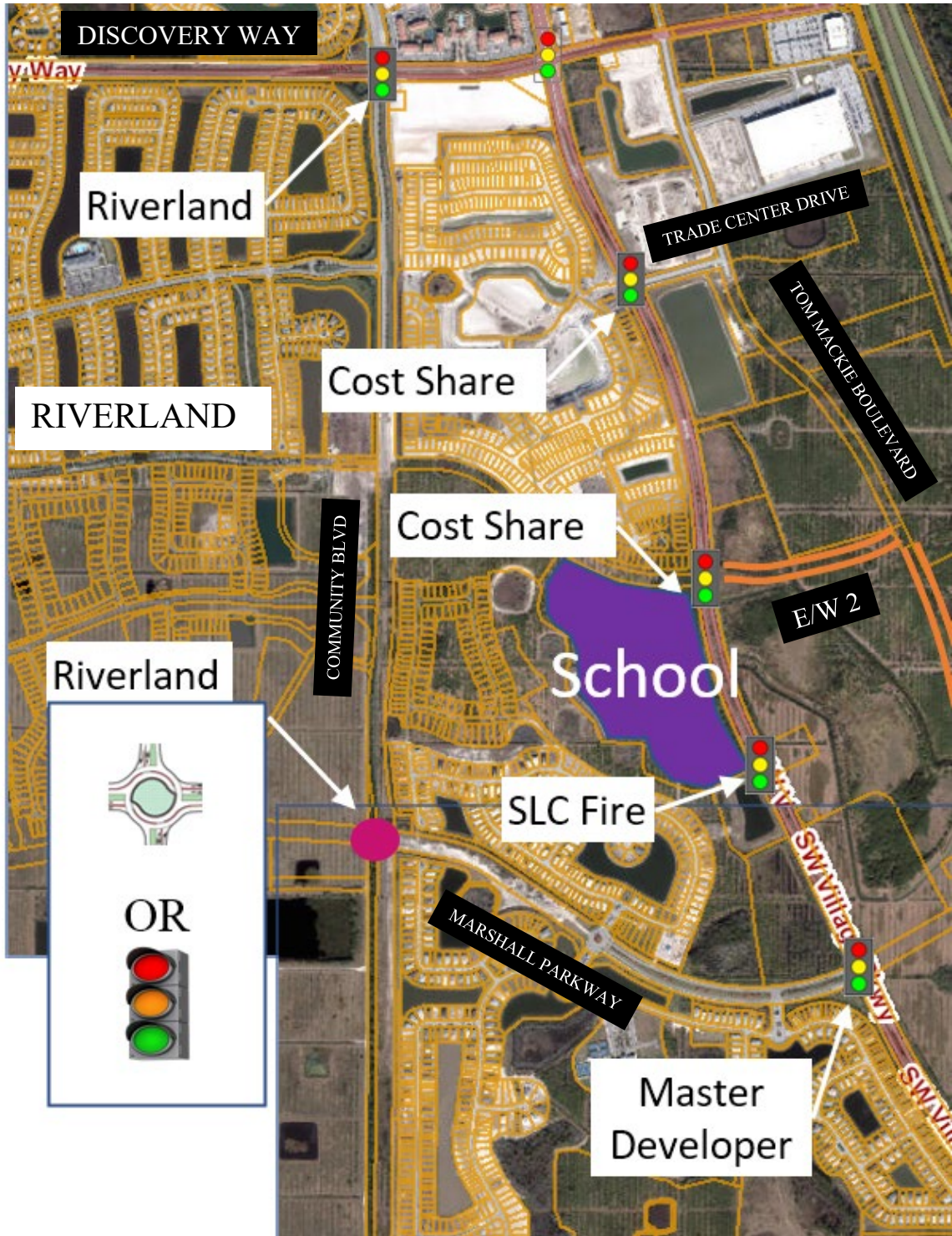


The Trade Center Drive traffic signal cost is recommended to be shared by the benefiting parcels. The Telaro south entrance aligns with a full median opening 3,300 feet south of Discovery Way. Signal warrants are not met at this location. A Port St. Lucie right-of-way designated East/West 2 (E/W 2) meets traffic signal warrants from the east and west sides of Village Parkway. The E/W 2 traffic signal cost is recommended to be shared by the benefiting parcels. A fire station will be responsible for an emergency signal located 2,000 feet north of Paar Drive. One major intersection exists on Marshall Parkway west of Village Parkway and it is controlled by roundabout. A traffic signal or roundabout will be required at the Community Boulevard & Marshall Parkway intersection. Southern Grove is responsible for constructing the traffic signal at Marshall Parkway and Village Parkway. Therefore, Riverland is responsible for constructing a traffic signal or roundabout at Community Boulevard and Marshall Parkway. Figure 4 displays the Area 2 summary and recommendations.

Summary:

- Marshall Parkway & Village Parkway – The Master Developer will install a future traffic signal.
- Community Boulevard & Marshall Parkway - Riverland Kennedy is recommended to construct the Community Boulevard & Marshall Parkway traffic signal because it is a northern/eastern traffic signal on their boundary and Riverland is not contributing to traffic signals east of Community Boulevard or north Discovery Way but 100 percent of the Riverland traffic utilizes the roads and traffic signals to their east and north.
- Trade Center Drive/Telaro – A future traffic signal is needed (See Cost Share in next section).
- E/W 2 - A future traffic signal is needed (See Cost Share in next section).

**Figure 4. Area 2 Summary**



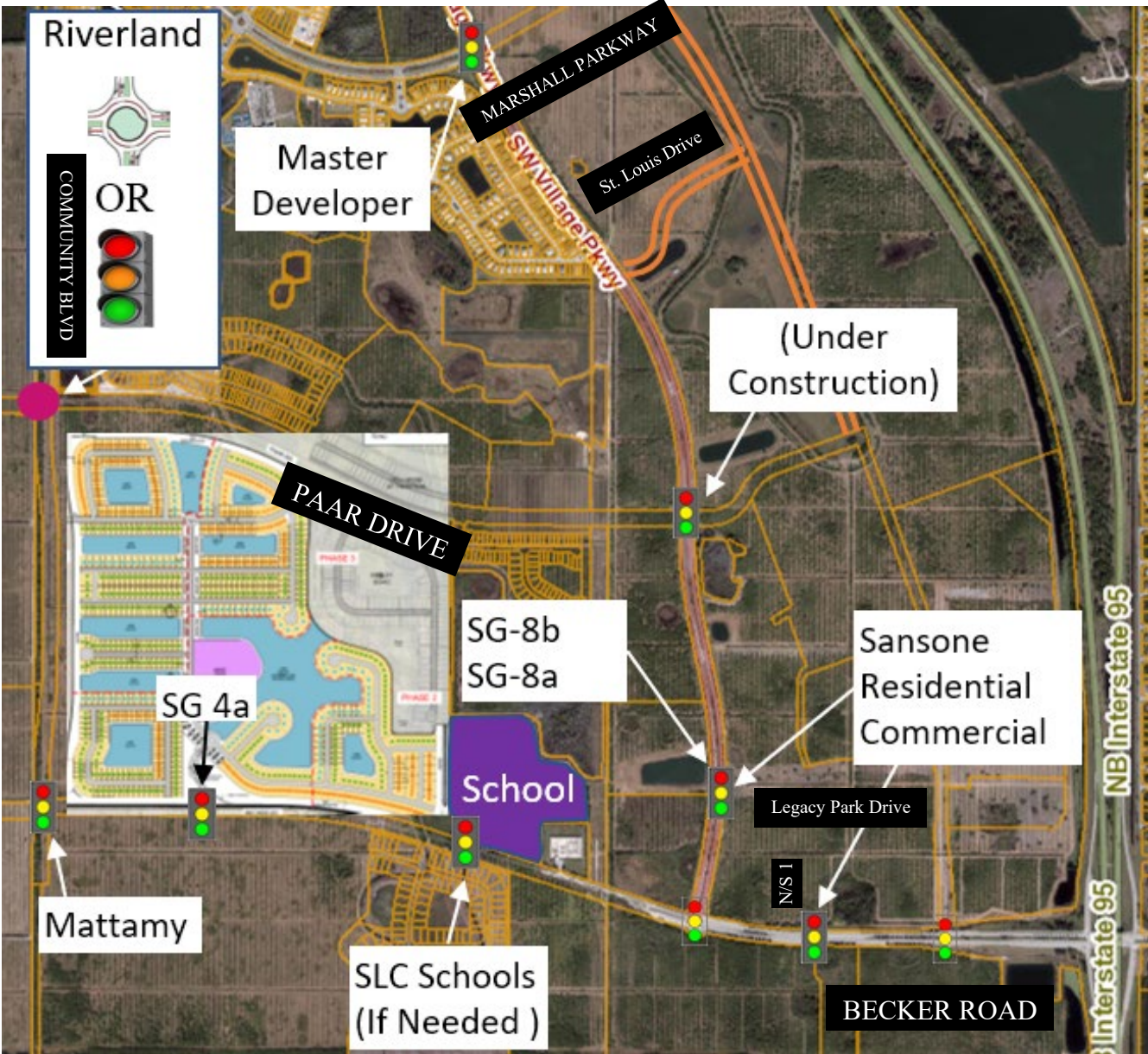
### *Southern Grove - Area 3*

Area 3 was reviewed. The Paar Drive and Village Parkway traffic signal is installed. A Pro rata share analysis is provided later in the report. A traffic signal will not be needed at a median opening located 1,200 feet south of Marshall Parkway. A full opening is located at the future St. Louis Drive median opening, 2,600 feet south of Marshall Parkway. A traffic signal is not warranted at this location. SG 10 / Farrell Southern Grove and Eden Multi-Family align with a full median opening 1,300 feet North of Paar Drive. Based on discussions with the City, the opening will be converted to a directional opening and therefore a signal is not warranted. A traffic signal or roundabout will be required at the Community Boulevard & Paar Drive intersection. A traffic signal is not warranted at the E/W B median opening, located 1,300 feet south of Paar Drive. A traffic signal is warranted at the Legacy Park Drive median opening 1,300 feet north of Becker Road. The 1,300-foot signal spacing is a deviation of two percent from City Standards, but the deviation is recommended at this location. A traffic signal is warranted at the N/S 1 median opening on Becker Road 1,200 feet east of Village Parkway. The signal spacing of 1,200 feet is a nine percent deviation, but a traffic signal is recommended to relieve the expected number of southbound left-turns Village Parkway and Sansone Boulevard and due to the frequency of heavy vehicle movements at the intersection. Figure 5 displays the Area 3 summary and recommendations.

#### Summary:

- Paar Drive & Village Parkway – a traffic signal is installed at this location
- Community Boulevard & Paar Drive - Riverland Kennedy is recommended to construct the Community Boulevard & Paar Drive traffic signal or roundabout because it is a northern/eastern traffic signal on their boundary and Riverland is not contributing to traffic signals east of Community Boulevard or north Discovery Way but 100 percent of the Riverland traffic utilizes the roads and traffic signals to their east and north
- Legacy Park Drive (Median Opening 1,300 Feet North of Becker Road & Village Parkway – Future Traffic Signal Needed (See Cost Share in next section)
- N/S 1 & Becker Road– Future Traffic Signal Needed (See Cost Share in next section)

**Figure 5. Area 3 Summary**



## *Southern Grove - Area 4*

Area 4 was reviewed. SG 4a and Becker will require a traffic signal. The school site will require a traffic signal or traffic control officers during arrival and dismissal times. A traffic signal will be required at the Community Boulevard & Becker Road intersection. Figure 4 displays the Area 4 summary and recommendations.

### Summary:

- Community Boulevard & Becker Road – This is a condition of Mattamy Homes per the Becker Road construction agreement.
- SG 4a & Becker Road – SG 4a is recommended to be responsible for the traffic signal.
- School & Becker Road – Responsibility of School if needed

## *Southern Grove - Cost Sharing*

Cost sharing may be an option for several of the traffic signals. The City's adopted methodology for cost sharing is contained within Section 156.070 through 156.073 of the City Code. The cost allocation used in the analysis follows Section 156.072 (B) for Proportionate Allocation. The overall cost of the traffic signal is applied to each benefiting parcel based on peak hour trips using the side street (minor street) at the intersection.

Table 1 displays the cost share for Trade Center Drive and Village Parkway. The cost share is 16.4 percent west of Village Parkway and 83.6 percent east of Village Parkway.

Table 1. Trade Center Drive Cost Share

<b>Trade Center Drive &amp; Village Parkway</b>			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
Telaro	71	16.40%	\$82,000
Parcel 2	37	8.55%	\$42,750
Parcel 5	64	14.79%	\$73,950
Parcel 6	44	10.16%	\$50,800
Parcel 8	63	14.55%	\$72,750
Parcel 9	58	13.39%	\$66,950
Parcel 10	45	10.39%	\$51,950
Parcel 11	36	8.31%	\$41,550
Parcel 12	15	3.46%	\$17,300
<b>Total</b>	<b>433</b>	<b>100%</b>	<b>500,000</b>

Table 2 displays the cost share for E/W 2 and Village Parkway. The cost share is 28.3 percent west of Village Parkway and 71.7 percent east of Village Parkway.

Table 2. E/W 2 Cost Share

<b>Signal at E/W 2 &amp; Village Parkway</b>			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
SLCSB	336	28.3%	\$141,500
Parcel 11	20	1.7%	\$8,500
Parcel 12	51	4.3%	\$21,500
Parcel 13	23	1.9%	\$9,500
Parcel 15	247	20.9%	\$104,500
Parcel 17	509	42.9%	\$214,500
<b>Total</b>	<b>1,186</b>	<b>100%</b>	<b>500,000</b>

Table 3 displays the cost share for Marshall Parkway and Village Parkway. The cost share is 57.7 percent west of Village Parkway and 42.3 percent east of Village Parkway.

Table 3. Marshall Parkway & Village Parkway Cost Share

<b>Signal at Marshall Pkwy &amp; Village Pkwy</b>			
Parcel	Peak Hour	% of Total	Share of Signal
W. of Village	799	57.7%	\$288,500
Area 2 N. of Marshall	394	28.4%	\$142,000
Legacy Park	192	13.9%	\$69,500
<b>Total</b>			
	1,385	100%	500,000

Table 4 displays the cost share for Paar Drive and Village Parkway. The cost share is 75.5 percent west of Village Parkway and 24.5 percent east of Village Parkway.

Table 4. Paar Drive & Village Parkway Cost Share

<b>Signal at Paar Dr &amp; Village Pkwy</b>			
Parcel	PM	% of	Share of
Legacy	(229)	24.5%	\$122,500
W. of Village	(697)	75.5%	\$377,500
<b>Total</b>			
	(926)	100%	500,000

Table 5 displays the cost share for Legacy Park Drive and Village Parkway. The cost share is 61.3 percent west of Village Parkway and 38.7 percent east of Village Parkway.

Table 5. Legacy Park Drive Cost Share

<b>Signal at Legacy Park Drive &amp; Village Pkwy</b>			
Parcel	PM	% of	Share of
Legacy Park	(380)	38.7%	\$193,500
SG 8B North	(159)	16.2%	\$81,000
SG 8B South	(442)	45.1%	\$225,500
<b>Total</b>	<b>(981)</b>	<b>100%</b>	<b>500,000</b>

Table 6 displays the cost share for N/S 1 and Becker Road. The cost share is 42 percent north of Becker Road and 58 percent south of Becker Road.

Table 6. N/S 1 Cost Share

<b>Signal at N/S 1 &amp; Becker Road</b>			
Parcel	PM	% of	Share of
Sansone	(561)	42.0%	\$210,000
S. of Becker	(770)	58.0%	\$290,000
<b>Total</b>	<b>(1,331)</b>	<b>100%</b>	<b>500,000</b>

Table 7 provides a summary of the division in cost between the area east of Village Parkway and north of Becker Road (GFC & Legacy Park) and the area west of Village Parkway and South of Becker Road.



Table 7. Overall Pro Rata Share Allocation of Shared Signal Costs

<b>Signal Cost Assigned West and East of Village Parkway and North and South of Becker Road</b>					
<b>Signal Location</b>	<b>Signal Share</b>				
	GFC	Legacy Park	Mattamy	SLCSB	Total
Trade Center Drive	\$418,000	-	\$82,000	-	\$500,000
E/W 2 & Village Pkwy	\$358,500			\$141,500	\$500,000
Marshall Pkwy & Village Pkwy	\$142,000	\$69,500	\$288,500		\$500,000
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N/S 1 & Becker Rd	-	\$210,000	\$290,000		\$500,000
<b>Total</b>	\$918,500 30.6%	\$595,500 19.9%	\$1,344,500 44.8%	\$141,500 4.7%	\$3,000,000

## Tradition

Additional traffic signals are not anticipated within Tradition. Tradition has constructed four traffic signals and seven roundabouts to facilitate the movement of traffic. No additional traffic signals are anticipated unless they are developer landowner driven.

## Western Grove

Additional traffic signals are anticipated within Western Grove. A traffic signal is projected to be needed at N/S A & Crosstown Parkway.

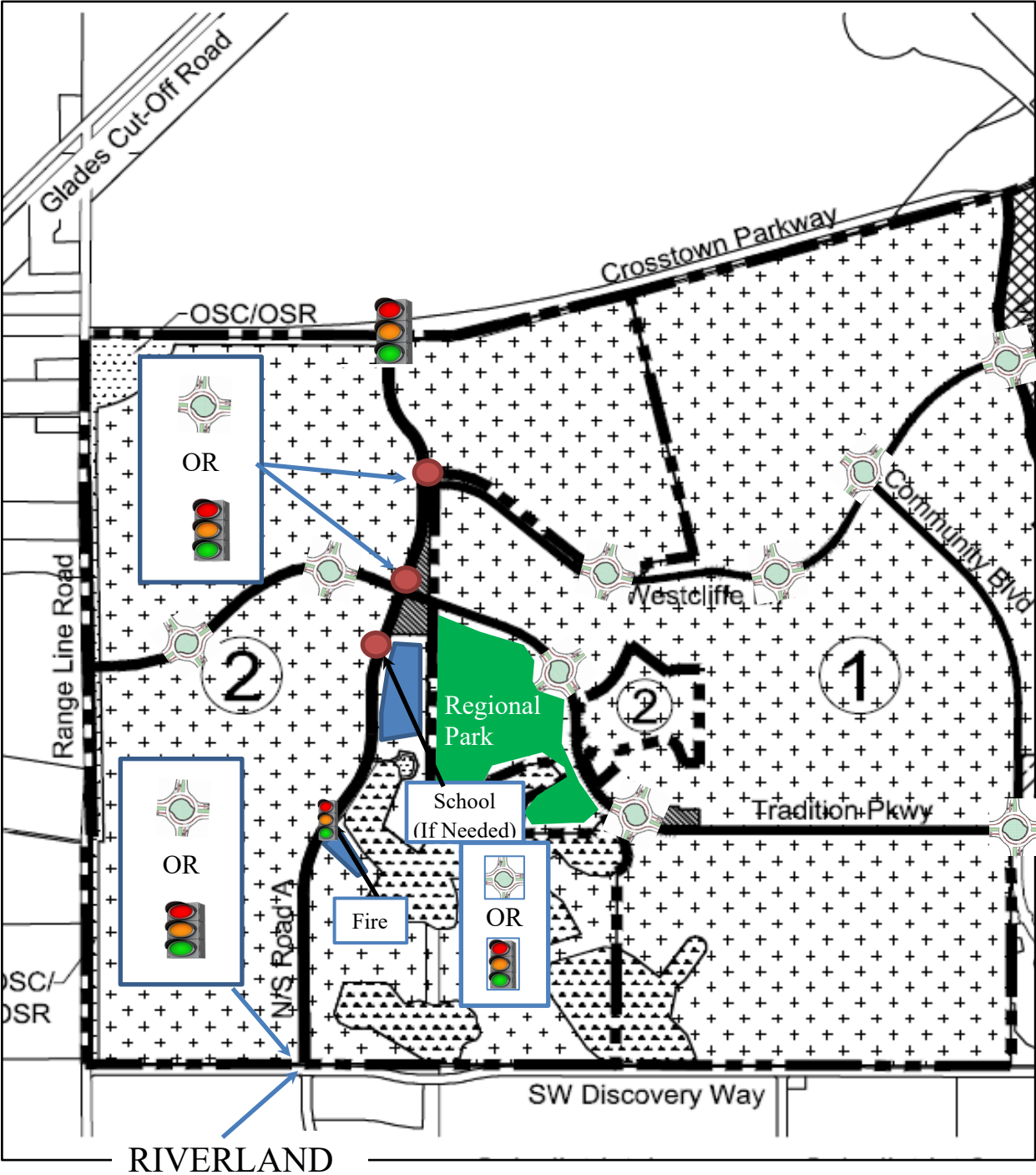
A traffic signal or roundabout is projected to be needed at the following locations and is graphically displayed in Figure 6:

- Westcliffe Lane & N/S A
- N/S A & Tradition Parkway
- N/S A & Discovery Way
- Fire Station
- School (Traffic Signal or Roundabout if needed)

Major street volumes are too low on Rangeline Road to warrant a traffic signal at any Rangeline Road connections. Therefore, no signals are warranted along Rangeline Road. Connections to Rangeline Road are recommended for stop control for the east leg (westbound approach).

Any additional traffic signals along N/S Road A or other facilities will be a result of private sector or public sector (i.e. schoolboard) development and therefore a responsibility of those entities.

**Figure 6. Western Grove Traffic Control Devices**



## **CONCLUSION**

Future traffic signals or roundabouts are needed throughout Southern Grove and Western Grove to support future development and roadway connections. Up to 13 future traffic signals and/or roundabouts are projected to be warranted in Southern Grove. Four of the traffic signals are a direct result of the Riverland/Kennedy connections to Southern Grove. This study does not contemplate a Riverland Pro Rata Share allocation of cost to 10 of the traffic signals listed plus traffic signals previously constructed. In addition, Mattamy Homes is constructing one of the four traffic signals required on its western border, which is warranted as a result of Riverland traffic and connections. The anticipated responsibility for the signals are as follows:

- Mattamy Homes – 2 Traffic Signals
- St. Lucie County School Board – 1 Traffic Signal (if needed)
- St. Lucie County Fire Rescue – 1 Traffic Signal
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Western Grove is anticipated to need six traffic signals or roundabouts. One of the locations is a direct result of the Riverland/Kennedy connections to Western Grove and it is recommended that Riverland/Kennedy be responsible for the traffic signal or roundabout at Discovery Way and N/S A.

The study utilized a pro rata share methodology to assign costs to various benefitting property owners for six traffic signals.

Signal design and installation procedures are recommended upon a project or accumulation of projects reaching 75 projected peak hour left-turns on roads with 45 MPH or greater speed limits and 100 projected peak hour left-turns on roads with 40 MPH or lower speeds limits.

<b>Signal Cost Assigned West and East of Village Parkway and North and South of Becker Road</b>					
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## ***APPENDICES***

**Exhibit 1A**

**TAZ 660 Trip Generation (East of Village - Discovery To Marshall)**

Land Use	Intensity		Daily Trips	AM Peak Hour			PM Peak Hour			
				Total	In	Out	Total	In	Out	
<b><u>Proposed Site Traffic</u></b>										
Warehousing	48.253	1000 SF	115	29	22	7	32	9	23	
Manufacturing	91.004	1000 SF	545	65	49	16	62	19	43	
Single Family Detached	2	DU	28	2	1	1	3	2	1	
General Office Building	9.845	1000 SF	154	23	20	3	24	3	21	
Warehousing	271.003	1000 SF	466	56	43	13	59	17	42	
Manufacturing	90.349	1000 SF	543	65	49	16	61	19	42	
General Office Building	50.5	1000 SF	640	93	82	11	91	12	79	
Multi-family Housing (Mid-rise)	372	DU	1,728	152	35	117	145	88	57	
Strip Retail Center	39	1000 SF	1,875	71	43	28	205	103	102	
Manufacturing	105	1000 SF	598	74	56	18	74	23	51	
Warehousing	350	1000 SF	591	66	51	15	68	19	49	
General Office Building	10	1000 SF	157	23	20	3	24	3	21	
Warehousing	20	1000 SF	70	26	20	6	29	8	21	
Specialty Trade Contractor	34.224	1000 SF	336	57	42	15	66	21	45	
Warehousing	440	1000 SF	733	76	59	17	79	22	57	
Warehousing	393	1000 SF	659	71	55	16	74	21	53	
PART OF SITE 15	0	0	0	0	0	0	0	0	0	
Manufacturing	350	1000 SF	1,521	223	169	54	287	89	198	
PART OF SITE 15	0	0	0	0	0	0	0	0	0	
Shopping Center (40-150k)	100	1000 SF	9,109	353	219	134	886	425	461	
Shopping Center (40-150k)	108	1000 SF	9,724	381	236	145	947	455	492	
Warehousing	400	1000 SF	670	72	55	17	74	21	53	
LAKE	0	0	0	0	0	0	0	0	0	
Subtotal			30,262	1,978	1,326	652	3,290	1,379	1,911	
<b><u>Internal Capture</u></b>										
	AM	PM	DAILY							
Warehousing & Manufacturing	2.0%	2.0%	2.0%	137	18	13	4	19	6	14
Shopping Center (40-150k)	2.2%	0.9%	0.8%	156	18	4	14	19	14	5
General Office Building	2.0%	2.0%	2.0%	19	3	2	0	3	0	2
Subtotal	2.0%	1.2%	1.0%	312	39	19	18	41	20	21
<b><u>Pass-By Traffic</u></b>										
	AM	PM								
Strip Retail Center	40.0%	40.0%	750	28	17	11	82	41	41	
Shopping Center (40-150k)	40.0%	40.0%	3,644	141	88	54	354	170	184	
Shopping Center (40-150k)	40.0%	40.0%	3,890	152	94	58	379	182	197	

**Exhibit 1A**

**TAZ 660 Trip Generation (East of Village - Discovery To Marshall)**

Land Use		Intensity		Daily Trips	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
Site	Use	Intensity		Driveway Trips						
2	Warehousing	48	1000 SF	113	28	22	6	31	9	22
2	Manufacturing	91	1000 SF	534	64	48	16	61	19	42
2	Single Family Detached	2	DU	27	2	1	1	3	2	1
2	General Office Building	10	1000 SF	151	23	20	3	24	3	21
5	Warehousing	271	1000 SF	457	55	42	13	58	17	41
5	Manufacturing	90	1000 SF	532	64	48	16	60	19	41
5	General Office Building	51	1000 SF	627	91	80	11	89	12	77
6	Multi-family Housing (Mid-rise)	372	DU	1,693	149	34	115	142	86	56
7	Strip Retail Center	39	1000 SF	1,861	69	42	26	203	101	101
8	Manufacturing	105	1000 SF	586	73	55	18	73	23	50
9	Warehousing	350	1000 SF	579	65	50	15	67	19	48
10	General Office Building	10	1000 SF	154	23	20	3	24	3	21
10	Warehousing	20	1000 SF	69	25	20	5	28	8	20
11	Specialty Trade Contractor	34	1000 SF	329	56	41	15	65	21	44
12	Warehousing	440	1000 SF	718	74	58	16	77	22	55
13	Warehousing	393	1000 SF	646	70	54	16	73	21	52
14	PART OF SITE 15	0	0	0	0	0	0	0	0	0
15	Manufacturing	350	1000 SF	1,491	219	166	53	281	87	194
16	PART OF SITE 15	0	0	0	0	0	0	0	0	0
17	Shopping Center (40-150k)	100	1000 SF	9,040	345	217	128	878	419	459
18	Shopping Center (40-150k)	108	1000 SF	9,651	372	234	139	938	449	490
18	Warehousing	400	1000 SF	657	71	54	17	73	21	52
19	LAKE	0	0	0	0	0	0	0	0	0
<b>NET PROPOSED TRIPS</b>				<b>21,666</b>	<b>1,618</b>	<b>1,108</b>	<b>511</b>	<b>2,434</b>	<b>966</b>	<b>1,468</b>
<b>Total Proposed Driveway Volumes</b>				<b>30,262</b>	<b>1,978</b>	<b>1,326</b>	<b>652</b>	<b>3,290</b>	<b>1,379</b>	<b>1,911</b>

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Warehousing	150	1000 SF	$T = 1.58(X) + 38.29$	0%	77/23	$T = 0.12(X) + 23.62$	28/72	$T = 0.12(X) + 26.48$
Manufacturing	140	1000 SF	$T = 3.77(X) + 201.98$	0%	76/24	$T = 0.61(X) + 9.54$	31/69	$T = 0.87(X) - 17.5$
General Office Building	710	1000 SF	$\ln(T) = 0.87 \ln(X) + 3.05$	0%	88/12	$\ln(T) = 0.86 \ln(X) + 1.16$	13/87	$\ln(T) = 0.83 \ln(X) + 1.29$
Multi-family Housing (Mid-rise)	221	DU	$T = 4.77(X) - 46.46$	0%	23/77	$T = 0.44(X) - 11.61$	61/39	$T = 0.39(X) + 0.34$
Specialty Trade Contractor	180	1000 SF	9.82	0%	74/26	1.66	32/68	1.93
Single Family Detached	210	DU	$\ln(T) = 0.92 \ln(X) + 2.68$	0%	26/74	$\ln(T) = 0.91 \ln(X) + 0.12$	63/37	$\ln(T) = 0.94 \ln(X) + 0.27$
Strip Retail Center	822	1000 SF	$T = 42.20(X) + 229.68$	40%	60/40	$\ln(T) = 0.66 \ln(X) + 1.84$	50/40	$\ln(T) = 0.71 \ln(X) + 2.72$
Shopping Center (40-150k)	821	1000 SF	$T = 76.96(X) + 1412.79$	40%	62/38	3.53	48/52	$T = 7.67(X) + 118.86$



## Exhibit 1B

### K-8 School Trip Generation

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>								
Middle School/Junior High School	1,600 Students	3,316	112	60	52	336	161	175

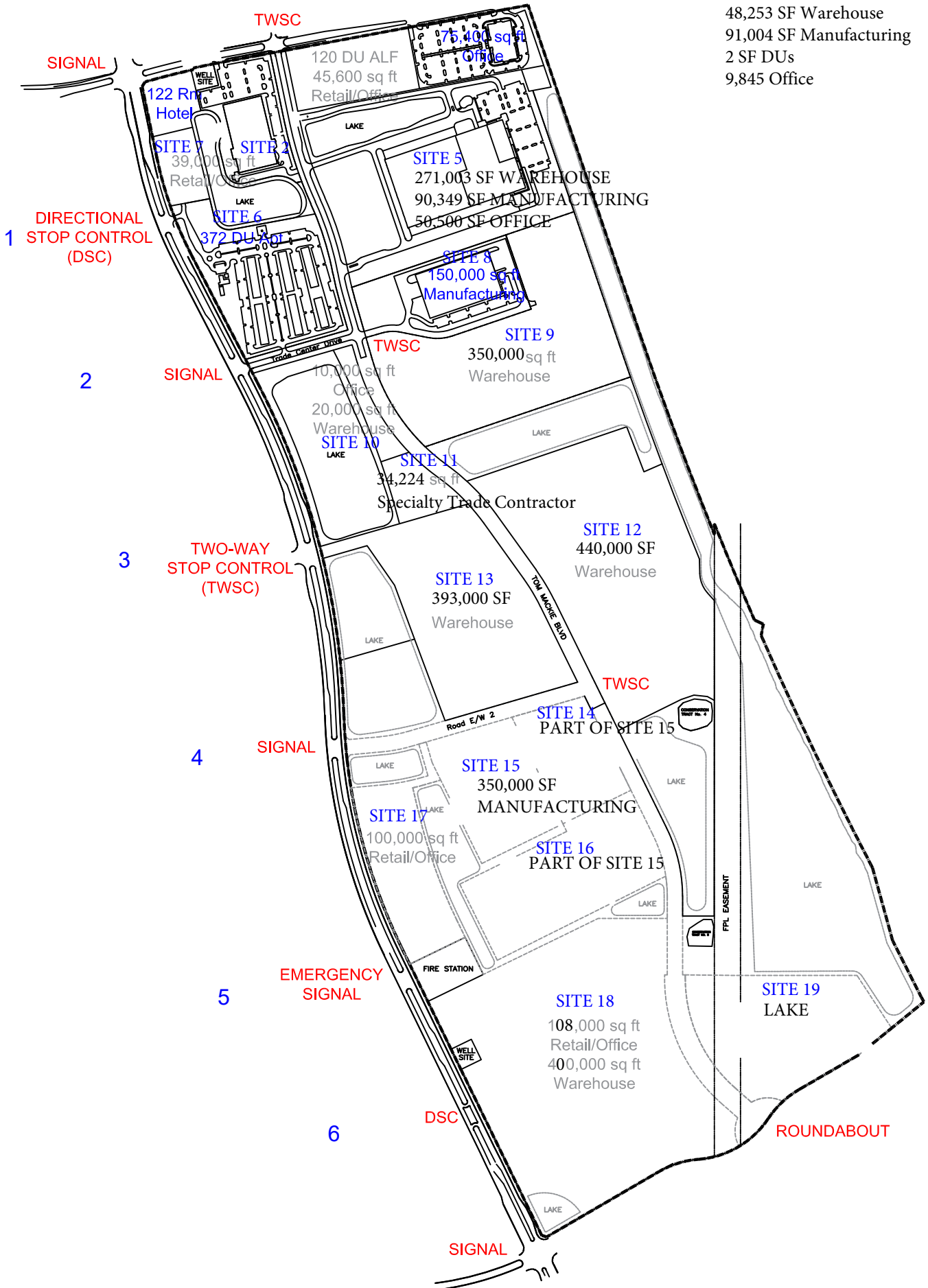
Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Middle School/Junior High School	522	Students	$\ln(T) = 0.97 \ln(X) + 0.95$	0%	54/46	0.67	48/52	0.15

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EXHIBIT 2

Site 2  
 48,253 SF Warehouse  
 91,004 SF Manufacturing  
 2 SF DUs  
 9,845 Office





PROJECT DRIVEWAY TRIPS						
Telaro - 55+ Community						
Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out
DW	2,100	120	40	80	142	87

0%

0



Opening 1

60%  
85

0

Project Site

Trade Center Drive

Opening 2  
Telaro Main Entrance

50%  
71

0

0

50%  
71

0

Opening 3  
Telaro Southern  
Entrance

50%  
71

40%  
57

Opening 4 (EW 2)  
K-8 School

40%  
57

0

Opening 5

Fire Station

40%  
57

0

Opening 6  
Mid-Block U-turns

40%  
57

0

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study  
ESTIMATED DAILY DRIVEWAY VOLUMES  
TELARO  
EXHIBIT 3 SHEET 2 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS						
K-8 school						
k-8 sch	AM Peak Hour	PM Peak Hour				
Total	In	Out	Total	In	Out	
DW	3,316	112	60	52	326	161   175

0%

0



Opening 1

60%  
202

0

Opening 2

Telaro Main Entrance

0

0

Trade Center Drive

0

0

50%  
168

Opening 3

Telaro Southern Entrance

0

0

50%  
168

Opening 4 (E/W 2)

K-8 School

100%

336

0

50%  
168

Project Site

Opening 5

Fire Station

0

50%  
168

Opening 6

Mid-Block U-turns

0

50%  
168

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

K-8 SCHOOL

EXHIBIT 3 SHEET 3 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS							
SG-11							
Daily	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
DW	11,264	452	280	172	1,101	528	573

0%



Opening 1

0

0

Opening 2

Telaro Main Entrance

Trade Center Drive

0

0

Opening 3  
Telaro Southern  
Entrance

0

Opening 4 (E/W 2)  
K-8 School

0

Opening 5

Fire Station

0

50%  
551

Opening 6  
Mid-Block U-turns

25%  
275

0

Marshall Pkwy

20%  
220

30%  
330

0

Village

30%  
330

Sansone

SG-11  
128,000 SF  
Commercial

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

SG-11

EXHIBIT 3 SHEET 4 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS							
Heron Preserve - 364 SF							
Daily	AM Peak Hour		PM Peak Hour				
	Total	In	Out	Total	In	Out	
DW	3,372	241	63	178	335	211	124



Opening 1

0

Trade Center Drive

Opening 2

Telaro Main Entrance

0

0

Opening 3  
Telaro Southern  
Entrance

0

Opening 4 (E/W 2)  
K-8 School

0

Opening 5

Fire Station

75%  
251

0

Opening 6  
Mid-Block U-turns

75%  
251

0

Heron Preserve  
364 SF DUs

Marshall Pkwy     100%     95%  
                         335           318

0

20%  
67

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

HERON PRESERVE

EXHIBIT 3 SHEET 5 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

 MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS						
DEL WEBB - 940 AGE RESTRICTED DUS						
Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out
DW	3,312	241	63	178	335	211 124

0%

0



Opening 1

0

0

Opening 2

Telaro Main Entrance

0

Trade Center Drive

0

Opening 3  
Telaro Southern  
Entrance

0

Opening 4 (E/W 2)  
K-8 School

0

Opening 5

Fire Station

75%  
251

0

Opening 6  
Mid-Block U-turns

75%  
251

0

Marshall Pkwy

50% 45%  
168 151

0

Del Webb  
940 Age Restricted SF DUs

Village

45%  
151

Samsone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

DEL WEBB

EXHIBIT 3 SHEET 6 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips





PROJECT DRIVEWAY TRIPS						
LEGACY PARK AT TRADITION						
Daily	AM Peak Hour			PM Peak Hour		
	Total	In	Out	Total	In	Out
DW						

0%

0



Opening 1

0

0

Opening 2

Telaro Main Entrance

0

Trade Center Drive

0

Opening 3  
Telaro Southern  
Entrance

0

Opening 4 (EW 2)  
K-8 School

0

Opening 5

Fire Station

75%  
0

0

Opening 6  
Mid-Block U-turns

0

0

Marshall Pkwy

0 0

192

Village

0

LEGACY PARK AT TRADITION (SANSONE)

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

LEGACY PARK AT TRADITION (SANSONE) Total Trips on Marshall (East of Village)

EXHIBIT 3 SHEET 7 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

 MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS						
Daily	48,253 1000 SF			Warehousing		
	Total	AM Peak Hour	PM Peak Hour	Total	AM Peak Hour	PM Peak Hour
DW	113	28	22	8	21	9
DW	534	64	48	16	61	19
DW	27	2	1	1	3	2
DW	151	23	20	3	24	3
Total	825	117	91	26	119	33

Project Site 2  
 91,004 SF Manufacturing  
 48,253 SF Warehouse  
 2 SF Homes  
 9,845 SF Office



59%  
70

41%  
49

Opening 1

Opening 2  
Telero Main Entrance

31%  
37

Trade Center Drive

31%  
37

Opening 3

31%  
37

10%  
12

Opening 4 (E/W 2)  
K-8 School

31%  
37

10%  
12

Opening 5

Fire Station

31%  
37

10%  
12

Opening 6  
Mid-Block U-turns

31%  
37

10%  
12

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study  
 ESTIMATED DAILY DRIVEWAY VOLUMES  
 AREA 2  
 EXHIBIT 3 SHEET 8 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips

MacKenzie  
 Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS							
Daily	271 1000 SF			Warehousing			
	AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour		
Total	In	Out	Total	In	Out		
DW	457	55	42	13	58	17	41
DW	532	64	48	16	60	19	41
DW	627	91	80	11	89	12	77
Total	1,616	210	170	40	207	48	159

+90,349 sf OF Manufacturing  
+50,500 sf of office use

59%

122



Project Site 5  
271,003 SF Warehouse  
90,349 SF Manufacturing  
50,500 SF Office

41%

85

Opening 1

Opening 2

Teiara Main Entrance

31%

Trade Center Drive

31%

64

64

Opening 3

31%

64

10%

21

Opening 4 (E/W 2)

K-8 School

31%

64

10%

21

Opening 5

Fire Station

31%

64

10%

21

Opening 6  
Mid-Block U-turns

31%

64

10%

21

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

AREA 5

EXHIBIT 3 SHEET 9 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS						
372 DU	Multi-family Housing (Mid-rise)					
	AM Peak Hour			PM Peak Hour		
Daily	Total	In	Out	Total	In	Out
1,693	149	34	115	142	86	56



Opening 1

58%  
82



1%  
1

1%  
1

Opening 2

Telaro Main Entrance

31%  
44

Trade Center Drive

11%  
16

Opening 3

31%  
44

31%  
44

11%  
16

Opening 4 (E/W 2)  
K-8 School

31%  
44

11%  
16

Opening 5

Fire Station

31%  
44

11%  
16

Opening 6  
Mid-Block U-turns

31%  
44

11%  
16

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

AREA 6

EXHIBIT 3 SHEET 10 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

 MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS

Daily	39 1000 SF Strip Retail Center			AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	Total	In	Out	
DW	1,861	69	42	26	203	101	101			

Project Site 7  
39,000 SF  
retail/office



Opening 1 100%  
203

Opening 2 Trade Center Drive 0 0

Telero Main Entrance 0

Opening 3 41%  
83

Opening 4 (E/W 2) K-8 School 41%  
83

Opening 5 Fire Station 41%  
83

Opening 6 Mid-Block U-turns 41%  
83

Marshall Pkwy Village Samsone

Southern Grove & Western Grove Signals Study  
ESTIMATED DAILY DRIVEWAY VOLUMES  
AREA 7  
EXHIBIT 3 SHEET 11 OF 23

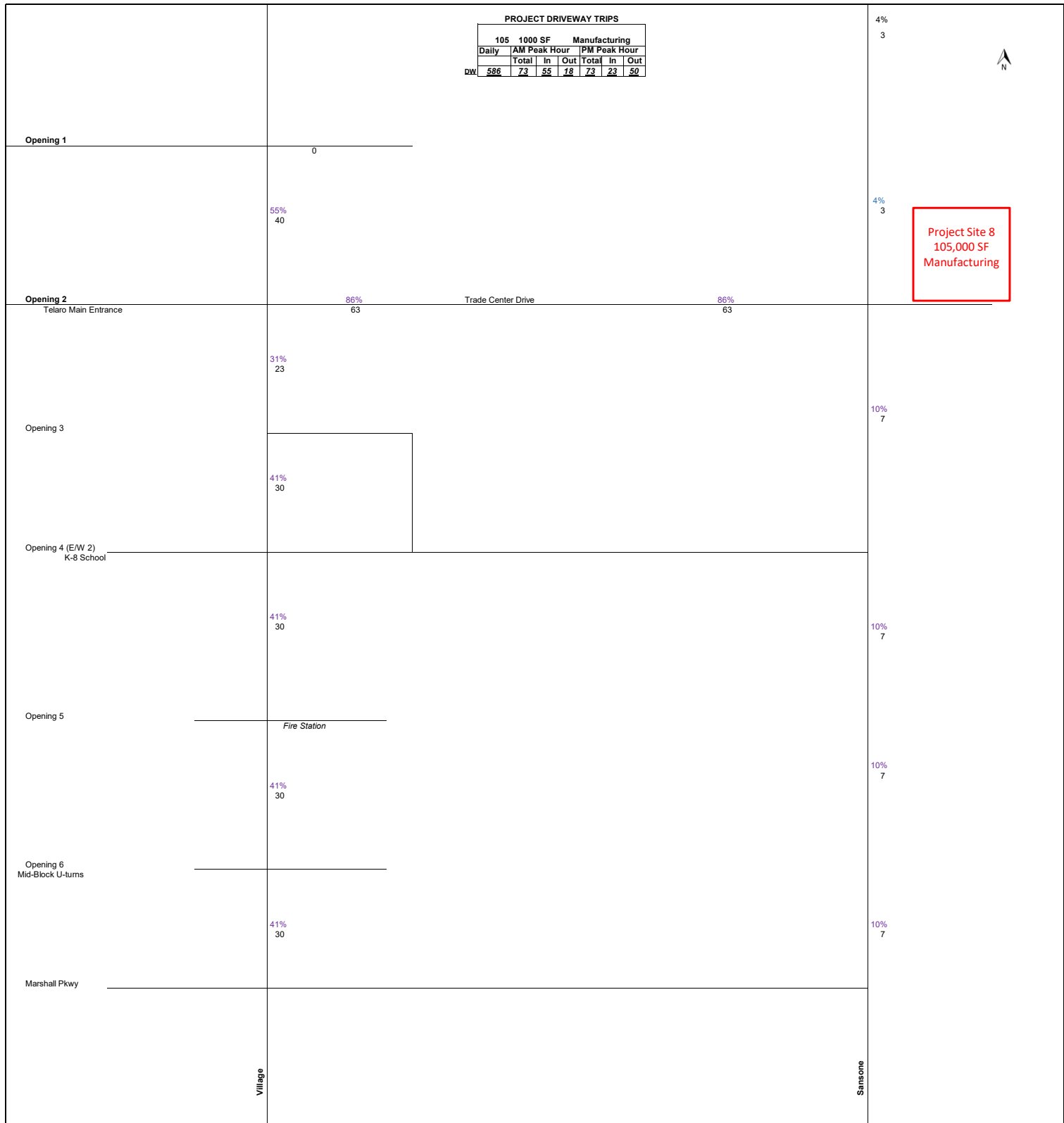
XXX Total daily driveway trips  
XXX PM peak hour trips  
XXX AM peak hour trips



PROJECT DRIVEWAY TRIPS						
Daily	105 1000 SF			Manufacturing		
	AM Peak Hour	PM Peak Hour	Total	In	Out	Total
DW	586	73	55	18	73	23
						50



Project Site 8  
105,000 SF  
Manufacturing

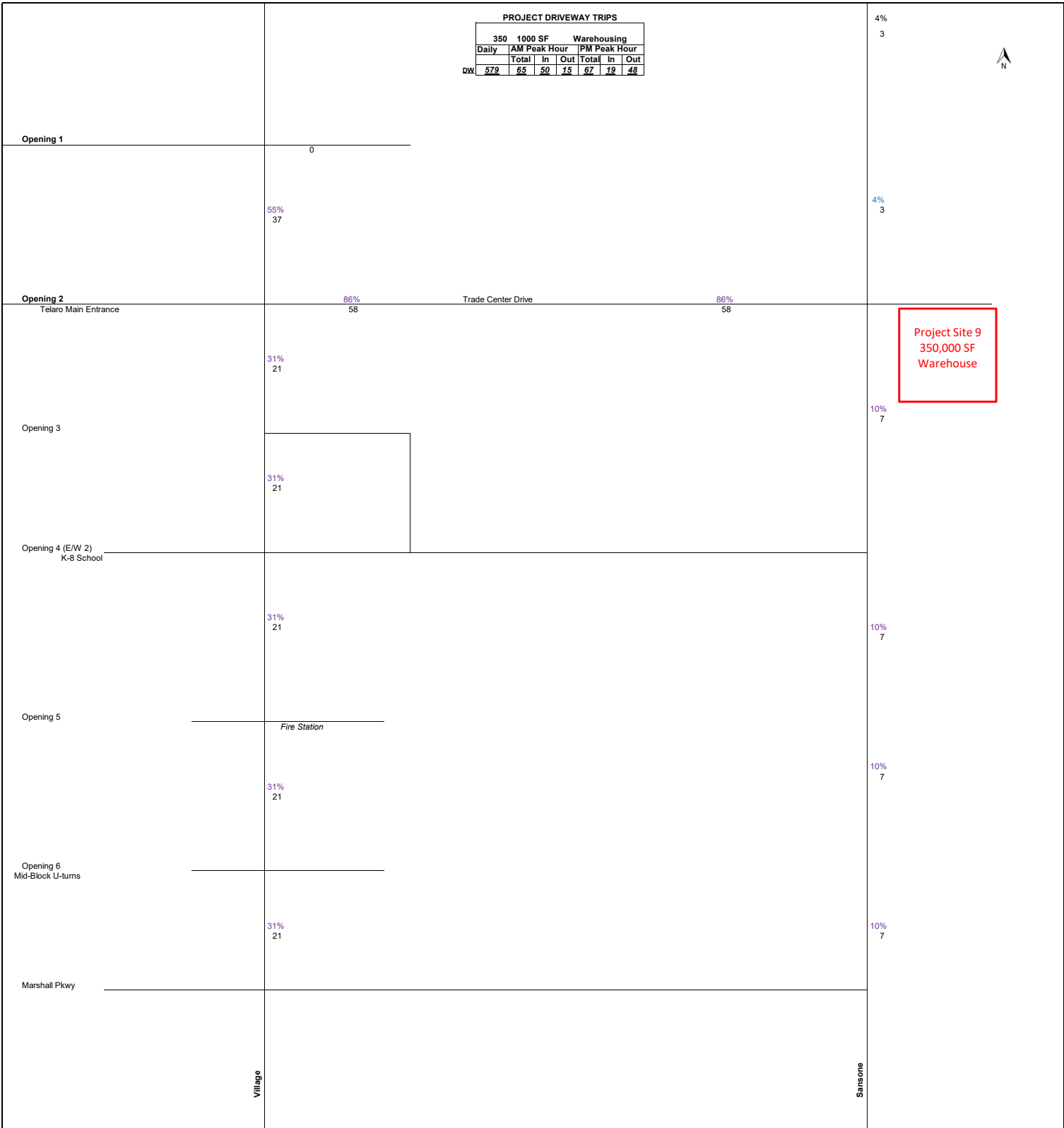


Southern Grove & Western Grove Signals Study  
ESTIMATED DAILY DRIVEWAY VOLUMES  
AREA 8  
EXHIBIT 3 SHEET 12 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS							
Daily	350 1000 SF			Warehousing			
	Total	In	Out	Total	In	Out	
DW	579	65	50	15	67	19	48



Project Site 9  
350,000 SF  
Warehouse

Southern Grove & Western Grove Signals Study  
ESTIMATED DAILY DRIVEWAY VOLUMES  
AREA 9  
EXHIBIT 3 SHEET 13 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



**PROJECT DRIVEWAY TRIPS**

Daily	10 1000 SF General Office Building						
	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
DW	154	23	20	3	24	3	21
DW	89	25	20	5	28	8	20
<b>Total</b>	<b>223</b>	<b>48</b>	<b>40</b>	<b>8</b>	<b>52</b>	<b>11</b>	<b>41</b>

Office  
Warehousing

4%  
2



Opening 1

0

55%  
29

4%  
2

Opening 2

86%

Trade Center Drive

86%

Telaro Main Entrance

45

45

31%  
16

Project Site 10  
10,000 SF office  
20,000 SF  
warehouse

10%  
5

Opening 3

31%  
16

Opening 4 (E/W 2)  
K-8 School

31%  
16

10%  
5

Opening 5

Fire Station

31%  
16

10%  
5

Opening 6  
Mid-Block U-turns

31%  
16

10%  
5

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

AREA 10

EXHIBIT 3 SHEET 14 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.



