

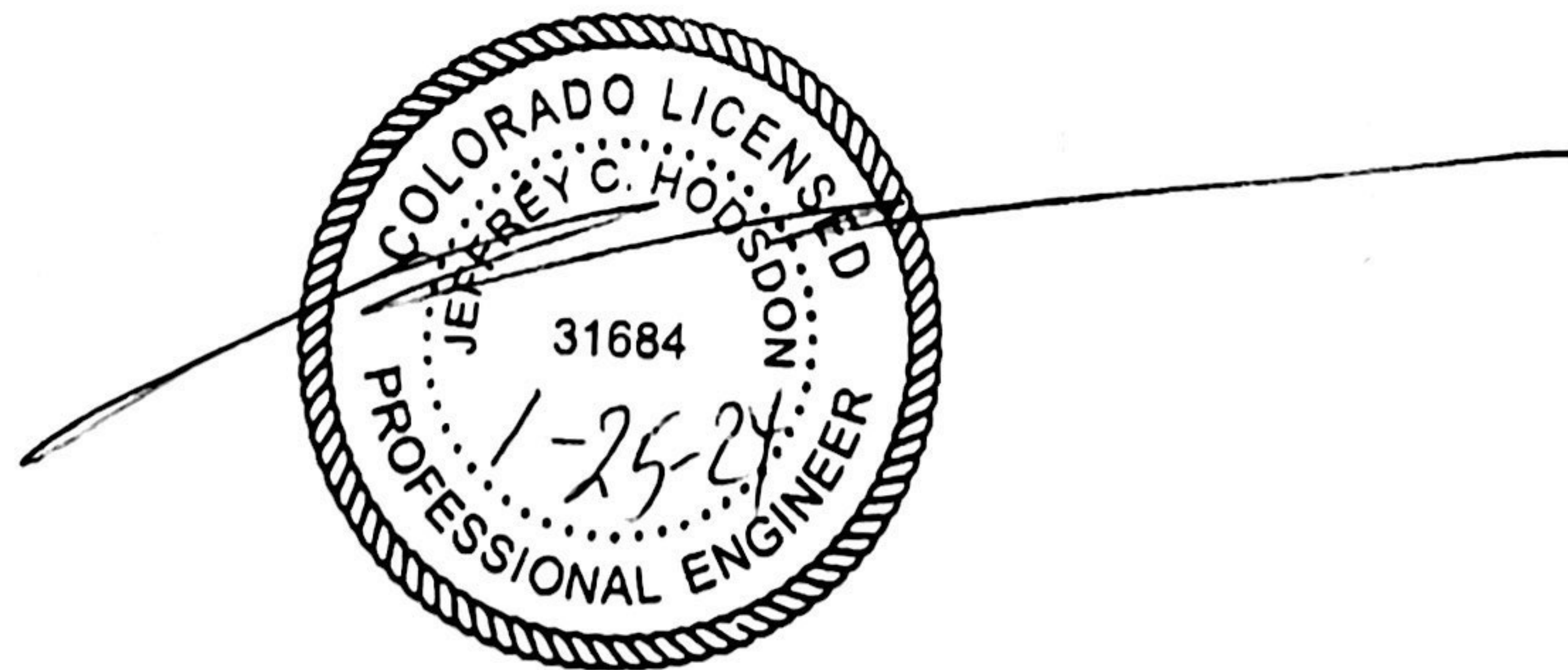


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Windermere Zone Change  
Traffic Impact Study  
PCD File No.: P229 & SP223  
(LSC #S224091)  
January 25, 2024

Traffic Engineer's Statement

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.



2/5/2024  
Date

# Windermere Zone Change Traffic Impact Study

Prepared for:  
Todd Stephens  
Windsor Ridge Homes  
4164 Austin Bluffs Parkway, Suite 361  
Colorado Springs, CO 80918

JANUARY 25, 2024

---

LSC Transportation Consultants  
Prepared by: Kirstin D. Ferrin, P.E.  
Reviewed by: Jeffrey C. Hodsdon, P.E.

LSC #S224091

PCD File No.: P229 & SP223



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Appendix A – Sight Distance on Urban Local





LSC TRANSPORTATION CONSULTANTS, INC.  
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January 25, 2024

Todd Stephens  
Windsor Ridge Homes  
4164 Austin Bluffs Parkway, Suite 361  
Colorado Springs, CO 80918

RE: Windermere Zone Change  
El Paso County, CO  
Traffic Impact Study  
PCD File No.: [P229](#) & [SP223](#)  
LSC #S224091

Dear Mr. Stephens:

In response to your request, LSC Transportation Consultants, Inc. has prepared this traffic impact analysis for a proposed zone change for a portion of the Windermere development. As shown in Figure 1, the site is located north of North Carefree Circle between Marksheffel Road and Antelope Ridge Drive in El Paso County, Colorado. The southern 9 acres of the Windermere development is planned to be rezoned to allow for multifamily-residential land uses. Site access is proposed to Mardale Lane.

**This report contains notations to reflect the recent outcome of coordination with the City of Colorado Springs. The City has indicated that an escrow of \$100,000 toward the cost of installation of a traffic signal will be required rather than the temporary channelized-T intersection.**

## REPORT CONTENTS

This report presents:

- The existing roadway and traffic conditions in the site's vicinity including the roadway widths, surface conditions, lane geometries, traffic controls, and posted speed limits;
- Current traffic-volume data;
- Estimates of projected 2044 background traffic volumes;
- The projected average weekday and peak-hour vehicle trips to be generated by the proposed development;
- The assignment of the projected site-generated traffic volumes to the area roadways;

- The projected short-term total traffic volumes on the area roadways;
- The projected levels of service at the key intersections in the vicinity of the site;
- The recommendations for roadway improvements to mitigate the traffic impacts;
- The recommended street classifications for the internal streets within the proposed development;
- The project's obligation to the County roadway improvement fee program; and
- The project's obligation to the City of Colorado Springs for participation in the cost of traffic signal installation at the North Carefree/Antelope Ridge Drive intersection.

### **Previous Traffic Reports Completed in the Area**

LSC completed a traffic impact study (TIS) for the entire Windermere Preliminary Plan ([SP-193](#)) dated August 31, 2020. Since completion of that report, a final plat was submitted and approved for 163 lots for single-family homes on the northern 44 acres of the preliminary plan area. The land use and access proposed for Filing 1 are consistent with the preliminary plan TIS. The preliminary plan TIS also assumed an additional 40 lots for single-family homes on the southern 9-acre parcel.

LSC also completed a traffic study for the Gardens at North Carefree located southwest of the site. The latest update was dated October 16, 2018. This study accounts for the land use, trip generation, and roadway network included in that study.

### **LAND USE AND ACCESS**

As shown in Figure 1, the site is located north of North Carefree Circle between Marksheffel Road and Antelope Ridge Drive. The Chateau at Antelope Ridge residential development is located just north of the site. There are also existing single-family homes west of the site.

Figure 2 shows the site land use and access plan. The southern 9 acres of the Windermere Preliminary Plan area is proposed to be developed for 150 townhome units. There are two existing full-movement access points to Antelope Ridge Drive for the overall Windermere development. The south access point (Mardale Lane) aligns with the existing south intersection of Pronghorn Meadows Circle. The north access (Borrowdale Lane) is located about 755 feet north of the south intersection of Pronghorn Meadows/Antelope Ridge and about 675 feet south of the north intersection of Pronghorn Meadows/Antelope Ridge.

Access for the parcel proposed to be rezoned would be via two full-movement access points to Mardale Lane. The west access would align with Ryedale Way about 210 feet east of Antelope Ridge Drive and the east access would form the south leg of the intersection of Mardale Lane and Wyedale Way. If the westbound vehicle queue on Mardale Lane approaching Antelope Ridge Drive extends beyond Ryedale Way on a regular basis, access for the site aligning with Ryedale Way may be restricted to right-in/right-out only.

## PEDESTRIAN AND BICYCLE ACCESS

Sidewalks are planned on all of the streets interior to the Windermere development. Sidewalks are also planned adjacent to the site along Antelope Ridge Drive and North Carefree Circle, but not along Marksheffel Road.

## ROADWAY AND TRAFFIC CONDITIONS

The roadways in the site's vicinity are shown in Figure 1 and are described below. Copies of the *2016 El Paso County Major Transportation Corridors Plan (MTCP) 2040 Roadway Plan* and *2016 MTCP 2060 Corridor Preservation Plan* with the site location identified on them have been attached to this report.

**North Carefree Circle** is a six-lane Principal Arterial. In the vicinity of Antelope Ridge Drive, North Carefree Circle has a posted limit of 35 miles per hour (mph).

**Marksheffel Road** is a Principal Arterial extending north from the City of Fountain to Woodmen Road. Marksheffel has two through lanes in each direction, plus a raised median south of North Carefree Circle and one through lane in each direction north of North Carefree Circle. The posted speed limit adjacent to the site is 50 mph. Marksheffel Road is ultimately planned to be widened to six lanes and extended north and west from Woodmen Road to connect to Research Parkway at Black Forest Road. Marksheffel Road is shown as a six-lane Principal Arterial adjacent to the site on the *2016 El Paso County Major Transportation Corridors Plan (MTCP) 2040 Roadway Plan* and as an Expressway on the *2016 MTCP 2060 Corridor Preservation Plan*. Marksheffel Road is planned to be constructed north from Woodmen Road to Vollmer Road in the short-term future.

**Antelope Ridge Drive** is an Urban Residential Collector that extends north from North Carefree Circle to about one-half mile north of Stetson Hills Boulevard. In the vicinity of the site, Antelope Ridge Drive has one through lane in each direction and a striped center median. The posted speed limit on Antelope Ridge Drive is 35 mph. The intersection of Antelope Ridge Drive/North Carefree Circle is currently stop-sign controlled.

## Sight Distance Analysis

Figure 3 shows the stopping sight-distance analysis at the site-access points to Lake Mardale Lane (Urban Local). Intersection sight-distance analysis was not analyzed for these intersections as guidance from the *Colorado Department of Transportation 2018 Roadway Design Guide and A Policy on Geometric Design of Highway and Street, 7th Edition* published by AASHTO indicate that intersection sight distance is not applicable to local urban/residential streets. See the attached Appendix A for further details. Based on a design speed of 25 miles per hour (mph) and the criteria contained in Table 2-17 of the *Engineering Criteria Manual (ECM)*, the required stopping sight distance approaching the access points is 155 feet. As shown in Figure 3, the stopping sight distance can be met at both of the proposed access points. The line of sight for the intersection

of Mardale/Wyedale will need to be kept clear of any sight distance obstructions. This includes landscaping, signage, etc. proposed for the development.

### Crash History

A three-year crash history request was submitted to CSP in late July 2023. One single vehicle crash was reported at Antelope Ridge Drive/North Carefree Circle in 2020. Two crashes were reported in 2022 near the Antelope Ridge Drive/Pronghorn Meadows Circle. Only one crash occurred between two vehicles at this intersection. An eastbound motorist did not yield right-of-way to a southbound vehicle.

### Existing Traffic Volumes

Figure 4 shows the existing morning and afternoon peak-hour traffic volumes at the intersections of North Carefree Circle/Marksheffel Road, North Carefree Circle/Antelope Ridge Drive and the south Antelope Ridge Drive/Pronghorn Meadows Circle intersection. The average weekday traffic volumes shown are estimates by LSC, based on traffic counts conducted by LSC in August 2018 and March 2022. The traffic count reports are attached.

### Existing Levels of Service

Level of service (LOS) is a quantitative measure of the level of delay at an intersection. Level of service is indicated on a scale from “A” to “F.” LOS A represents control delay of less than 10 seconds for unsignalized and signalized intersections. LOS F represents control delay of more than 50 seconds for unsignalized intersections and more than 80 seconds for signalized intersections. Table 1 shows the level of service delay ranges.

**Table 1: Intersection Levels of Service Delay Ranges**

Level of Service	Signalized Intersections	Unsignalized Intersections
	Average Control Delay (seconds per vehicle)	Average Control Delay (seconds per vehicle) <sup>(1)</sup>
A	10.0 sec or less	10.0 sec or less
B	10.1-20.0 sec	10.1-15.0 sec
C	20.1-35.0 sec	15.1-25.0 sec
D	35.1-55.0 sec	25.1-35.0 sec
E	55.1-80.0 sec	35.1-50.0 sec
F	80.1 sec or more	50.1 sec or more

For unsignalized intersections, if V/C ratio is greater than 1.0, the level of service is LOS F, regardless of the projected average control delay per vehicle.



The intersections of North Carefree Circle/Antelope Ridge Drive and the south Antelope Ridge Drive/Pronghorn Meadows Circle intersection have been analyzed to determine the existing levels of service based on the unsignalized method of analysis procedures outlined in the *Highway Capacity Manual, 6<sup>th</sup> Edition* by the Transportation Research Board. The results of the level of service analysis are shown in Figure 4. The recently signalized intersection of North Carefree Circle/Marksheffel Road has been analyzed using Synchro. The level of service reports are attached.

The intersection of North Carefree Circle/Marksheffel Road was recently converted to traffic-signal control by the City of Colorado Springs. As a signalized intersection, all movements are currently operating at LOS D or better during the peak hours.

The southbound left-turn movement at intersection of North Carefree Circle/Antelope Ridge Drive is currently operating at LOS F during the morning peak hour and LOS C during the afternoon peak hours. These are based on *Highway Capacity Manual* procedures analysis and not actual delay measured in the field. The limited sight distance at this intersection may have an effect on delay. The limited sight distance also likely has an effect on motorists' decisions to not use this left-turn movement. If the sight distance were better and/or if the intersection were signalized, the volume of left turns would likely be higher.

All movements at the two-way, stop-sign-controlled Pronghorn Meadows Circle/Antelope Ridge Drive south intersection are currently operating at a level of service C or better during the peak hours.

## **2044 BACKGROUND TRAFFIC**

Figure 5 shows the projected 2044 background traffic volumes. Background traffic is the traffic estimated to be on the roadways without the Windermere traffic. The estimates assume the extension of North Carefree Circle east of Marksheffel Road. Background through traffic estimates for North Carefree Circle may be conservative, as traffic increases and the extension of North Carefree Circle into Banning Lewis Ranch will depend largely on the level of growth within Banning Lewis Ranch in this area. Note: The 2044 background traffic volumes account for additional latent southbound left-turn demand at North Carefree/Antelope Ridge Drive, assuming a signal or alternative improvement will be in place, improving the level of service for this turning movement.

## **TRIP GENERATION**

The site-generated vehicle-trips were estimated using the nationally-published trip-generation rates from *Trip Generation, 11th Edition, 2022* by the Institute of Transportation Engineers (ITE). Table 2 shows the current trip-generation estimate. Table 2 also shows the trip-generation estimate for Windermere Filing No. 1 that was recently approved and recorded.

As shown in Table 2, the 9-acre portion of the Windermere proposed to be rezoned is projected to generate about 1,080 new vehicle trips on the average weekday, with about one-half of the vehicles entering and one-half of the vehicles exiting in a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 18 vehicles would enter and 54 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:30 and 6:30 p.m., about 50 vehicles would enter and 36 vehicles would exit the site.

### **DIRECTIONAL DISTRIBUTION AND ASSIGNMENT**

The estimated directional distribution of the site-generated traffic volumes on the adjacent roadways is an important factor in determining the traffic impacts of the site. Figure 6 shows the specific distribution estimates for the short-term and long-term site-generated traffic volumes, respectively. The estimates are based on the following factors: the location of the site with respect to the regional residential, employment, commercial, and activity centers and the balance of the Colorado Springs area; the land use proposed for the site; the proposed access system for the site; and the roadway system serving the site. The short-term distribution estimate is based on the existing street network and the long-term distribution estimates assume the extension of Barnes Road and North Carefree Circle east of Marksheffel Road into Banning Lewis Ranch.

When the distribution percentages (from Figure 6) are applied to the trip-generation estimates (from Table 2), the site-generated traffic volumes on the adjacent roadways can be determined. Figures 7a and 7b show the short-term site-generated traffic volumes for Windermere Filing No. 1 (recently approved and recorded) and the 9-acre parcel currently proposed to be rezoned, respectively. Figure 7c shows the sum of the volumes from Figures 7a and 7b. Figures 8a and 8b show the long-term site-generated traffic volumes for Windermere Filing No. 1 (recently approved and recorded) and the 9-acre parcel currently proposed to be rezoned, respectively. Figure 8c shows the sum of the volumes from Figures 8a and 8b.

### **SHORT-TERM TOTAL TRAFFIC**

Figure 9 shows the projected short-term total traffic volumes. The short-term total traffic volumes are the sum of the existing traffic volumes (from Figure 4) plus the short-term traffic volumes estimated to be generated by development of Windermere Filing No. 1 and the 9-acre parcel currently proposed to be rezoned (from Figure 7c). The short-term total traffic volumes identify the short-term impacts of the development.

## **2044 TOTAL TRAFFIC**

Figure 10 shows the projected 2044 total traffic volumes. The 2044 total traffic volumes are the sum of the 2044 background traffic volumes (from Figure 5) plus the long-term traffic volumes estimated to be generated by the development of Windermere Filing No. 1 and the 9-acre parcel currently proposed to be rezoned (from Figure 8c).

## **PROJECTED INTERSECTION LEVELS OF SERVICE**

The intersections of North Carefree/Marksheffel, North Carefree/Antelope Ridge, Antelope Ridge/Pronghorn Meadows (south)/Mardale Lane, and Antelope Ridge/Borrowdale Lane were analyzed to determine the projected levels of service for the short-term total and 2044 background and total traffic volumes, based on the unsignalized intersection analysis procedures from the *Highway Capacity Manual 6<sup>th</sup> Edition* and/or the Synchro signalized intersection procedures. Figures 5, 9, and 10 show the level of service analysis results. The level of service reports are attached.

### **North Carefree Circle/Marksheffel Road**

The intersection of North Carefree/Marksheffel was recently converted to traffic-signal control by the City of Colorado Springs. As a signalized intersection it is projected to operate at an overall LOS D or better during the peak hours, based on the projected short-term and 2044 total traffic volumes. By 2044, the northbound and eastbound left-turn movements are projected to operate at LOS E during the morning peak hour. These movements have projected delays in the LOS E range simply because they arrive at the traffic signal at the beginning of the red phase at an intersection with many phases and a long cycle length. These movements would not be considered “failing” since their volume-to-capacity ratios are less than one. The justification is that to progress through traffic along an arterial corridor, the traffic signal offsets and left-turn phase times have been adjusted to favor the through band, which can result in higher delay for the left-turn movements even though there is sufficient capacity for them.

### **North Carefree Circle/Antelope Ridge Drive**

The previous version of this report recommended the intersection of North Carefree/Antelope Ridge be reconfigured as an interim/temporary channelize “T” intersection. In August 2023, the City of Colorado Springs indicated that an escrow of \$100,000 toward the cost of installation of a traffic signal will be required rather than the temporary channelized T intersection. The City has also indicated that a signal-warrants study was done in January of 2023 for this intersection and that both peak-hour signal warrants (3A & 3B) meet the signal warrants. This intersection is projected to operate at LOS D or better during the peak hours as a signal-controlled intersection, based on the projected short-term total and 2044 total traffic volumes.

### **Antelope Ridge Drive/Borrowdale Lane**

The intersection of Antelope Ridge Drive/Borrowdale Lane is projected to operate at LOS D or better for all movements during the peak hours as a stop-sign-controlled intersection, based on the short-term and 2044 total traffic volumes.

### **Antelope Ridge Drive/South Pronghorn Meadows Circle/Mardale Lane**

The intersection of Antelope Ridge Drive/South Pronghorn Meadows Circle/Mardale Lane is projected to operate at LOS D during the morning peak hour and LOS B during the afternoon peak hour as a stop-sign-controlled intersection, based on the 2044 total traffic volumes.

The morning peak-hour traffic patterns on Antelope Ridge Drive adjacent to the site are highly impacted by the Rocky Mountain Classical Academy located north of the site. A copy of the school carpool plan is attached (may not be the official version). The school Parent-Student Handbook posted online notes that the “City of Colorado Springs, El Paso County Sheriff’s Department, and District Security Resource Officers have approved our traffic plan.” Only right turns are permitted out of the school access during pick-up and drop-off times. To facilitate better traffic flow, school staff meter the exiting vehicles into platoons of up to ten cars per line. LSC staff observed the afternoon pick-up time in September 2021 and based on this recent field observation, operations appear to be generally in accordance with the established plan. The HCM analysis of the site-access points to Antelope Ridge Drive did not account for the “metering” of exiting vehicles from the Rocky Mountain Classical Academy, which helps to create additional gaps in the southbound through traffic. These gaps generally reduce the side-street delay.

### **QUEUING ANALYSIS**

A queuing analysis was performed using Synchro/SimTraffic to determine if the existing turn lanes at the intersection of North Carefree Circle/Antelope Ridge Drive will be sufficient to accommodate the projected queues, based on the short-term and 2044 total traffic volumes. An analysis was also completed for the westbound approach at the Antelope Ridge/Mardale intersection. The short-term and 2044 total peak-hour traffic volumes were entered into the Synchro model. The simulation was run five times for each scenario. The queuing reports are attached.

### **North Carefree Circle/Antelope Ridge Drive**

It was assumed that the intersection of North Carefree Circle/Antelope Ridge Drive will be converted to traffic-signal control by the time the site is built out. Based on the short-term total traffic volumes, the southbound maximum left-turn queue on Antelope Ridge Drive approaching North Carefree Circle is projected to be 137 feet long during the morning peak hour and 70 feet long during the afternoon peak hour. Based on the 2044 total traffic volumes, the southbound



maximum left-turn queue on Antelope Ridge Drive approaching North Carefree Circle is projected to be 280 feet long during the morning peak hour and 168 feet long during the afternoon peak hour. This maximum queue could be accommodated by the existing 300-foot southbound left-turn lane. Based on the short-term total traffic volumes, the maximum southbound right-turn queue is projected to be 106 feet long during the morning peak hour and 49 feet long in the afternoon peak hour. Based on the 2044 total traffic volumes, the maximum southbound right-turn queue is projected to be 129 feet long during the morning peak hour and 59 feet long in the afternoon peak hour. This queue is not projected to block the intersection of Antelope Ridge/South Pronghorn Meadows Circle/Mardale.

### **Antelope Ridge Drive/Mardale Lane**

The maximum westbound queue on Mardale Lane approaching Antelope Ridge Drive is 64 feet during the morning peak hour and 46 feet during the afternoon peak hour. This queue would not block the first intersection to the east (Ryedale Way).

### **DEVIATION REQUESTS**

There are no deviations proposed to the criteria contained in the *El Paso County Engineering Criteria Manual* for the streets within the Windermere development.

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **Trip Generation**

- The 9-acre portion of the Windermere proposed to be rezoned is projected to generate about 1,080 new vehicle trips on the average weekday, with about one-half of the vehicles entering and one-half of the vehicles exiting in a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 18 vehicles would enter and 54 vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:30 and 6:30 p.m., about 50 vehicles would enter and 36 vehicles would exit the site.

#### **Projected Levels of Service**

- The City of Colorado Springs recently converted the intersection of North Carefree/Marksheffel to signal control. As a signal-controlled intersection, it is projected to operate at an overall LOS D or better during the peak hours, based on the projected short-term and 2044 total traffic volumes. By 2044, the northbound and eastbound left-turn movements are projected to operate at LOS E during the morning peak hour. These movements have projected delays in the LOS E range simply because they arrive at the traffic signal at the beginning of the red phase at an intersection with many phases and a long cycle length. These movements would not be considered “failing” since their volume-

to-capacity ratios are less than one. The justification is that to progress through traffic along an arterial corridor, the traffic-signal offsets and left-turn phase times have been adjusted to favor the through band, which can result in higher delay for the left-turn movements, even though there is sufficient capacity for them.

