



Traffic Impact Study

SWC Mesa Ridge & Syracuse  
Lots 1-5  
Fountain, Colorado

Prepared for:

**Evergreen Devco, Inc.**

**Kimley»Horn**



T R A F F I C   I M P A C T   S T U D Y

**SWC Mesa Ridge & Syracuse, Lots 1-5**

Fountain, Colorado

**Prepared for**  
**Evergreen Devco, Inc.**  
2390 East Camelback Road  
Suite 410  
Phoenix, Arizona 85016

**Prepared by**  
**Kimley-Horn and Associates, Inc.**  
4582 South Ulster Street  
Suite 1500  
Denver, Colorado 80237  
(303) 228-2300



November 2019

*This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.*

**TABLE OF CONTENTS**

TABLE OF CONTENTS ..... i

LIST OF TABLES .....ii

LIST OF FIGURES.....ii

1.0 EXECUTIVE SUMMARY ..... 1

2.0 INTRODUCTION..... 5

3.0 EXISTING AND FUTURE CONDITIONS ..... 7

    3.1 Existing Study Area .....7

    3.2 Existing and Future Roadway Network .....7

    3.3 Existing Traffic Volumes .....10

    3.4 Unspecified Development Traffic Growth .....10

4.0 PROJECT TRAFFIC CHARACTERISTICS ..... 14

    4.1 Trip Generation.....14

    4.2 Trip Distribution .....16

    4.3 Traffic Assignment.....16

    4.4 Total (Background Plus Project) Traffic.....16

5.0 TRAFFIC OPERATIONS ANALYSIS ..... 24

    5.1 Analysis Methodology .....24

    5.2 Key Intersection Operational Analysis .....25

    5.3 CDOT Turn Bay Length Analysis .....28

    5.4 Turn Bay Vehicle Queuing Analysis.....30

6.0 CONCLUSIONS AND RECOMMENDATIONS ..... 34

**APPENDICES**

- Appendix A – Intersection Count Sheets
- Appendix B – Growth Projections
- Appendix C – Trip Generation Worksheets
- Appendix D – Intersection Analysis Worksheets
- Appendix E – Queuing Analysis Worksheets
- Appendix F – Conceptual Site Plan

## LIST OF TABLES

Table 1 – SWC Mesa Ridge and Syracuse Project Traffic Generation .....	15
Table 2 – Level of Service Definitions .....	24
Table 3 – Mesa Ridge Parkway and Syracuse Street LOS Results .....	25
Table 4 – Syracuse Street North Access LOS Results .....	26
Table 5 – Syracuse Street South Access LOS Results .....	27
Table 6 – Turn Lane Length Analysis Results .....	30

## LIST OF FIGURES

Figure 1 – Vicinity Map.....	6
Figure 2 – Surrounding Site Area.....	8
Figure 3 – Existing Lane Configurations and Control.....	9
Figure 4 – Existing Traffic Volumes.....	11
Figure 5 – 2022 Background Traffic Volumes.....	12
Figure 6 – 2040 Background Traffic Volumes.....	13
Figure 7 – Non Pass-By Project Trip Distribution .....	17
Figure 8 – AM Peak Pass-By Project Trip Distribution.....	18
Figure 9 – PM Peak Pass-By Project Trip Distribution.....	19
Figure 10 – Non Pass-By Project Traffic Assignment.....	20
Figure 11 – Pass-By Project Traffic Assignment .....	21
Figure 12 – 2022 Background Plus Project Traffic Volumes.....	22
Figure 13 – 2040 Background Plus Project Traffic Volumes.....	23
Figure 14 – 2022 Recommended Lane Configurations and Control .....	32
Figure 15 – 2040 Recommended Lane Configurations and Control .....	33

## 1.0 EXECUTIVE SUMMARY

---

The SWC Mesa Ridge and Syracuse Project is a proposed new commercial development to be located on the southwest corner of the intersection of Mesa Ridge Parkway (State Highway 16) and Syracuse Street in Fountain, Colorado. As currently envisioned, the site is anticipated to develop Lots 1 through 5 to include a 20-fueling position gas station with convenience market, a 4,000 square foot automated car wash, a 3,500 square foot fast food restaurant with drive-through window, an 8,500 square foot tire superstore, and a 12,000 square foot day care facility. It is expected that this project development will be completed by 2022; therefore, analysis was conducted for the 2022 short term horizon as well as the 2040 long-term horizon.

The purpose of this traffic study is to identify project traffic generation characteristics and potential project traffic related impacts on the local street system, as well as to develop mitigation measures required for identified impacts. The intersection of Mesa Ridge Parkway (SH-16) and Syracuse Street was incorporated into this traffic study in accordance with City of Fountain and State of Colorado Department of Transportation (CDOT) standards and requirements. In addition, the two proposed project accesses along the west side of Syracuse Street were also included for evaluation.

Regional access will be provided by Interstate 25 (I-25), Highway 85 (US-85), and Powers Boulevard (SH-21). Primary access to the site will be provided by Mesa Ridge Parkway (SH-16). Direct access to the project is proposed from two (2) full movement accesses along the west side of Syracuse Street. The North Syracuse Street access is proposed approximately 325 feet south of Mesa Ridge Parkway and the South Syracuse Street access is proposed approximately 650 feet south of Mesa Ridge Parkway (measured center to center).

The SWC Mesa Ridge and Syracuse Project is expected to generate approximately 7,064 daily external weekday trips with 589 of these trips occurring during the weekday morning peak hour and 601 trips occurring during the weekday afternoon peak hour. Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the gas station and fast-food restaurant land uses. With pass-by, expected net new trips (non pass-by) to the surrounding street network results in

3,940 weekday daily trips with 365 and 386 trips anticipated during the weekday morning and afternoon peak hours, respectively.

Non pass-by distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, anticipated surrounding development in the area, and the proposed access system for the project. Pass-by distribution of project traffic was based on the existing traffic volumes traveling by the site during each peak hour. Assignment of project traffic was based upon the trip generation described previously and the distributions developed.

Based on the analysis presented in this report, Kimley-Horn believes the proposed SWC Mesa Ridge and Syracuse Project development will be successfully incorporated into the existing and future roadway network. The proposed project development and expected traffic volumes resulted in the following recommendations and conclusions:

- The threshold for requiring an access permit along CDOT roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Based on traffic projections, the addition of project traffic on the south leg of Syracuse Street at Mesa Ridge Parkway (SH-16) is anticipated to increase existing access traffic volumes by more than 20 percent; therefore, it is believed that CDOT will require an access permit for this intersection in association with this project.
- For the south leg of Syracuse Street at Mesa Ridge Parkway (SH-16), a westbound left turn deceleration lane, an eastbound right turn deceleration lane, and an eastbound acceleration lane from the northbound right turn are all warranted based on the State Highway Access Code (SHAC) guidelines. The westbound left turn deceleration and eastbound right turn deceleration lanes exist today.
- The total required westbound left-turn deceleration length is 745 feet (a 380-foot deceleration length, plus a 145-foot storage length, plus a 220-foot taper length, 18.5 to 1 ratio) to meet current CDOT SHAC guidelines for a NR-A roadway with a 55-mph speed limit. This left turn lane exists today providing an approximate length of 820 feet (550 feet plus 270-foot taper). Therefore, no modifications to this left turn lane are anticipated to be necessary.

