SOUTHWEST TRAFFIC ENGINEERING, LLC

TRAFFIC IMPACT STATEMENT

SILVERHAWKE BLOCK 5

KAI DRIVE/FIRST AVENUE

REVISED 14 SEPTEMBER 2020
1 JUNE 2020

PREPARED FOR
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REVISED TRAFFIC IMPACT STATEMENT
SILVERHAWKE BLOCK 5
KAI DRIVE/FIRST AVENUE

Project Description

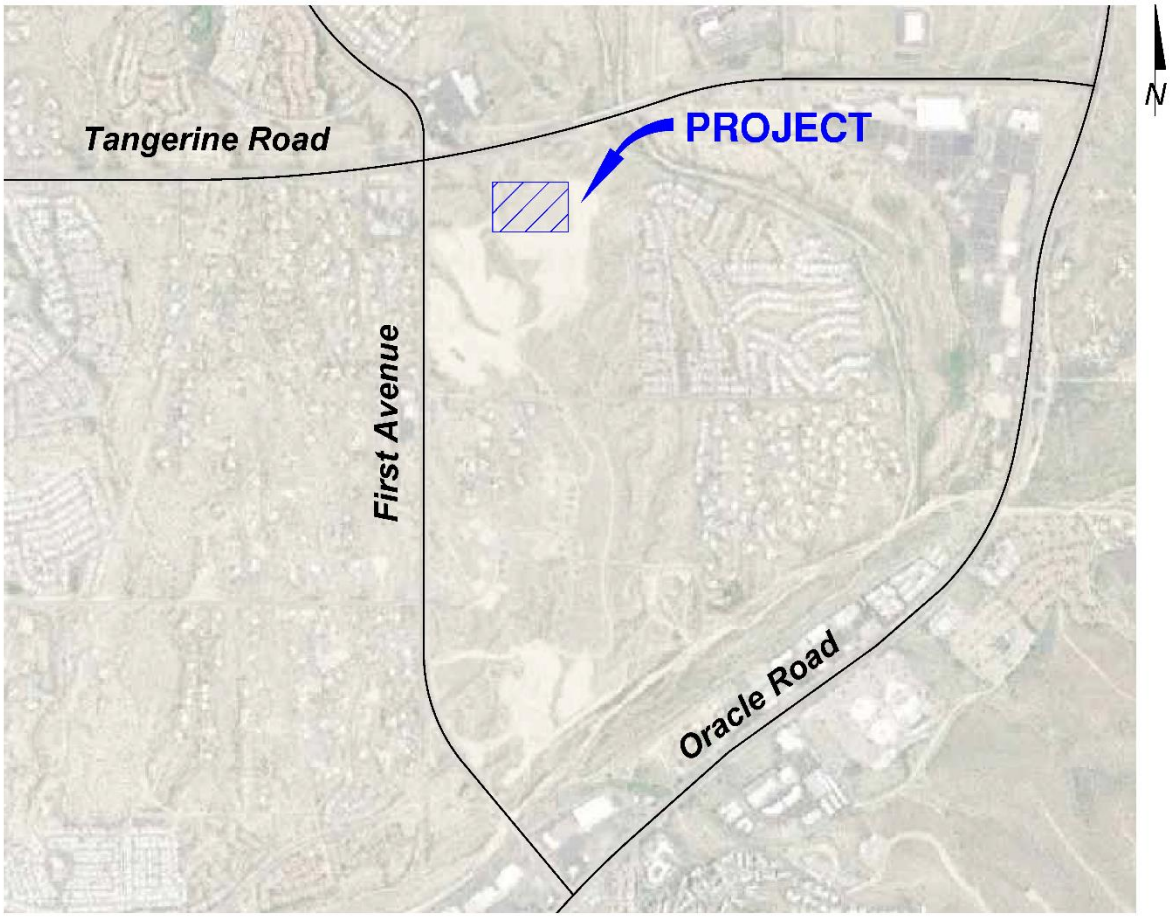
With the development of the Villages at Silverhawke project underway, the Capri Company, LLC now intends to begin constructing the Silverhawke Block 5 portion of the project located on the east side of Kai Drive, east of First Avenue in Oro Valley, Arizona. The site is located as shown in **Figure 1**. There are currently five possible scenarios for this project site: apartments, casitas (similar to apartments), senior care, townhomes, and single-family residential. For the purposes of this report, the apartment concept was analyzed, as it is anticipated to be the highest trip generator from the proposed scenarios. The apartment option will consist of a proposed 167-unit apartment land use, as shown in **Figure 2**. The future site will be served by two proposed access points.

This site was previously analyzed as part of the approved *The Villages at Silverhawke Traffic Impact Analysis* (Original TIA) dated 28 November 2017 and completed by **S**outh**w**est **T**raffic **E**ngineering, LLC (**SWTE)**. The Original TIA analyzed the entire Villages at Silverhawke development with four separate phases, as depicted in **Figure 3**. Phases 1, 2, and 3 of the Villages at Silverhawke development are currently under construction. The Silverhawke Block 5 project is part of Phase 4 of the total development plan. The Original TIA analyzed Phase 4 as office space and shopping center, while the current development plan is proposing various possible residential uses and shopping center.

The purpose of this traffic impact statement is to:

- Identify the possible impacts of the site on the immediate area.
- Estimate the traffic generation associated with the project and assign that traffic to the existing roadway network.
- Compare the estimated the traffic generation associated with the proposed project to the trip generation from the Original TIA.
- Conduct a preliminary sight distance analysis at the proposed intersection of Kai Drive/Tangerine Road.
- Conduct a traffic signal warrant analysis at the intersection of Kai Drive/First Avenue based on two scenarios: one with an assumed access to Tangerine Road and one with no access to Tangerine Road.

Figure 1 – Vicinity Map



LEGEND:

= Existing Road

= Project Site

Plan Summary

1. Property Area: 13.44 Ac.
2. APN: 140-44-0040
3. Existing Zoning: C-1 Commercial
4. Proposed Zoning: R-6 Residential
5. Proposed Land Use: Multifamily Residential
6. Proposed Units: 167
7. Proposed Building Height: 2-Story / 25 ft.
8. Min. Distance Between 2-Story Structures: 20 ft.
9. Proposed Open Space: 35%
10. Proposed Rec. Area: 250 sq. ft. per Unit as specified in OVZCR Sec. 23.7.E.3.
11. Adjacent Villages Bufferyards Count Toward Onsite Bufferyard Requirement

A Trail Easement will be Provided Along the Northern Edge of the Property, Either within a Landsape Bufferyard or within the Pima County Land

20' Min. Building Setback
10' Min. Landscape Bufferyard 'A'

Subject Property Boundary

Trail Connection to Town Property

Proposed Connection to Tangerine Rd.

Emergency Access & Pedestrian Gate

Sidewalk to be Provided Along Kai Dr. to Tangerine Rd.

KAI DR.

Main Entrance including Sidewalk Connection to Kai Dr.

Pedestrian Crossing to be Provided Across Kai Dr. Location to be Coordinated with Town Engineering Staff

30' Min. Building Setback
35' Landscape Bufferyard 'A'
Between Parking & Kai Dr.

Block 4
C-1 Commercial

Connection to 1st Ave.

Gate

Gate

2-Story

2-Story

2-Story

2-Story

2-Story

2-Story

2-Story

2-Story

2-Story

Pool/Spa

Clubhouse

Rec. Area

20' Min. Building Setback
15' Landscape Bufferyard 'B'
(See Note #11)

20' Min. Building Setback
15' Landscape Bufferyard 'B'
(See Note #11)

Villages at Silverhawke
Ph. 3 Subdivision
(Under Construction)

Detention Basin

8/13/20

0'

100'

N

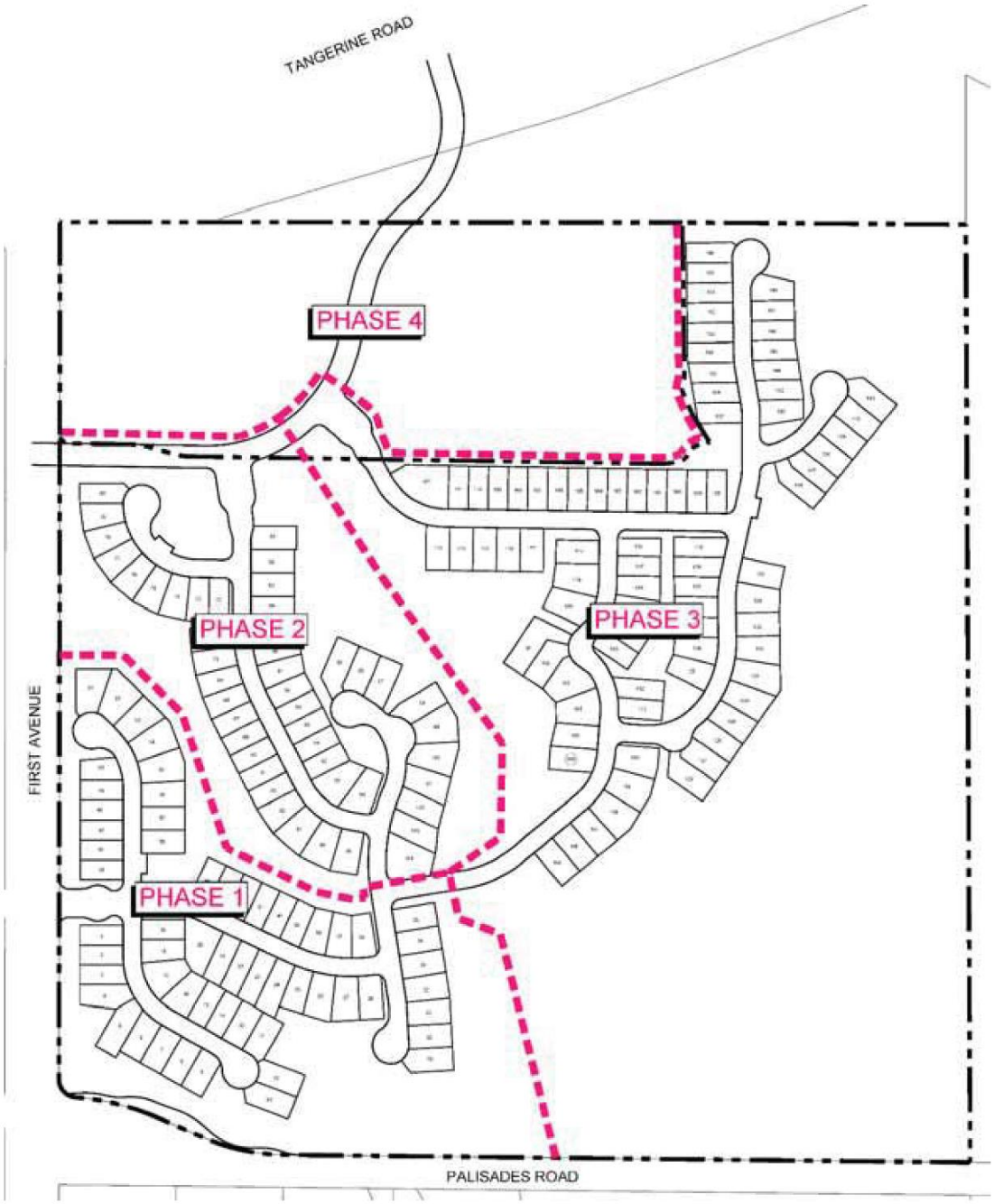
19ada02

PARADIGM LAND DESIGN LLC

Exhibit III-C-2a
Tentative Development Plan 'A' (Apartments)

"G:\Projects\19ad Silverhawke\a02 Commercial\0230\Site Analysis\Exhibits\Exh III-C-2a TDP Concept A Apts.dwg"

Figure 3 – Overall Villages at Silverhawke Development Site Plan



Study Methodology

In order to analyze and evaluate the potential traffic impacts of the proposed development, the following tasks were undertaken:

- Field observation of the proposed site and surrounding area was conducted to conduct a preliminary sight distance review and evaluate the existing physical and operational characteristics of the adjacent roadway network.
- Site traffic volumes generated by the proposed site and the entire Villages at Silverhawke development were calculated using the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition,* 2017.
- Calculated site traffic was distributed based on existing traffic patterns and assigned to the primary roadways within the project study limits.
- Traffic signal warrant analyses were completed at the intersection of Kai Drive/First Avenue based on two scenarios: one with an assumed access to Tangerine Road and one with no access to Tangerine Road.
- Preliminary sight distance analysis at the intersection of Kai Drive/Tangerine Road was completed based on Town of Oro Valley standards.

Existing Conditions

The Silverhawke Block 5 project is located on an undeveloped parcel of land on the east side of Kai Drive, approximately 860 feet east of First Avenue and 280 feet south of Tangerine Road.

Tangerine Road is an east/west aligned roadway that offers two through lanes in each direction separated by a raised median. The posted speed limit of the roadway is 45 miles per hour (mph).

First Avenue is a north/south aligned roadway that provides two through lanes for each direction of travel, separated by a raised median. This roadway offers access to Tangerine Road to the north of the project site and Oracle Road to the south. The posted speed limit on First Avenue is 45 mph.

Kai Drive is a three-lane roadway that 'dead-ends' approximately 600 feet east of First Avenue. This roadway provides one through lane in each direction separated by a two-way center left turn lane. Kai Drive aligns with Oro Valley Retail Center Driveway located on the west side of First Avenue.

Strada Patania is a two-lane roadway that serves residential land uses to the east and west of First Avenue. This roadway has a posted speed limit of 25 mph.