- The previous version of this report recommended the intersection of North Carefree/Antelope Ridge be reconfigured as an interim/temporary channelized-T intersection. In August 2023, the City of Colorado Springs indicated that an escrow of \$100,000 toward the cost of installation of a traffic signal will be required rather than the temporary channelized-T intersection. The City has also indicated that a signal-warrants study was done in January of 2023 for this intersection and that both peak-hour signal warrants (3A & 3B) meet the signal warrants. This intersection is projected to operate at LOS D or better during the peak hours as a signal-controlled intersection, based on the projected short-term total and 2044 total traffic volumes.
- The stop-sign-controlled intersections of Antelope Ridge Drive/Borrowdale Lane and Antelope Ridge Drive/South Pronghorn Meadows Circle/Mardale Lane are projected to operate at LOS D or better for all movements during the peak hours based on the short-term and 2044 total traffic volumes.

### **Sight Distance**

- The access-point locations on Mardale Lane meet *ECM* criteria for stopping sight distance.

### **Recommended Street Classification**

- Based on the projected 2044 total average weekday traffic volumes, Mardale Lane can remain classified as an Urban Local with the additional traffic projected to be generated by the proposed zone change.

### **Roadway Improvements**

- Based on the short-term total traffic volumes and the criteria contained in the *ECM*, southbound left-turn lanes are not projected to be warranted on Antelope Ridge Drive approaching Borrowdale Lane and Mardale Lane. However, Antelope Ridge was recently restriped to provide exclusive left-turn bays as part of Windermere Filing 1.
- Based on the short-term and 2044 total traffic volumes and the criteria contained in the *ECM*, a northbound right-turn deceleration lane is projected to be warranted on Antelope Ridge Drive approaching Borrowdale Lane. This lane has already been constructed as part of Windermere Filing 1.
- Based on the short-term and 2044 total traffic volumes and the criteria contained in the *ECM*, a northbound right-turn deceleration lane is projected to be warranted on Antelope Ridge Drive approaching Mardale Lane. Based on a design speed of 40 mph, the right-turn lane approaching Mardale Lane should be 155 feet long plus a 160-foot taper.

- Based on the short-term and 2044 total traffic volumes and the criteria contained in the *ECM*, a separate westbound left-turn lane is projected to be warranted on Mardale Lane approaching Antelope Ridge Drive. However, LSC does not recommend that this lane be constructed for the following reasons:
  - Although the projected westbound left-turn volume is just above 50 vehicles per hour, the through and right-turn volumes are low.
  - As this leg is stop-sign-controlled, auxiliary turn lanes will not be needed for “speed change” or speed differential purposes.
  - The westbound approach is projected to operate at a satisfactory level of service (LOS D or better) during the peak hours with a single lane approach.
  - Mardale Lane has already been constructed and aligns with existing Pronghorn Circle - the west leg of the intersection. Adding a left-turn lane while maintaining alignment of the through lanes would be difficult.
- The City of Colorado Springs has indicated that an escrow of \$100,000 toward the cost of installation of a traffic signal at the intersection of Antelope Ridge/North Carefree will be required rather than the temporary channelized-T intersection that was previously recommended.
- LSC discussed with County staff and it is our understanding from that conversation that the County will defer to the City for the required project mitigation at the intersection of Antelope Ridge/North Carefree. At the final plat stage of this project, if the signal is not yet installed, the applicant, or LSC on behalf of the applicant, will contact City Traffic Engineering for an update on the timing of signal installation. An updated crash history report could also be obtained at that time. Note: As of July 2023, a three-year crash history report from CSP records branch indicated that one single-vehicle crash was reported in the past three years at this intersection.

\* \* \* \* \*

Please contact me if you have any questions regarding this report.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E.  
Principal

JCH/KDF:jas

Enclosures: Table 2  
Figures 1-10  
Traffic Count Reports  
Level of Service Reports  
Queuing Reports  
Crash Data  
MTCP Maps  
Rocky Mountain Classical Academy Carpool Plan and key pages from the Parent-  
Student Handbook  
Appendix A – Sight Distance on Urban Local



# Table 2



**Table 2  
Trip Generation Estimate  
Windermere**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total Trips Generated					
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out	In	Out
<b>Trip Generation Estimate Based on the Currently Proposed Site Plan</b>												
215	Single Family Attached Housing	150 DU <sup>(2)</sup>	7.20	0.12	0.36	0.34	0.23	1,080	18	54	50	36
<b>Trip Generation Estimate From the <i>Windermere Zone Change Traffic Impact Study, March 15, 2023</i></b>												
220	Multifamily Housing (Low-Rise)	277 DU <sup>(2)</sup>	6.74	0.10	0.30	0.32	0.19	1,867	27	84	89	52
<b>Change (decrease) in trip generation estimate</b>								<b>-787</b>	<b>-9</b>	<b>-30</b>	<b>-39</b>	<b>-16</b>

Notes:

(1) Source: "*Trip Generation, 11th Edition, 2021*" by the Institute of Transportation Engineers (ITE)

(2) DU = dwelling unit

(3) KSF = thousand square feet of floor space

Source: LSC Transportation Consultants, Inc.

Dec-23

# Figures 1-10

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Approximate Scale  
Scale: 1" = 1,000'

Figure 1  
**Vicinity Map**

Windermere Zone Change (LSC #S224091)  
Rev. 1/26/2024



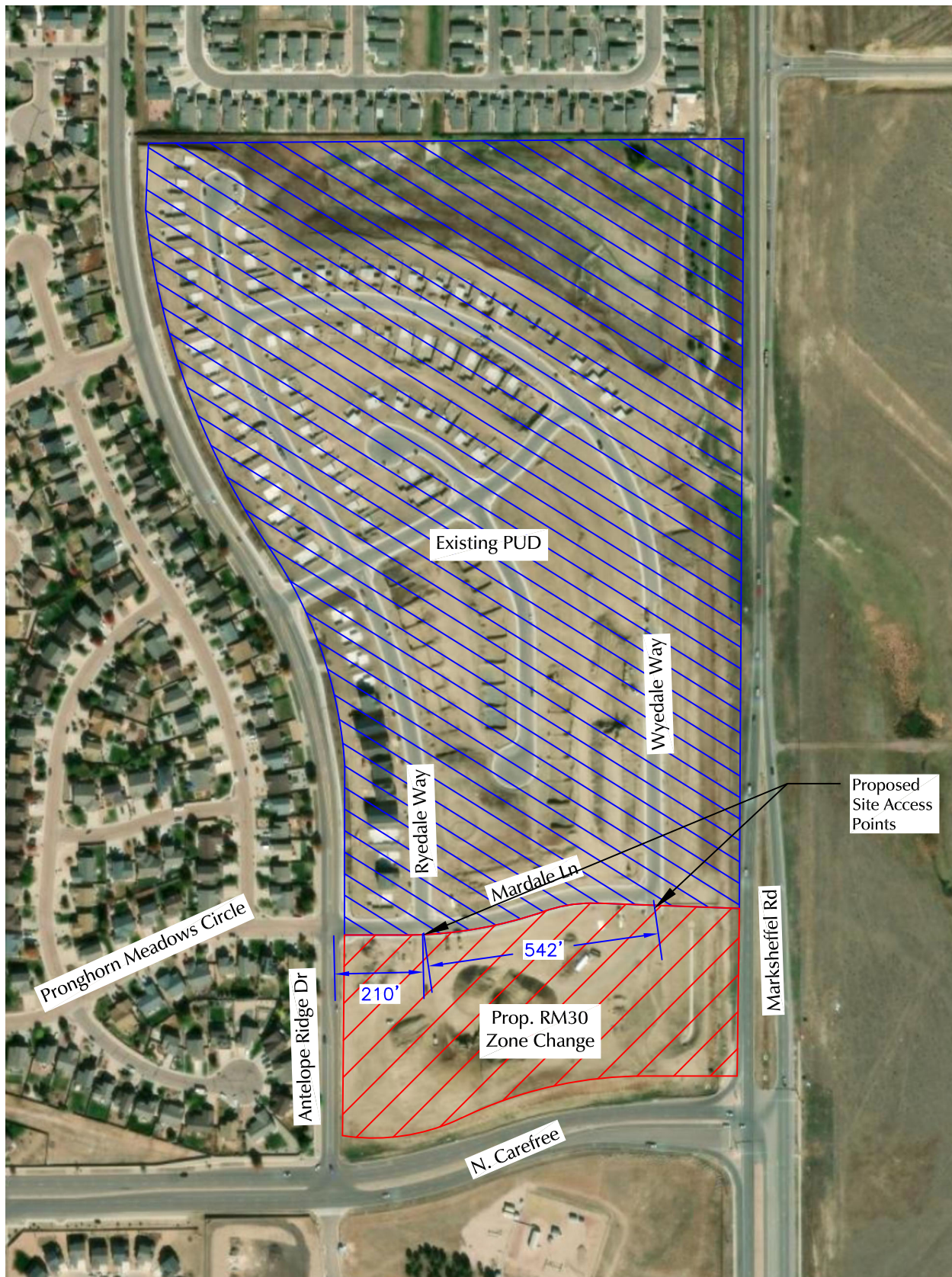
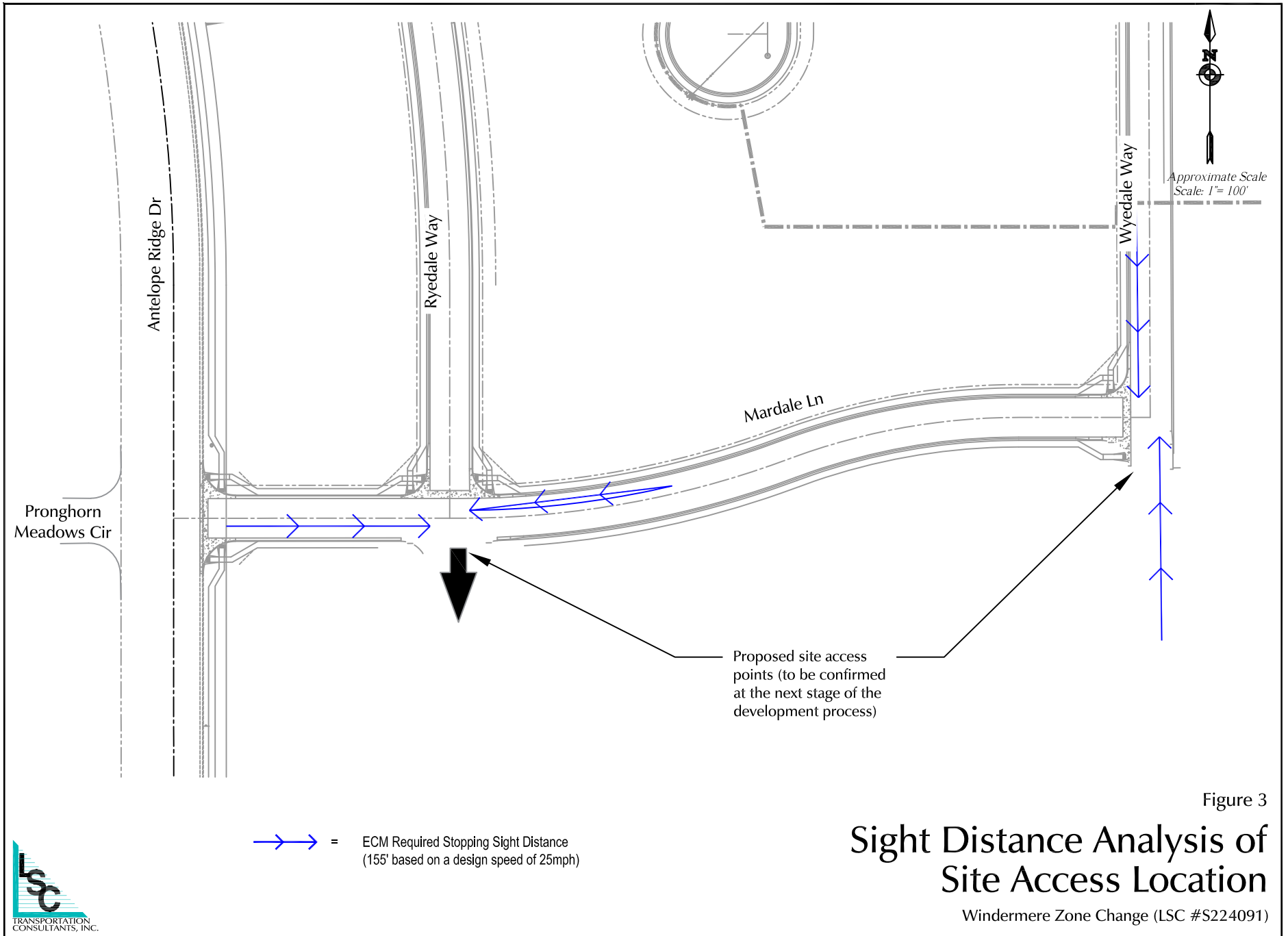


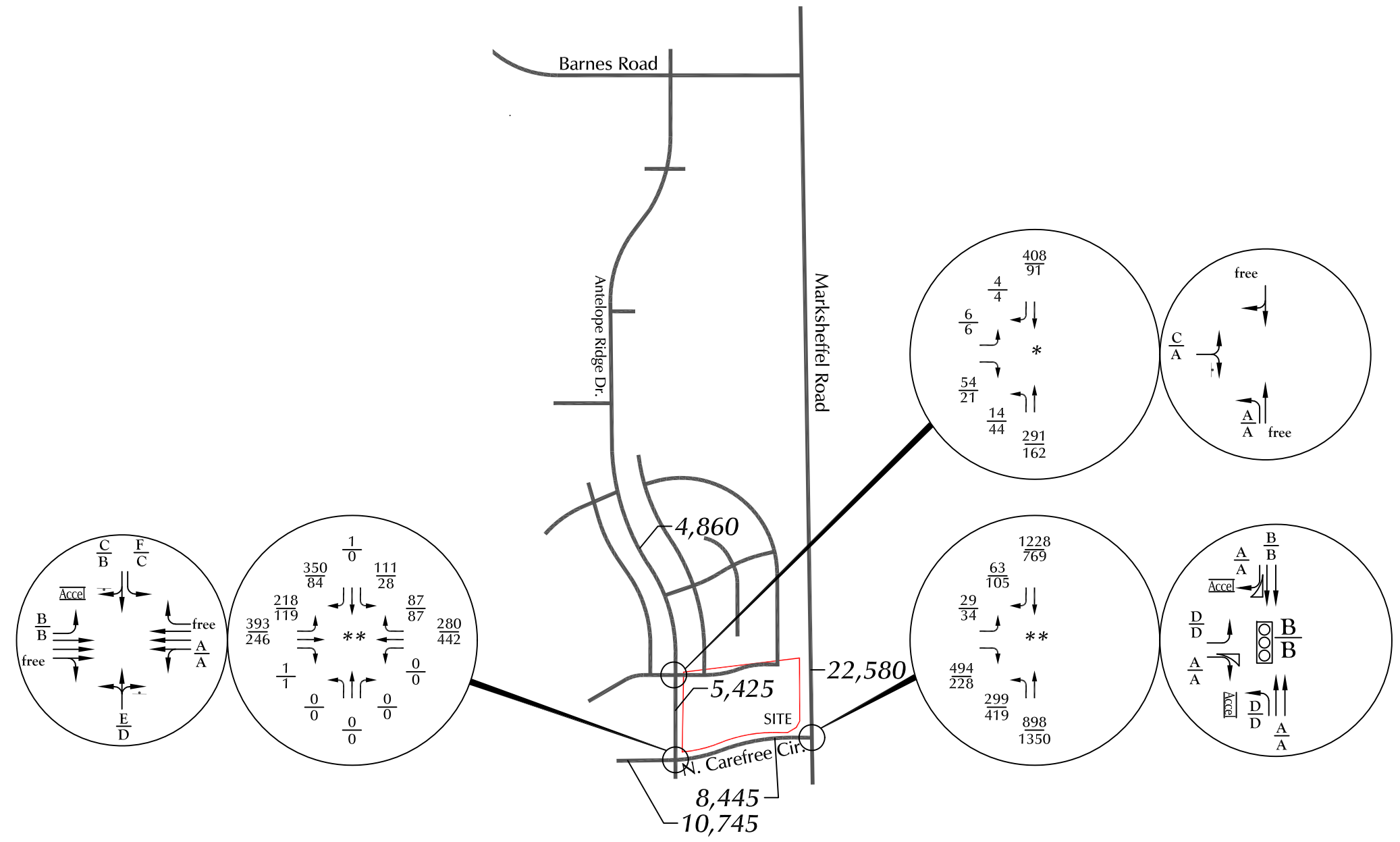
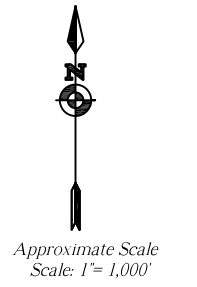
Figure 2

# Site Plan

Windermere Zone Change (LSC #S224091)







**LEGEND:**

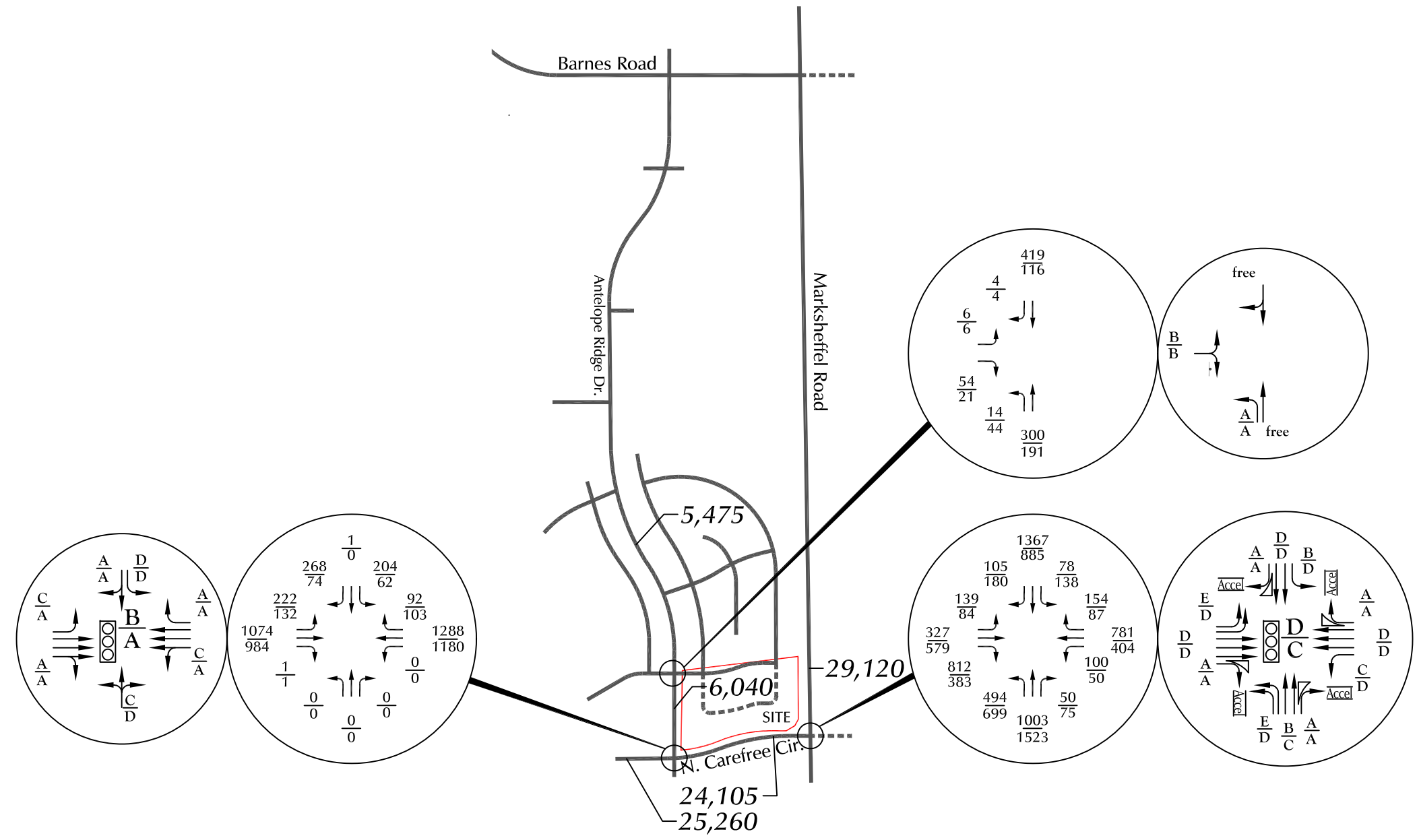
- = Stop Sign
- ⊞ = Traffic Signal
- $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
PM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{A}{C}$  = AM Individual Movement Peak-Hour Level of Service  
PM Individual Movement Peak-Hour Level of Service
- $\frac{A}{D}$  = AM Entire Intersection Peak-Hour Level of Service  
PM Entire Intersection Peak-Hour Level of Service
- 16,330 = Average Weekday Traffic (vehicles per day)

\* Based on counts August 2018  
\*\* Based on counts March 2022

Figure 4  
**Existing Traffic,  
Lane Geometry, Traffic Control  
and Levels of Service**  
Windermere Zone Change (LSC #S224091)







LEGEND:

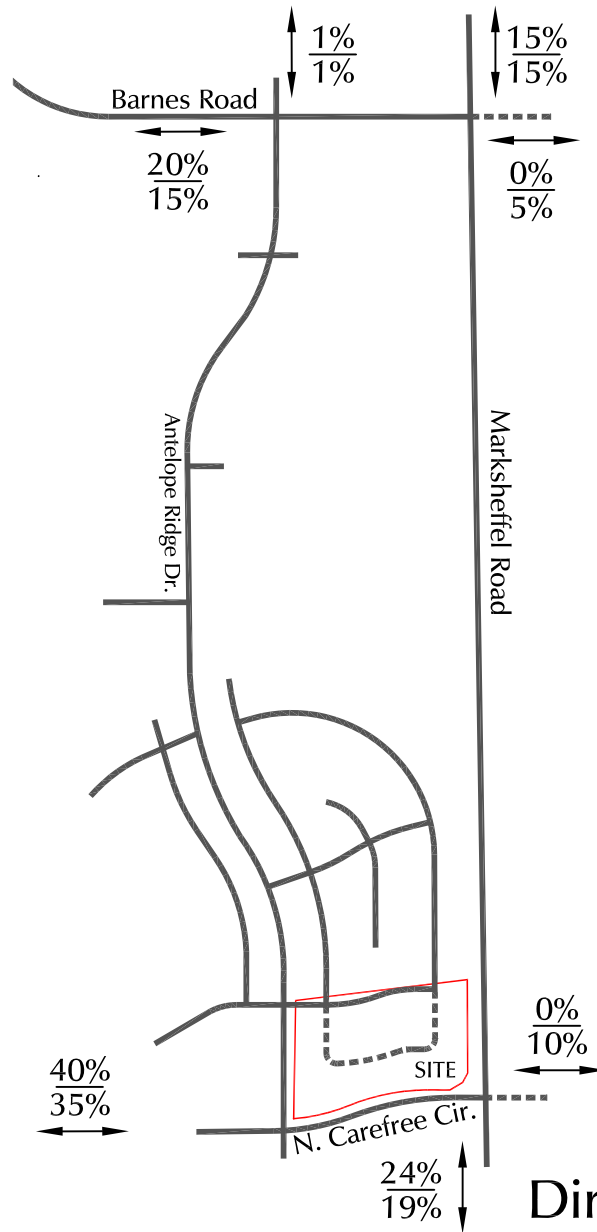
- = Stop Sign
- = Traffic Signal
- $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
PM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{A}{C}$  = AM Individual Movement Peak-Hour Level of Service  
PM Individual Movement Peak-Hour Level of Service
- $\frac{A}{D}$  = AM Entire Intersection Peak-Hour Level of Service  
PM Entire Intersection Peak-Hour Level of Service