PROJECT DRIVEWAY TRIPS							
34.224		1000 SF		Specialty Trade Contractor			
Daily	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
DW	329	56	47	15	65	21	44

4%  
3



Opening 1

0

55%  
36

4%  
3

Opening 2  
Telaro Main Entrance

55%  
36

Trade Center Drive

55%  
36

Opening 3



0

Project Site 11  
34.224 SF  
Specialty Trade Contractor

100%  
65

Opening 4 (E/W 2)  
K-8 School

31%  
20

31%  
20

31%  
20

10%  
7

Opening 5  
Fire Station

31%  
20

10%  
7

Opening 6  
Mid-Block U-turns

31%  
20

10%  
7

Marshall Pkwy

Village

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

AREA 11

EXHIBIT 3 SHEET 15 OF 23

XXX

Total daily driveway trips

XXX

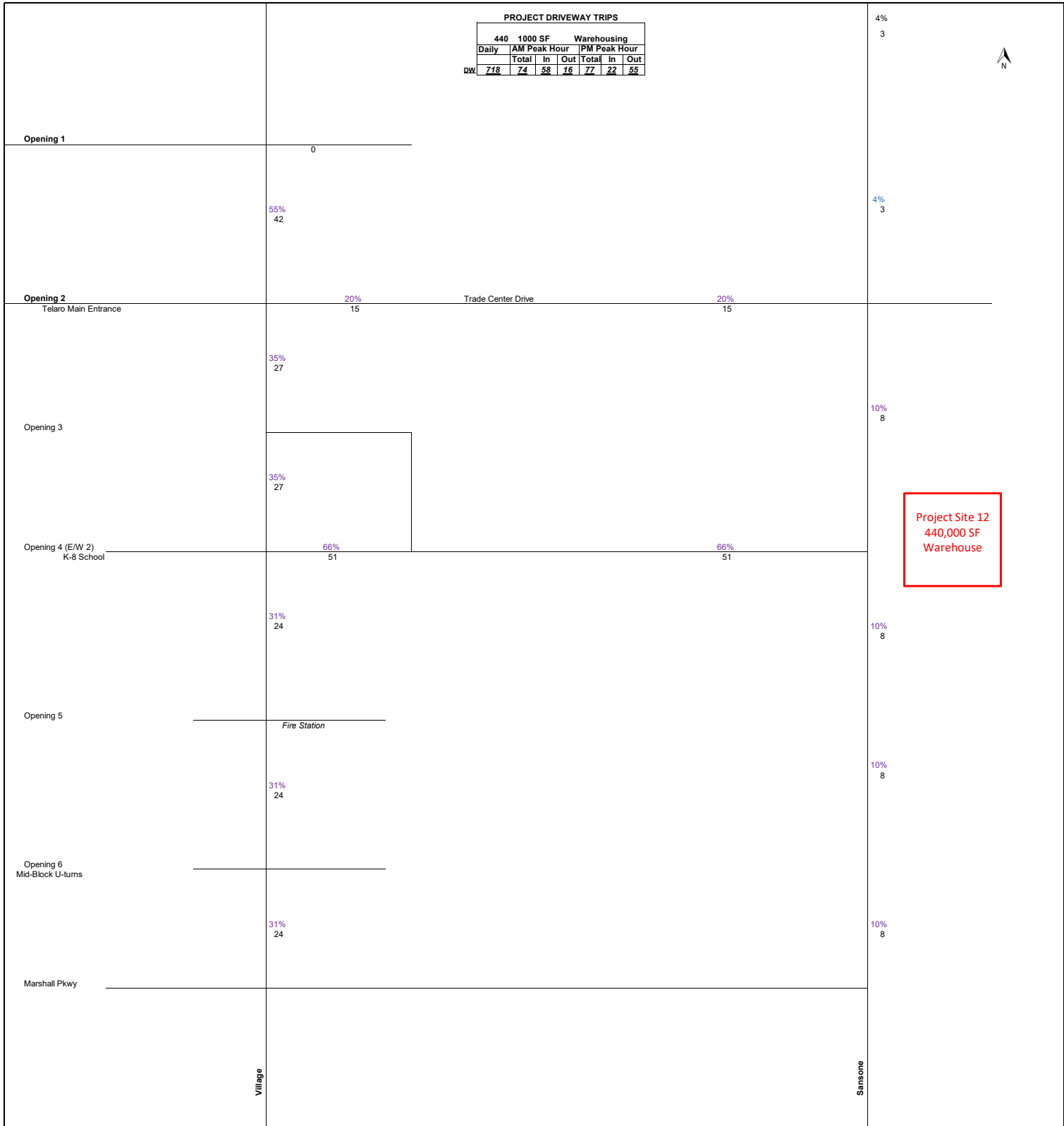
PM peak hour trips

XXX

AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS							
Daily	440 1000 SF			Warehousing			
	AM Peak Hour	PM Peak Hour		AM Peak Hour		PM Peak Hour	
Total	In	Out	Total	In	Out	Total	Out
DW 718	74	58	16	77	22	55	



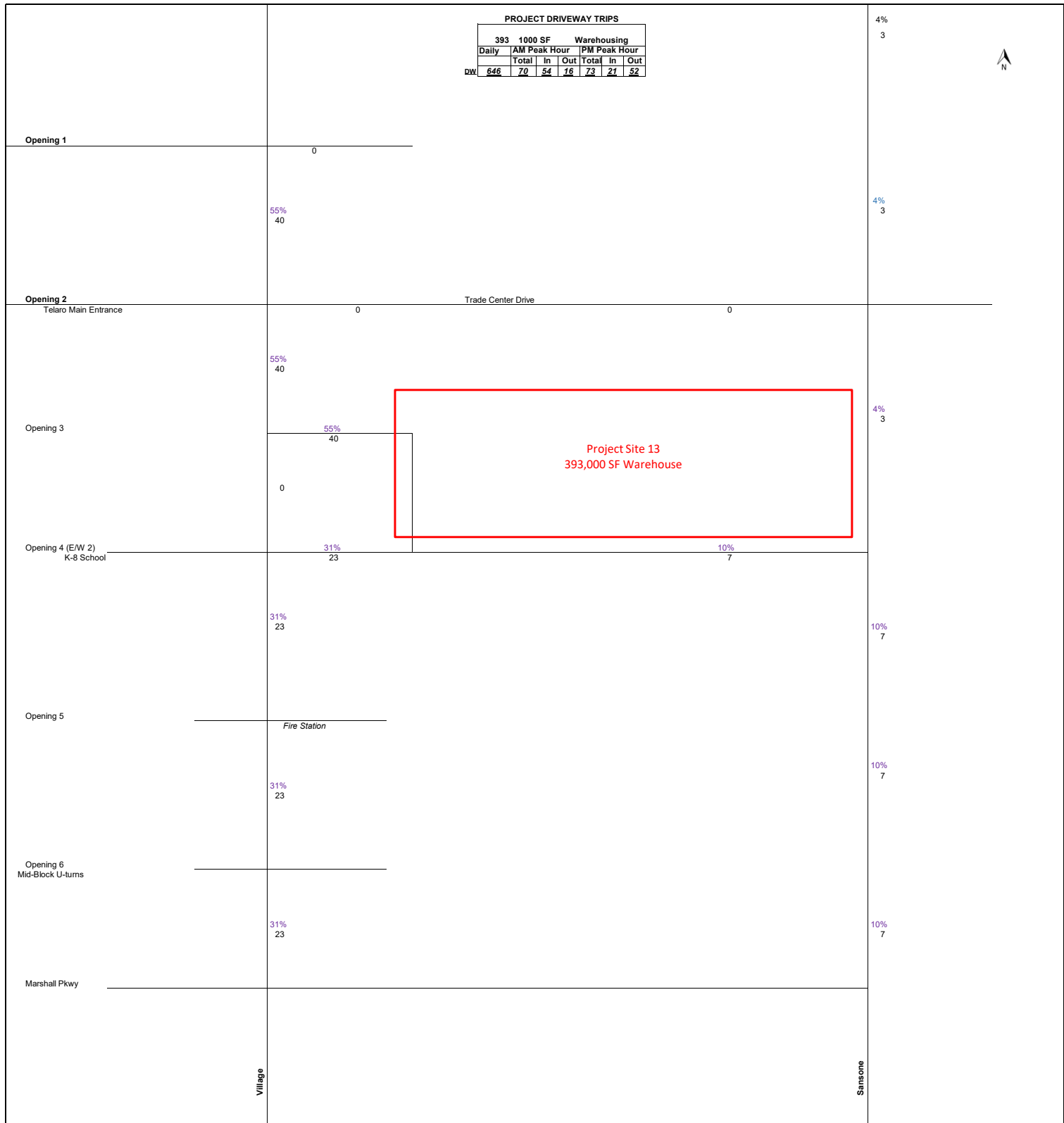
Project Site 12  
440,000 SF  
Warehouse

Southern Grove & Western Grove Signals Study  
ESTIMATED DAILY DRIVEWAY VOLUMES  
AREA 12  
EXHIBIT 3 SHEET 16 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips

MacKenzie  
Engineering & Planning, Inc.

PROJECT DRIVEWAY TRIPS							
Daily	393 1000 SF			Warehousing			
	AM Peak Hour	Total		PM Peak Hour	Total		
	In	Out	In	Out	In	Out	
DW	646	70	54	16	73	21	52

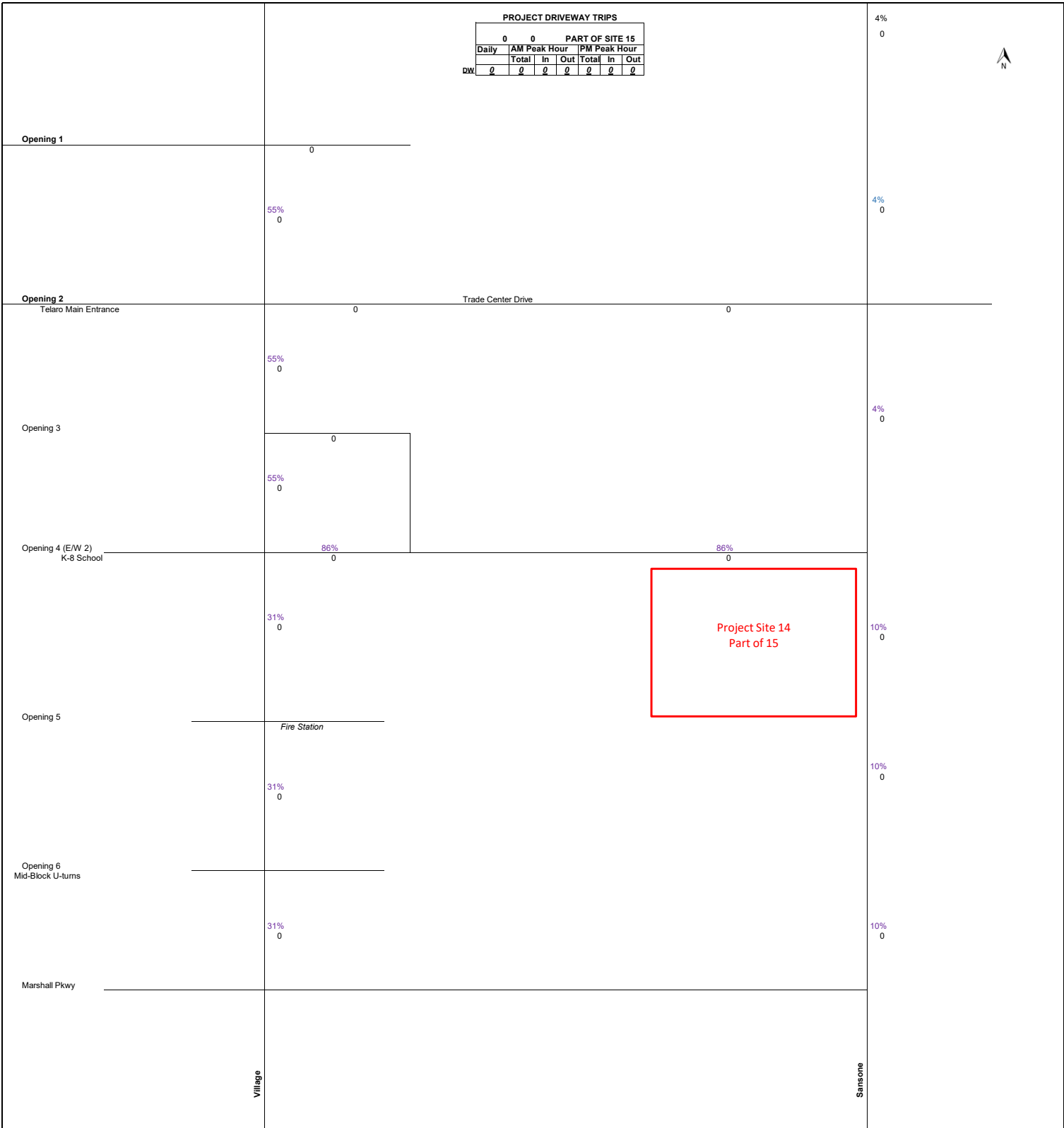


Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 13  
 EXHIBIT 3 SHEET 17 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS							
0				PART OF SITE 15			
Daily		AM Peak Hour		PM Peak Hour			
Total	In	Out	Total	In	Out	Total	In
0	0	0	0	0	0	0	0

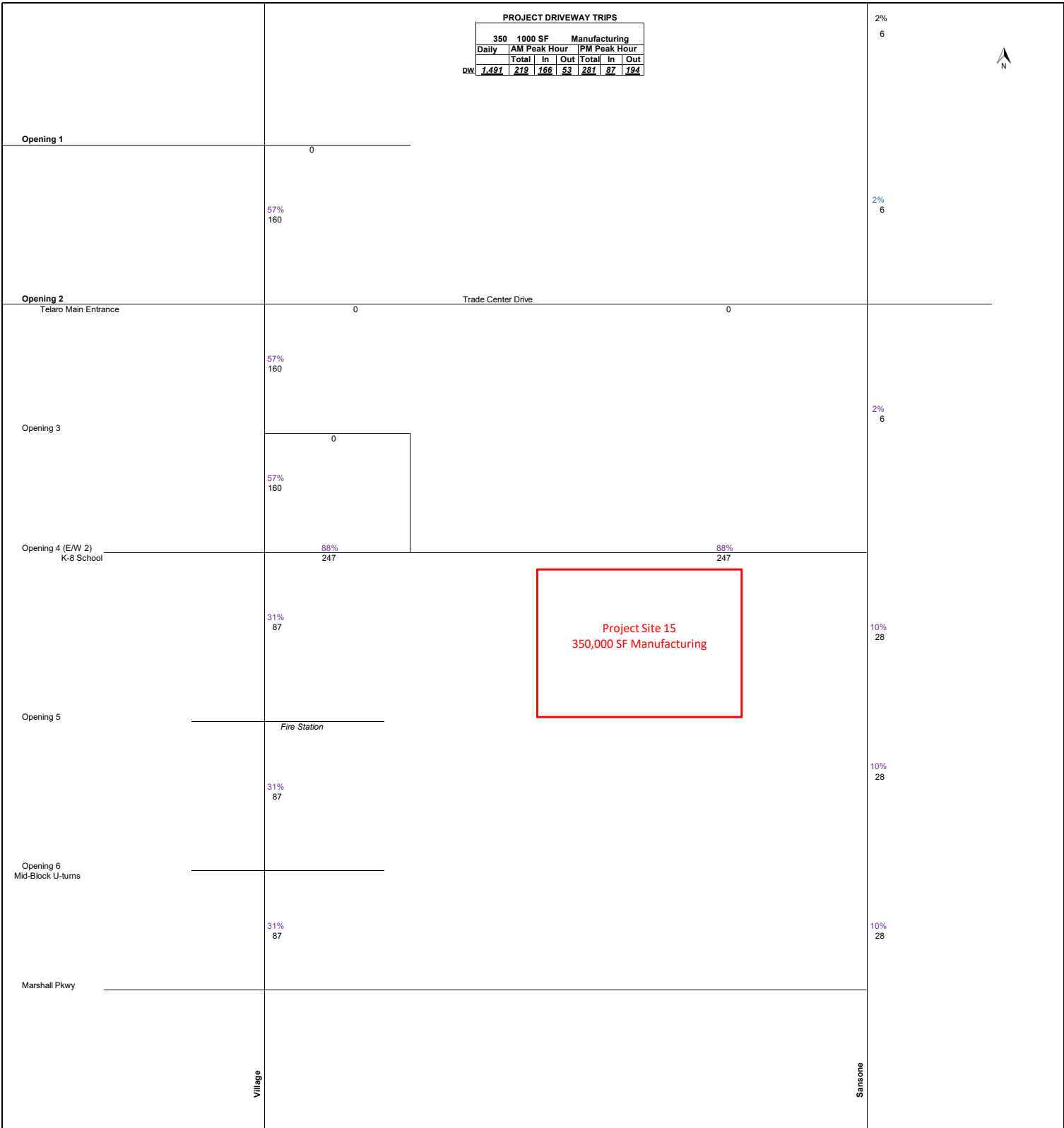


Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 14  
 EXHIBIT 3 SHEET 18 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS							
Daily	350 1000 SF		Manufacturing		Manufacturing		
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
	Total	In	Out	Total	In	Out	
DW	1,491	219	166	53	281	87	194

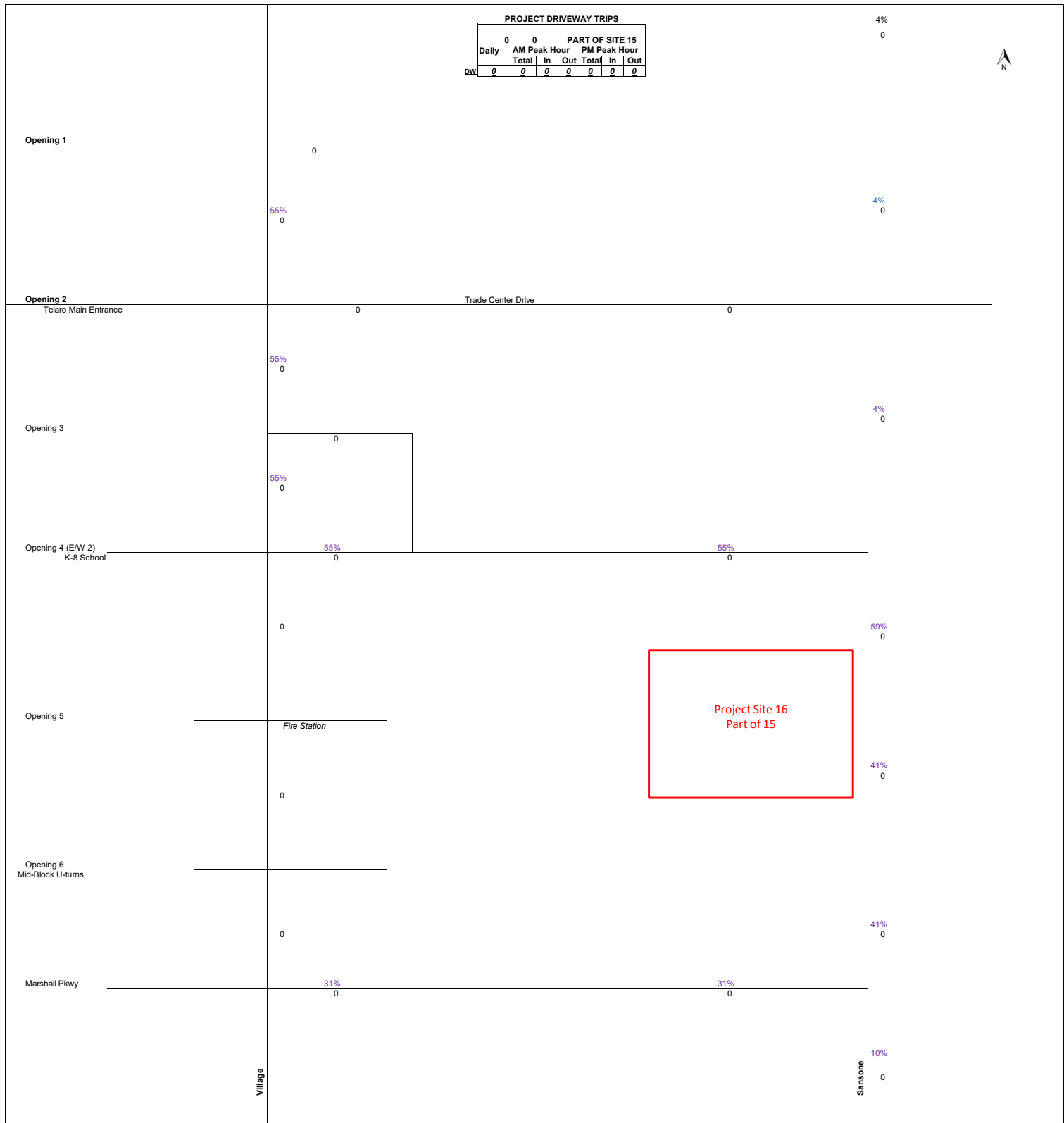


Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 15  
 EXHIBIT 3 SHEET 19 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS						
0		0		PART OF SITE 15		
Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out
DW	0	0	0	0	0	0

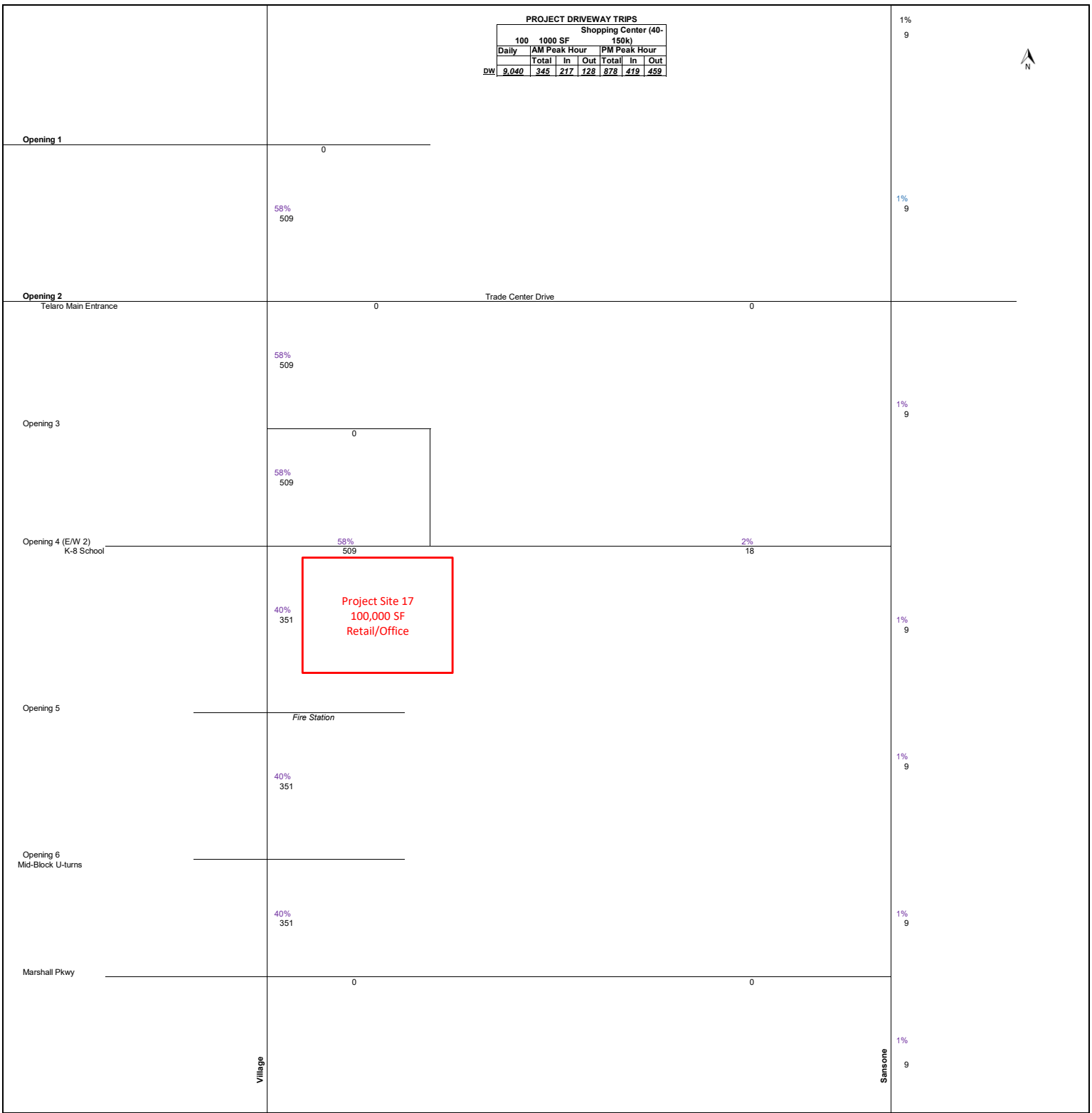


Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 16  
 EXHIBIT 3 SHEET 20 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS							
Daily	100 1000 SF			Shopping Center (40-150k)			
	AM Peak Hour	Hour		PM Peak Hour	Hour		
	Total	In	Out	Total	In	Out	
DW	9,040	345	217	128	878	419	459



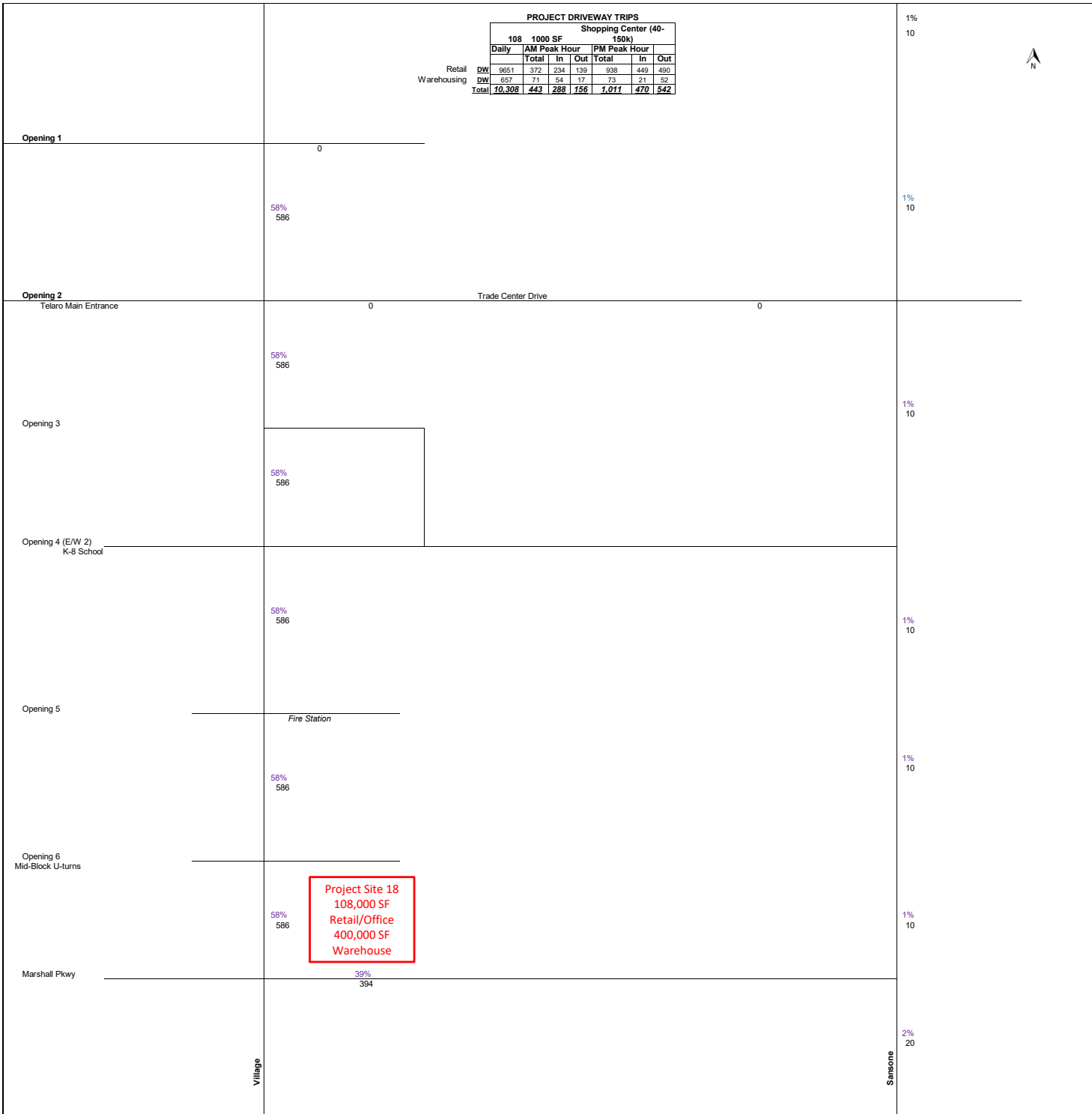
Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 17  
 EXHIBIT 3 SHEET 21 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips



PROJECT DRIVEWAY TRIPS

		108 1000 SF		Shopping Center (40-150k)				
Daily		AM Peak Hour		PM Peak Hour				
		Total	In	Out	Total	In	Out	
Retail	DW	9651	372	234	139	938	449	490
Warehousing	DW	657	71	54	17	73	21	52
<b>Total</b>		<b>10,308</b>	<b>443</b>	<b>288</b>	<b>156</b>	<b>1,011</b>	<b>470</b>	<b>542</b>



Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

AREA 18

EXHIBIT 3 SHEET 22 OF 23

XXX

Total daily driveway trips

XXX

PM peak hour trips

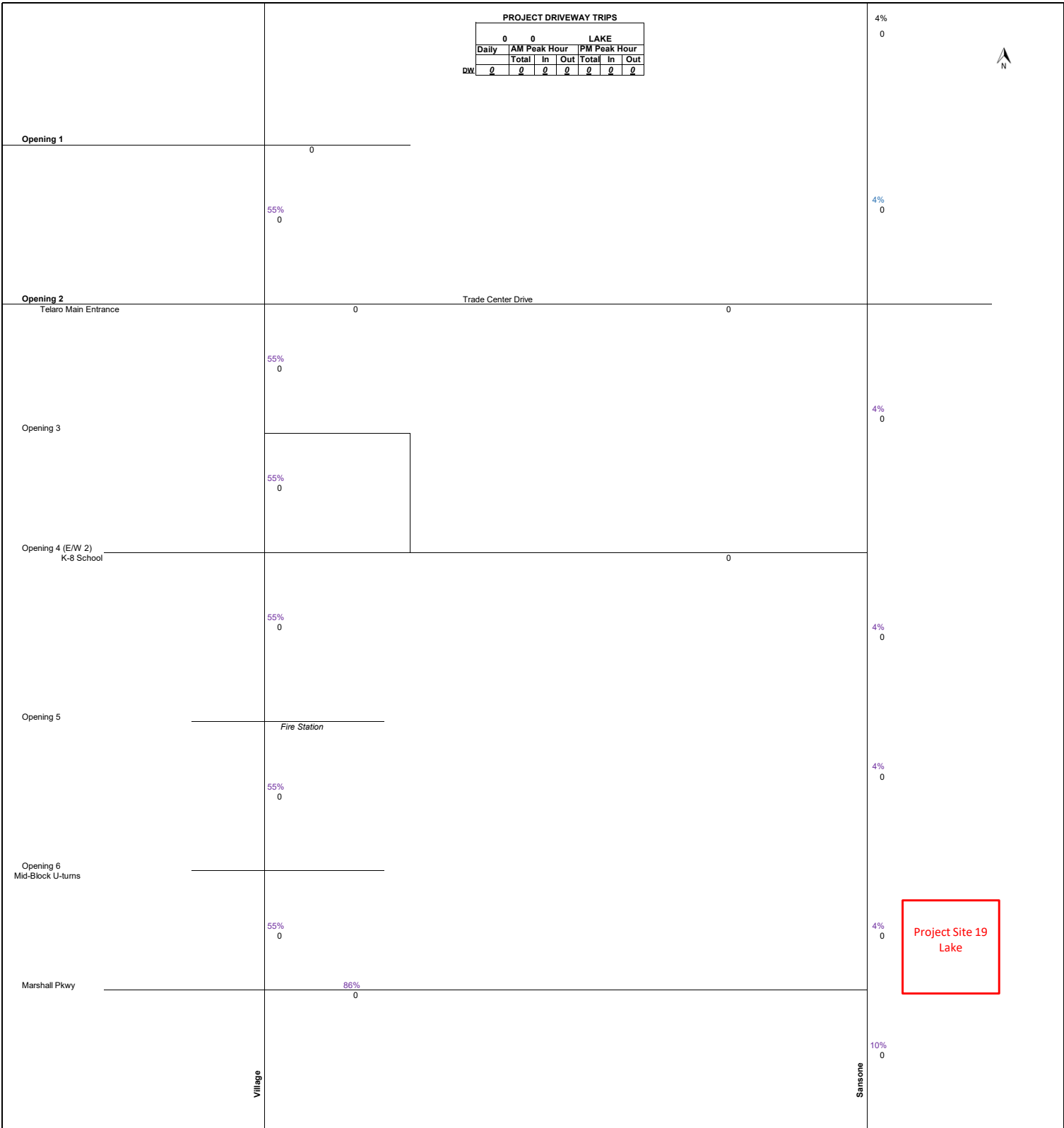
XXX

AM peak hour trips





PROJECT DRIVEWAY TRIPS								
0				LAKE				
Daily	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Total	In	Out	Total	In	Out	Total	Out
DW	0	0	0	0	0	0	0	0



Southern Grove & Western Grove Signals Study  
**ESTIMATED DAILY DRIVEWAY VOLUMES**  
 AREA 19  
 EXHIBIT 3 SHEET 23 OF 23

XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips

 MacKenzie  
 Engineering & Planning, Inc.



Opening 1

No Access West



Signal Not recommended  
Convert to Directional Median Opening if necessary

285

Trade Center Drive & Village Parkway			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
Telaro	71	16.40%	\$82,000
Parcel 2	37	8.55%	\$42,750
Parcel 5	64	14.79%	\$73,950
Parcel 6	44	10.18%	\$50,800
Parcel 8	63	14.55%	\$72,750
Parcel 9	58	13.39%	\$66,950
Parcel 10	45	10.39%	\$51,950
Parcel 11	36	8.31%	\$41,550
Parcel 12	15	3.46%	\$17,300
<b>Total</b>	<b>433</b>	<b>100%</b>	<b>500,000</b>

Opening 2

Telaro Main Entrance

71



362

334

177

Opening 3

71



Result TWSC

40

Opening 4 (E/W 2)  
K-8 School

336



850

343

Signal at E/W 2 & Village Parkway			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
SLCSB	336	28.3%	\$141,500
Parcel 11	20	1.7%	\$8,500
Parcel 12	51	4.3%	\$21,500
Parcel 13	23	1.9%	\$9,500
Parcel 14			
Parcel 15	247	20.9%	\$104,500
Parcel 16			
Parcel 17	509	42.9%	\$214,500
<b>Total</b>	<b>1,186</b>	<b>100%</b>	<b>500,000</b>

Opening 5



Fire Station Only Signal

Opening 6  
Mid-Block U-turns



Keep as Directional Opening

Signal at Marshall Pkwy & Village Pkwy			
Parcel	Peak Hour	% of Total	Share of Signal Cost
W. of Village	799	57.7%	\$288,500
Area 2 N. of Marshall	394	28.4%	\$142,000
Legacy Park	192	13.9%	\$69,500
<b>Total</b>	<b>1,385</b>	<b>100%</b>	<b>500,000</b>

Marshall Pkwy

799



586

169

137

137

Sansone

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

TOTAL  
EXHIBIT 8



XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips

## Exhibit 4A - Sansone PUD Trip Generation Summary

### Southern Grove Signals Study

Land Use	Intensity		Daily Trips	AM Peak Hour			PM Peak Hour			
				Total	In	Out	Total	In	Out	
<b>Proposed Site Traffic</b>										
Warehousing Totals	5,502.000	1000 SF	9,113	919	708	211	951	268	683	
Shopping Center (>150k)	350.000	1000 SF	15,002	340	211	129	1,391	668	723	
Multi-family Housing (Low-rise)	600	DU	3,996	232	56	176	300	190	110	
Subtotal			28,111	1,491	975	516	2,642	1,126	1,516	
<b>Internal Capture</b>										
	AM	PM	DAILY							
Warehousing	1.3%	4.1%	4.7%	427	12	7	5	39	24	15
Shopping Center (>150k)	12.1%	9.1%	10.7%	1,609	41	23	18	127	52	75
Multi-family Housing (Low-rise)	15.9%	32.0%	32.2%	1,286	37	15	22	96	55	41
Subtotal	6.0%	9.9%	11.8%	3,322	90	45	45	262	131	131
<b>Pass-By Traffic</b>										
	AM	PM								
Warehousing	0.0%	0.0%	0	0	0	0	0	0	0	
Shopping Center (>150k)	19.0%	19.0%	2,545	57	36	21	240	117	123	
Multi-family Housing (Low-rise)	0.0%	0.0%	0	0	0	0	0	0	0	
Subtotal			2,545	57	36	21	240	117	123	
<b>NET PROPOSED TRIPS</b>			<b>22,244</b>	<b>1,344</b>	<b>894</b>	<b>450</b>	<b>2,140</b>	<b>878</b>	<b>1,262</b>	
<b>Total Proposed Driveway Volumes</b>			<b>28,111</b>	<b>1,491</b>	<b>975</b>	<b>516</b>	<b>2,642</b>	<b>1,126</b>	<b>1,516</b>	
<b>NET CHANGE IN TRIPS (FOR THE PURPOSES OF CONCURRENCY)</b>			<b>22,244</b>	<b>1,344</b>	<b>894</b>	<b>450</b>	<b>2,140</b>	<b>878</b>	<b>1,262</b>	
<b>NET CHANGE IN DRIVEWAY VOLUMES</b>			<b>28,111</b>	<b>1,491</b>	<b>975</b>	<b>516</b>	<b>2,642</b>	<b>1,126</b>	<b>1,516</b>	

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Warehousing	150	1000 SF	$T = 1.58(X) + 38.29$	0%	77/23	$T = 0.12(X) + 23.62$	28/72	$T = 0.12(X) + 26.48$
Shopping Center (>150k)	820	1000 SF	$T = 26.11(X) + 5863.73$	19%	62/38	$T = 0.59(X) + 133.55$	48/52	$\ln(T) = 0.72 \ln(X) + 3.02$
Multi-family Housing (Low-rise)	220	DU	$T = 6.41(X) + 75.31$	0%	24/76	$T = 0.31(X) + 22.85$	63/37	$T = 0.43(X) + 20.55$

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**Exhibit 4B - Sansone PUD Warehouse Trip Generation - Driveway**

**Southern Grove Signals Study**

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour			
			Total	In	Out	Total	In	Out	
<b>Proposed Driveway Traffic</b>									
1 Warehousing	168.000 1000 SF	304	44	34	10	47	13	34	
2 Warehousing	250.000 1000 SF	433	54	42	12	56	16	40	
3 Warehousing	245.000 1000 SF	425	53	41	12	56	16	40	
4 Warehousing	520.000 1000 SF	860	86	66	20	89	25	64	
5 Warehousing	665.000 1000 SF	1,089	103	79	24	106	30	76	
6 Warehousing	220.000 1000 SF	386	50	39	11	53	15	38	
7 Warehousing	220.000 1000 SF	386	50	39	11	53	15	38	
8 Warehousing	1,240.000 1000 SF	1,997	172	132	40	175	49	126	
9 Warehousing	1,240.000 1000 SF	1,997	172	132	40	175	49	126	
10 Warehousing	572.000 1000 SF	942	92	71	21	95	27	68	
11 Warehousing	162.000 1000 SF	294	43	33	10	46	13	33	
<b>Total Proposed Driveway Volumes</b>	<b>5,502.000</b>	<b>9,113</b>	<b>919</b>	<b>708</b>	<b>211</b>	<b>951</b>	<b>268</b>	<b>683</b>	

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Warehousing	150	1000 SF	$T = 1.58(X) + 38.29$	0%	77/23	$T = 0.12(X) + 23.62$	28/72	$T = 0.12(X) + 26.48$

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**Exhibit 4C - Sansone PUD Warehouse Trip Generation - Net External**

**Southern Grove Signals Study**

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour			
			Total	In	Out	Total	In	Out	
<b>Proposed Driveway Traffic</b>									
1 Warehousing	168.000 1000 SF	291	44	34	10	46	12	34	
2 Warehousing	250.000 1000 SF	414	53	42	11	54	15	39	
3 Warehousing	245.000 1000 SF	406	52	41	11	54	15	39	
4 Warehousing	520.000 1000 SF	820	85	65	20	85	23	62	
5 Warehousing	665.000 1000 SF	1,037	102	78	24	101	27	74	
6 Warehousing	220.000 1000 SF	369	50	39	11	51	14	37	
7 Warehousing	220.000 1000 SF	369	50	39	11	51	14	37	
8 Warehousing	1,240.000 1000 SF	1,901	169	130	39	166	44	122	
9 Warehousing	1,240.000 1000 SF	1,901	169	130	39	166	44	122	
10 Warehousing	572.000 1000 SF	898	91	70	21	91	25	66	
11 Warehousing	162.000 1000 SF	281	43	33	10	45	12	33	
<b>Total Proposed Driveway Volumes</b>		<b>8,687</b>	<b>908</b>	<b>701</b>	<b>207</b>	<b>910</b>	<b>245</b>	<b>665</b>	

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Warehousing	150	1000 SF	$T = 1.58(X) + 38.29$	0%	77/23	$T = 0.12(X) + 23.62$	28/72	$T = 0.12(X) + 26.48$

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**Exhibit 4D - Sansone PUD Residential Trip Generation**

**Southern Grove Signals Study**

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>								
Multi-family Housing (Low-rise)	300 DU	1,998	116	28	88	150	95	55
Multi-family Housing (Low-rise)	300 DU	1,998	116	28	88	150	95	55
<b>NET CHANGE IN DRIVEWAY VOLUMES</b>		<b>3,996</b>	<b>232</b>	<b>56</b>	<b>176</b>	<b>300</b>	<b>190</b>	<b>110</b>

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Multi-family Housing (Low-rise)	220	DU	$T = 6.41(X) + 75.31$	0%	24/76	$T = 0.31(X) + 22.85$	63/37	$T = 0.43(X) + 20.55$

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## Exhibit 4E - South of Becker Road Trip Generation

### Southern Grove Signals Study

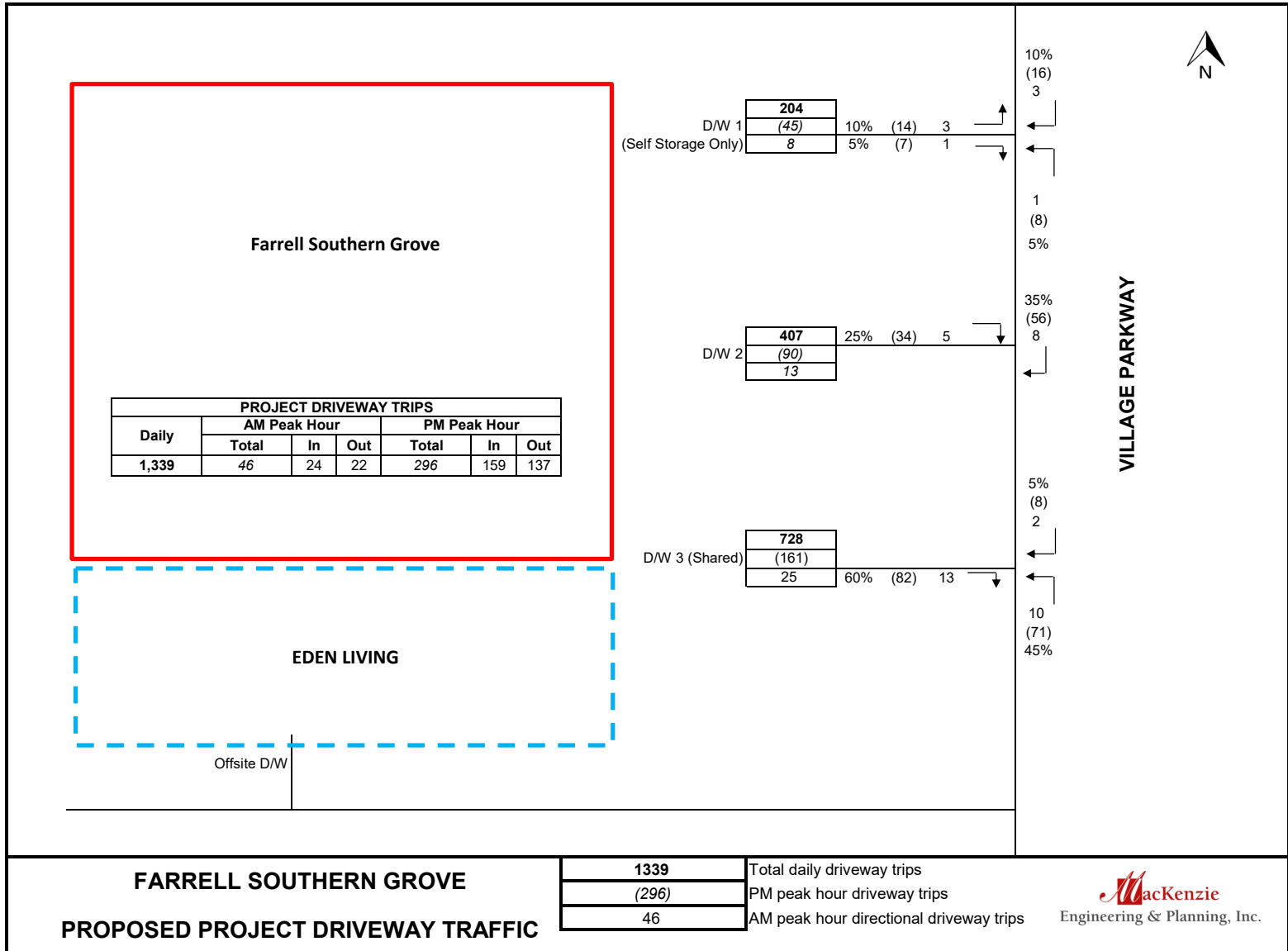
Land Use	Intensity		Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>									
Congregate Care Facility	400 DU		909	33	19	14	67	33	34
Shopping Center (>150k)	308.000 1000 SF		13,906	315	195	120	1,269	609	660
Subtotal			14,815	348	214	134	1,336	642	694
<b>Pass-By Traffic</b>									
	AM	PM							
Congregate Care Facility	0.0%	0.0%	0	0	0	0	0	0	0
Shopping Center (>150k)	19.0%	19.0%	2,642	53	34	19	223	105	118
Subtotal			2,642	53	34	19	223	105	118
<b>NET PROPOSED TRIPS</b>			<b>12,173</b>	<b>258</b>	<b>165</b>	<b>93</b>	<b>1,017</b>	<b>482</b>	<b>535</b>
<b>Total Proposed Driveway Volumes</b>			<b>14,815</b>	<b>348</b>	<b>214</b>	<b>134</b>	<b>1,336</b>	<b>642</b>	<b>694</b>
<b>NET CHANGE IN TRIPS (FOR THE PURPOSES OF CONCURRENCY)</b>			<b>12,173</b>	<b>258</b>	<b>165</b>	<b>93</b>	<b>1,017</b>	<b>482</b>	<b>535</b>
<b>NET CHANGE IN DRIVEWAY VOLUMES</b>			<b>14,815</b>	<b>348</b>	<b>214</b>	<b>134</b>	<b>1,336</b>	<b>642</b>	<b>694</b>