The intersection of Kai Drive/First Avenue is a four-leg, un-signalized intersection. The eastbound and westbound approaches to this intersection make use of a shared left

turn/through lane and an exclusive right turn lane. Northbound vehicles are offered an exclusive left turn lane, two through lanes, and an exclusive right turn lane. Southbound traffic is provided with an exclusive left turn lane, one through lane, and a shared through/right turn lane. Eastbound and westbound vehicles are STOP controlled while traffic is free flow on First Avenue.

The intersection of Strada Patania/First Avenue is a four-leg, unsignalized intersection. Eastbound vehicles are provided with a shared left turn/through/right turn lane, while westbound traffic is offered a shared left turn/through lane and an exclusive right turn lane. The northbound and southbound approaches to the intersection make use of an exclusive left turn lane, one through lane, and a shared through/right turn lane. Eastbound and westbound vehicles are STOP controlled.

Figure 4 shows the existing lane configurations and traffic control at the intersection of Kai Drive/First Avenue: the intersection for which the Town of Oro Valley has requested a traffic signal warrant analysis be completed.

Access

Overall Villages at Silverhawke Development

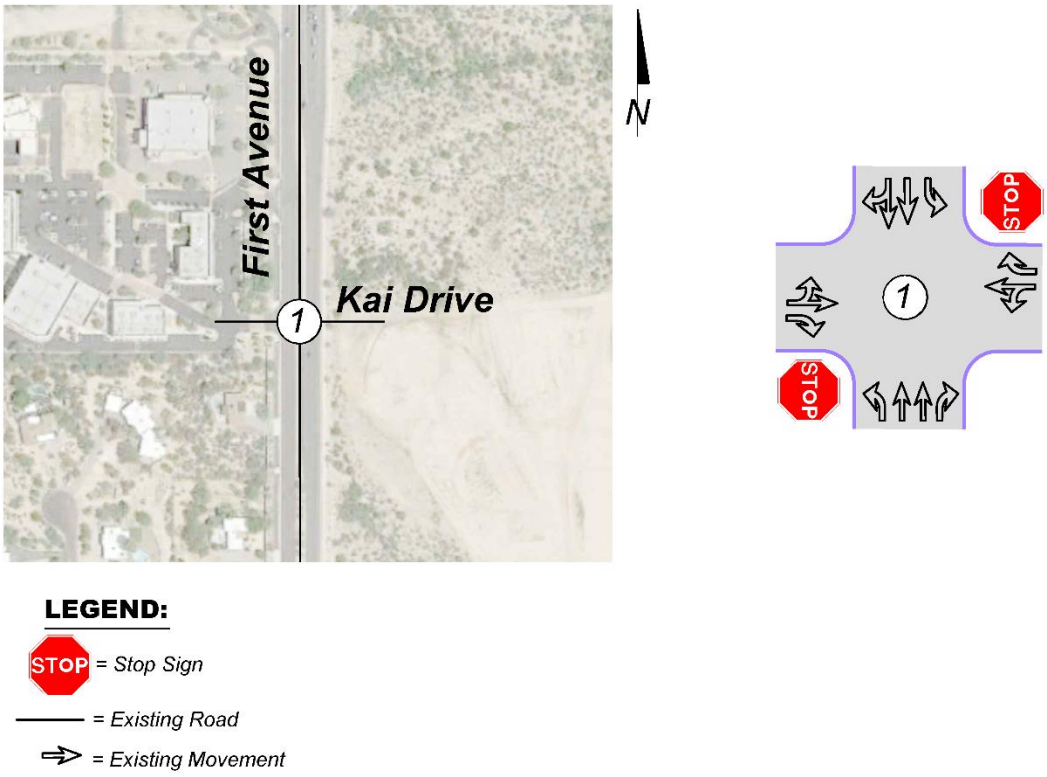
Phases 1, 2 and 3 of the entire Villages at Silverhawke development are currently under construction and were assumed to completed by 2021 for the purposes of this analysis. Two intersections, Kai Drive/First Avenue and Strada Patania/First Avenue are expected to provide primary access to this portion of the development.

Phase 4 of the Silverhawke development is expected to consist of 59,588 square feet of commercial space and Silverhawke Block 5 (167 apartment units).

Kai Drive is expected to be completed as part of Phase 4. Currently, Kai Drive extends east from First Avenue for approximately 600 feet. When completed, this roadway will then curve to the north and connect to Tangerine Road, forming the three-leg un-signalized intersection of Kai Drive/Tangerine Road approximately 865 feet east of First Avenue. This intersection is planned to provide ¾ access (left-in, right-in, and right-out only). However, for a conservative analysis, as access to Tangerine Road may not be permitted, this report includes two different access scenarios for Phase 4: one with access to Tangerine Road and one without access to Tangerine Road.

West Driveway is also expected to be constructed as part of Phase 4. This driveway will be located on the east side of First Avenue, approximately 440 feet south of Tangerine Road. West Driveway will provide right-in/right-out only access to the commercial portion of Phase 4.

Figure 4 – Existing Lane Configurations and Traffic Control



Silverhawke Block 5

The Silverhawke Block 5 apartment site option will be served by two gated access points, Main Access and an emergency access. Main Access will be located on the east side of Kai Drive, approximately 575 feet south of Tangerine Road. This access point will offer full access to the site. An emergency access will be located approximately 200 feet north of Main Access and will provide emergency vehicle access only.

Westbound vehicles exiting the site at the intersection of Main Access/Kai Drive will be offered a shared left/right turn lane. Northbound traffic will make use of a shared through/right turn lane. The southbound approach to the intersection will be provided with a two-way center left turn lane and one through lane.

Existing Traffic Data

In order to form a basis for analysis of the project impacts, traffic counts from the Original TIA were utilized. These counts were used due to the recent impacts from the COVID-19 pandemic, which has caused many non-essential businesses to close or employees have been asked to work from home. People are also being asked to adhere to social distancing guidelines from the federal government. These restrictions have led to a reduction in vehicle trips on the roadway system.

The weekday turning movement counts from the Original TIA were conducted from 7:00 AM to 9:00 AM and 2:30 PM to 6:00 PM in October 2016.

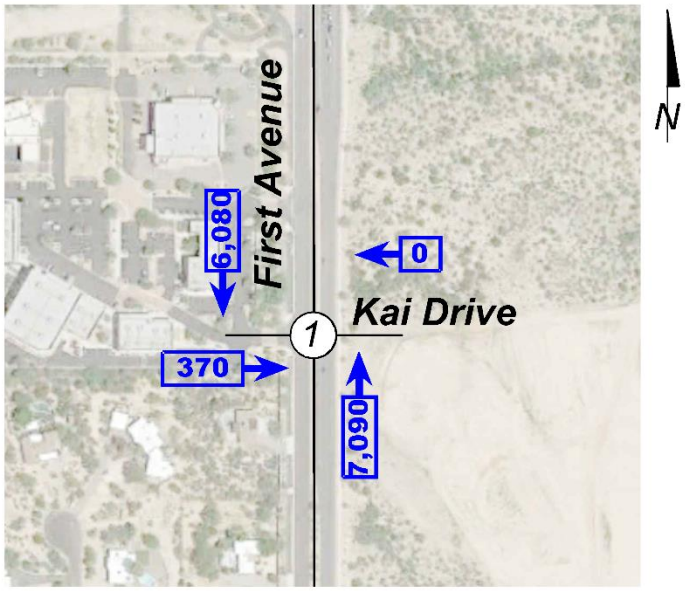
While the Original TIA included traffic counts at several intersections in the project area, in order to complete traffic signal warrant analyses at the intersection of Kai Drive/First Avenue, only traffic counts from this intersection were utilized. Daily traffic volumes at the intersection of Kai Drive/First Avenue were estimated based on the assumption that peak hour volumes account for approximately 10% of daily traffic volumes.

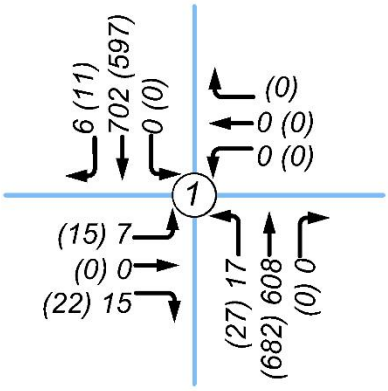
It should be noted that at the time these counts were taken, the east leg at the intersection of Kai Drive/First Avenue had not yet been constructed. For the purposes of this analysis, it was assumed that minimal traffic currently utilizes this newly built east leg, as the first phases of the Villages at Silverhawke development are still being constructed.

The 2016 weekday daily and AM/PM peak hour traffic volumes at Kai Drive/First Avenue are shown in **Figure 5**. Complete traffic count data can be found in the Appendix.

ADOT historical traffic data near the project site show increasing and decreasing traffic volumes in recent years. Using a conservative 2% annual compounded growth rate, existing (2020) weekday peak hour traffic volumes at the intersection of Kai Drive/First Avenue were estimated in order to analyze the current intersection operations. **Figure 6** shows the existing (2020) weekday daily and AM/PM peak hour traffic volumes at the intersection of Kai Drive/First Avenue.

Figure 5 – 2016 Weekday Peak Hour Traffic Volumes

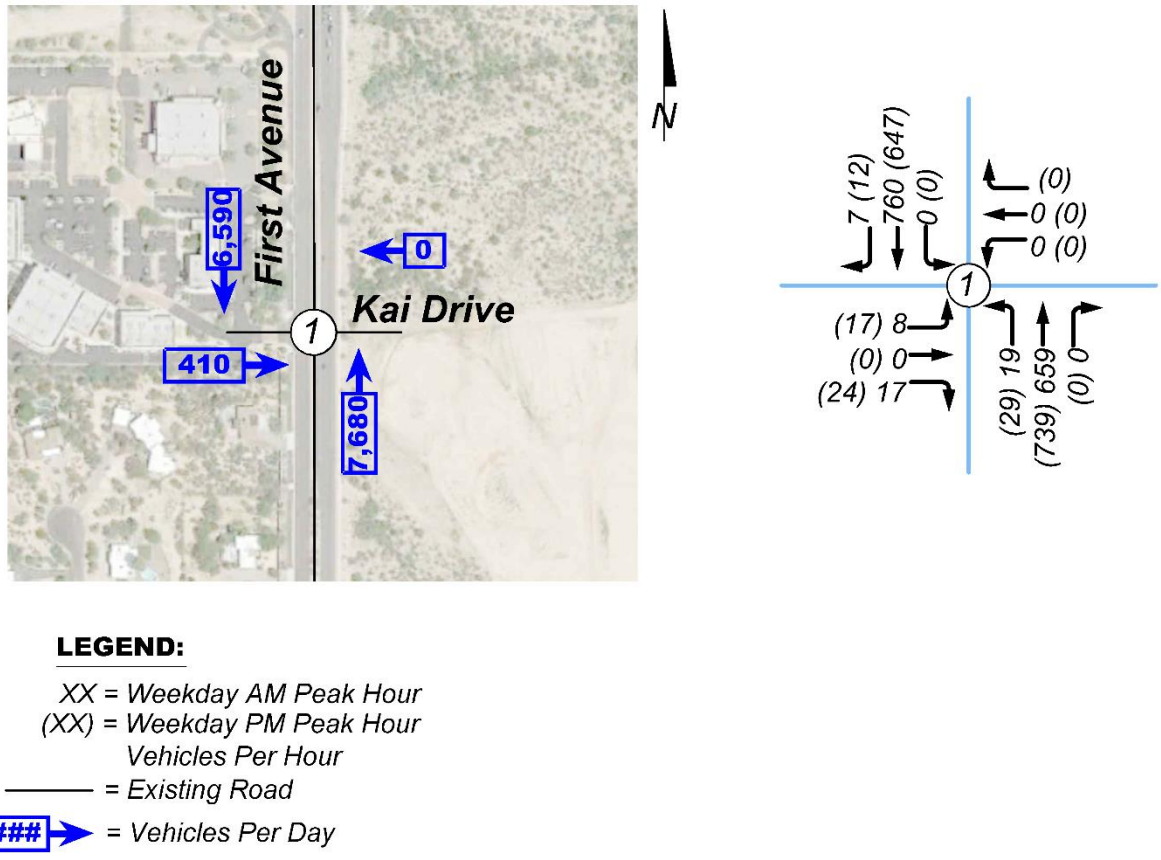




LEGEND:

XX = Weekday AM Peak Hour
(XX) = Weekday PM Peak Hour
Vehicles Per Hour
——— = Existing Road
= Vehicles Per Day

Figure 6 – Existing (2020) Weekday Peak Hour Traffic Volumes



LEGEND:

XX = Weekday AM Peak Hour
(XX) = Weekday PM Peak Hour
Vehicles Per Hour
= Existing Road
= Vehicles Per Day

Trip Generation

Silverhawke Block 5 – Original TIA vs Current Development Plan

Trip generation was developed utilizing nationally agreed upon data contained in the Institute of Transportation Engineers (ITE) publication *Trip Generation Manual, 10th Edition,* 2017. The Silverhawke Block 5 project trip generation was estimated for the construction of 167 apartment units based on ITE Land Use Code 220, Multifamily Housing Low-Rise (LUC 220). The result is the expected weekday trip generation for the project as shown in **Table 1**. The complete trip generation calculations can be found in the Appendix.

Table 1 – Silverhawke Block 5 Weekday Project Site Generated Trips (Current Development Plan)

Time Period	167 Units Multifamily Housing (LUC 220)
Average Daily, Inbound (vtpd)	611
Average Daily, Outbound (vtpd)	611
Total Daily	**1,222**
AM Peak Hour, Inbound (vtph)	18
AM Peak Hour, Outbound (vtph)	60
Total AM Peak	**78**
PM Peak Hour, Inbound (vtph)	59
PM Peak Hour, Outbound (vtph)	35
Total PM Peak	**94**

vtpd - vehicle trips per day, vtph - vehicle trips per hour

In the Original TIA, Phase 4 included land to the east and the west of Kai Drive as shown in **Figure 3**. The Silverhawke Block 5 site encompasses the Phase 4 area east of Kai Drive. It was originally assumed that Phase 4 would include the construction of 59,588 square feet of office space and 59,588 square feet of shopping center space.

