

January 3, 2018



Whipple Consulting Engineers, Inc.

W.O. No. 2017-1939

City of Spokane
Department of Engineering Services
801 W. Spokane Falls Boulevard
Spokane, WA 99201

Attn: Inga Note, P.E.

Re: **Proposed Greenstone – Sonneland PUD**
31st Avenue & Crestline Street
Traffic (Trip) Distribution Letter

Dear Inga,

The purpose of this document is to provide a Trip Generation and Distribution letter (TGDL) for the proposed Sonneland PUD and Community Retail project, located in the vicinity of 31st Avenue & Crestline Street and north to 29th Avenue, as shown on Figure 2 Concept Site Plan. This letter will follow the standards for doing Trip Distribution Letters as required by the City of Spokane and the Institute of Transportation Engineers (ITE).

PROJECT DESCRIPTION

The project proposes to develop approximately 19.59± acres of undeveloped land into the proposed Sonneland PUD and Community retail development project, a concept development plan is attached and is anticipated to include the following land uses.

Table 1 Concept Land Uses

Land Use	Units/ GFA	ITE Land Use Code	
Multi-Family Residential	200 units	220	Apartments
Single Family Residential	50 units	210	Single Family – Detached Housing
Walk-up Coffee Shop	2,500 sf	936	Coffee/Donut Shop Without Drive Thru
Retail Strip Mall	17,500 sf	826	Specialty Retail

Per the concept plan, it is proposed that 31st Avenue be extended from Southeast Boulevard to an extension of Crestline Street. It is also proposed that 30th Avenue be extended to the Stone Street alignment as a private site driveway/access road. Additionally, a new north-south connecting road (Clubhouse Drive) be built between 30th and 31st Avenues for additional internal connectivity. The proposed residential and commercial landuses are intended to make driveway connections to these proposed street extensions or existing streets. As shown in Figure 2, Concept Site Plan.

VICINITY / SITE PLAN

The site is currently listed on the Comprehensive Plan as Residential Single Family (RSF), and Center and Corridors, District Center, with pedestrian emphasis and auto accommodating. The

subject properties lies on the N ½ of Section 33, T.25N., R.43E., W.M. within the City of Spokane, Washington. The parcel numbers for the site are shown on Table 2. A vicinity map is included as Figure 1 and an exhibit of the subject property is included as Figure 2, per Spokane County Scout.

Table 2 Subject Properties Parcels, Area, and Land Use

Parcel #	Area (sf)	Existing Land Use	Parcel #	Area (sf)	Existing Land Use	Parcel #	Area (sf)	Existing Land Use
35332.3102	25,200	RSF	35332.3103	25,260	RSF	35332.3101	20,500	RSF
35332.3105	26,090	RSF	35332.3106	20,200	RSF	35332.3104	45,730	RSF
35332.3108	21,888	RSF	35332.3109	18,720	RSF	35332.3107	20,400	RSF
35332.3111	20,160	RSF	35331.3203	20,280	RSF	35332.3110	19,440	RSF
35331.3202	19,300	RSF	35331.3301	25,390	RSF	35331.3201	18,860	RSF
35331.3205	20,450	RSF	35331.3304	22,110	RSF	35331.3204	21,125	RSF
35331.3303	18,900	RSF	35331.3307	26,596	RSF	35331.3302	19,000	RSF
35331.3306	27,580	RSF	35331.3203	20,280	RSF	35331.3305	19,860	RSF
35331.0016	10,674	CC1-DC	35331.0008	41,082	CC1-DC	35331.0010	15,485	CC1-DC
35331.0009	11,812	CC1-DC	35331.4103	231,023	CC1-DC			

*Areas Per Spokane County Auditor

City of Spokane Comprehensive Plan

With the projects extension of Crestline Street, a designated collector arterial, and the extension of 31st Avenue from Crestline Street to Southeast Boulevard identified in the COS Comprehensive Plan an arterial route connection will be completed. This route will provide some relief to Regal and Perry Streets while not disrupting the traffic flow patterns of 29th Avenue with another traffic signal that would be in close proximity to the signal at Southeast Boulevard.

Local Access Relief

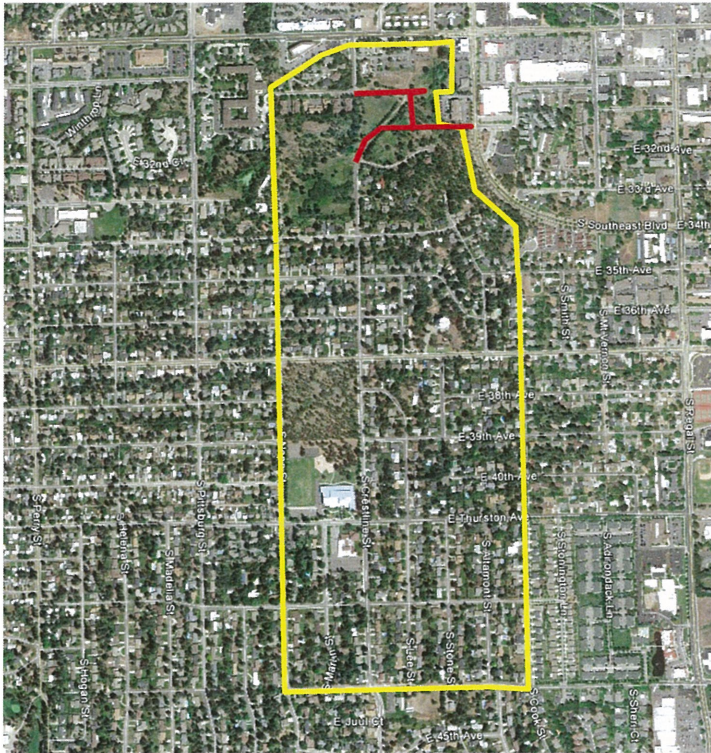
With the extension of 30th Avenue east from Martin Street and connection of Clubhouse Drive between 30th and 31st Avenues. The local residents will now have an alternate route than 29th Avenue which should also provide some relief at the Grapetree development. Additional relief may be found for those adjacent residents on 32nd Avenue.

Trough Travel Estimation (Influence Area).

With any roadway there is an area of influence, or an area that will use the roadway. This area can be small like a local access road or larger for a collector arterial with many local access roads connecting to it. In this case we believe that the proposed connection of Crestline and 31st to Southeast Boulevard will have an influence area between Napa and Cook Streets and from 29th Avenue to 44th Avenue.

This area of influence includes approximately 422 residential lots. Although many or all of the residents may try the new roadway it is anticipated that only about 30% of drivers will get a specific identifiable result, in order to change their commute. Considering that a left turn is the most difficult turn to complete at an unsignalized intersection it is assumed that the eastbound left turn at the intersection of 31st Avenue & Southeast Boulevard will be a deterrent.

It is anticipated that a trip with a southwest direction of travel to the influence area would most likely redirect their standard commute on Regal Street and 37th and utilize the 31st and Crestline connection. This is ideally a trip from I-90 that moves up Ray Street to 29th Avenue and instead of turning at Regal Street (before the area), or at Perry Street (after the area) they would turn at Southeast Boulevard and then turn onto 31st Avenue.



In the AM peak hour we do not believe that there is any benefit for trips to go north on Crestline Street to 31st Avenue as they would have to turn left onto Southeast Boulevard. But there are those that will choose that route, therefore we anticipate about 25 to 50 trips from Regal and Perry Streets to be redirected down Crestline Street and 31st Avenue.

In the PM peak hour there is a greater potential for trips to utilize the new connection as the movement on is primarily a right turn as trips come from the east and from the north. Therefore, we estimate that as many as 125 to 150 trips from Regal and Perry Streets will be redirected to the new connection of Crestline.

Overall it is important to remember that these trips are already being generated and that one's neighbor will still be doing the same trip at the same time. It just maybe a little different as the new roadway (Crestline) opens and commuters move to the new roadway and their original space on Regal or Perry Streets will be filled by someone else. This is as we understand a natural occurrence on today's transportation system. As drivers find balance in the system that suits their need. For example, if a driver knows that during their morning commute they go past a school and that there is a 15-minute period when the intersection in front of the school is congested then they will either leave early or late in order to avoid that congestion. This is the natural balance of an individual, but what is traffic but a group of individuals that make choices based upon the information that they have, (Time, Destination, Route) and the information presented to them (Alternate route, Congestion, Time). All of this is a specific identifiable result that can make the difference in the number of trips that will travel through on Crestline.

TRIP GENERATION AND DISTRIBUTION

Trip Types

The proposed land uses will be evaluated as residential and commercial; ITE has developed data regarding various trip types that all developments experience. These are found in several places, however, for this analysis the *Trip Generation Manual 8th Edition* as well as the Institute of transportation Engineers (ITE) *Trip Generation Handbook* were used to develop the criteria for this analysis.