- The total required eastbound right turn deceleration length is 820 feet (600 feet plus a 220-foot taper) to meet CDOT SHAC guidelines for an EX, Expressway roadway with a speed limit of 55 miles per hour. Today, a right turn deceleration lane exists at this intersection, providing 600 feet of length (450-foot deceleration lane plus 150-foot taper), which would meet the NR-A category for SH-16 which exists on the east side of Syracuse Street. However, with the west leg having a category of EX, Expressway, it is recommended that this eastbound right turn lane be reconstructed to provide a 600-foot right turn lane plus 220-foot taper.
- The total required northbound to eastbound right turn acceleration length is 960 feet (a 740-foot acceleration length plus a 220-foot taper length, 18.5 to 1 ratio) per CDOT SHAC guidelines for a NR-A roadway with a 55-mph speed limit. Currently, a northbound to eastbound right turn acceleration lane does not exist at this intersection. In order to meet CDOT SHAC standards and requirements, this acceleration lane is recommended to be incorporated into this intersection with project construction and provided by opening in 2022.
- The project proposes a full movement access along the west side of Syracuse Street approximately 325 feet southwest of Mesa Ridge Parkway (measured center to center). The eastbound project access drive is recommended to have a R1-1 "STOP" sign installed for the exiting approach. A northbound left turn lane with 100 feet of length is recommended to be designated at this access intersection. Currently, sufficient pavement width exists along Syracuse Street in order for this northbound left turn lane to be striped. It is recommended that the eastbound access drive be constructed with separate left and right turn egress lanes to accommodate vehicle demands and prohibit left turning vehicles from blocking right turn movements. Three vehicles of storage length (75 feet) is recommended in the driveway throat for the project access exiting approach based on vehicle usage anticipated.
- With completion of the SWC Mesa Ridge and Syracuse development, the site proposes a full movement access along the west side of Syracuse Street approximately 650 feet southwest of Mesa Ridge Parkway (measured center to center). The eastbound project access drive is recommended to have a R1-1 "STOP" sign installed for the exiting approach. One exiting lane should be sufficient at this project access. One vehicle of storage length is recommended to be provided for the project access based on vehicle usage anticipated.

- The northbound left turn lane at the intersection of Mesa Ridge Parkway and Syracuse Street currently provides 200 feet of storage length. With construction of this project in the 2022 project buildout year, it is recommended that this northbound left turn lane be extended to provide 275 feet of storage length up to the proposed northern driveway location. By 2040, northbound left turning vehicles may exceed this queue storage length. However, by the long-term horizon when this area is fully developed, northbound and southbound dual left turn lanes may be implemented at this intersection to accommodate future traffic demands.
- The existing 200-foot southbound left turn lane at the intersection of Mesa Ridge Parkway and Syracuse Street was found to require 250 feet of length in 2022 and 425 feet of length in 2040. However, this left turn lane cannot be further extended due to the existing full movement driveway for Mesa Ridge High School on the east side of Syracuse Street. If this driveway were restricted to right-in/right-out movements only, then this driveway would not be blocked by the southbound left turn queue. It is important to note that project traffic does not add to this movement.
- By 2040, It is anticipated that Mesa Ridge Parkway will be improved to be a six-lane roadway. When this improvement occurs, it is anticipated that the separate eastbound and westbound right turn lanes will be absorbed into through lanes. Therefore, at the intersection of Mesa Ridge Parkway and Syracuse Street, the eastbound and westbound Mesa Ridge Parkway approaches should provide separate left turn lanes and three through lanes with the third outside lane being a shared through/right turn lane.
- Any on-site and off-site signing and striping improvements should be incorporated into the Civil Drawings and conform to City of Fountain and CDOT Standards as well as the Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD).