The site plan from the Original TIA does not specify the location of the proposed office or shopping center spaces. However, shopping centers are typically located adjacent to major roadways for increased visibility to attract customers. For the purposes of this analysis, it was assumed that the proposed shopping center space would be located to the west of Kai Drive, closer to First Avenue, and that the Silverhawke Block 5 site would replace the proposed office space.

The Original TIA estimated the trip generation for 59,588 square feet of office space in Phase 4 using the *ITE Trip Generation Manual, 9th Edition*, 2012 based on ITE LUC 710, General Office Building. In order to provide a consistent comparison between the development assumed in the Original TIA and the current development plan, trip generation for office space was calculated using the current ITE publication *Trip Generation Manual, 10th Edition*, 2017, as shown in **Table 2**.

Table 2 – Silverhawke Block 5 Weekday Site Generated Trip (Original TIA)

Time Period	59,588 sqft General Office Building (LUC 710)
Average Daily, Inbound (vtpd)	321
Average Daily, Outbound (vtpd)	321
Total Daily	**642**
AM Peak Hour, Inbound (vtph)	71
AM Peak Hour, Outbound (vtph)	12
Total AM Peak	**83**
PM Peak Hour, Inbound (vtph)	11
PM Peak Hour, Outbound (vtph)	59
Total PM Peak	**70**

vtpd - vehicle trips per day, vtph - vehicle trips per hour

The anticipated difference in trip generation between the proposed apartments and the previously proposed office space is shown in **Table 3**.

Table 3 – Silverhawke Block 5 Weekday Site Generated Trip Comparison

Time Period	167 Units Multifamily Housing (LUC 220)	59,588 sqft Office Space (LUC 710)	Difference
Average Daily, Inbound (vtpd)	611	321	290
Average Daily, Outbound (vtpd)	611	321	290
Total Daily	**1,222**	**642**	**580**
AM Peak Hour, Inbound (vtph)	18	71	-53
AM Peak Hour, Outbound (vtph)	60	12	48
Total AM Peak	**78**	**83**	**-5**
PM Peak Hour, Inbound (vtph)	59	11	48
PM Peak Hour, Outbound (vtph)	35	59	-24
Total PM Peak	**94**	**70**	**24**

vtpd - vehicle trips per day, vtph - vehicle trips per hour
Red indicates a reduction

Overall Villages at Silverhawke Development

The Town of Oro Valley has requested a traffic signal warrant analysis be completed at the intersection of Kai Drive/First Avenue. To generate future traffic volumes at this intersection, trip generation for Phases 1, 2, and 3 (which have not been constructed) and the commercial portion of Phase 4 were estimated based on the following:

- 186 Single Family Homes (LUC 210, Single Family Detached Housing)
- 59,588 square feet of chopping center space (LUC 820, Shopping Center)

Table 4 shows the new total expected trip generation for the entire Villages at Silverhawke development.

Table 4 – Weekday Project Site Generated Trips (Overall Development)

Time Period	Phases 1, 2, and 3	Phase 4		Total
	186 Units Single Family Housing (LUC 210)	167 Units Multifamily Housing (LUC 220)	59,588 sqft Shopping Center (LUC 820)	
Average Daily, Inbound (vtpd)	921	611	1,125	2,657
Average Daily, Outbound (vtpd)	921	611	1,125	2,657
Total Daily	**1,842**	**1,222**	**2,250**	**5,314**
AM Peak Hour, Inbound (vtph)	34	18	35	87
AM Peak Hour, Outbound (vtph)	103	60	22	185
Total AM Peak	**137**	**78**	**57**	**272**
PM Peak Hour, Inbound (vtph)	117	59	109	285
PM Peak Hour, Outbound (vtph)	68	35	119	222
Total PM Peak	**185**	**94**	**228**	**507**

vtpd - vehicle trips per day, vtph - vehicle trips per hour

Depending on economic conditions, the development timing of the commercial portion of this site in Phase 4 of the project may vary from the assumptions in this analysis.

Trip Distribution & Assignment

The Town of Oro Valley has requested a traffic signal warrant analysis be completed at the intersection of Kai Drive/First Avenue. To estimate daily site-related traffic volumes at this intersection, the daily trips expected to be generated by Phases 1, 2, 3 and 4 were distributed and assigned to the proposed access points.

Trip distribution for the project was based on existing traffic volume patterns near the proposed site. **Figure 7** shows the weekday trip distribution for the entire Villages at Silverhawke development as a percentage of net new primary trips.

Figure 8 shows the assignment of the new site generated trips from Phases 1, 2, and 3 to the project intersections within the study area. **Figures 9** and **10** show the assignment of the new site generated trips for the entire Villages at Silverhawke development (Phases 1, 2, 3, and 4) to the project intersections within the study area, with and without access to Tangerine Road, respectively.

Future Traffic Volumes Without Project

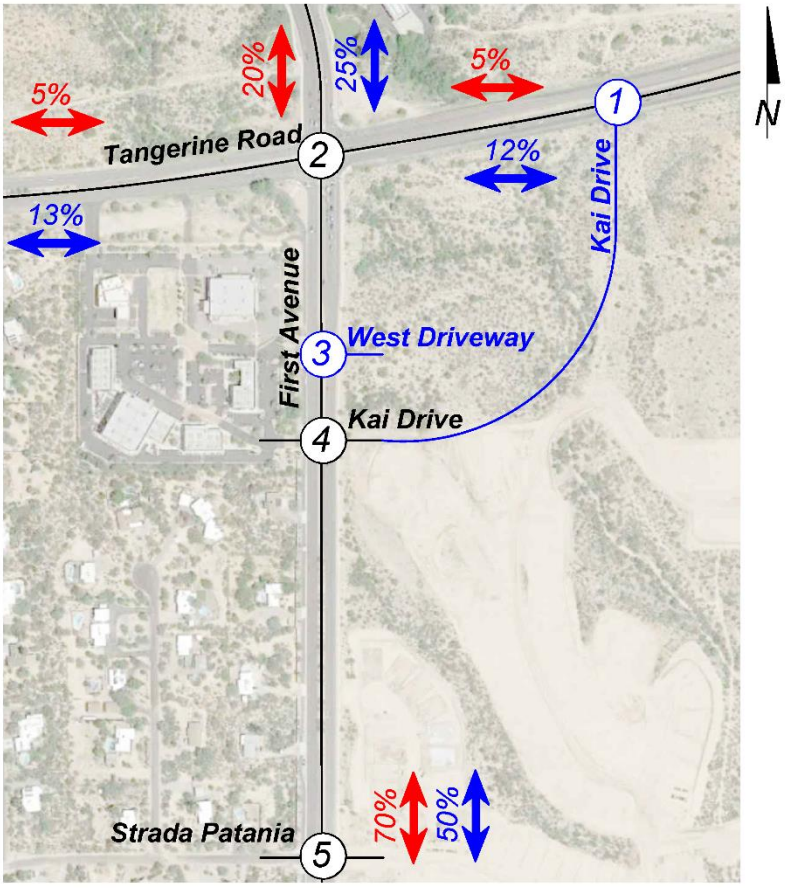
In order to complete a traffic signal warrant analysis at the intersection of Kai Drive/First Avenue, traffic projections were made for the 2021 study horizon. Using a conservative 2% annual compounded growth rate, 2021 weekday peak hour traffic volumes without the project were estimated as shown in **Figure 11**.

The Villages at Silverhawke development (Phases 1, 2, and 3) is currently under construction on the southeast corner of Kai Drive/First Avenue, and for the purposes of this analysis, is assumed to be completed by 2021. Traffic volumes from Phases 1, 2, and 3 of the Villages at Silverhawke development were combined with the estimated 2021 traffic volumes to yield 2021 weekday traffic volumes, without the project and with Phases 1, 2, and 3, as shown in **Figure 12**.

Future Traffic Volumes With Project

In order to estimate future traffic volumes with the site and complete a traffic signal warrant analysis at the intersection of Kai Drive/First Avenue, weekday peak hour traffic volumes for 2021 without the project and with Phases 1, 2, and 3 of the Villages at Silverhawke development were combined with the estimated trips generated by Phase 4 of the project to yield weekday peak hour traffic volumes with the project, as shown in **Figures 13** (with access to Tangerine Road) and **Figure 14** (without access to Tangerine Road).

Figure 7 – Weekday Peak Hour Trip Distribution



LEGEND:

——— = *Existing Road*

——— = *New Access*

XX% ⟷ = *Distribution of Vehicle Trips for Residential Land Uses*

XX% ⟷ = *Distribution of Vehicle Trips for Commercial Land Uses*

Figure 8 – Weekday Peak Hour Trip Assignment (Phases 1, 2, and 3)

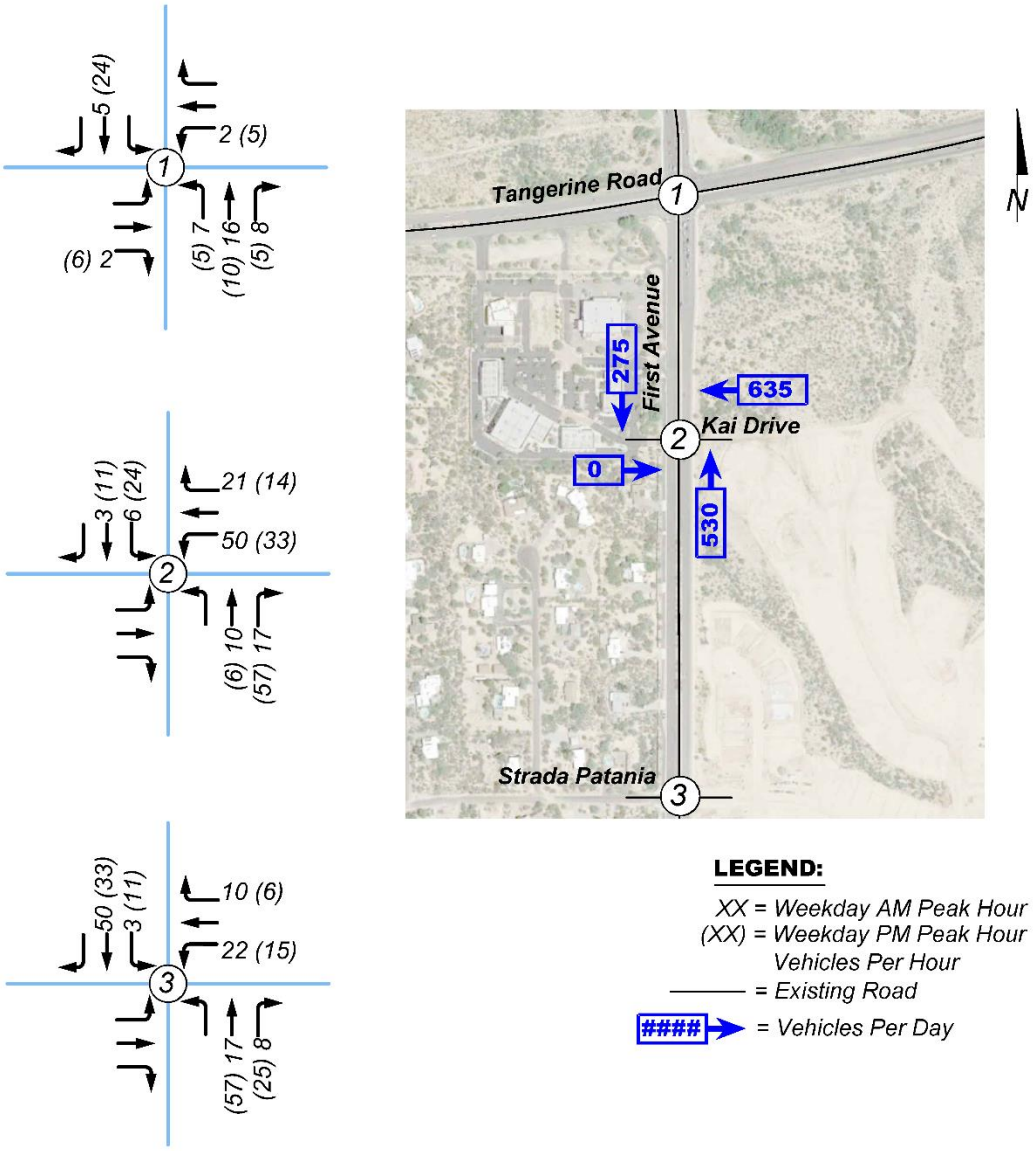


Figure 9 – Weekday Peak Hour Trip Assignment
(Phases 1, 2, 3 and 4 With Access to Tangerine Road)