Generally all existing and proposed developments will be made up of one or more of the following four trip types: new (destination) trips, pass-by trips, diverted trips, and shared (internal trips). In order to better understand the trip types available for land access a description of each specific trip type follows.

New (Destination) Trips - These types of trips occur only to access a specific land use such as a new retail development or a new residential subdivision. These types of trips will travel to and from the new site and a single other destination such as home or work. This is the only trip type that will result in a net increase in the total amount of traffic within the study area. The reason primarily is that these trips represent planned trips to a specific destination that never took trips to that part of the City prior to the development being constructed and occupied. This project will develop new trips.

Pass-by Trips - These trips represent vehicles which currently use adjacent roadways providing primary access to new land uses or projects and are trips of convenience. These trips, however, have an ultimate destination other than the project in question. They should be viewed as customers who stop in on their way home from work. An example would be on payday, where an individual generally drives by their bank every day without stopping, except on payday. On that day, this driver would drive into the bank, perform the prerequisite banking and then continue on home. In this example, the trip started from work with a destination of home, however on the way, the driver stopped at the grocery store/latte stand and/or bank directly adjacent to their path. Pass-by trips are most always associated with commercial/retail types of development along major roadways. Therefore, for this project pass-by trips will be considered.

Shared / Internal / Trips - These are trips which occur on the site where a vehicle/ consumer/ tenant will stop at more than one place on the site. For example, someone destined for a certain shop at a commercial site may stop at a bank just before or after they visit the shop that they went to the site to visit. This trip type reduces the number of new trips generated on the public road system and is most commonly used for commercial developments. These trips are anticipated and will be being accounted for.

Trip Generation Characteristics for the Concept land uses

As noted earlier, trip generation rates for the AM and PM peak hours are determined by the use of the *Trip Generation Manual, 9th Edition* published by the Institute of Transportation Engineers (ITE). The purpose of the *Trip Generation Manual* is to compile and quantify empirical data into trip generation rates for specific land uses within the US, UK and Canada.

For the proposed 200 units of Multi-Family Residential units, Land Use Code (LUC) 220 Apartment was used to anticipate the trip generation of the proposed use. The AM and PM peak hour trip generation for LUC 220 are shown on the following table with the anticipated average daily trips to/from the site.

Table 3 - Trip Generation Rates for LUC 220 Apartment

Dwelling Units	AM Peak Hour Trips			PM Peak Hour Trips		
	Vol. @ 0.51 trips/ Unit	Directional Distribution		Vol. @ 0.62 trips/ Unit	Directional Distribution	
		20% In	80% Out		65% In	35% Out
200	102	20	82	124	81	43
Internal	8	3	5	20	11	9
Driveway	94	17	77	104	70	34
Average Daily Trip Ends (ADT)						
Dwelling Units	Rate	ADT				
200	6.65	1,330				

For the 50 Single Family Residential Units, Land Use Code (LUC) 210 Single Family Detached Housing was used to anticipate the trip generation of the proposed use. The AM and PM peak hour trip generation for LUC 210 are shown on the following table with the anticipated average daily trips to/from the site.

Table 4 - Trip Generation Rates for LUC 210 Single Family Detached Housing

Dwelling Units	AM Peak Hour Trips			PM Peak Hour Trips		
	Vol. @ 0.75 trips/ Unit	Directional Distribution		Vol. @ 1.00 trips/ Unit	Directional Distribution	
		25% In	75% Out		63% In	37% Out
50	38	10	28	50	32	18
Internal	6	0	6	13	9	4
Driveway	32	10	22	37	23	14
Average Daily Trip Ends (ADT)						
Dwelling Units	Rate	ADT				
50	9.52	476				

For the proposed 2,500 sf (2.5 ksf) Walk-up Coffee Shop, Land Use Code (LUC) 936 Coffee/Donut Shop without Drive through Window was used to anticipate the trip generation of the proposed use. The AM and PM peak hour trip generation for LUC 936 are shown on the following table with the anticipated average daily trips to/from the site.

Table 5 - Trip Generation Rates for LUC 936 Coffee/Donut Shop W/O Drive thru Window

Thousand Square Feet (KSF)	AM Peak Hour Trips			PM Peak Hour Trips		
	Vol. @ 108.38 trips/ KSF	Directional Distribution		Vol. @ 40.75 trips/ KSF	Directional Distribution	
		51% In	49% Out		50% In	50% Out
2.5	271	138	133	102	51	51
Internal	13	12	1	29	15	14
Driveway	258	126	132	73	36	37
Pass-by	129	63	66	36	18	18
New	129	63	66	37	18	19
Average Daily Trip Ends (ADT)				Pass-by 50% per Engineering Judgement		
KSF	Rate	ADT				
2.5	407.50*	1,019		*ADT = PM Peak Hour x 10		

For the proposed 17,500 sf (17.5 ksf) of Specialty Retail, Land Use Code (LUC) 826 Specialty Retail was used to anticipate the trip generation of the proposed use. The AM and PM peak hour trip generation for LUC 826 are shown on the following table with the anticipated average daily trips to/from the site.

Table 6 – Trip Generation Rates for LUC 826 Specialty Retail

Thousand Square Feet (KSF)	AM Peak Hour Trips			PM Peak Hour Trips		
	N/A	Directional Distribution		Vol. @ 2.71 trips/ KSF	Directional Distribution	
		In	Out		44% In	56% Out
17.5				48	21	27
Internal				23	8	15
Driveway				25	13	12
Pass-by				5	3	2
New				20	10	10
Average Daily Trip Ends (ADT)				Pass-by 20% per Engineering Judgement		
KSF	Rate	ADT				
17.5	44.32	776				

Development Trip Summaries

Internal/Shared Trip Summary

This mixed-use development is anticipated to have internal or shared trips between the land uses or group of land uses. For example, someone destined for a certain entity/business at a commercial site may stop at a business entity, just before or after they visit their intended destination on site. Likewise, a resident within a mixed-use development may stop at a shop before going on to the public road system, for example to get a coffee, or a soft drink. This trip type reduces the number of new trips generated on the public road system and is most common within mixed use developments. Generally internal trip capture is 15 to 30% of a developments trip generation for a mixed-use development.

The Institute of Transportation Engineers Trip Generation Handbook outlines a method to quantify the internal trips within chapter 7. ITE does include warnings of its limitations and its use. It is the purpose of these guidelines to determine an internal trip generation that best fits the relationship of a mixed-use development. An example of this is that the chapter 7 tables do not include any data for the AM peak hour, yet we know from experience that internal trips between the land uses will occur (hence, the coffee/soda example previously given) , so an engineering judgement must be made to represent this relationship. For this analysis when AM internal/ shared trip data is not available, it was decided that the AM percentage should be 50%, or half of the PM internal/ shared trip data.

As shown in the internal trip generation worksheet included in the appendix, In the AM peak hour 27 internal trips are captured within the proposed projects uses which results in a 7% capture (27/411) In the PM peak hour 85 internal trips are captured by the proposed projects uses, which result in a 26% internal capture (85/324).

Pass-by Trip Summary

Pass-by trips are those trips that are already on the neighboring roadways and they turn into the proposed project uses before continuing their trip to their destination. While these pass-by trips occur at the driveways they are not a new trip and do not add to the traffic volumes of the transportation system. Table 7 shows a summary of the pass-by trips anticipated to be generated by the commercial uses of the project.

Table 7 –Development Pass-by Trip Generation Summary

Land Use Code	AM Peak Hour Trips			PM Peak Hour Trips		
	Per LUC	Directional Distribution		Per LUC	Directional Distribution	
		In	Out		In	Out
LUC 936 Coffee/Donut Shop W/O Dr. Thru	129	63	66	36	18	18
LUC 826 Specialty Retail				5	3	2
Total	129	63	66	41	21	20

As shown on Table 7 there are 129 Pass-by trips anticipated in the AM peak hour with 63 pass-by trips entering the site and 66 pass-by trips exiting the site. In the PM peak hour there are 41 Pass-by trips anticipated, with 21 pass-by trips entering the site and 20 pass-by trips exiting the site

Driveway/New Trip Summary

The traffic to/from this site would be made up of new (destination) trips. Table 8 shows a summary of the anticipated new trips that will be generated by the Retail and Apartment uses. These new trips will add to the traffic volumes of transportation system.