16,330 = Average Weekday Traffic (vehicles per day)

Figure 5  
Year 2044 Background Traffic,  
Lane Geometry, Traffic Control  
and Levels of Service  
Windermere Zone Change (LSC #S224091)







Approximate Scale  
Scale: 1" = 1,000'

LEGEND:



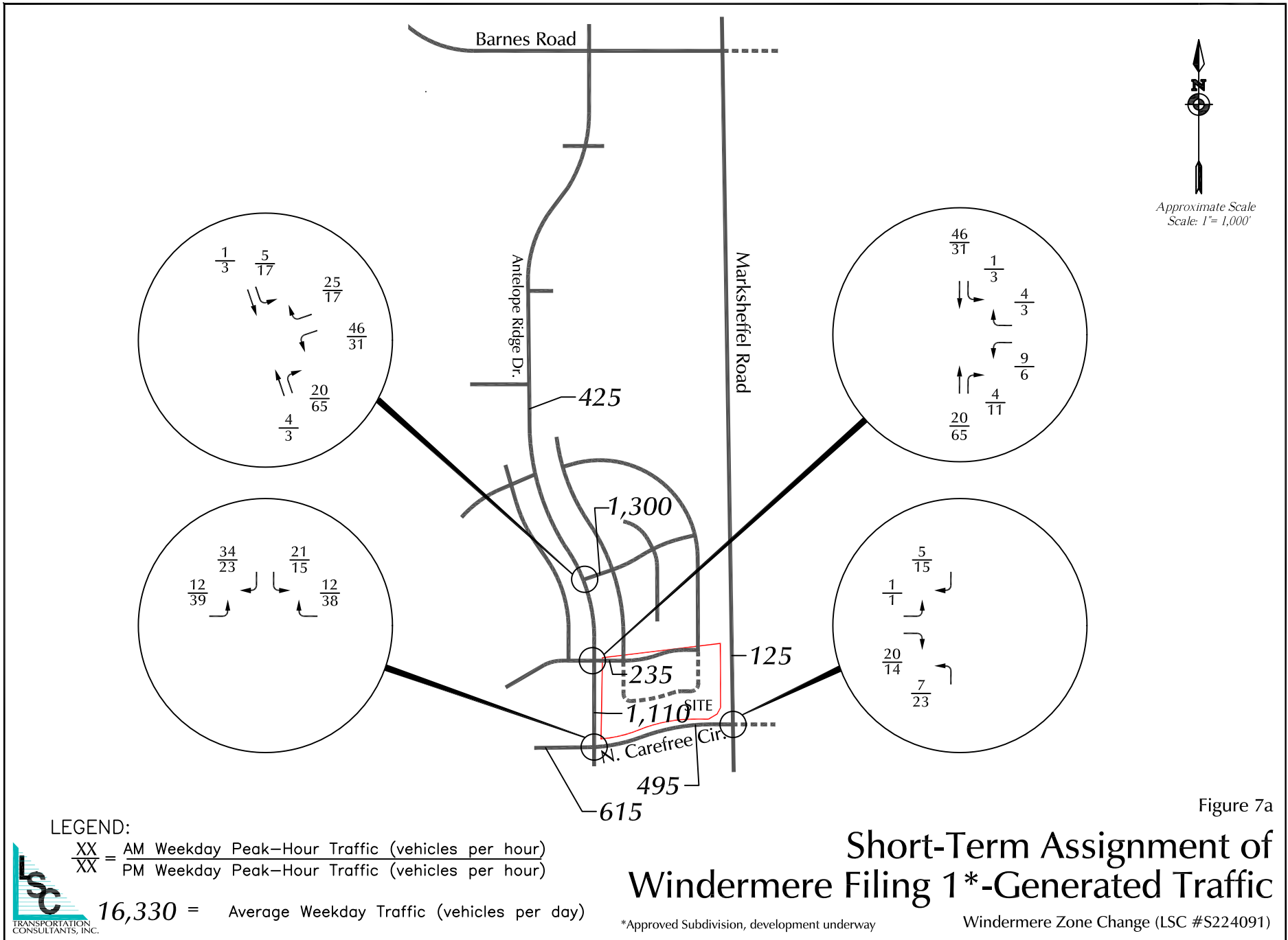
$\frac{35\%}{50\%}$  =

Short-Term Percent Directional Distribution  
 Long-Term Percent Directional Distribution

Figure 6

# Directional Distribution of Site-Generated Traffic

Windermere Zone Change (LSC #S224091)



Approximate Scale  
Scale: 1" = 1,000'

Figure 7a

LEGEND:

$\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
 $\frac{XX}{XX}$  = PM Weekday Peak-Hour Traffic (vehicles per hour)

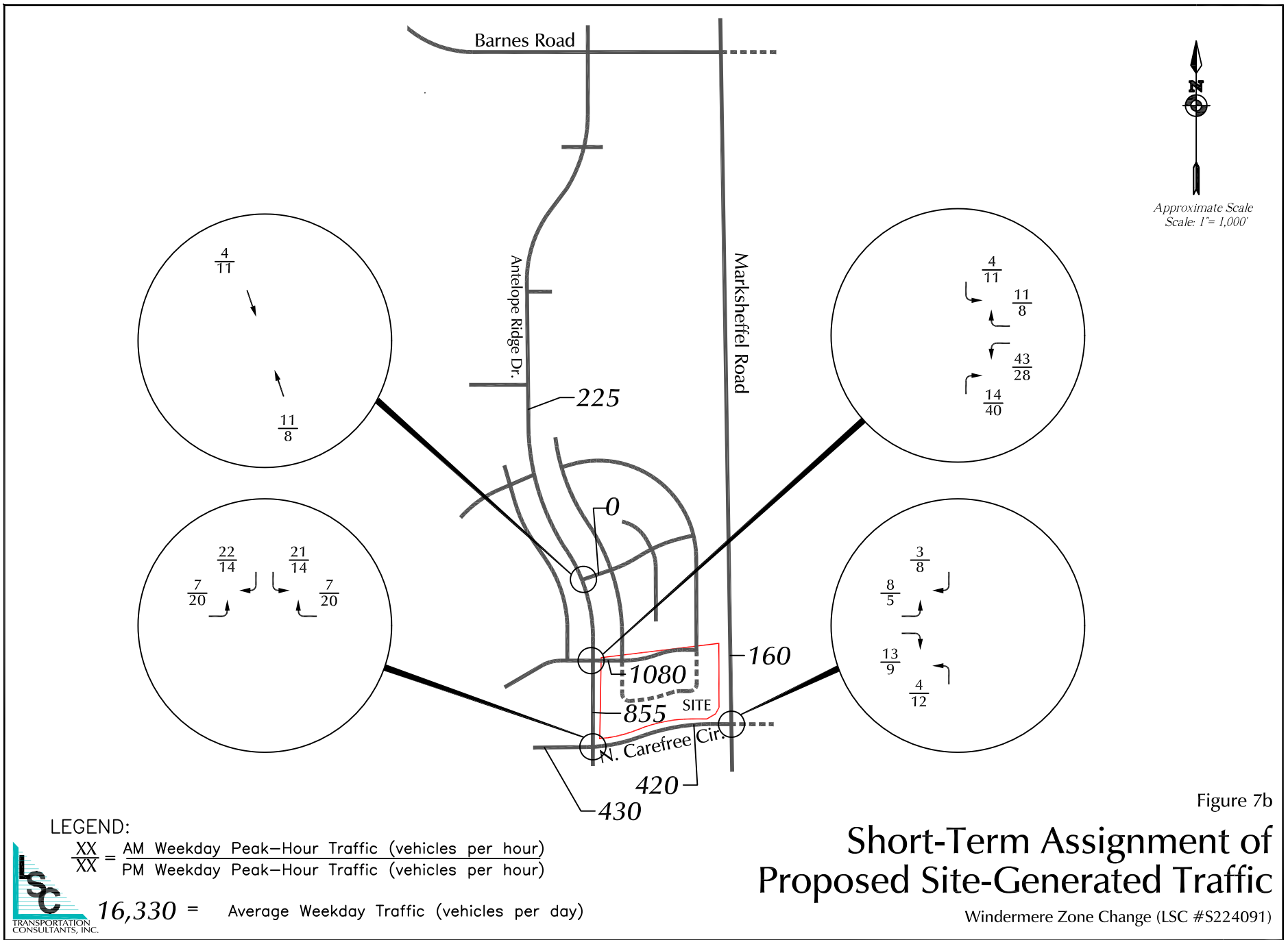
16,330 = Average Weekday Traffic (vehicles per day)

# Short-Term Assignment of Windermere Filing 1\*-Generated Traffic

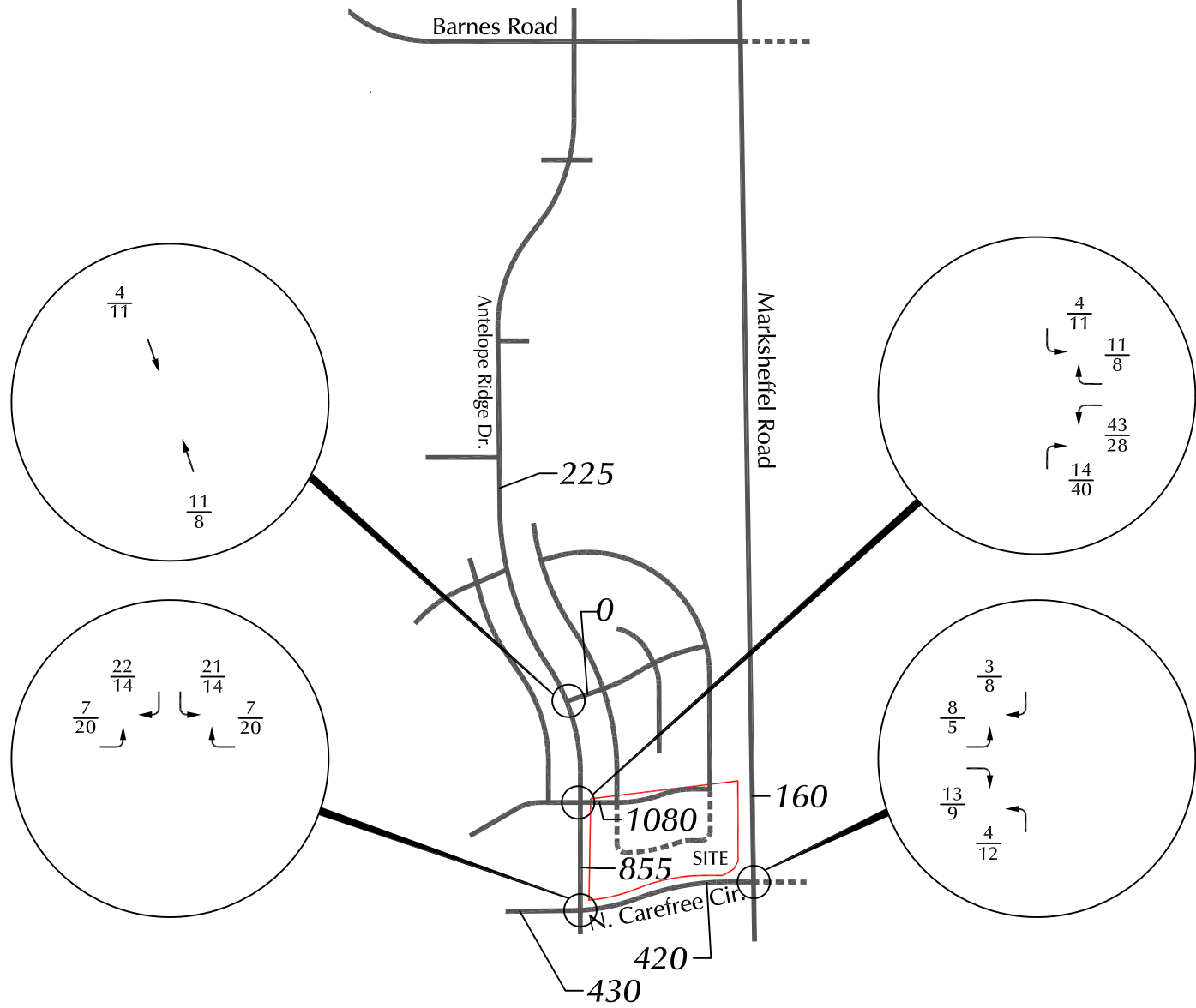
\*Approved Subdivision, development underway

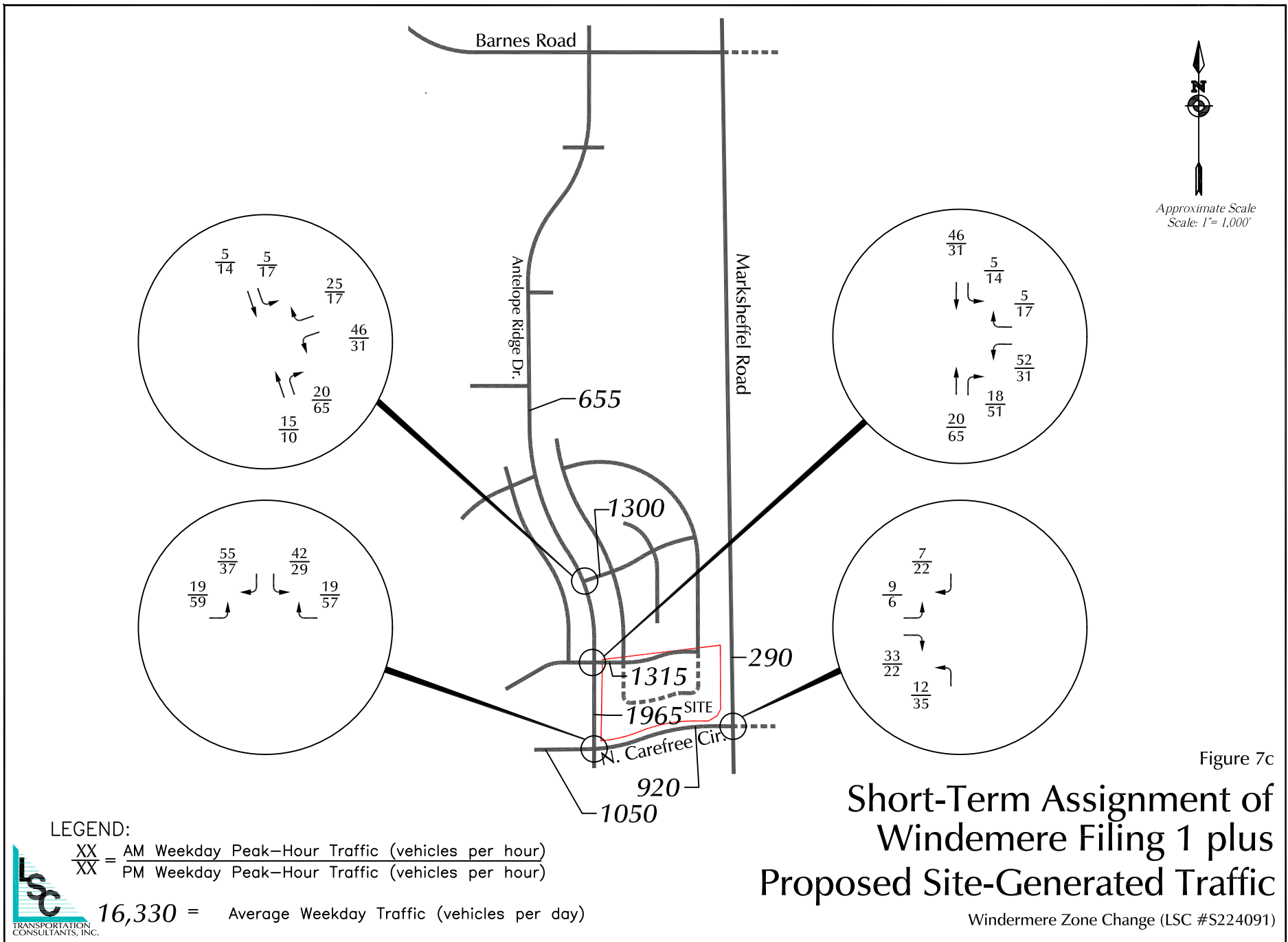
Windermere Zone Change (LSC #S224091)