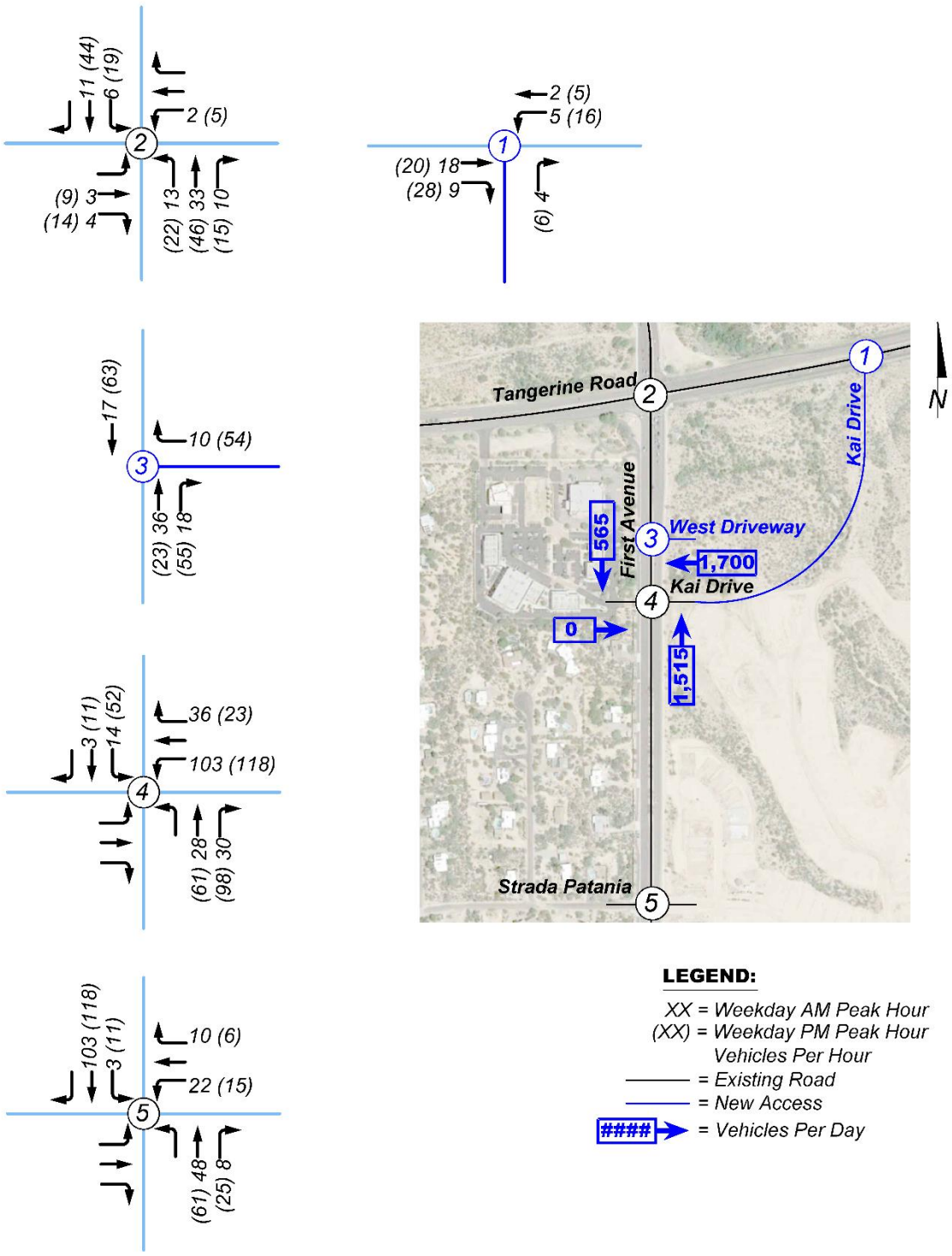


Figure 10 – Weekday Peak Hour Trip Assignment
(Phases 1, 2, 3 and 4 Without Access to Tangerine Road)

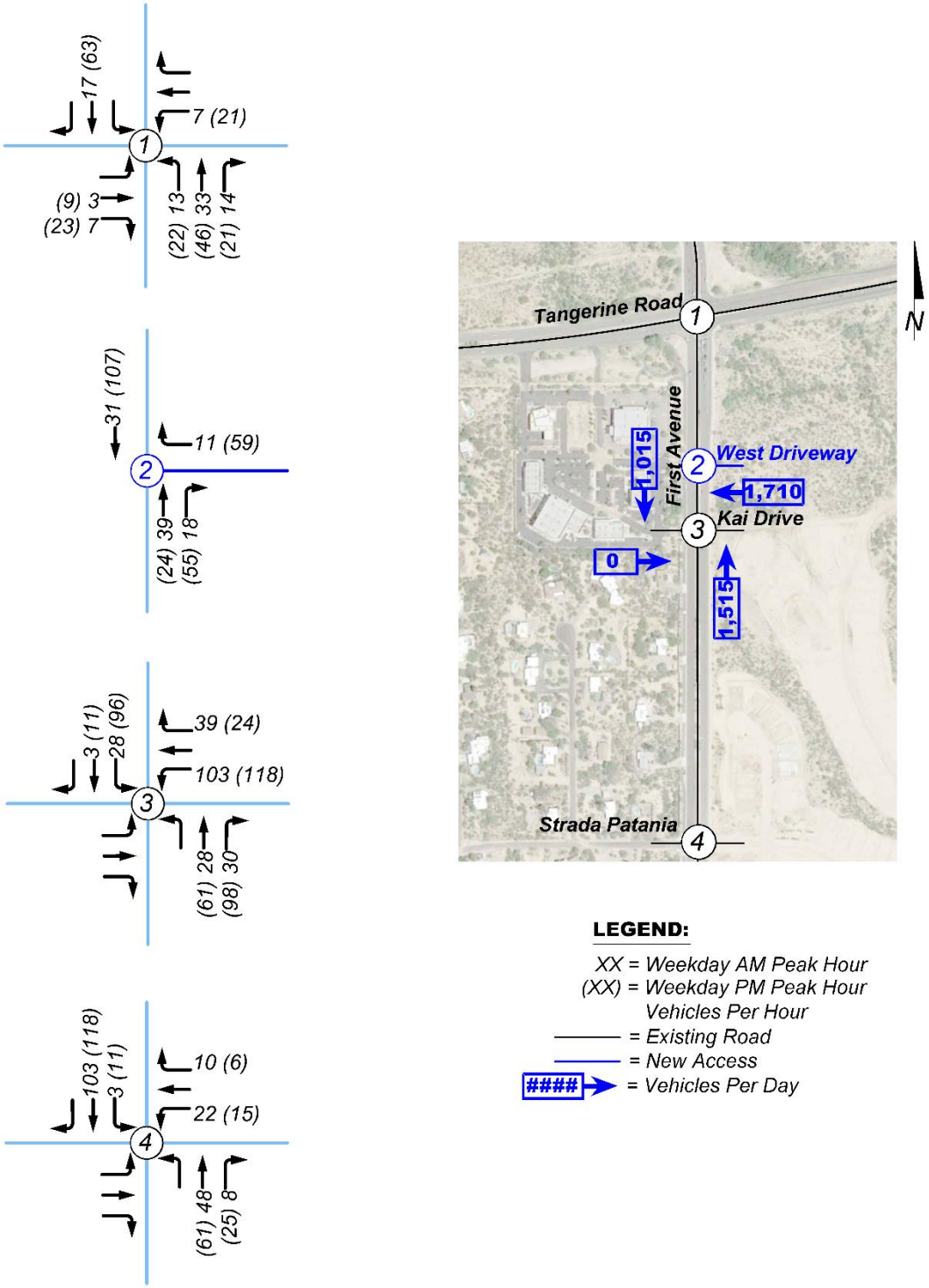
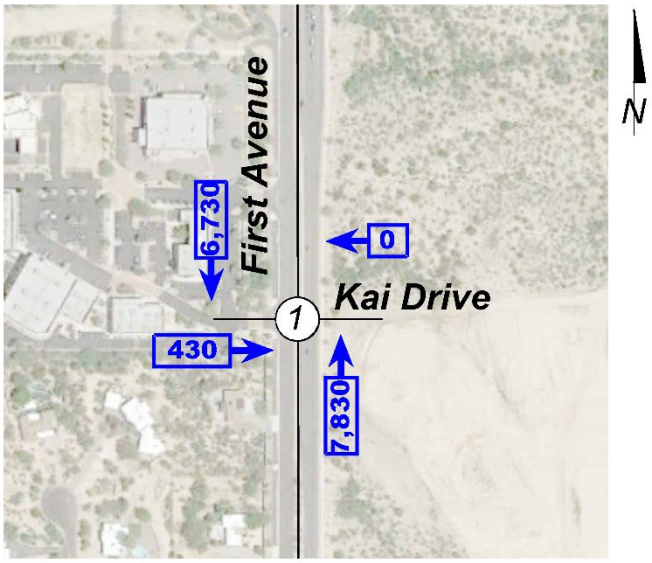
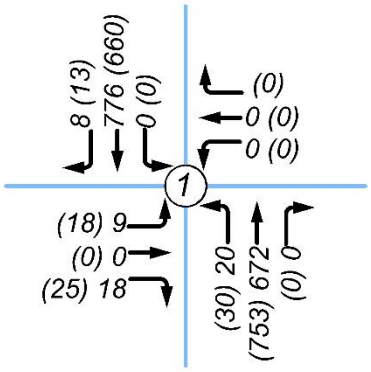


Figure 11 – 2021 Weekday Peak Hour Traffic Volumes
Without Villages at Silverhawke





LEGEND:

XX = Weekday AM Peak Hour
(XX) = Weekday PM Peak Hour
Vehicles Per Hour
——— = Existing Road
= Vehicles Per Day

Figure 12 – 2021 Weekday Peak Hour Traffic Volumes
With Phases 1, 2, and 3

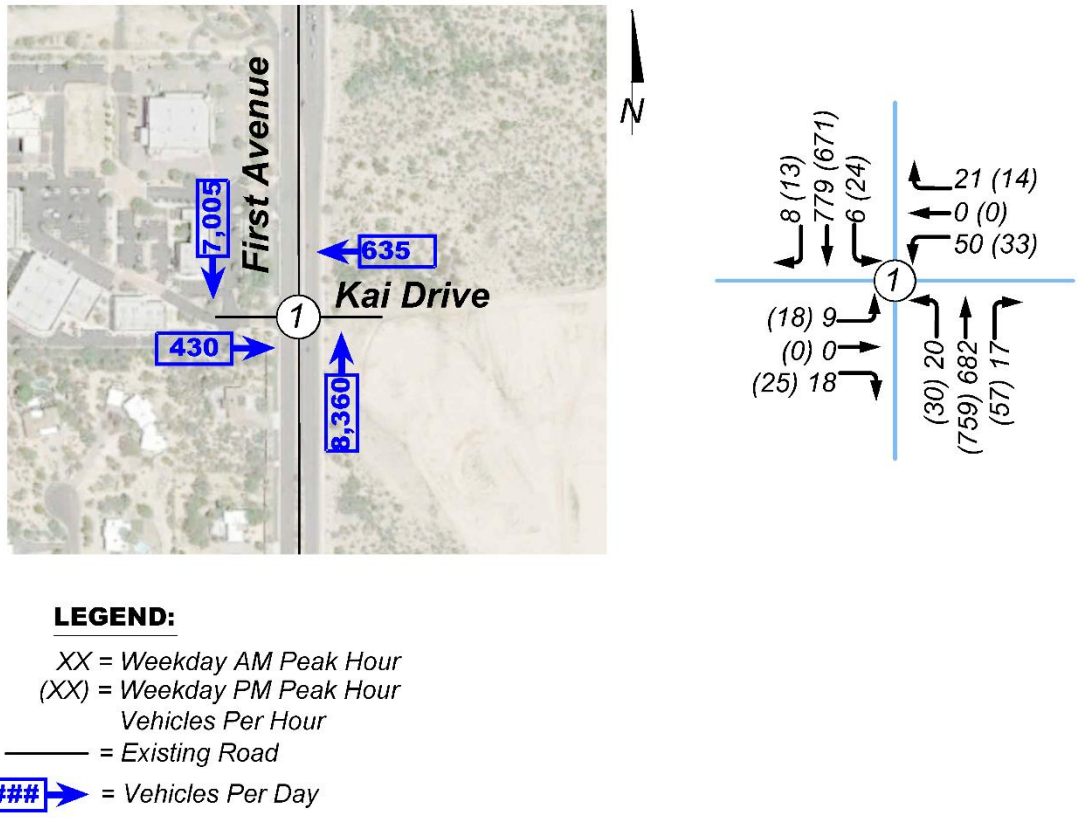


Figure 13 – 2021 Weekday Peak Hour Traffic Volumes
With Villages at Silverhawke and Access to Tangerine Road