Table 8 –Development New Trip Generation Summary

Land Use Code	AM Peak Hour Trips			PM Peak Hour Trips		
	Per LUC	Directional Distribution		Per LUC	Directional Distribution	
		In	Out		In	Out
LUC 220 Apartment	94	27	77	104	70	34
LUC 210 Single Family Detached Housing	32	10	22	37	23	14
LUC 936 Coffee/Donut Shop W/O Dr. Thru	129	63	66	37	18	19
LUC 826 Specialty Retail	-	-	-	20	10	10
Total	255	100	165	198	121	77
Average Daily Trip Ends (ADT)						
Land Use Code	Rate	ADT				
LUC 220 Apartment		1,330				
LUC 210 Single Family Detached Housing		476				
LUC 936 Coffee/Donut Shop W/O Dr. Thru		1,019				
LUC 826 Specialty Retail		776				
Total		3,601				

As shown on Table 8 In the AM Peak hour the development is anticipated to generate a total of 255 new trips with 100 new trips entering the site and 165 new trips exiting the site. In the PM peak hour 198 new trips are anticipated with 121 new trips entering the site and 77 new trips exiting the site. Please see Figures 3 & 4 for a distribution of these trips on the transportation system.

Overall Summary of Landuses

Table 9 summarizes the total number of anticipated trips that enter and exit the site during the AM and PM peak hours. These are trips that register at the proposed project driveways.

Table 9 –Overall Development Trip Generation Summary

Land Use Code	AM Peak Hour Trips			PM Peak Hour Trips		
	Per LUC	Directional Distribution		Per LUC	Directional Distribution	
		In	Out		In	Out
Table 8, Total New Trips	255	100	165	198	121	77
Table 7, Total Pass-by Trips	129	63	66	41	21	20
Total Overall	384	163	231	239	142	97

As shown on Table 9 In the AM Peak hour the development is anticipated to generate a total of 384 trips with 163 trips entering the site and 231 trips exiting the site. In the PM peak hour 239 trips are anticipated with 142 trips entering the site and 97 trips exiting the site.

TRIP DISTRIBUTION

The overall transportation network in this area consists of a principle arterial, a minor arterial, collectors, and local access roads. As shown on the concept site plan the development is to be accessed via public roadways connecting to; 29th Avenue at the intersection of Martin Street and connecting to Southeast Boulevard at 31st Avenue and connecting to South Crestline Street, at 32nd Avenue.

31st Avenue is a short east-west, two-way, local access road that extends west from Cook Street to Southeast Boulevard. The project proposes extending the roadway to Crestline Street. 31st Avenue currently serves the STA park and ride. The speed limit on 31st Avenue is 25 MPH.

Southeast Boulevard is generally a north-south, two-way, two-lane Minor arterial that extends from Sherman Street to Regal Street. Southeast Boulevard generally serves residential uses along the north face of the South Hill, and commercial uses near the intersection of Southeast Boulevard & 29th Avenue. The speed limit on Southeast Boulevard is 30 MPH.

Crestline Street is a north-south two-way two-lane neighborhood collector that extends from 37th Avenue to 63rd Avenue. Crestline is surrounded by residential uses. The speed limit on Crestline Street is 25 MPH.

The distribution of the additional new trips of the proposed land uses are anticipated to distribute onto the existing transportation system as follows: it is anticipated that 30% of the trips will travel to/from the north, 40% will go to/from the south, 10% will go to/from the Lincoln Heights Shopping Center, 10% will go to/from the east via 29th Avenue, and 10% will go to/from the west on 29th Avenue.

For the 30% of trips traveling north, it is anticipated that 15% of the trips will go to/from Interstate 90 via Ray Street, 5% of the trips will go to the Perry and University Districts via Southeast Boulevard, and 15% of the trips will go to/from the downtown area via 29th Avenue and Grand Boulevard.

For the 40% of trips traveling south it is anticipated that 20% of the trips will go to/from the south via Regal Street, 15% will go to/from the south via Crestline Street, and 5% will go to/from the south via Perry Street.

The above-mentioned traffic distribution percentages are based on engineering judgment and actual traffic observations.

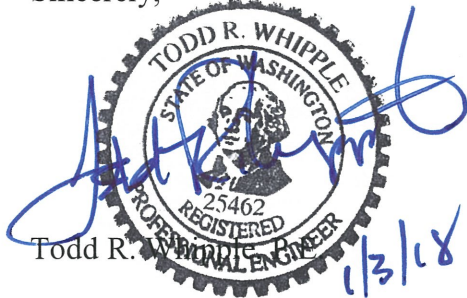
CONCLUSIONS AND RECOMMENDATIONS

It is anticipated that this project will generate 255 new AM peak hour trips and 198 new PM peak hour trips on the transportation system.

Based upon the location of the project, the number of anticipated trips, the distribution of those trips on the surrounding network of public roadway. We believe that the proposed project while adding trips to local intersections, will not reduce the intersections in the immediate area below an acceptable level of service. Therefore, we recommend that the project be allowed to move forward without further traffic analysis.

Should you have any questions related to this document please do not hesitate to call at 893-2617.

Sincerely,



Todd R.

TRW/bng

encl. Appendix (Vicinity Map, Site Plan, Trip Dist %, Photos)