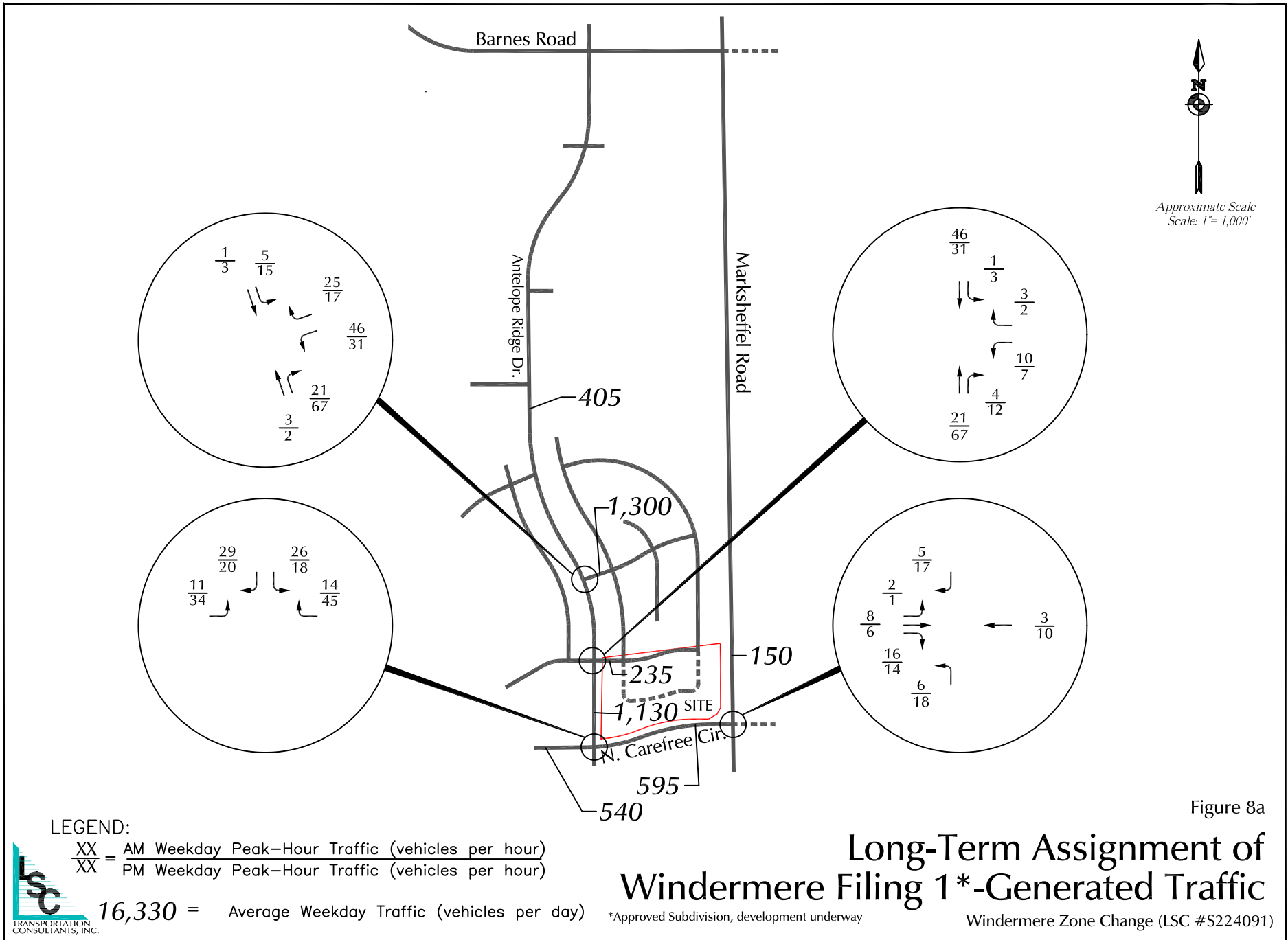


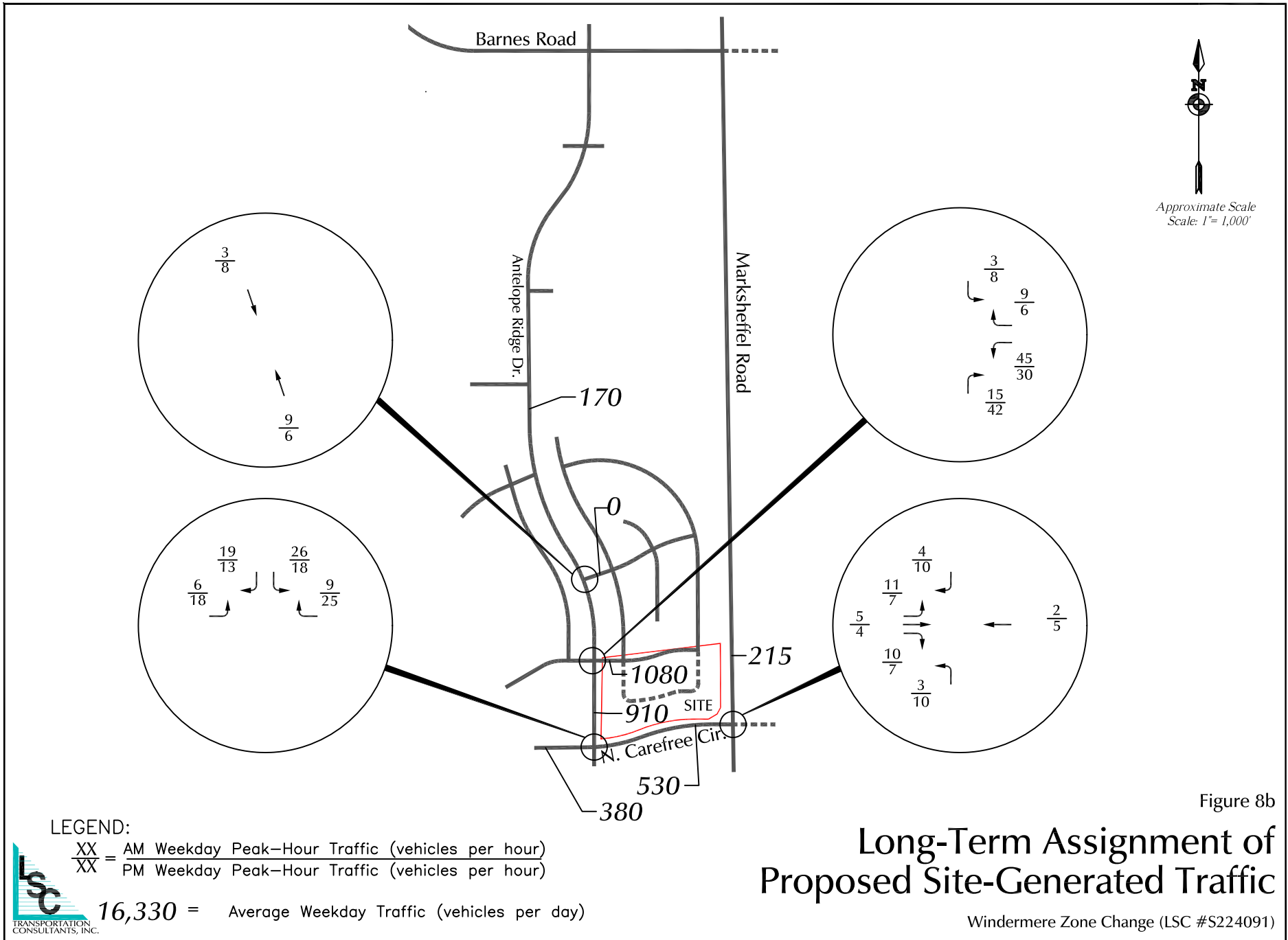


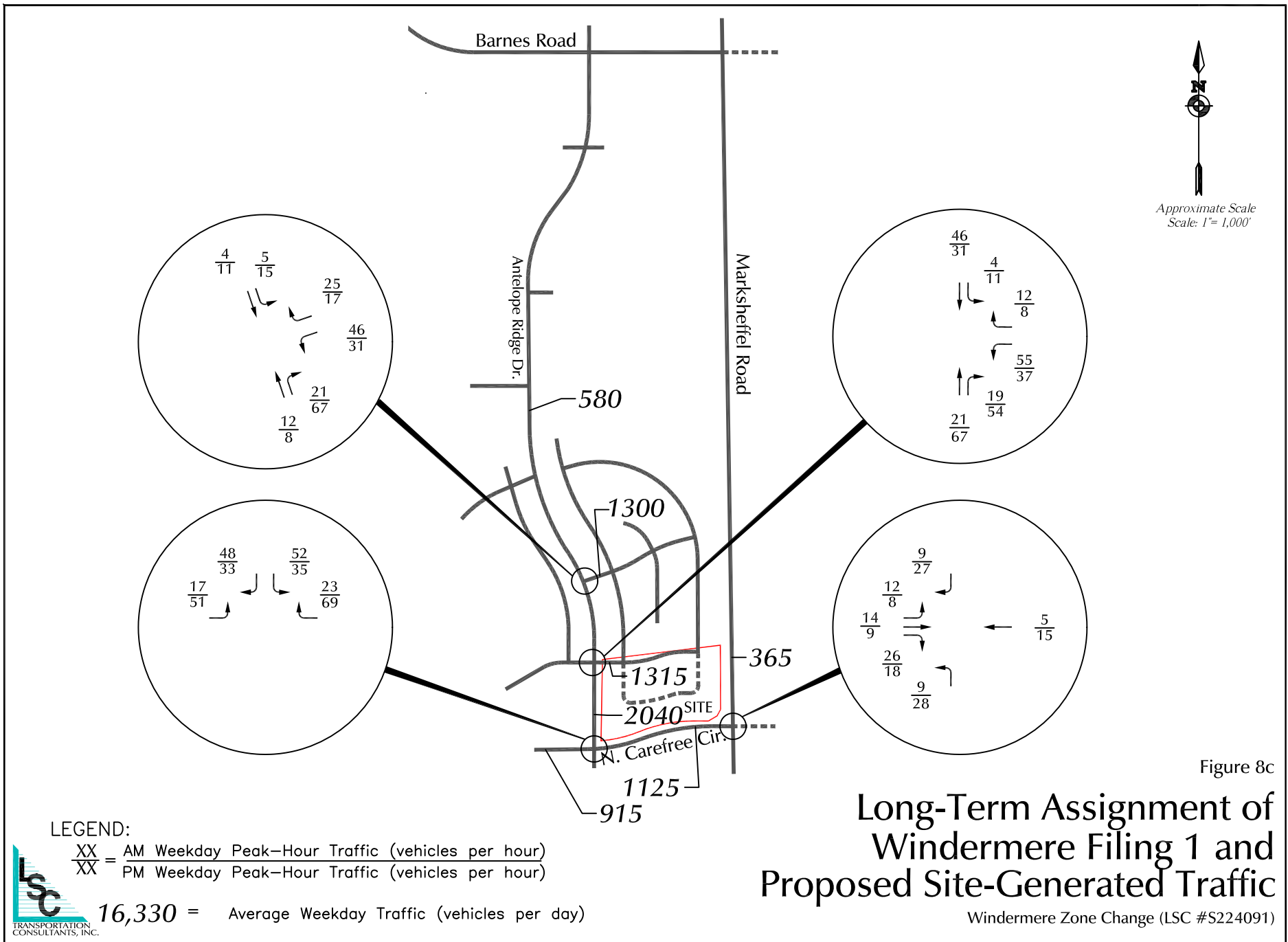
Approximate Scale  
 Scale: 1" = 1,000'

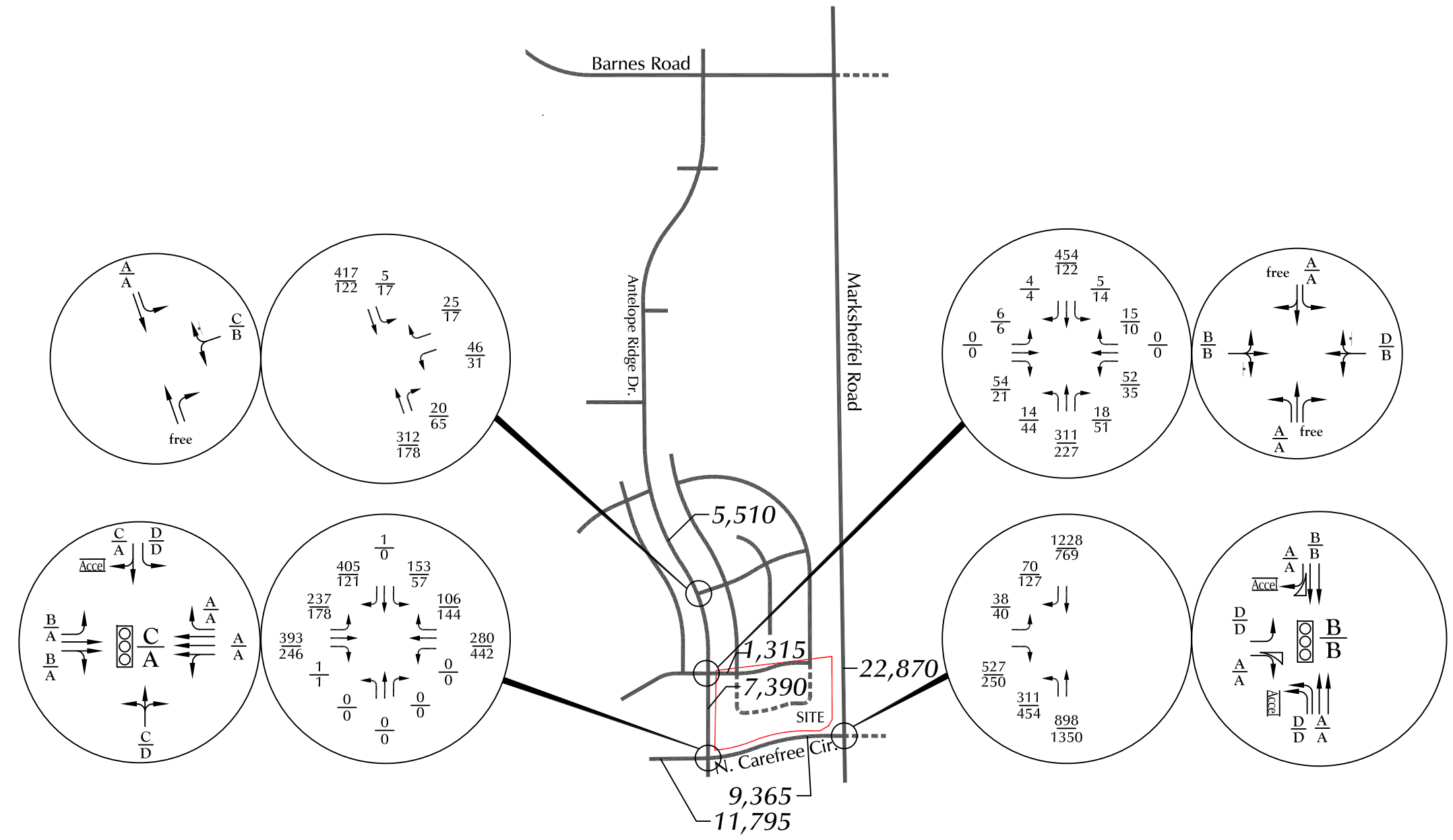
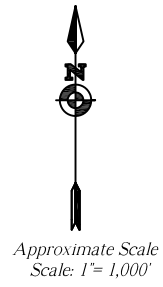










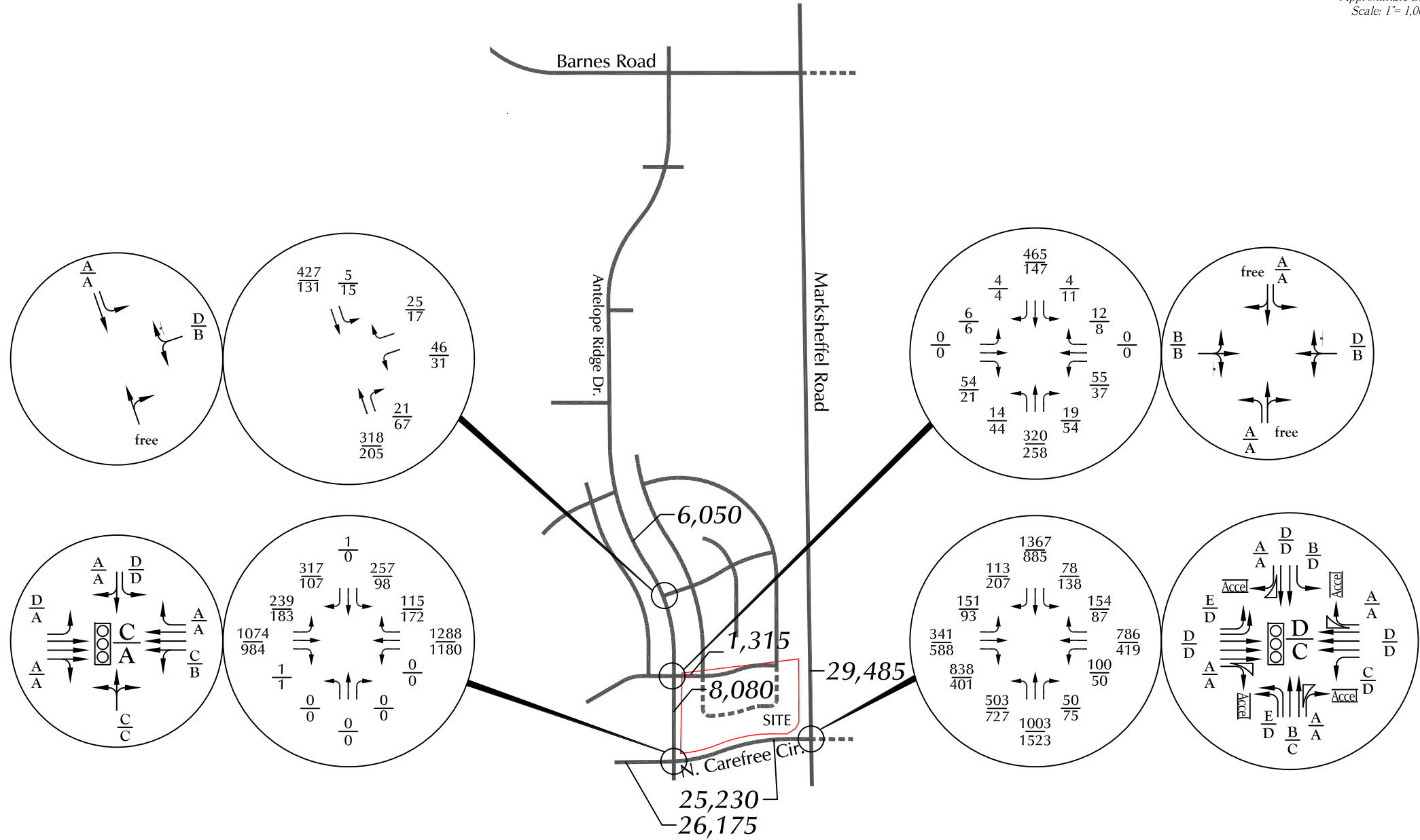
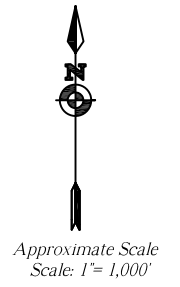


- LEGEND:**
- = Stop Sign
  - = Traffic Signal
  - $\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
PM Weekday Peak-Hour Traffic (vehicles per hour)
  - $\frac{A}{C}$  = AM Individual Movement Peak-Hour Level of Service  
PM Individual Movement Peak-Hour Level of Service
  - $\frac{A}{D}$  = AM Entire Intersection Peak-Hour Level of Service  
PM Entire Intersection Peak-Hour Level of Service
  - 16,330 = Average Weekday Traffic (vehicles per day)

Figure 9  
**Short-Term Total Traffic, Lane Geometry, Traffic Control and Levels of Service**  
 Windermere Zone Change (LSC #S224091)







LEGEND:

= Stop Sign

= Traffic Signal

$\frac{XX}{XX}$  = AM Weekday Peak-Hour Traffic (vehicles per hour)  
 PM Weekday Peak-Hour Traffic (vehicles per hour)

$\frac{A}{C}$  = AM Individual Movement Peak-Hour Level of Service  
 PM Individual Movement Peak-Hour Level of Service

$\frac{A}{D}$  = AM Entire Intersection Peak-Hour Level of Service  
 PM Entire Intersection Peak-Hour Level of Service

16,330 = Average Weekday Traffic (vehicles per day)



Figure 10  
**Year 2044 Total Traffic,  
 Lane Geometry, Traffic Control  
 and Levels of Service**  
 Windermere Zone Change (LSC #S224091)

# Traffic Counts

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# LSC Transportation Consultants, Inc.

2504 E Pikes Peak Ave, Suite 304  
 Colorado Springs, CO 80909  
 719-633-2868

File Name : Antelope Ridge Dr - N Carefree Cir AM  
 Site Code : S224090  
 Start Date : 3/9/2022  
 Page No : 1

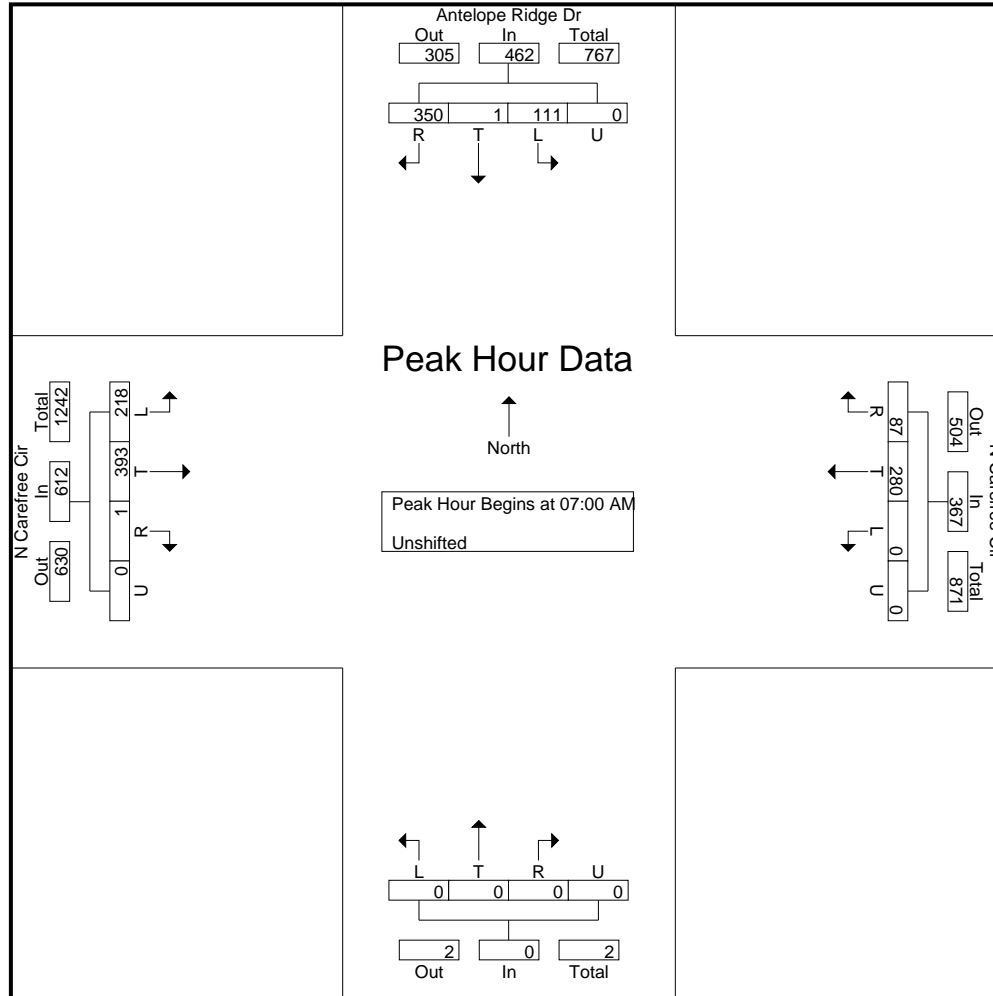
### Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound					N Carefree Cir Westbound					Northbound					N Carefree Cir Eastbound					Int. Total
	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	
06:30 AM	10	0	14	0	24	9	23	0	0	32	0	0	0	0	0	0	47	4	0	51	107
06:45 AM	19	0	22	0	41	5	36	0	0	41	0	0	0	0	0	0	82	9	0	91	173
Total	29	0	36	0	65	14	59	0	0	73	0	0	0	0	0	0	129	13	0	142	280
07:00 AM	34	0	21	0	55	11	49	0	0	60	0	0	0	0	0	0	104	23	0	127	242
07:15 AM	47	0	26	0	73	20	89	0	0	109	0	0	0	0	0	0	103	41	0	144	326
07:30 AM	100	1	27	0	128	22	70	0	0	92	0	0	0	0	0	0	98	68	0	166	386
07:45 AM	169	0	37	0	206	34	72	0	0	106	0	0	0	0	0	1	88	86	0	175	487
Total	350	1	111	0	462	87	280	0	0	367	0	0	0	0	0	1	393	218	0	612	1441
Grand Total	379	1	147	0	527	101	339	0	0	440	0	0	0	0	0	1	522	231	0	754	1721
Apprch %	71.9	0.2	27.9	0		23	77	0	0		0	0	0	0		0.1	69.2	30.6	0		
Total %	22	0.1	8.5	0	30.6	5.9	19.7	0	0	25.6	0	0	0	0	0	0.1	30.3	13.4	0	43.8	

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 Colorado Springs, CO 80909  
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File Name : Antelope Ridge Dr - N Carefree Cir AM  
 Site Code : S224090  
 Start Date : 3/9/2022  
 Page No : 3



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Colorado Springs, CO 80909

719-633-2868

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Then Click the Comments Tab

### Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound					N Carefree Cir Westbound					Northbound					N Carefree Cir Eastbound					Int. Total
	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	
07:30 AM	24	0	8	0	32	5	25	0	1	31	0	0	0	0	0	0	39	29	0	68	131
07:35 AM	33	0	16	0	49	5	19	0	0	24	0	0	0	0	0	0	18	14	0	32	105
07:40 AM	49	0	9	0	58	11	26	0	0	37	0	0	0	0	0	0	27	26	0	53	148
07:45 AM	50	0	9	0	59	14	20	0	0	34	0	0	0	0	0	0	28	28	0	56	149
07:50 AM	60	0	10	0	70	16	24	0	1	41	0	0	0	0	0	0	32	25	1	58	169
07:55 AM	58	0	12	0	70	10	21	0	0	31	0	0	0	0	0	1	26	18	0	45	146
Total	274	0	64	0	338	61	135	0	2	198	0	0	0	0	0	1	170	140	1	312	848
08:00 AM	49	0	12	0	61	4	18	0	0	22	0	0	0	0	0	1	24	10	0	35	118
08:05 AM	26	0	9	0	35	4	19	0	0	23	0	0	0	0	0	0	15	9	0	24	82
08:10 AM	6	0	3	0	9	3	20	0	0	23	0	0	0	0	0	0	17	3	0	20	52
08:15 AM	10	0	7	0	17	3	20	0	0	23	0	0	0	0	0	0	21	10	0	31	71
08:20 AM	4	0	6	0	10	4	13	0	0	17	0	0	0	0	0	0	15	5	0	20	47
08:25 AM	5	0	4	0	9	1	15	1	0	17	0	0	0	0	0	0	15	3	0	18	44
08:30 AM	5	0	4	0	9	1	17	0	0	18	1	0	0	0	1	0	15	8	0	23	51
08:35 AM	2	0	6	0	8	2	14	0	0	16	0	0	0	0	0	1	19	5	0	25	49
08:40 AM	9	0	7	0	16	1	15	0	0	16	0	0	0	0	0	0	14	1	0	15	47
08:45 AM	8	0	3	0	11	2	24	0	0	26	0	0	0	0	0	0	11	2	2	15	52
08:50 AM	7	0	2	0	9	2	21	0	0	23	1	0	0	0	1	0	13	3	0	16	49
08:55 AM	2	0	1	0	3	2	27	1	0	30	0	0	0	0	0	0	18	2	0	20	53
Total	133	0	64	0	197	29	223	2	0	254	2	0	0	0	2	2	197	61	2	262	715
09:00 AM	6	0	5	0	11	1	10	0	0	11	0	0	0	0	0	0	24	6	0	30	52
09:05 AM	2	0	2	0	4	2	12	0	0	14	0	0	0	0	0	0	13	7	0	20	38
09:10 AM	6	0	5	0	11	3	18	0	0	21	0	0	0	0	0	0	10	2	0	12	44
09:15 AM	2	0	2	0	4	1	18	0	1	20	0	0	0	0	0	0	10	3	0	13	37
09:20 AM	7	0	3	0	10	6	11	0	0	17	0	0	0	0	0	0	13	4	0	17	44
09:25 AM	6	0	7	0	13	3	10	1	1	15	0	0	0	0	0	0	6	5	0	11	39

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 Then Click the Comments Tab

### Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound					N Carefree Cir Westbound					Northbound					N Carefree Cir Eastbound					Int. Total
	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	
11:00 AM	4	0	5	0	9	2	9	0	0	11	0	0	0	0	0	1	7	5	0	13	33
11:05 AM	2	0	3	0	5	1	19	0	0	20	0	0	0	0	0	0	11	6	0	17	42
11:10 AM	4	0	3	0	7	1	14	0	0	15	1	0	0	0	1	0	14	5	0	19	42
11:15 AM	3	0	1	0	4	0	18	0	0	18	0	0	0	0	0	1	11	5	0	17	39
11:20 AM	4	0	5	0	9	4	15	1	1	21	1	0	0	0	1	0	12	8	0	20	51
11:25 AM	6	0	3	0	9	4	17	0	1	22	1	0	0	0	1	0	11	10	0	21	53
11:30 AM	6	0	0	0	6	2	17	0	0	19	0	0	0	0	0	0	13	5	0	18	43
11:35 AM	11	0	3	0	14	3	17	2	0	22	0	0	0	0	0	0	7	9	0	16	52
11:40 AM	10	0	3	0	13	2	14	0	0	16	2	0	0	0	2	1	10	7	0	18	49
11:45 AM	5	0	3	0	8	4	18	0	0	22	0	0	0	0	0	0	24	4	1	29	59
11:50 AM	4	0	5	0	9	2	14	0	0	16	1	0	0	0	1	0	20	1	0	21	47
11:55 AM	9	0	2	0	11	2	13	0	0	15	0	0	0	0	0	1	16	6	0	23	49
<b>Total</b>	<b>68</b>	<b>0</b>	<b>36</b>	<b>0</b>	<b>104</b>	<b>27</b>	<b>185</b>	<b>3</b>	<b>2</b>	<b>217</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>4</b>	<b>156</b>	<b>71</b>	<b>1</b>	<b>232</b>	<b>559</b>
12:00 PM	1	0	0	0	1	2	20	0	0	22	0	1	0	0	1	0	13	4	0	17	41
12:05 PM	7	0	1	0	8	3	20	0	0	23	0	0	0	0	0	0	15	4	0	19	50
12:10 PM	3	0	4	0	7	7	17	0	0	24	0	0	0	0	0	0	21	4	0	25	56
12:15 PM	2	0	0	0	2	2	15	0	0	17	0	0	0	0	0	0	19	4	0	23	42
12:20 PM	4	0	2	0	6	5	14	0	0	19	0	0	0	0	0	0	9	3	0	12	37
12:25 PM	3	0	2	0	5	1	14	0	0	15	0	0	0	0	0	1	15	8	0	24	44
12:30 PM	7	0	1	0	8	2	13	0	1	16	0	0	0	0	0	0	19	7	1	27	51
12:35 PM	5	0	3	0	8	2	17	0	0	19	0	0	0	0	0	0	14	5	0	19	46
12:40 PM	5	0	3	0	8	1	28	0	1	30	0	0	0	0	0	0	10	4	0	14	52
12:45 PM	6	0	1	0	7	2	11	0	0	13	0	0	0	0	0	0	12	6	1	19	39
12:50 PM	5	0	1	0	6	2	22	0	0	24	0	0	0	0	0	0	14	3	0	17	47
12:55 PM	4	0	2	0	6	4	12	0	1	17	0	0	1	0	1	0	17	8	0	25	49
<b>Total</b>	<b>52</b>	<b>0</b>	<b>20</b>	<b>0</b>	<b>72</b>	<b>33</b>	<b>203</b>	<b>0</b>	<b>3</b>	<b>239</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>178</b>	<b>60</b>	<b>2</b>	<b>241</b>	<b>554</b>

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 Colorado Springs, CO 80909  
 719-633-2868

File Name : Antelope Ridge Dr - N Carefree Cir 2-4 SW  
 Site Code : S224090  
 Start Date : 4/5/2022  
 Page No : 1

### Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound					N Carefree Cir Westbound					Northbound					N Carefree Cir Eastbound					Int. Total
	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	Right	T	L	U	App. Total	
02:00 PM	7	0	0	0	7	5	18	0	0	23	0	0	0	0	0	0	12	8	0	20	50
02:05 PM	3	0	4	0	7	3	21	0	0	24	0	0	0	0	0	0	22	4	0	26	57
02:10 PM	5	0	4	0	9	1	15	0	0	16	1	0	0	0	1	0	15	4	0	19	45
02:15 PM	7	0	0	0	7	1	24	0	0	25	0	0	0	0	0	0	18	11	0	29	61
02:20 PM	8	0	3	0	11	3	16	0	0	19	0	0	0	0	0	0	21	6	0	27	57
02:25 PM	2	0	3	0	5	3	25	1	0	29	0	0	0	0	0	0	22	8	0	30	64
02:30 PM	2	0	3	0	5	3	30	0	0	33	0	0	0	0	0	0	22	8	0	30	68
02:35 PM	11	0	2	0	13	6	43	0	0	49	0	0	0	0	0	0	17	9	0	26	88
02:40 PM	13	0	2	0	15	6	42	0	0	48	0	0	0	0	0	0	24	13	2	39	102
02:45 PM	7	0	2	0	9	6	29	1	0	36	1	0	0	0	1	0	33	17	0	50	96
02:50 PM	11	0	0	0	11	5	25	0	0	30	0	0	0	0	0	0	40	18	0	58	99
02:55 PM	8	0	3	0	11	7	24	0	0	31	0	0	0	0	0	0	22	19	0	41	83
<b>Total</b>	<b>84</b>	<b>0</b>	<b>26</b>	<b>0</b>	<b>110</b>	<b>49</b>	<b>312</b>	<b>2</b>	<b>0</b>	<b>363</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>268</b>	<b>125</b>	<b>2</b>	<b>395</b>	<b>870</b>
03:00 PM	8	0	1	0	9	12	29	0	0	41	0	0	0	0	0	0	13	17	0	30	80
03:05 PM	26	0	5	0	31	2	25	0	0	27	0	0	0	0	0	0	27	20	0	47	105
03:10 PM	43	0	8	0	51	6	17	0	0	23	0	0	0	0	0	0	31	26	0	57	131
03:15 PM	31	0	10	0	41	8	18	0	0	26	0	0	0	0	0	0	27	35	0	62	129
03:20 PM	24	0	5	0	29	15	24	0	0	39	0	0	0	0	0	0	20	21	0	41	109
03:25 PM	8	0	2	0	10	13	33	0	0	46	0	0	0	0	0	0	19	13	0	32	88
03:30 PM	24	0	4	0	28	8	27	0	0	35	0	0	0	0	0	0	28	13	0	41	104
03:35 PM	54	0	18	0	72	7	27	0	0	34	0	0	0	0	0	0	13	13	0	26	132
03:40 PM	52	0	15	0	67	5	35	0	0	40	0	0	0	0	0	0	19	17	0	36	143
03:45 PM	27	0	16	0	43	5	31	0	0	36	0	0	0	0	0	0	18	6	0	24	103
03:50 PM	7	0	3	0	10	4	27	0	0	31	0	0	0	0	0	0	22	8	0	30	71
03:55 PM	10	0	3	0	13	5	38	0	0	43	0	0	0	0	0	0	14	10	0	24	80
<b>Total</b>	<b>314</b>	<b>0</b>	<b>90</b>	<b>0</b>	<b>404</b>	<b>90</b>	<b>331</b>	<b>0</b>	<b>0</b>	<b>421</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>251</b>	<b>199</b>	<b>0</b>	<b>450</b>	<b>1275</b>
Grand Total	398	0	116	0	514	139	643	2	0	784	2	0	0	0	2	0	519	324	2	845	2145
Apprch %	77.4	0	22.6	0		17.7	82	0.3	0		100	0	0	0		0	61.4	38.3	0.2		
Total %	18.6	0	5.4	0	24	6.5	30	0.1	0	36.6	0.1	0	0	0	0.1	0	24.2	15.1	0.1	39.4	

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 719-633-2868

File Name : Antelope Ridge Dr - N Carefree Cir PM  
 Site Code : S224090  
 Start Date : 3/16/2022  
 Page No : 1

### Groups Printed- Unshifted

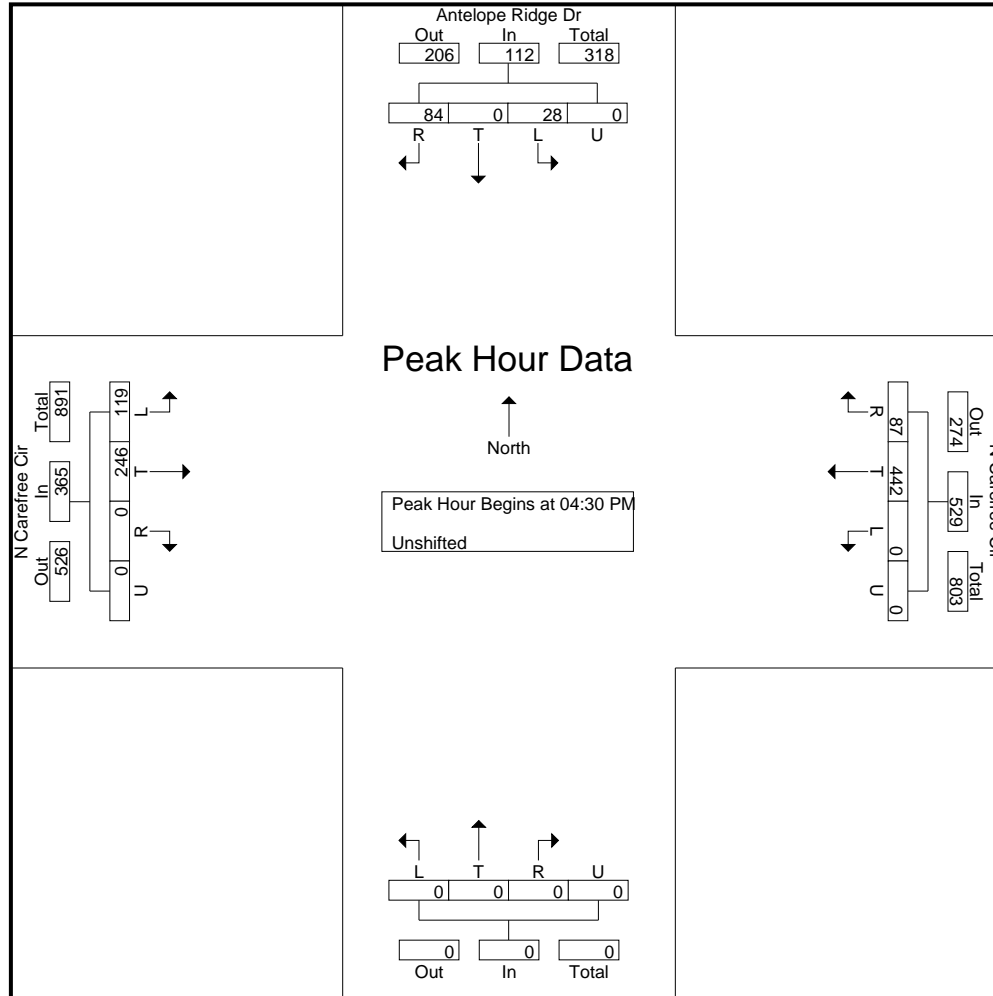
Start Time	Antelope Ridge Dr Southbound					N Carefree Cir Westbound					Northbound					N Carefree Cir Eastbound					Int. Total
	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	
04:00 PM	7	0	9	0	16	18	87	0	0	105	0	0	0	0	0	0	43	23	0	66	187
04:15 PM	26	0	13	0	39	21	94	0	0	115	0	0	0	0	0	0	53	28	0	81	235
04:30 PM	24	0	6	0	30	29	100	0	0	129	0	0	0	0	0	0	59	32	0	91	250
04:45 PM	22	0	8	0	30	15	118	0	0	133	0	0	0	0	0	0	58	30	0	88	251
Total	79	0	36	0	115	83	399	0	0	482	0	0	0	0	0	0	213	113	0	326	923
05:00 PM	19	0	9	0	28	21	116	0	0	137	0	0	0	0	0	0	51	31	0	82	247
05:15 PM	19	0	5	0	24	22	108	0	0	130	0	0	0	0	0	0	78	26	0	104	258
05:30 PM	14	0	8	0	22	19	96	0	0	115	0	0	0	0	0	0	75	23	0	98	235
05:45 PM	19	0	5	0	24	12	66	0	0	78	0	0	0	0	0	0	69	26	0	95	197
Total	71	0	27	0	98	74	386	0	0	460	0	0	0	0	0	0	273	106	0	379	937
Grand Total	150	0	63	0	213	157	785	0	0	942	0	0	0	0	0	0	486	219	0	705	1860
Apprch %	70.4	0	29.6	0		16.7	83.3	0	0		0	0	0	0	0	0	68.9	31.1	0		
Total %	8.1	0	3.4	0	11.5	8.4	42.2	0	0	50.6	0	0	0	0	0	0	26.1	11.8	0	37.9	



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File Name : Antelope Ridge Dr - N Carefree Cir PM  
 Site Code : S224090  
 Start Date : 3/16/2022  
 Page No : 3



# LSC Transportation Consultants, Inc.

2504 E Pikes Peak Ave, Suite 304  
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 719-633-2868

File Name : Marksheffel Rd - N Carefree Cir AM 3-22  
 Site Code : S224090  
 Start Date : 3/9/2022  
 Page No : 1

### Groups Printed- Unshifted

Start Time	Marksheffel Rd Southbound					Westbound					Marksheffel Rd Northbound					N Carefree Cir Eastbound					Int. Total
	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	L	T	R	U	App. Total	
06:30 AM	0	226	10	0	236	0	0	0	0	0	27	146	0	0	173	8	0	95	0	103	512
06:45 AM	0	351	20	0	371	0	0	0	0	0	35	148	0	0	183	5	0	97	0	102	656
Total	0	577	30	0	607	0	0	0	0	0	62	294	0	0	356	13	0	192	0	205	1168
07:00 AM	0	346	19	0	365	0	0	0	0	0	59	189	0	0	248	3	0	119	6	128	741
07:15 AM	0	339	6	0	345	0	0	0	0	0	94	249	0	0	343	2	0	129	4	135	823
07:30 AM	0	291	25	0	316	0	0	0	0	0	76	227	0	1	304	5	0	117	2	124	744
07:45 AM	0	252	13	0	265	0	0	0	0	0	70	233	0	0	303	5	0	129	2	136	704
Total	0	1228	63	0	1291	0	0	0	0	0	299	898	0	1	1198	15	0	494	14	523	3012
08:00 AM	0	254	19	0	273	0	0	0	0	0	57	184	0	0	241	12	0	83	1	96	610
08:15 AM	0	245	28	0	273	0	0	0	0	0	43	161	0	0	204	3	0	45	0	48	525
Grand Total	0	2304	140	0	2444	0	0	0	0	0	461	1537	0	1	1999	43	0	814	15	872	5315
Apprch %	0	94.3	5.7	0		0	0	0	0	0	23.1	76.9	0	0.1		4.9	0	93.3	1.7		
Total %	0	43.3	2.6	0	46	0	0	0	0	0	8.7	28.9	0	0	37.6	0.8	0	15.3	0.3	16.4	

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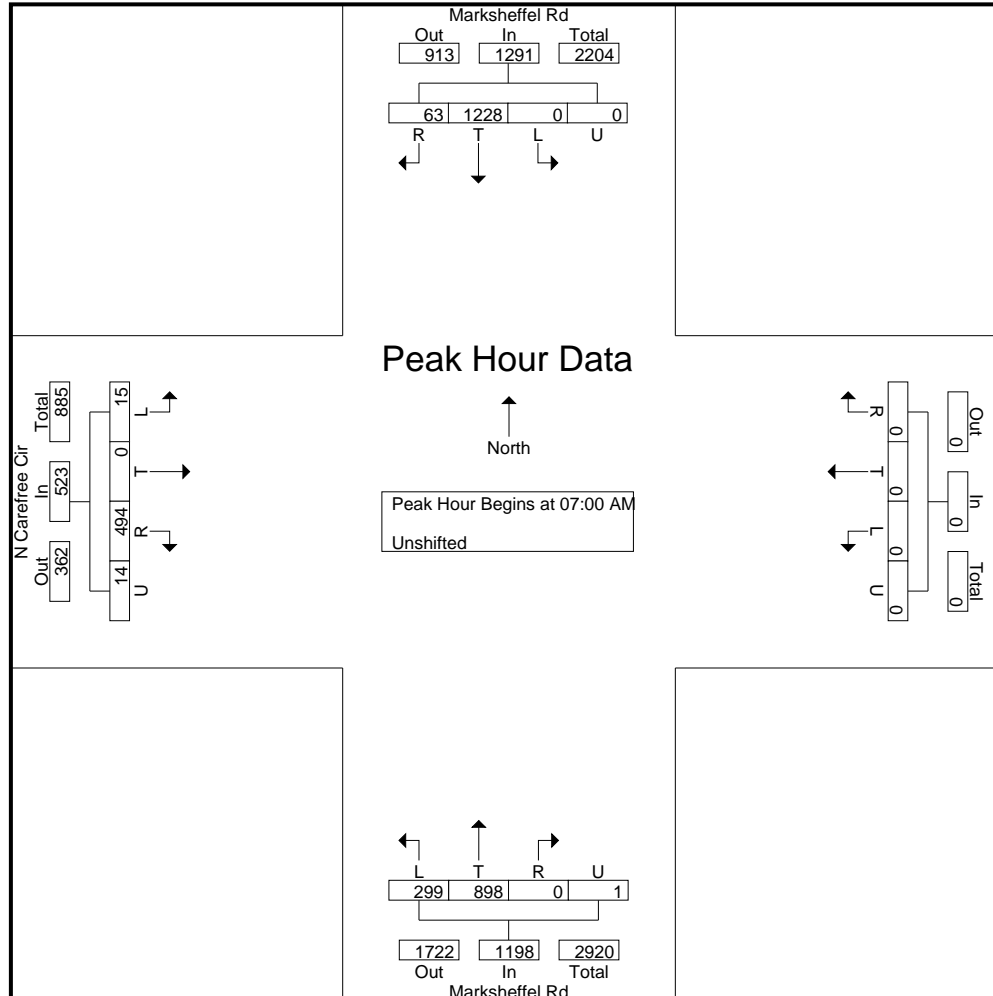
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 719-633-2868

File Name : Marksheffel Rd - N Carefree Cir AM 3-22

Site Code : S224090

Start Date : 3/9/2022

Page No : 3



# LSC Transportation Consultants, Inc.

2504 E Pikes Peak Ave, Suite 304  
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File Name : Marksheffel Rd - N Carefree Cir PM 3-22  
 Site Code : S224090  
 Start Date : 3/16/2022  
 Page No : 1

### Groups Printed- Unshifted

Start Time	Marksheffel Rd Southbound					Westbound					Marksheffel Rd Northbound					N Carefree Cir Eastbound					Int. Total
	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	R	T	L	U	App. Total	
04:00 PM	17	197	0	0	214	0	0	0	0	0	0	328	96	0	424	49	0	5	0	54	692
04:15 PM	26	185	0	0	211	0	0	0	0	0	0	333	86	0	419	61	0	13	1	75	705
04:30 PM	21	211	0	1	233	0	0	0	0	0	0	341	113	0	454	57	0	5	0	62	749
04:45 PM	32	156	0	0	188	0	0	0	0	0	0	362	99	0	461	60	0	9	0	69	718
Total	96	749	0	1	846	0	0	0	0	0	0	1364	394	0	1758	227	0	32	1	260	2864
05:00 PM	28	192	0	0	220	0	0	0	0	0	0	342	111	0	453	49	0	5	0	54	727
05:15 PM	24	210	0	0	234	0	0	0	0	0	0	305	96	0	401	62	0	15	0	77	712
05:30 PM	26	216	0	0	242	0	0	0	0	0	0	282	86	0	368	57	0	17	0	74	684
05:45 PM	16	158	0	0	174	0	0	0	0	0	0	273	64	0	337	62	0	16	0	78	589
Total	94	776	0	0	870	0	0	0	0	0	0	1202	357	0	1559	230	0	53	0	283	2712
Grand Total	190	1525	0	1	1716	0	0	0	0	0	0	2566	751	0	3317	457	0	85	1	543	5576
Apprch %	11.1	88.9	0	0.1		0	0	0	0	0	0	77.4	22.6	0		84.2	0	15.7	0.2		
Total %	3.4	27.3	0	0	30.8	0	0	0	0	0	0	46	13.5	0	59.5	8.2	0	1.5	0	9.7	

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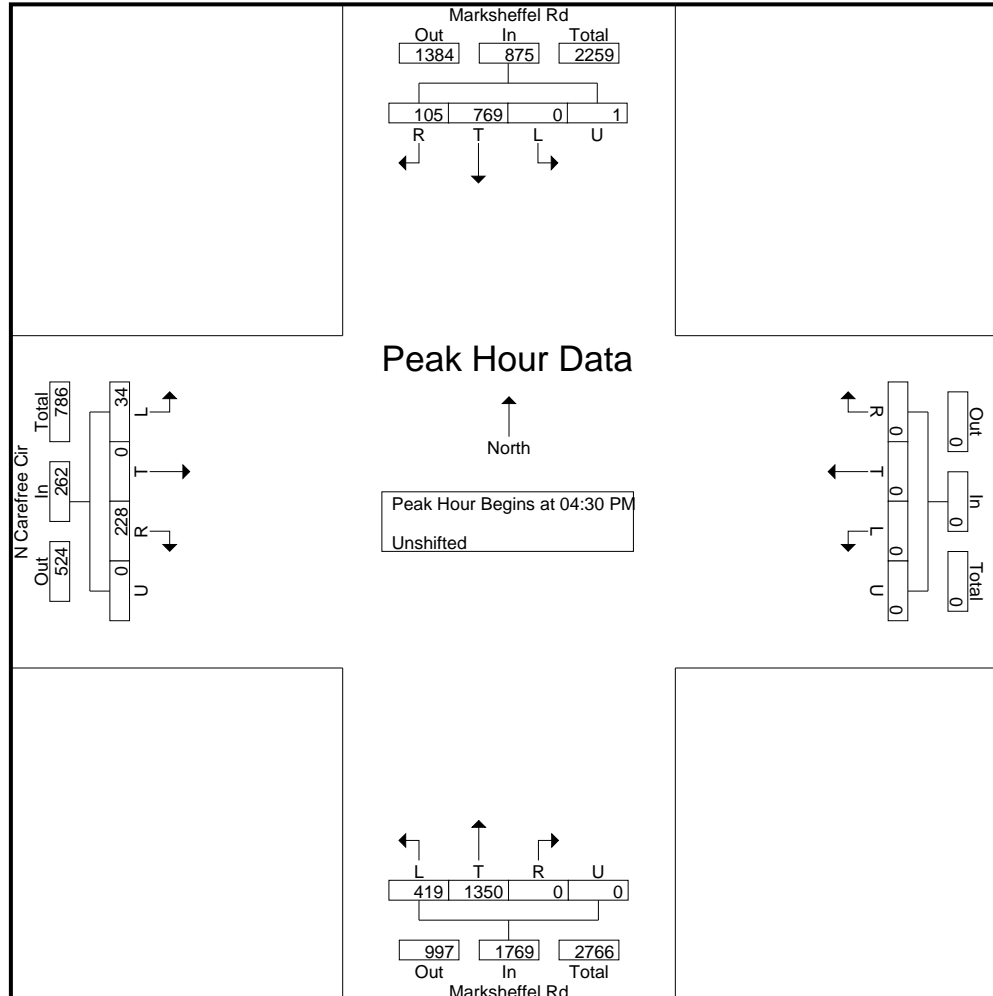
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 719-633-2868