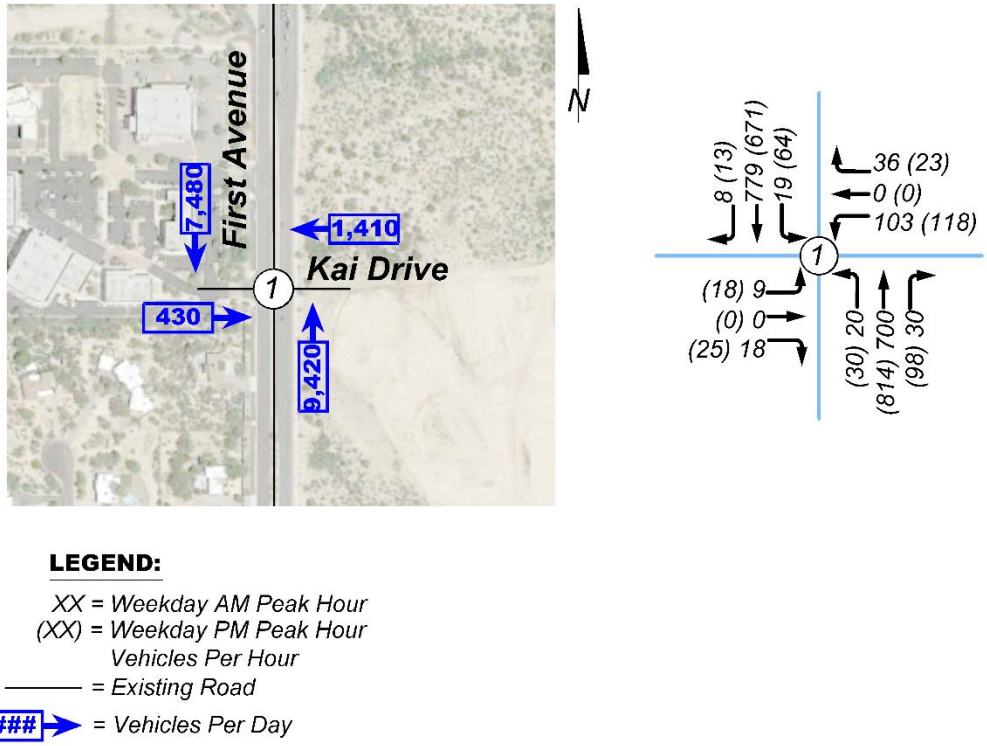
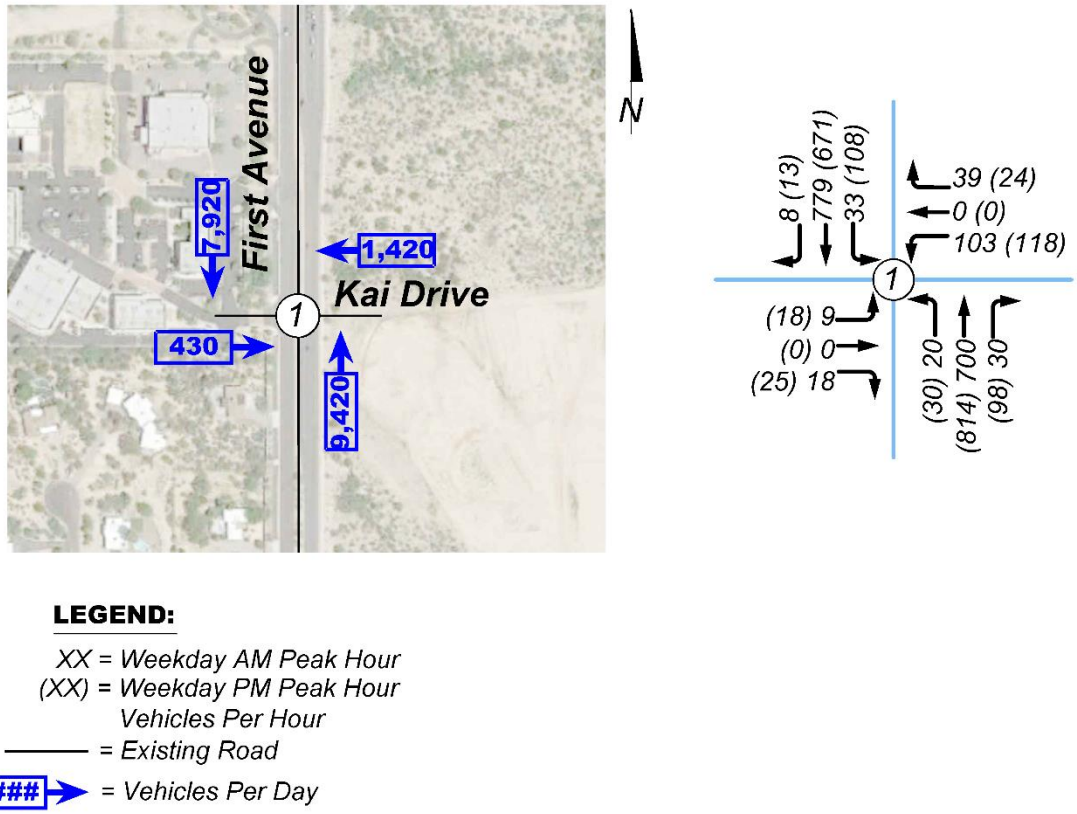


Figure 14 – 2021 Weekday Peak Hour Traffic Volumes
With Villages at Silverhawke and Without Access to Tangerine Road



LEGEND:

XX = Weekday AM Peak Hour
(XX) = Weekday PM Peak Hour
Vehicles Per Hour
= Existing Road
= Vehicles Per Day

Traffic Signal Warrant Analysis

Traffic Signal Warrant analysis was completed at the intersection of Kai Drive/First Avenue for the existing conditions and future 2021 study year, without and with the project:

The *Manual on Uniform Traffic Control Devices (MUTCD),* Federal Highway Administration, 2009, lists 9 warrants that are used to determine if a traffic signal should be considered for installation at an intersection. A traffic signal may be warranted if one or more of the warrants are satisfied. Warrants #1 (Eight Hour Volume) and #2 (Four Hour Vehicular Volume), were used to evaluate the need to signalize the intersections. Based on existing conditions, availability of information, and applicability, the remaining warrants (#3, #4, #5, #6, #7, #8, and #9) do not apply to the given conditions.

Warrant #1 (Eight Hour Volume) is satisfied when for at least eight (8) hours of an average day, specific traffic volume levels are met for both the major and minor streets (Condition A – Minimum Vehicular Volume). The MUTCD states these volumes depend on the vehicles per hour (vph) combined for both approaches of the major street, and for the highest volume approach on the minor street. The values vary depending on the number of approach lanes and the 85th percentile speed of the roadways.

Warrant #1 also applies to operating conditions where the major street traffic levels are sufficiently high that traffic entering or crossing from a minor street suffers excessive delay (Condition B – Interruption of Continuous Traffic). Once again, the warrant is satisfied when for each of any of the same eight (8) hours of an average day, specific traffic volume levels are met for both the major and minor streets.

Warrant #2 (Four Hour Volume) is met when, for any four hours of the average day on both the major and minor streets, the hourly approach volumes are above the plotted curve contained in the MUTCD (see Appendix).

In order to estimate the daily traffic volumes at the intersection of Kai Drive/First Avenue, it was assumed that peak hour volumes account for approximately 10% of total daily traffic volumes. Eighty percent (80%) of the daily volume was distributed evenly from 6:00 AM to 6:00 PM and the remaining 20% was distributed evenly from 6:00 PM to 6:00 AM. Daily traffic volumes expected to be generated by future development were distributed throughout the 24 hours of a day based on these traffic distributions.

Table 5 shows the results of the warrant analysis. Complete warrant analysis calculations can be found attached to this traffic impact statement.

Table 5 – Traffic Signal Warrant Analysis (Kai Drive/First Avenue)

Kai Drive/First Avenue	Warrant Number									
	1		2	3	4	5	6	7	8	9
	Condition A	Condition B								
Existing (2020 Volumes)	No	No	No	*	*	*	*	*	*	*
Hours Met	0	0	0	*	*	*	*	*	*	*
2021 with Phases 1-3	No	No	No	*	*	*	*	*	*	*
Hours Met	0	0	0	*	*	*	*	*	*	*
2021 with Phases 1-4 w/o Tangerine Access	Yes	Yes	Yes	*	*	*	*	*	*	*
Hours Met	12	12	12	*	*	*	*	*	*	*
2021 with Phases 1-4 with Tangerine Access	Yes	Yes	Yes	*	*	*	*	*	*	*
Hours Met	12	12	12	*	*	*	*	*	*	*

* Warrant Does Not Apply

Table 5 shows that the intersection of Kai Drive/First Avenue does not currently meet traffic signal warrants #1 or #2 and neither warrant is expected to be met in 2021 without traffic from Phase 4 of the Villages at Silverhawke development. Both traffic signal warrants #1 and #2 are expected to be met in 2021 with traffic from the overall Villages at Silverhawke development, without or with access to Tangerine Road. The need for this traffic signal is primarily due to the commercial portion in Phase 4 of the development.

It is important to mention that traffic signals should not be installed because one or more of the warrants are satisfied. The MUTCD warrants reflect only the lowest minimum levels on which traffic engineers agree. It also states that, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."

Preliminary Sight Distance Review

At the request of the Town of Oro Valley, a preliminary sight distance analysis was conducted at the proposed intersection of Kai Drive/Tangerine Road as part of a field review completed in August 2020. Sight distance is measured from an eye height of 3.5 feet at/near the centerline of a driveway to a point along the crossing roadway that is six feet from the face of curb or edge of the traveled way and 2.75 feet above the roadway.

The preliminary sight distance evaluation was conducted in the field on the south leg of the proposed intersection of Kai Drive/Tangerine Road, from the centerline of the future Kai Drive, fifteen feet south of Tangerine Road, at an eye height of 3.5 feet.

The field measurements were then evaluated based on the requirements set forth by the Town of Oro Valley *Subdivision Street Standards and Policies Manual*. The measured sight distances at the access points and the sight distance required by the Town of Oro Valley are shown in **Table 6**.

Table 6 – Sight Distance Evaluation at Kai Drive/Tangerine Road

Sight Line	Preliminary Available Sight Distance Measurement	Distance Required per Town of Oro Valley	Minimum Requirement Met?
Northbound, looking East	680'	470'	Yes
Northbound, looking West	880'	600'	Yes

*Distances in Feet

As shown in **Table 5**, adequate sight distance is available for northbound left and right turn movements at the proposed intersection of Kai Drive/Tangerine Road. Vegetation within the median of Tangerine Road, east of the proposed driveway, should be removed to further improve visibility to the east.

It should be noted that a topographic survey would be required to complete a thorough sight distance evaluation. This preliminary sight distance analysis was performed based on the site plan. It is recommended that sight distances at the proposed access points be verified during the design process.

Conclusion

The Silverhawke Block 5 apartment option is predicted to generate 5 fewer weekday AM peak hour trips and 24 additional weekday PM peak hour trips to the surrounding roadway network when compared to the office land use assumed in the Original TIA.

Daily trips would be expected to increase from office space to apartments, as is currently planned, since one resident of an apartment will generate more daily trips than one office worker during the day, as the office worker mostly stays at the office during the day. The traffic pattern during the AM peak would also change between office space and apartments as residents leave for jobs in the morning, where office trips lean to more inbound trips. In the PM peak hour, this pattern reverses itself as the apartments see residents returning home and office workers leave the site.

As noted in **Table 3**, the AM peak hour comparison shows a decrease of inbound traffic and a slightly smaller increase in outbound traffic, resulting in a slight decrease in AM peak hour trips. Similarly, the PM peak hour comparison shows an increase for inbound traffic and a slight decrease for outbound traffic bringing about an overall increase in PM peak hour traffic.

While a daily increase in trips is expected, these trips will likely be distributed throughout the day. Traffic patterns will also change when the PM peak hour shifts to more vehicles entering (rather than leaving) the site when the planned office space sees more vehicles

exiting (rather than entering) the site during the PM peak. This switch in patterns may actually improve the operation of the study intersections during the controlling factor PM peak hour as delays are normally generated by vehicles exiting a site rather than entering it. These change in traffic volumes and patterns are not expected to have a significant impact on the surrounding roadway network. The results from the Original TIA are expected to remain applicable with this land use change.

A preliminary analysis shows that adequate sight distance is available for northbound left and right turn movements at the proposed intersection of Kai Drive/Tangerine Road. Vegetation within the median of Tangerine Road, east of the proposed driveway, should be removed to further improve visibility to the east.

It is recommended that sight distances at the proposed access points be verified during the design process after topographic survey has been obtained.

The intersection of Kai Drive/First Avenue does not currently meet traffic signal warrants #1 or #2 and neither warrant is expected to be met in 2021 without traffic from Phase 4 of the Villages at Silverhawke development. Both traffic signal warrants #1 and #2 are expected to be met in 2021 with traffic from the overall Villages at Silverhawke development, without or with access to Tangerine Road. The need for this traffic signal is primarily due to the commercial portion in Phase 4 of the development. However, depending on economic conditions, the development and timeline for the commercial portion of the development may vary from the assumptions in this analysis. For this reason, the intersection of Kai Drive/First Avenue should be monitored, and a traffic signal should be installed if/when it becomes warranted.