Note: Trip generation was calculated using the following data:

Land Use	ITE		Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
	Code	Unit			in/out	Rate	in/out	Equation
Congregate Care Facility	253	DU	$T = 2.33(X) - 22.53$	0%	58/42	$T = 0.08(X) + 1.11$	49/51	$T = 0.16(X) + 2.67$
Shopping Center (>150k)	820	1000 SF	$T = 26.11(X) + 5863.73$	19%	62/38	$T = 0.59(X) + 133.55$	48/52	$\ln(T) = 0.72 \ln(X) + 3.02$

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## EXHIBIT 4F EDEN MULFTI-FAMILY & FARRELL SOUTHERN GROVE





**EXHIBIT 4F**



Farrel Southern Grove

**EDEN LIVING**

**PROJECT DRIVEWAY TRIPS**

Daily	AM Peak Hour			PM Peak Hour		
	Total	In	Out	Total	In	Out
1,575	95	23	72	121	76	45

D/W 3 (Shared)

638
(49)
38

30%  
(23)  
7

40% (18) 29

2  
(8)  
10%

**Village  
Parkway**

Offsite D/W

**Paar Drive**

60%  
(73)

**EDEN LIVING COMMITTED TRAFFIC**

<b>1,575</b>	Total daily driveway trips
<b>(121)</b>	PM peak hour driveway trips
<b>95</b>	AM peak hour directional driveway trips

# EXHIBIT 4G

SG 8B (North)

## TRIP GENERATION

Land Use	Intensity		Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>									
Business Park	216.000	1000 SF	3,010	282	175	107	287	138	149
Note: Trip generation was calculated using the following data:									
Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour		
					in/out	Rate	in/out	Equation	
Business Park	770	1000 SF	$T = 10.62 (X) + 715.67$	0%	62/38	$\ln(T) = 0.94 \ln(X) + 0.59$	48/52	$\ln(T) = 0.88 \ln(X) + 0.93$	

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# EXHIBIT 4G

SG 8B (South)

## TRIP GENERATION

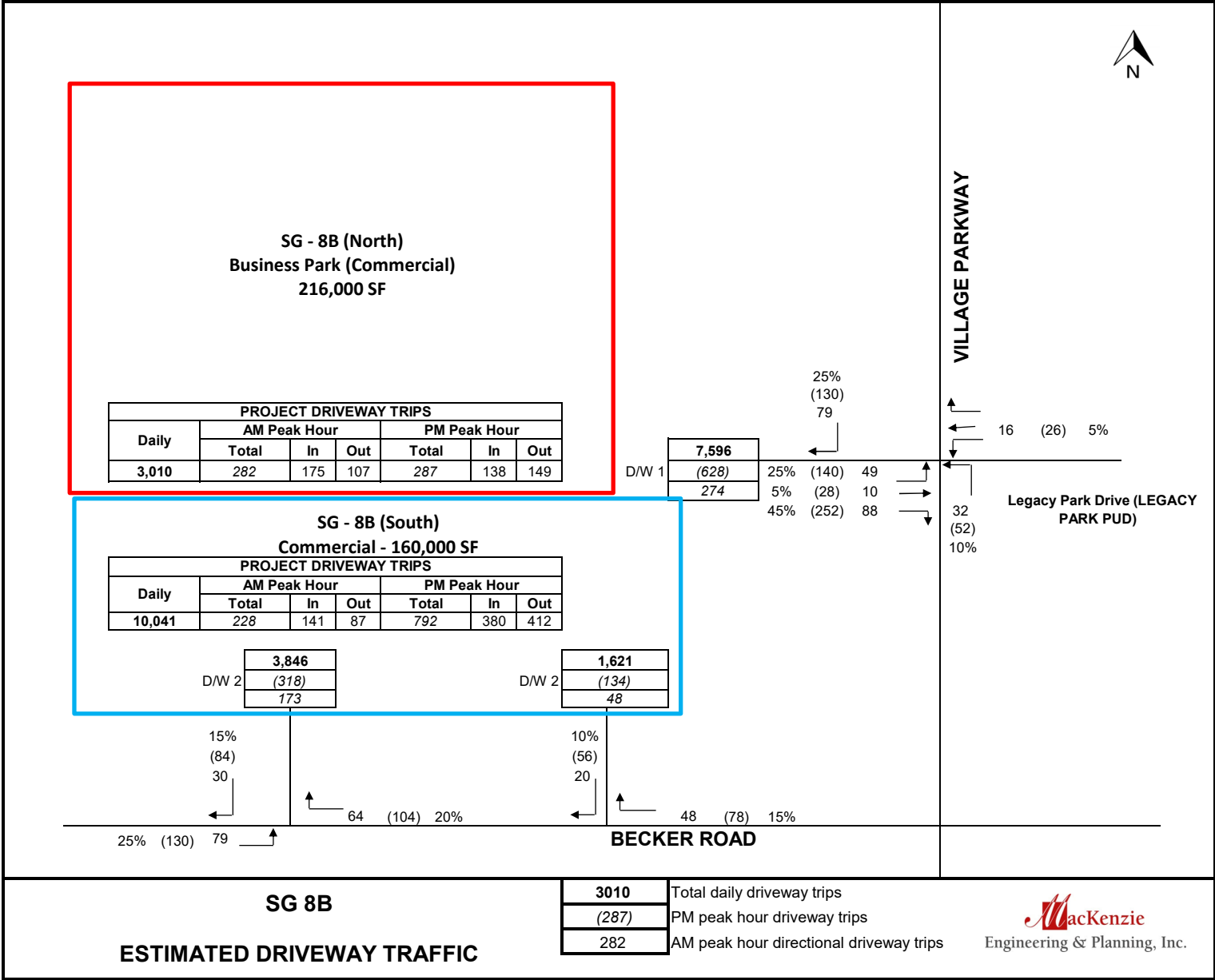
Land Use	Intensity		Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>									
Shopping Center	160.000	1000 SF	10,041	228	141	87	792	380	412
<b>Pass-By Traffic</b>									
Shopping Center	29.0%		2,912	66	41	25	230	110	120
<i>Net Proposed Trips</i>			<b>7,129</b>	<b>162</b>	<b>100</b>	<b>62</b>	<b>562</b>	<b>270</b>	<b>292</b>
<b>Total Proposed Driveway Volumes</b>			<b>10,041</b>	<b>228</b>	<b>141</b>	<b>87</b>	<b>792</b>	<b>380</b>	<b>412</b>

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Shopping Center	820	1000 SF	$T = 26.11 (X) + 5863.73$	29%	62/38	$T = 0.59 (X) + 133.55$	48/52	$\ln(T) = 0.72 \ln(X) + 3.02$

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# EXHIBIT 4G



**Exhibit 4H**  
**Trip Generation - Net External Trips (Concurrency)**  
**Kenley**

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
<b>Proposed Use</b> Single Family Detached	220 DU	2,084	153	40	113	209	132	77
<b>NET CHANGE IN TRIPS (FOR THE PURPOSES OF CONCURRENCY)</b>		<b>2,084</b>	<b>153</b>	<b>40</b>	<b>113</b>	<b>209</b>	<b>132</b>	<b>77</b>

Note: Trip generation was calculated using the following data:

Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Single Family Detached	210	DU	$\ln(T) = 0.92 \ln(X) + 2.68$	0%	26/74	$\ln(T) = 0.91 \ln(X) + 0.12$	63/37	$\ln(T) = 0.94 \ln(X) + 0.27$

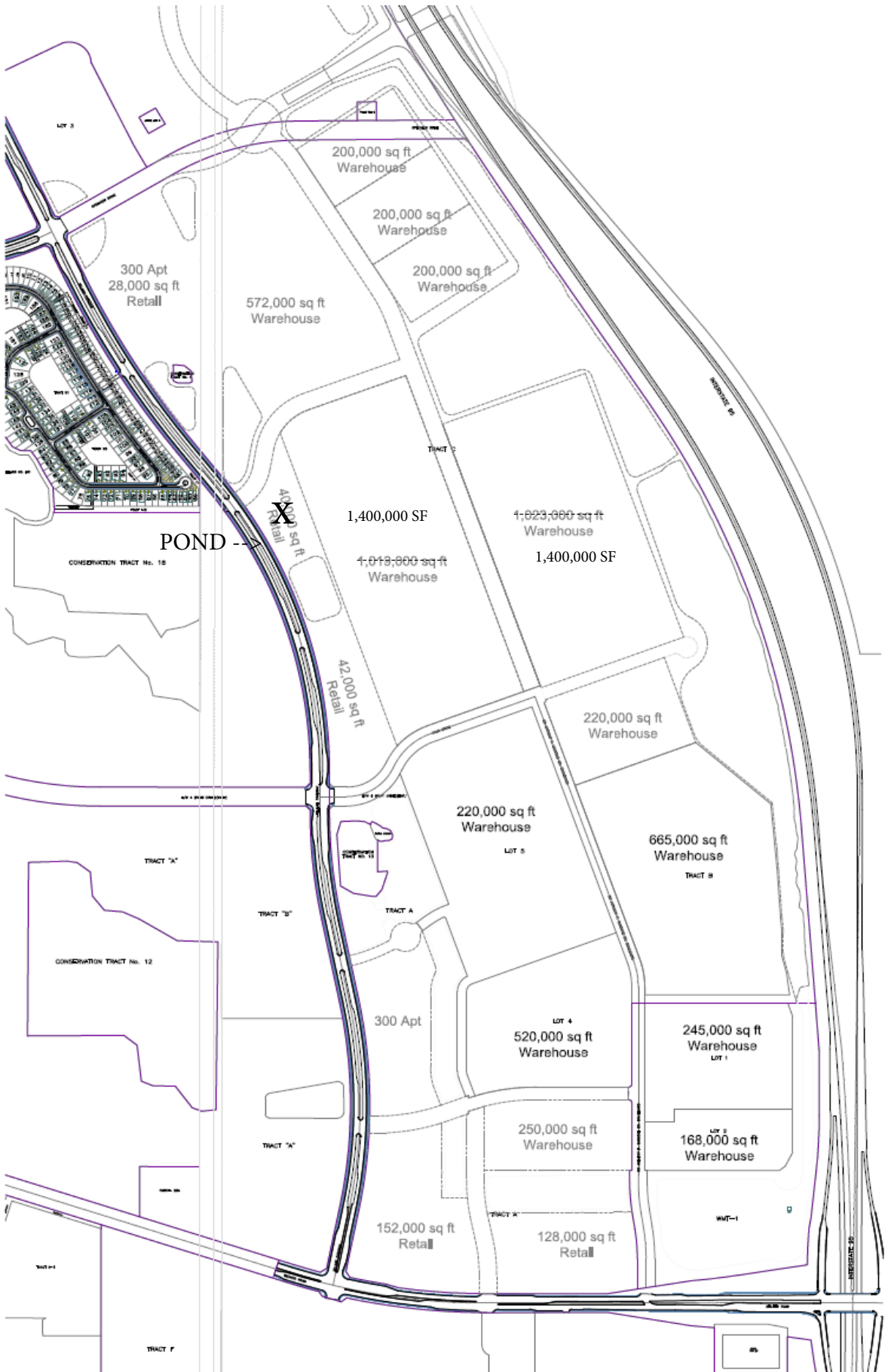
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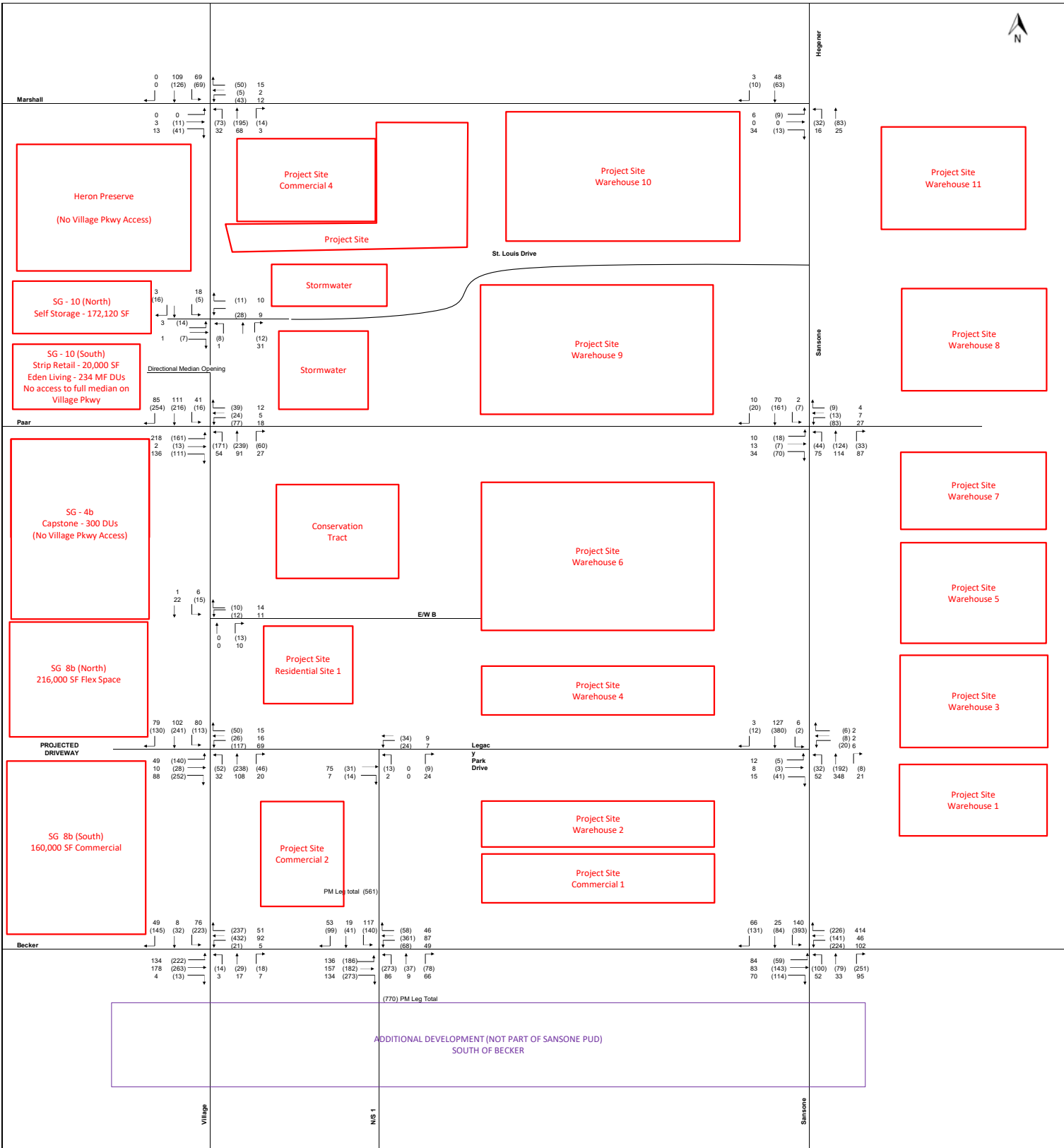
**EXHIBIT 4I  
CAPSTONE  
TRIP GENERATION**

Land Use	Intensity	Daily Trips	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
<b>Proposed Site Traffic</b>								
Single Family Detached	286 DU	2,734	208	52	156	279	176	103
Note: Trip generation was calculated using the following data:								
Land Use	ITE Code	Unit	Daily Rate	Pass-by Rate	AM Peak Hour		PM Peak Hour	
					in/out	Rate	in/out	Equation
Single Family Detached	210	DU	$\ln(T) = 0.92 \ln(X) + 2.71$	0%	25/75	$T = 0.71 (X) + 4.8$	63/37	$\ln(T) = 0.96 \ln(X) + 0.2$

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# EXHIBIT 5 - AREA 3 USE MAP





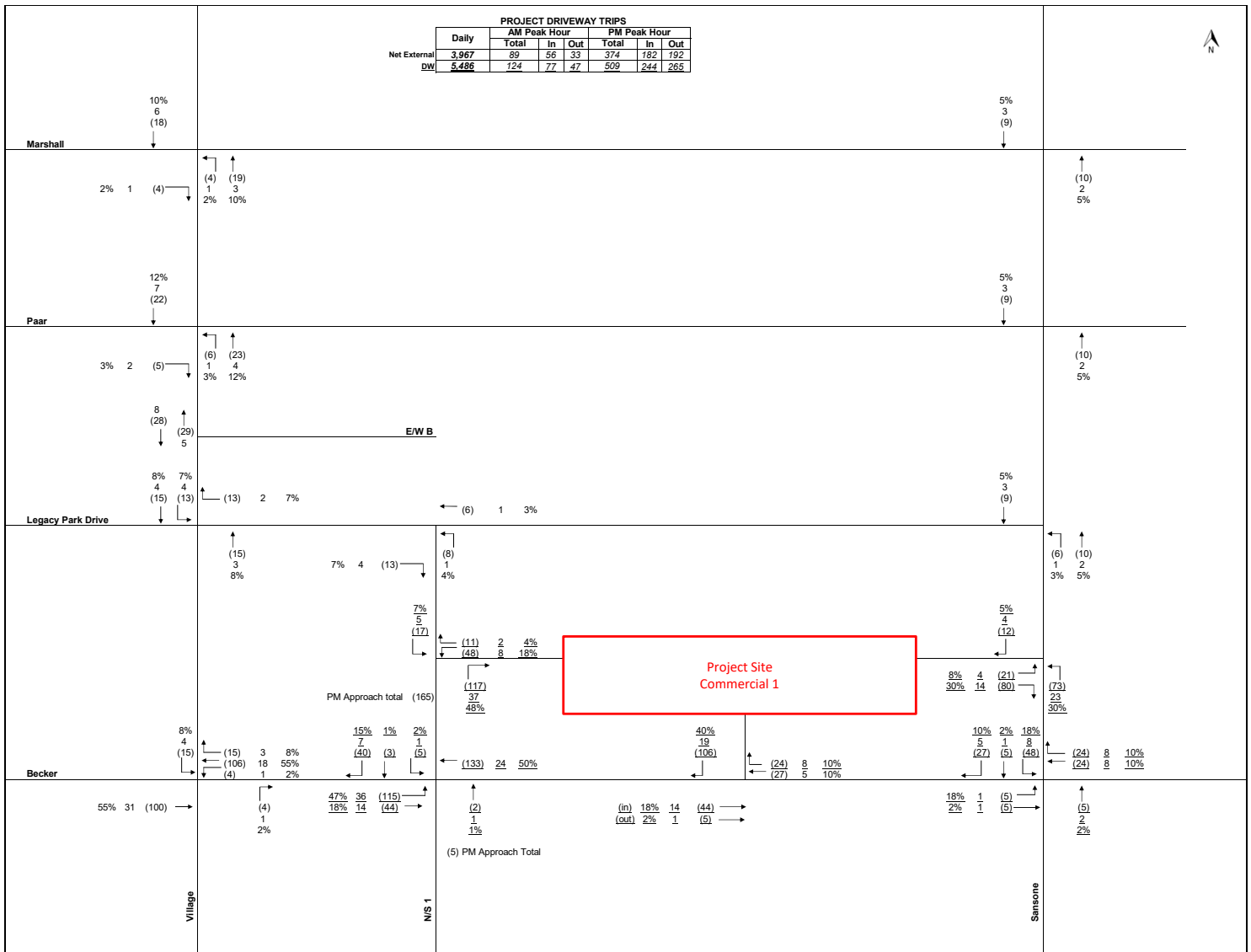
Southern Grove Traffic Signal Study  
**PROPOSED PROJECT + SOUTH OF BECKER VOLUMES**  
 TOTAL USE  
 EXHIBIT 6 SHEET 1 OF 23

<b>42,926</b>	Total daily driveway trips
<b>(3,978)</b>	PM peak hour trips
<b>1,839</b>	AM peak hour trips





Daily	PROJECT DRIVEWAY TRIPS						
	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
3,967	89	56	33	374	182	192	
Net External DW	5,486	124	77	47	509	244	265



**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**COMMERCIAL 1**  
**EXHIBIT 6 SHEET 2 OF 23**

<b>3,967</b>	Total daily driveway trips
<b>(374)</b>	PM peak hour trips
<b>89</b>	AM peak hour trips
<b>(509) / 124</b>	Includes IC & pass-by trips



	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
Adjustment Trips	4,216	373	190	183	300	157	143



Marshall

Paar

E/W B

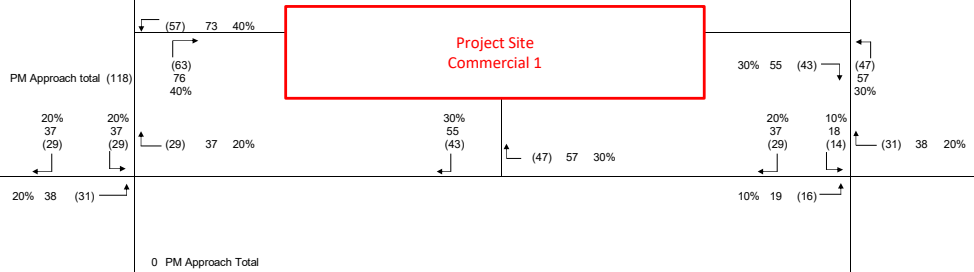
Legacy Park Drive

Becker

Village

MS 1

Sansone



Southern Grove Traffic Signal Study

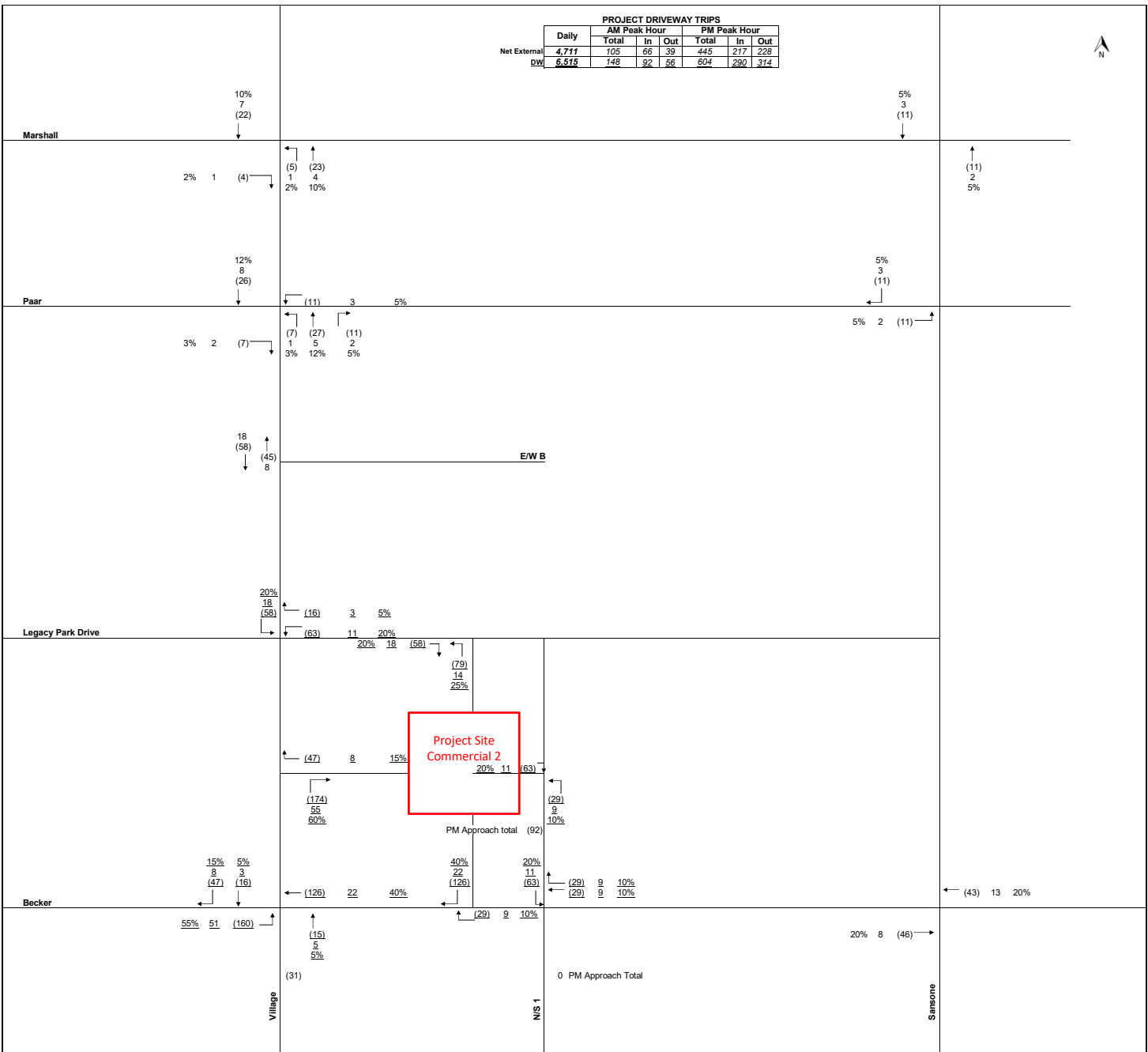
PASS-BY DRIVEWAY VOLUMES  
COMMERCIAL 1

EXHIBIT 6 SHEET 3 OF 23

4,216	Total daily driveway trips
(300)	PM peak hour trips
373	AM peak hour trips



Daily	PROJECT DRIVEWAY TRIPS					
	AM Peak Hour			PM Peak Hour		
	Total	In	Out	Total	In	Out
4,711	105	66	39	445	217	228
<b>6,618</b>	<b>148</b>	<b>92</b>	<b>56</b>	<b>604</b>	<b>290</b>	<b>314</b>



Southern Grove Traffic Signal Study  
 PROPOSED PROJECT DRIVEWAY VOLUMES  
 COMMERCIAL 2

EXHIBIT 6 SHEET 4 OF 23

<b>4,711</b>	Total daily driveway trips
<b>(445)</b>	PM peak hour trips
<b>105</b>	AM peak hour trips
<b>(604) / 148</b>	Includes IC & pass-by trips



Daily	PROJECT DRIVEWAY TRIPS						
	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
Adjustment Trips	2,642	250	128	122	200	103	97



Marshall

Paar

E/W B

Legacy Park Drive

30%  
38  
(31)

(29) 37 30% 38 (31)

Project Site  
Commercial 2

(19) 24 20% 30% 38 (31)

(21) 26 20% (31) 38 30%

PM Approach total (60)

20% 30%  
24 37  
(19) (29)

Becker

(21) 26 20%

30% 38 (31)

Village

MS-1

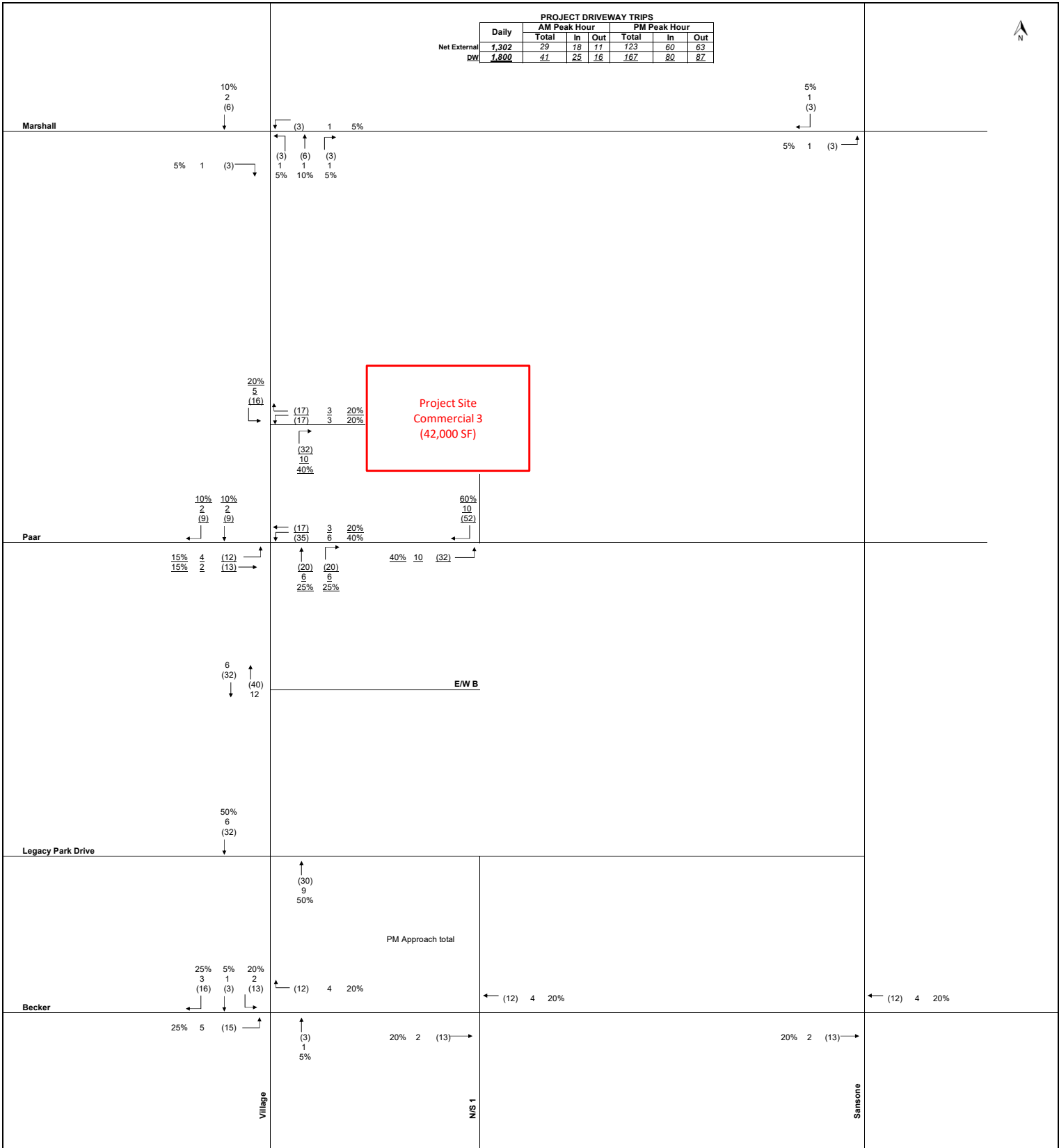
Sainsone

Southern Grove Traffic Signal Study  
PASS-BY VOLUMES  
COMMERCIAL 2

2,642	Total daily driveway trips
(200)	PM peak hour trips
250	AM peak hour trips



Daily	PROJECT DRIVEWAY TRIPS						
	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	1,302	29	18	11	123	60	63
DW	1,800	41	25	16	167	80	87

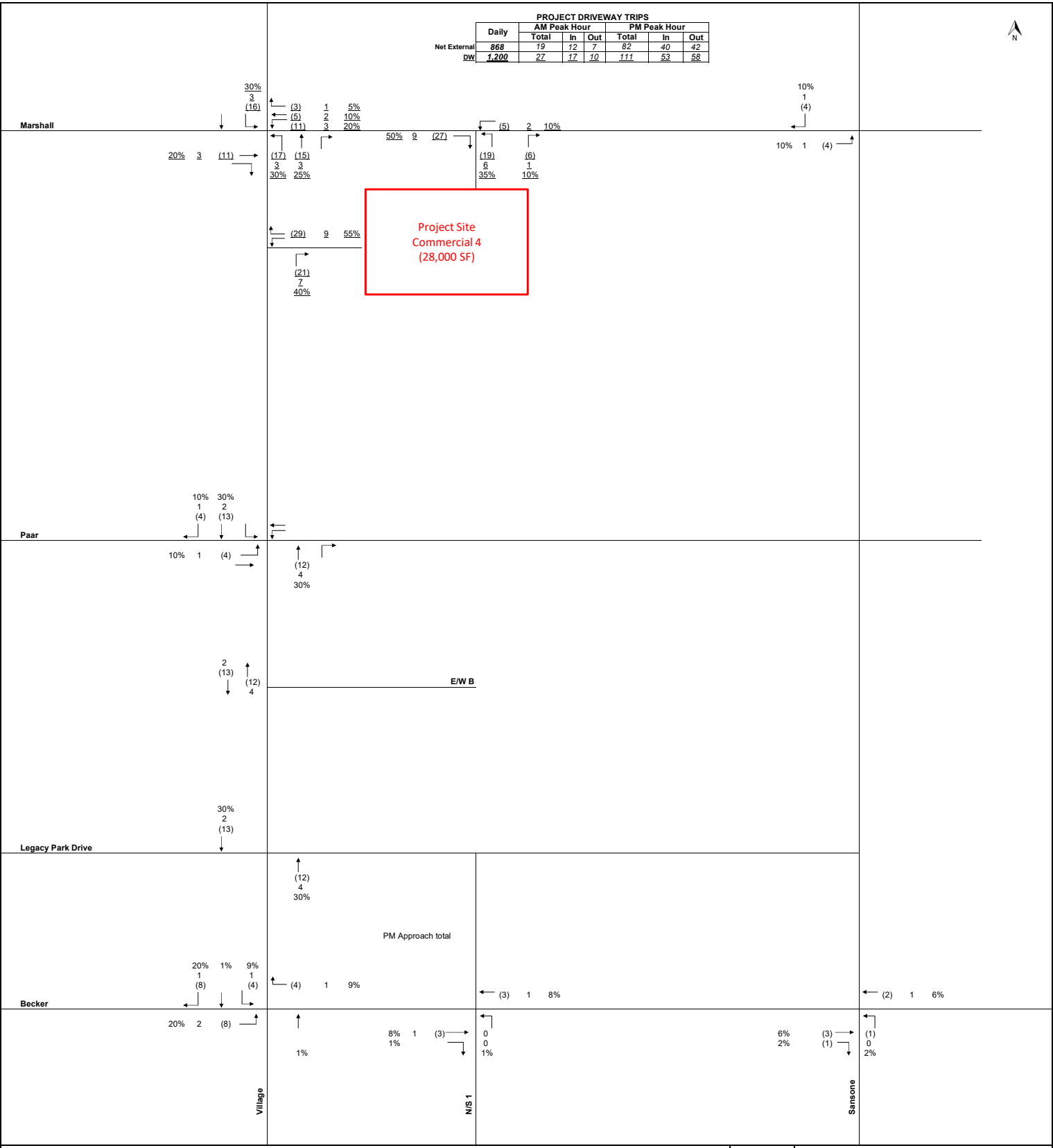


**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**COMMERCIAL 3**

<b>1,302</b>	Total daily driveway trips
<b>(123)</b>	PM peak hour trips
<b>29</b>	AM peak hour trips
<b>(167) / 41</b>	Includes IC & pass-by trips



Net External DW	PROJECT DRIVEWAY TRIPS					
	Daily	AM Peak Hour		PM Peak Hour		
		Total	In	Out	Total	In
868	19	12	7	82	40	42
1,200	27	17	10	111	53	58

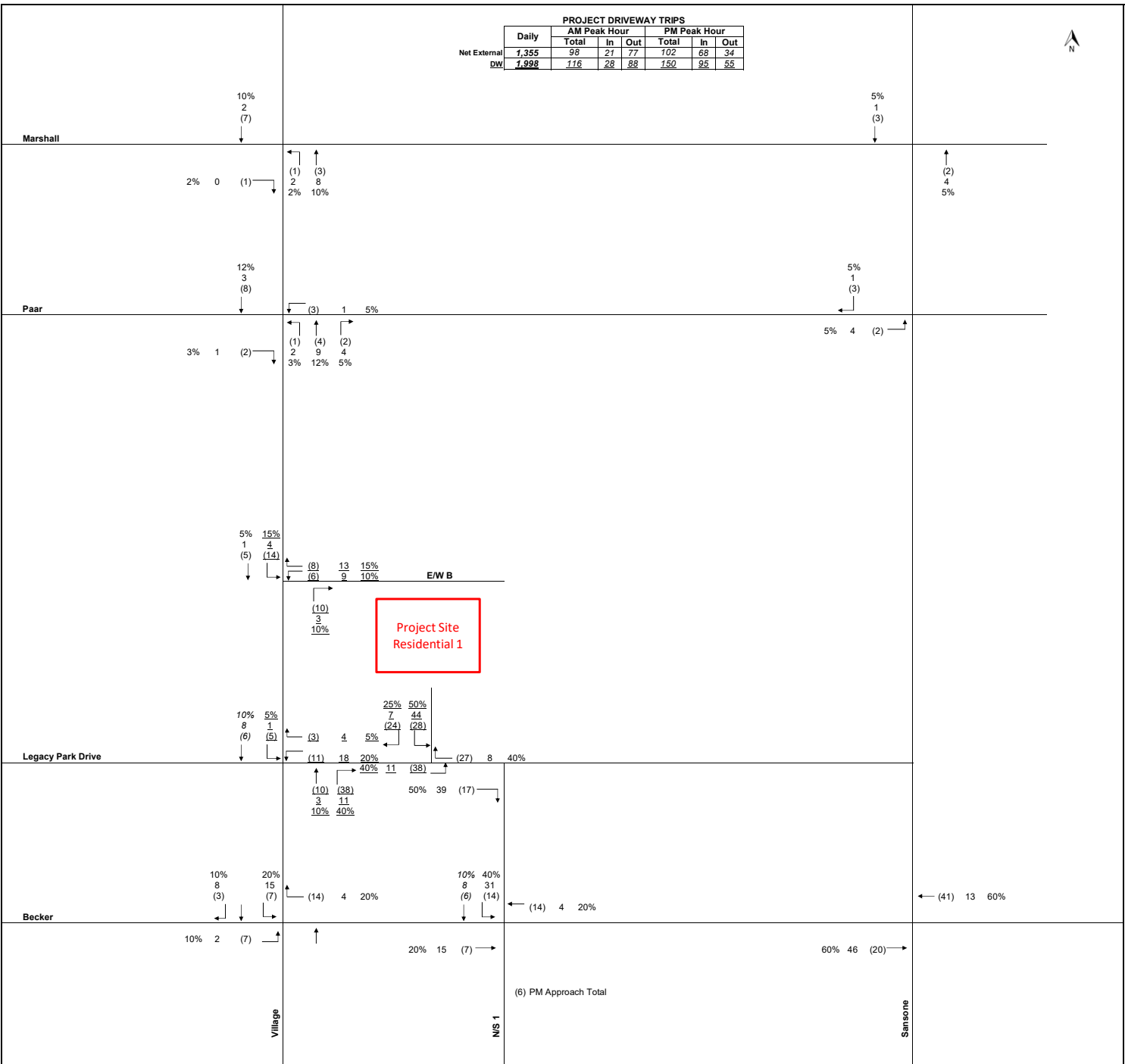


**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**COMMERCIAL 3**

<b>868</b>	Total daily driveway trips
<b>(82)</b>	PM peak hour trips
<b>19</b>	AM peak hour trips
<b>(111) / 27</b>	Includes IC & pass-by trips



Daily	PROJECT DRIVEWAY TRIPS						
	Total	AM Peak Hour		PM Peak Hour		Total	
		In	Out	In	Out		
Net External	1,355	98	21	77	102	68	34
DW	1,398	116	28	88	150	95	55



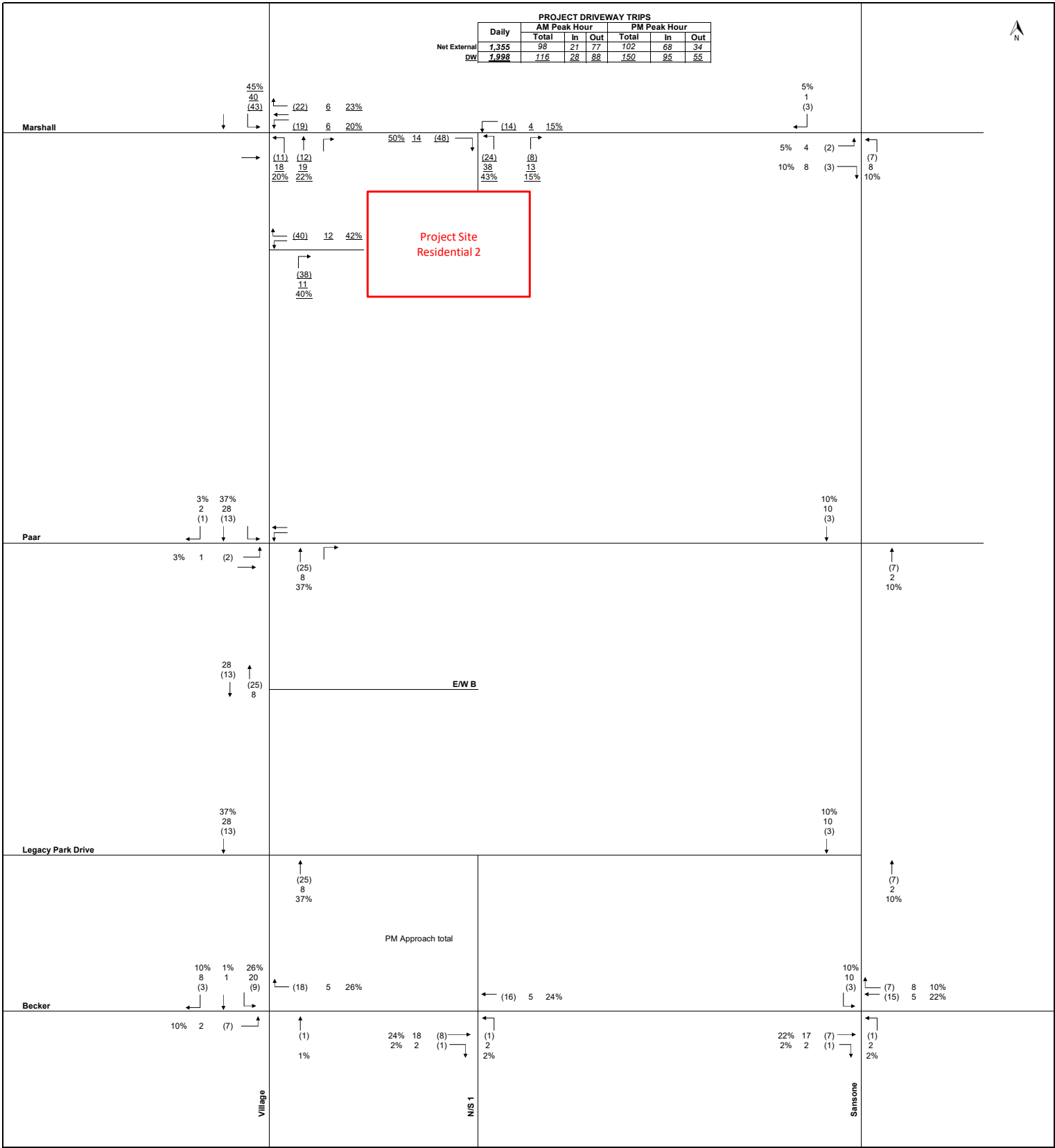
**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**RESIDENTIAL**

EXHIBIT 6 SHEET 8 OF 23

1,355	Total daily driveway trips
(102)	PM peak hour trips
98	AM peak hour trips
(150) / 116	Includes IC & pass-by trips



Daily	PROJECT DRIVEWAY TRIPS						
	AM Peak Hour			PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	1,355	98	21	77	102	68	34
DW	1,998	116	28	88	150	95	55



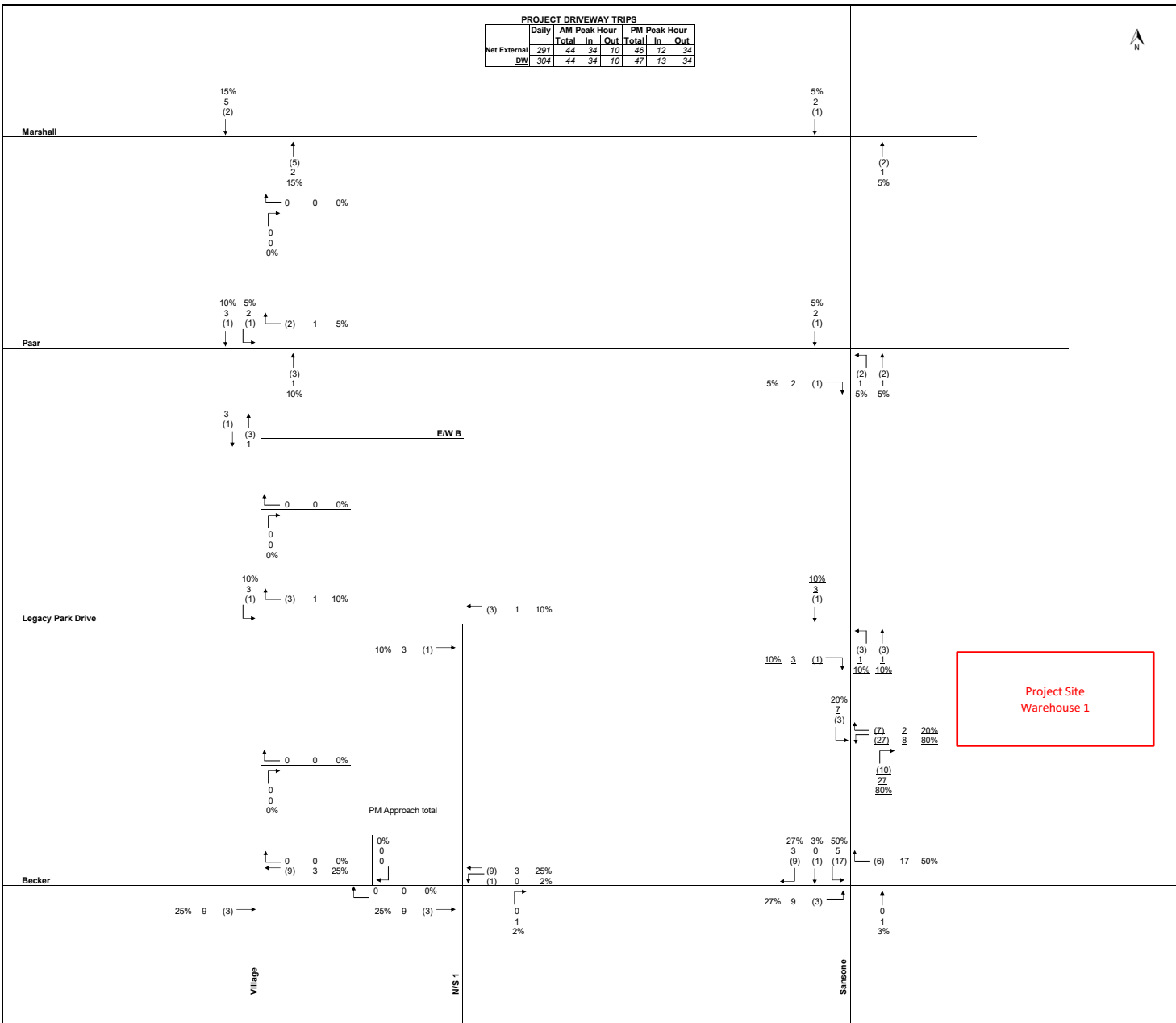
**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**COMMERCIAL 3**