File Name : Marksheffel Rd - N Carefree Cir PM 3-22

Site Code : S224090

Start Date : 3/16/2022

Page No : 3



# LSC Transportation Consultants, Inc.

2504 E Pikes Peak Ave, Suite 304

Colorado Springs, CO 80909

719-633-2868

File Name : Antelope Ridge Dr - S Pronghorn Meadows Dr AM

Site Code : 00184640

Start Date : 8/15/2018

Page No : 1

## Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound				Westbound				Antelope Ridge Dr Northbound				S Pronghorn Meadows Dr Eastbound				Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
06:30	0	17	1	0	0	0	0	0	3	10	0	0	1	0	8	0	40
06:45	0	37	0	0	0	0	0	0	1	25	0	0	1	0	16	0	80
Total	0	54	1	0	0	0	0	0	4	35	0	0	2	0	24	0	120
07:00	0	39	0	0	0	0	0	0	2	47	0	0	0	0	12	0	100
07:15	0	72	0	0	0	0	0	0	6	86	0	0	2	0	16	0	182
07:30	0	184	1	0	0	0	0	0	3	157	0	0	0	0	17	0	362
07:45	0	198	3	0	0	0	0	0	3	61	0	0	4	0	9	0	278
Total	0	493	4	0	0	0	0	0	14	351	0	0	6	0	54	0	922
08:00	0	61	1	0	0	0	0	0	4	8	0	0	1	0	4	0	79
08:15	0	21	0	0	0	0	0	0	1	18	0	0	1	0	7	0	48
Grand Total	0	629	6	0	0	0	0	0	23	412	0	0	10	0	89	0	1169
Apprch %	0	99.1	0.9	0	0	0	0	0	5.3	94.7	0	0	10.1	0	89.9	0	
Total %	0	53.8	0.5	0	0	0	0	0	2	35.2	0	0	0.9	0	7.6	0	

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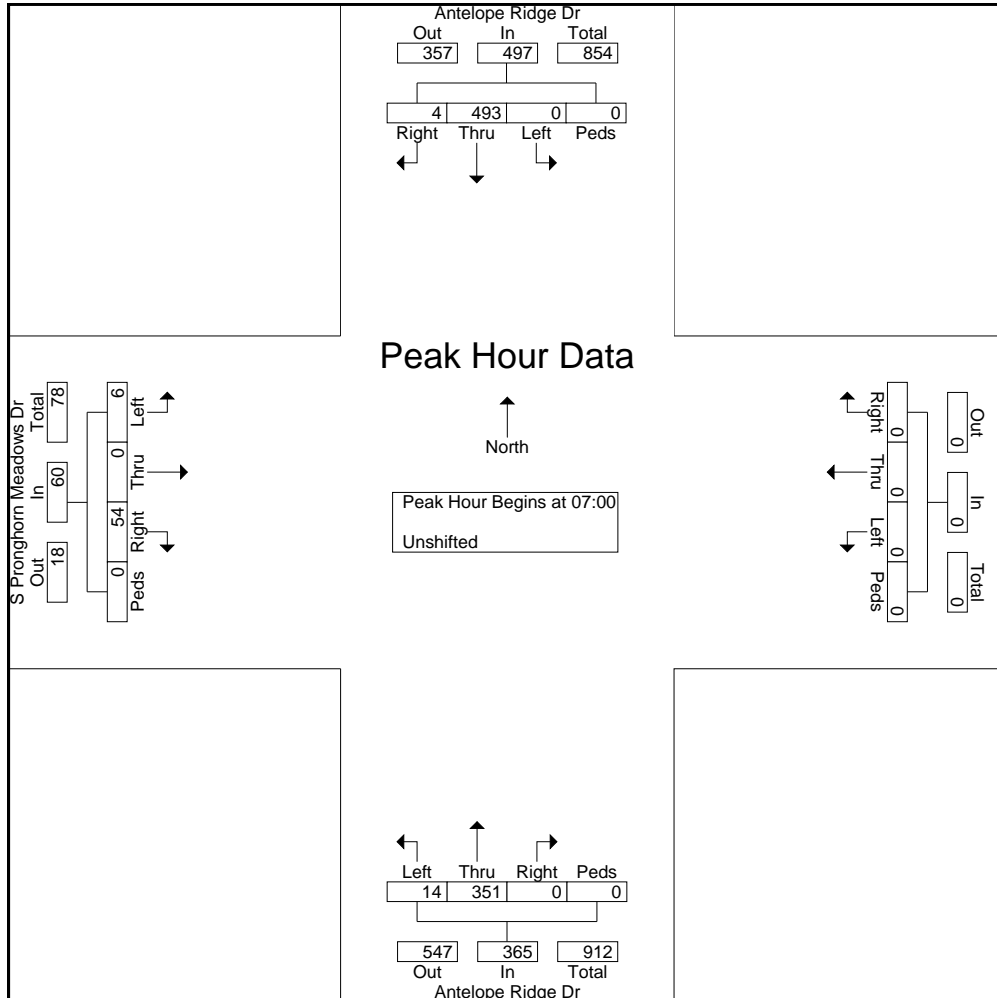
File Name : Antelope Ridge Dr - S Pronghorn Meadows Dr AM

Site Code : 00184640

Start Date : 8/15/2018

Page No : 2

Start Time	Antelope Ridge Dr Southbound					Westbound					Antelope Ridge Dr Northbound					S Pronghorn Meadows Dr Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 6:30:00 AM to 8:15:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 7:00:00 AM																					
7:00:00 AM	0	39	0	0	39	0	0	0	0	0	2	47	0	0	49	0	0	12	0	12	100
7:15:00 AM	0	72	0	0	72	0	0	0	0	0	6	86	0	0	92	2	0	16	0	18	182
7:30:00 AM	0	184	1	0	185	0	0	0	0	0	3	157	0	0	160	0	0	17	0	17	362
7:45:00 AM	0	198	3	0	201	0	0	0	0	0	3	61	0	0	64	4	0	9	0	13	278
Total Volume	0	493	4	0	497	0	0	0	0	0	14	351	0	0	365	6	0	54	0	60	922
% App. Total	0	99.2	0.8	0		0	0	0	0		3.8	96.2	0	0		10	0	90	0		
PHF	.000	.622	.333	.000	.618	.000	.000	.000	.000	.000	.583	.559	.000	.000	.570	.375	.000	.794	.000	.833	.637



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2504 E Pikes Peak Ave, Suite 304

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719-633-2868

File Name : Antelope Ridge Dr - S Pronghorn Meadows Dr PM

Site Code : 00184640

Start Date : 8/15/2018

Page No : 1

## Groups Printed- Unshifted

Start Time	Antelope Ridge Dr Southbound				Westbound				Antelope Ridge Dr Northbound				S Pronghorn Meadows Dr Eastbound				Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
16:00	0	27	2	0	0	0	0	0	12	37	0	0	1	0	7	0	86
16:15	0	19	4	0	0	0	0	0	13	42	0	0	0	0	5	0	83
16:30	0	24	0	0	0	0	0	0	8	30	0	0	2	0	7	0	71
16:45	0	12	5	0	0	0	0	0	9	51	0	0	0	0	8	0	85
Total	0	82	11	0	0	0	0	0	42	160	0	0	3	0	27	0	325
17:00	0	21	0	0	0	0	0	0	8	63	0	0	2	0	6	0	100
17:15	0	26	3	0	0	0	0	0	14	67	0	0	1	0	4	0	115
17:30	0	24	0	0	0	0	0	0	6	43	0	0	1	0	7	0	81
17:45	0	36	1	0	0	0	0	0	16	42	0	0	2	0	4	0	101
Total	0	107	4	0	0	0	0	0	44	215	0	0	6	0	21	0	397
Grand Total	0	189	15	0	0	0	0	0	86	375	0	0	9	0	48	0	722
Apprch %	0	92.6	7.4	0	0	0	0	0	18.7	81.3	0	0	15.8	0	84.2	0	
Total %	0	26.2	2.1	0	0	0	0	0	11.9	51.9	0	0	1.2	0	6.6	0	



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719-633-2868

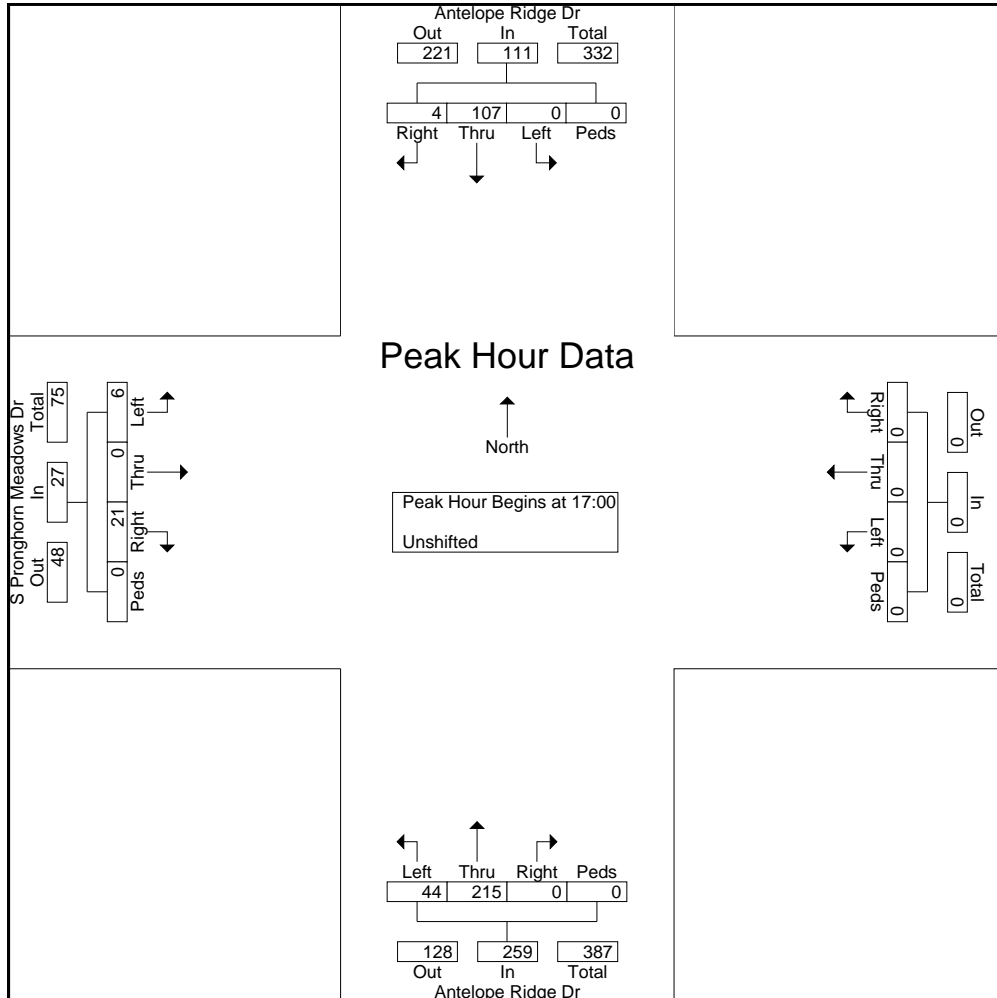
File Name : Antelope Ridge Dr - S Pronghorn Meadows Dr PM

Site Code : 00184640

Start Date : 8/15/2018

Page No : 2

Start Time	Antelope Ridge Dr Southbound					Westbound					Antelope Ridge Dr Northbound					S Pronghorn Meadows Dr Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	0	21	0	0	21	0	0	0	0	0	8	63	0	0	71	2	0	6	0	8	100
17:15	0	26	3	0	29	0	0	0	0	0	14	67	0	0	81	1	0	4	0	5	115
17:30	0	24	0	0	24	0	0	0	0	0	6	43	0	0	49	1	0	7	0	8	81
17:45	0	36	1	0	37	0	0	0	0	0	16	42	0	0	58	2	0	4	0	6	101
Total Volume	0	107	4	0	111	0	0	0	0	0	44	215	0	0	259	6	0	21	0	27	397
% App. Total	0	96.4	3.6	0		0	0	0	0		17	83	0	0		22.2	0	77.8	0		
PHF	.000	.743	.333	.000	.750	.000	.000	.000	.000	.000	.688	.802	.000	.000	.799	.750	.000	.750	.000	.844	.863



# Level of Service Reports

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HCM 6th TWSC  
4: Antelope Ridge Dr. & North Carefree

Existing Traffic  
AM Peak Hour

Intersection												
Int Delay, s/veh	13.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔ ↑↑↑			↔ ↑↑↑		↔		↔		↔	↔	
Traffic Vol, veh/h	218	393	1	0	280	87	0	1	0	111	1	350
Future Vol, veh/h	218	393	1	0	280	87	0	1	0	111	1	350
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	345	-	-	-	-	155	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	50	50	50	75	75	75
Heavy Vehicles, %	1	2	2	2	2	1	2	2	2	1	2	1
Mvmt Flow	251	452	1	0	322	100	0	2	0	148	1	467

Major/Minor	Major1		Major2		Minor1			Minor2				
Conflicting Flow All	422	0	0	453	0	0	1084	1377	227	1006	1277	161
Stage 1	-	-	-	-	-	-	955	955	-	322	322	-
Stage 2	-	-	-	-	-	-	129	422	-	684	955	-
Critical Hdwy	5.32	-	-	5.34	-	-	6.44	6.54	7.14	6.42	6.54	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	7.32	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.74	5.54	-	6.72	5.54	-
Follow-up Hdwy	3.11	-	-	3.12	-	-	3.82	4.02	3.92	3.81	4.02	3.91
Pot Cap-1 Maneuver	740	-	-	713	-	-	228	144	661	255	165	730
Stage 1	-	-	-	-	-	-	214	335	-	579	650	-
Stage 2	-	-	-	-	-	-	792	587	-	370	335	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	740	-	-	713	-	-	60	95	661	185	109	730
Mov Cap-2 Maneuver	-	-	-	-	-	-	60	95	-	185	109	-
Stage 1	-	-	-	-	-	-	141	221	-	383	650	-
Stage 2	-	-	-	-	-	-	285	587	-	242	221	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.4	0	43.7	32.3
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	95	740	-	-	713	-	-	185	718
HCM Lane V/C Ratio	0.021	0.339	-	-	-	-	-	0.8	0.652
HCM Control Delay (s)	43.7	12.3	-	-	0	-	-	74.5	18.9
HCM Lane LOS	E	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.1	1.5	-	-	0	-	-	5.5	4.9

Timings  
5: Marksheffel & North Carefree

Existing Traffic  
AM Peak Hour

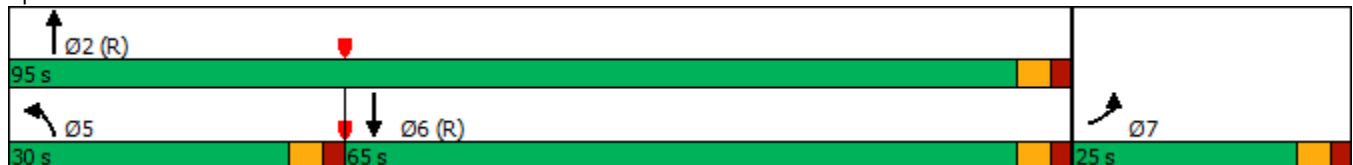


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖↗	↑↑	↑↑	↗
Traffic Volume (vph)	29	494	299	898	1228	63
Future Volume (vph)	29	494	299	898	1228	63
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	7		5	2	6	
Permitted Phases		Free				Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	15.0		20.0	15.0	15.0	
Minimum Split (s)	20.0		25.0	23.0	23.0	
Total Split (s)	25.0		30.0	95.0	65.0	
Total Split (%)	20.8%		25.0%	79.2%	54.2%	
Yellow Time (s)	3.0		3.0	3.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	15.0	120.0	20.3	105.0	77.7	120.0
Actuated g/C Ratio	0.12	1.00	0.17	0.88	0.65	1.00
v/c Ratio	0.14	0.34	0.59	0.33	0.58	0.04
Control Delay	48.7	0.6	50.6	2.8	14.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	0.6	50.6	2.8	14.8	0.0
LOS	D	A	D	A	B	A
Approach Delay	3.3			14.8	14.1	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 12.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 75.6%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



HCM 6th TWSC  
4: Antelope Ridge Dr. & North Carefree

Existing Traffic  
PM Peak Hour

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔ ↑↑↑			↔ ↑↑↑		↔		↔		↔	↔	
Traffic Vol, veh/h	119	246	1	0	442	87	0	1	0	28	0	84
Future Vol, veh/h	119	246	1	0	442	87	0	1	0	28	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	345	-	-	-	-	155	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	92	92	92	50	50	50	83	83	83
Heavy Vehicles, %	1	2	2	2	2	1	2	2	2	1	2	1
Mvmt Flow	135	280	1	0	480	95	0	2	0	34	0	101

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	575	0	0	281	0	0	743	1126	141	863	1031	240
Stage 1	-	-	-	-	-	-	551	551	-	480	480	-
Stage 2	-	-	-	-	-	-	192	575	-	383	551	-
Critical Hdwy	5.32	-	-	5.34	-	-	6.44	6.54	7.14	6.42	6.54	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	7.32	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.74	5.54	-	6.72	5.54	-
Follow-up Hdwy	3.11	-	-	3.12	-	-	3.82	4.02	3.92	3.81	4.02	3.91
Pot Cap-1 Maneuver	628	-	-	857	-	-	361	203	749	309	232	651
Stage 1	-	-	-	-	-	-	405	514	-	454	553	-
Stage 2	-	-	-	-	-	-	727	501	-	562	514	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	628	-	-	857	-	-	255	159	749	256	182	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	255	159	-	256	182	-
Stage 1	-	-	-	-	-	-	318	403	-	356	553	-
Stage 2	-	-	-	-	-	-	614	501	-	439	403	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	4			0			27.9			13.9		
HCM LOS							D			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	159	628	-	-	857	-	-	256	651
HCM Lane V/C Ratio	0.013	0.215	-	-	-	-	-	0.132	0.155
HCM Control Delay (s)	27.9	12.3	-	-	0	-	-	21.2	11.5
HCM Lane LOS		D	B	-	-	A	-	C	B
HCM 95th %tile Q(veh)		0	0.8	-	-	0	-	0.4	0.5

Timings  
5: Marksheffel & North Carefree

Existing Traffic  
PM Peak Hour

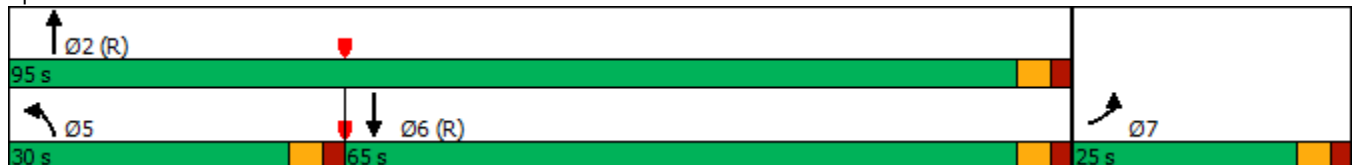


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖↗	↑↑	↑↑	↗
Traffic Volume (vph)	34	228	419	1350	769	105
Future Volume (vph)	34	228	419	1350	769	105
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	7		5	2	6	
Permitted Phases		Free				Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	15.0		20.0	15.0	15.0	
Minimum Split (s)	20.0		25.0	23.0	23.0	
Total Split (s)	25.0		30.0	95.0	65.0	
Total Split (%)	20.8%		25.0%	79.2%	54.2%	
Yellow Time (s)	3.0		3.0	3.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	15.0	120.0	22.0	105.0	76.0	120.0
Actuated g/C Ratio	0.12	1.00	0.18	0.88	0.63	1.00
v/c Ratio	0.18	0.17	0.72	0.47	0.37	0.07
Control Delay	49.3	0.2	53.0	3.6	12.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	0.2	53.0	3.6	12.9	0.1
LOS	D	A	D	A	B	A
Approach Delay	6.6			15.3	11.4	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 13.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Timings  
4: Antelope Ridge Dr. & North Carefree

2044 Background Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↕↕↕	↖↖↖	↗		↕	↖	↗
Traffic Volume (vph)	222	1074	1288	92	1	0	204	1
Future Volume (vph)	222	1074	1288	92	1	0	204	1
Turn Type	pm+pt	NA	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2	6			8		4
Permitted Phases	2			6	8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0
Total Split (s)	21.0	64.0	43.0	43.0	36.0	36.0	36.0	36.0
Total Split (%)	21.0%	64.0%	43.0%	43.0%	36.0%	36.0%	36.0%	36.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	66.3	66.3	47.0	47.0		23.7	23.7	23.7
Actuated g/C Ratio	0.66	0.66	0.47	0.47		0.24	0.24	0.24
v/c Ratio	0.75	0.34	0.57	0.14		0.02	0.76	0.53
Control Delay	30.2	8.3	22.1	4.4		26.0	49.3	6.8
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	30.2	8.3	22.1	4.4		26.0	49.3	6.8
LOS	C	A	C	A		C	D	A
Approach Delay		12.6	20.7			26.0		25.1
Approach LOS		B	C			C		C

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 86 (86%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 18.2  
 Intersection LOS: B  
 Intersection Capacity Utilization 74.8%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

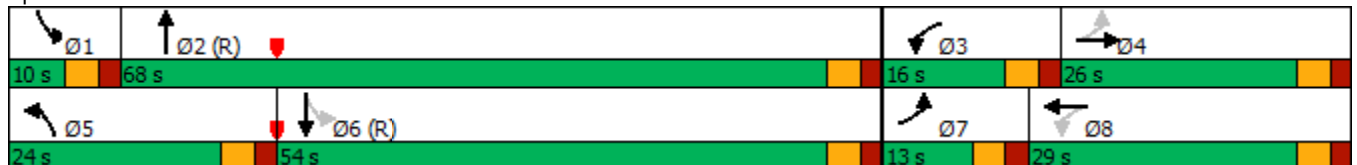
2044 Background Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	327	812	100	781	154	494	1003	50	78	1367	105
Future Volume (vph)	139	327	812	100	781	154	494	1003	50	78	1367	105
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	9.0		9.0	9.0		9.0	9.0		9.0	9.0	
Total Split (s)	13.0	26.0		16.0	29.0		24.0	68.0		10.0	54.0	
Total Split (%)	10.8%	21.7%		13.3%	24.2%		20.0%	56.7%		8.3%	45.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.5	21.5	120.0	32.9	23.2	120.0	19.1	65.8	120.0	55.0	49.7	120.0
Actuated g/C Ratio	0.25	0.18	1.00	0.27	0.19	1.00	0.16	0.55	1.00	0.46	0.41	1.00
v/c Ratio	0.79	0.37	0.52	0.33	0.81	0.10	0.92	0.53	0.03	0.29	0.95	0.07
Control Delay	64.0	44.7	1.2	34.0	53.7	0.1	73.8	19.1	0.0	14.2	49.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.0	44.7	1.2	34.0	53.7	0.1	73.8	19.1	0.0	14.2	49.0	0.1
LOS	E	D	A	C	D	A	E	B	A	B	D	A
Approach Delay		19.2			43.8			36.0			43.9	
Approach LOS		B			D			D			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 35.8  
 Intersection LOS: D  
 Intersection Capacity Utilization 91.3%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree





Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	54	14	300	419	4
Future Vol, veh/h	6	54	14	300	419	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	80	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	94	81	81	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	61	15	370	517	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	919	519	521	0	-	0
Stage 1	519	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	294	557	1045	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Platoon blocked, %	1			-	-	-
Mov Cap-1 Maneuver	290	557	1045	-	-	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	724	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1045	-	510	-	-
HCM Lane V/C Ratio	0.014	-	0.134	-	-
HCM Control Delay (s)	8.5	-	13.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Timings  
4: Antelope Ridge Dr. & North Carefree