TRAFFIC IMPACT STATEMENT
SILVERHAWKE BLOCK 5
KAI DRIVE/FIRST AVENUE

APPENDIX

Traffic Counts

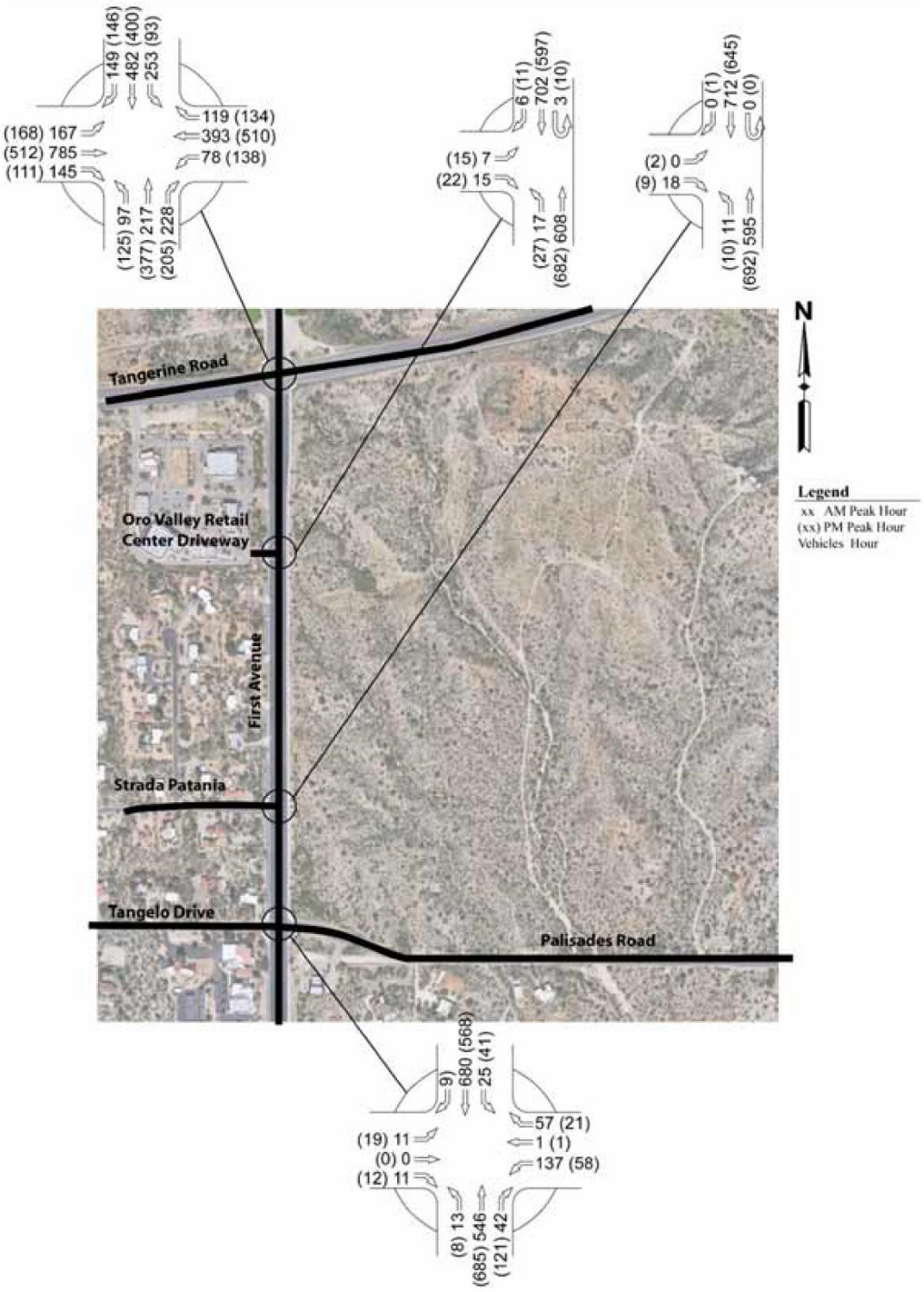
Trip Generation Calculations

Traffic Signal Warrant Analysis

TRAFFIC IMPACT STATEMENT
SILVERHAWKE BLOCK 5
KAI DRIVE/FIRST AVENUE

APPENDIX

Traffic Counts


149 (146)
482 (400)
253 (93)
119 (134)
393 (510)
78 (138)
(168) 167
(512) 785
(111) 145
(125) 97
(377) 217
(205) 228
6 (11)
702 (597)
3 (10)
(15) 7
(22) 15
(27) 17
(682) 608
0 (1)
712 (645)
0 (0)
(2) 0
(9) 18
(10) 11
(692) 595
N
Legend
xx AM Peak Hour
(xx) PM Peak Hour
Vehicles Hour
Tangerine Road
Oro Valley Retail
Center Driveway
First Avenue
Strada Patania
Tangelo Drive
Palisades Road
9)
680 (568)
25 (41)
57 (21)
1 (1)
137 (58)
(19) 11
(0) 0
(12) 11
(8) 13
(685) 546
(121) 42

TRAFFIC IMPACT STATEMENT
SILVERHAWKE BLOCK 5
KAI DRIVE/FIRST AVENUE

APPENDIX

Trip Generation

Multifamily Housing (Low-Rise) (LUC 220)

TRIP GENERATION CALCULATIONS ARE BASED ON THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION, 10TH EDITION.
THE ITE LAND USE CODE IS
Multifamily Housing (Low-Rise) (220), General Urban/Suburban

Weekday

Fitted Curve T=7.56(X) - 40.86
Where X = 167 Dwelling Units
T = 1,222 VTPD
ENTER: (0.5)*(1222) = **611 VTPD**
EXIT: (0.5)*(1222) = **611 VTPD**

AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)

Fitted Curve LN(T)=0.95 Ln(X) - 0.51
Where X = 167 Dwelling Units
T = 78 VPH
ENTER: (0.23)*(78) = **18 VPH**
EXIT: (0.77)*(78) = **60 VPH**

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Fitted Curve LN(T)=0.89 Ln(X) - 0.02
Where X = 167 Dwelling Units
T = 94 VPH
ENTER: (0.63)*(94) = **59 VPH**
EXIT: (0.37)*(94) = **35 VPH**

*where, T = trip ends

TRIP GENERATION SUMMARY

WEEKDAY	**1,222 VTPD**
AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)	**78 VPH**
PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)	**94 VPH**

General Office Building

LAND USE: 59,588 Square Feet General Office Building

TRIP GENERATION CALCULATIONS ARE BASED ON THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION, 10TH EDITION. THE ITE LAND USE CODE IS General Office Building (710), General Urban/Suburban

WEEKDAY

Fitted Curve Ln(T) = 0.97 Ln(X) +2.50
Where X = 59588 sqft/1000
T = 642 VTPD
ENTER: (0.5)*(642) = **321 VTPD**
EXIT: (0.5)*(642) = **321 VTPD**

AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)

Fitted Curve T = 0.94(X) + 26.49
Where X = 59588 sqft/1000
T = 83 VPH
ENTER: (0.86)*(83) = **71 VPH**
EXIT: (0.14)*(83) = **12 VPH**

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Fitted Curve Ln(T) = 0.95 Ln(X) + 0.36
Where X = 59588 sqft/1000
T = 70 VPH
ENTER: (0.16)*(70) = **11 VPH**
EXIT: (0.84)*(70) = **59 VPH**

*where, T = trip ends

TRIP GENERATION SUMMARY

WEEKDAY	**642 VTPD**
AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)	**83 VPH**
PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)	**70 VPH**

Shopping Center

LAND USE: 59,588 Square Feet Shopping Center

TRIP GENERATION CALCULATIONS ARE BASED ON THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION, 10TH EDITION. THE ITE LAND USE CODE IS Shopping Center (820), General Urban/Suburban

Weekday

Average Rate = 37.75 Trips per 1000 Square Feet (sqft)

T = 37.75 Trips x 59588 sqft / 1000

T = 2,250 VTPD

ENTER: (0.5)*(2250) = **1,125 VTPD**

EXIT: (0.5)*(2250) = **1,125 VTPD**

AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)

Average Rate = 0.94 Trips per 1000 Square Feet (sqft)

T = 0.94 Trips x 59588 sqft / 1000

T = 57 VPH

ENTER: (0.62)*(57) = **35 VPH**

EXIT: (0.38)*(57) = **22 VPH**

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Average Rate = 3.81 Trips per 1000 Square Feet (sqft)

T = 3.81 Trips x 59588 sqft / 1000

T = 228 VPH

ENTER: (0.48)*(228) = **109 VPH**

EXIT: (0.52)*(228) = **119 VPH**

*where, T = trip ends

TRIP GENERATION SUMMARY

WEEKDAY	**2,250 VTPD**
AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)	**57 VPH**
PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)	**228 VPH**

Single Family Detached Housing (LUC 210)

TRIP GENERATION CALCULATIONS ARE BASED ON THE INSTITUTE OF TRANSPORTATION ENGINEERS' TRIP GENERATION, 10TH EDITION.
THE ITE LAND USE CODE IS
Single Family Detached Housing (210), General Urban/Suburban

Weekday

Fitted Curve LN(T)=0.92 Ln(X) + 2.71
Where X = 186 Dwelling Units
T = 1,842 VTPD
ENTER: (0.5)*(1842) = **921 VTPD**
EXIT: (0.5)*(1842) = **921 VTPD**

AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)

Fitted Curve T=0.71(X) + 4.80
Where X = 186 Dwelling Units
T = 137 VPH
ENTER: (0.25)*(137) = **34 VPH**
EXIT: (0.75)*(137) = **103 VPH**

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Fitted Curve LN(T)=0.96 Ln(X) + 0.2
Where X = 186 Dwelling Units
T = 185 VPH
ENTER: (0.63)*(185) = **117 VPH**
EXIT: (0.37)*(185) = **68 VPH**

*where, T = trip ends

TRIP GENERATION SUMMARY

WEEKDAY	**1,842 VTPD**
AM PEAK HOUR (ONE HOUR BETWEEN 7 AND 9 AM)	**137 VPH**
PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)	**185 VPH**

TRAFFIC IMPACT STATEMENT
SILVERHAWKE BLOCK 5
KAI DRIVE/FIRST AVENUE

APPENDIX

Traffic Signal Warrant Analysis

General Description of Intersection

Existing (2020 Volumes Without Project)

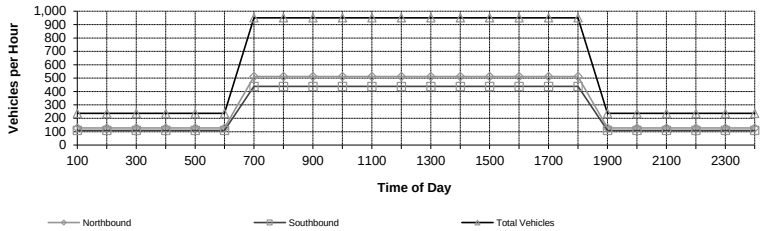
Project Number:	20059
Name of Major Roadway:	First Avenue
Direction:	N/S
# of NB Lanes:	2
# of SB Lanes:	2
85th percentile speed:	45 *mph*
Control #:	
Section #:	
Route #:	
Name of Minor Roadway:	Kai Drive
Direction:	E/W
# of EB Lanes:	1
# of WB Lanes:	1
85th percentile speed:	25 *mph*
Control #:	
Section #:	
Route #:	
City:	Oro Valley
Population:	45,395
County:	
District:	
Data Source:	AM/PM Peak Hour Count
Date of Survey:	10/5/2016 *(press Ctrl + ;)*
Day of Week:	Wednesday
Weather:	Sunny
Surface Conditions:	Dry / Smooth

Enter Traffic Volumes:

Automated Traffic Counts

Street: **First Avenue**
Location: **Kai Drive**

City/State: **Oro Valley, AZ**
Project #: **20059**
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **14,249**

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	128		109	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	128		109	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	128		109	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	128		109	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	128		109	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	128		109	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	512		438	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	512		438	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	512		438	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	512		438	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	512		438	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	512		438	

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	512		438	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	512		438	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	512		438	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	512		438	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	512		438	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	512		438	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	128		109	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	128		109	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	128		109	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	128		109	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	128		109	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	128		109	0
	7,677		6,573	
			24-Hour Volume	14,249

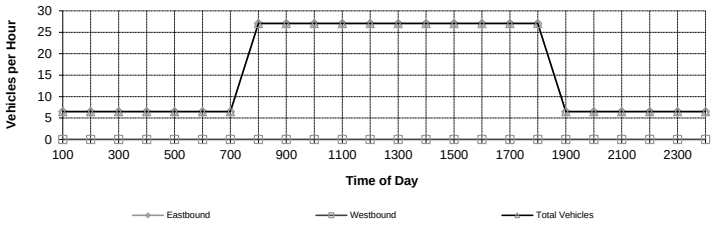
Equipment ID#:

Automated Traffic Counts

Street: **Kai Drive**
Location: **First Avenue**

City/State: **Oro Valley, AZ**
Project #:
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**

24-Hour Volume: **382**



Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	6		0	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	6		0	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	6		0	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	6		0	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	6		0	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	6		0	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	6		0	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	27		0	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	27		0	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	27		0	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	27		0	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	27		0	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:59 PM				
12:30 PM				
12:45 PM				
1:00 PM	27		0	
1:59 PM				
1:30 PM				
1:45 PM				
2:00 PM	27		0	
2:59 PM				
2:30 PM				
2:45 PM				
3:00 PM	27		0	
3:59 PM				
3:30 PM				
3:45 PM				
4:00 PM	27		0	
4:59 PM				
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12:00 AM				
5:00 PM	27		0	
5:59 PM				
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6:59 PM				
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7:59 PM				
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7:45 PM				
8:00 PM	6		0	
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8:30 PM				
8:45 PM				
9:00 PM	6		0	
9:59 PM				
9:30 PM				
9:45 PM				
10:00 PM	6		0	
10:59 PM				
10:30 PM				
10:45 PM				
11:00 PM	6		0	
11:59 PM				
11:30 PM				
11:45 PM				
12:00 AM	6		0	
	382		0	
			24-Hour Volume	382

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS

2009 MUTCD WARRANTS

Existing (2020 Volumes Without Project)

County: _____ **District No.:** _____

City: Oro Valley **Population:** 45,395 **Survey Date:** 10/5/2016

	Route #	Name	Control	Section	85% Speed
Major		First Avenue		-	45
Minor		Kai Drive		-	25

Warrant 1: Eight- Hour Volumes

Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria		
Begin	End	Major	Minor	Major >= 420	Minor >= 105	Both Meet
12:00 AM	1:00 AM	237.0526	6.494593	N	N	N
1:00 AM	2:00 AM	237.0526	6.494593	N	N	N
2:00 AM	3:00 AM	237.0526	6.494593	N	N	N
3:00 AM	4:00 AM	237.0526	6.494593	N	N	N
4:00 AM	5:00 AM	237.0526	6.494593	N	N	N
5:00 AM	6:00 AM	237.0526	6.494593	N	N	N
6:00 AM	7:00 AM	950.3754	6.494593	Y	N	N
7:00 AM	8:00 AM	950.3754	27.060804	Y	N	N
8:00 AM	9:00 AM	950.3754	27.060804	Y	N	N
9:00 AM	10:00 AM	950.3754	27.060804	Y	N	N
10:00 AM	11:00 AM	950.3754	27.060804	Y	N	N
11:00 AM	12:00 PM	950.3754	27.060804	Y	N	N
12:00 PM	1:00 PM	950.3754	27.060804	Y	N	N
1:00 PM	2:00 PM	950.3754	27.060804	Y	N	N
2:00 PM	3:00 PM	950.3754	27.060804	Y	N	N
3:00 PM	4:00 PM	950.3754	27.060804	Y	N	N
4:00 PM	5:00 PM	950.3754	27.060804	Y	N	N
5:00 PM	6:00 PM	950.3754	27.060804	Y	N	N
6:00 PM	7:00 PM	237.0526	6.494593	N	N	N
7:00 PM	8:00 PM	237.0526	6.494593	N	N	N
8:00 PM	9:00 PM	237.0526	6.494593	N	N	N
9:00 PM	10:00 PM	237.0526	6.494593	N	N	N
10:00 PM	11:00 PM	237.0526	6.494593	N	N	N
11:00 PM	12:00 AM	237.0526	6.494593	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition A is not satisfied

Warrant 1 not satisfied.