## 2.0 INTRODUCTION

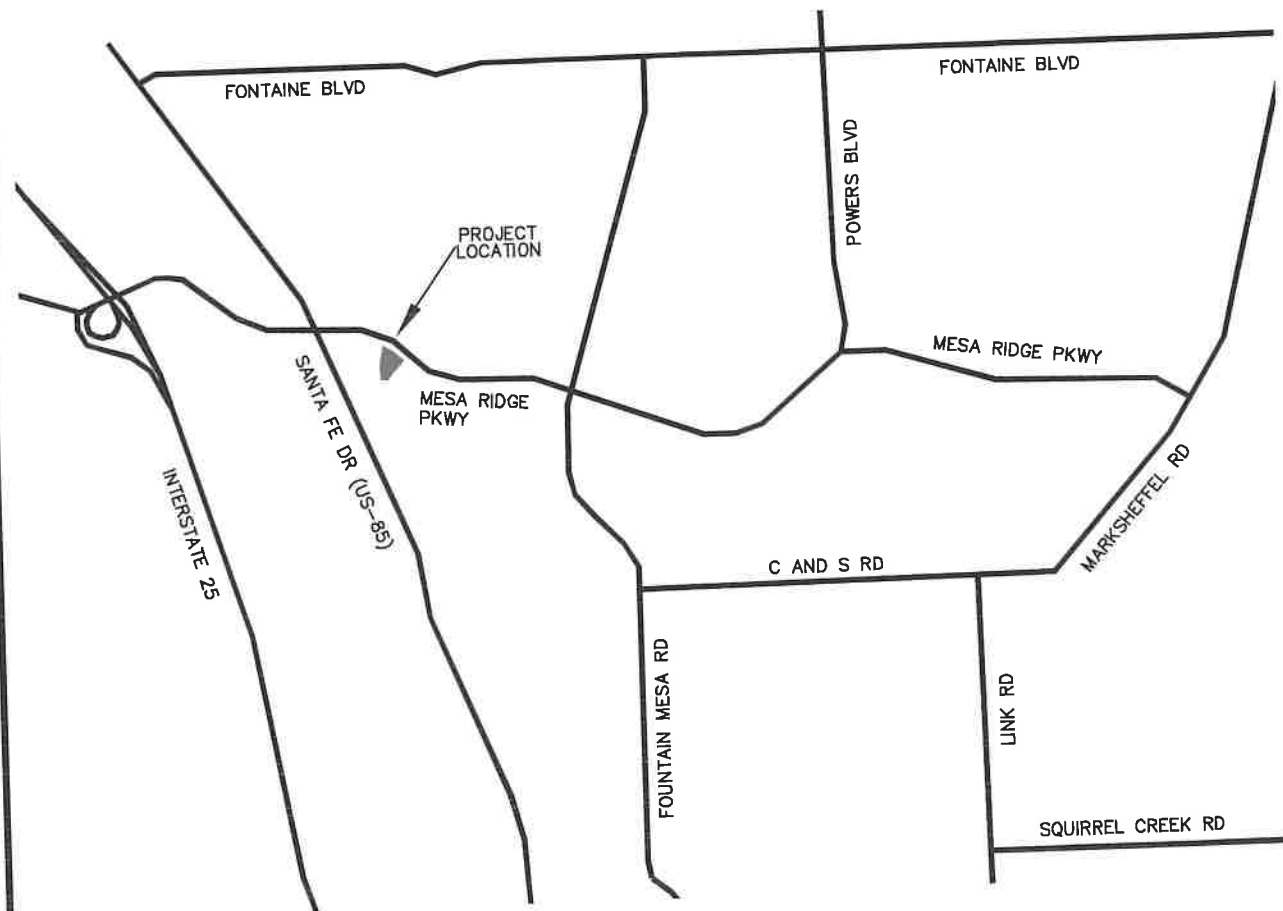
---

Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study of future traffic conditions associated with the proposed SWC Mesa Ridge & Syracuse, a proposed commercial project located on the southwest corner of the intersection of Mesa Ridge Parkway (SH-16) and Syracuse Street in Fountain, Colorado. A vicinity map is shown in **Figure 1**.

As currently envisioned, Lots 1 through 5 of the site are anticipated to include a 20-fueling position gas station with convenience market, a 4,000 square foot automated car wash, a 3,500 square foot fast food restaurant with drive-through window, an 8,500 square foot tire superstore, and a 12,000 square foot day care facility. A conceptual site plan illustrating the development is shown in **Appendix F**. It is expected that this project development will be completed by 2022; therefore, analysis was conducted for the 2022 short term horizon as well as the 2040 long-term horizon per City of Fountain and State of Colorado Department of Transportation (CDOT) requirements.

The purpose of this traffic study is to identify project traffic generation characteristics and potential project traffic related impacts on the local street system, as well as to develop mitigation measures required for identified impacts. The intersection of Mesa Ridge Parkway (State Highway 16) and Syracuse Street was incorporated into this traffic study in accordance with City of Fountain and CDOT standards and requirements. In addition, the two proposed project accesses along the west side of Syracuse Street were also included for evaluation.

Regional access will be provided by Interstate 25 (I-25), Highway 85 (US-85), and Powers Boulevard (SH-21). Primary access to the site will be provided by Mesa Ridge Parkway (SH-16). Direct access to the project is proposed from two (2) full movement accesses along the west side of Syracuse Street. The North Syracuse Street access is proposed approximately 325 feet south of Mesa Ridge Parkway and the South Syracuse Street access is proposed approximately 650 feet south of Mesa Ridge Parkway (measured center to center).



SWC MESA RIDGE & SYRACUSE  
VICINITY MAP

FIGURE 1

### 3.0 EXISTING AND FUTURE CONDITIONS

---

#### 3.1 Existing Study Area

The existing project site is comprised of a vacant land. Vacant land also exists surrounding the project site in all directions. Further from the site residential land uses exist. The City of Fountain exists to the south. Mesa Ridge High School exists east of Syracuse Street, on the northeast corner of the Mesa Ridge Parkway and Syracuse Street intersection. The land uses and roadway network surrounding the site are shown in **Figure 2**.

#### 3.2 Existing and Future Roadway Network

Mesa Ridge Parkway (SH-16) is a four-lane divided east-west roadway with a posted speed limit of 55 mph in the vicinity of the site. Based on estimates from traffic count data, the 2018 average daily traffic (ADT) volume is approximately 30,000 vehicles per day (vpd) at Syracuse Street. It is anticipated that Mesa Ridge Parkway (SH-16) will be improved to be a six-lane roadway by the long-term future.

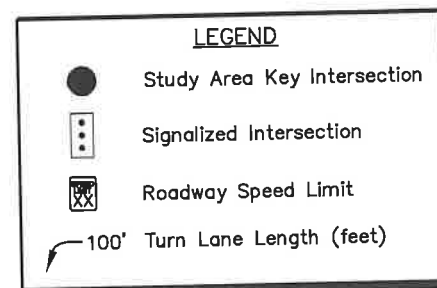
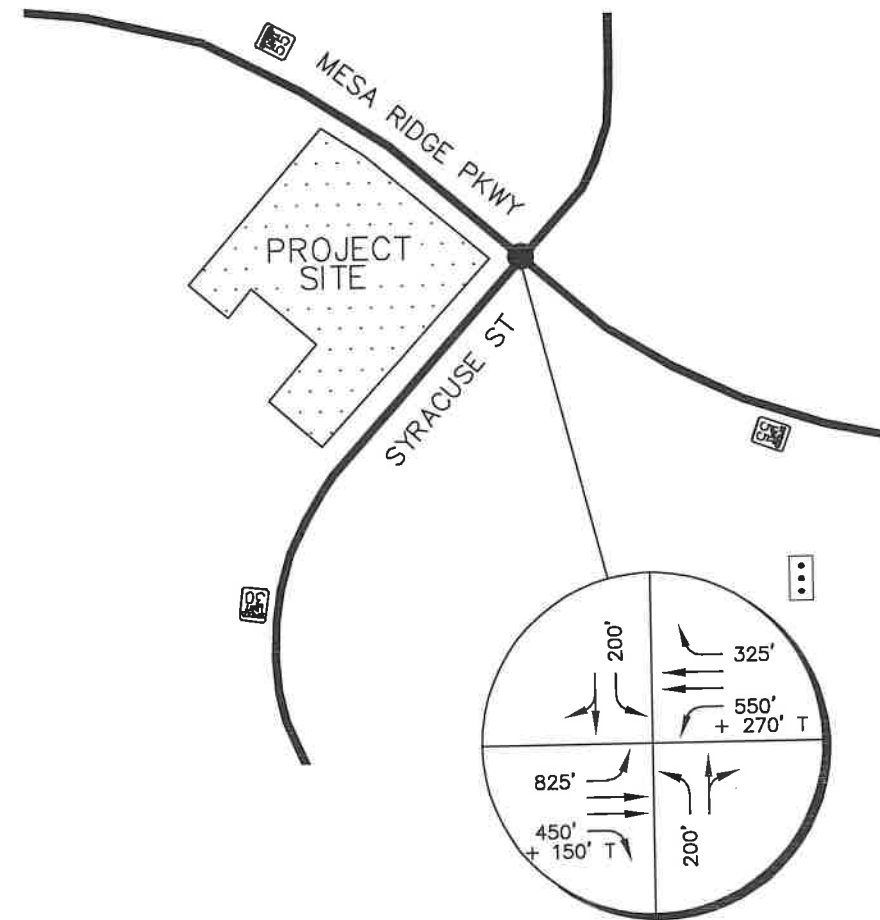
Syracuse Street is generally a two-lane undivided roadway with a posted speed limit of 25 mph north of Mesa Ridge Parkway and 30 mph south of Mesa Ridge Parkway. Based on estimates from traffic count data, the 2018 ADT volume is approximately 7,300 vpd north of Mesa Ridge Parkway and approximately 1,500 vpd south of Mesa Ridge Parkway.