cc: Sponsor, File

APPENDIX

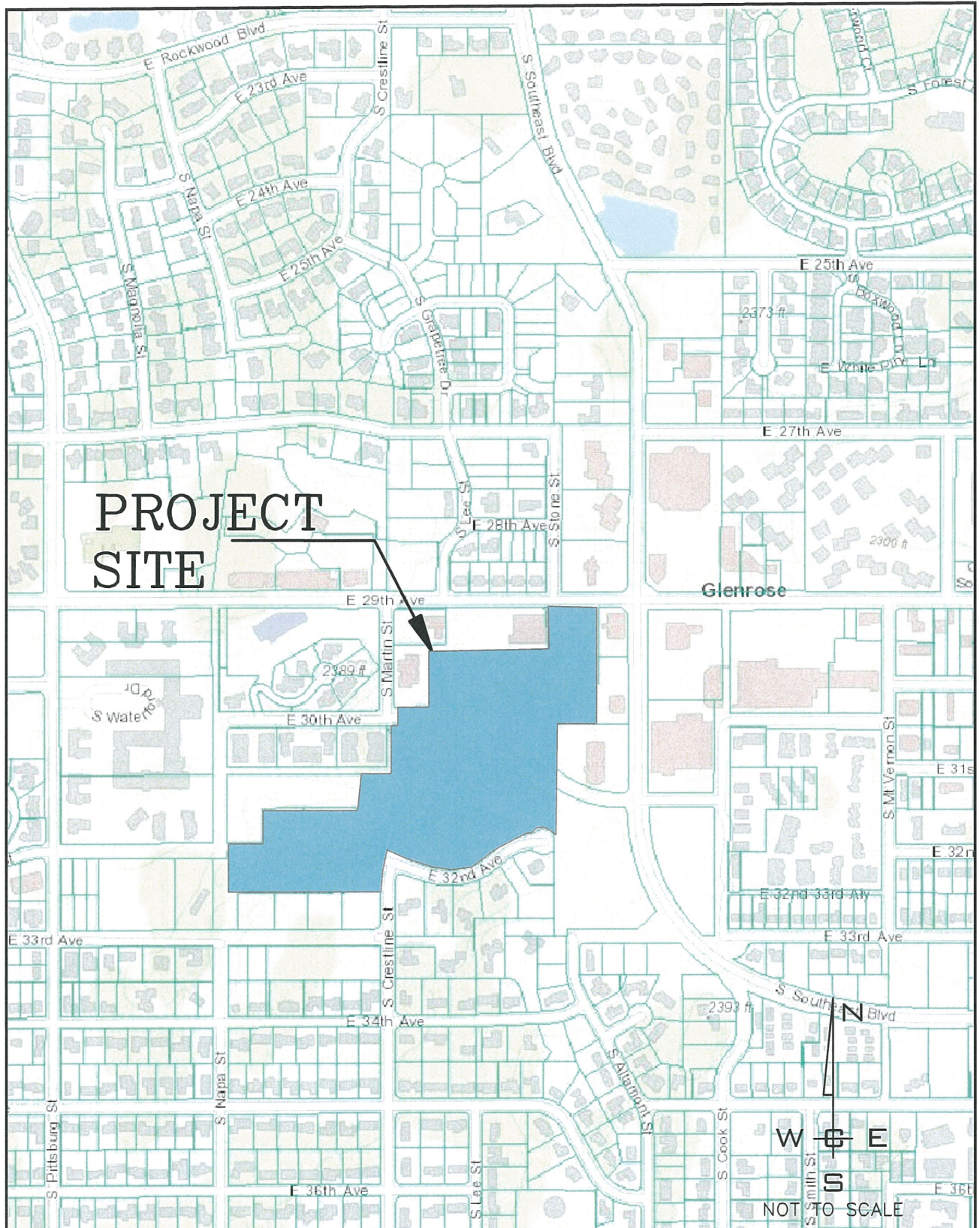
1.Vicinity Map

2.Site Plan

3.AM Trip Distribution by Percent

4.PM Trip Distribution by Percent

5.Misc Information



PROJ #: 17-1939
DATE: 12/04/17
DRAWN: BNG
APPROVED: TRW

TRIP GENERATION & DISTRIBUTION
SONNELAND PUD
32ND AVENUE & CRESTLINE STREET
SPOKANE, WASHINGTON

FIGURE 1

VICINITY MAP



WHIPPLE CONSULTING ENGINEERS
21 S. PINES ROAD
SPOKANE VALLEY, WASHINGTON 99206
PH: 509-893-2617 FAX: 509-926-0227



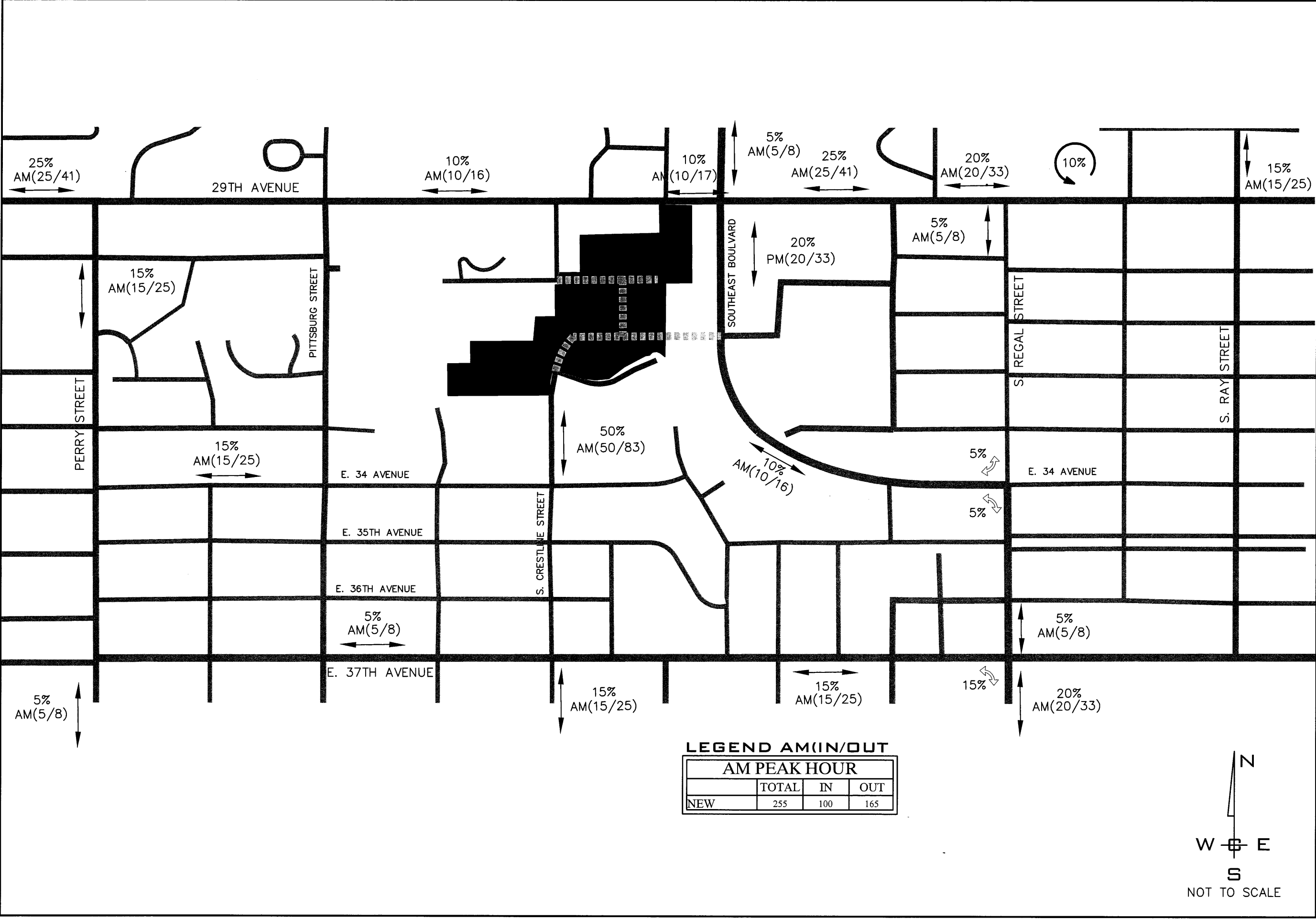
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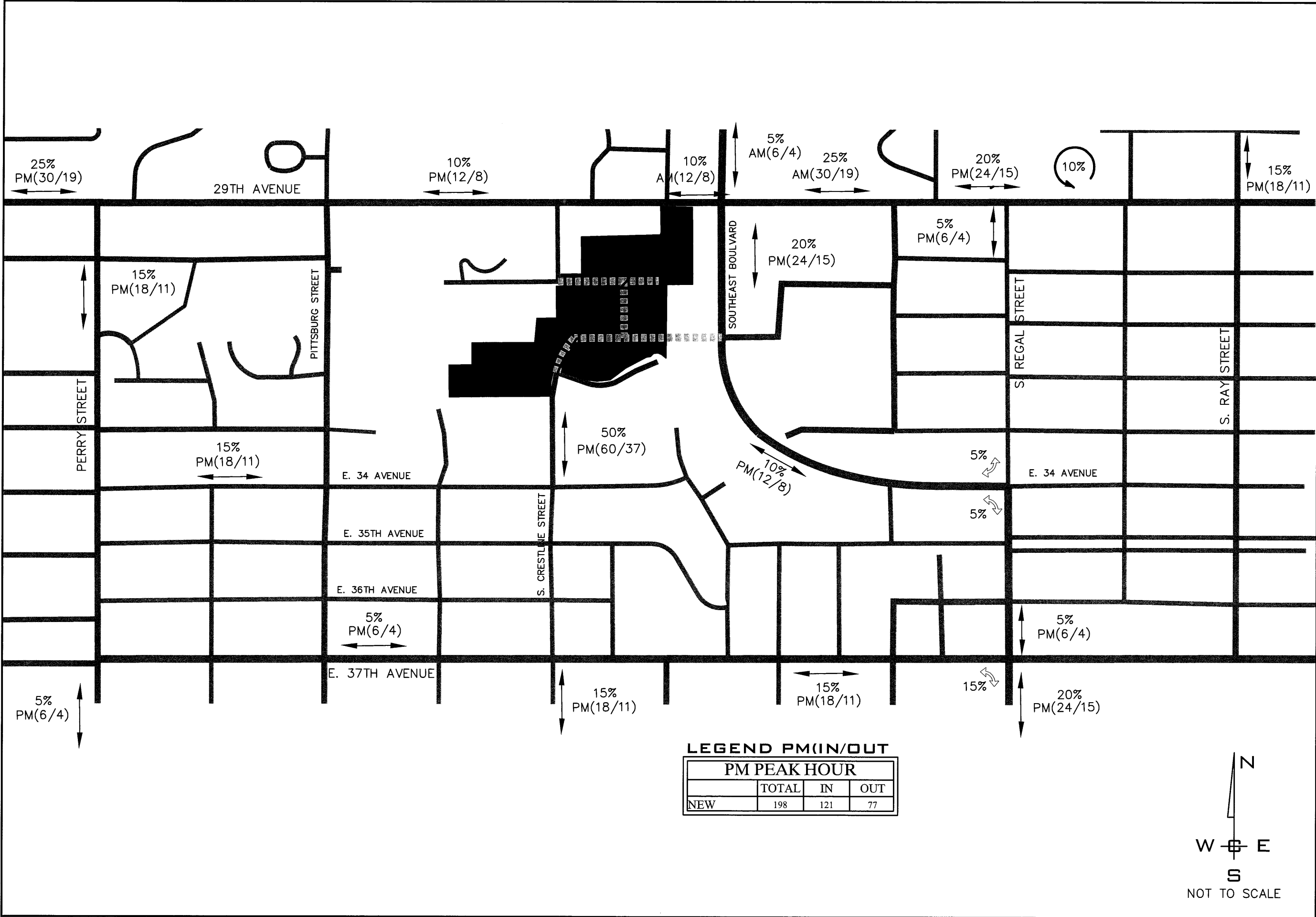
TRIP GENERATION & DISTRIBUTION
SONNELAND PUD
32ND AVENUE & CRESTLINE STREET
SPOKANE, WASHINGTON
CONCEPT SITE PLAN


FIGURE
2
OF
4

PROJ #: 1939
DATE: 12/04/17
DRAWN: BNG
APPROVED: TRW

WCE
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TRIP GENERATION & DISTRIBUTION
SONNELAND PUD
32ND AVENUE & CRESTLINE STREET
SPOKANE, WASHINGTON