2044 Background Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↗	↑↑↑	↖↖↖	↗		↕	↘	↘
Traffic Volume (vph)	132	984	1180	103	1	0	62	0
Future Volume (vph)	132	984	1180	103	1	0	62	0
Turn Type	pm+pt	NA	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2	6			8		4
Permitted Phases	2			6	8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0
Total Split (s)	12.0	65.0	53.0	53.0	35.0	35.0	35.0	35.0
Total Split (%)	12.0%	65.0%	53.0%	53.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	81.6	82.6	69.1	69.1		10.5	10.6	10.6
Actuated g/C Ratio	0.82	0.83	0.69	0.69		0.10	0.11	0.11
v/c Ratio	0.39	0.25	0.35	0.10		0.01	0.50	0.28
Control Delay	5.7	2.8	7.7	1.8		37.0	52.5	2.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	5.7	2.8	7.7	1.8		37.0	52.5	2.2
LOS	A	A	A	A		D	D	A
Approach Delay		3.2	7.2			37.0		25.2
Approach LOS		A	A			D		C

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 86 (86%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.50  
 Intersection Signal Delay: 6.5  
 Intersection LOS: A  
 Intersection Capacity Utilization 58.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

2044 Background Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	579	383	50	404	87	699	1523	75	138	885	180
Future Volume (vph)	84	579	383	50	404	87	699	1523	75	138	885	180
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	19.0	31.0		12.0	24.0		39.0	65.0		12.0	38.0	
Total Split (%)	15.8%	25.8%		10.0%	20.0%		32.5%	54.2%		10.0%	31.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	3.0		5.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	30.6	22.2	120.0	23.4	16.7	120.0	30.4	65.3	120.0	52.7	44.8	120.0
Actuated g/C Ratio	0.26	0.18	1.00	0.20	0.14	1.00	0.25	0.54	1.00	0.44	0.37	1.00
v/c Ratio	0.37	0.65	0.25	0.30	0.60	0.06	0.85	0.83	0.05	0.69	0.71	0.12
Control Delay	37.0	48.8	0.4	36.3	51.9	0.1	52.2	28.6	0.1	46.1	37.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	48.8	0.4	36.3	51.9	0.1	52.2	28.6	0.1	46.1	37.3	0.2
LOS	D	D	A	D	D	A	D	C	A	D	D	A
Approach Delay		30.1			42.1			34.8			32.8	
Approach LOS		C			D			C			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 34.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 80.1%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↔	↑	↑	
Traffic Vol, veh/h	6	21	44	191	116	4
Future Vol, veh/h	6	21	44	191	116	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	80	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	92	84	84	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	24	48	227	138	4

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	463	140	142	0	-	0
Stage 1	140	-	-	-	-	-
Stage 2	323	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	593	908	1441	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	764	-	-	-	-	-
Platoon blocked, %	1			-	-	-
Mov Cap-1 Maneuver	574	908	1441	-	-	-
Mov Cap-2 Maneuver	574	-	-	-	-	-
Stage 1	858	-	-	-	-	-
Stage 2	764	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	1.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1441	-	804	-	-
HCM Lane V/C Ratio	0.033	-	0.038	-	-
HCM Control Delay (s)	7.6	-	9.7	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Timings  
4: Antelope Ridge Dr. & North Carefree

Short-Term Total Traffic  
AM Peak Hour

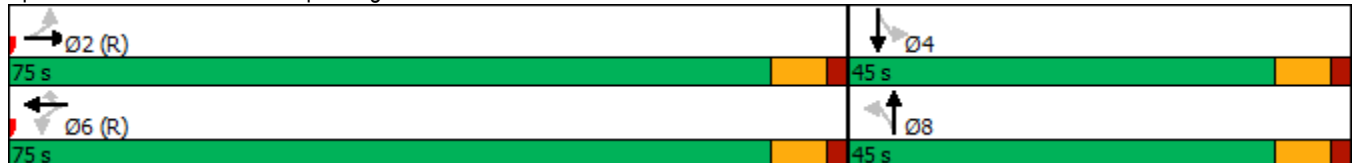


Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations	↔	↕↕↕	↕↕↕	↔	↕↕	↔	↕
Traffic Volume (vph)	237	393	280	106	1	153	1
Future Volume (vph)	237	393	280	106	1	153	1
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA
Protected Phases		2	6		8		4
Permitted Phases	2			6		4	
Detector Phase	2	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	20.0	20.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	27.0	27.0
Total Split (s)	75.0	75.0	75.0	75.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%	37.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)	74.8	74.8	74.8	74.8	31.2	31.2	31.2
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.26	0.26	0.26
v/c Ratio	0.42	0.14	0.10	0.12	0.00	0.74	0.90
Control Delay	15.6	10.3	9.7	6.3	29.0	52.2	26.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	10.3	9.7	6.3	29.0	52.2	26.3
LOS	B	B	A	A	C	D	C
Approach Delay		12.3	8.7		29.0		33.4
Approach LOS		B	A		C		C

Intersection Summary













Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 21.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 61.2%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

Short-Term Total Traffic  
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	38	527	311	898	1228	70
Future Volume (vph)	38	527	311	898	1228	70
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	7		5	2	6	
Permitted Phases		Free				Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	20.0		20.0	4.0	4.0	
Minimum Split (s)	25.0		25.0	11.0	11.0	
Total Split (s)	25.0		30.0	95.0	65.0	
Total Split (%)	20.8%		25.0%	79.2%	54.2%	
Yellow Time (s)	3.0		3.0	3.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	20.0	120.0	20.4	102.0	74.6	120.0
Actuated g/C Ratio	0.17	1.00	0.17	0.85	0.62	1.00
v/c Ratio	0.14	0.36	0.61	0.34	0.60	0.05
Control Delay	50.3	1.9	51.0	4.0	17.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	1.9	51.0	4.0	17.6	0.1
LOS	D	A	D	A	B	A
Approach Delay	5.1			16.1	16.6	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 14.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 79.8%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	6	0	54	52	0	15	14	311	18	5	454	4
Future Vol, veh/h	6	0	54	52	0	15	14	311	18	5	454	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	80	-	-	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	100	88	92	92	92	75	80	92	92	80	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	0	61	57	0	16	19	389	20	5	568	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1026	1028	571	1048	1020	399	573	0	0	409	0	0
Stage 1	581	581	-	437	437	-	-	-	-	-	-	-
Stage 2	445	447	-	611	583	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	213	234	520	206	237	651	1000	-	-	1150	-	-
Stage 1	499	500	-	598	579	-	-	-	-	-	-	-
Stage 2	592	573	-	481	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	204	229	520	178	232	651	1000	-	-	1150	-	-
Mov Cap-2 Maneuver	204	229	-	178	232	-	-	-	-	-	-	-
Stage 1	490	498	-	587	568	-	-	-	-	-	-	-
Stage 2	566	562	-	422	497	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	14.4		30.4		0.4		0.1	
HCM LOS	B		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1000	-	-	450	213	1150	-	-
HCM Lane V/C Ratio	0.019	-	-	0.152	0.342	0.005	-	-
HCM Control Delay (s)	8.7	-	-	14.4	30.4	8.1	-	-
HCM Lane LOS	A	-	-	B	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	1.4	0	-	-

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	25	312	20	5	417
Future Vol, veh/h	46	25	312	20	5	417
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	80	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	75	92	92	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	27	416	22	5	556

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	993	427	0	0	438
Stage 1	427	-	-	-	-
Stage 2	566	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	272	628	-	-	1122
Stage 1	658	-	-	-	-
Stage 2	568	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	271	628	-	-	1122
Mov Cap-2 Maneuver	271	-	-	-	-
Stage 1	658	-	-	-	-
Stage 2	566	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	339	1122
HCM Lane V/C Ratio	-	-	0.228	0.005
HCM Control Delay (s)	-	-	18.7	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.9	0



Timings  
4: Antelope Ridge Dr. & North Carefree

Short-Term Total Traffic  
PM Peak Hour

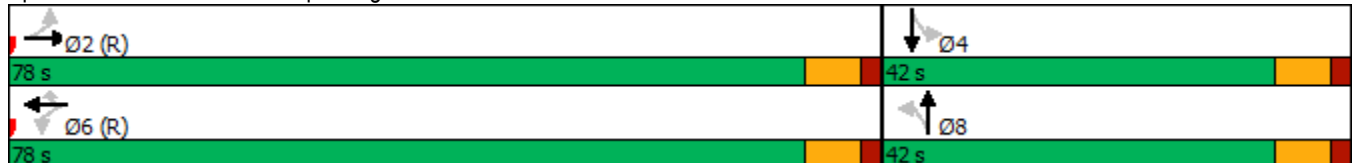


Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations	↖	↕↕↕	↖↖↖	↗	↕↕	↖	↗
Traffic Volume (vph)	178	246	442	144	1	57	0
Future Volume (vph)	178	246	442	144	1	57	0
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA
Protected Phases		2	6		8		4
Permitted Phases	2			6		4	
Detector Phase	2	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	20.0	20.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	27.0	27.0
Total Split (s)	78.0	78.0	78.0	78.0	42.0	42.0	42.0
Total Split (%)	65.0%	65.0%	65.0%	65.0%	35.0%	35.0%	35.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)	86.0	86.0	86.0	86.0	20.0	20.0	20.0
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.17	0.17	0.17
v/c Ratio	0.32	0.08	0.13	0.13	0.01	0.29	0.25
Control Delay	7.9	5.1	3.5	1.0	42.0	47.6	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	5.1	3.5	1.0	42.0	47.6	1.0
LOS	A	A	A	A	D	D	A
Approach Delay		6.3	2.9		42.0		16.0
Approach LOS		A	A		D		B

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.32  
 Intersection Signal Delay: 6.3  
 Intersection LOS: A  
 Intersection Capacity Utilization 52.6%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

Short-Term Total Traffic  
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	40	250	454	1350	769	127
Future Volume (vph)	40	250	454	1350	769	127
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	7		5	2	6	
Permitted Phases		Free				Free
Detector Phase	7		5	2	6	
Switch Phase						
Minimum Initial (s)	20.0		15.0	4.0	4.0	
Minimum Split (s)	25.0		20.0	11.0	11.0	
Total Split (s)	27.0		32.0	93.0	61.0	
Total Split (%)	22.5%		26.7%	77.5%	50.8%	
Yellow Time (s)	3.0		3.0	3.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	
Act Effct Green (s)	20.0	120.0	22.2	96.0	67.8	120.0
Actuated g/C Ratio	0.17	1.00	0.18	0.80	0.56	1.00
v/c Ratio	0.16	0.18	0.77	0.51	0.42	0.09
Control Delay	48.2	0.7	54.9	6.2	17.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	0.7	54.9	6.2	17.7	0.1
LOS	D	A	D	A	B	A
Approach Delay	7.3			18.5	15.2	
Approach LOS	A			B	B	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.77  
 Intersection Signal Delay: 16.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 63.4%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	6	0	21	35	0	10	44	227	51	14	122	4
Future Vol, veh/h	6	0	21	35	0	10	44	227	51	14	122	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	80	-	-	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	92	92	92	84	84	92	92	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	0	25	38	0	11	52	270	55	15	156	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	596	618	159	603	593	298	161	0	0	325	0	0
Stage 1	189	189	-	402	402	-	-	-	-	-	-	-
Stage 2	407	429	-	201	191	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	415	405	886	411	418	741	1418	-	-	1235	-	-
Stage 1	813	744	-	625	600	-	-	-	-	-	-	-
Stage 2	621	584	-	801	742	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	394	385	886	385	398	741	1418	-	-	1235	-	-
Mov Cap-2 Maneuver	394	385	-	385	398	-	-	-	-	-	-	-
Stage 1	783	735	-	602	578	-	-	-	-	-	-	-
Stage 2	589	562	-	769	733	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	14.4	1.1	0.7
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1418	-	-	694	431	1235	-	-
HCM Lane V/C Ratio	0.037	-	-	0.046	0.113	0.012	-	-
HCM Control Delay (s)	7.6	-	-	10.4	14.4	8	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.4	0	-	-

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T		T	T
Traffic Vol, veh/h	31	17	178	65	17	109
Future Vol, veh/h	31	17	178	65	17	109
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	80	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	84	92	92	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	18	212	71	18	140

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	424	248	0	0	283
Stage 1	248	-	-	-	-
Stage 2	176	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	587	791	-	-	1279
Stage 1	793	-	-	-	-
Stage 2	855	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	579	791	-	-	1279
Mov Cap-2 Maneuver	579	-	-	-	-
Stage 1	793	-	-	-	-
Stage 2	843	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.1	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	640	1279
HCM Lane V/C Ratio	-	-	0.082	0.014
HCM Control Delay (s)	-	-	11.1	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0

Timings  
4: Antelope Ridge Dr. & North Carefree

2044 Total Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↕↕↕	↖↖↖	↗		↕	↖	↗
Traffic Volume (vph)	239	1074	1288	115	1	0	257	1
Future Volume (vph)	239	1074	1288	115	1	0	257	1
Turn Type	pm+pt	NA	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2	6			8		4
Permitted Phases	2			6	8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0
Total Split (s)	21.0	64.0	43.0	43.0	36.0	36.0	36.0	36.0
Total Split (%)	21.0%	64.0%	43.0%	43.0%	36.0%	36.0%	36.0%	36.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	63.0	63.0	43.2	43.2		27.0	27.0	27.0
Actuated g/C Ratio	0.63	0.63	0.43	0.43		0.27	0.27	0.27
v/c Ratio	0.83	0.35	0.62	0.19		0.02	0.84	0.59
Control Delay	41.2	9.7	24.8	4.2		25.0	53.3	9.7
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	41.2	9.7	24.8	4.2		25.0	53.3	9.7
LOS	D	A	C	A		C	D	A
Approach Delay		16.3	22.8			25.0		29.2
Approach LOS		B	C			C		C

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 86 (86%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 21.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.8%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

2044 Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	341	838	100	786	154	503	1003	50	78	1367	113
Future Volume (vph)	151	341	838	100	786	154	503	1003	50	78	1367	113
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	9.0		9.0	9.0		9.0	9.0		9.0	9.0	
Total Split (s)	13.0	26.0		16.0	29.0		24.0	68.0		10.0	54.0	
Total Split (%)	10.8%	21.7%		13.3%	24.2%		20.0%	56.7%		8.3%	45.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.5	21.5	120.0	32.9	23.2	120.0	19.2	65.7	120.0	54.8	49.6	120.0
Actuated g/C Ratio	0.25	0.18	1.00	0.27	0.19	1.00	0.16	0.55	1.00	0.46	0.41	1.00
v/c Ratio	0.86	0.38	0.54	0.34	0.82	0.10	0.93	0.53	0.03	0.29	0.95	0.07
Control Delay	73.9	44.9	1.3	34.1	53.8	0.1	75.4	19.2	0.0	14.2	49.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.9	44.9	1.3	34.1	53.8	0.1	75.4	19.2	0.0	14.2	49.5	0.1
LOS	E	D	A	C	D	A	E	B	A	B	D	A
Approach Delay		20.7			44.0			36.7			44.2	
Approach LOS		C			D			D			D	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 36.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 92.4%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↑	↖	↗	↖	
Traffic Vol, veh/h	6	0	54	55	0	12	14	320	19	4	465	4
Future Vol, veh/h	6	0	54	55	0	12	14	320	19	4	465	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	80	-	100	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	94	94	94	94	81	94	94	81	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	0	61	59	0	13	15	395	20	4	574	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1026	1029	576	1040	1011	395	578	0	0	415	0	0
Stage 1	584	584	-	425	425	-	-	-	-	-	-	-
Stage 2	442	445	-	615	586	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	205	217	517	199	224	777	996	-	-	1161	-	-
Stage 1	498	498	-	701	626	-	-	-	-	-	-	-
Stage 2	682	610	-	479	497	-	-	-	-	-	-	-
Platoon blocked, %	1	1		1	1	1		-	-	1	-	-
Mov Cap-1 Maneuver	198	213	517	173	220	777	996	-	-	1161	-	-
Mov Cap-2 Maneuver	198	213	-	173	220	-	-	-	-	-	-	-
Stage 1	491	497	-	690	617	-	-	-	-	-	-	-
Stage 2	660	601	-	421	496	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	14.5		32.4		0.3		0.1	
HCM LOS	B		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	996	-	-	445	201	1161	-	-
HCM Lane V/C Ratio	0.015	-	-	0.153	0.355	0.004	-	-
HCM Control Delay (s)	8.7	-	-	14.5	32.4	8.1	-	-
HCM Lane LOS	A	-	-	B	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	1.5	0	-	-

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↙		↑	↗↘	↘↙	↑
Traffic Vol, veh/h	46	25	318	21	5	427
Future Vol, veh/h	46	25	318	21	5	427
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	150	80	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	64	94	94	52
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	27	497	22	5	821

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1328	497	0	0	519
Stage 1	497	-	-	-	-
Stage 2	831	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	171	573	-	-	1047
Stage 1	611	-	-	-	-
Stage 2	428	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	170	573	-	-	1047
Mov Cap-2 Maneuver	170	-	-	-	-
Stage 1	611	-	-	-	-
Stage 2	426	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.7	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	226	1047
HCM Lane V/C Ratio	-	-	0.334	0.005
HCM Control Delay (s)	-	-	28.7	8.5
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	1.4	0



Timings  
4: Antelope Ridge Dr. & North Carefree

2044 Total Traffic  
PM Peak Hour

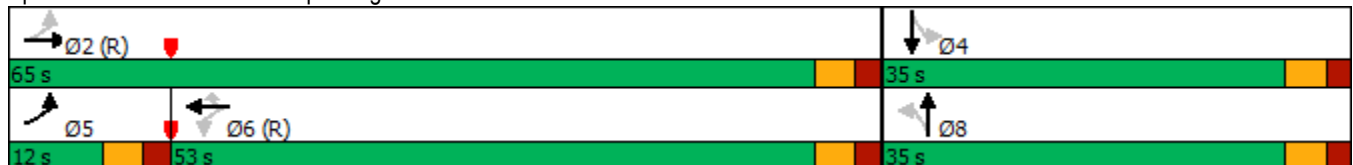


Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↕↕↕	↖↖↖	↗		↕↕	↖	↗
Traffic Volume (vph)	183	984	1180	172	1	0	98	0
Future Volume (vph)	183	984	1180	172	1	0	98	0
Turn Type	pm+pt	NA	NA	Perm	Perm	NA	Perm	NA
Protected Phases	5	2	6			8		4
Permitted Phases	2			6	8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	4.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	15.0	15.0	15.0	10.0	10.0	10.0	10.0
Total Split (s)	12.0	65.0	53.0	53.0	35.0	35.0	35.0	35.0
Total Split (%)	12.0%	65.0%	53.0%	53.0%	35.0%	35.0%	35.0%	35.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	76.4	76.4	61.4	61.4		13.6	13.6	13.6
Actuated g/C Ratio	0.76	0.76	0.61	0.61		0.14	0.14	0.14
v/c Ratio	0.53	0.27	0.40	0.18		0.01	0.61	0.36
Control Delay	8.9	4.0	11.2	2.2		34.0	53.2	5.2
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	8.9	4.0	11.2	2.2		34.0	53.2	5.2
LOS	A	A	B	A		C	D	A
Approach Delay		4.9	10.1			34.0		28.2
Approach LOS		A	B			C		C

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 86 (86%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay: 9.4  
 Intersection Capacity Utilization 60.9%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 4: Antelope Ridge Dr. & North Carefree



Timings  
5: Marksheffel & North Carefree

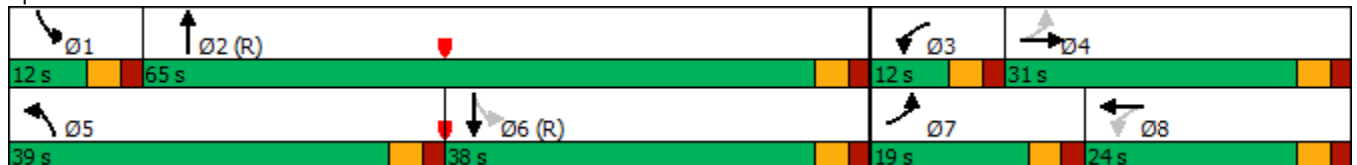
2044 Total Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	588	401	50	419	87	727	1523	75	138	885	207
Future Volume (vph)	93	588	401	50	419	87	727	1523	75	138	885	207
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	19.0	31.0		12.0	24.0		39.0	65.0		12.0	38.0	
Total Split (%)	15.8%	25.8%		10.0%	20.0%		32.5%	54.2%		10.0%	31.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	3.0		5.0	3.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	31.4	22.6	120.0	23.4	16.7	120.0	31.3	65.1	120.0	51.1	43.4	120.0
Actuated g/C Ratio	0.26	0.19	1.00	0.20	0.14	1.00	0.26	0.54	1.00	0.43	0.36	1.00
v/c Ratio	0.40	0.65	0.27	0.30	0.62	0.06	0.85	0.84	0.05	0.70	0.73	0.14
Control Delay	37.7	48.4	0.4	36.0	52.6	0.1	52.2	28.8	0.1	47.8	38.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.7	48.4	0.4	36.0	52.6	0.1	52.2	28.8	0.1	47.8	38.8	0.2
LOS	D	D	A	D	D	A	D	C	A	D	D	A
Approach Delay		29.7			42.8			35.2			33.3	
Approach LOS		C			D			D			C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 34.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 80.3%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 5: Marksheffel & North Carefree



Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↑	↖	↗	↖	
Traffic Vol, veh/h	6	0	21	37	0	8	44	258	54	11	147	4
Future Vol, veh/h	6	0	21	37	0	8	44	258	54	11	147	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	80	-	100	80	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	92	92	92	92	84	92	92	84	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	0	24	40	0	9	48	307	59	12	175	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	638	663	177	616	606	307	179	0	0	366	0	0
Stage 1	201	201	-	403	403	-	-	-	-	-	-	-
Stage 2	437	462	-	213	203	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	427	399	866	445	436	841	1397	-	-	1207	-	-
Stage 1	801	735	-	689	627	-	-	-	-	-	-	-
Stage 2	656	584	-	789	733	-	-	-	-	-	-	-
Platoon blocked, %	1	1		1	1	1		-	-	1	-	-
Mov Cap-1 Maneuver	408	381	866	419	417	841	1397	-	-	1207	-	-
Mov Cap-2 Maneuver	408	381	-	419	417	-	-	-	-	-	-	-
Stage 1	774	728	-	666	606	-	-	-	-	-	-	-
Stage 2	627	564	-	760	726	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	13.8	0.9	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1397	-	-	693	460	1207	-
HCM Lane V/C Ratio	0.034	-	-	0.044	0.106	0.01	-
HCM Control Delay (s)	7.7	-	-	10.4	13.8	8	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.4	0	-

Intersection						
Int Delay, s/veh	1.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑	↑	↑	↑
Traffic Vol, veh/h	31	17	205	67	15	131
Future Vol, veh/h	31	17	205	67	15	131
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	150	80	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	84	92	92	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	18	244	73	16	156

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	432	244	0	0	317	0
Stage 1	244	-	-	-	-	-
Stage 2	188	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	581	795	-	-	1243	-
Stage 1	797	-	-	-	-	-
Stage 2	844	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	573	795	-	-	1243	-
Mov Cap-2 Maneuver	573	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	636	1243
HCM Lane V/C Ratio	-	-	0.082	0.013
HCM Control Delay (s)	-	-	11.2	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0