The intersection of Mesa Ridge Parkway and Syracuse Street is signalized with protected-permitted left turn phasing on the eastbound and westbound Mesa Ridge Parkway approaches and with permitted-only left turn phasing on the northbound and southbound Syracuse Street approaches. The eastbound and westbound approaches of this intersection provide a left turn lane, two through lanes, and a right turn lane. The northbound and southbound approaches provide a left turn lane and a shared through/right turn lane. The intersection lane configuration and control for the study area key intersections are shown in **Figure 3**.



SWC MESA RIDGE & SYRACUSE  
SURROUNDING SITE AREA

FIGURE 2



SWC MESA RIDGE & SYRACUSE  
EXISTING LANE CONFIGURATIONS

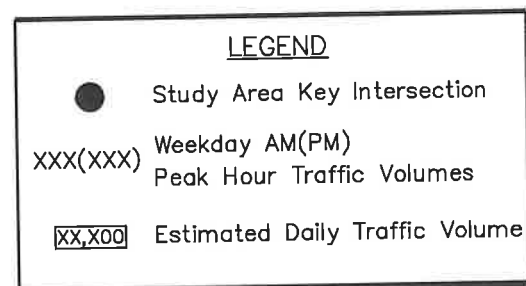
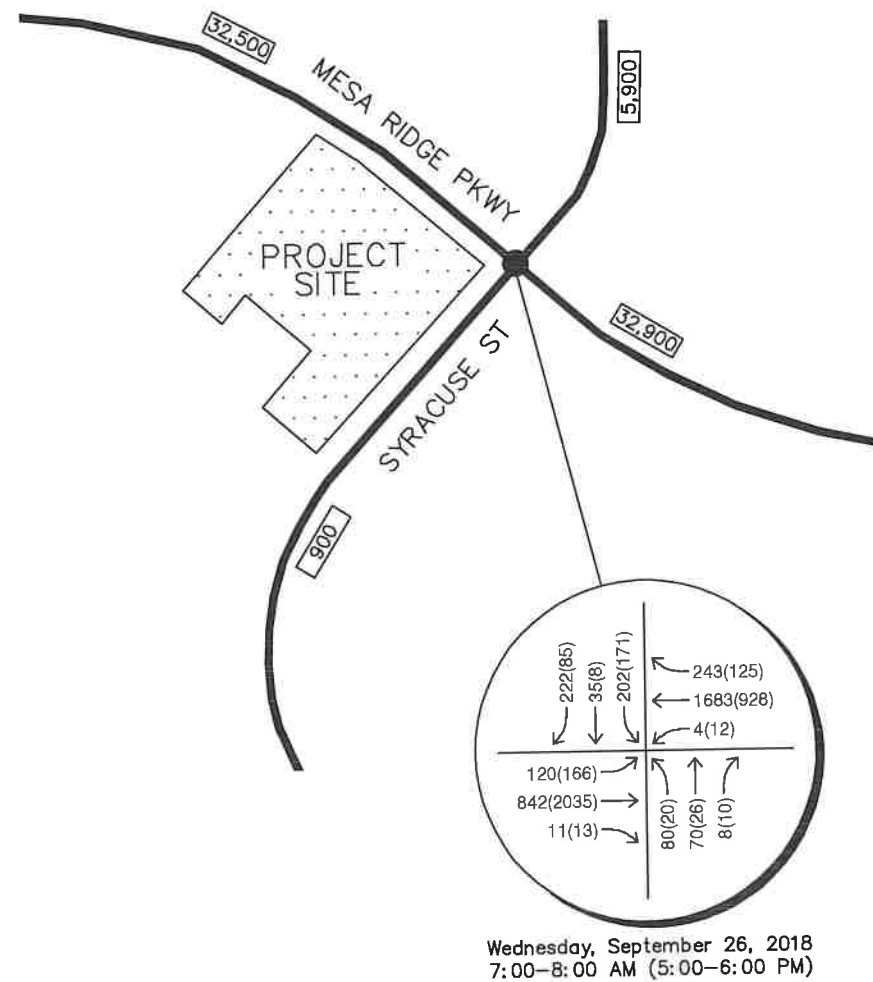
FIGURE 3

### 3.3 Existing Traffic Volumes

Existing peak hour turning movement counts were conducted at the intersection of Mesa Ridge Parkway and Syracuse Street on Wednesday, September 26, 2018. Counts were conducted in 15-minute intervals during the morning and afternoon peak hours of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. Existing turning movement counts are shown in **Figure 4** with count sheets provided in **Appendix A**.