<b>1,355</b>	Total daily driveway trips
<b>(102)</b>	PM peak hour trips
<b>98</b>	AM peak hour trips
<b>(150) / 116</b>	Includes IC & pass-by trips





	Daily		AM Peak Hour		PM Peak Hour		
	Total	In	Out	Total	In	Out	
Net External	291	44	34	10	46	12	34
DW	304	44	34	10	47	13	34

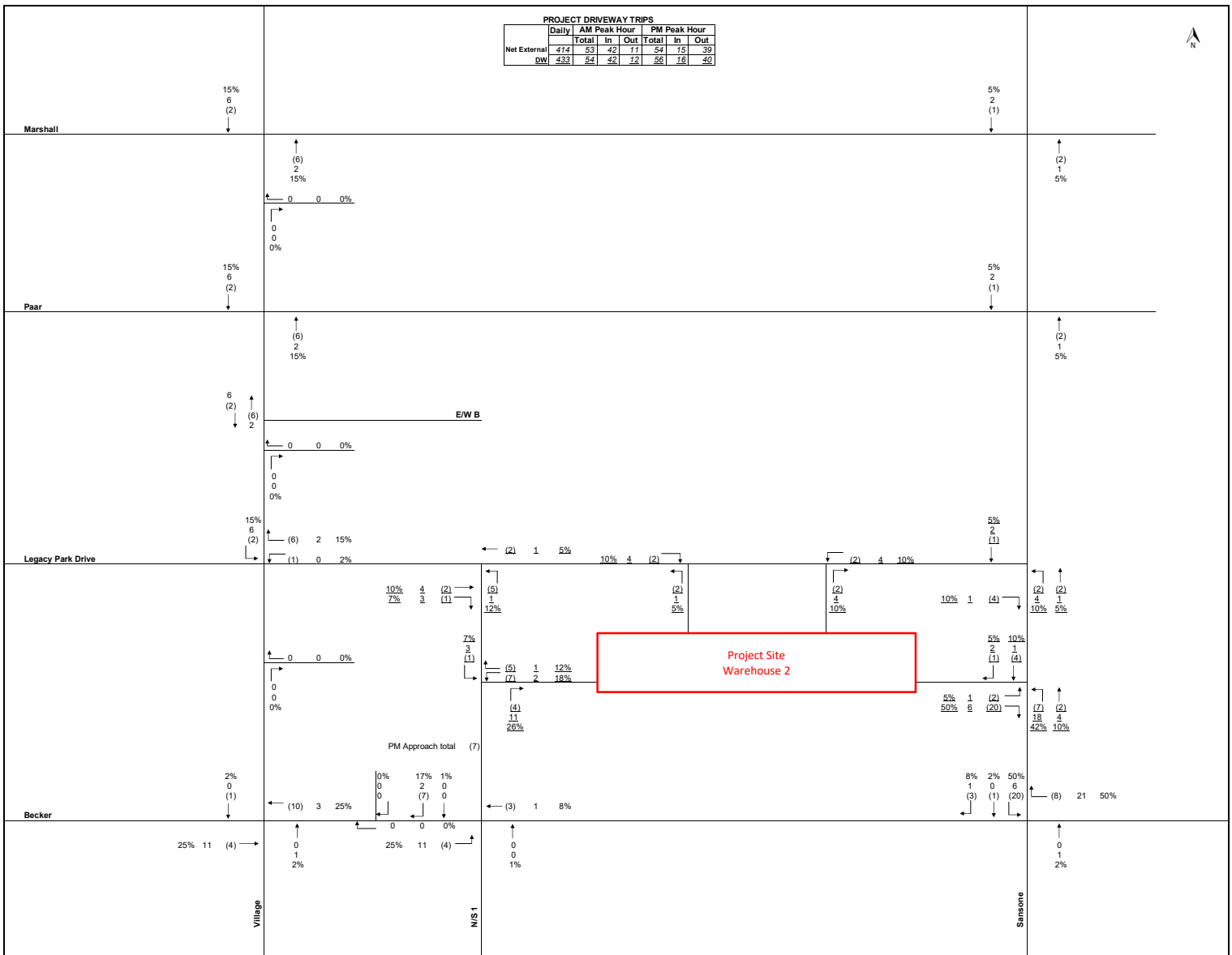


**Southern Grove Traffic Signal Study  
PROPOSED PROJECT DRIVEWAY VOLUMES  
WAREHOUSE 1**

<b>291</b>	Total daily driveway trips
<b>(46)</b>	PM peak hour trips
<b>44</b>	AM peak hour trips
<b>(47) / 44</b>	Includes IC & pass-by trips



	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
Net External DW	Total	In	Out	Total	In	Out	
	414	53	42	11	64	15	39
	433	54	42	12	56	16	40

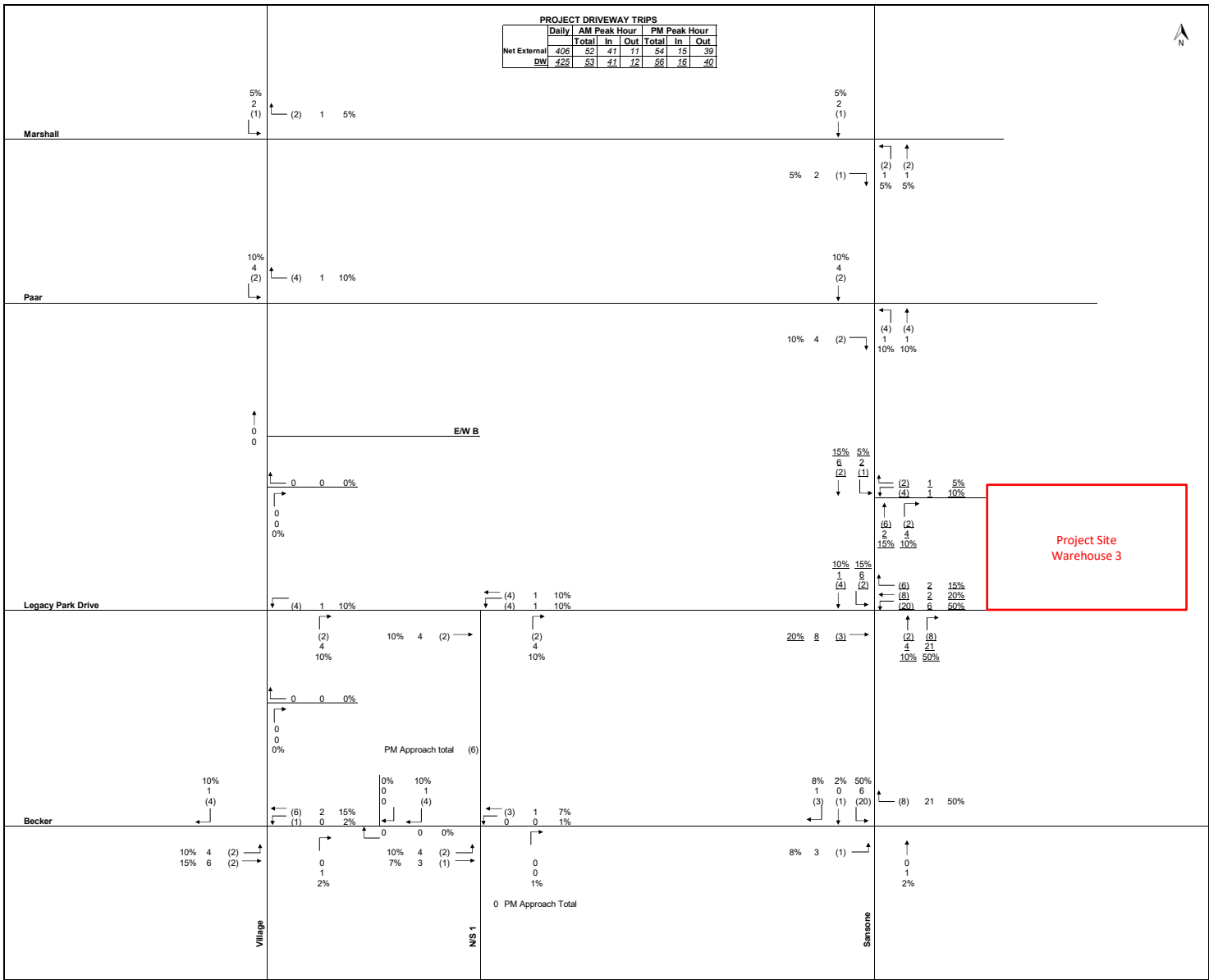


**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 2**  
**EXHIBIT 6 SHEET 11 OF 23**

<b>414</b>	Total daily driveway trips
<b>(54)</b>	PM peak hour trips
<b>53</b>	AM peak hour trips
<b>(56) / 54</b>	Includes IC & pass-by trips



	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	406	52	41	17	54	15	39
DW	425	53	41	32	56	16	40



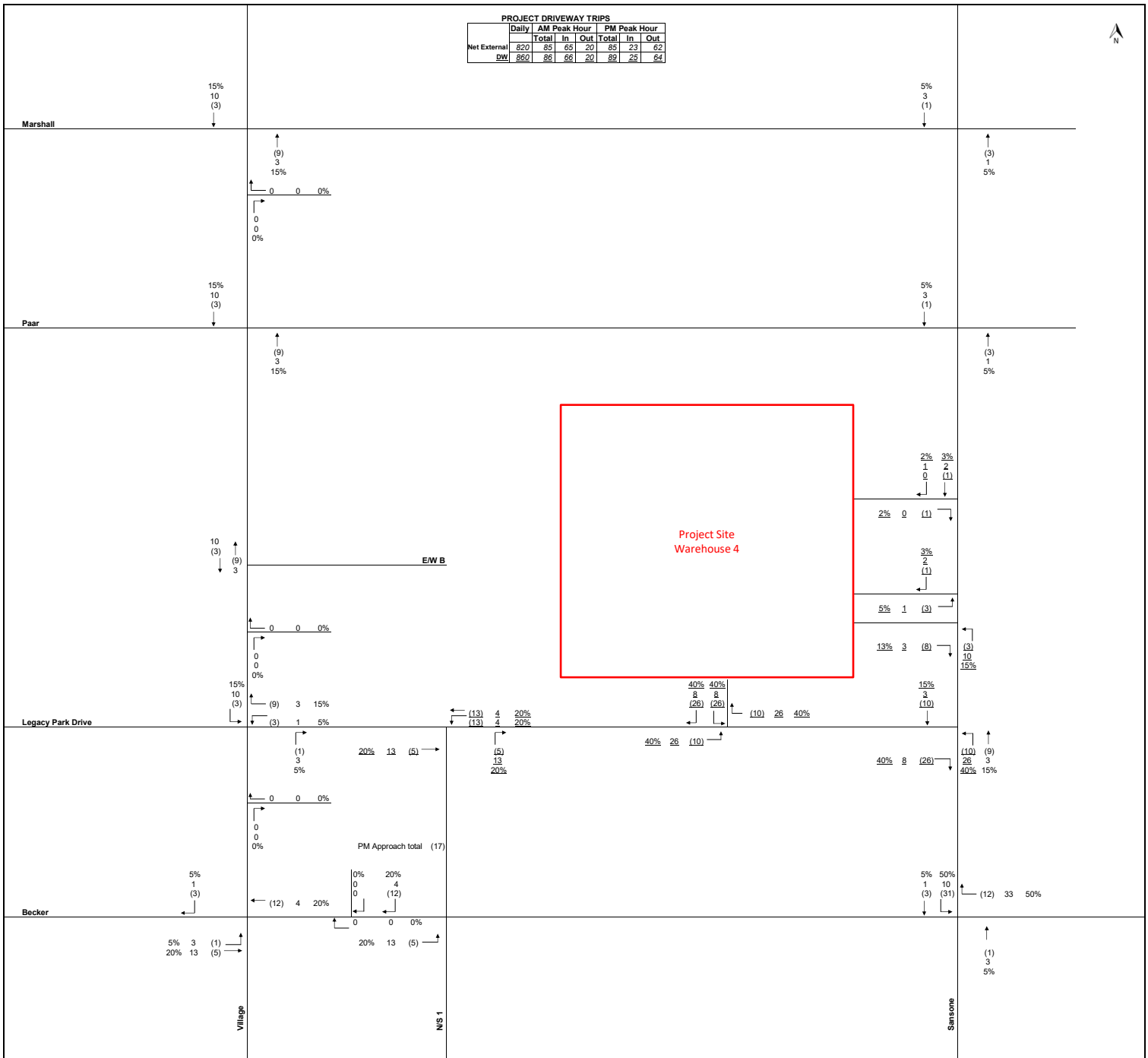
Southern Grove Traffic Signal Study  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 3**

EXHIBIT 6 SHEET 12 OF 23

<b>406</b>	Total daily driveway trips
<b>(54)</b>	PM peak hour trips
<b>52</b>	AM peak hour trips
<b>(56) / 53</b>	Includes IC & pass-by trips

 MacKenzie  
 Engineering & Planning, Inc.

	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
Net External	Total	In	Out	Total	In	Out	
DW	820	85	65	20	85	23	62
	860	86	66	20	89	25	64

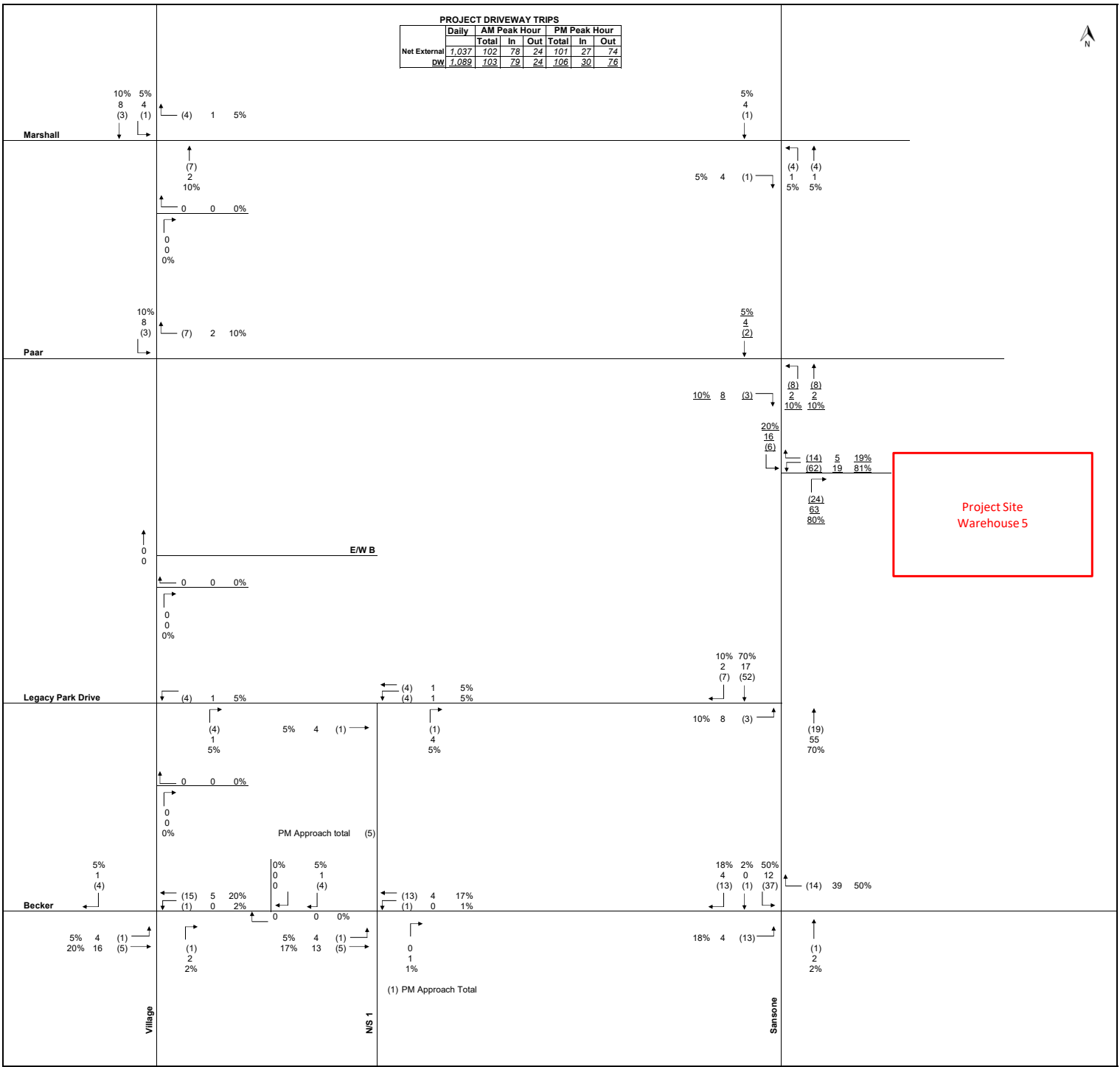


**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 4**  
**EXHIBIT 6 SHEET 13 OF 23**

<b>820</b>	Total daily driveway trips
<b>(85)</b>	PM peak hour trips
<b>85</b>	AM peak hour trips
<b>(89) / 86</b>	Includes IC & pass-by trips


  
 MacKenzie  
 Engineering & Planning, Inc.

	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	1,037	102	78	24	101	27	74
DW	1,089	103	79	24	106	30	76



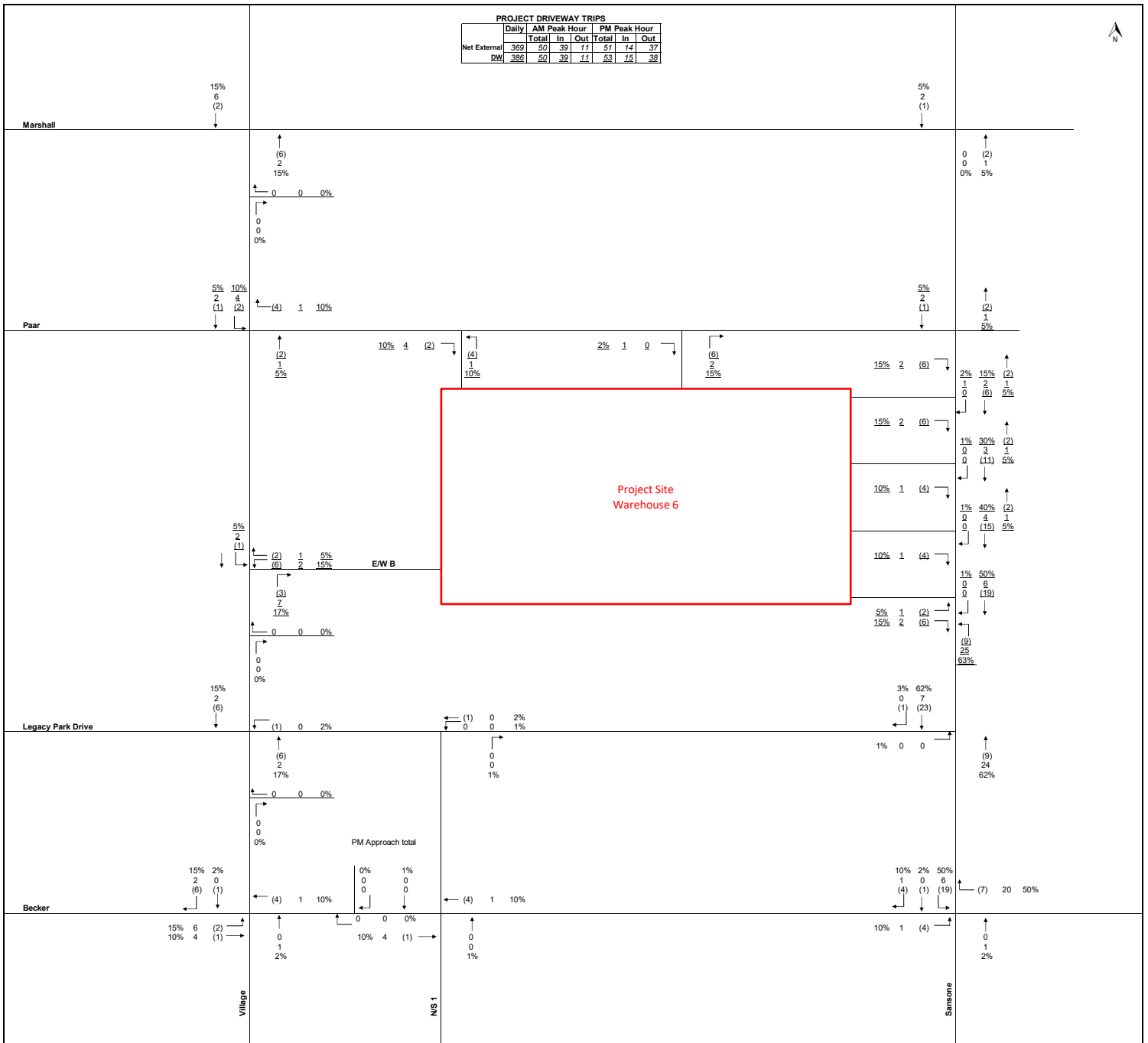
Project Site  
Warehouse 5

**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 5**  
**EXHIBIT 6 SHEET 14 OF 23**

<b>1,037</b>	Total daily driveway trips
<b>(101)</b>	PM peak hour trips
<b>102</b>	AM peak hour trips
<b>(106) / 103</b>	Includes IC & pass-by trips

**MacKenzie**  
Engineering & Planning, Inc.

	Daily		AM Peak Hour		PM Peak Hour	
	Total	In	Out	Total	In	Out
Net External	369	50	39	17	51	14
DW	386	50	39	17	53	15



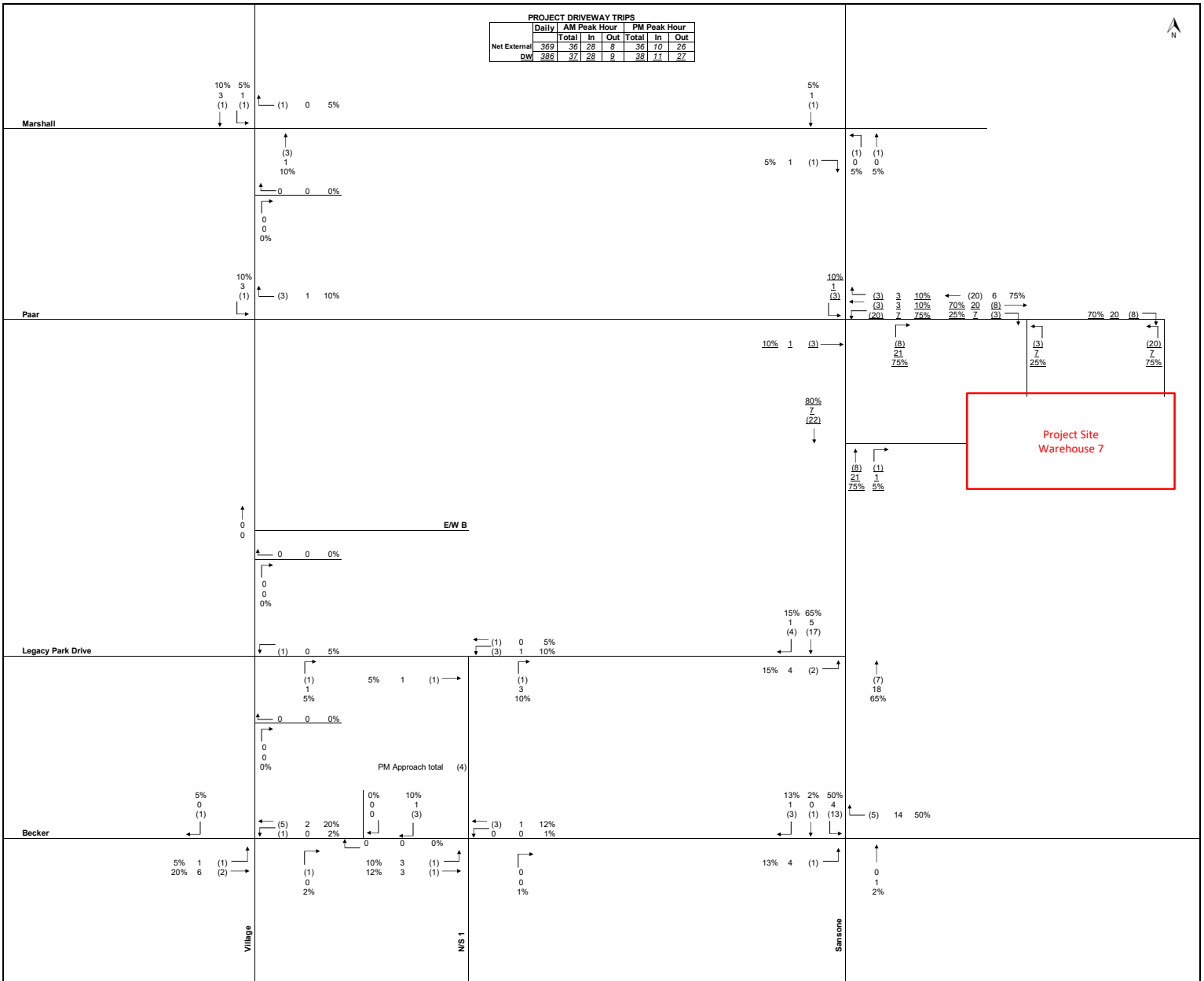
**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 6**

EXHIBIT 6 SHEET 15 OF 23

<b>369</b>	Total daily driveway trips
<b>(51)</b>	PM peak hour trips
<b>50</b>	AM peak hour trips
<b>(53) / 50</b>	Includes IC & pass-by trips



	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
Net External	369	36	28	8
DW	386	37	28	9
			38	11
			27	



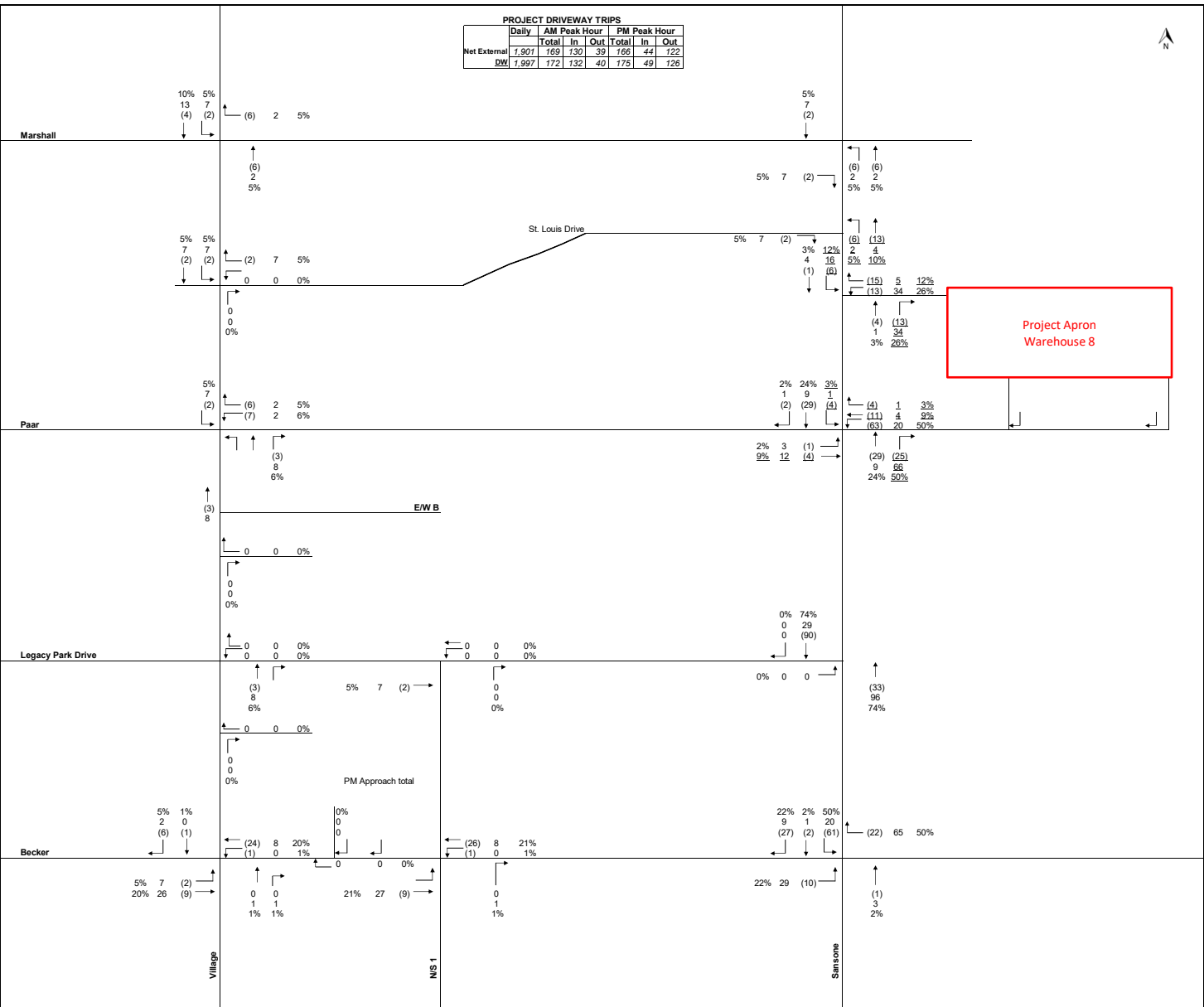
Southern Grove Traffic Signal Study  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 7**

EXHIBIT 6 SHEET 16 OF 23

<b>369</b>	Total daily driveway trips
<b>(36)</b>	PM peak hour trips
<b>36</b>	AM peak hour trips
<b>(38) / 37</b>	Includes IC & pass-by trips

MacKenzie  
 Engineering & Planning, Inc.

	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	1,901	169	130	39	166	44	122
DW	1,997	172	132	40	175	49	126



Southern Grove Traffic Signal Study  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 8**

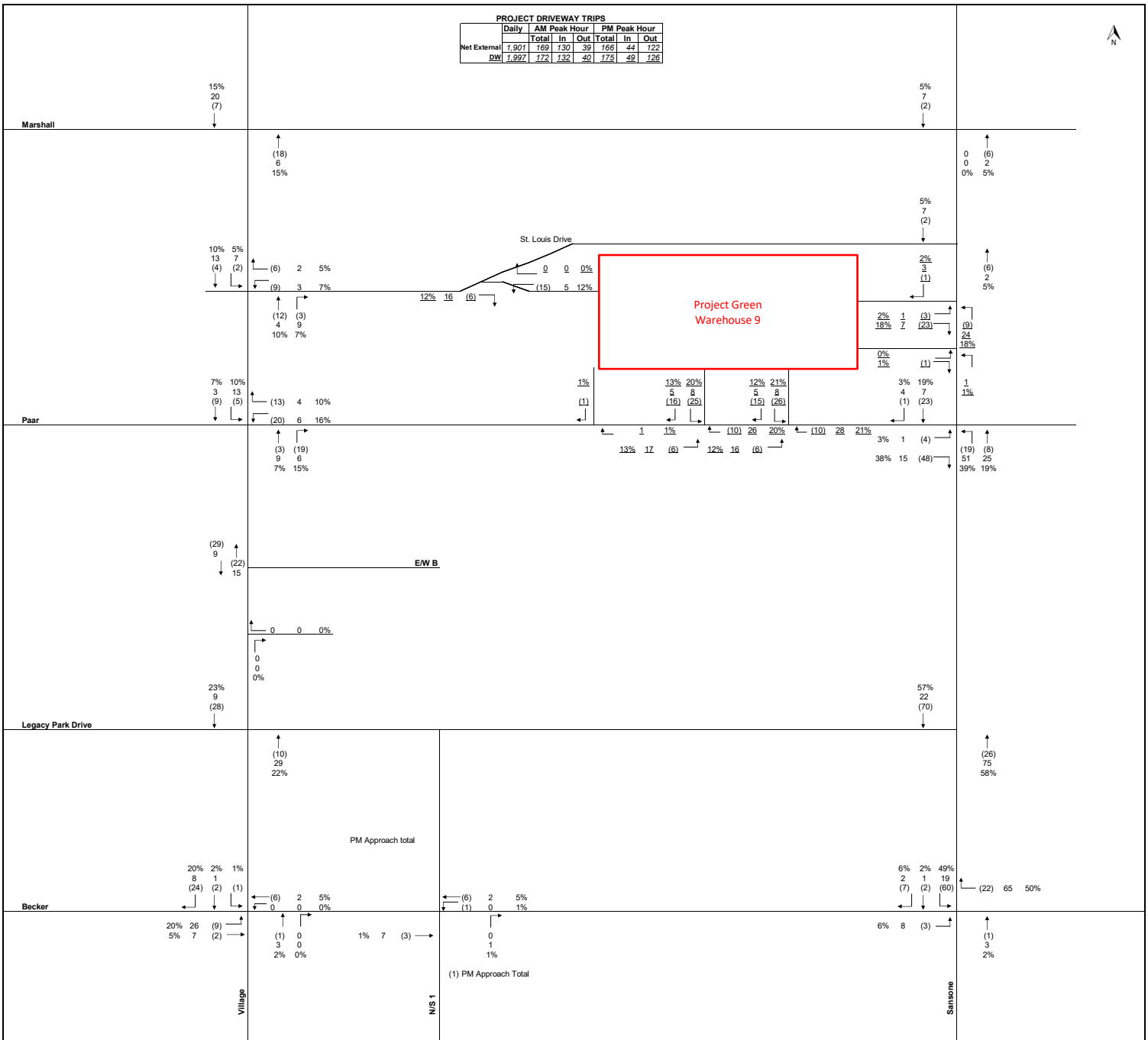
EXHIBIT 6 SHEET 17 OF 23

<b>1,901</b>	Total daily driveway trips
<b>(166)</b>	PM peak hour trips
<b>169</b>	AM peak hour trips
<b>(175) / 172</b>	Includes IC & pass-by trips

**MacKenzie**  
 Engineering & Planning, Inc.



	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour		PM Peak Hour			
	Total	In	Out	Total	In	Out	
Net External	1,901	169	130	39	166	44	122
DW	1,997	172	132	40	175	49	126

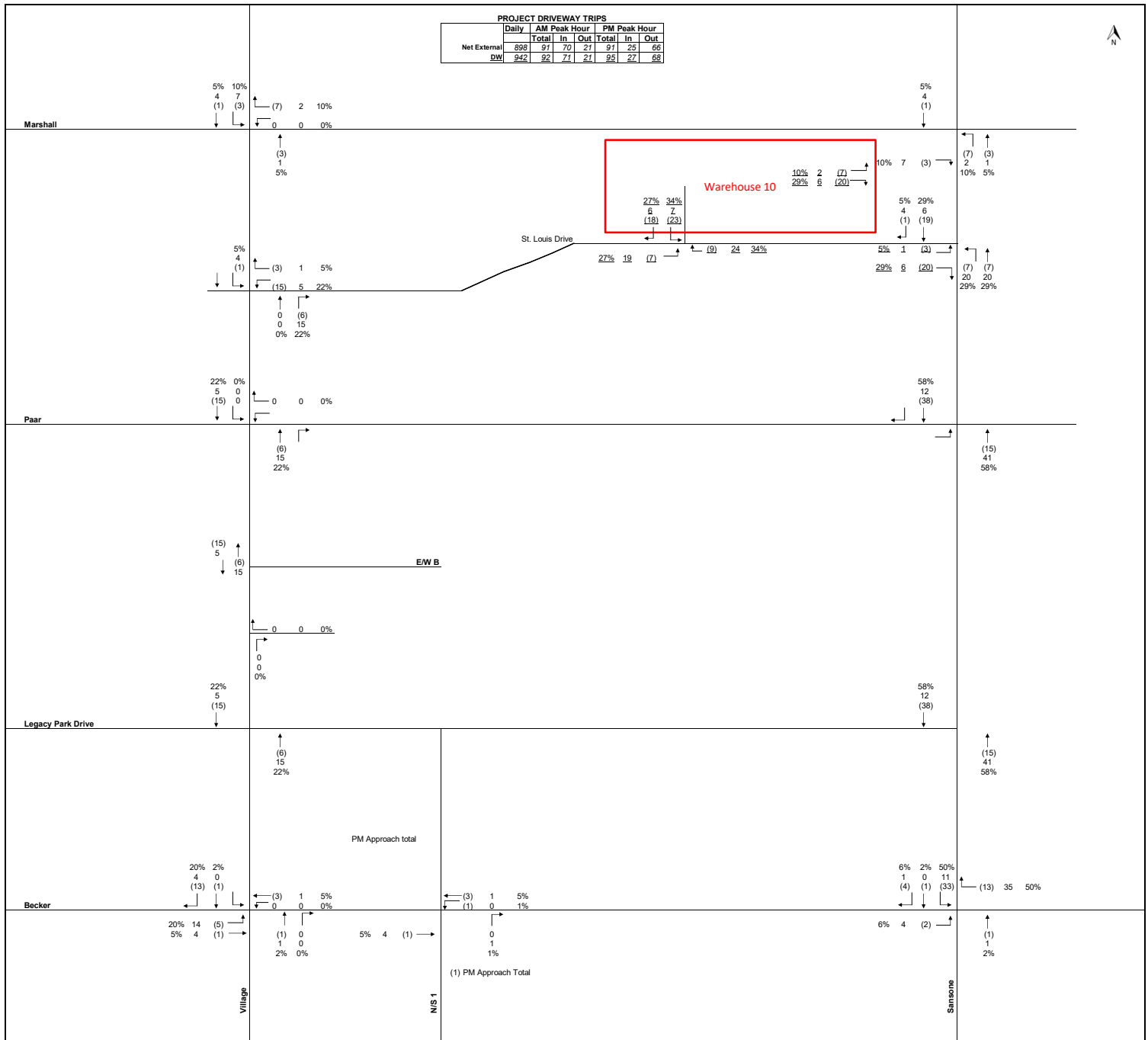


Southern Grove Traffic Signal Study  
 PROPOSED PROJECT DRIVEWAY VOLUMES  
 WAREHOUSE 9  
 EXHIBIT 6 SHEET 18 OF 23

1,901	Total daily driveway trips
(166)	PM peak hour trips
169	AM peak hour trips
(175) / 172	Includes IC & pass-by trips

**MacKenzie**  
 Engineering & Planning, Inc.

	PROJECT DRIVEWAY TRIPS	
	Daily	PM Peak Hour
Net External	898	91
DW	942	92

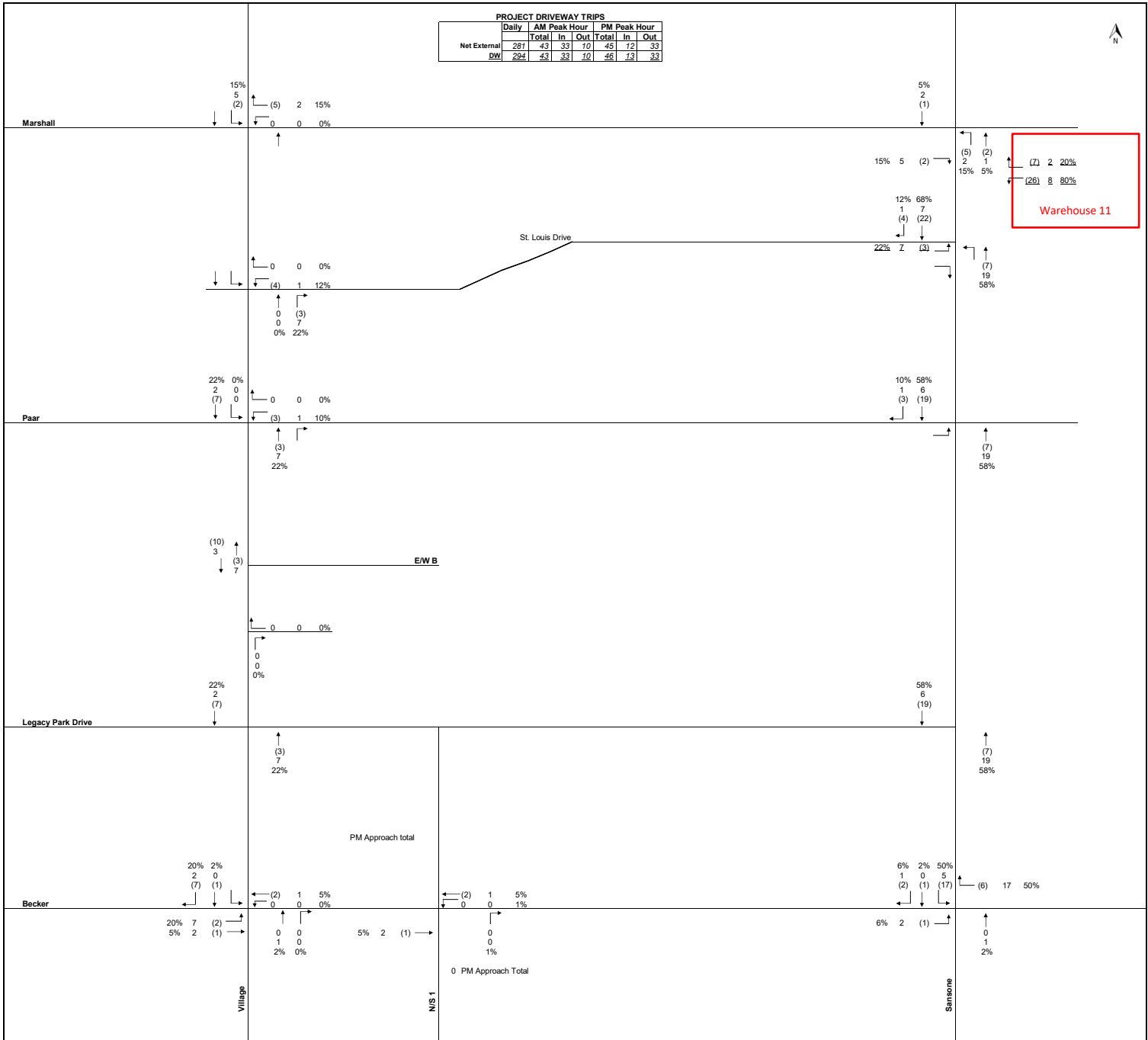


**Southern Grove Traffic Signal Study**  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 9**  
**EXHIBIT 6 SHEET 19 OF 23**

<b>898</b>	Total daily driveway trips
<b>(91)</b>	PM peak hour trips
<b>91</b>	AM peak hour trips
<b>(95) / 92</b>	Includes IC & pass-by trips



	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour			PM Peak Hour		
Net External	Total	In	Out	Total	In	Out	
DW	281	43	33	10	45	12	33
	294	43	33	10	46	13	33



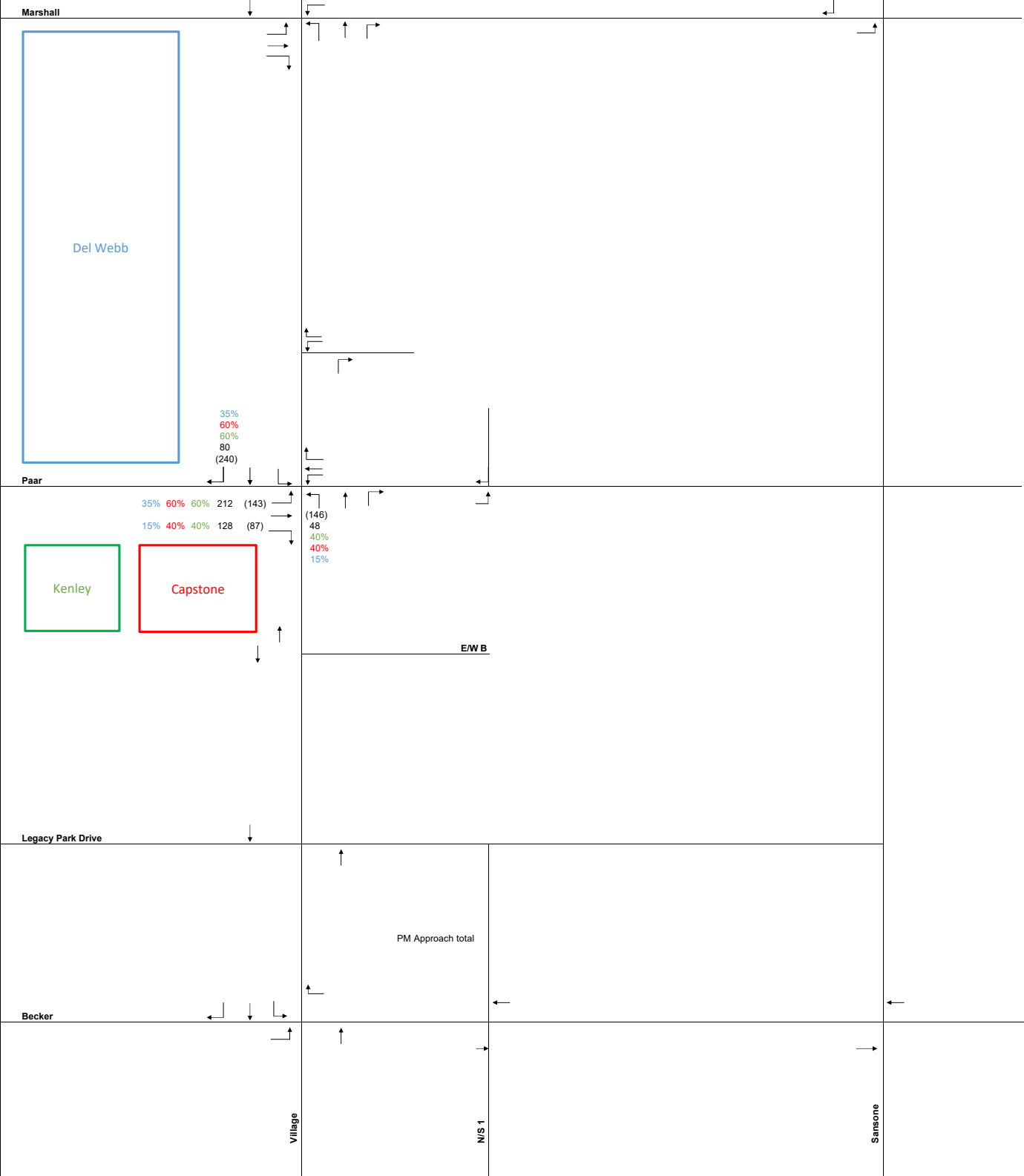
Southern Grove Traffic Signal Study  
**PROPOSED PROJECT DRIVEWAY VOLUMES**  
**WAREHOUSE 9**  
 EXHIBIT 6 SHEET 20 OF 23

<b>281</b>	Total daily driveway trips
<b>(45)</b>	PM peak hour trips
<b>43</b>	AM peak hour trips
<b>(46) / 43</b>	Includes IC & pass-by trips



Heron Preserve  
SG-11 (128,000 SF)

	Daily	AM Peak Hour		PM Peak Hour			
		Total	In	Out	Total	In	Out
Heron Preserve	3,312	241	63	178	335	217	124
Del Webb	3,980	213	70	143	255	156	99
SG-11	11,264	452	280	172	1,101	528	573
Capstone	2,734	208	52	156	279	176	103
Kenley	2,084	153	40	113	209	132	77