FIGURE
4
OF
4

PM NEW TRIP DISTRIBUTION

LAND USE 1

Analyst BNG
Date 12/5/2017
Peak Hour AM

LAND USE 2 Single Family

ITE LUC	Size	Total	Internal	External
Enter	10	-	-	-
Exit	28	-	-	-
Total	38	-	-	-
%	100%	-	-	-

Demand (from/to)	0	Demand (to/from)	0
Lowest	0	Lowest	0
Demand (to/from)	0	Demand (from/to)	0

LAND USE 3 Coffe Shop

ITE LUC	Size	Total	Internal	External
Enter	138	-	-	-
Exit	133	-	-	-
Total	271	-	-	-
%	100%	-	-	-

Demand (from/to)	8	Demand (to/from)	21
Lowest	3	Lowest	5
Demand (to/from)	3	Demand (from/to)	5

LAND USE 1 Apartment

ITE LUC	Size	Total	Internal	External
Enter	20	3	17	
Exit	82	5	77	
Total	102	8	94	
%	100%	8%	92%	

Demand (from/to)	3	Demand (to/from)	0
Lowest	0	Lowest	0
Demand (to/from)	0	Demand (from/to)	0

LAND USE 4 Specialty Retail

ITE LUC	Size	Total	Internal	External
Enter	0	-	-	-
Exit	0	-	-	-
Total	0	-	-	-
%	#DIV/0!	-	-	-

Demand (from/to)	5	Demand (to/from)	3
Lowest	0	Lowest	0
Demand (to/from)	0	Demand (from/to)	0

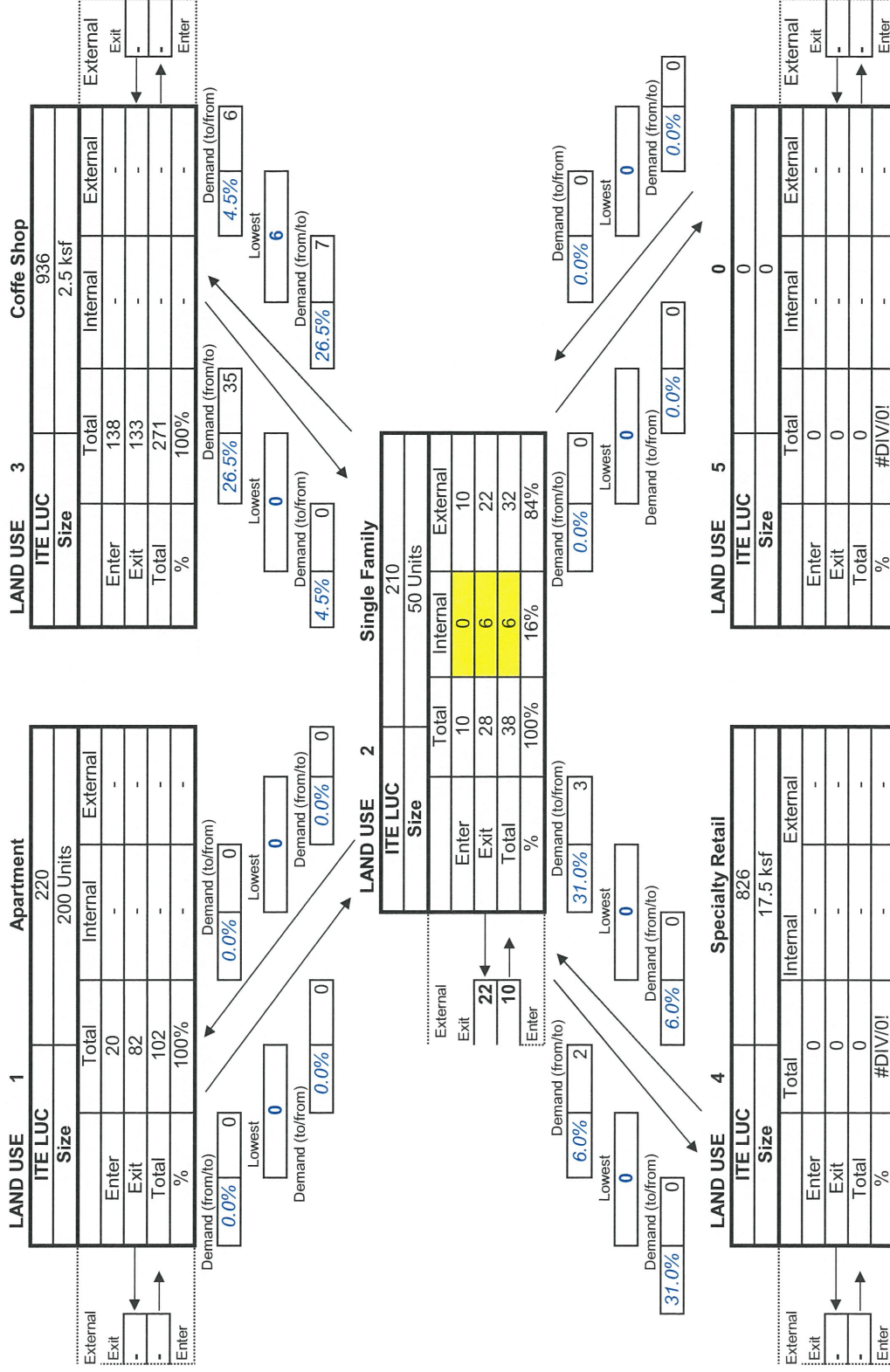
LAND USE 5

ITE LUC	Size	Total	Internal	External
Enter	0	-	-	-
Exit	0	-	-	-
Total	0	-	-	-
%	#DIV/0!	-	-	-

Demand (from/to)	0	Demand (to/from)	0
Lowest	0	Lowest	0
Demand (to/from)	0	Demand (from/to)	0