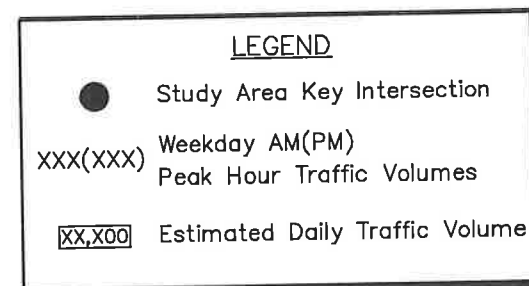
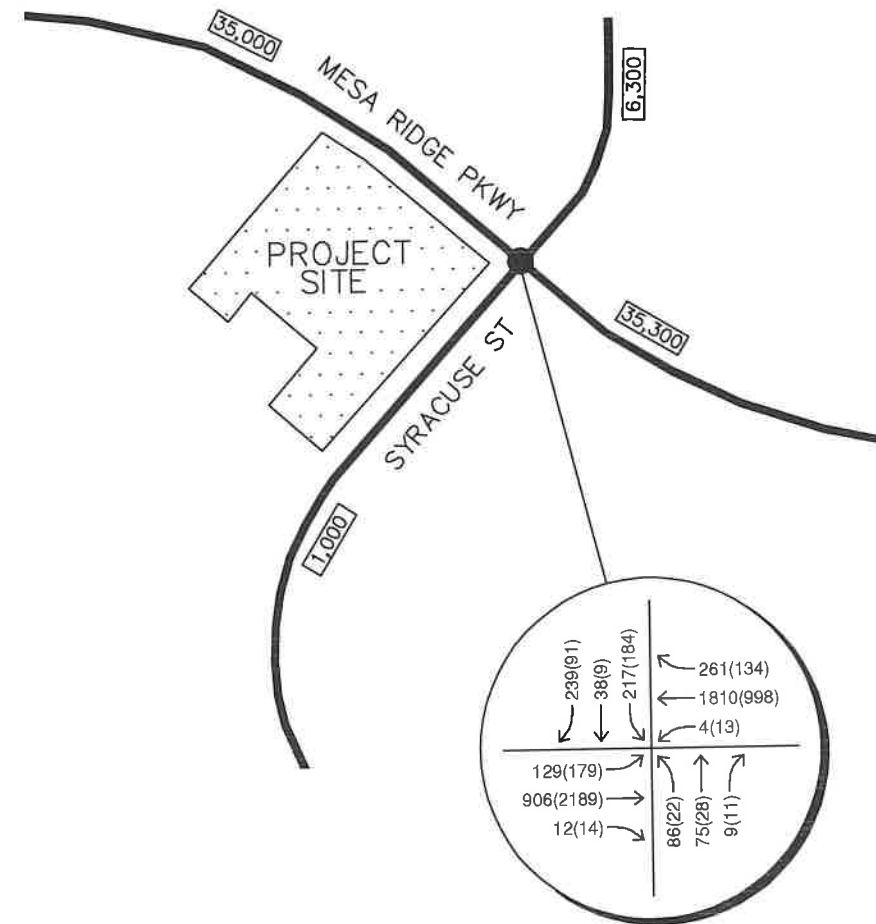
### 3.4 Unspecified Development Traffic Growth

Historic growth traffic is the increase in traffic due to usage increases and non-specific growth throughout the area. According to information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along Mesa Ridge Parkway (SH-16) adjacent to the project site is 1.44. This value equates to an annual growth rate of approximately 1.84 percent. Traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix B**. Based on this, an annual growth rate of 1.84 percent was used to calculate future traffic volumes. This annual growth rate was used to estimate near term 2022 and long term 2040 traffic volume projections at the key intersections without development of the project. Background traffic volumes for 2022 and 2040 are shown in **Figure 5** and **Figure 6**, respectively



SWC MESA RIDGE & SYRACUSE  
2019 EXISTING TRAFFIC VOLUMES

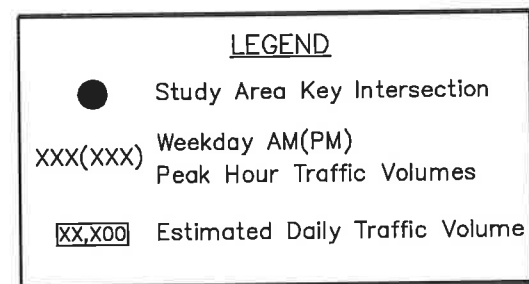
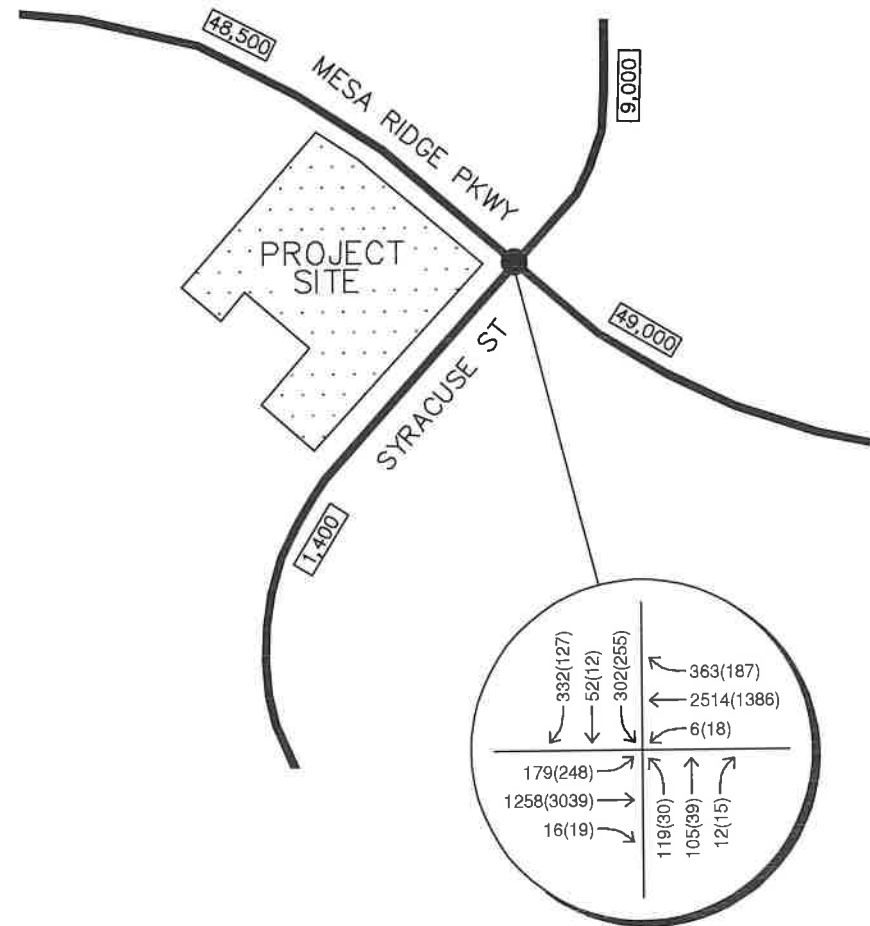
FIGURE 4



SWC MESA RIDGE & SYRACUSE  
2022 BACKGROUND TRAFFIC VOLUMES

FIGURE 5





SWC MESA RIDGE & SYRACUSE  
2040 BACKGROUND TRAFFIC VOLUMES

FIGURE 6

## 4.0 PROJECT TRAFFIC CHARACTERISTICS

---

### 4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land uses to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*<sup>1</sup> published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses.

As mentioned previously, Lots 1 through 5 of the site are currently anticipated to include a 20-fueling position gas station with convenience market, a 4,000 square foot automated car wash, a 3,500 square foot fast food restaurant with drive-through window, an 8,500 square foot tire superstore, and a 12,000 square foot day care facility. For this study, Kimley-Horn used the ITE Trip Generation average rate equations that apply to Gasoline Station with Convenience Market (ITE Code 945), Automated Car Wash (ITE Code 948), Fast Food Restaurant with Drive-Through Window (ITE Code 934), Tire Superstore (ITE 849), and Day Care Facility (ITE Code 565) for traffic associated with the development.

Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the proposed gas station and fast-food restaurant. Since this project development area is located along Mesa Ridge Parkway (SH-16), with a gas station/convenience market and a fast food restaurant proposed, it is believed that the ITE percentages for pass-by rates are applicable for use in the calculations. Of note, pass-by traffic volumes were captured primarily from Mesa Ridge Parkway (SH-16), so this traffic is counted as new traffic along Syracuse Street at the proposed access as applicable.

With pass-by, expected net new trips (non pass-by) to the surrounding street network is 3,940 weekday daily trips with 365 and 386 trips anticipated during the weekday morning and afternoon peak hours, respectively. Total site generated trips for the proposed SWC Mesa Ridge and Syracuse Project is approximately 7,064 daily weekday trips with 589 of these trips

---

<sup>1</sup> Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

expected to occur during the morning peak hour and 601 trips occurring during the afternoon peak hour.

Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10<sup>th</sup> Edition – Volume 1: User’s Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the proposed development. The trip generation worksheet is included in **Appendix C**.

Table 1 – SWC Mesa Ridge and Syracuse Project Traffic Generation

Land Use	Quantity		Vehicle Trips						
	Square Foot	Fueling Stations	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
Non Pass-By Trips									
Gasoline Station with Convenience Market (ITE 945)		20	1,808	48	46	94	63	60	123
Automated Car Wash (ITE 948)	4,000		560	28	28	56	28	28	56
Fast Food Restaurant with Drive-Thru (ITE 934)	3,500		826	37	35	72	29	27	56
Tire Superstore (ITE 849)	8,500		174	7	4	11	8	10	18
Day Care Facility (ITE 565)	12,000		572	70	62	132	63	70	133
Total			3,940	190	175	365	191	195	386
Pass-By Trips									
Gasoline Station with Convenience Market (ITE 945)		20	2,300	79	76	155	80	77	157
Fast Food Restaurant with Drive-Thru (ITE 934)	3,500		824	35	34	69	30	28	58
Total Pass-By Trips			3,124	114	110	224	110	105	215
Total Site Generated Trips			7,064	304	285	589	301	300	601

**4.2 Trip Distribution**

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, expected roadway improvements, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution is illustrated in **Figure 7**.

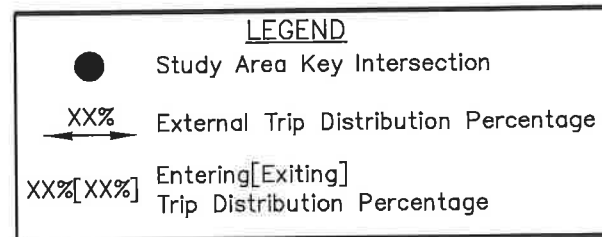
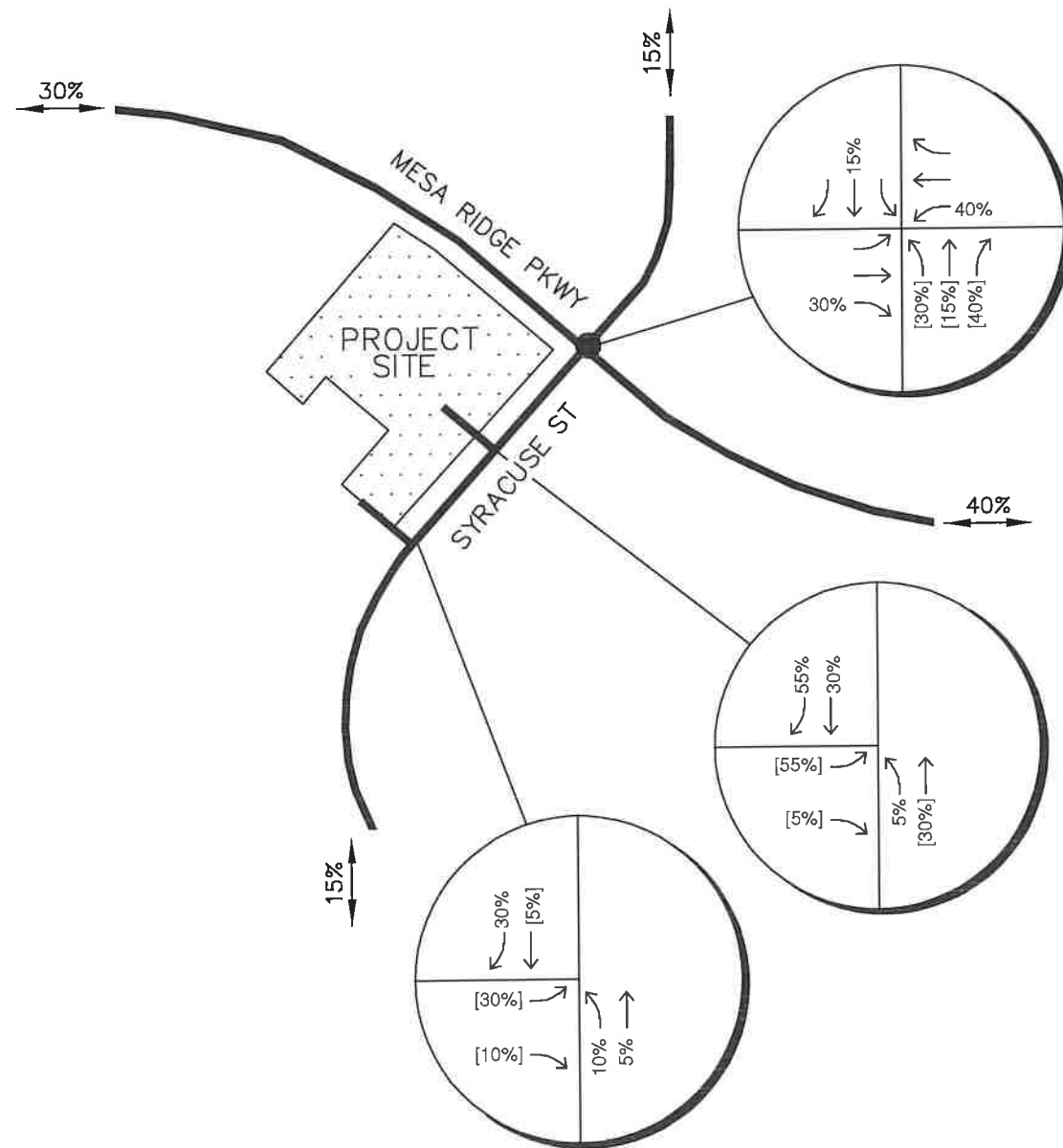
Due to the nature of the proposed uses, both new (non-pass-by) and pass-by trips are anticipated to be generated by this project. Pass-by distributions capture the route of the vehicle, which is a percentage of traffic driving by the site, arriving from a direction and then continuing in that original direction when leaving. Pass-by distributions are prepared directly based on existing traffic volume counts along the adjacent streets. Since the land uses anticipated to attract the Pass-by trips are located towards the north side of the project site, it was assumed that all Pass-by trips would access the site by using the Syracuse Street North driveway. **Figure 8** and **Figure 9**, illustrate the pass-by traffic, calculated separately for the morning and afternoon peak hours, respectively, due to the directional differences of traffic during these peak hours.