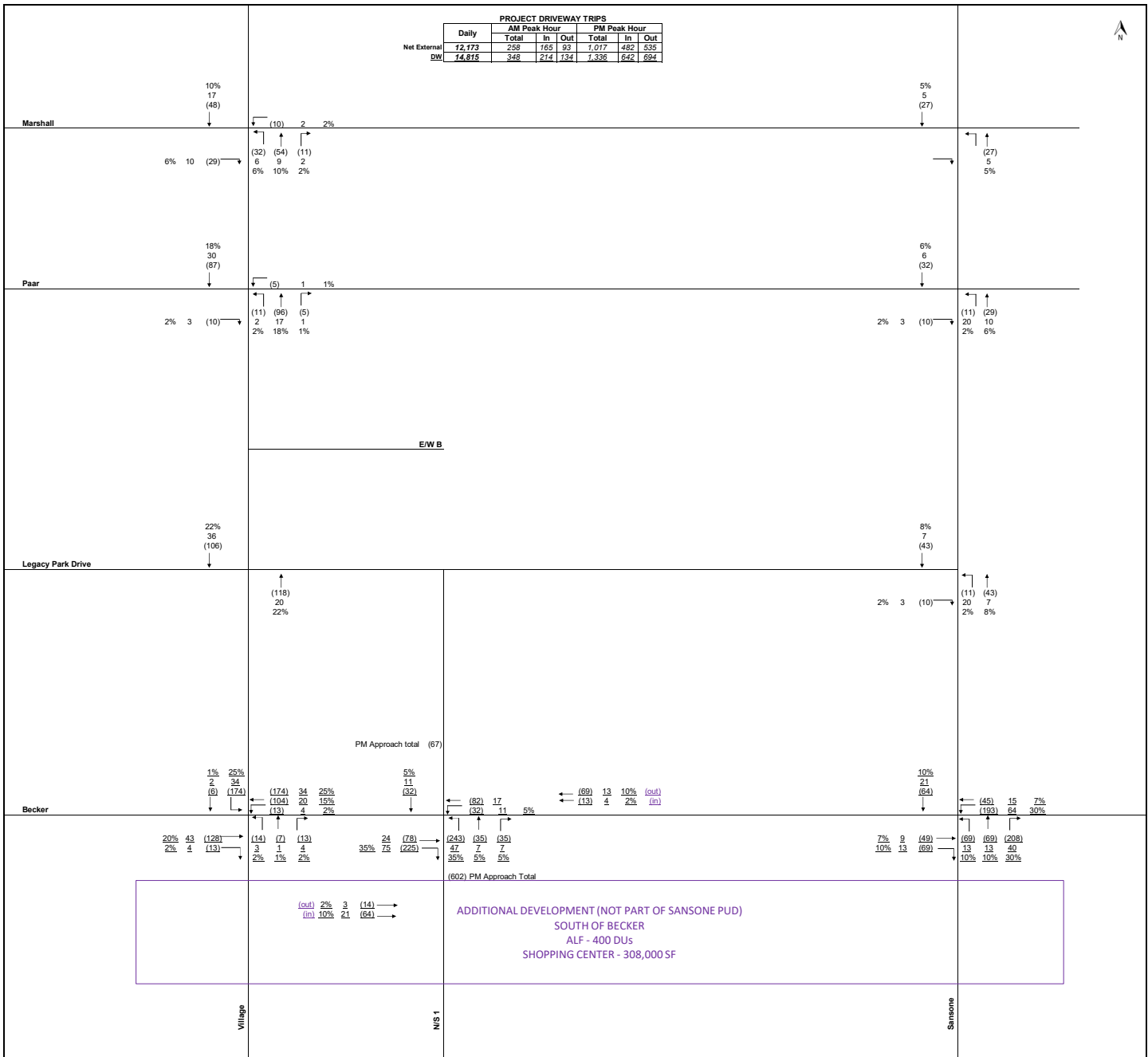


Southern Grove Traffic Signal Study  
 PROPOSED PROJECT DRIVEWAY VOLUMES  
 AREA 3, WEST OF VILLAGE PARKWAY  
 EXHIBIT 6 SHEET 21 OF 23

####	Total daily driveway trips
####	PM peak hour trips
241	AM peak hour trips
55 / 2	Includes IC & pass-by trips



Net External	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
	12,173	258	765	93	7,017	482	535
<b>DW</b>	<b>14,813</b>	<b>348</b>	<b>212</b>	<b>134</b>	<b>7,336</b>	<b>642</b>	<b>694</b>



**Southern Grove Traffic Signal Study**  
**PROPOSED SOUTH OF BECKER DRIVEWAY VOLUMES**  
**EXHIBIT 6 SHEET 22 OF 23**

<b>12,173</b>	Total daily driveway trips
<b>(7,017)</b>	PM peak hour trips
<b>258</b>	AM peak hour trips
<b>(1336) / 348</b>	Includes IC & pass-by trips



Adjustment Trips	PROJECT DRIVEWAY TRIPS						
	Daily	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
4,216	373	190	183	300	157	143	



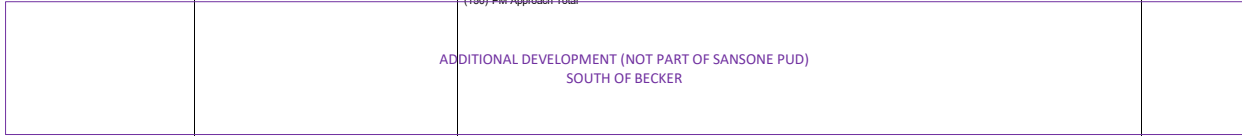
Marshall

Paar

E/W B

Legacy Park Drive

Becker



Village

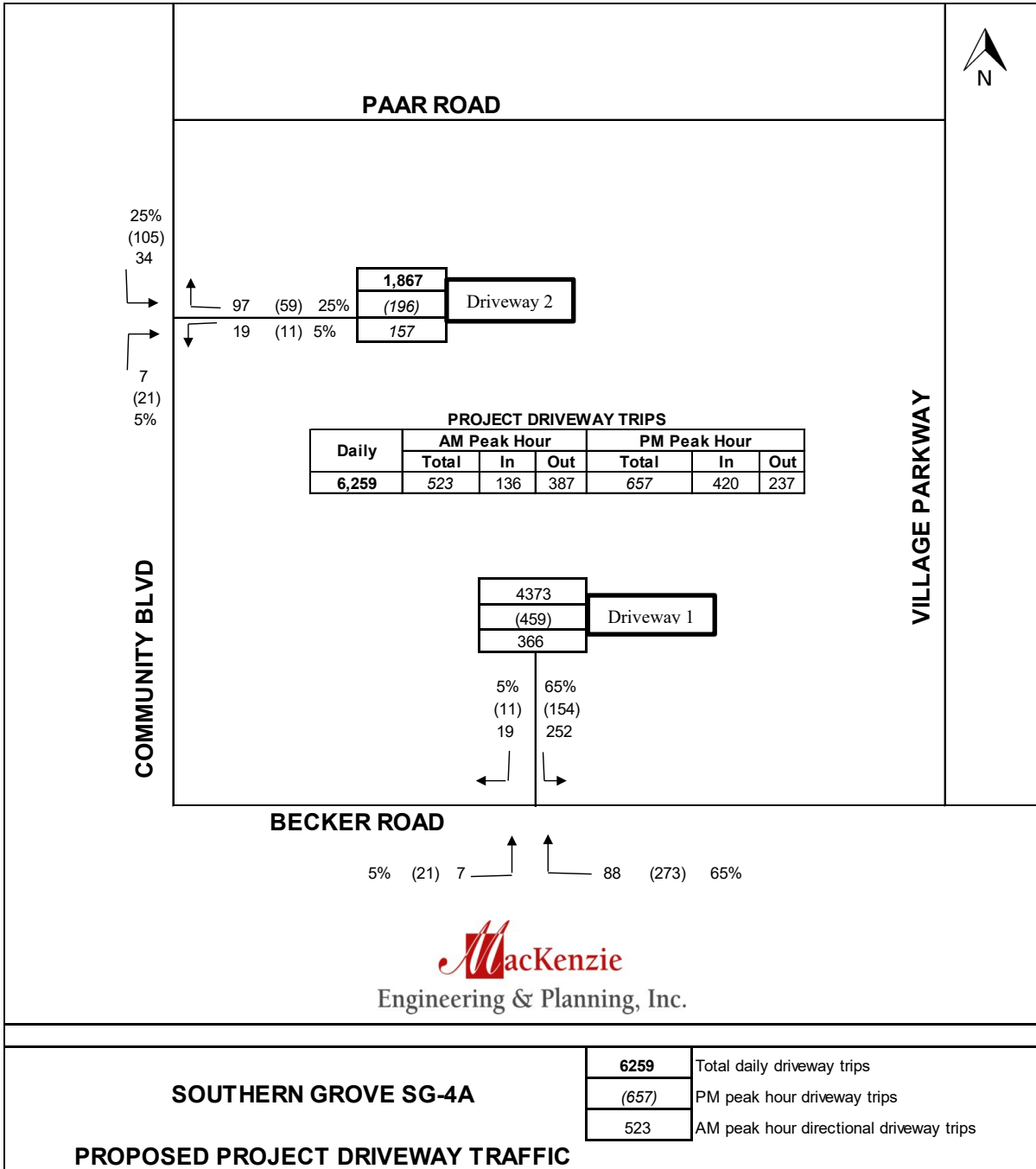
N/S 1

Sansone

Southern Grove Traffic Signal Study  
 PASS-BY SOUTH OF BECKER VOLUMES  
 EXHIBIT 6 SHEET 23 OF 23

4,216	Total daily driveway trips
(300)	PM peak hour trips
373	AM peak hour trips

**EXHIBIT 7**





Opening 1

No Access West



Signal Not recommended  
Convert to Directional Median Opening if necessary

285

Trade Center Drive & Village Parkway			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
Telaro	71	16.40%	\$82,000
Parcel 2	37	8.55%	\$42,750
Parcel 5	64	14.78%	\$73,900
Parcel 6	44	10.18%	\$50,800
Parcel 8	63	14.55%	\$72,750
Parcel 9	58	13.39%	\$66,950
Parcel 10	45	10.39%	\$51,950
Parcel 11	36	8.31%	\$41,550
Parcel 12	15	3.46%	\$17,300
<b>Total</b>	<b>433</b>	<b>100%</b>	<b>499,950</b>

Opening 2

Telaro Main Entrance

71



362

Trade Center Drive

334

177

Opening 3

71



Result TWSC

40

Opening 4 (E/W 2)  
K-8 School

336



850

Signal at E/W 2 & Village Parkway			
Parcel	Peak Hour Trips	% of Total	Share of Signal Cost
SLCSB	336	28.3%	\$141,500
Parcel 11	20	1.7%	\$8,500
Parcel 12	51	4.3%	\$21,500
Parcel 13	23	1.9%	\$9,500
Parcel 14			
Parcel 15	247	20.8%	\$104,000
Parcel 16			
Parcel 17	509	42.9%	\$214,500
<b>Total</b>	<b>1,186</b>	<b>100%</b>	<b>499,500</b>

343

169

Opening 5



Fire Station Only Signal

Opening 6  
Mid-Block U-turns



Keep as Directional Opening

Signal at Marshall Pkwy & Village Pkwy			
Parcel	Peak Hour	% of Total	Share of Signal Cost
W. of Village	799	57.7%	\$288,500
Area 2 N. of Marshall	394	28.4%	\$142,000
Legacy Park	192	13.9%	\$69,500
<b>Total</b>	<b>1,385</b>	<b>100%</b>	<b>500,000</b>

799



586

Marshall Pkwy

Village

Sansone

137

137

Southern Grove & Western Grove Signals Study

ESTIMATED DAILY DRIVEWAY VOLUMES

TOTAL  
EXHIBIT 8

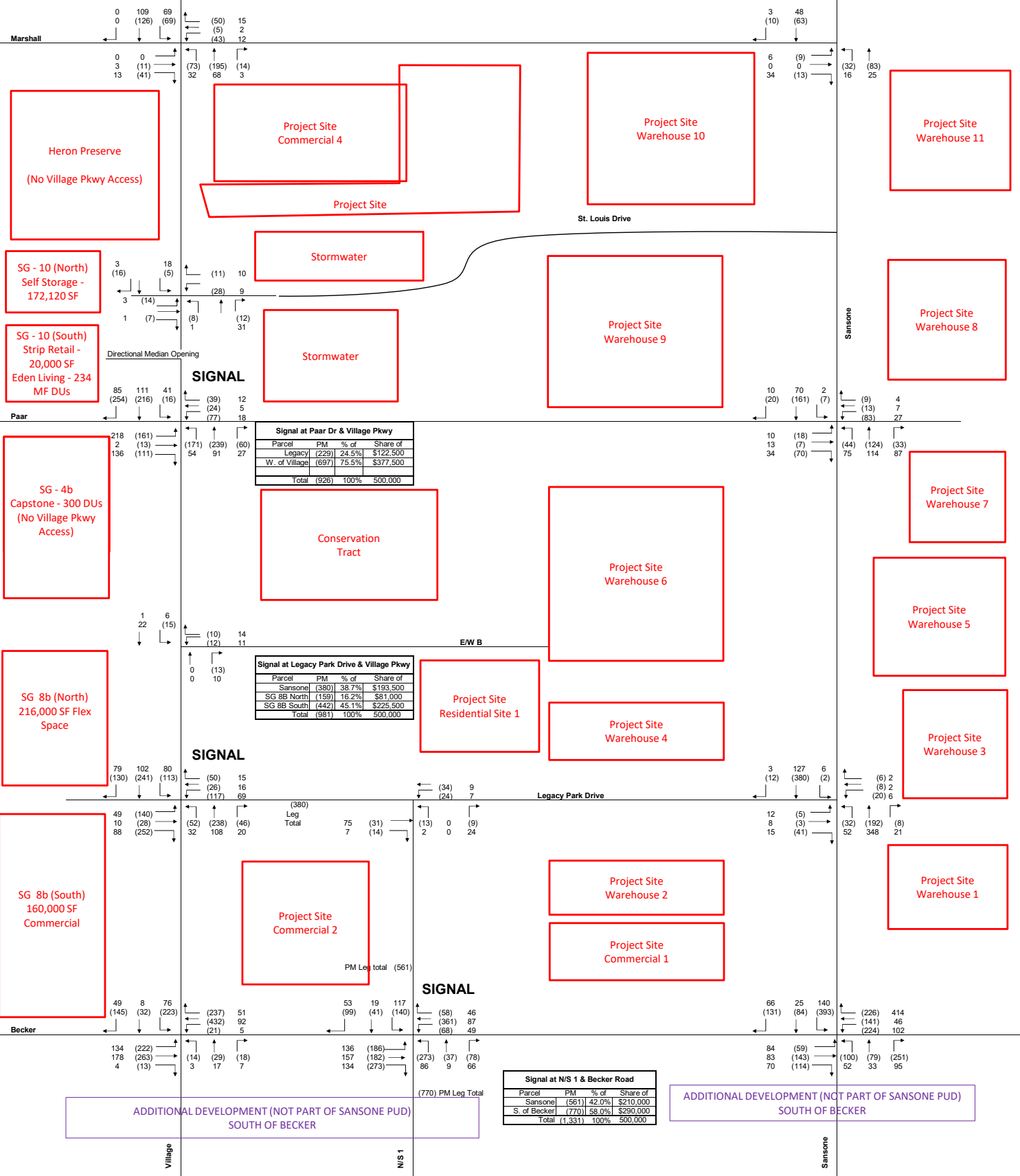


XXX	Total daily driveway trips
XXX	PM peak hour trips
XXX	AM peak hour trips





**SIGNAL**



**Signal at Paar Dr & Village Pkwy**

Parcel	PM	% of	Share of
Legacy	(229)	24.5%	\$122,500
W. of Village	(697)	76.5%	\$377,500
<b>Total</b>	<b>(926)</b>	<b>100%</b>	<b>500,000</b>

**Signal at Legacy Park Drive & Village Pkwy**

Parcel	PM	% of	Share of
Sansone	(380)	38.7%	\$193,500
SG 8B North	(159)	16.2%	\$81,000
SG 8B South	(442)	45.1%	\$225,500
<b>Total</b>	<b>(981)</b>	<b>100%</b>	<b>500,000</b>

**Signal at N/S 1 & Becker Road**

Parcel	PM	% of	Share of
Sansone	(561)	42.0%	\$210,000
S. of Becker	(770)	58.0%	\$290,000
<b>Total</b>	<b>(1,331)</b>	<b>100%</b>	<b>500,000</b>

ADDITIONAL DEVELOPMENT (NOT PART OF SANSONE PUD) SOUTH OF BECKER

ADDITIONAL DEVELOPMENT (NOT PART OF SANSONE PUD) SOUTH OF BECKER

**Southern Grove Traffic Signal Study**  
**EXHIBIT 9 - SIGNALS AND COST SHARE**

<b>42,926</b>	Total daily driveway trips
<b>(3,978)</b>	PM peak hour trips
<b>1,839</b>	AM peak hour trips

EXHIBIT 10 – OVERALL SOUTHERN GROVE SIGNAL MAP



<b>List of Land Uses with Vehicle Pass-By Rates and Data</b>
Source: ITE <i>Trip Generation Manual</i> , 11th Edition

**Institutional (Land Uses 500–599)**

<b>CODE</b>	<b>LAND USE</b>
565	Day Care Center

**Retail (Land Uses 800–899)**

<b>CODE</b>	<b>LAND USE</b>
813	Free-Standing Discount Superstore
814	Variety Store
815	Free-Standing Discount Store
816	Hardware/Paint Store
820	Shopping Center (>150k)
821	Shopping Plaza (40-150k)
843	Automobile Parts Sales
848	Tire Store
850	Supermarket
857	Discount Club
862	Home Improvement Superstore
863	Electronics Superstore
880	Pharmacy/Drugstore without Drive-Through Window
881	Pharmacy/Drugstore with Drive-Through Window
890	Furniture Store

**Services (Land Uses 900–999)**

<b>CODE</b>	<b>LAND USE</b>
912	Drive-in Bank
931	Fine Dining Restaurant
932	High-Turnover (Sit-Down) Restaurant
934	Fast-Food Restaurant with Drive-Through Window
935	Fast-Food Restaurant with Drive-Through Window and No Indoor Seating
938	Coffee/Donut Shop with Drive-Through Window and No Indoor Seating
944	Gasoline/Service Station
945	Convenience Store/Gas Station

### Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	820								
Land Use	Shopping Center (> 150k)								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	8 Sites with GLA between 150 and 300k				16 Sites with GLA between 300 and 900k				
Average Pass-By Rate	29% for Sites with GLA between 150 and 300k				19% for Sites with GLA between 300 and 900k				
	Pass-By Characteristics for Individual Sites								
						Non-Pass-By Trips			Adj Street Peak
GLA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
213	Florida	1990	312	28	31	41	72	—	33
225	Illinois	1994	264	35	32	33	65	1970	24
227.9	Kentucky	1993	—	34	35	31	66	—	34
235	Kentucky	1993	211	35	29	36	65	2593	2
255	Iowa	1994	222	23	38	39	77	3706	24
256	Connecticut	1994	208	27	51	22	73	3422	24
293	Illinois	1994	282	24	70	6	76	4606	13
294	Pennsylvania	1994	213	24	48	18	76	4055	24
350	Massachusetts	1994	224	18	45	37	82	2112	24
361	Virginia	1994	315	17	54	29	83	2034	24
375	North Carolina	1994	214	29	48	23	71	2053	24
413	Texas	1994	228	28	51	21	72	589	24
418	Maryland	1994	281	20	50	30	80	5610	24
450	California	1994	321	23	49	28	77	2787	24
476	Washington	1994	234	25	53	22	75	3427	24
488	Texas	1994	257	12	75	13	88	1094	13
560	Virginia	1994	437	19	49	32	81	3051	24
581	Colorado	1994	296	18	53	29	82	2939	24
598	Colorado	1994	205	17	55	28	83	3840	24
633	Texas	1994	257	10	64	26	90	—	24







# Land Use: 140

## Manufacturing

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### Description

A manufacturing facility is an area where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, a manufacturing facility typically has an office and may provide space for warehouse, research, and associated functions. General light industrial (Land Use 110) and industrial park (Land Use 130) are related uses.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Minnesota, Missouri, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Texas, Vermont, Washington, and West Virginia.

### Source Numbers

177, 179, 184, 241, 357, 384, 418, 443, 583, 598, 611, 728, 747, 875, 879, 940, 969, 1067, 1068, 1082



# Manufacturing (140)

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

**Setting/Location: General Urban/Suburban**

Number of Studies: 53

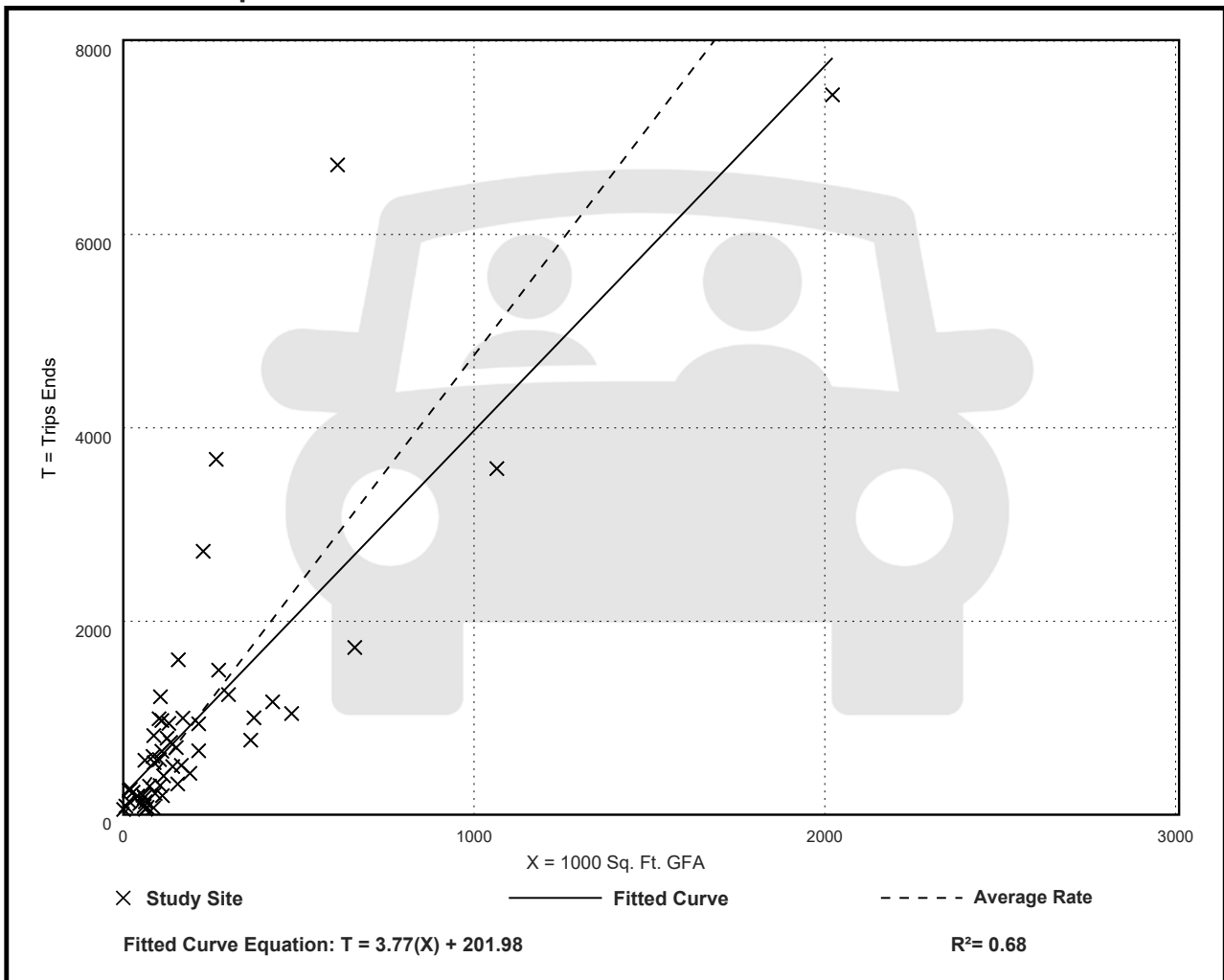
Avg. 1000 Sq. Ft. GFA: 208

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.75	0.83 - 49.50	3.20

## Data Plot and Equation



# Manufacturing (140)

**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: 48

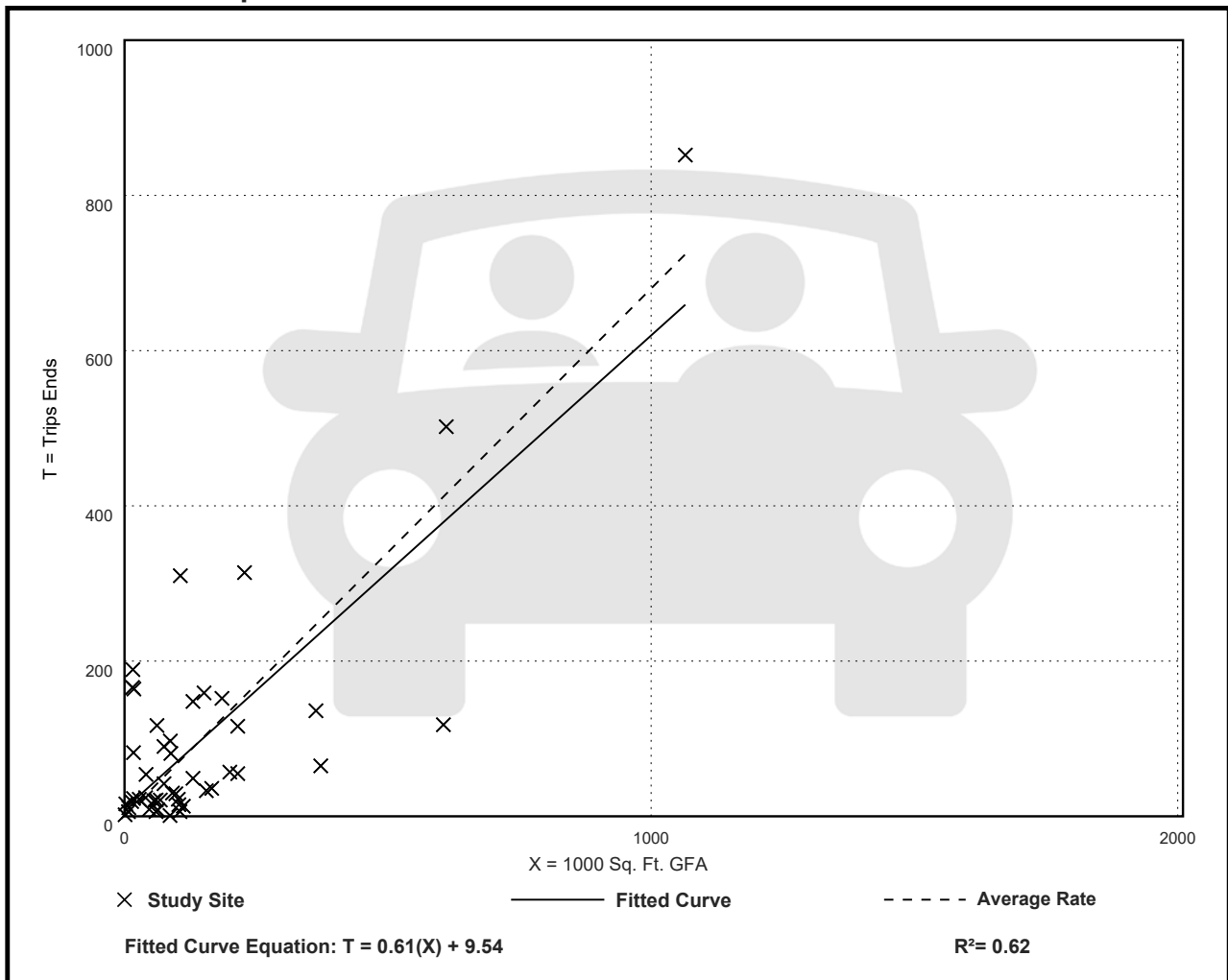
Avg. 1000 Sq. Ft. GFA: 138

Directional Distribution: 76% entering, 24% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.68	0.01 - 11.93	1.03

## Data Plot and Equation



# Manufacturing (140)

**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: 55

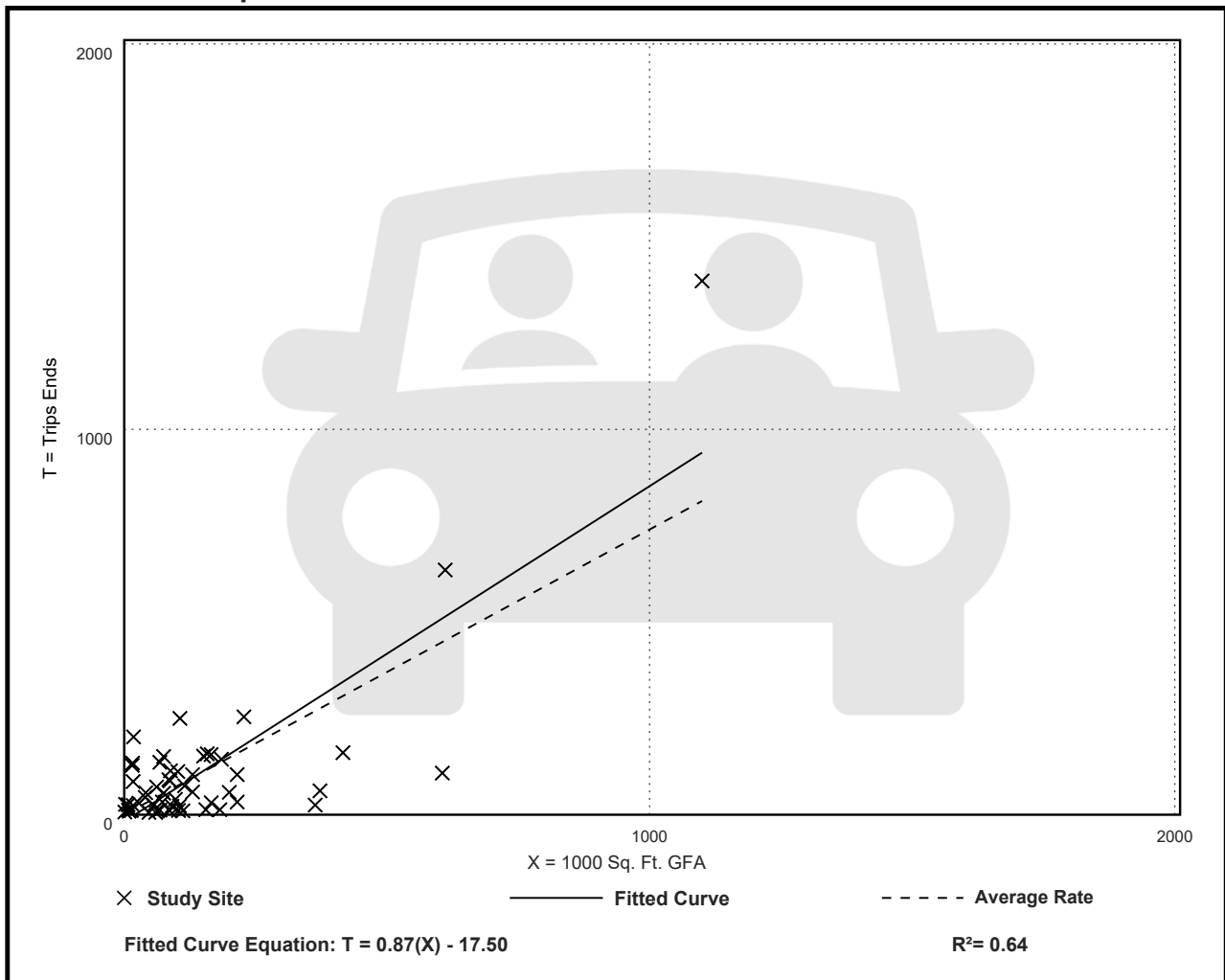
Avg. 1000 Sq. Ft. GFA: 142

Directional Distribution: 31% entering, 69% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.74	0.07 - 11.37	0.93

## Data Plot and Equation



# Land Use: 150

## Warehousing

---

### Description

A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related uses.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Texas.

### Source Numbers

184, 331, 406, 411, 443, 579, 583, 596, 598, 611, 619, 642, 752, 869, 875, 876, 914, 940, 1050

# Warehousing (150)

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

**Setting/Location: General Urban/Suburban**

Number of Studies: 31

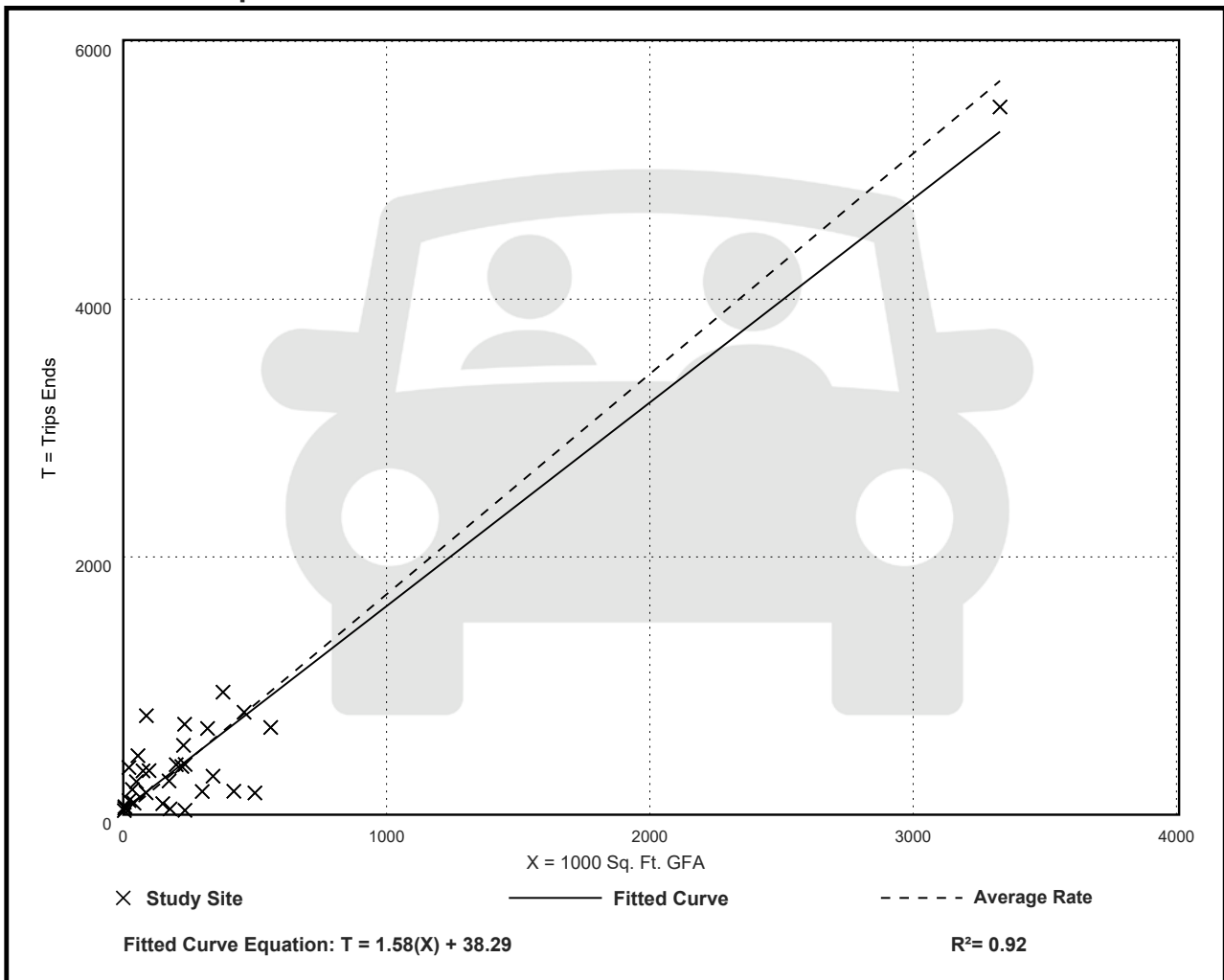
Avg. 1000 Sq. Ft. GFA: 292

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.71	0.15 - 16.93	1.48

## Data Plot and Equation



# Warehousing (150)

**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: 36

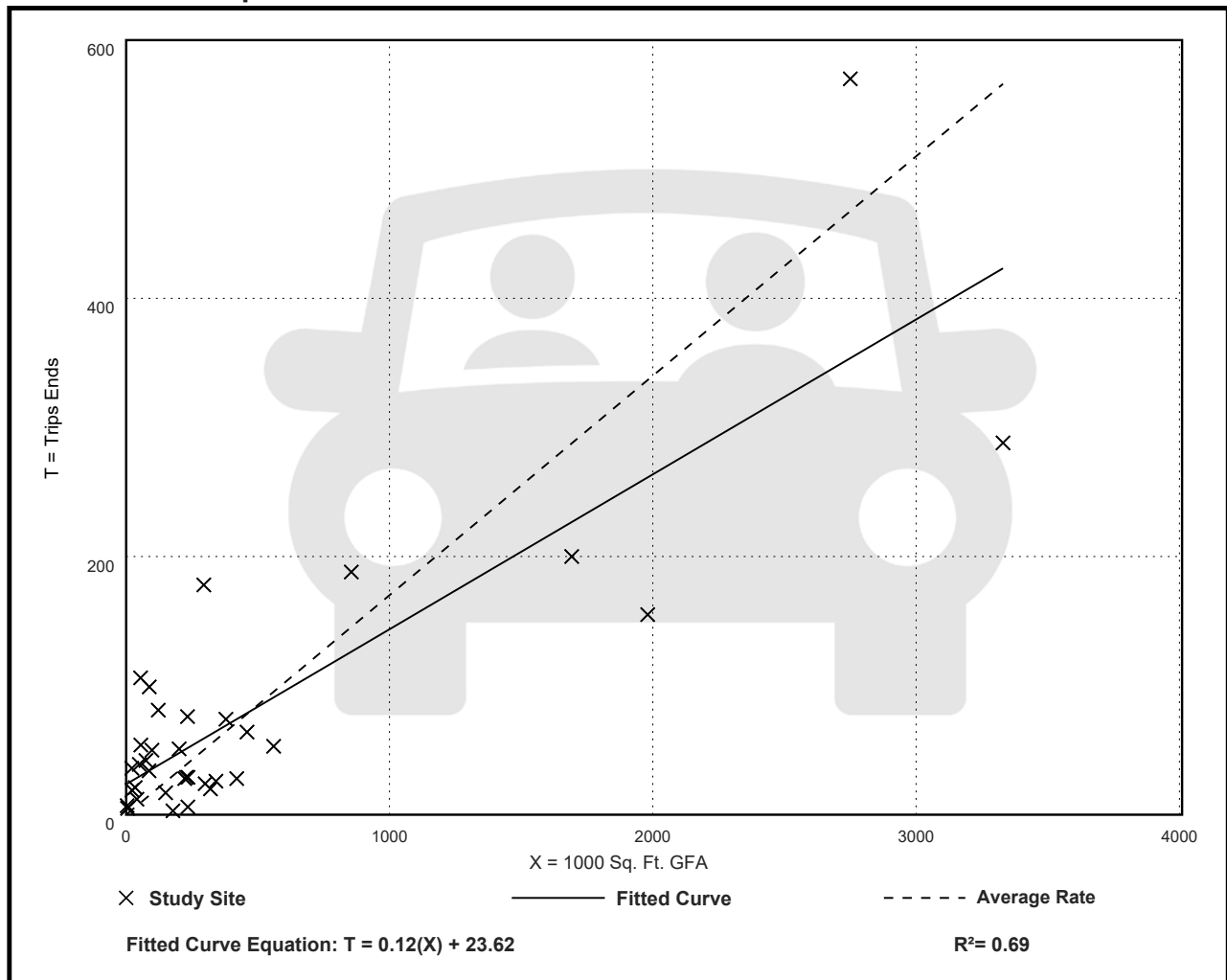
Avg. 1000 Sq. Ft. GFA: 448

Directional Distribution: 77% entering, 23% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

## Data Plot and Equation



# Warehousing (150)

**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: 49

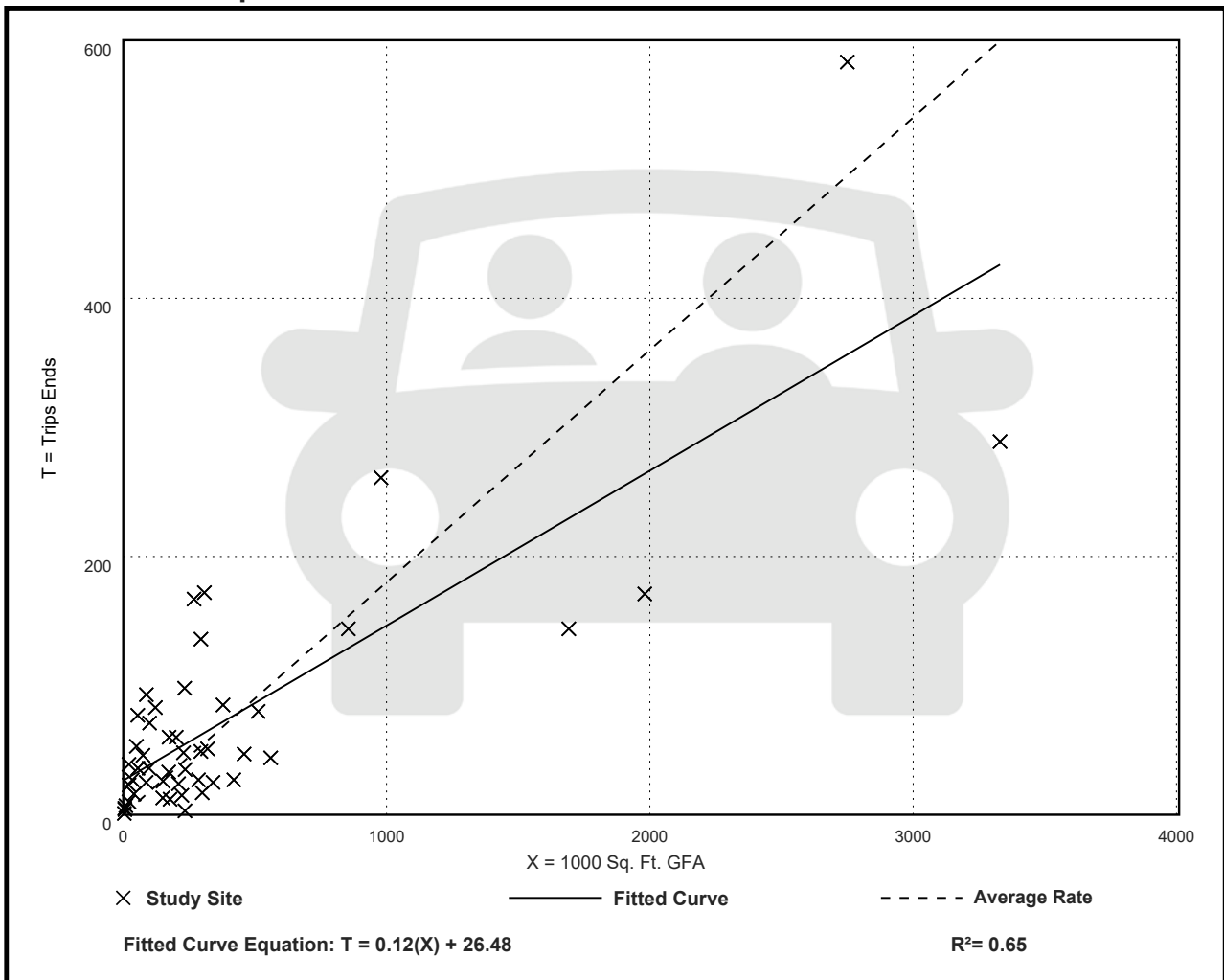
Avg. 1000 Sq. Ft. GFA: 400

Directional Distribution: 28% entering, 72% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

## Data Plot and Equation



# Land Use: 180

## Specialty Trade Contractor

---

### Description

A specialty trade contractor is a business primarily involved in providing contract repairs and services to meet industrial or residential needs. This land use includes businesses that provide the following services: plumbing, heating and cooling, machine repair, electrical and mechanical repair, industrial supply, roofing, locksmith, weed and pest control, and cleaning.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 2010s in Texas.