Warrant 1: Eight- Hour Volumes

Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	237.0526	6.494593	N	N	N
1:00 AM	2:00 AM	237.0526	6.494593	N	N	N
2:00 AM	3:00 AM	237.0526	6.494593	N	N	N
3:00 AM	4:00 AM	237.0526	6.494593	N	N	N
4:00 AM	5:00 AM	237.0526	6.494593	N	N	N
5:00 AM	6:00 AM	237.0526	6.494593	N	N	N
6:00 AM	7:00 AM	950.3754	6.494593	Y	N	N
7:00 AM	8:00 AM	950.3754	27.060804	Y	N	N
8:00 AM	9:00 AM	950.3754	27.060804	Y	N	N
9:00 AM	10:00 AM	950.3754	27.060804	Y	N	N
10:00 AM	11:00 AM	950.3754	27.060804	Y	N	N
11:00 AM	12:00 PM	950.3754	27.060804	Y	N	N
12:00 PM	1:00 PM	950.3754	27.060804	Y	N	N
1:00 PM	2:00 PM	950.3754	27.060804	Y	N	N
2:00 PM	3:00 PM	950.3754	27.060804	Y	N	N
3:00 PM	4:00 PM	950.3754	27.060804	Y	N	N
4:00 PM	5:00 PM	950.3754	27.060804	Y	N	N
5:00 PM	6:00 PM	950.3754	27.060804	Y	N	N
6:00 PM	7:00 PM	237.0526	6.494593	N	N	N
7:00 PM	8:00 PM	237.0526	6.494593	N	N	N
8:00 PM	9:00 PM	237.0526	6.494593	N	N	N
9:00 PM	10:00 PM	237.0526	6.494593	N	N	N
10:00 PM	11:00 PM	237.0526	6.494593	N	N	N
11:00 PM	12:00 AM	237.0526	6.494593	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition B is not satisfied

Warrant 1 not satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** The required traffic volumes for Warrant 2 do not meet for any one hour.**

Warrant 2 is not satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume

This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This w is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 is N/A.

Warrant 4: Pedestrian Volume

	Required*	Existing
100 or more for each of any four hours		_____
OR		
190 or more during any one hour		_____

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: none

Warrants not satisfied: 1, 2

Warrants not applicable: 3, 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

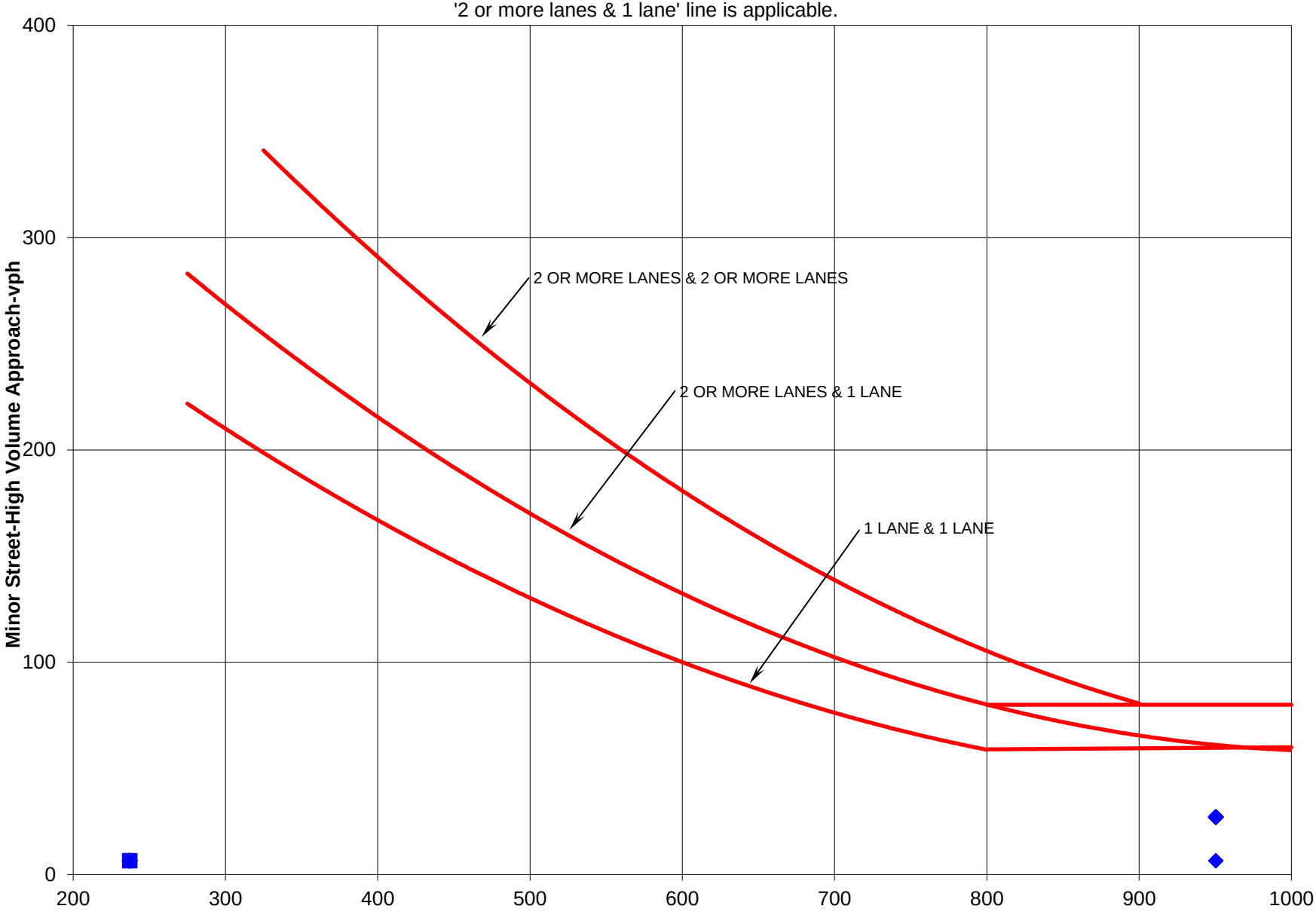
Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	237.052643	6.49459296	-	-	-	-	N	-
2	237.052643	6.49459296	-	-	-	-	N	-
3	237.052643	6.49459296	-	-	-	-	N	-
4	237.052643	6.49459296	-	-	-	-	N	-
5	237.052643	6.49459296	-	-	-	-	N	-
6	237.052643	6.49459296	-	-	-	-	N	-
7	237.052643	6.49459296	-	-	-	-	N	-
8	950.3754365	6.49459296	-	-	-	-	N	-
9	950.3754365	27.060804	-	-	-	-	N	-
10	950.3754365	27.060804	-	-	-	-	N	-
11	950.3754365	27.060804	-	-	-	-	N	-
12	950.3754365	27.060804	-	-	-	-	N	-
13	950.3754365	27.060804	-	-	-	-	N	-
14	950.3754365	27.060804	-	-	-	-	N	-
15	950.3754365	27.060804	-	-	-	-	N	-
16	950.3754365	27.060804	-	-	-	-	N	-
17	950.3754365	27.060804	-	-	-	-	N	-
18	950.3754365	27.060804	-	-	-	-	N	-
19	950.3754365	27.060804	-	-	-	-	N	-
20	237.052643	6.49459296	-	-	-	-	N	-
21	237.052643	6.49459296	-	-	-	-	N	-
22	237.052643	6.49459296	-	-	-	-	N	-
23	237.052643	6.49459296	-	-	-	-	N	-
24	237.052643	6.49459296	-	-	-	-	N	-
			0	0	0	0	0	0
Warrant 2 is not satisfied.			N	N	N	N	N	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

General Description of Intersection

2021 With Phases 1, 2, and 3

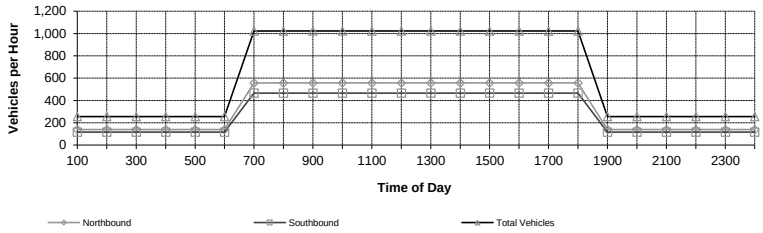
Project Number:	20059
Name of Major Roadway:	First Avenue
Direction:	N/S
# of NB Lanes:	2
# of SB Lanes:	2
85th percentile speed:	45 *mph*
Control #:	
Section #:	
Route #:	
Name of Minor Roadway:	Kai Drive
Direction:	E/W
# of EB Lanes:	1
# of WB Lanes:	1
85th percentile speed:	25 *mph*
Control #:	
Section #:	
Route #:	
City:	Oro Valley
Population:	45,395
County:	
District:	
Data Source:	AM/PM Peak Hour Count
Date of Survey:	10/5/2016 *(press Ctrl + ;)*
Day of Week:	Wednesday
Weather:	Sunny
Surface Conditions:	Dry
	Smooth

Enter Traffic Volumes:

Automated Traffic Counts

Street: **First Avenue**
Location: **Kai Drive**

City/State: **Oro Valley, AZ**
Project #: **20059**
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **15,337**

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	139		116	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	139		116	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	139		116	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	139		116	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	139		116	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	139		116	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	557		465	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	558		466	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	558		466	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	558		466	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	558		466	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	558		466	

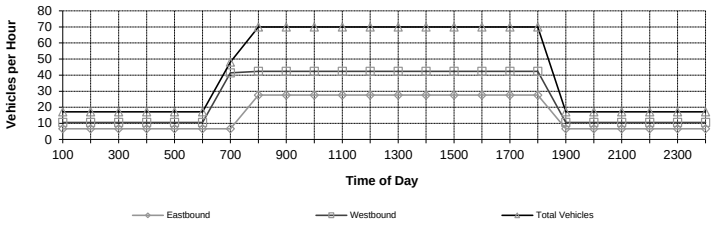
Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	558		466	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	558		466	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	558		466	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	558		466	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	558		466	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	558		466	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	139		116	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	139		116	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	139		116	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	139		116	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	139		116	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	139		116	0
	8,358		6,979	
			24-Hour Volume	15,337

Equipment ID#:

Automated Traffic Counts

Street: **Kai Drive**
Location: **First Avenue**

City/State: **Oro Valley, AZ**
Project #:
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **1,024**

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	7		11	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	7		11	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	7		11	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	7		11	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	7		11	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	7		11	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	7		41	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	28		42	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	28		42	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	28		42	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	28		42	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	28		42	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:59 PM				
12:30 PM				
12:45 PM				
1:00 PM	28		42	
1:59 PM				
1:30 PM				
1:45 PM				
2:00 PM	28		42	
2:59 PM				
2:30 PM				
2:45 PM				
3:00 PM	28		42	
3:59 PM				
3:30 PM				
3:45 PM				
4:00 PM	28		42	
4:59 PM				
4:30 PM				
12:00 AM				
5:00 PM	28		42	
5:59 PM				
5:30 PM				
5:45 PM				
6:00 PM	28		42	
6:59 PM				
6:30 PM				
6:45 PM				
7:00 PM	7		11	
7:59 PM				
7:30 PM				
7:45 PM				
8:00 PM	7		11	
8:59 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		11	
9:59 PM				
9:30 PM				
9:45 PM				
10:00 PM	7		11	
10:59 PM				
10:30 PM				
10:45 PM				
11:00 PM	7		11	
11:59 PM				
11:30 PM				
11:45 PM				
12:00 AM	7		11	
	390		634	
	24-Hour Volume		1,024	

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS

2009 MUTCD WARRANTS

2021 With Phases 1, 2, and 3

County: _____ **District No.:** _____

City: Oro Valley **Population:** 45,395 **Survey Date:** 10/5/2016

	Route #	Name	Control	Section	85% Speed
Major		First Avenue		-	45
Minor		Kai Drive		-	25

Warrant 1: Eight- Hour Volumes

Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria		
Begin	End	Major	Minor	Major >= 420	Minor >= 105	Both Meet
12:00 AM	1:00 AM	255.1602	10.553377	N	N	N
1:00 AM	2:00 AM	255.1602	10.553377	N	N	N
2:00 AM	3:00 AM	255.1602	10.553377	N	N	N
3:00 AM	4:00 AM	255.1602	10.553377	N	N	N
4:00 AM	5:00 AM	255.1602	10.553377	N	N	N
5:00 AM	6:00 AM	255.1602	10.553377	N	N	N
6:00 AM	7:00 AM	1021.898	41.463047	Y	N	N
7:00 AM	8:00 AM	1023.027	42.354221	Y	N	N
8:00 AM	9:00 AM	1023.027	42.354221	Y	N	N
9:00 AM	10:00 AM	1023.027	42.354221	Y	N	N
10:00 AM	11:00 AM	1023.027	42.354221	Y	N	N
11:00 AM	12:00 PM	1023.027	42.354221	Y	N	N
12:00 PM	1:00 PM	1023.027	42.354221	Y	N	N
1:00 PM	2:00 PM	1023.027	42.354221	Y	N	N
2:00 PM	3:00 PM	1023.027	42.354221	Y	N	N
3:00 PM	4:00 PM	1023.027	42.354221	Y	N	N
4:00 PM	5:00 PM	1023.027	42.354221	Y	N	N
5:00 PM	6:00 PM	1023.027	42.354221	Y	N	N
6:00 PM	7:00 PM	255.1602	10.553377	N	N	N
7:00 PM	8:00 PM	255.1602	10.553377	N	N	N
8:00 PM	9:00 PM	255.1602	10.553377	N	N	N
9:00 PM	10:00 PM	255.1602	10.553377	N	N	N
10:00 PM	11:00 PM	255.1602	10.553377	N	N	N
11:00 PM	12:00 AM	255.1602	10.553377	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition A is not satisfied

Warrant 1 not satisfied.