**4.3 Traffic Assignment**

Traffic assignment was obtained by applying the distributions from **Figure 7**, **Figure 8**, and **Figure 9** to the estimated traffic generation of the project shown in **Table 1**. The non-pass-by traffic assignment is shown in **Figure 10**. Pass-by traffic assignment is shown in **Figure 11**.

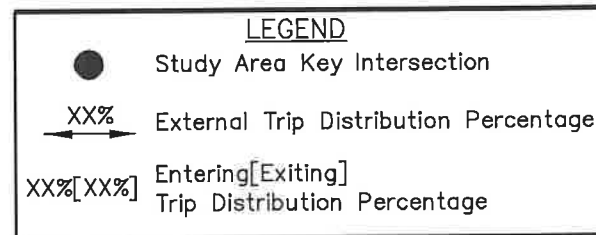
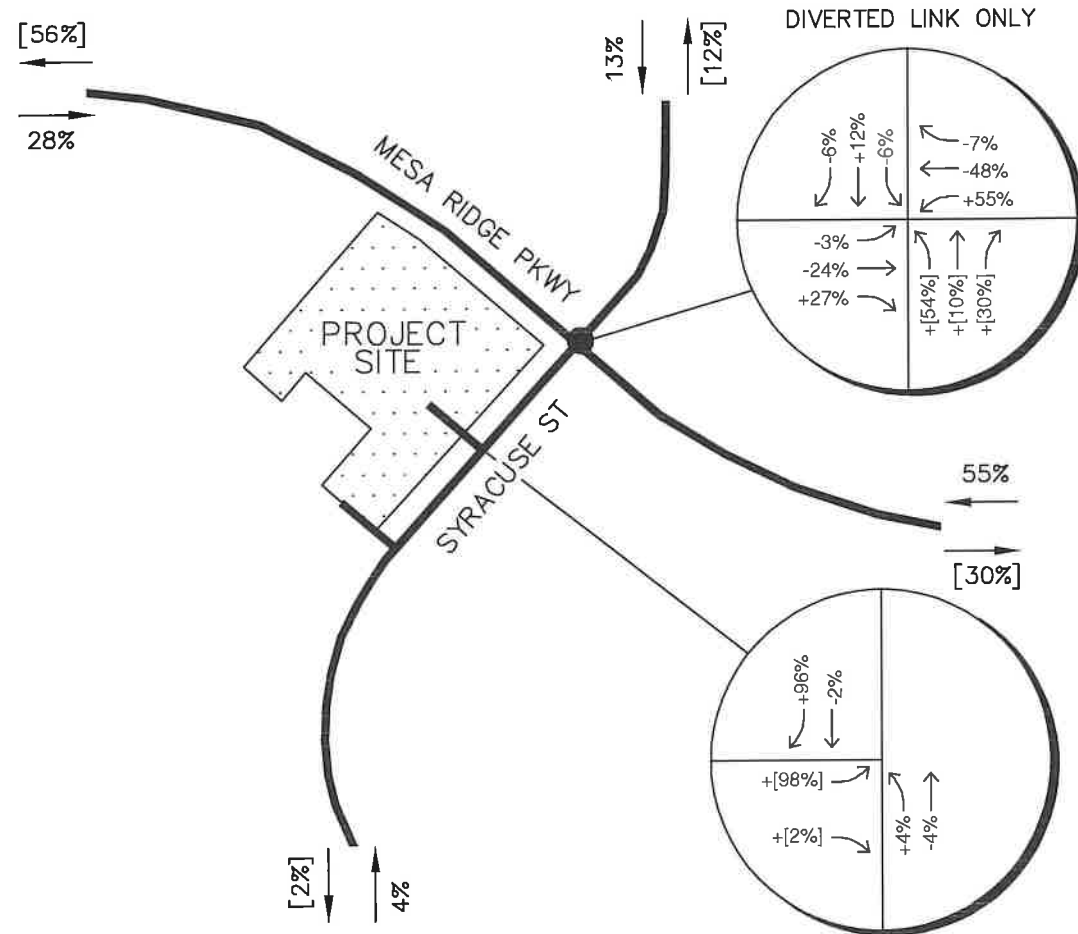
**4.4 Total (Background Plus Project) Traffic**

The project traffic volumes were added to the background volumes to represent estimated traffic conditions for the short term 2022 project build out horizon and long term 2040 horizon. **Figure 12** illustrates the background plus project traffic volumes for the 2022 horizon at the study key intersections and the access intersections proposed with the project. The 2040 background plus project traffic volumes are shown in **Figure 13**.