### Source Numbers

889, 890



# Specialty Trade Contractor (180)

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

Setting/Location: General Urban/Suburban

Number of Studies: 20

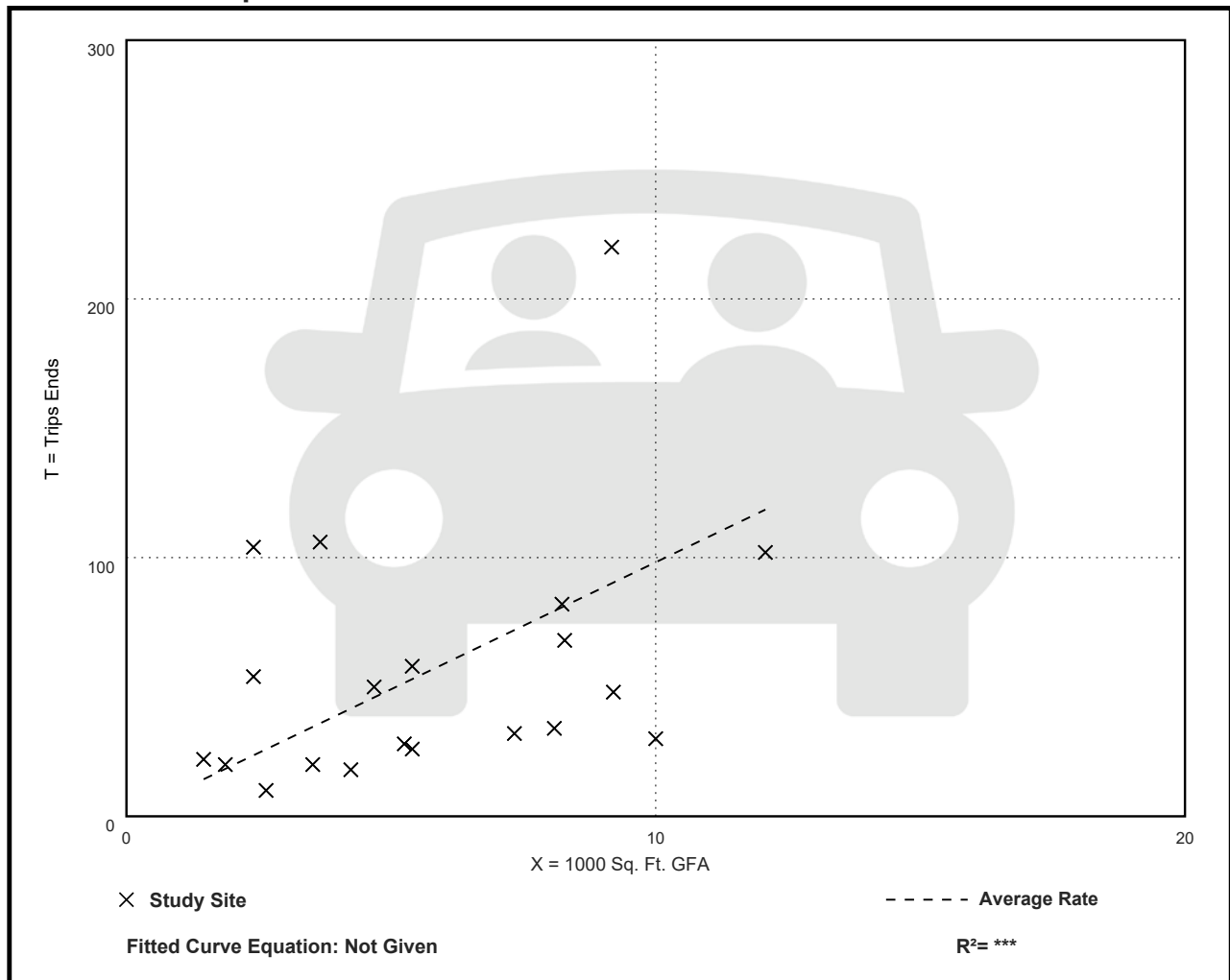
Avg. 1000 Sq. Ft. GFA: 6

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.82	3.00 - 43.33	8.56

## Data Plot and Equation



# Specialty Trade Contractor (180)

**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: 20

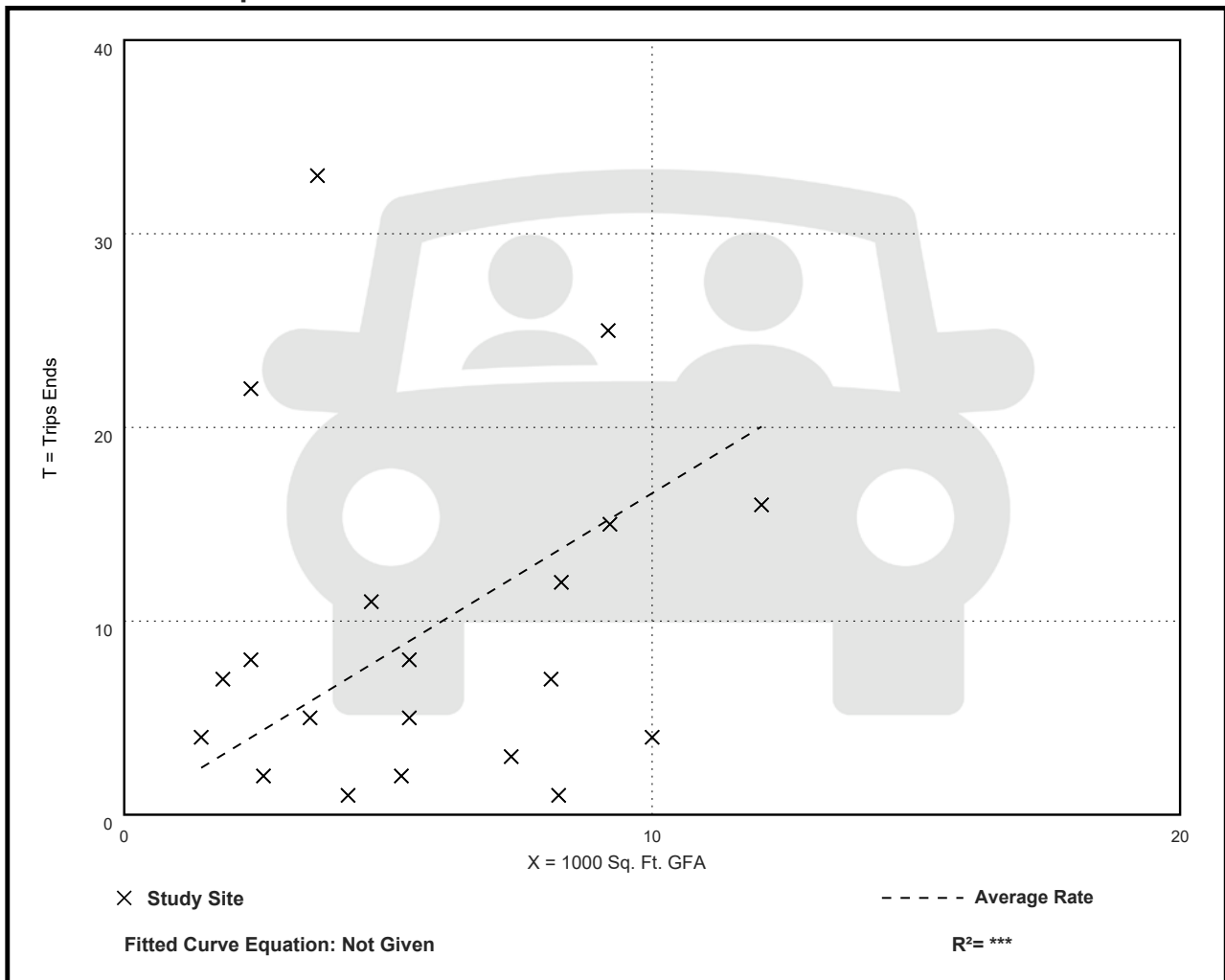
Avg. 1000 Sq. Ft. GFA: 6

Directional Distribution: 74% entering, 26% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.66	0.12 - 9.17	2.00

## Data Plot and Equation



# Specialty Trade Contractor (180)

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: 19

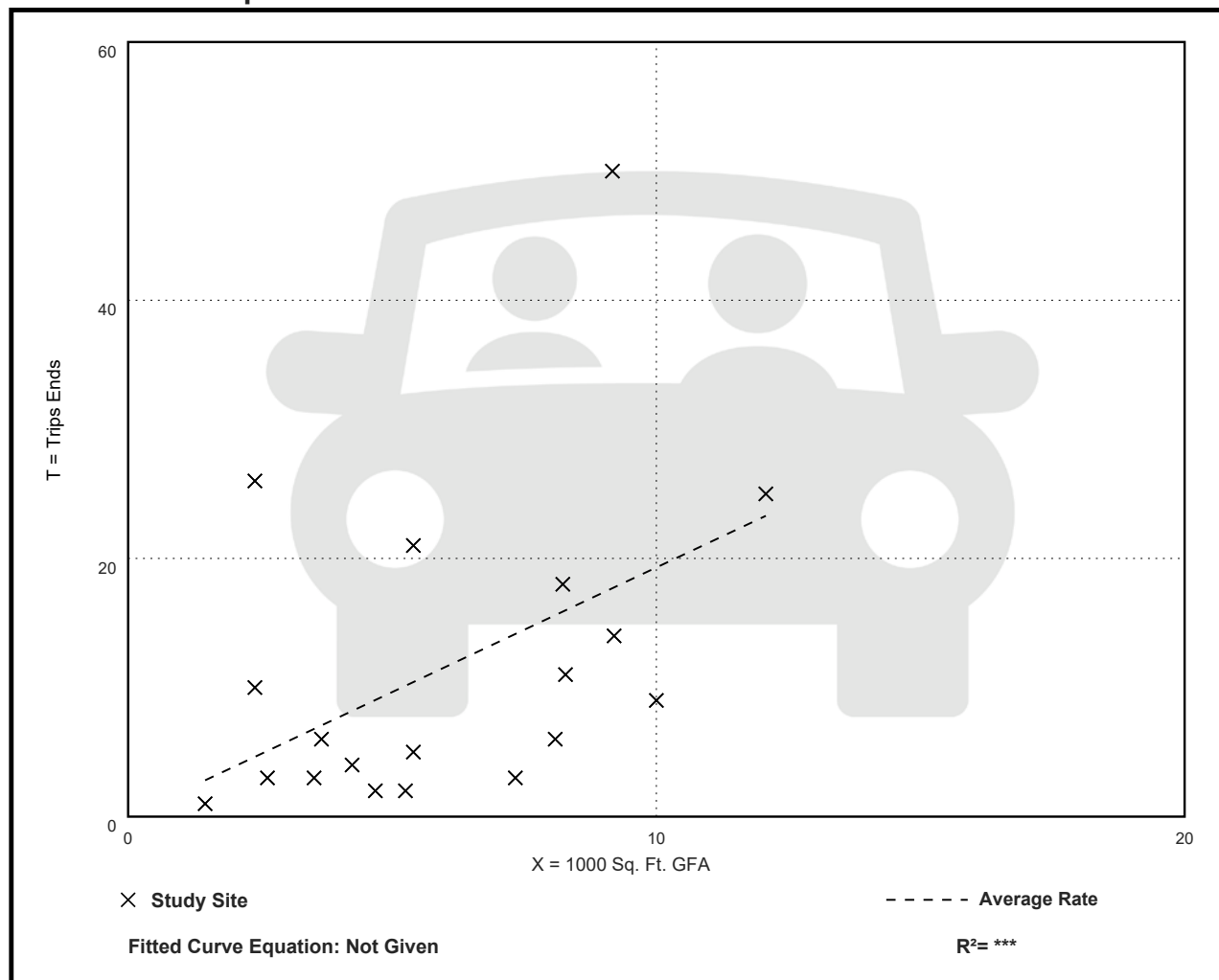
Avg. 1000 Sq. Ft. GFA: 6

Directional Distribution: 32% entering, 68% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.93	0.38 - 10.83	1.98

## Data Plot and Equation



# Land Use: 210

## Single-Family Detached Housing

---

### Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

### Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

### Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079

# Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

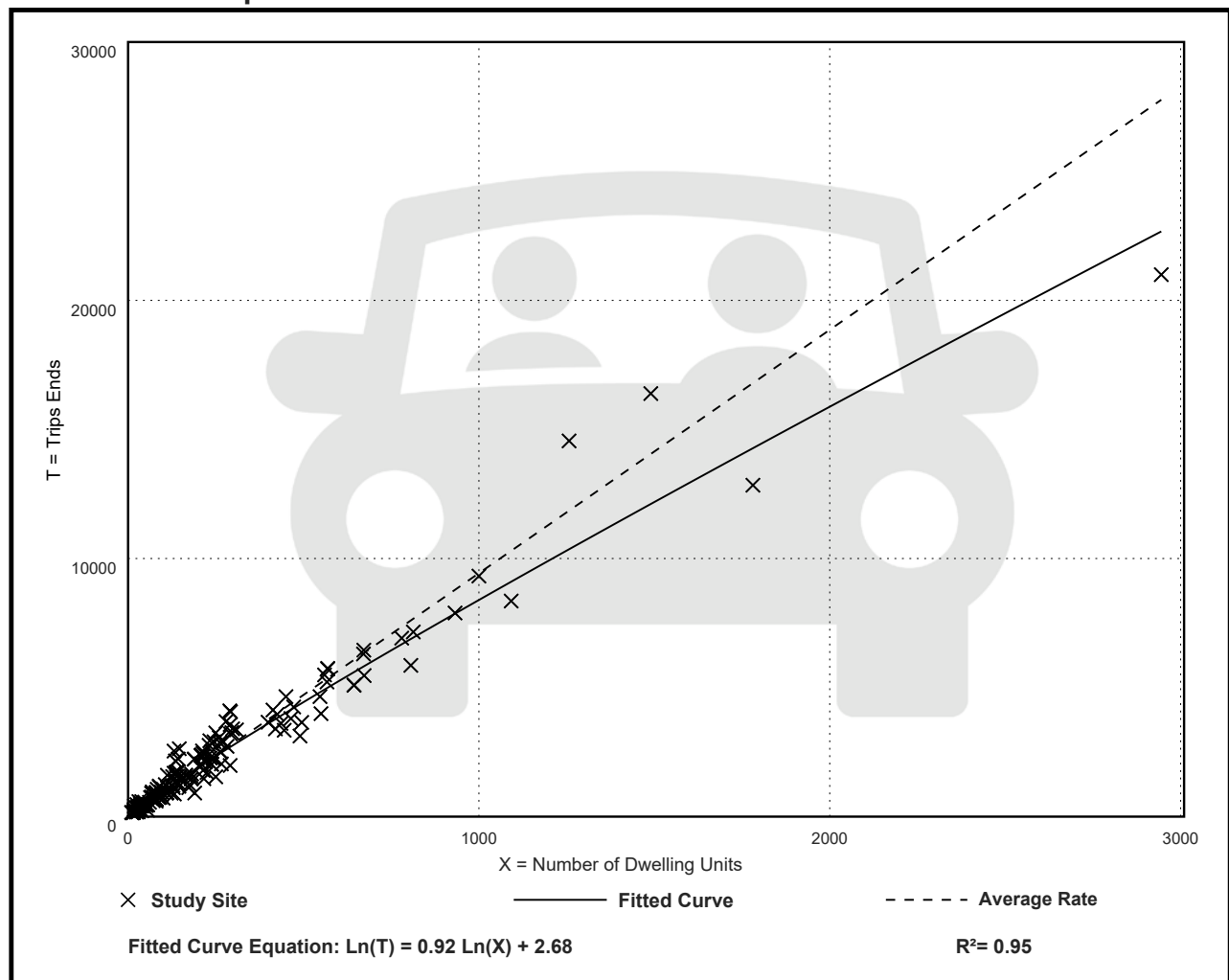
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

## Data Plot and Equation



# Single-Family Detached Housing (210)

## Vehicle Trip Ends vs: Dwelling Units

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: 192

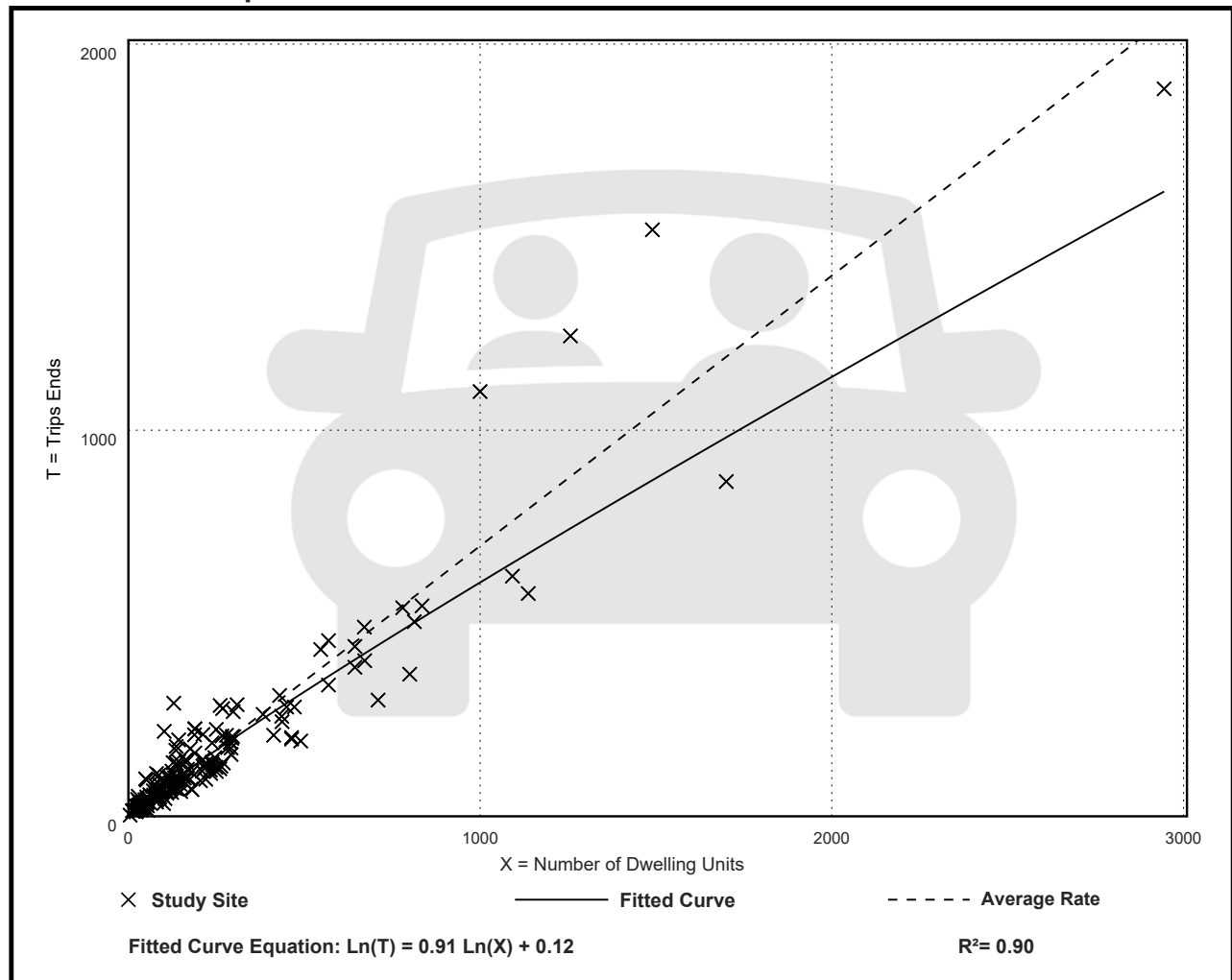
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

## Data Plot and Equation



# Single-Family Detached Housing (210)

## Vehicle Trip Ends vs: Dwelling Units

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: 208

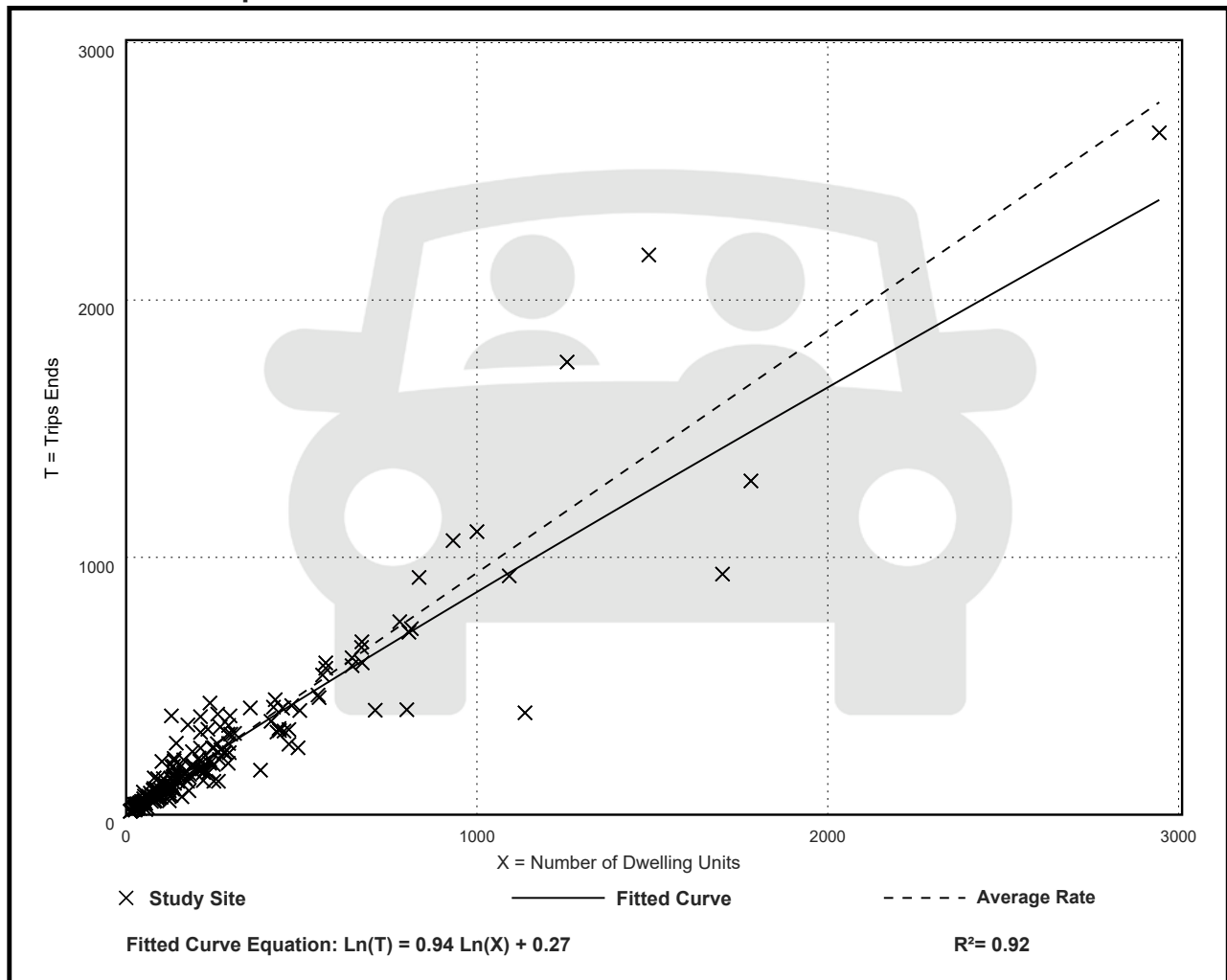
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

## Data Plot and Equation



# Land Use: 220

## Multifamily Housing (Low-Rise)

---

### Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.
- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.
- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.

### Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

### Additional Data

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip



generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

***It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).***

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in British Columbia (CAN), California, Delaware, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, and Washington.

### **Source Numbers**

188, 204, 237, 300, 305, 306, 320, 321, 357, 390, 412, 525, 530, 579, 583, 638, 864, 866, 896, 901, 903, 904, 936, 939, 944, 946, 947, 948, 963, 964, 966, 967, 1012, 1013, 1014, 1036, 1047, 1056, 1071, 1076

# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 22

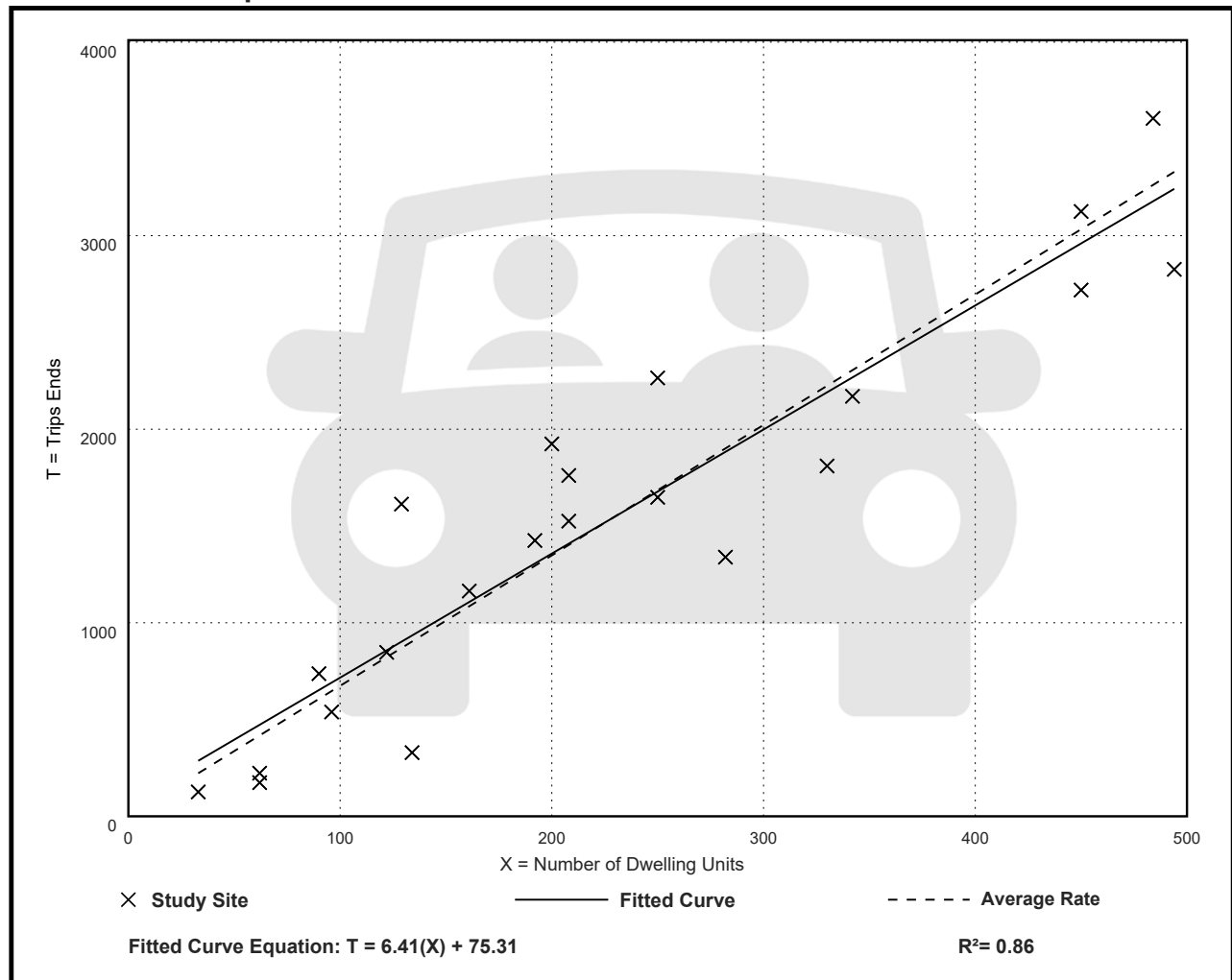
Avg. Num. of Dwelling Units: 229

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
6.74	2.46 - 12.50	1.79

## Data Plot and Equation



# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

## Vehicle Trip Ends vs: Dwelling Units

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: 49

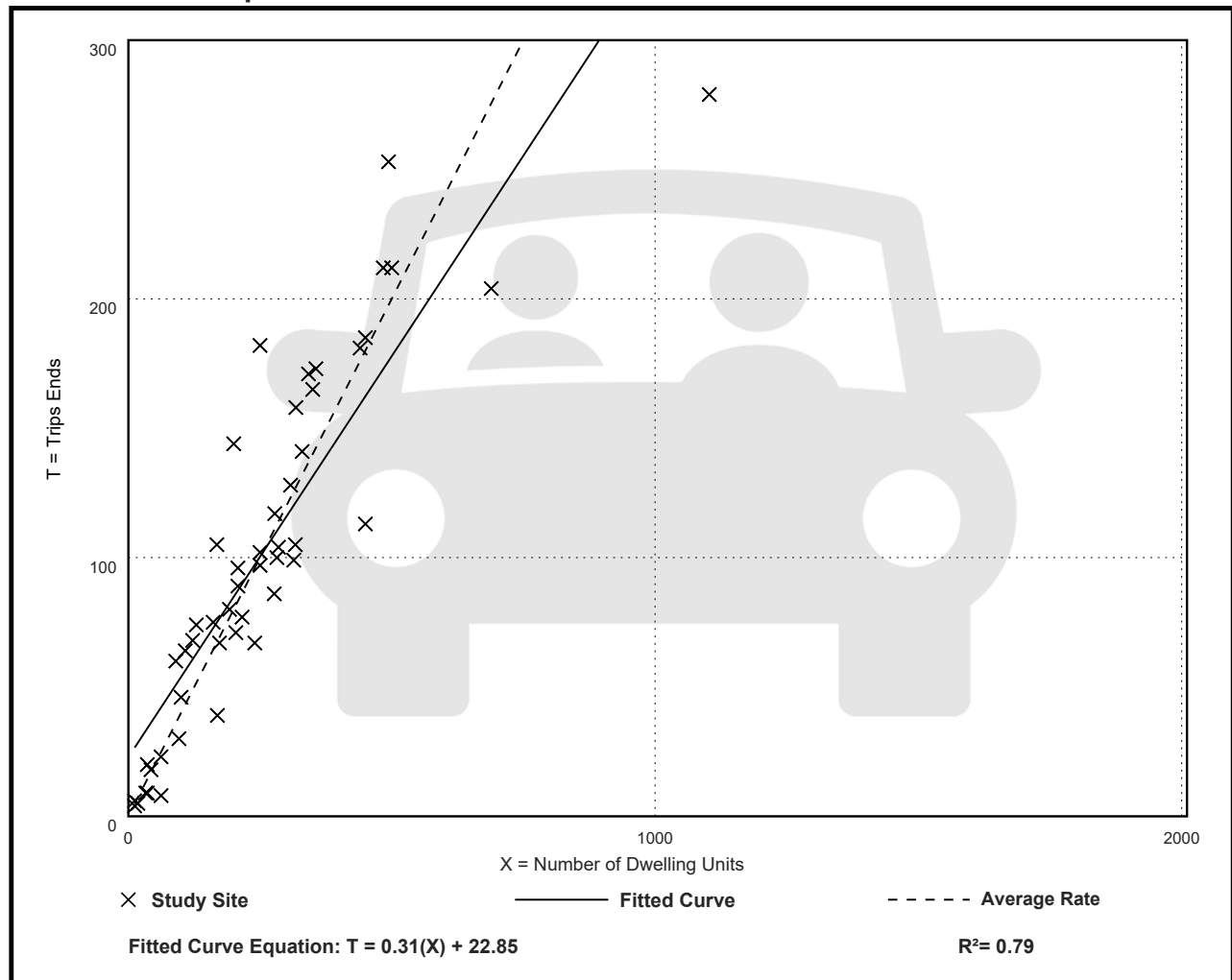
Avg. Num. of Dwelling Units: 249

Directional Distribution: 24% entering, 76% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

## Data Plot and Equation



# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

## Vehicle Trip Ends vs: Dwelling Units

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: 59

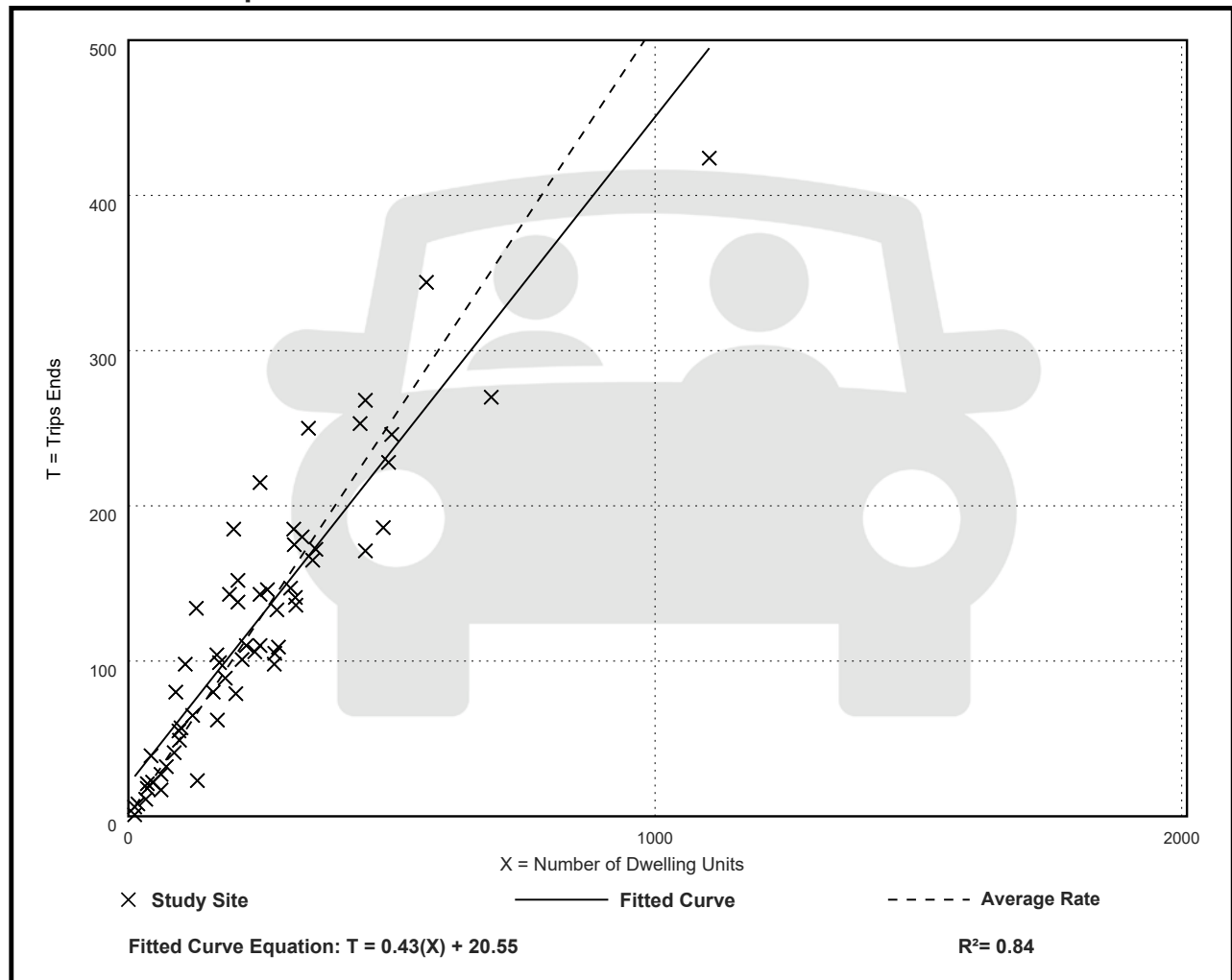
Avg. Num. of Dwelling Units: 241

Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

## Data Plot and Equation



# Land Use: 221

## Multifamily Housing (Mid-Rise)

---

### Description

Mid-rise multifamily housing includes apartments and condominiums located in a building that has between four and 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (mid-rise) (Land Use 226), and mid-rise residential with ground-floor commercial (Land Use 231) are related land uses.

### Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

### Additional Data

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.5 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

***It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).***

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, Montana, New Jersey, New York, Ontario (CAN), Oregon, Utah, and Virginia.

### Source Numbers

168, 188, 204, 305, 306, 321, 818, 857, 862, 866, 901, 904, 910, 949, 951, 959, 963, 964, 966, 967, 969, 970, 1004, 1014, 1022, 1023, 1025, 1031, 1032, 1035, 1047, 1056, 1057, 1058, 1071, 1076

# Multifamily Housing (Mid-Rise) Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 11

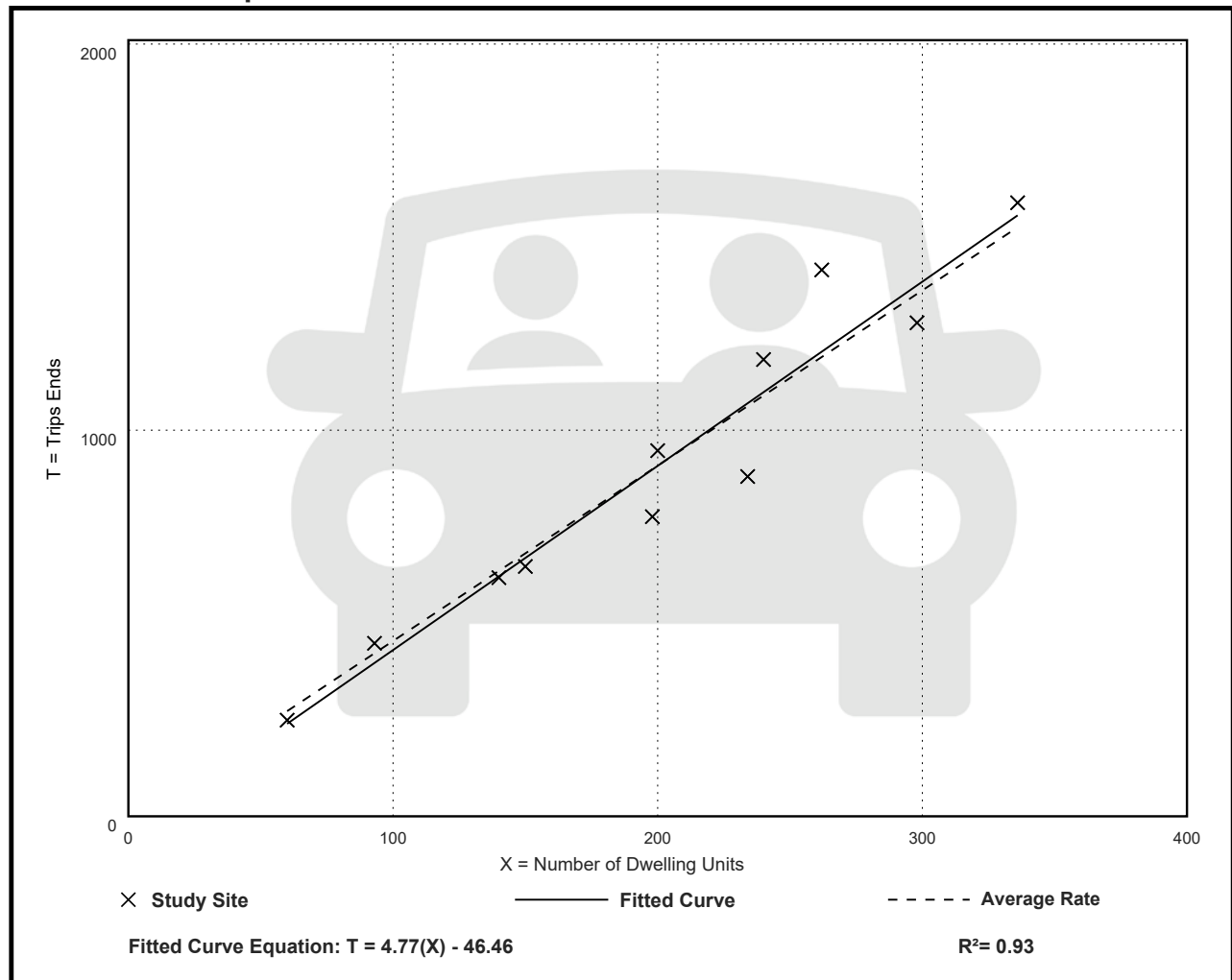
Avg. Num. of Dwelling Units: 201

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.54	3.76 - 5.40	0.51

## Data Plot and Equation



# Multifamily Housing (Mid-Rise) Not Close to Rail Transit (221)

## Vehicle Trip Ends vs: Dwelling Units

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: 30

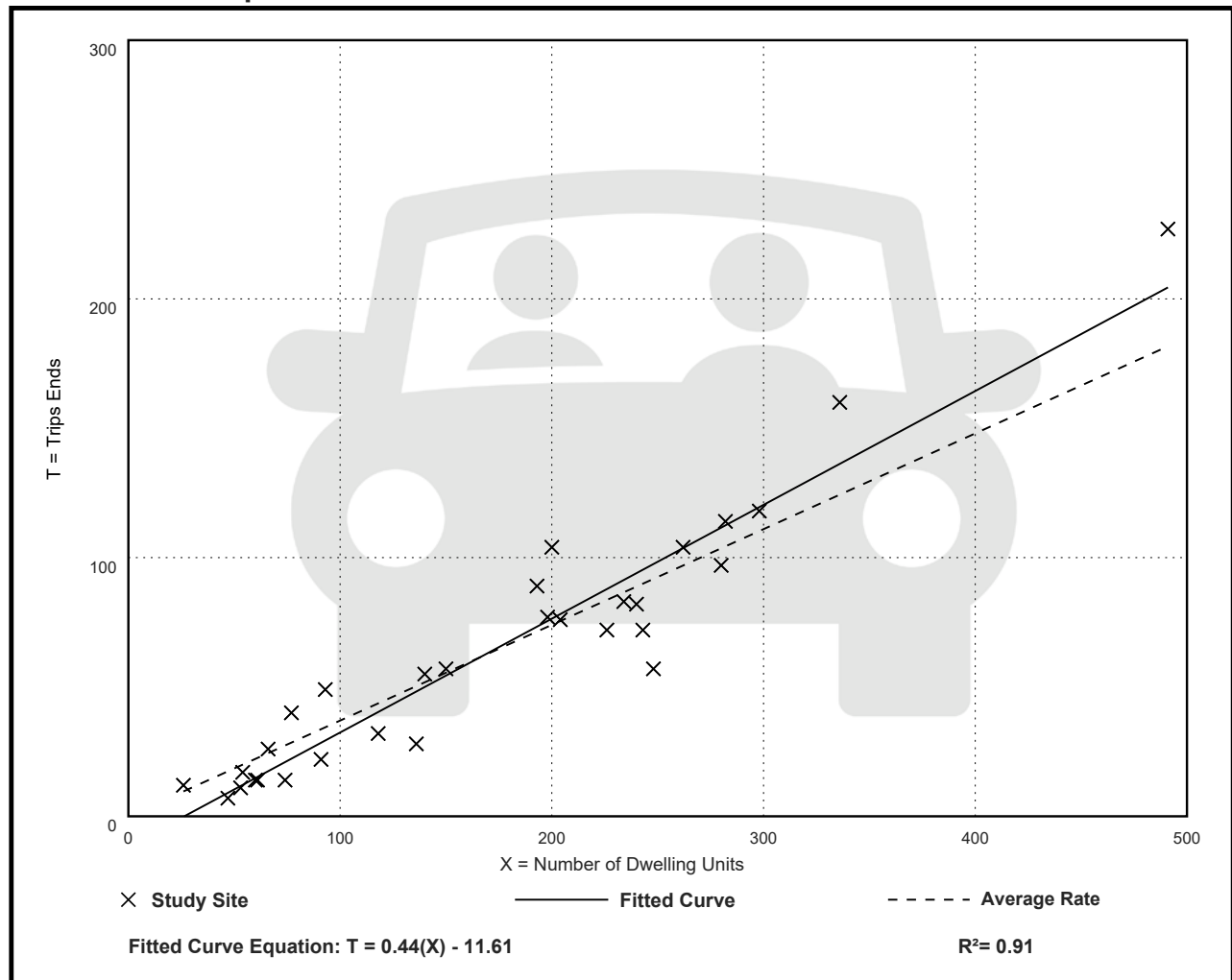
Avg. Num. of Dwelling Units: 173

Directional Distribution: 23% entering, 77% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

## Data Plot and Equation



# Multifamily Housing (Mid-Rise) Not Close to Rail Transit (221)

## Vehicle Trip Ends vs: Dwelling Units

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: 31

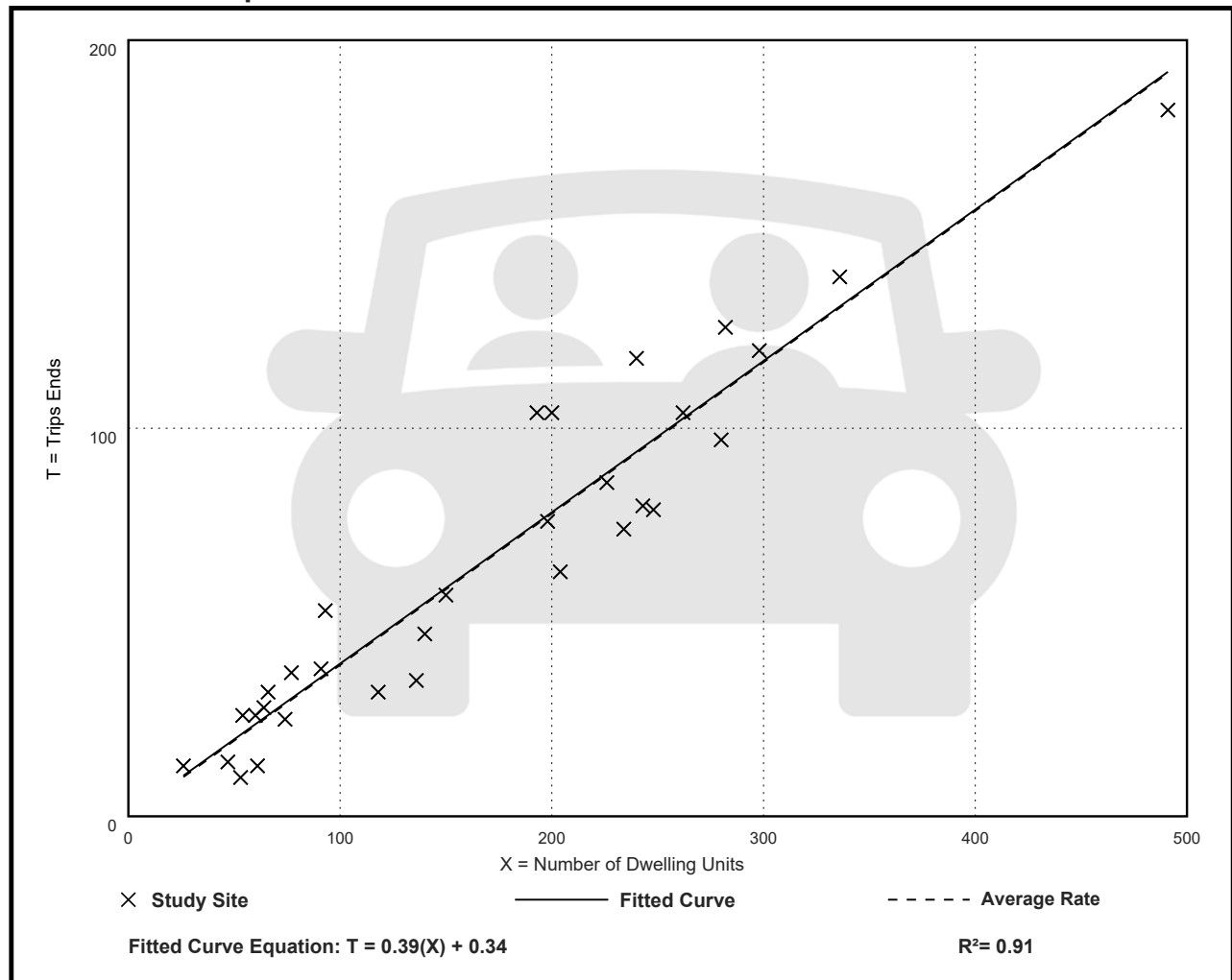
Avg. Num. of Dwelling Units: 169

Directional Distribution: 61% entering, 39% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

## Data Plot and Equation





# Land Use: 251

## Senior Adult Housing—Single-Family

---

### Description

Senior adult housing—single-family sites are independent living developments that are called various names including retirement communities, age-restricted housing, and active adult communities. The development has a specific age restriction for its residents, typically a minimum of 55 years of age for at least one resident of the household.

Residents in these communities are typically considered active and requiring little to no medical supervision. The percentage of retired residents varies by development. The development may include amenities such as a golf course, swimming pool, 24-hour security, transportation, and common recreational facilities. They generally lack centralized dining and on-site health facilities.

The dwelling units can be either detached or attached. The types of housing types represented by sites in the database include traditional single-family detached homes, patio homes, duplexes, and townhouses. Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Senior adult housing—multifamily (Land Use 252), congregate care facility (Land Use 253), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related land uses.

### Additional Data

***Caution should be used when applying trip rates for this land use as it may contain a wide variety of studies ranging from communities with very active, working residents to communities with older, retired residents. As more data become available, consideration will be given to future stratification of this land use.***

Many factors affected the trip rates for detached senior adult housing. Factors such as the average age of residents, development location and size, affluence of residents, employment status, and vehicular access should be taken into consideration when conducting an analysis. Some developments were located within close proximity to medical facilities, restaurants, shopping centers, banks, and recreational activities.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For the six sites for which data were provided for both occupied dwelling units and total dwelling units, an average of 98 percent of the units were occupied.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Delaware, Florida, Maryland, New Jersey, New York, Pennsylvania, Virginia, and Washington.