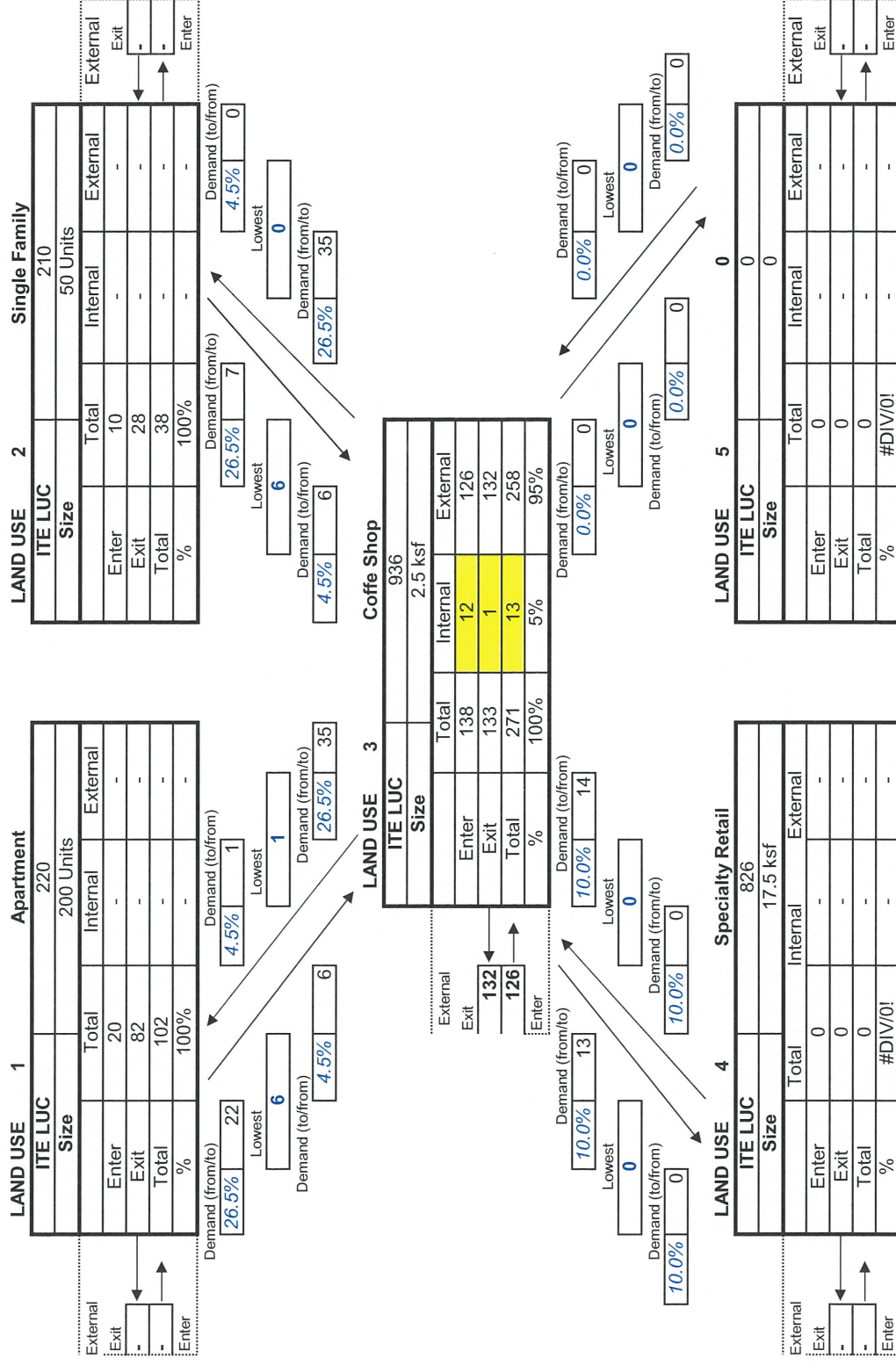
LAND USE 2

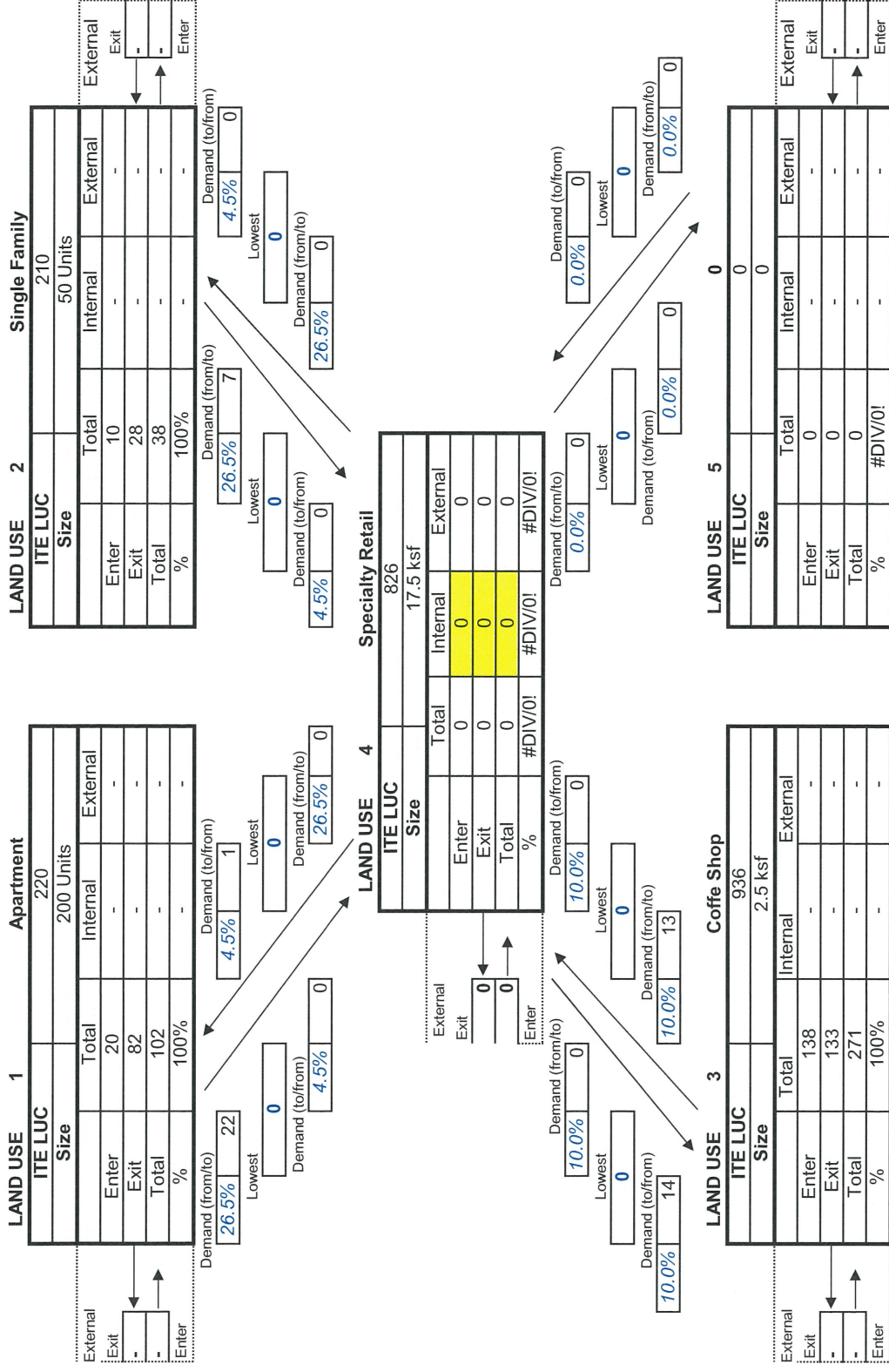
Analyst BNG
Date 12/5/2017
Peak Hour AM

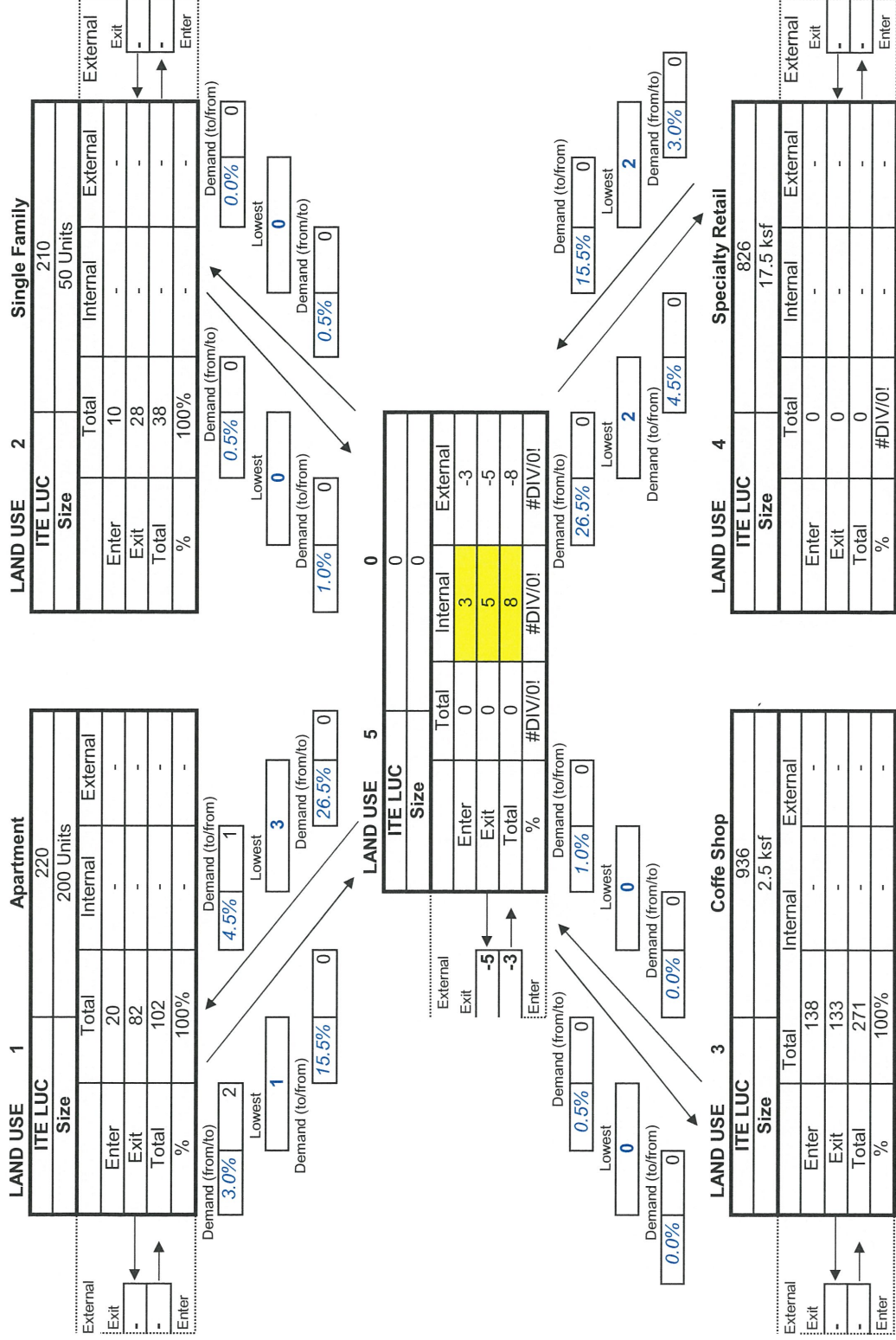


LAND USE 3

Analyst BNG
Date 12/5/2017
Peak Hour AM







External Summary

ITE Trip Generation Handbook 2nd Edition

Table 7.1 Unconstrained Internal Capture Rates for Trip Origins Within a Multi-Use Development