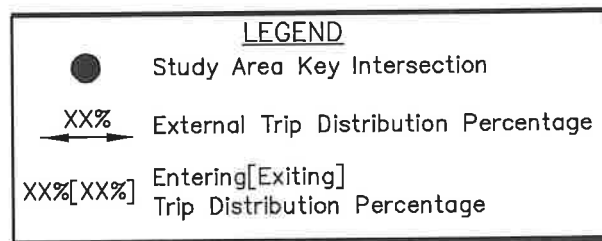
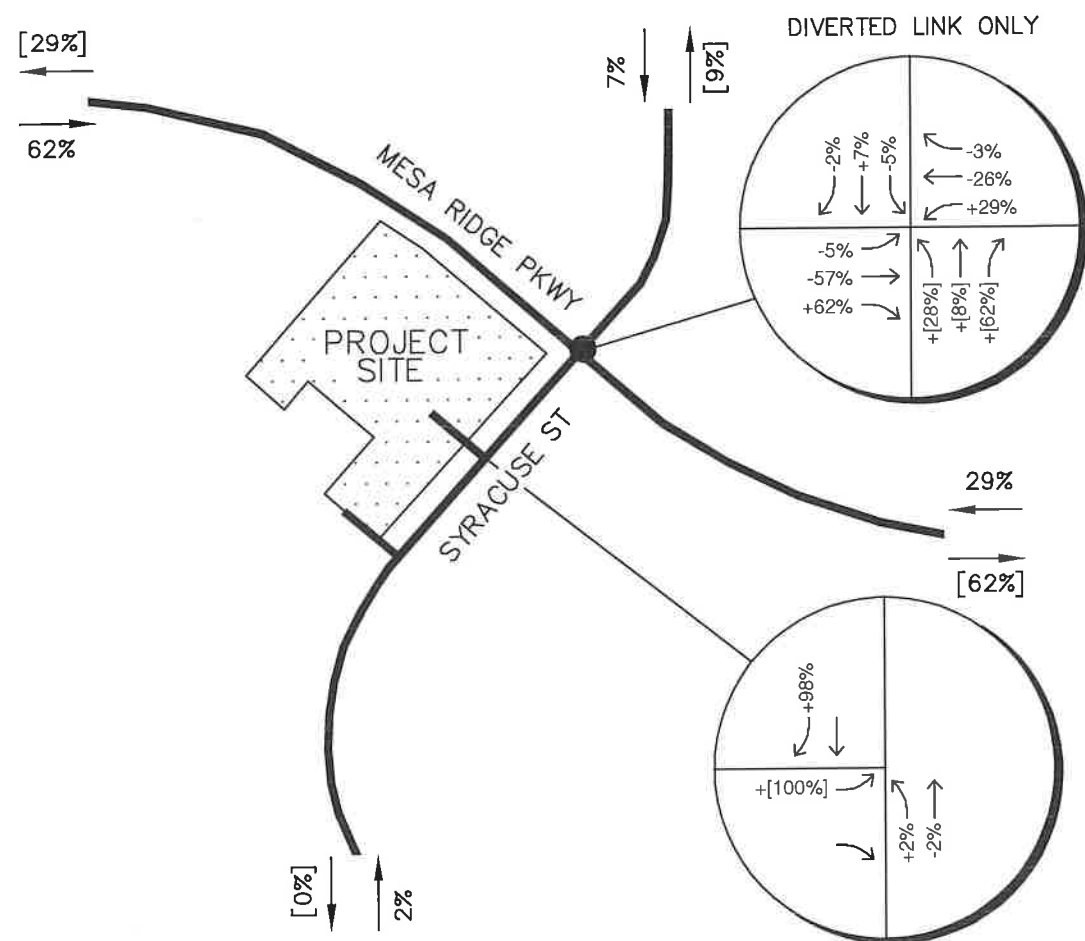
SWC MESA RIDGE & SYRACUSE  
PROJECT TRIP DISTRIBUTION

FIGURE 7



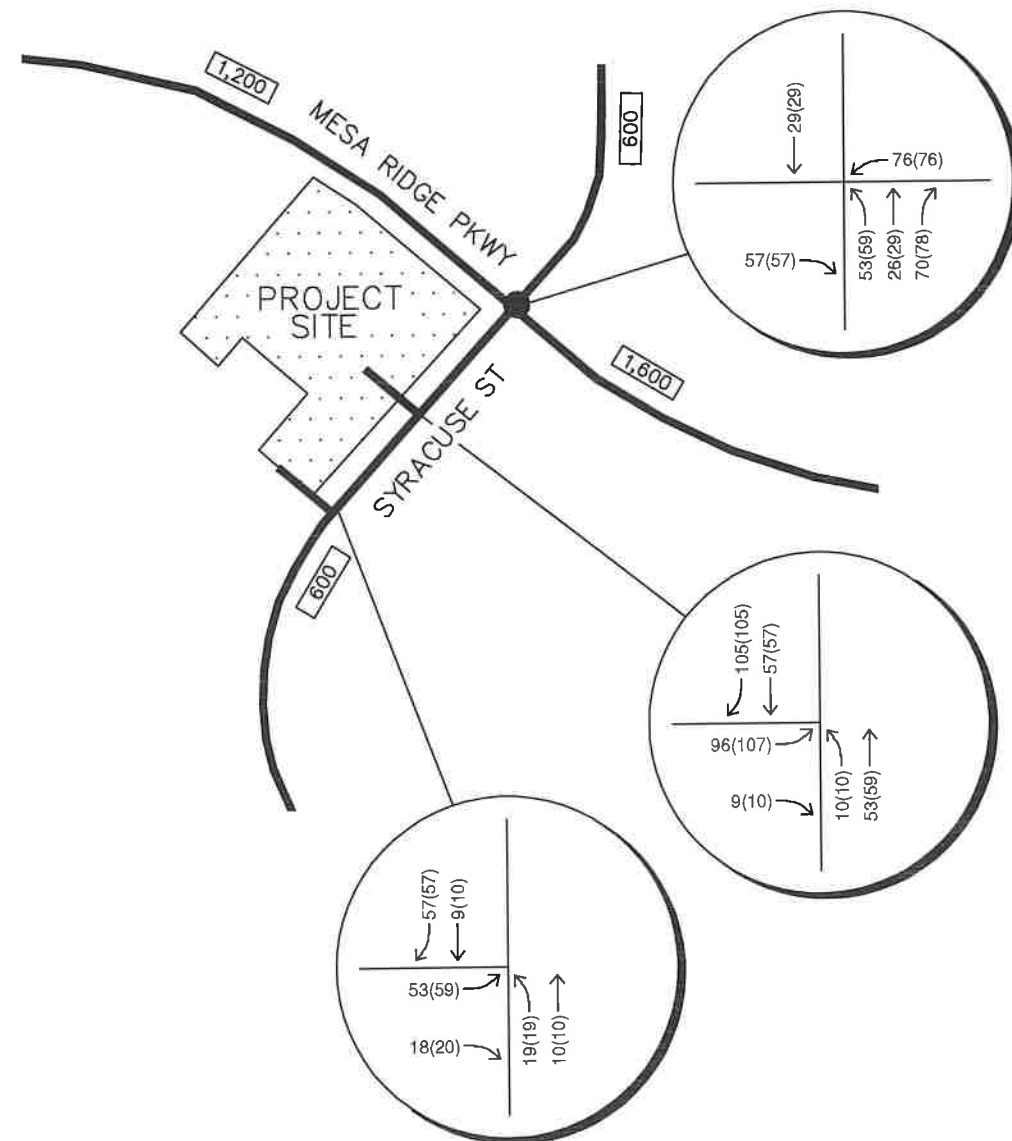
SWC MESA RIDGE & SYRACUSE  
AM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 8



SWC MESA RIDGE & SYRACUSE  
PM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 9



SWC MESA RIDGE & SYRACUSE  
NON PASS-BY TRAFFIC ASSIGNMENT

FIGURE 10