### **Source Numbers**

221, 289, 398, 421, 500, 550, 598, 601, 602, 629, 930, 1015, 1060, 1074

# Senior Adult Housing - Single-Family (251)

Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 15

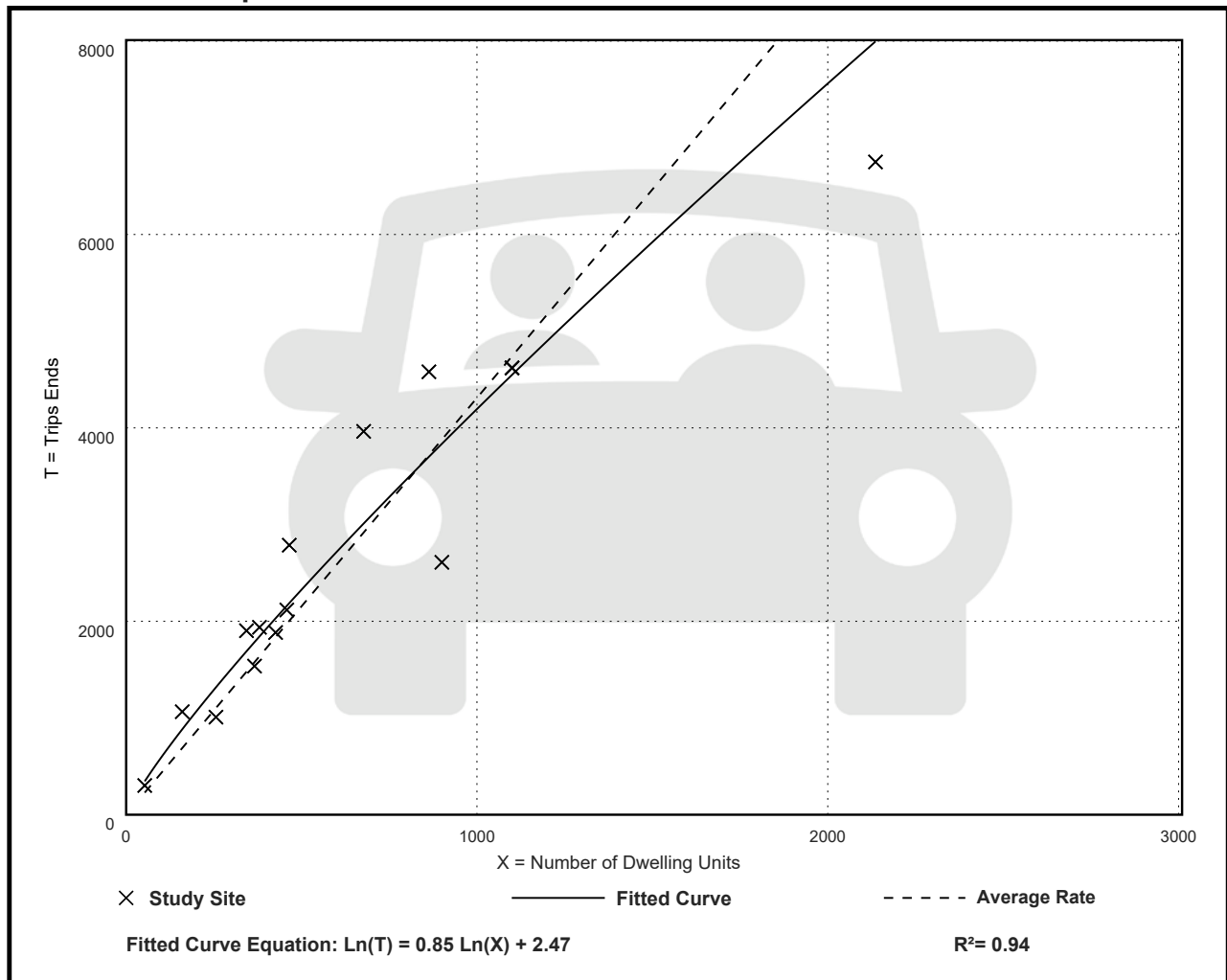
Avg. Num. of Dwelling Units: 646

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.31	2.90 - 6.66	1.07

## Data Plot and Equation



# Senior Adult Housing - Single-Family (251)

## Vehicle Trip Ends vs: Dwelling Units

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: 34

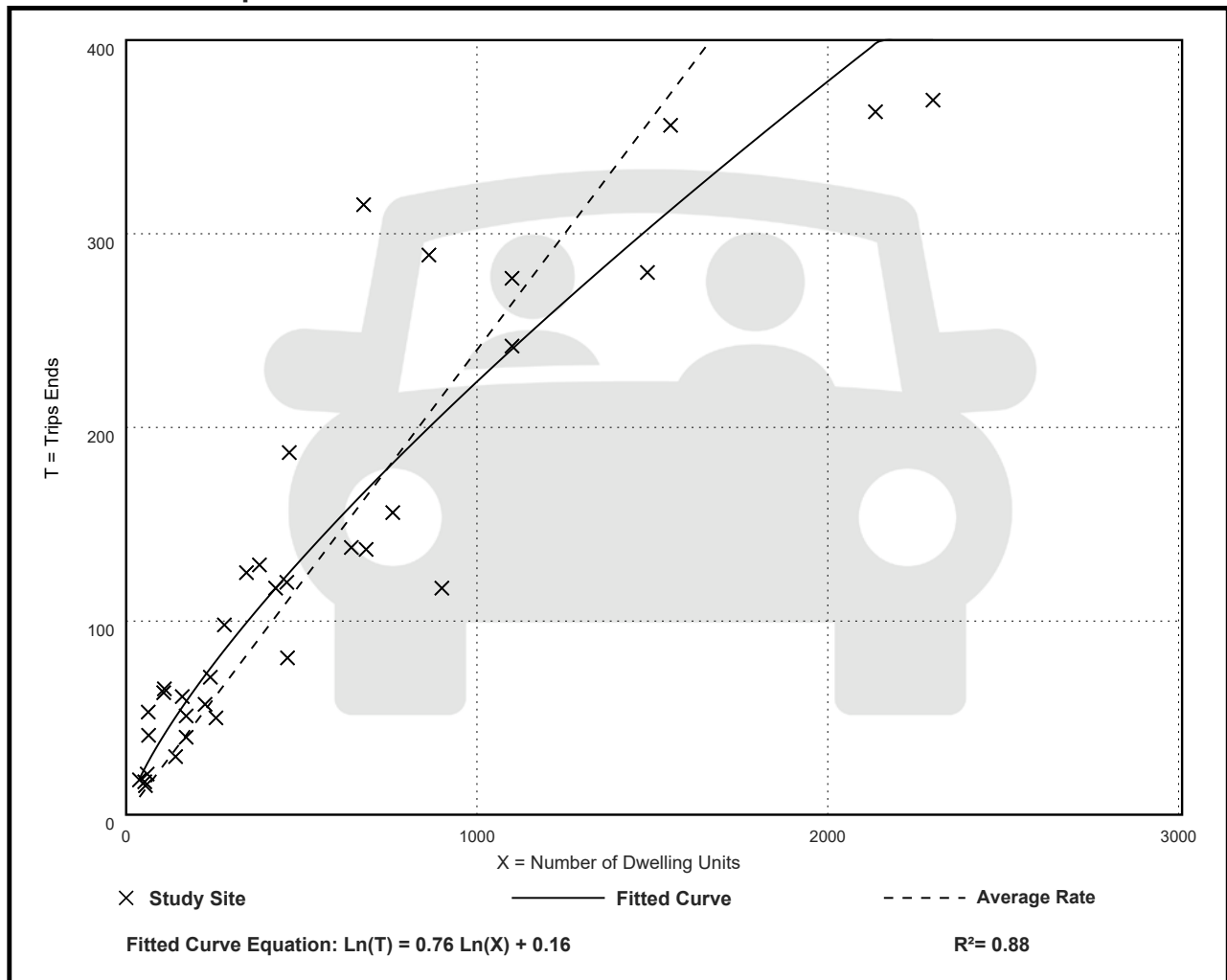
Avg. Num. of Dwelling Units: 557

Directional Distribution: 33% entering, 67% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.24	0.13 - 0.84	0.10

## Data Plot and Equation



# Senior Adult Housing - Single-Family (251)

## Vehicle Trip Ends vs: Dwelling Units

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: 35

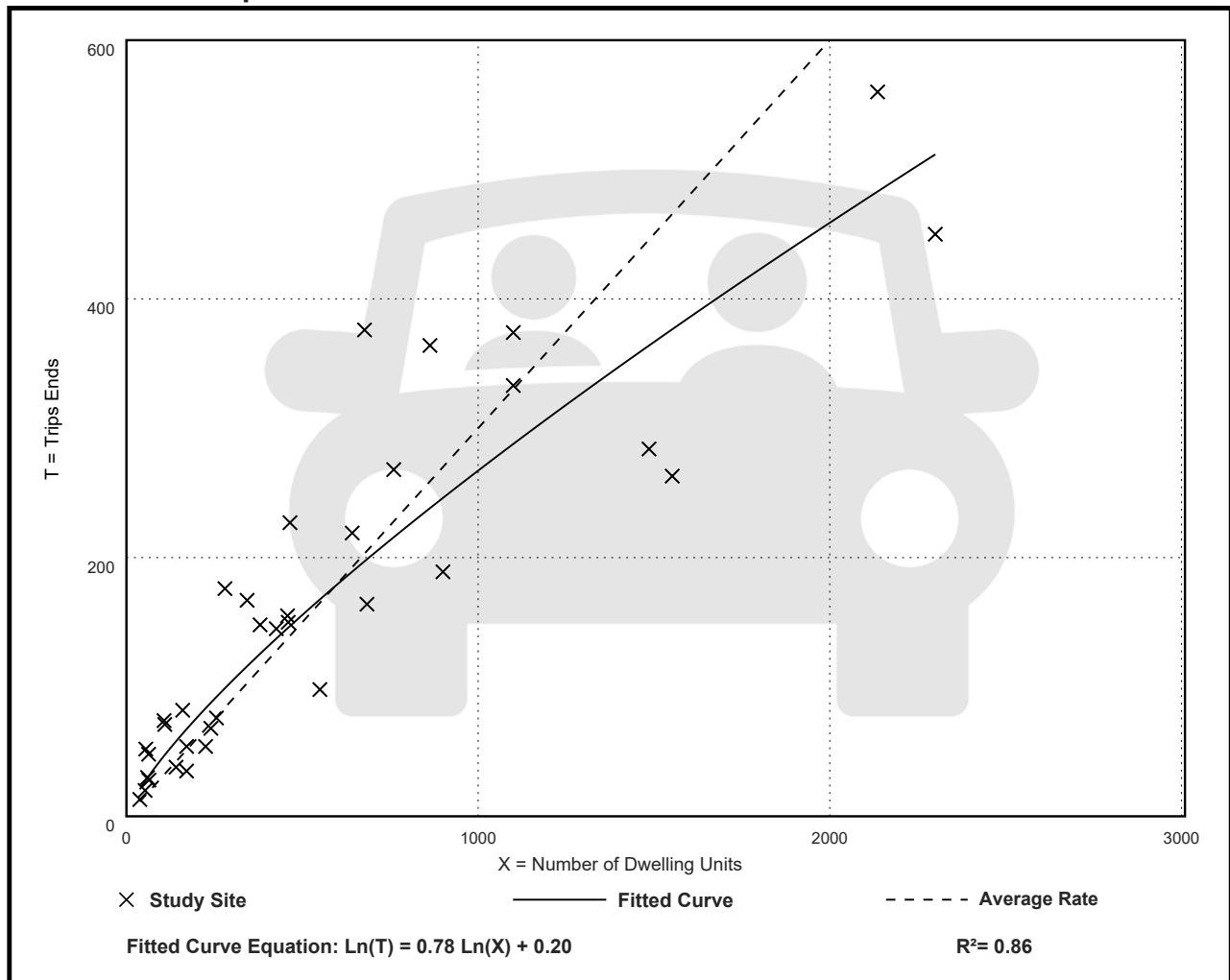
Avg. Num. of Dwelling Units: 556

Directional Distribution: 61% entering, 39% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.17 - 0.95	0.12

## Data Plot and Equation



# Land Use: 253

## Congregate Care Facility

---

### Description

A congregate care facility is an independent living development that provides centralized amenities such as dining, housekeeping, communal transportation, and organized social/recreational activities. Each individual dwelling unit often has a kitchenette. Assistance is typically available for housekeeping or minor household maintenance. Limited medical services (such as nursing and dental) may or may not be provided. The resident may contract additional medical services or personal assistance. Senior adult housing—single-family (Land Use 251), senior adult housing—multifamily (Land Use 252), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related uses.

### Additional Data

Resident vehicle ownership levels are very low at a congregate care facility. The majority of site-generated trips are made by facility employees, contracted services, and visitors.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), Minnesota, Ontario (CAN), and Oregon.

### Source Numbers

155, 584, 910, 970, 1049

# Congregate Care Facility (253)

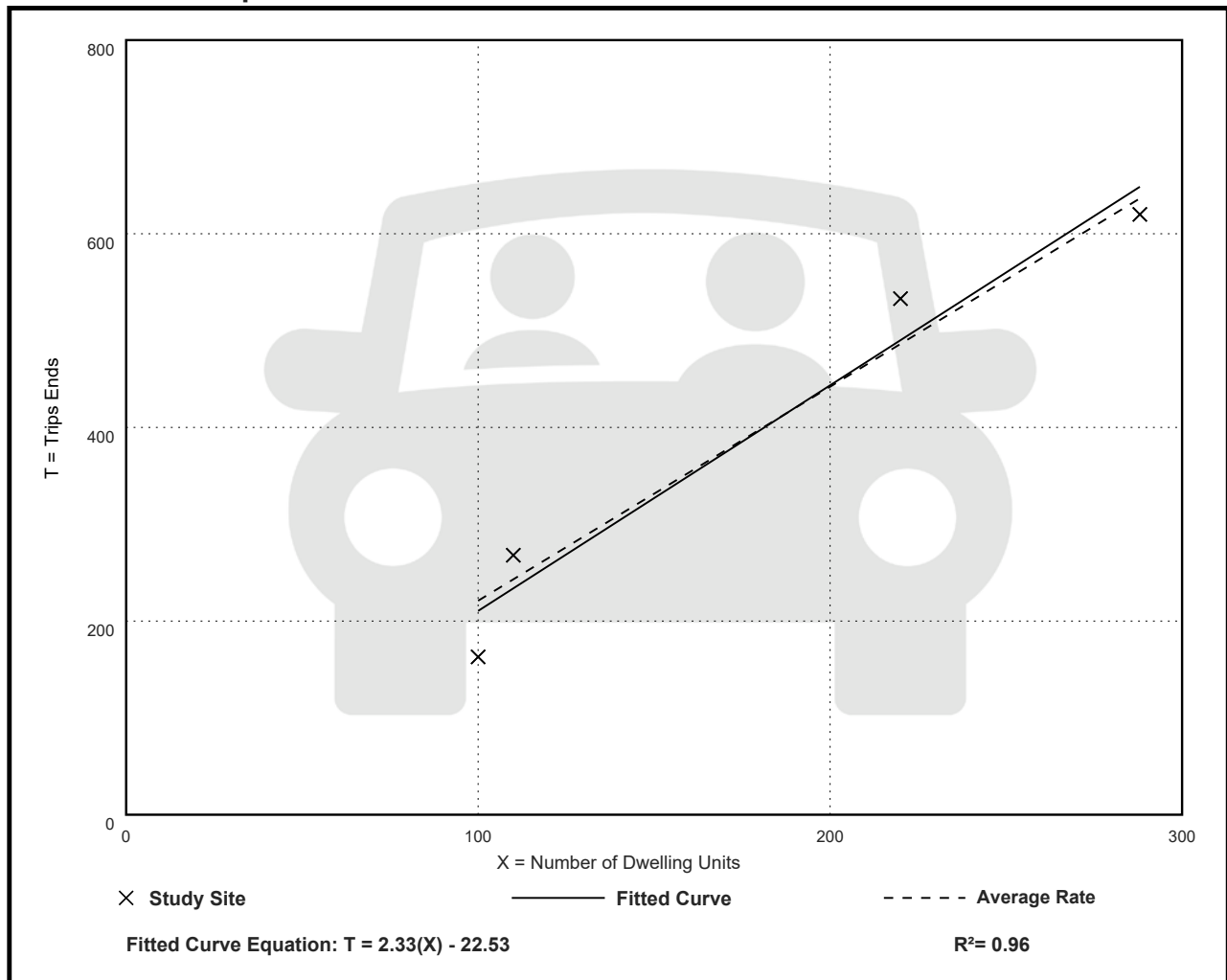
**Vehicle Trip Ends vs: Dwelling Units**  
On a: Weekday

**Setting/Location: General Urban/Suburban**  
Number of Studies: 4  
Avg. Num. of Dwelling Units: 180  
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
2.21	1.63 - 2.44	0.31

## Data Plot and Equation



# Congregate Care Facility (253)

## Vehicle Trip Ends vs: Dwelling Units

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: 8

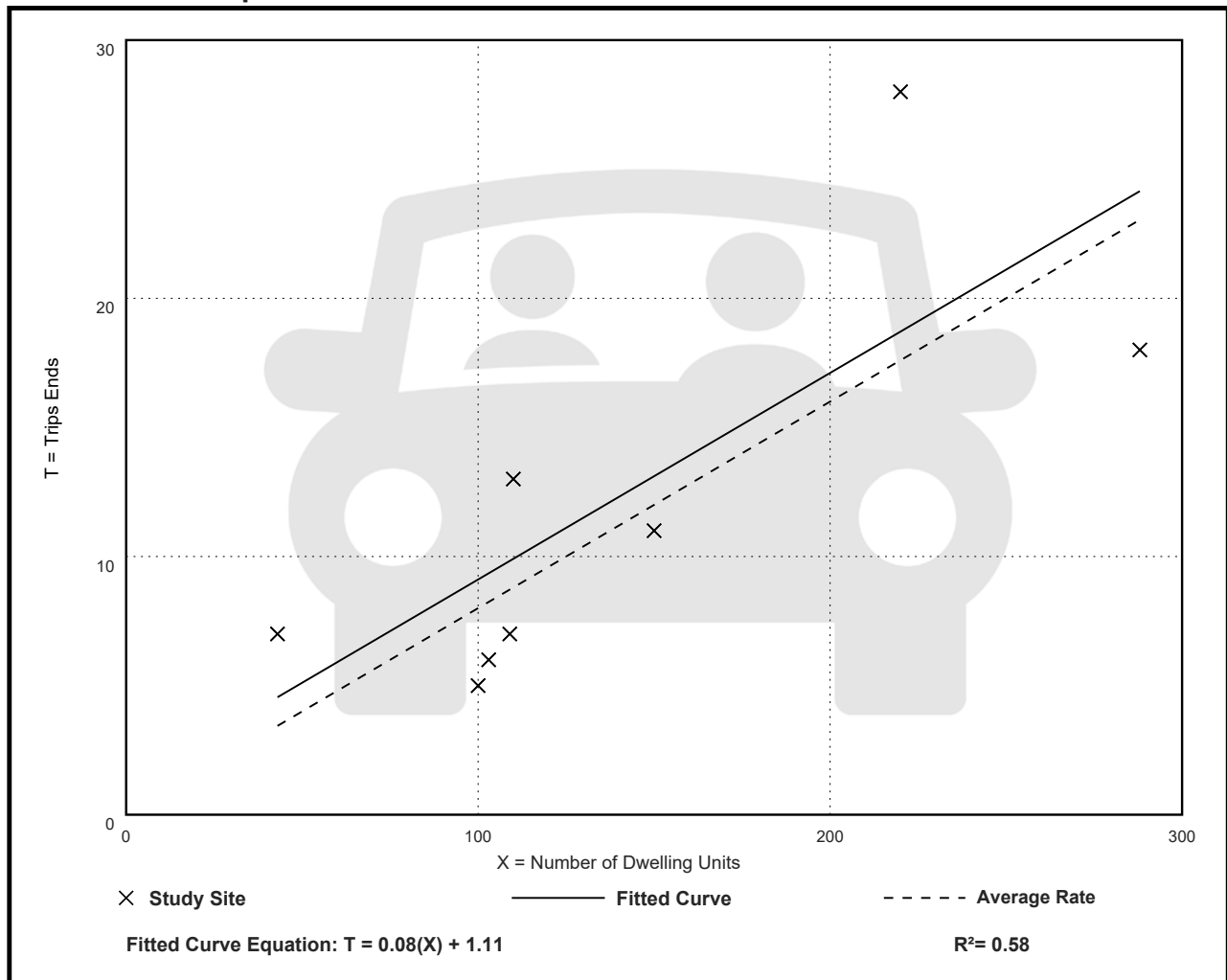
Avg. Num. of Dwelling Units: 140

Directional Distribution: 58% entering, 42% exiting

### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.08	0.05 - 0.16	0.03

### Data Plot and Equation





# Congregate Care Facility (253)

## Vehicle Trip Ends vs: Dwelling Units

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: 9

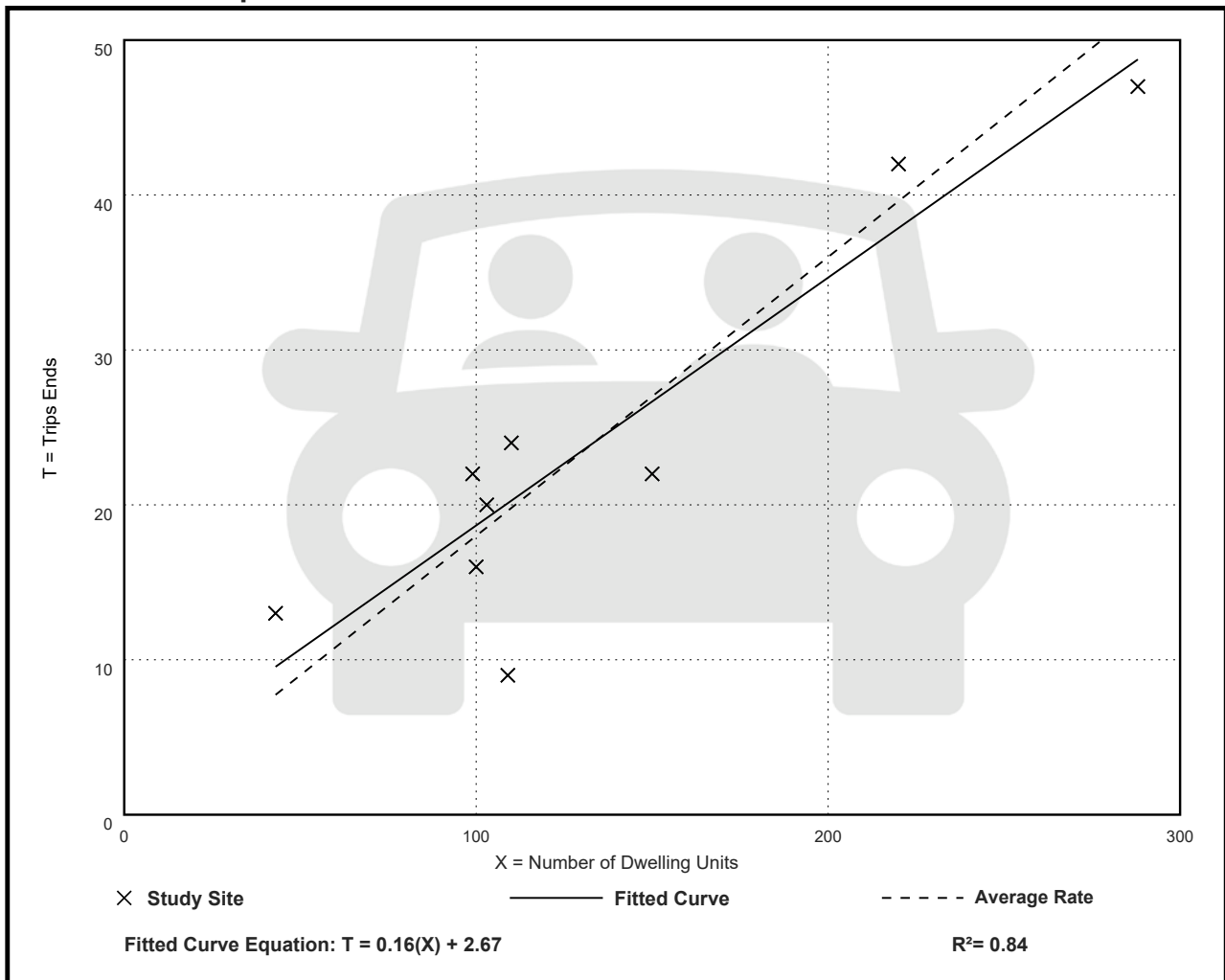
Avg. Num. of Dwelling Units: 136

Directional Distribution: 49% entering, 51% exiting

### Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.18	0.08 - 0.30	0.05

### Data Plot and Equation



# Land Use: 710

## General Office Building

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### Description

A general office building is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building houses multiple tenants that can include, as examples, professional services, insurance companies, investment brokers, a banking institution, a restaurant, or other service retailers. A general office building with a gross floor area of 10,000 square feet or less is classified as a small office building (Land Use 712). Corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), medical-dental office building (Land Use 720), office park (Land Use 750), research and development center (Land Use 760), and business park (Land Use 770) are additional related uses.

### Additional Data

If two or more general office buildings are in close physical proximity (within a close walk) and function as a unit (perhaps with a shared parking facility and common or complementary tenants), the total gross floor area or employment of the paired office buildings can be used for calculating the site trip generation. If the individual buildings are isolated or not functionally related to one another, trip generation should be calculated for each building separately.

For study sites with reported gross floor area and employees, an average employee density of 3.3 employees per 1,000 square feet GFA (or roughly 300 square feet per employee) has been consistent through the 1980s, 1990s, and 2000s. No sites counted in the 2010s reported both GFA and employees.

The average building occupancy varies considerably within the studies for which occupancy data were provided. The reported occupied gross floor area was 88 percent for general urban/suburban sites and 96 percent for the center city core and dense multi-use urban sites.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The average numbers of person trips per vehicle trip at the eight center city core sites at which both person trip and vehicle trip data were collected are as follows:

- 2.8 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 2.9 during Weekday, AM Peak Hour of Generator
- 2.9 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 3.0 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 18 dense multi-use urban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.5 during Weekday, AM Peak Hour of Generator
- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.5 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 23 general urban/suburban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.3 during Weekday, AM Peak Hour of Generator
- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.4 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, Colorado, Connecticut, Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Jersey, New York, Ontario (CAN) Pennsylvania, Texas, Utah, Virginia, and Washington.

### **Source Numbers**

161, 175, 183, 184, 185, 207, 212, 217, 247, 253, 257, 260, 262, 273, 279, 297, 298, 300, 301, 302, 303, 304, 321, 322, 323, 324, 327, 404, 407, 408, 419, 423, 562, 734, 850, 859, 862, 867, 869, 883, 884, 890, 891, 904, 940, 944, 946, 964, 965, 972, 1009, 1030, 1058, 1061

# General Office Building (710)

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

**Setting/Location: General Urban/Suburban**

Number of Studies: 59

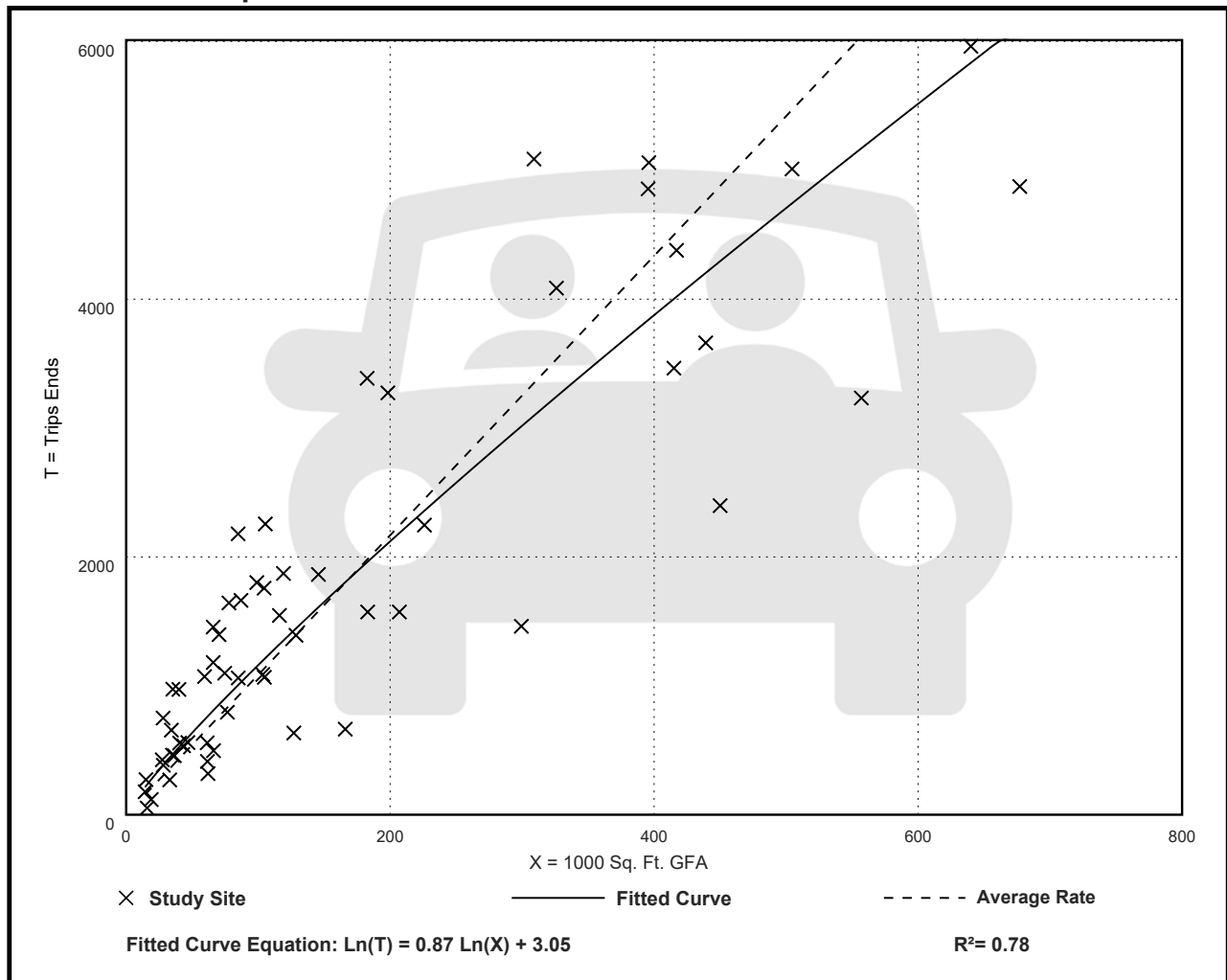
Avg. 1000 Sq. Ft. GFA: 163

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
10.84	3.27 - 27.56	4.76

## Data Plot and Equation



# General Office Building (710)

**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: 221

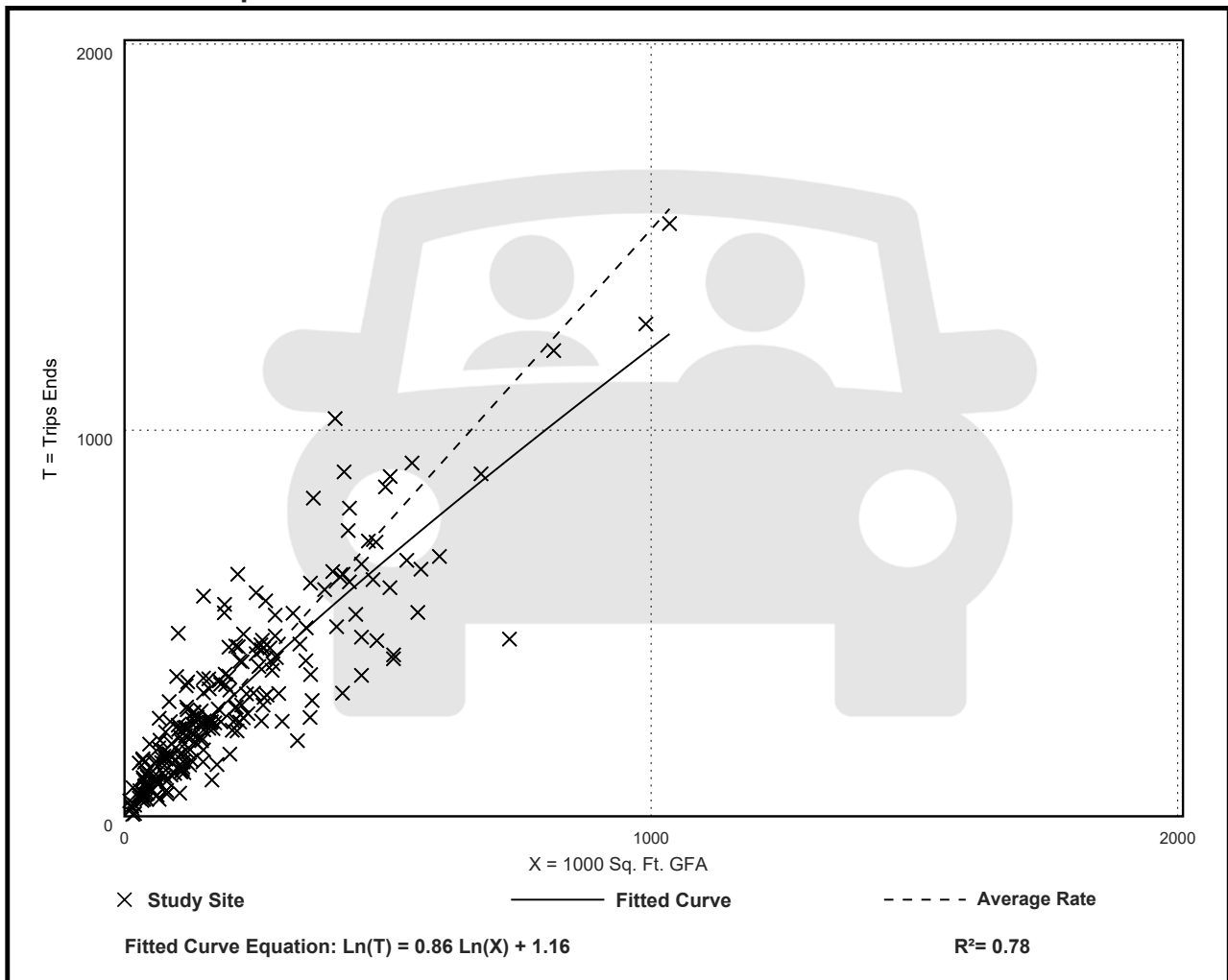
Avg. 1000 Sq. Ft. GFA: 201

Directional Distribution: 88% entering, 12% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.52	0.32 - 4.93	0.58

## Data Plot and Equation



# General Office Building (710)

**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: 232

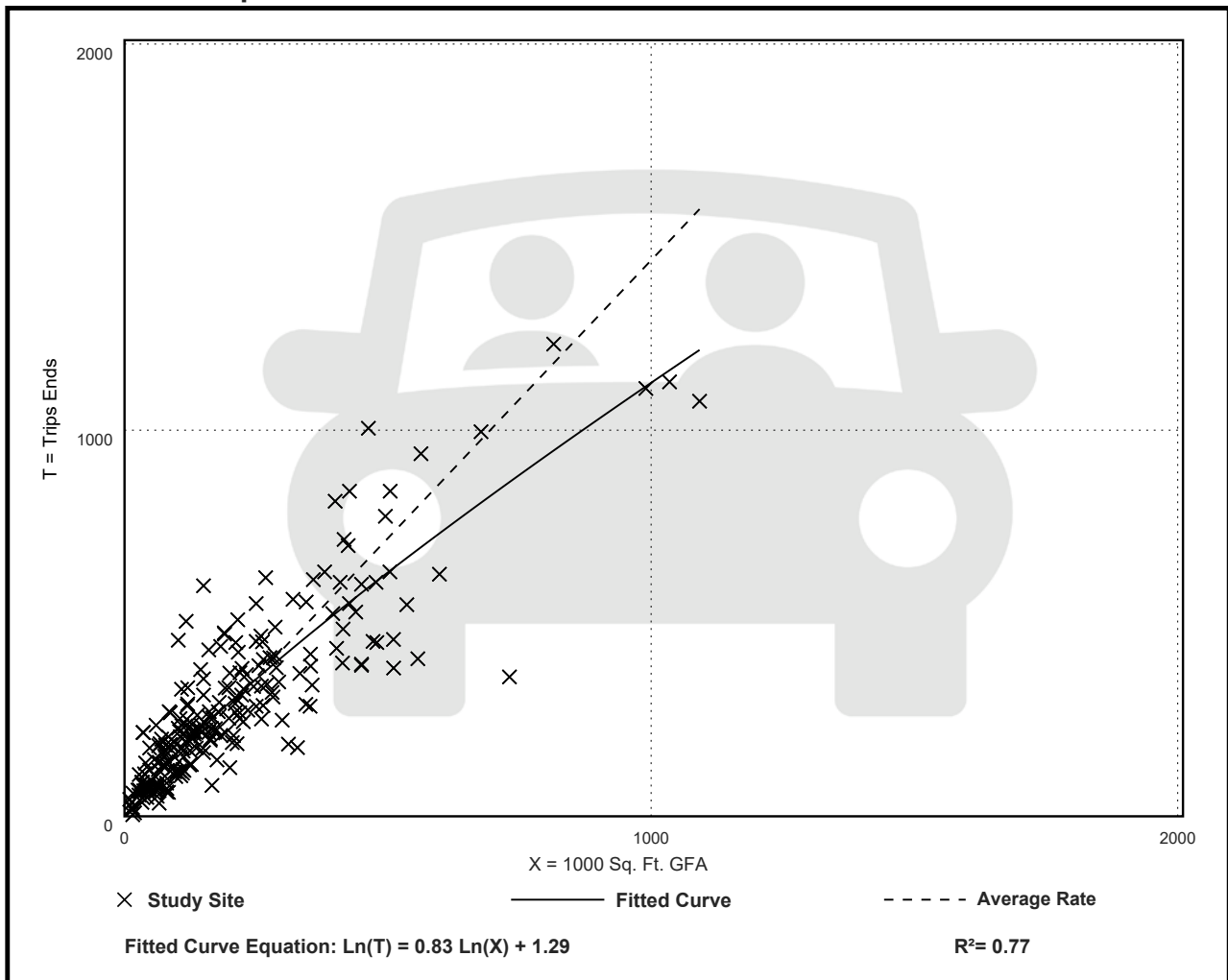
Avg. 1000 Sq. Ft. GFA: 199

Directional Distribution: 17% entering, 83% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.44	0.26 - 6.20	0.60

## Data Plot and Equation



# Land Use: 770 Business Park

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## Description

A business park consists of a group of flex-type or incubator one- or two-story buildings served by a common roadway system. The tenant space is flexible and lends itself to a variety of uses. The rear side of the building is often served by a garage door. Tenants may be start-up companies or small mature companies that require a variety of space. The space may include offices, retail and wholesale stores, restaurants, recreational areas and warehousing, manufacturing, light industrial, or scientific research functions. A common mix is 20 to 30 percent office/commercial and 70 to 80 percent industrial/warehousing. Industrial park (Land Use 130), general office building (Land Use 710), corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), office park (Land Use 750), and research and development center (Land Use 760) are related uses.

## Additional Data

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Georgia, New Jersey, Oregon, Vermont, and Virginia.

## Source Numbers

155, 211, 212, 213, 216, 407, 423, 715, 926

# Business Park (770)

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

**Setting/Location: General Urban/Suburban**

Number of Studies: 16

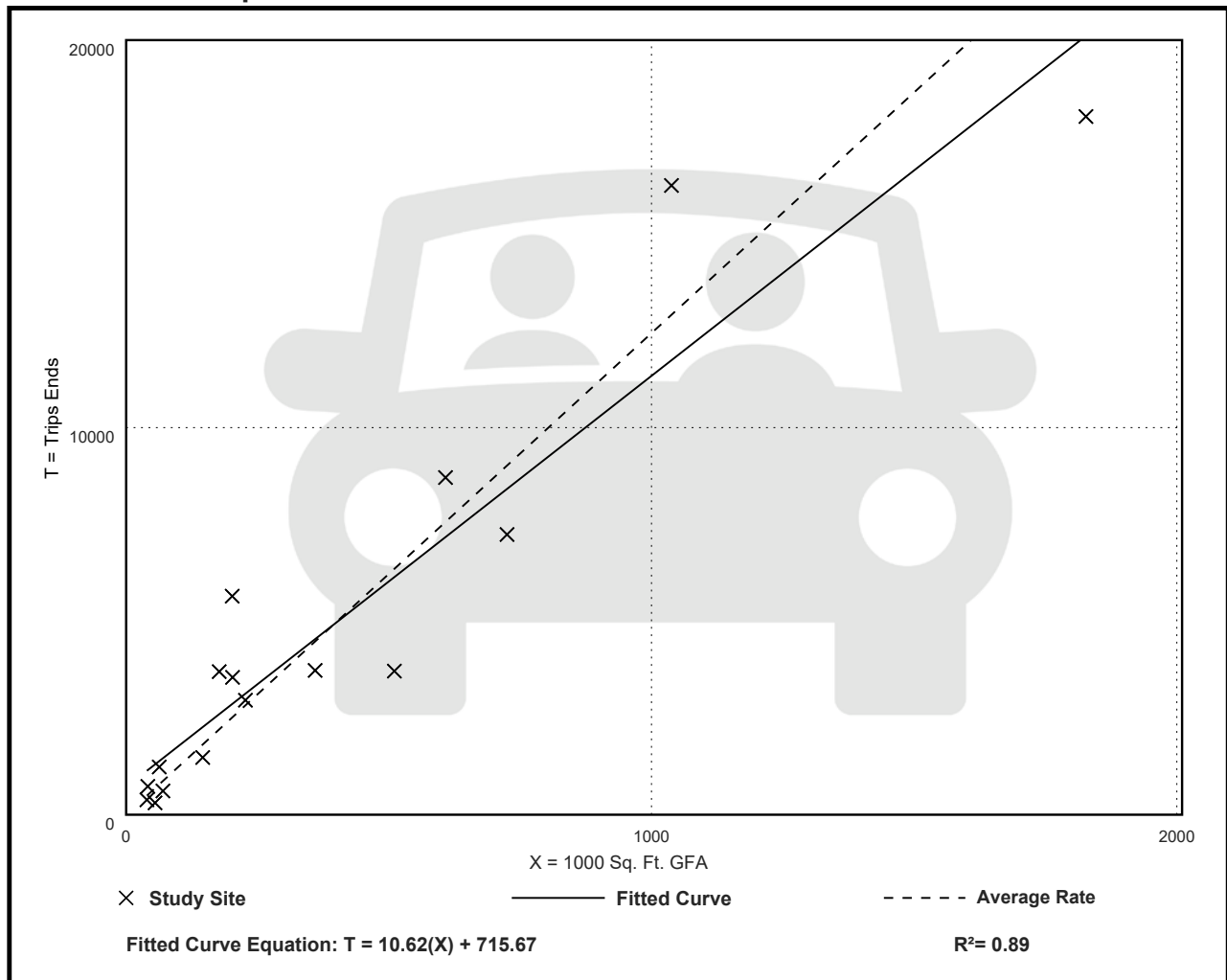
Avg. 1000 Sq. Ft. GFA: 393

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
12.44	5.56 - 27.97	4.51

## Data Plot and Equation





# Business Park (770)

**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: 21

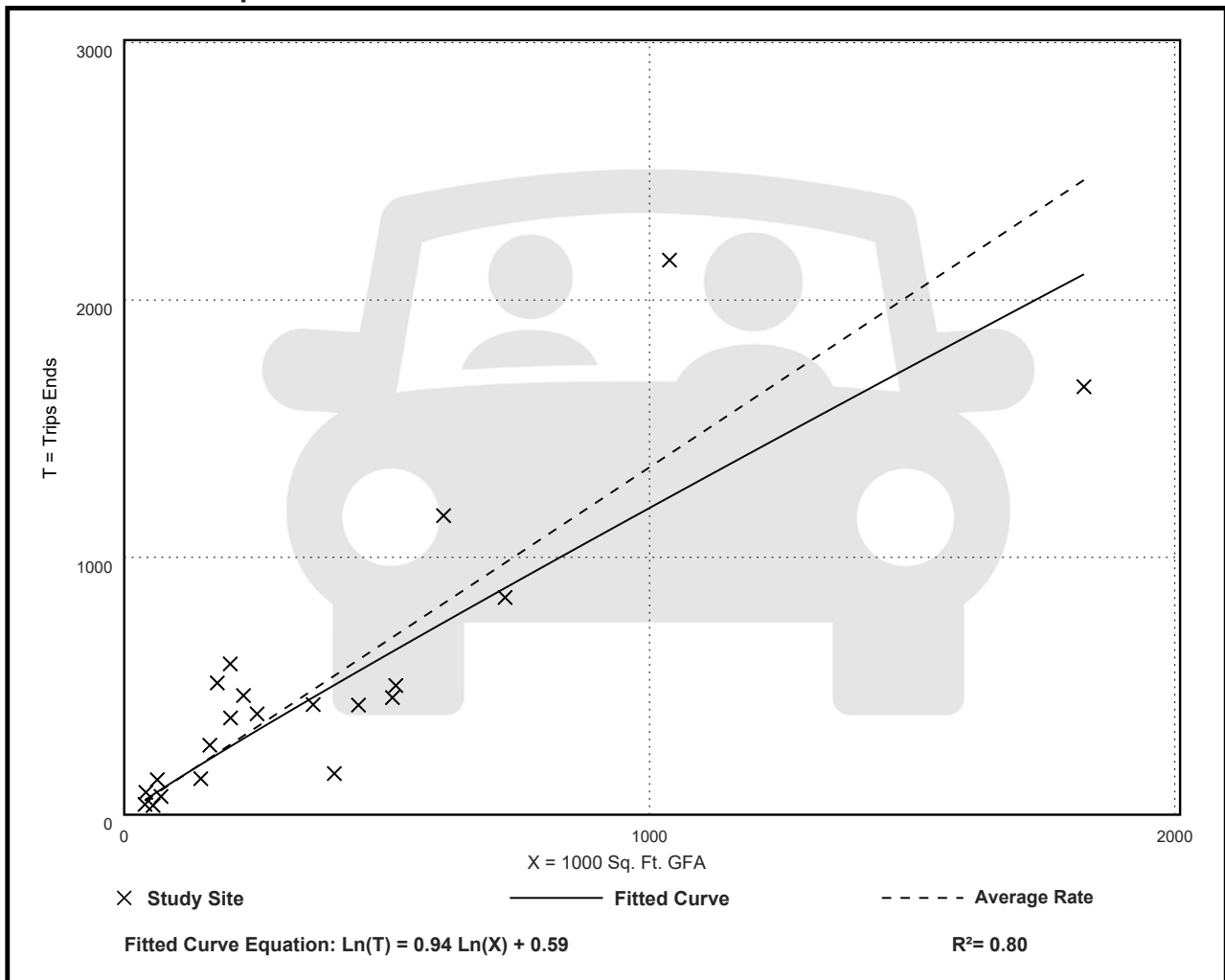
Avg. 1000 Sq. Ft. GFA: 384

Directional Distribution: 85% entering, 15% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.35	0.40 - 2.90	0.62

## Data Plot and Equation



# Business Park (770)

**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: 22

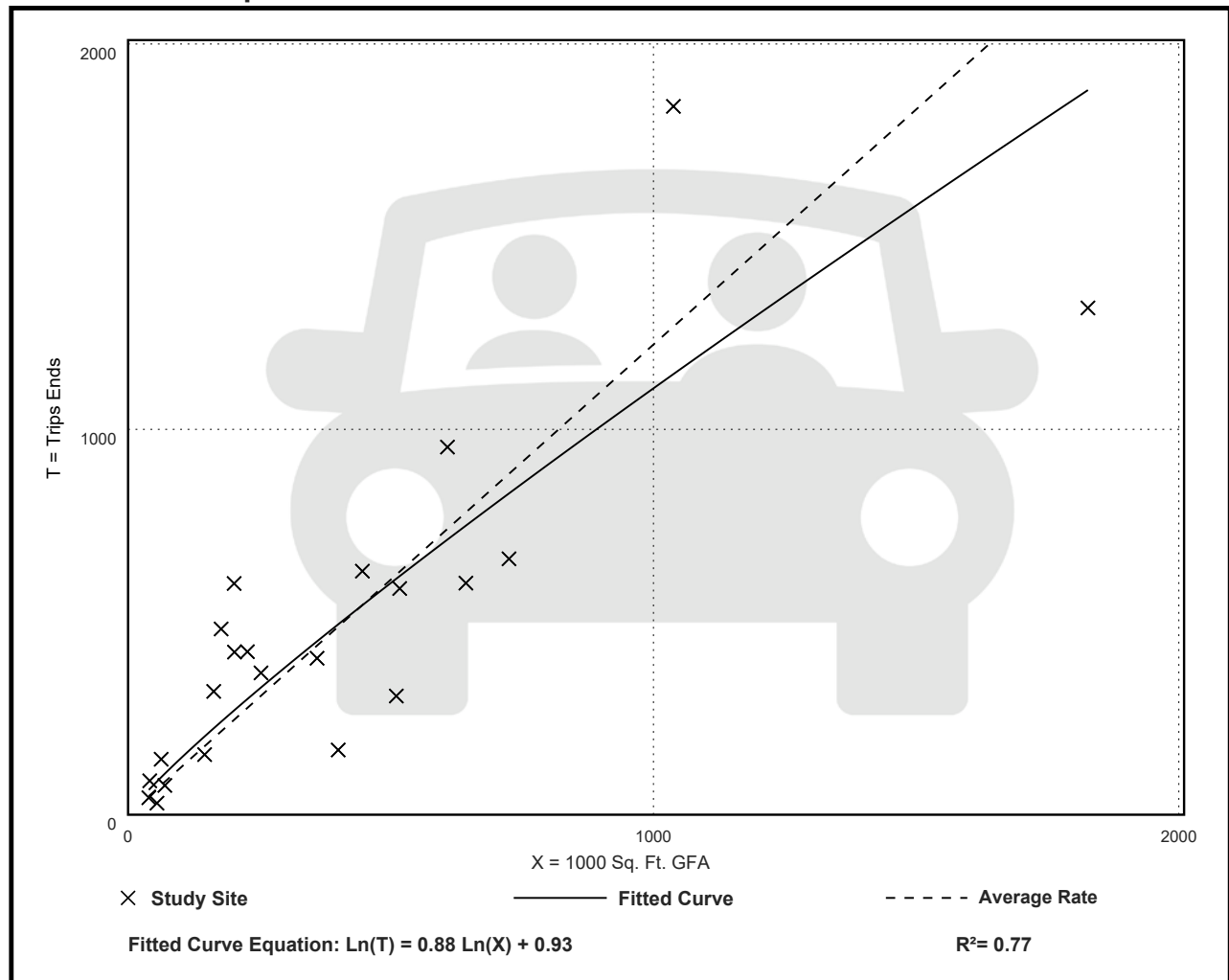
Avg. 1000 Sq. Ft. GFA: 396

Directional Distribution: 26% entering, 74% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.22	0.42 - 2.97	0.59

## Data Plot and Equation



# Land Use: 820

## Shopping Center (>150k)

---

### Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Each study site in this land use has at least 150,000 square feet of gross leasable area (GLA). It often has more than one anchor store. Various names can be assigned to a shopping center within this size range, depending on its specific size and tenants, such as community center, regional center, superregional center, fashion center, and power center.