(From/To)		Weekday		AM % of PM
		PM Peak Hour of Adj. St.		
From Office	to Office	1%		50%
	to Retail	23%		0.5%
	To Residential	2%		11.5%
From Retail	to Office	3%		1.0%
	to Retail	20%		1.5%
	To Residential	12%		10.0%
From Residential	to Office	N/A		6.0%
	to Retail	53%		1.0%
	To Residential	N/A		26.5%
N/A Not Available				N/A

Table 7.2 Unconstrained Internal Capture Rates for Trip Destinations Within a Multi-Use Development

(To/From)		Weekday		AM % of PM
		PM Peak Hour of Adj. St.		
To Office	From Office	6%		50%
	From Retail	31%		3.0%
	From Residential	0%		15.5%
To Retail	From Office	2%		0.0%
	From Retail	20%		1.0%
	From Residential	9%		10.0%
To Residential	From Office	2%		4.5%
	From Retail	31%		1.0%
	From Residential	N/A		15.5%
N/A Not Available				N/A

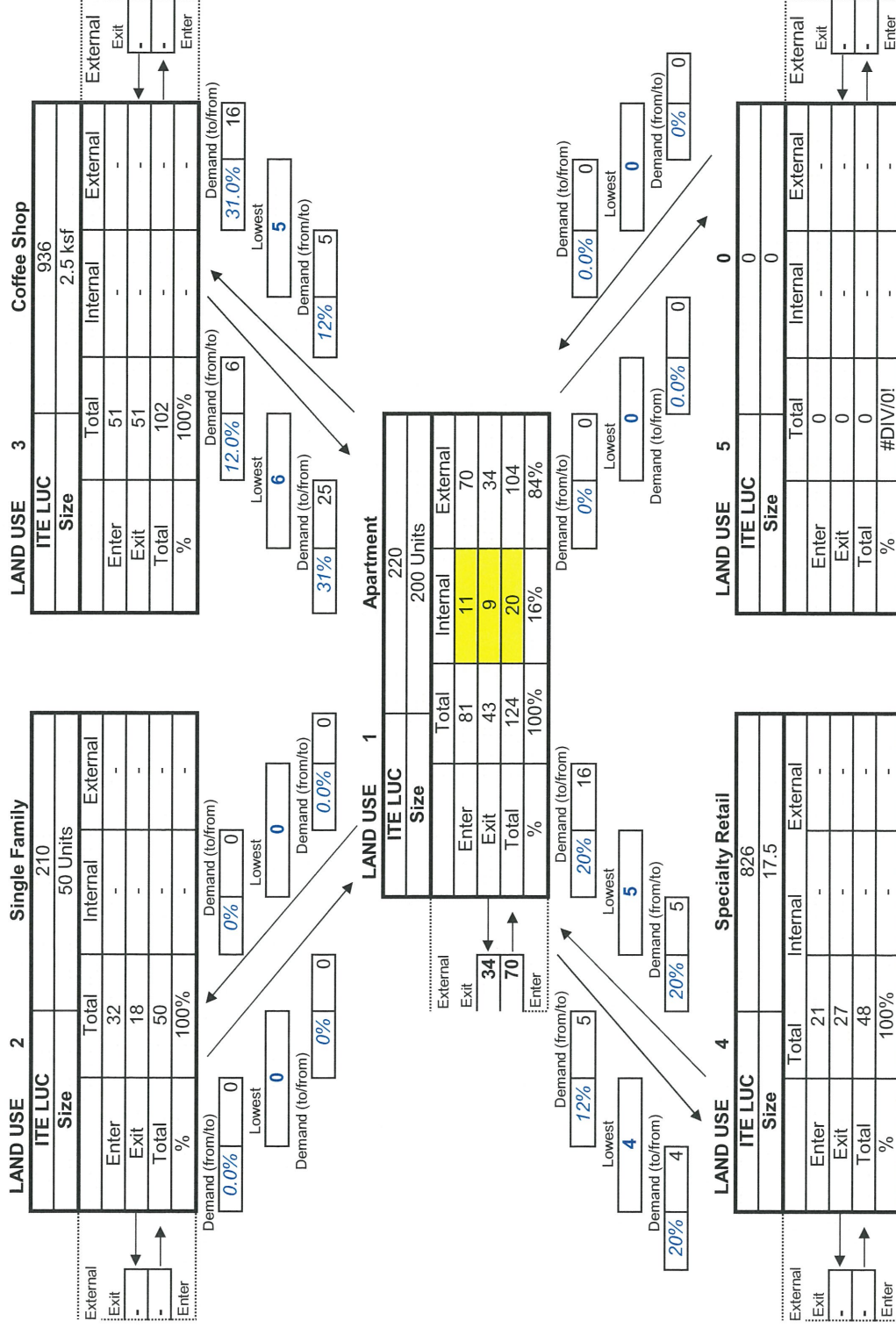
Design Note: When 2 landuses of the same type; Office, Retail, Residential, are analyzed. The percentage of distribution is divided by the number of the same type of land uses. Thus, preserving the ITE distribution data.

Land Use	1	Land Use	2	Land Use	3	Land Use	4	Land Use	5
Apartment									
ITE LUC	220	ITE LUC	210	ITE LUC	936	ITE LUC	826	ITE LUC	
Size	200 Units	Size	50 Units	Size	2.5 ksf	Size	17.5 ksf	Size	
Enter	20	Enter	10	Enter	138	Enter	0	Enter	
Exit	82	Exit	28	Exit	133	Exit	0	Exit	
Total	102	Total	38	Total	271	Total	0	Total	

Net External Trips for Multi-Use Development						27 INTERNAL CAPTURE
Land Use	1	2	3	4	5	
Enter	17	10	126	0	153	
Exit	77	22	132	0	231	
Total	94	32	258	0	384	
Single-use Trip Gen Est.	102	38	271	0	411	7%