# Queuing Reports

---



## Queuing and Blocking Report

### Intersection: 4: Antelope Ridge Dr. & North Carefree

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	L	T	T	LT	T	T	R	L	TR
Maximum Queue (ft)	153	89	133	42	65	70	38	137	106
Average Queue (ft)	106	45	81	23	28	23	14	91	68
95th Queue (ft)	183	104	143	63	81	76	47	145	114
Link Distance (ft)		355	355	256	256	256			499
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	345						155	150	
Storage Blk Time (%)								1	0
Queuing Penalty (veh)								4	0

### Intersection: 24: Antelope Ridge Dr. & S. Pronghorn Meadow Cir/Mardale Ln

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	49	44	22	6
Average Queue (ft)	27	28	4	1
95th Queue (ft)	57	54	25	11
Link Distance (ft)	154	288		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			80	80
Storage Blk Time (%)				
Queuing Penalty (veh)				

### Zone Summary

Zone wide Queuing Penalty: 4

## Queuing and Blocking Report

### Intersection: 4: Antelope Ridge Dr. & North Carefree

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	LT	T	T	R	LTR	L	TR
Maximum Queue (ft)	122	35	69	48	50	69	38	3	70	49
Average Queue (ft)	87	9	28	16	20	32	17	1	37	33
95th Queue (ft)	140	39	77	59	65	88	47	5	77	53
Link Distance (ft)		355	355	256	256	256		140		499
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	345						155		150	
Storage Blk Time (%)										
Queuing Penalty (veh)										

### Intersection: 24: Antelope Ridge Dr. & S. Pronghorn Meadow Cir/Mardale Ln

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	34	44	12	17
Average Queue (ft)	17	31	2	3
95th Queue (ft)	44	51	16	18
Link Distance (ft)	154	288		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			80	80
Storage Blk Time (%)				
Queuing Penalty (veh)				

### Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 4: Antelope Ridge Dr. & North Carefree

Movement	EB	EB	EB	EB	B20	WB	WB	WB	WB	SB	SB
Directions Served	L	T	T	TR	T	LT	T	T	R	L	TR
Maximum Queue (ft)	202	154	131	298	4	346	352	389	103	280	129
Average Queue (ft)	97	58	31	151	0	135	156	159	30	157	59
95th Queue (ft)	168	115	87	270	3	310	333	336	72	252	97
Link Distance (ft)		355	355	355	652	930	930	930	930		503
Upstream Blk Time (%)				0							
Queuing Penalty (veh)				0							
Storage Bay Dist (ft)	350									330	
Storage Blk Time (%)										0	
Queuing Penalty (veh)										0	

Intersection: 24: Antelope Ridge Dr. & S. Pronghorn Meadow Cir/Mardale Ln

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	58	64	35	23
Average Queue (ft)	30	26	7	1
95th Queue (ft)	52	50	29	8
Link Distance (ft)	156	285		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			80	80
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0
------------------------------



Intersection: 4: Antelope Ridge Dr. & North Carefree

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	L	T	T	TR	LT	T	T	R	L	TR
Maximum Queue (ft)	189	124	94	145	203	215	236	79	168	59
Average Queue (ft)	71	50	24	48	68	79	88	27	75	35
95th Queue (ft)	134	106	71	113	172	188	198	64	130	54
Link Distance (ft)		355	355	355	930	930	930	930		503
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	350				330					
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 24: Antelope Ridge Dr. & S. Pronghorn Meadow Cir/Mardale Ln

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	36	46	35	30
Average Queue (ft)	19	20	5	4
95th Queue (ft)	43	40	25	21
Link Distance (ft)	156	285		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			80	80
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0
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# Crash History

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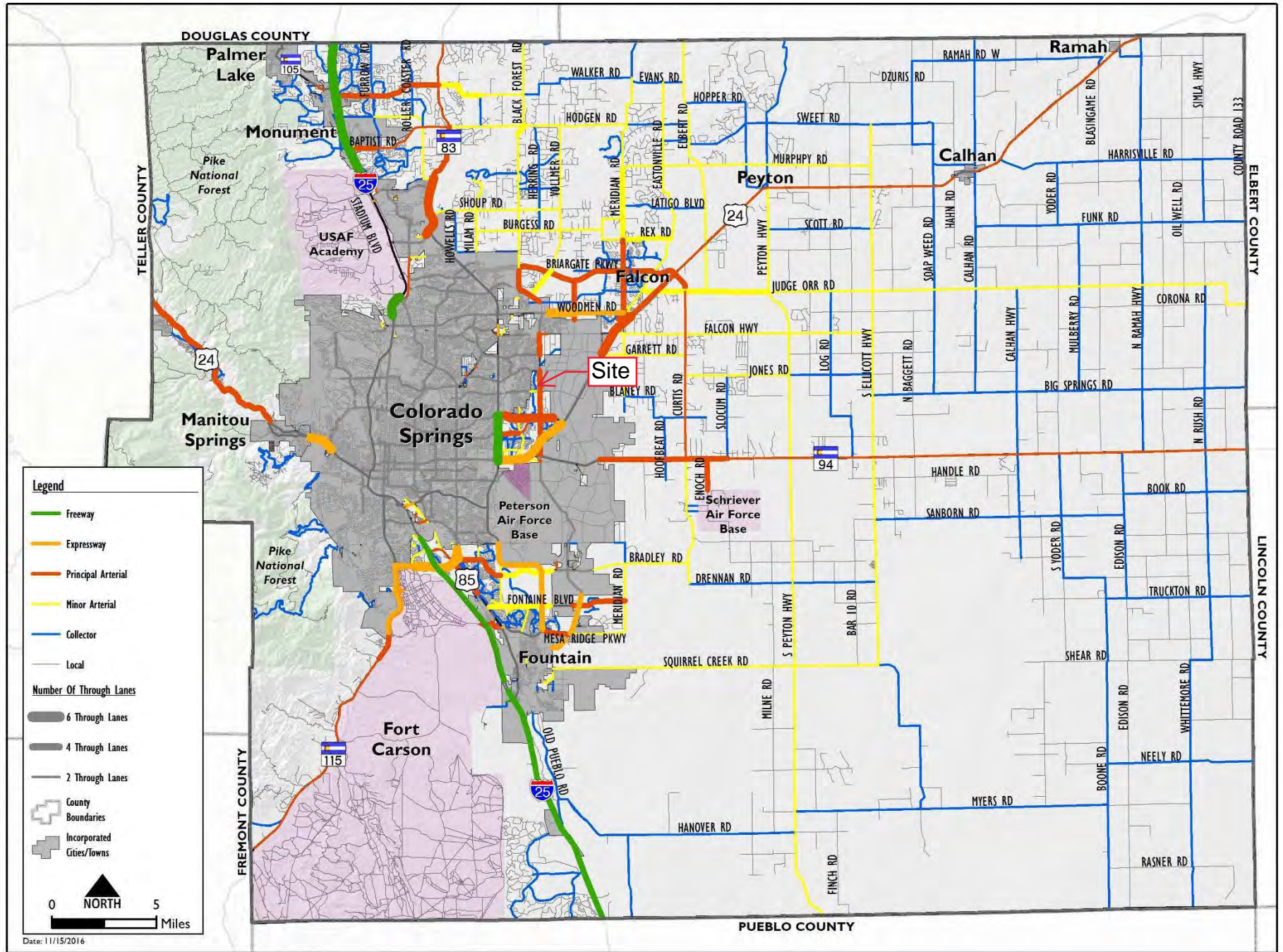
Accident Date	Reference Point Name	Reference Point At Name	Accident Narrative
2022-05-06	ANTELOPE RIDGE DR	PRONGHORN MEADOWS CIR	<p>Vehicle #1 was travelling southbound on Antelope Ridge Dr, just south of Pronghorn Meadows Cir. Vehicle #1 drove off the left side of the road and collided its front with a temporary construction fence. Vehicle #1 drove through the dirt lot under construction for approximately 525 feet before colliding its front with another temporary construction fence. Vehicle #1 then collided its front with a ditch, causing Vehicle #1 to go airborne across the westbound lanes of N. Carefree Cir. Vehicle #1 landed in the rock filled median on N Carefree Cir, drove across the eastbound lanes, and collided its front with the raised curb. Vehicle #1 came to rest on its wheels facing southeast off the right side of the road.</p>
2022-11-05	ANTELOPE RIDGE DR	PRONGHORN MEADOWS CIR	<p>Vehicle #1 was eastbound on Pronghorn Meadows Cir proceeding from a stop sign. Vehicle #2 was southbound on Antelope Ridge. The front of vehicle #1 collided with the right side of vehicle #2. Vehicles were moved prior to investigation.</p>

Accident Date	Reference Point Name	Reference Point At Name	Accident Narrative
2020-12-13	ANTELOPE RIDGE DR	N CAREFREE CIR	Vehicle #1 was traveling westbound on N Carefree Cir near Antelope Ridge Dr. Vehicle #1 lost control and went off the right side of the roadway and struck a concrete fence. Vehicle #1 backed out of the fence and got back onto the roadway. Vehicle #1 came to rest in the left lane of N Carefree Cir.

# MTCP Maps

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Map 14: 2040 Roadway Plan (Classification and Lanes)





# Additional Attachments

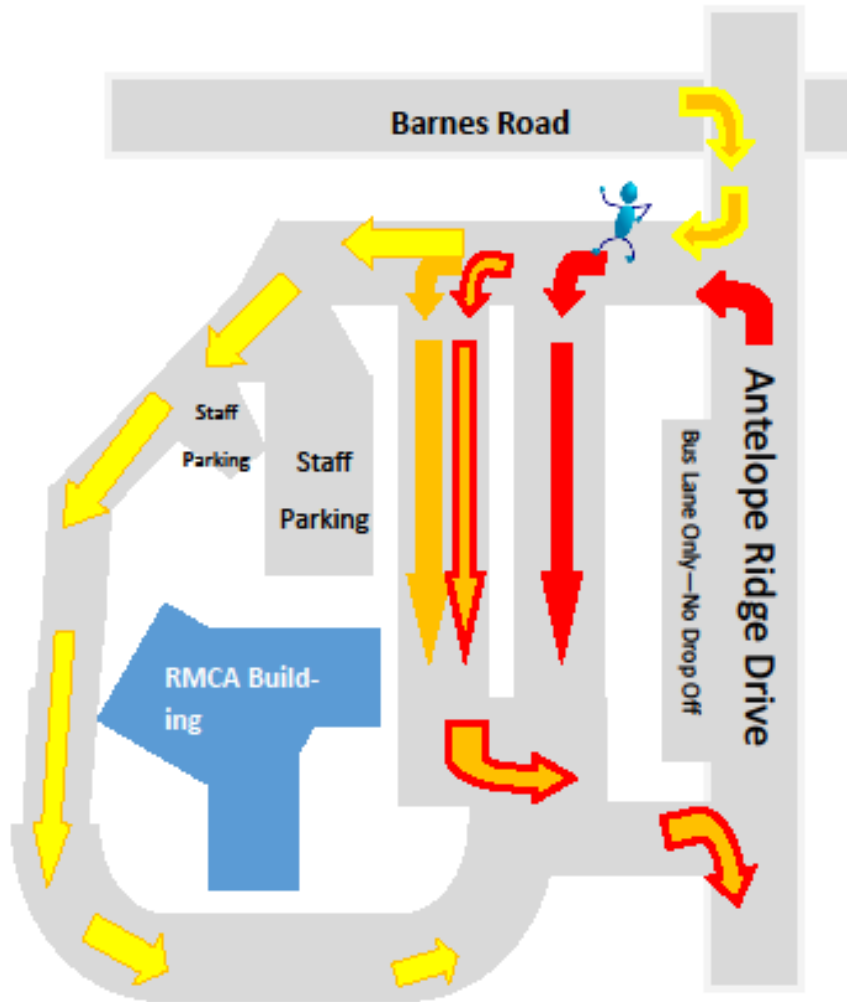
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Rocky Mountain Classical Academy Carpool Plan and key pages from the Parent-Student Handbook





**Morning Carpool Drop**—Doors open at 7:30am Classes start at 8:00am



- PRE-SCHOOL**
- If Preschooler has a K-8 sibling drop off between 7:45 and 8am (K-8 students come in with pre-school and continue to appropriate locations)
  - Preschool without K-8 sibling drop off between 8 and 8:15 am
  - Must come in from the north Barnes entrance

\*Starting at 7:30, staff will open access to the parking lot for student drop-off.

\*Staff will direct you to the lane for entry. Stay in the lane to which you are you directed.

**\*NEVER CROSS OR CHANGE LANES WHEN ENTERING AND/OR EXITING CAR POOL.**

**\*NEVER DROP STUDENTS OFF IN BUS LANE**

**No cell phone use during carpool**

**\*RIGHT TURN ONLY TO EXIT** after drop-off.

\*Never park in a drop off lane and exit your car      \*Do not threaten RMCA staff , other drivers or students.

\*The City of Colorado Springs & El Paso County Sherriff's Department have approved this traffic plan. Keep our students, faculty, and yourself safe by following all procedures.

**Violating any of the carpool rules creates serious safety hazards and drivers who do not comply may have their carpool privileges revoked by administration. These drivers would need to make other arrangements for drop-off.**

**Be Good to Our Neighbors!**

Please note that Antelope Ridge to our east, and Falcon Ridge to our west are **PRIVATE PROPERTIES!** Do not drive though, park in, or walk through these properties. You will be ticketed or towed.

Our neighbors to the south in Whispering Pines need access to their driveways and streets. We ask that you do not park in front of their homes, block driveways or roadways

if you do not live in the neighborhood and walk to school, please use carpool

## Afterschool Carpool Pick-Up

K-4 dismisses at 3:00 pm

Pre-K 3:15 pm,

5th-8th dismiss at 3:30 pm

Parents of 5th-8th & Pre-K grade: Wait until 3:30pm to enter the line. If you arrive before elementary carpool is complete, you will be asked to leave the parking lot and return to the end of the line



\* If you have a K-4 grade student with a Pre-K sibling, the K-4 student will wait in the Pre-K waiters room from 3 to 3:30, then when called will go out through the gate from Kindie gate. This will mean parents 2 stops in close proximity in the fire lane.

- Display your carpool numbers on the front dashboard of your car.
- K-4 dismiss at 3:00 pm. Older siblings go the youngest sibling's carpool line.
- If you have children in both K-4 and 5-8, the K-4 younger siblings will to their waiters room until the 5th-8th grade sibling picks them up after the 5th-8th grade dismissal at 3:30 pm.
- All siblings go to the youngest 5th-8th grade student's carpool line.

Enter the parking lot from the designated direction as display on the map. In 30 minutes, we safely move and average of 765 cars every day, providing pickup for 1,200 students. Traffic safety is a serious matter, we need YOUR help to ensure the safety of our children's lives.

- Once your children load into your car, wait for Staff to direct you to pull forward. Do not pull around any cars. RMCA reserves the legal right to deny violators the privilege of carpool.
- Only RIGHT TURNS are permitted to exit the parking lot during carpool and only RIGHT TURNS are accepted by the City of Colorado and El Paso Sheriff Department's approved traffic plan.

**ONLY STAFF** may access the building through the staff doors before and during school. All others must enter through the front entrance near the flagpole for safety purposes.



# Parent-Student Handbook

2020 - 2021

Last Update 08-02-19  
RMCA Board of Directors

## SCHOOL CONTACT INFORMATION

Pre-K-8 CAMPUS  
4620 Antelope Ridge  
Colorado Springs, CO 80922

PHONE: 719-622-8000  
FAX: 719-622-8004

OFFICE HOURS:  
Monday – Friday 7:30am – 4:00pm

SCHOOL HOURS:  
Full-day kindergarten, first thru fourth grade:  
Monday-Friday from 8:00am – 3:00pm

Fifth thru eighth grade:  
Monday-Friday from 8:00am – 3:30pm

### Homeschool Program Kindergarten – High School

“HOMESCHOOL CAMPUS”  
RMCA Home School Program  
3525 Akers Drive, Suite 100  
Colorado Springs, CO 80922

PHONE: 719-591-5666  
FAX: 719-591-5777

SCHOOL HOURS:  
Monday-Friday from 8:00am – 3:00pm

OFFICE HOURS:  
Monday-Friday from 8:00am – 4:00pm

Website: [www.rmcaacs.org](http://www.rmcaacs.org)

Email: [info@rmcaacs.org](mailto:info@rmcaacs.org)

following link to D49's website: <http://www.d49.org/sf/feeforservicebus/Pages/default.aspx>.

## Carpool and Traffic Safety

### Elementary (K-5)

Upon enrollment, you will be given a carpool number. Please display in a visible location on your dashboard during carpool pickup. If you lose your carpool display number, you may obtain another from the front office at your child's campus.

### Carpool Procedures (See Appendix C for carpool maps)

RMCA operates two carpools each day, one for morning drop off, and one for afternoon pickup. Our City of Colorado Springs, El Paso County Sheriff's Department, and District Security Resource Officers have approved our traffic plan. Please follow all procedures, because doing so ensures the safest possible movement of over 2,200 people and 860 cars in both daily carpools. **Our traffic flows best when we release blocks of up to ten cars per line.** This sometimes causes short personal delays, but it makes overall carpool time shrink.

Many of the streets off of Antelope Ridge Drive are not public or city streets. Do not park in our bordering neighborhoods and wait for students. Doing so violates privately owned communities, prevents our neighbors from safely navigating to and from home, and potentially disrupts emergency services. Please support RMCA in this process as we strive to be good neighbors.

Violating any of the carpool rules creates serious safety hazards and drivers who do not comply may have their carpool privileges revoked. These drivers will need to make other arrangements for the drop off and pick up of their child.

RMCA operates a staff parking lot. Staff cars have been designated staff parking stickers. Cars not displaying a staff parking sticker and parked in the staff lot may be towed at the vehicle owners expense. Except for AM/PM Kindergarten pick up, please do not park in the carpool lane closest to the school during the school day. This creates a safety hazard for the school. Please utilize the visitor parking at all times.

### Morning Carpool Procedures

Starting at 7:30am, staff will open access to the parking lot for student drop-off. Staff will direct you into a lane for entry. Stay in the lane you are directed into.

- Never cross over or change lanes when entering and/or exiting carpool.

- Never drop off students in the bus lane.
- Right turns onto Antelope Ridge only to exit after drop-off.
- No cell phone use.
- Never park in a drop off lane and exit your car.
- Do not engage in conflict with staff or fellow drivers.
- If there is a carpool violation, please refer that to the school administration

### Afternoon Carpool Procedures

Only PreK-5<sup>th</sup> grade students have carpool numbers. Display these on the front dashboard of your car. Kindergarten through 4<sup>th</sup> grades dismiss at 3:00pm. Older siblings go to youngest sibling’s carpool line. If you have children in both K-4<sup>th</sup> and 5<sup>th</sup>-8<sup>th</sup>, the K-4<sup>th</sup> younger siblings will wait inside for the 5<sup>th</sup>-8<sup>th</sup> grade sibling to pick them up after the 5<sup>th</sup>-8<sup>th</sup> sibling dismisses at 3:30 pm. All siblings then go to the youngest 5<sup>th</sup>-8<sup>th</sup> grade student’s line.

Enter the parking lot from the designated direction as displayed on the map you receive during the enrollment process.

Kindergarten and 5<sup>th</sup> use the “yellow” lane that goes behind the school.

1<sup>st</sup> and 8<sup>th</sup> graders use the “purple” lane closest to the building.

2<sup>nd</sup> and 7<sup>th</sup> graders use the “green” middle lane in front of the building.

3<sup>rd</sup>, 4<sup>th</sup> and 6<sup>th</sup> graders use the “blue” lane closest to the street. Once your children load into your car, wait for Staff to direct you to pull forward. Do not pull around any cars.

RMCA reserves the legal right to deny violators the privilege of carpool.

Only RIGHT TURNS are permitted to exit the parking lot during carpool and right turns only are accepted by the City of Colorado Springs and El Paso Sheriff Department’s approved traffic plan.

Parents of 5<sup>th</sup>-8<sup>th</sup> graders: Wait until at least 3:15pm to enter the line. If you arrive before elementary carpool is complete, you will be directed to leave the parking lot and return to the end of the line. This allows elementary parents arriving at the end of elementary carpool to pick up their children without disrupting middle school traffic.

### Walkers

#### K-8 Campus

Your student may not walk home without prior, written notification from a parent or guardian on the family dismissal plan.

### Someone Else Picking Up Your

#### Student(s)

# Appendix A - Sight Distance on Urban Local

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## Appendix A

### Sight Distance on Urban Local/Residential Streets with homes fronting

Section 2.3.6.G of the *El Paso County Engineering Criteria Manual* states:

This section applies to intersections where one public road meets a second public road. The intersection sight distance provides for vehicles to enter traffic and accelerate to the average running speed.

However, for local residential streets, the intent is different from Collector or Arterial roadways and ensuring that motorists traveling along a residential/local street can maintain an “average running speed,” should **not** be an objective, but should actually be discouraged.

*The 2018 Roadway Design Guide* published by the Colorado Department of Transportation and *A Policy on Geometric Design of Highways and Streets* (“green book”) published by the American Association of Highway and Transportation Officials (AASHTO) both identify that need for different design standards for local roads. See the clips from key pages from both reports below. Both reports give the same criteria for stopping sight distance and both state that passing sight distance is rarely applicable. Neither report provides criteria for “entering” (or “intersection”) sight distance and it is our position that entering sight distance is also not applicable to local urban/residential streets.





## 5.2 LOCAL URBAN STREETS

### 5.2.4 Sight Distance

Minimum **stopping sight distance** for local streets should range from 115 to 200 feet depending on the design speed (see Table 3-1). Design for passing sight distance seldom is applicable on local streets.

## 5.2 LOCAL URBAN STREETS

### 5.2.1 General Design Considerations

The design criteria presented in other chapters of this Guide are **most applicable to rural and high speed roadways**. This section attempts to identify **lower design criteria applicable to the lesser functional classes of urban streets that operate at lower speeds**.

An urban street **is characterized by** restricted right of way, stop-and-go traffic, residential, commercial and industrial traffic, pedestrian and bus traffic, bikeways and the special demands and needs these conditions generate. An urban street includes the entire area within the right of way and usually is the product of a comprehensive community development plan. The design values should be those for the ultimately planned development. Typical types of improvements through the urban program include:

# From the AASHTO “Green Book”

## 5.3 LOCAL STREETS IN URBAN AREAS

This section presents guidance on the design of local streets in urban areas. Local streets in urban areas are designed with a flexible approach to meet the needs of the suburban, urban, and urban core contexts. Local streets generally have lower traffic volumes than collectors and

an Association of State Highway and Transportation Officials  
Markit under license with AASHTO  
or networking permitted without license from IHS  
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arterials and lower speeds are appropriate because the emphasis is on serving the adjacent developments. A flexible and balanced design approach to serve all transportation modes appropriately should be applied. The balance among transportation modes may differ between projects based on the demand flows for each transportation mode and established neighborhood plans. The design guidance given below should be adapted to the context and needs of each individual neighborhood and street.

### 5.3.1 General Design Considerations

Local streets in urban areas fall within three functional classifications: arterials, collectors, and local access routes, which are discussed in Chapter 1. Geometric design guidance is provided for collector streets in Chapter 6 and for arterial streets in Chapter 7. This chapter does not present a complete discussion of all design criteria that apply to local streets. However, where there are substantial differences from the criteria used in design of other functional classes, specific design guidance is given below.

#### 5.3.1.8 Sight Distance

Minimum stopping sight distance for local streets should range from 100 to 200 ft [30 to 60 m] depending on the design speed (see Table 3-1). Design for passing sight distance seldom is applicable on local streets.