A shopping center of this size typically contains more than retail merchandising facilities. Office space, a movie theater, restaurants, a post office, banks, a health club, and recreational facilities are common tenants.

A shopping center of this size can be enclosed or open-air. The vehicle trips generated at a shopping center are based upon the total GLA of the center. In the case of a smaller center without an enclosed mall or peripheral buildings, the GLA is the same as the gross floor area of the building.

The 150,000 square feet GLA threshold value between community/regional shopping center and shopping plaza (Land Use 821) is based on an examination of trip generation data. For a shopping plaza that is smaller than the threshold value, the presence or absence of a supermarket within the plaza has a measurable effect on site trip generation. For a shopping center that is larger than the threshold value, the trips generated by its other major tenants mask any effects of the presence or absence of an on-site supermarket.

Shopping plaza (40-150k) (Land Use 821), strip retail plaza (<40k) (Land Use 822), and factory outlet center (Land Use 823) are related uses.

### Additional Data

***Many shopping centers—in addition to the integrated unit of shops in one building or enclosed around a mall—include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied include peripheral buildings, it can be assumed that some of the data show their effect.***

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky,

Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

### **Source Numbers**

77, 110, 154, 156, 159, 190, 199, 202, 204, 213, 251, 269, 294, 295, 299, 304, 305, 307, 308, 309, 311, 314, 315, 316, 317, 319, 365, 385, 404, 414, 423, 442, 446, 562, 629, 702, 715, 728, 868, 871, 880, 899, 912, 926, 946, 962, 973, 974, 978, 1034, 1040, 1067

# Shopping Center (>150k) (820)

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

**Setting/Location: General Urban/Suburban**

Number of Studies: 108

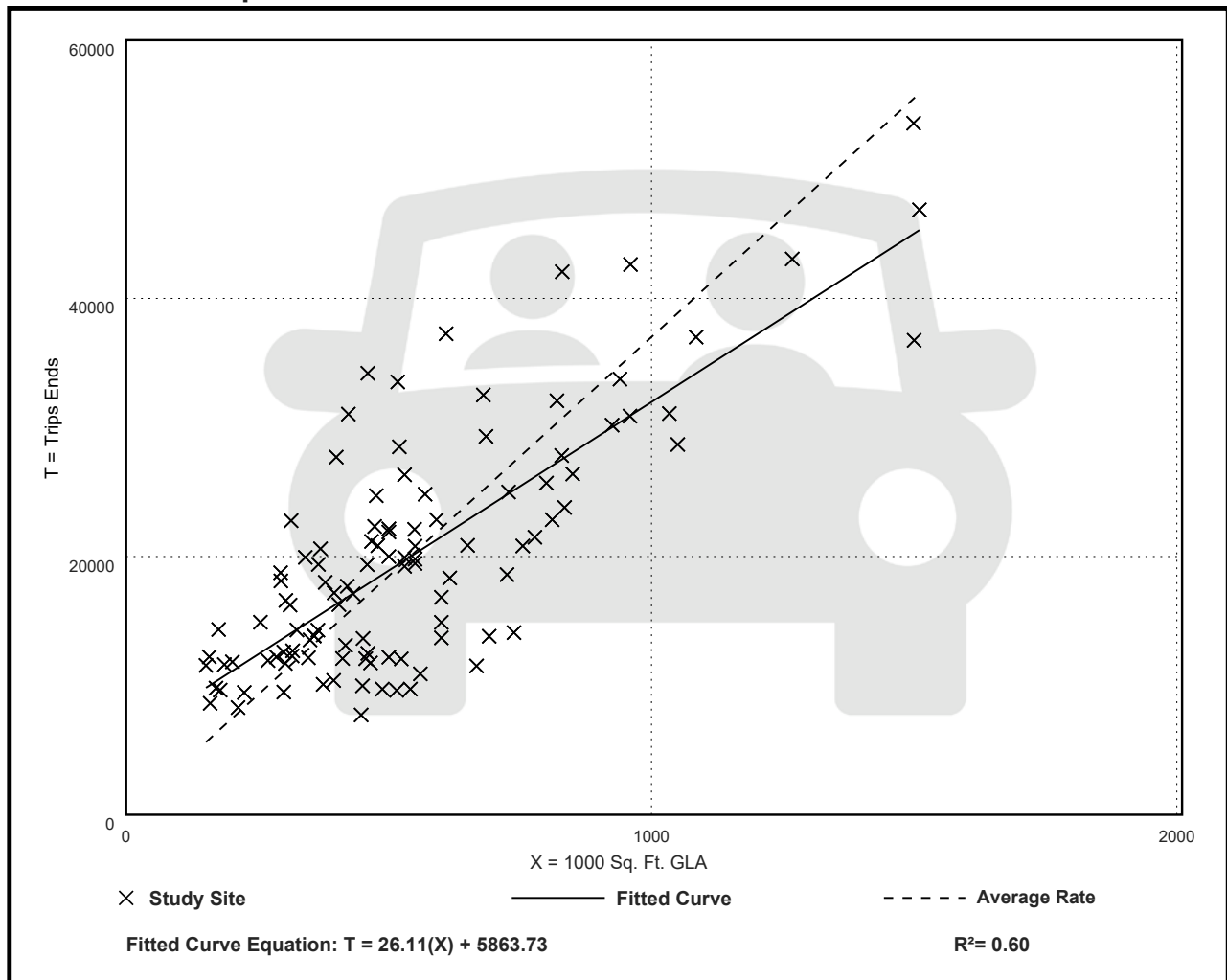
Avg. 1000 Sq. Ft. GLA: 538

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.01	17.27 - 81.53	12.79

## Data Plot and Equation



# Shopping Center (>150k) (820)

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: 44

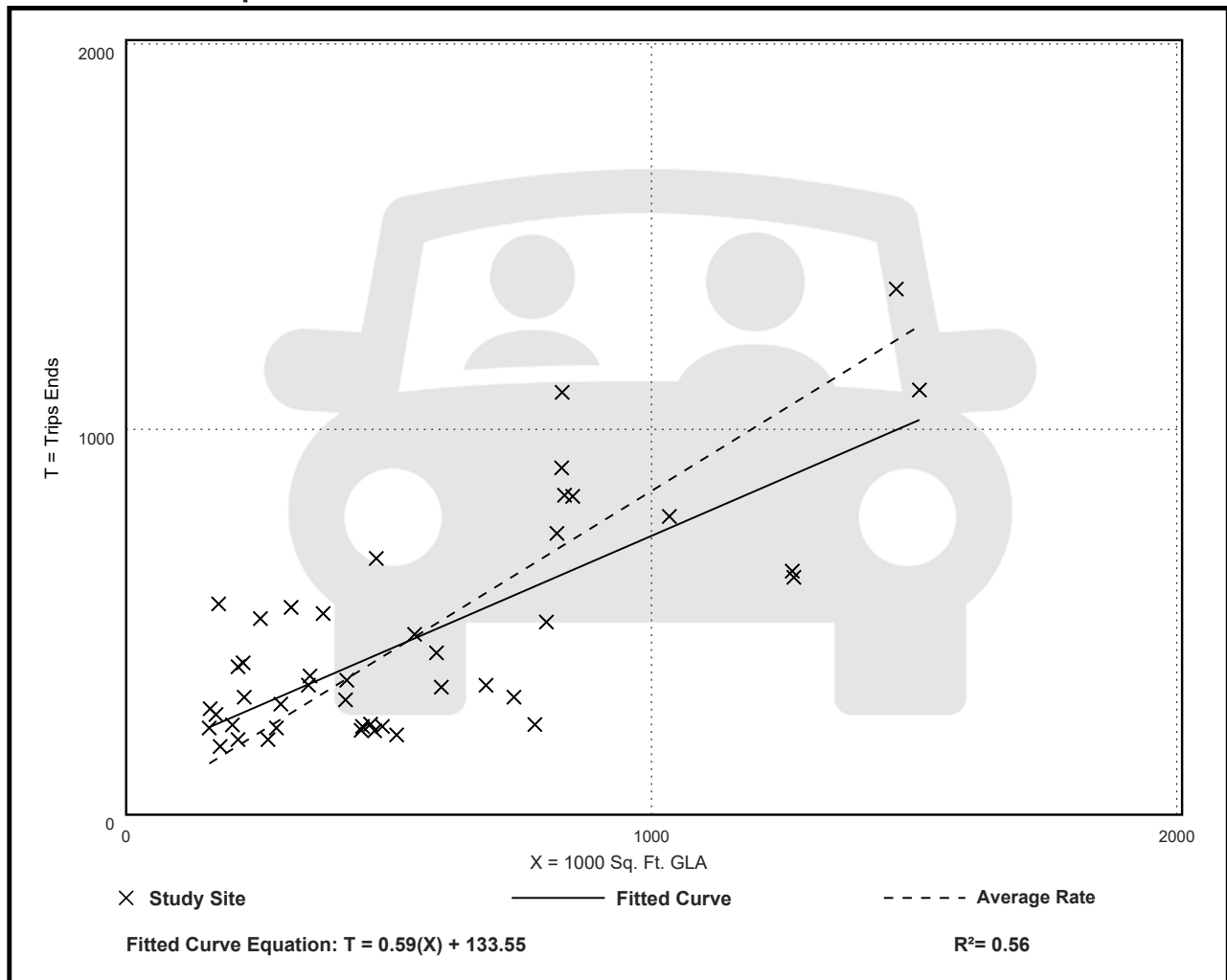
Avg. 1000 Sq. Ft. GLA: 546

Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.84	0.30 - 3.11	0.42

## Data Plot and Equation



# Shopping Center (>150k) (820)

**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: 126

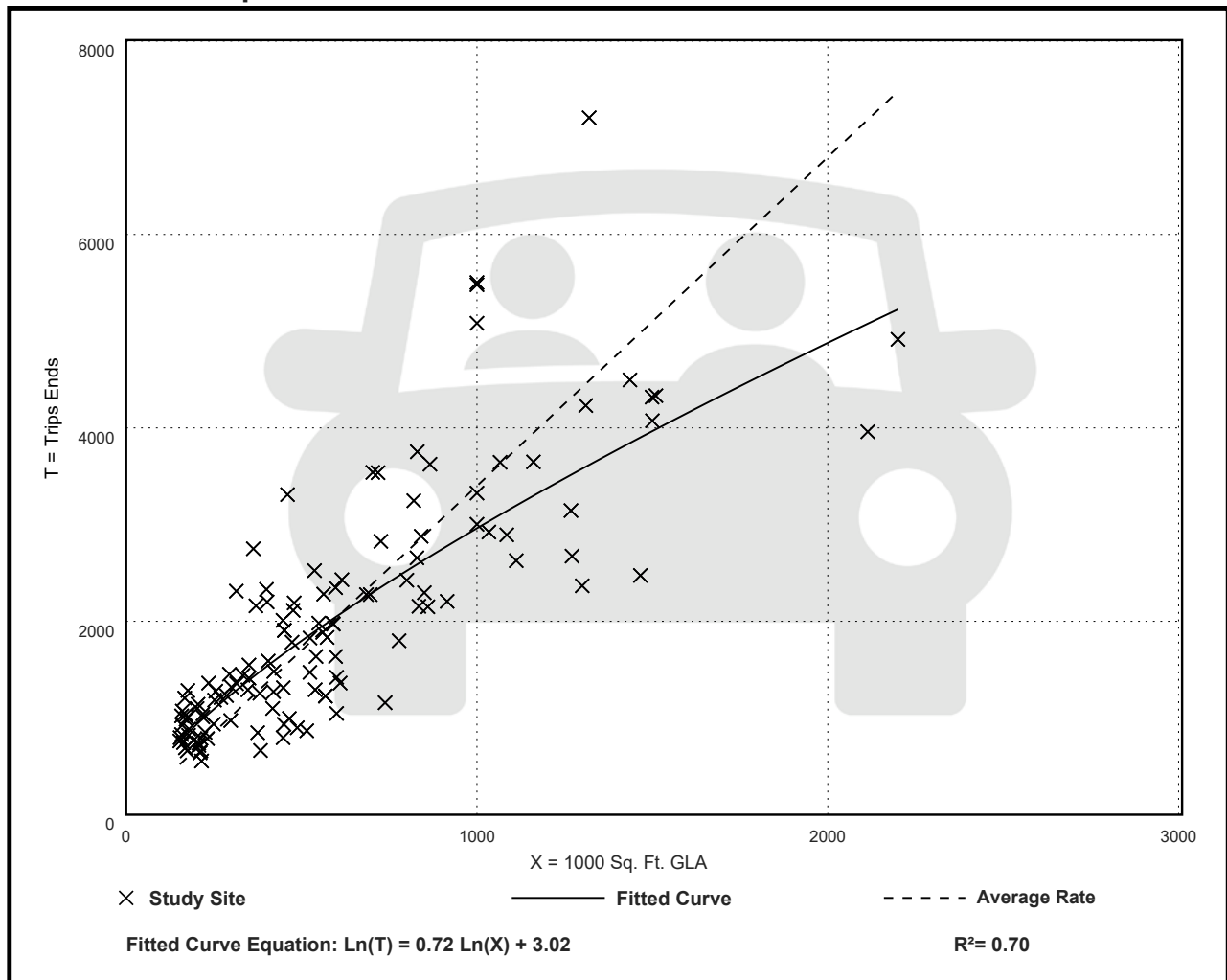
Avg. 1000 Sq. Ft. GLA: 581

Directional Distribution: 48% entering, 52% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.40	1.57 - 7.58	1.26

## Data Plot and Equation



# Land Use: 821

## Shopping Plaza (40-150k)

---

### Description

A shopping plaza is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Each study site in this land use has between 40,000 and 150,000 square feet of gross leasable area (GLA). The term “plaza” in the land use name rather than “center” is simply a means of distinction between the different shopping center size ranges. Various other names are commonly used to categorize a shopping plaza within this size range, depending on its specific size and tenants, such as neighborhood center, community center, and fashion center.

Its major tenant is often a supermarket but many sites are anchored by home improvement, discount, or other stores. A shopping plaza typically contains more than retail merchandising facilities. Office space, a movie theater, restaurants, a post office, banks, a health club, and recreational facilities are common tenants. A shopping plaza is almost always open-air and the GLA is the same as the gross floor area of the building.

The 150,000 square feet GLA threshold value between shopping plaza and shopping center (Land Use 820) is based on an examination of trip generation data. For a shopping plaza that is smaller than the threshold value, the presence or absence of a supermarket within the plaza has a measurable effect on site trip generation. For a shopping center that is larger than the threshold value, the trips generated by its other major tenants mask any effects of the presence or absence of an on-site supermarket.

The 40,000 square feet GFA threshold between shopping plaza and strip retail plaza (Land Use 822) was selected based on an examination of the overall shopping center/plaza database. No shopping plaza with a supermarket as its anchor is smaller than 40,000 square feet GLA.

Shopping center (>150k) (Land Use 820), strip retail plaza (<40k) (Land Use 822), and factory outlet center (Land Use 823) are related uses.

### Land Use Subcategory

The presence or absence of a supermarket in a shopping plaza has been determined to have a measurable effect on site trip generation. Therefore, data are presented for two subcategories for this land use: sites with a supermarket anchor and sites without a supermarket.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).



The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), British Columbia (CAN), California, Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Jersey, New York, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Texas, Vermont, Virginia, Washington, and Wisconsin.

### **Source Numbers**

105, 110, 156, 159, 186, 198, 204, 211, 213, 239, 259, 260, 295, 301, 304, 305, 307, 317, 319, 358, 376, 390, 400, 404, 437, 444, 446, 507, 580, 598, 658, 728, 908, 926, 944, 946, 960, 973, 974, 1004, 1009, 1025, 1069

# Shopping Plaza (40-150k) - Supermarket - Yes (821)

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

Setting/Location: General Urban/Suburban

Number of Studies: 17

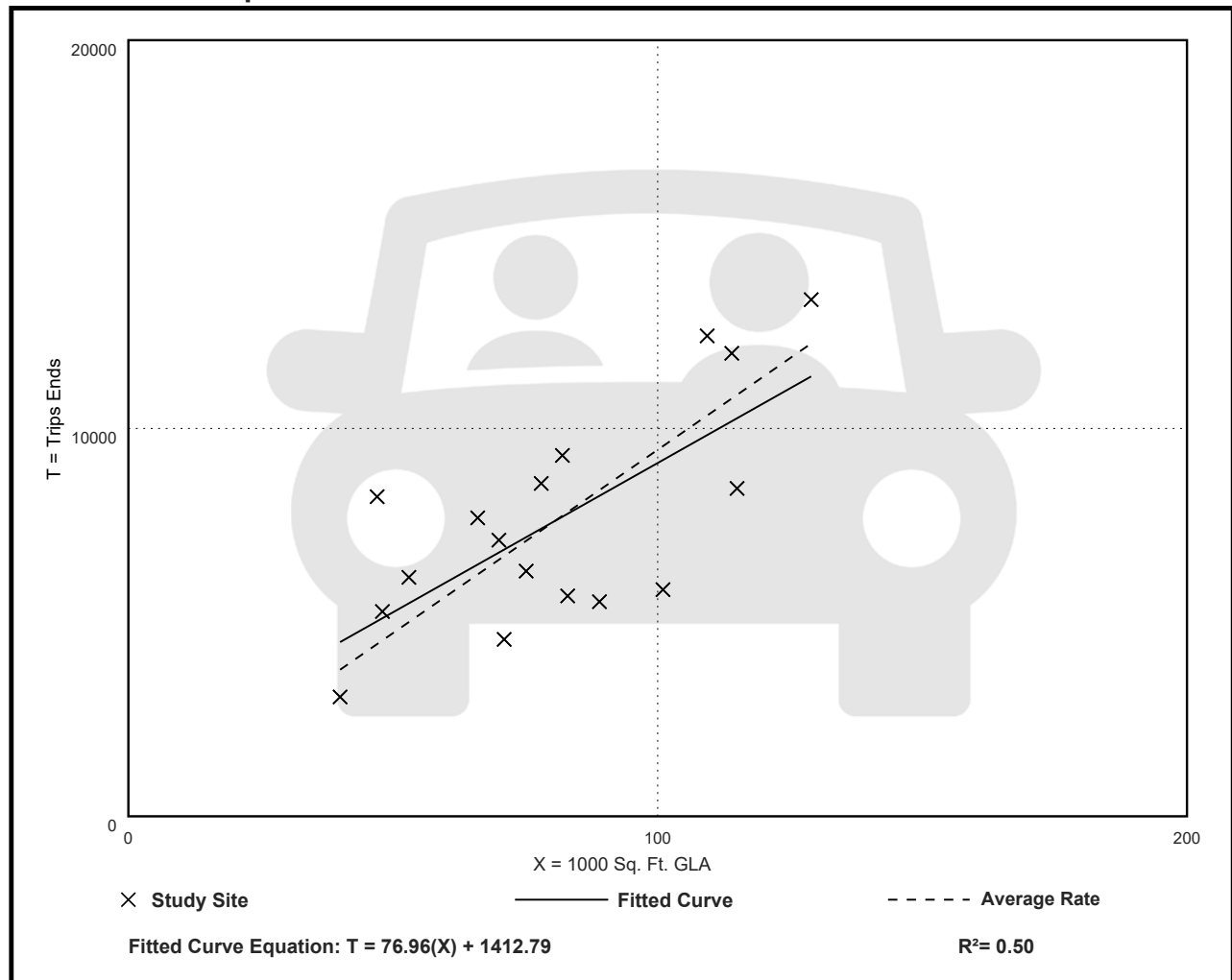
Avg. 1000 Sq. Ft. GLA: 81

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
94.49	57.86 - 175.32	26.55

## Data Plot and Equation



# Shopping Plaza (40-150k) - Supermarket - Yes (821)

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: 16

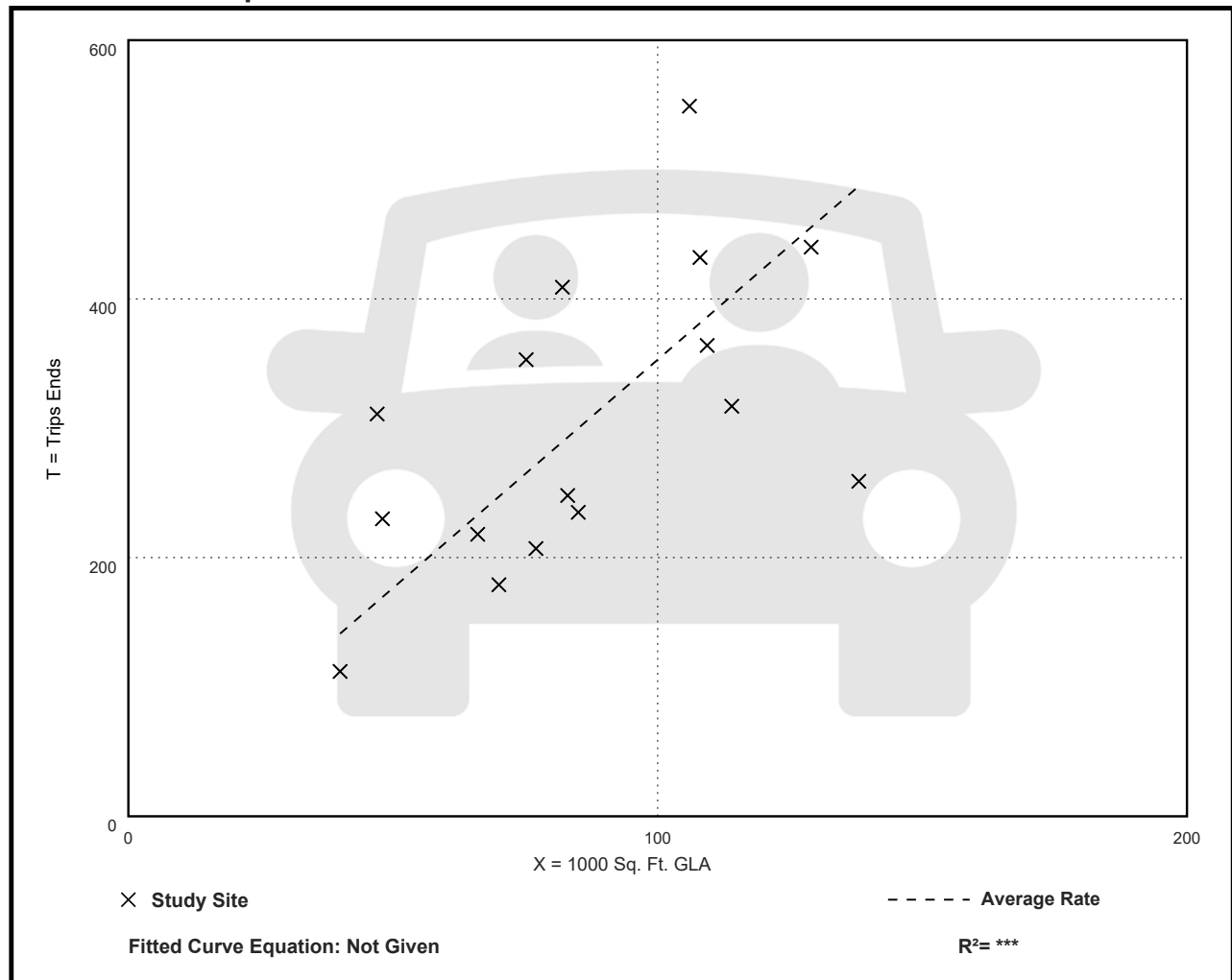
Avg. 1000 Sq. Ft. GLA: 86

Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.53	1.88 - 6.62	1.17

## Data Plot and Equation



# Shopping Plaza (40-150k) - Supermarket - Yes (821)

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: 51

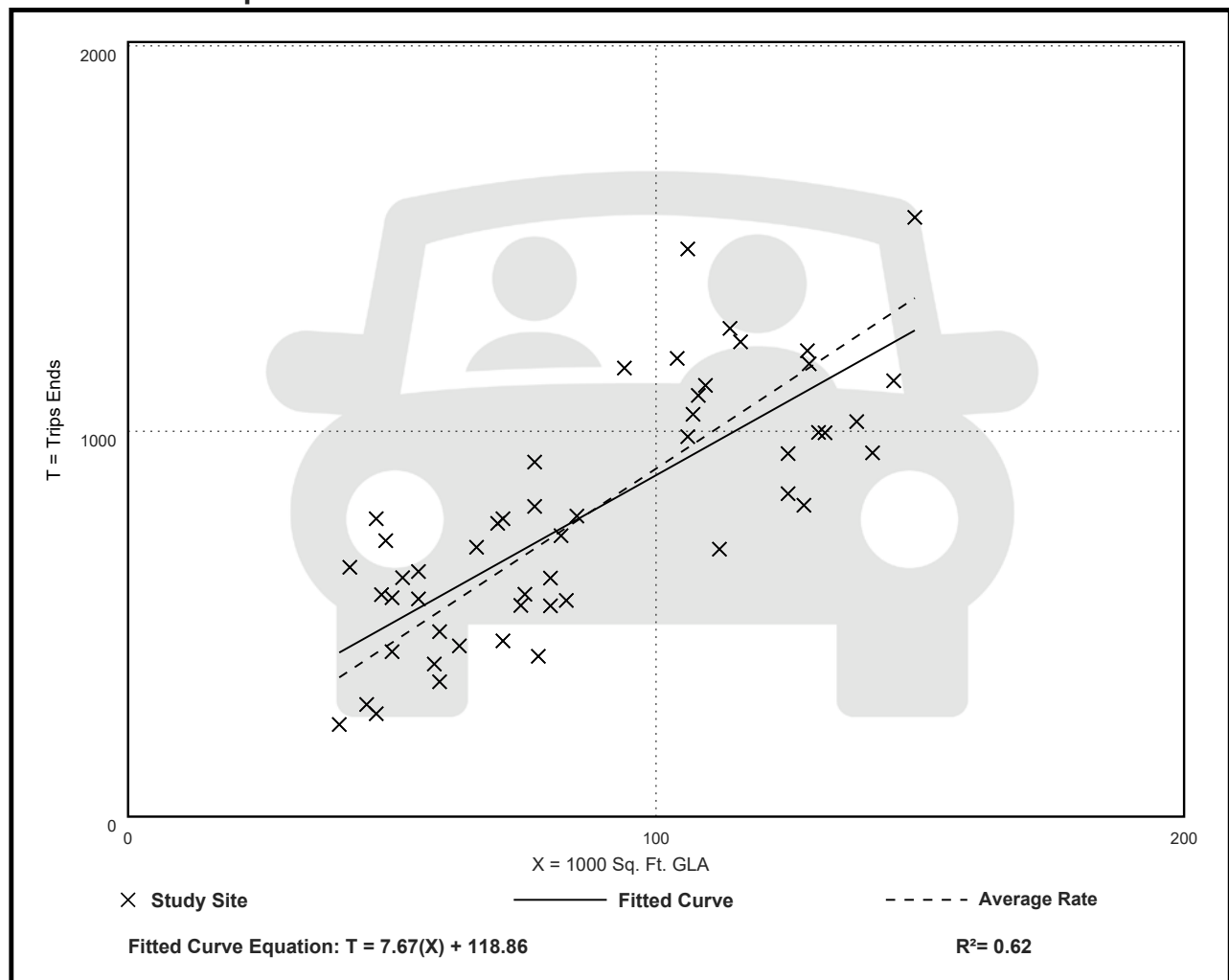
Avg. 1000 Sq. Ft. GLA: 87

Directional Distribution: 48% entering, 52% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
9.03	5.35 - 16.45	2.37

## Data Plot and Equation



# Shopping Plaza (40-150k) - Supermarket - No (821)

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

Setting/Location: General Urban/Suburban

Number of Studies: 7

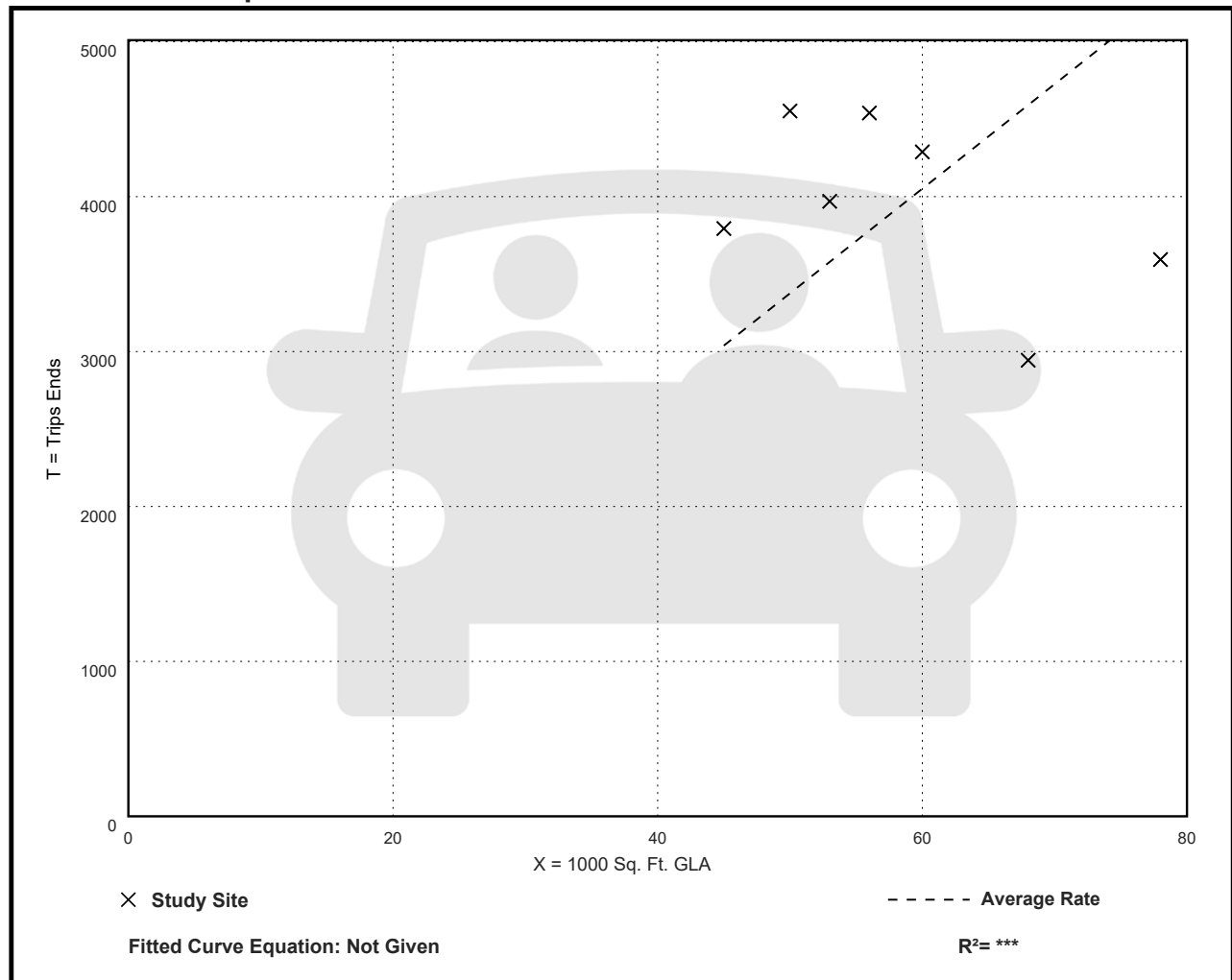
Avg. 1000 Sq. Ft. GLA: 59

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
67.52	43.29 - 91.06	19.25

## Data Plot and Equation



# Shopping Plaza (40-150k) - Supermarket - No (821)

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: 13

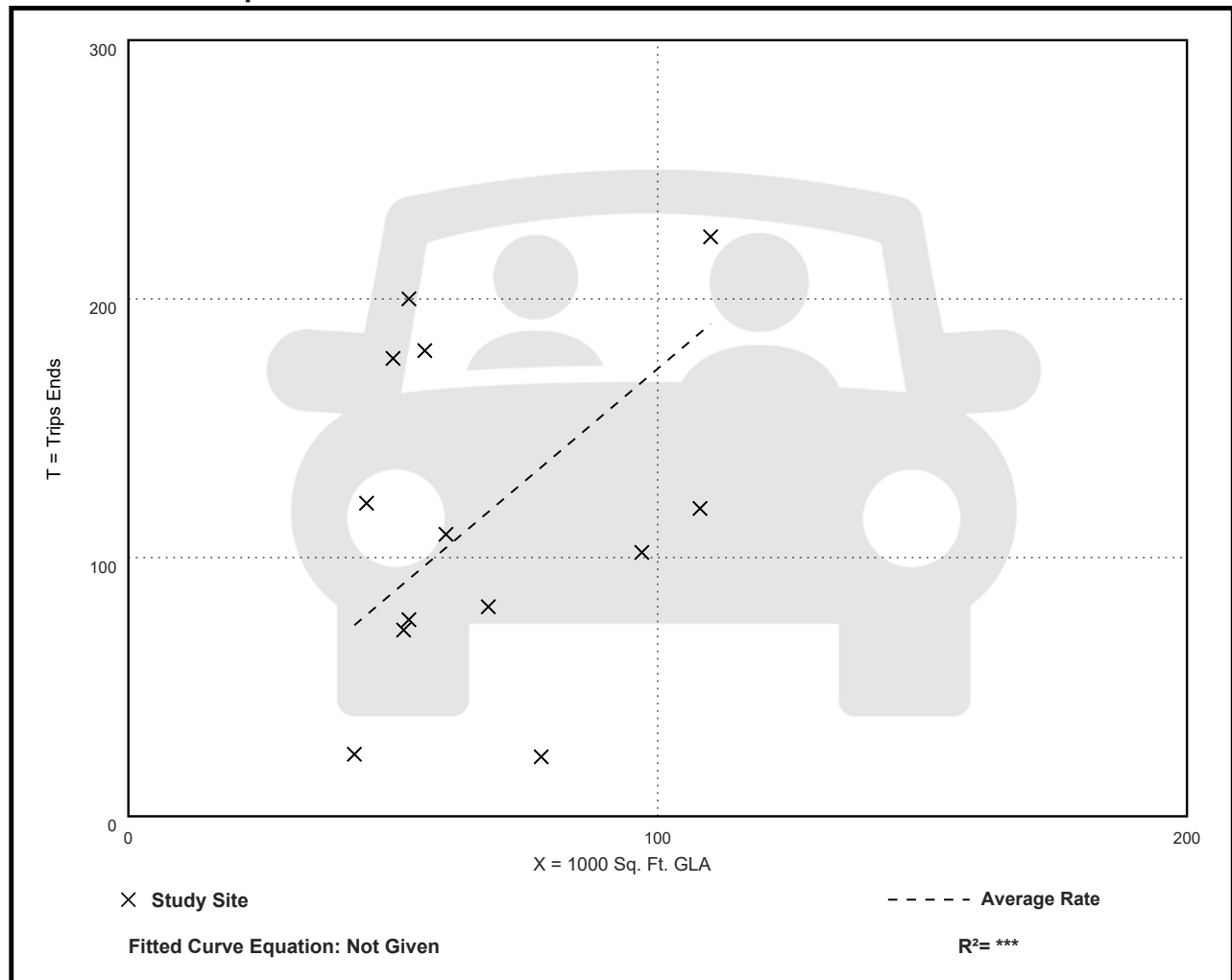
Avg. 1000 Sq. Ft. GLA: 67

Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
1.73	0.29 - 3.77	1.06

## Data Plot and Equation



# Shopping Plaza (40-150k) - Supermarket - No (821)

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: 42

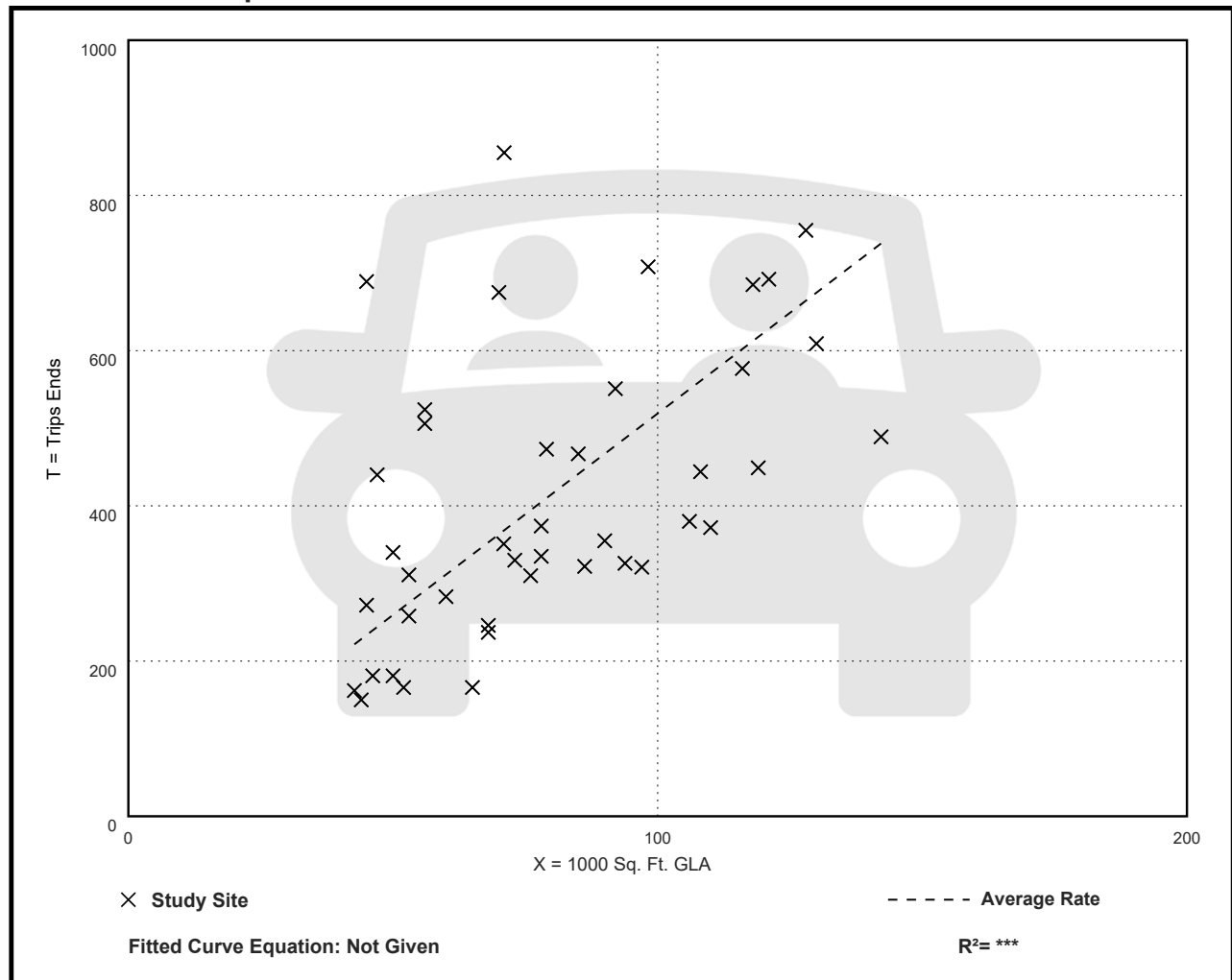
Avg. 1000 Sq. Ft. GLA: 79

Directional Distribution: 49% entering, 51% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
5.19	2.55 - 15.31	2.28

## Data Plot and Equation



# Land Use: 822

## Strip Retail Plaza (<40k)

---

### Description

A strip retail plaza is an integrated group of commercial establishments that is 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, the GLA is the same as the gross floor area of the building.

The 40,000 square feet GFA threshold between strip retail plaza and shopping plaza (Land Use 821) was selected based on an examination of the overall shopping center/plaza database. No shopping plaza with a supermarket as its anchor is smaller than 40,000 square feet GLA.

Shopping center (>150k) (Land use 820), shopping plaza (40-150k) (Land Use 821), and factory outlet center (Land Use 823) are related uses.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Delaware, Florida, New Jersey, Ontario (CAN), South Dakota, Vermont, Washington, and Wisconsin.

### Source Numbers

304, 358, 423, 428, 437, 507, 715, 728, 936, 960, 961, 974, 1009



# 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

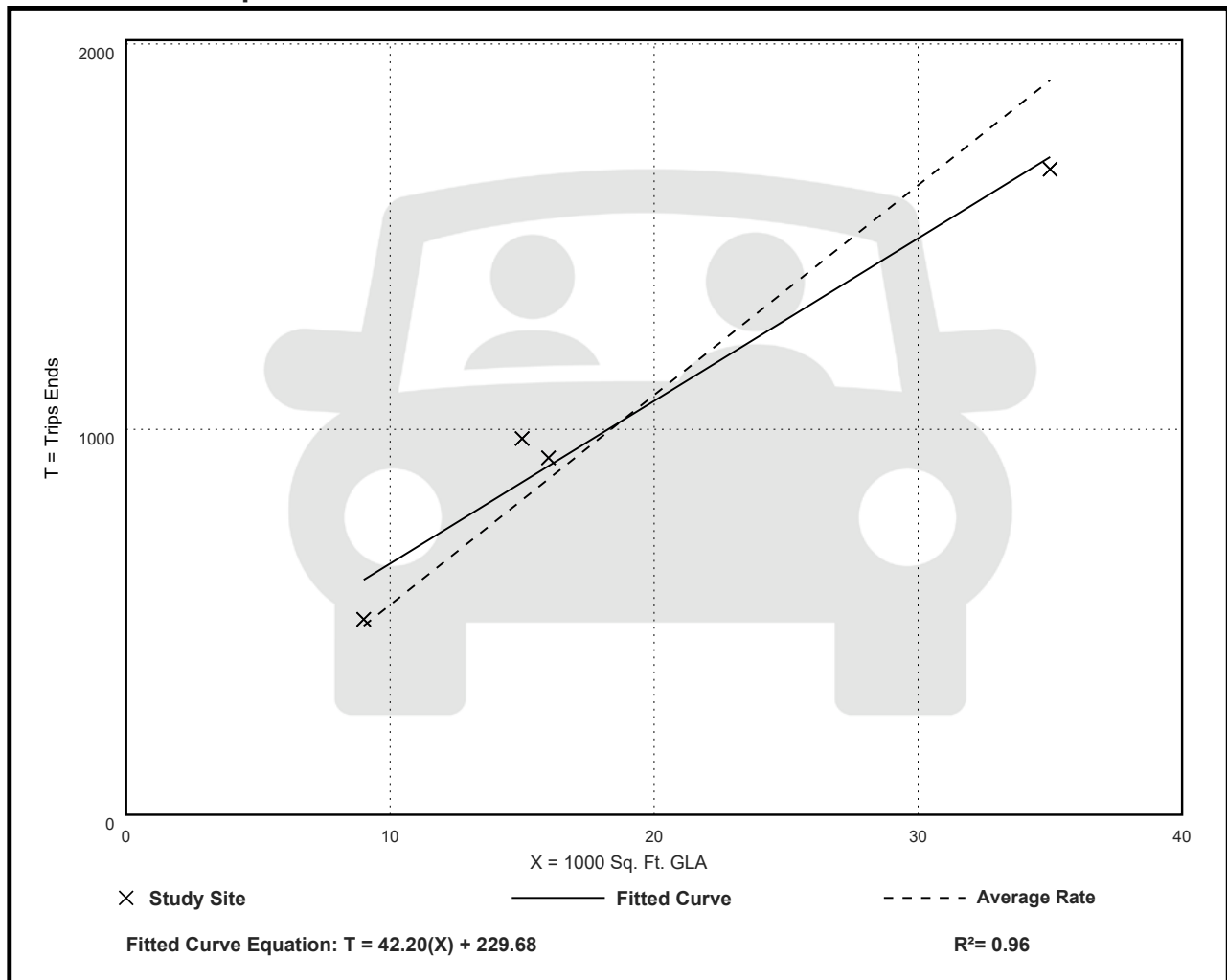
Avg. 1000 Sq. Ft. GLA: 19

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



# 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: 5

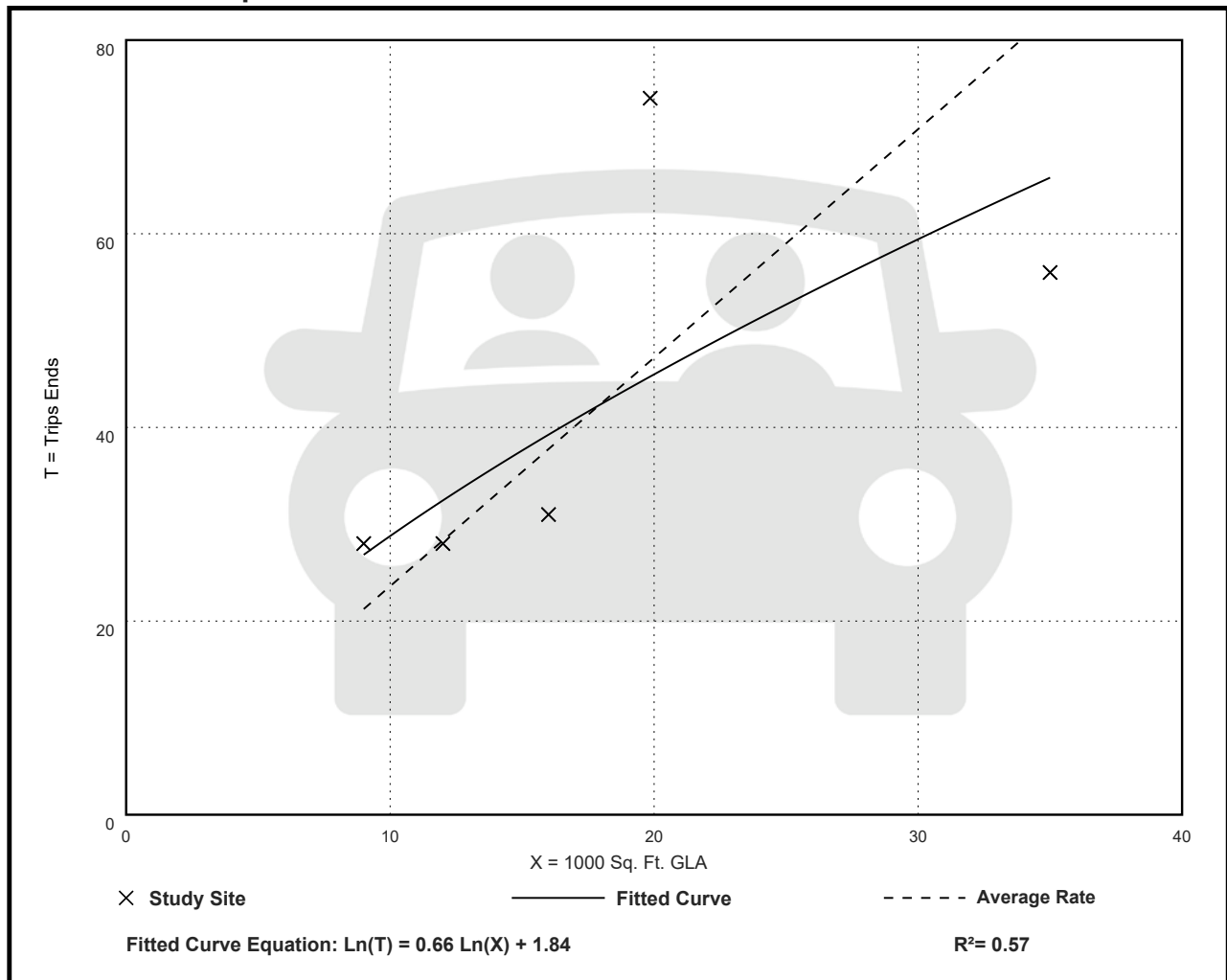
Avg. 1000 Sq. Ft. GLA: 18

Directional Distribution: 60% entering, 40% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
2.36	1.60 - 3.73	0.94

## Data Plot and Equation



# 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: 25

Avg. 1000 Sq. Ft. GLA: 21

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.59	2.81 - 15.20	2.94

## Data Plot and Equation