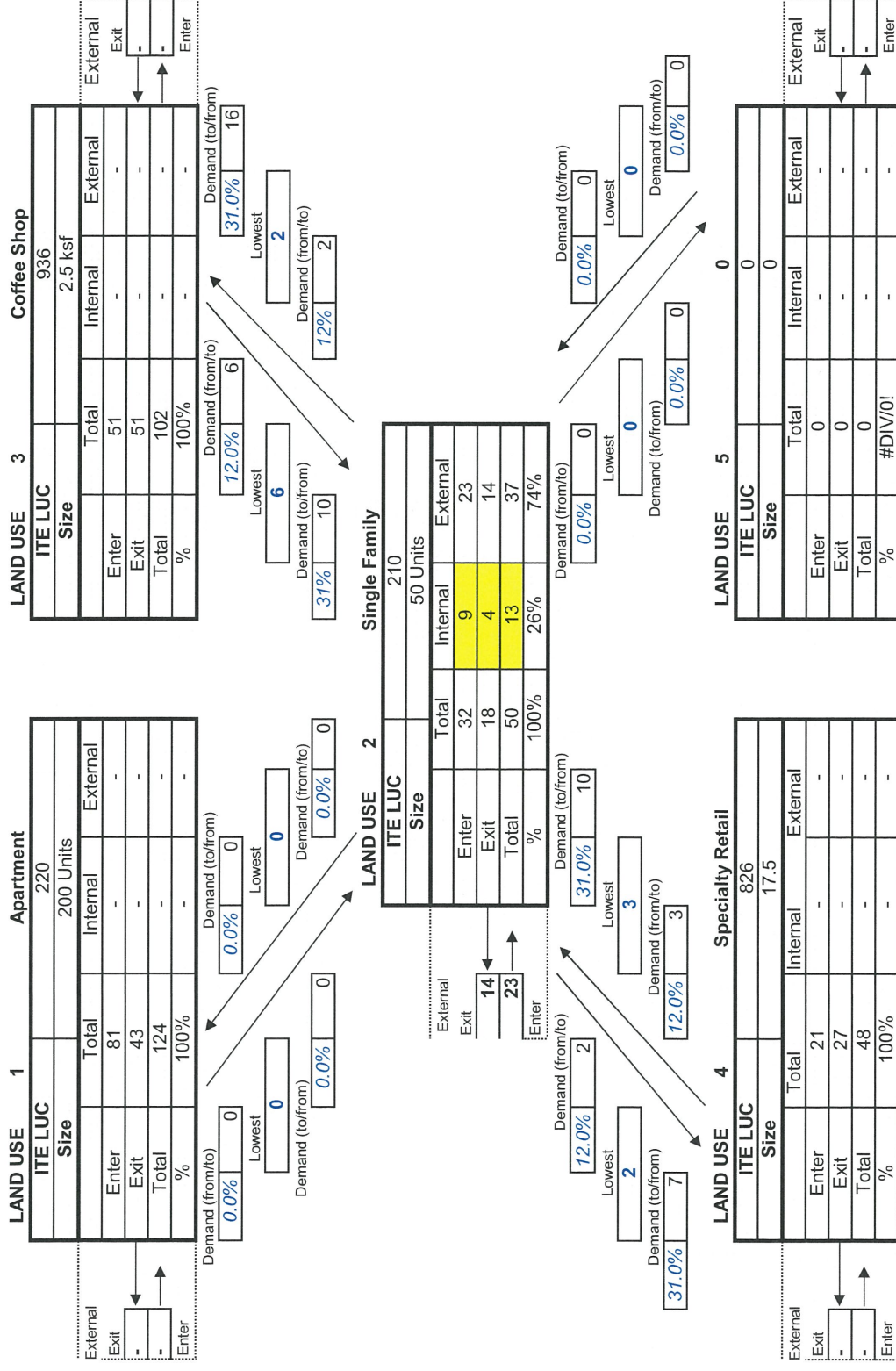
LAND USE 1

Analyst BNG
Date 12/5/2017
Peak Hour PM



LAND USE 2

Analyst BNG
Date 12/5/2017
Peak Hour PM

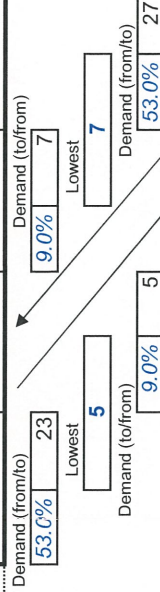


LAND USE 3

Analyst BNG
Date 12/5/2017
Peak Hour PM

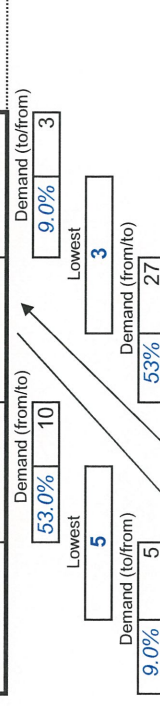
LAND USE 1 Apartment

ITE LUC	Size	Total	Internal	External
Enter	81		-	-
Exit	43		-	-
Total	124		-	-
%	100%		-	-



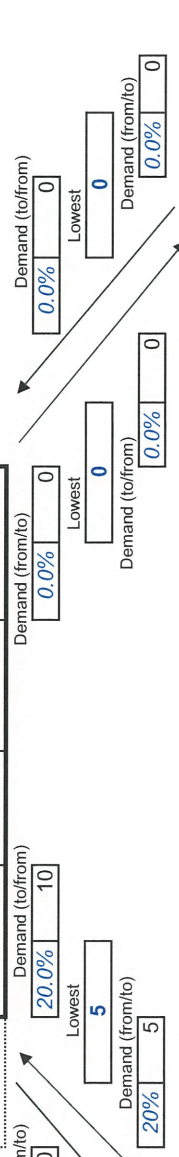
LAND USE 2 Single Family

ITE LUC	Size	Total	Internal	External
Enter	32		-	-
Exit	18		-	-
Total	50		-	-
%	100%		-	-



LAND USE 3 Coffee Shop

ITE LUC	Size	Total	Internal	External
Enter	51		15	36
Exit	51		14	37
Total	102		29	73
%	100%		28%	72%



LAND USE 4 Specialty Retail

ITE LUC	Size	Total	Internal	External
Enter	21		-	-
Exit	27		-	-
Total	48		-	-
%	100%		-	-



LAND USE 5

ITE LUC	Size	Total	Internal	External
Enter	0		-	-
Exit	0		-	-
Total	0		-	-
%	#DIV/0!		-	-



LAND USE 4

LAND USE		1	Apartment	
ITE LUC			220	
Size		200 Units		
		Total	Internal	External
Enter		81	-	-
Exit		43	-	-
Total		124	-	-
%		100%	-	-

LAND USE	2	Single Family		
ITE LUC		210		
Size		50 Units		
		Total	Internal	External
Enter		32	-	-
Exit		18	-	-
Total		50	-	-
%		100%	-	-

The diagram illustrates the relationship between demand and the lowest price for two different demand scenarios. The top scenario shows a demand of 23 (from/to) and a lowest price of 7 (from/to) with a 9.0% margin. The bottom scenario shows a demand of 2 (from/to) and a lowest price of 14 (from/to) with a 9.0% margin. An arrow points from the top scenario to the bottom scenario, indicating a shift in demand.

Figure 1 illustrates the relationship between demand and price for two goods, A and B. The vertical axis represents price and the horizontal axis represents quantity. Two downward-sloping demand curves are shown: Demand (from/to) A and Demand (from/to) B. The vertical axis is labeled "Demand (to/from)" and the horizontal axis is labeled "Demand (from/to)". The vertical axis has two points: 10 (53.0%) and 3 (9.0%). The horizontal axis has two points: 2 (9.0%) and 14 (53%). The vertical axis is labeled "Lowest" and the horizontal axis is labeled "Lowest".

LAND USE	4	Specialty Retail
ITE LUC		826
Size		17.5
	Total	Internal
Enter	21	8
Exit	27	15
Total	48	23
%	100%	48%
Enter		52%

Specialty Retail	
	826
	17.5
Internal	External
8	13
15	12
23	25
48%	52%

Demand (from/to) 20.0% Demand (to/from) 20.0% Lowest
 Demand (from/to) 20.0% Lowest Demand (to/from) 20.0% Demand (to/from) 20.0%

LAND USE		3	Coffee Shop	
	ITE LUC		936	
	Size		2.5 ksf	
		Total	Internal	External
Enter		51	-	-
Exit		51	-	-
Total		102	-	-
%		100%	-	-

LAND USE	5	0	0
ITE LUC			0
Size			0
	Total	Internal	External
Enter	0	-	-
Exit	0	-	-
Total	0	-	-
%	#DIV/0!	-	-

LAND USE 5

Analyst
Date
Peak Hour

BNG
12/5/2017
PM

LAND USE 1 Apartment

ITE LUC	Size	Total	Internal	External
Enter	81		-	-
Exit	43		-	-
Total	124		-	-
%	100%		-	-

LAND USE 2 Single Family

ITE LUC	Size	Total	Internal	External
Enter	32		-	-
Exit	18		-	-
Total	50		-	-
%	100%		-	-

LAND USE 5

ITE LUC	Size	Total	Internal	External
Enter	0		0	0
Exit	0		0	0
Total	0		0	0
%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

LAND USE 3 Coffee Shop

ITE LUC	Size	Total	Internal	External
Enter	51		-	-
Exit	51		-	-
Total	102		-	-
%	100%		-	-

LAND USE 4 Specialty Retail

ITE LUC	Size	Total	Internal	External
Enter	21		-	-
Exit	27		-	-
Total	48		-	-
%	100%		-	-

ITE Trip Generation Handbook 2nd Edition

Table 7.1 Unconstrained Internal Capture Rates for Trip Origins Within a Multi-Use Development

(From/To)		Weekday
		PM Peak Hour of Adj. St.
From Office	to Office	1%
	to Retail	23%
	To Residential	2%
From Retail	to Office	3%
	to Retail	20%
	To Residential	12%
From Residential	to Office	N/A
	to Retail	53%
	To Residential	N/A
N/A	Not Available	N/A

Table 7.2 Unconstrained Internal Capture Rates for Trip Destinations Within a Multi-Use Development

(To/From)		Weekday
	PM Peak Hour of Adj. St.	
To Office	From Office	6%
	From Retail	31%
	From Residential	0%
To Retail	From Office	2%
	From Retail	20%
	From Residential	9%
To Residential	From Office	2%
	From Retail	31%
	From Residential	N/A
N/A	Not Available	

Design Note: When 2 landuses of the same type; Office, Retail, Residential, are analyzed. The percentage of distribution is divided by the number of the same type of land uses. Thus, preserving the ITE distribution data.

Land Use	1	2	3	4	5
	Apartment	Single Family	Coffee Shop		
ITE LUC	220	ITE LUC	ITE LUC	ITE LUC	ITE LUC
Size	200 Units	Size	Size	Size	Size
Enter	81	Enter	Enter	Enter	Enter
Exit	43	Exit	Exit	Exit	Exit
Total	124	Total	Total	Total	Total
		50	102	48	

Net External Trips for Multi-Use Development						
Land Use	1	2	3	4	5	TOTAL
Enter	70	23	36	13	0	142
Exit	34	14	37	12	0	97
Total	104	37	73	25	0	239
Single-use Trip Gen Est.	124	50	102	48	0	324
						85 INTERNAL CAPTURE
						26%