Warrant 1: Eight- Hour Volumes

Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria		
				Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	255.1602	10.553377	N	N	N
1:00 AM	2:00 AM	255.1602	10.553377	N	N	N
2:00 AM	3:00 AM	255.1602	10.553377	N	N	N
3:00 AM	4:00 AM	255.1602	10.553377	N	N	N
4:00 AM	5:00 AM	255.1602	10.553377	N	N	N
5:00 AM	6:00 AM	255.1602	10.553377	N	N	N
6:00 AM	7:00 AM	1021.898	41.463047	Y	N	N
7:00 AM	8:00 AM	1023.027	42.354221	Y	N	N
8:00 AM	9:00 AM	1023.027	42.354221	Y	N	N
9:00 AM	10:00 AM	1023.027	42.354221	Y	N	N
10:00 AM	11:00 AM	1023.027	42.354221	Y	N	N
11:00 AM	12:00 PM	1023.027	42.354221	Y	N	N
12:00 PM	1:00 PM	1023.027	42.354221	Y	N	N
1:00 PM	2:00 PM	1023.027	42.354221	Y	N	N
2:00 PM	3:00 PM	1023.027	42.354221	Y	N	N
3:00 PM	4:00 PM	1023.027	42.354221	Y	N	N
4:00 PM	5:00 PM	1023.027	42.354221	Y	N	N
5:00 PM	6:00 PM	1023.027	42.354221	Y	N	N
6:00 PM	7:00 PM	255.1602	10.553377	N	N	N
7:00 PM	8:00 PM	255.1602	10.553377	N	N	N
8:00 PM	9:00 PM	255.1602	10.553377	N	N	N
9:00 PM	10:00 PM	255.1602	10.553377	N	N	N
10:00 PM	11:00 PM	255.1602	10.553377	N	N	N
11:00 PM	12:00 AM	255.1602	10.553377	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 0

Hours Required: 8

Condition B is not satisfied

Warrant 1 not satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** The required traffic volumes for Warrant 2 do not meet for any one hour.**

Warrant 2 is not satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume

This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This w is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 is N/A.

Warrant 4: Pedestrian Volume

	Required*	Existing
100 or more for each of any four hours		_____
OR		
190 or more during any one hour		_____

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: none

Warrants not satisfied: 1, 2

Warrants not applicable: 3, 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

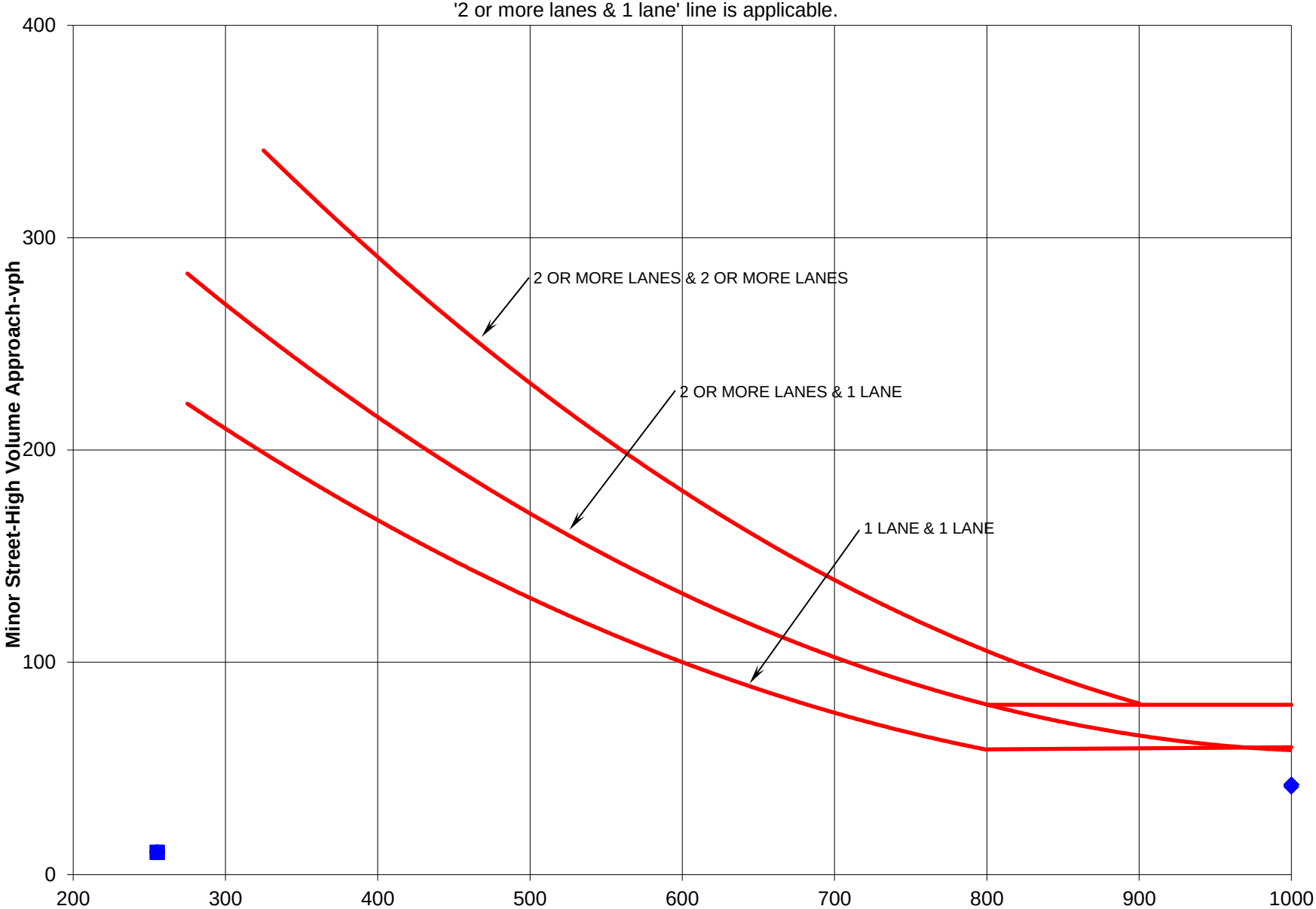
Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	255.1601973	10.5533772	-	-	-	-	N	-
2	255.1601973	10.5533772	-	-	-	-	N	-
3	255.1601973	10.5533772	-	-	-	-	N	-
4	255.1601973	10.5533772	-	-	-	-	N	-
5	255.1601973	10.5533772	-	-	-	-	N	-
6	255.1601973	10.5533772	-	-	-	-	N	-
7	255.1601973	10.5533772	-	-	-	-	N	-
8	1021.898444	41.4630465	-	-	-	-	N	-
9	1023.027171	42.3542206	-	-	-	-	N	-
10	1023.027171	42.3542206	-	-	-	-	N	-
11	1023.027171	42.3542206	-	-	-	-	N	-
12	1023.027171	42.3542206	-	-	-	-	N	-
13	1023.027171	42.3542206	-	-	-	-	N	-
14	1023.027171	42.3542206	-	-	-	-	N	-
15	1023.027171	42.3542206	-	-	-	-	N	-
16	1023.027171	42.3542206	-	-	-	-	N	-
17	1023.027171	42.3542206	-	-	-	-	N	-
18	1023.027171	42.3542206	-	-	-	-	N	-
19	1023.027171	42.3542206	-	-	-	-	N	-
20	255.1601973	10.5533772	-	-	-	-	N	-
21	255.1601973	10.5533772	-	-	-	-	N	-
22	255.1601973	10.5533772	-	-	-	-	N	-
23	255.1601973	10.5533772	-	-	-	-	N	-
24	255.1601973	10.5533772	-	-	-	-	N	-
			0	0	0	0	0	0
Warrant 2 is not satisfied.			N	N	N	N	N	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

General Description of Intersection

2021 With Project With Tangerine Access

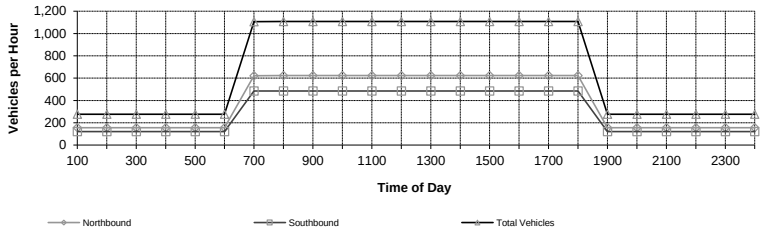
Project Number:	20059
Name of Major Roadway:	First Avenue
Direction:	N/S
# of NB Lanes:	2
# of SB Lanes:	2
85th percentile speed:	45 *mph*
Control #:	
Section #:	
Route #:	
Name of Minor Roadway:	Kai Drive
Direction:	E/W
# of EB Lanes:	1
# of WB Lanes:	1
85th percentile speed:	25 *mph*
Control #:	
Section #:	
Route #:	
City:	Oro Valley
Population:	45,395
County:	
District:	
Data Source:	AM/PM Peak Hour Count
Date of Survey:	10/5/2016 *(press Ctrl + ;)*
Day of Week:	Wednesday
Weather:	Sunny
Surface Conditions:	Dry
	Smooth

Enter Traffic Volumes:

Automated Traffic Counts

Street: **First Avenue**
Location: **Kai Drive**

City/State: **Oro Valley, AZ**
Project #: **20059**
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **16,611**

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	155		121	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	155		121	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	155		121	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	155		121	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	155		121	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	155		121	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	621		485	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	623		485	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	623		485	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	623		485	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	623		485	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	623		485	

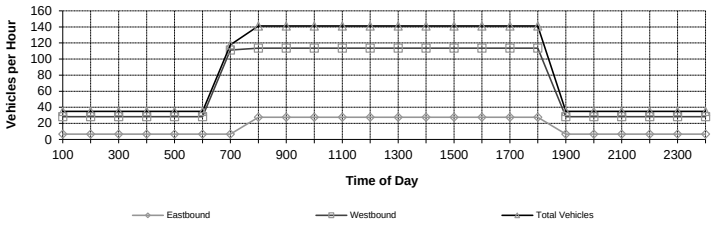
Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	623		485	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	623		485	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	623		485	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	623		485	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	623		485	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	623		485	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	155		121	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	155		121	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	155		121	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	155		121	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	155		121	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	155		121	0
	9,344		7,267	
			24-Hour Volume	16,611

Equipment ID#:

Automated Traffic Counts

Street: **Kai Drive**
Location: **First Avenue**

City/State: **Oro Valley, AZ**
Project #:
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **2,090**

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	7		28	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	7		28	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	7		28	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	7		28	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	7		28	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	7		28	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	7		111	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	28		114	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	28		114	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	28		114	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	28		114	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	28		114	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:59 PM				
12:30 PM				
12:45 PM				
1:00 PM	28		114	
1:59 PM				
1:30 PM				
1:45 PM				
2:00 PM	28		114	
2:59 PM				
2:30 PM				
2:45 PM				
3:00 PM	28		114	
3:59 PM				
3:30 PM				
3:45 PM				
4:00 PM	28		114	
4:59 PM				
4:30 PM				
12:00 AM				
5:00 PM	28		114	
5:59 PM				
5:30 PM				
5:45 PM				
6:00 PM	28		114	
6:59 PM				
6:30 PM				
6:45 PM				
7:00 PM	7		28	
7:59 PM				
7:30 PM				
7:45 PM				
8:00 PM	7		28	
8:59 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		28	
9:59 PM				
9:30 PM				
9:45 PM				
10:00 PM	7		28	
10:59 PM				
10:30 PM				
10:45 PM				
11:00 PM	7		28	
11:59 PM				
11:30 PM				
11:45 PM				
12:00 AM	7		28	
	390		1,700	
	24-Hour Volume		2,090	

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS

2009 MUTCD WARRANTS

2021 With Project With Tangerine Access

County: _____ **District No.:** _____

City: Oro Valley **Population:** 45,395 **Survey Date:** 10/5/2016

	Route #	Name	Control	Section	85% Speed
Major		First Avenue		-	45
Minor		Kai Drive		-	25

Warrant 1: Eight- Hour Volumes

Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria		
Begin	End	Major	Minor	Major >= 420	Minor >= 105	Both Meet
12:00 AM	1:00 AM	276.3601	28.297699	N	N	N
1:00 AM	2:00 AM	276.3601	28.297699	N	N	N
2:00 AM	3:00 AM	276.3601	28.297699	N	N	N
3:00 AM	4:00 AM	276.3601	28.297699	N	N	N
4:00 AM	5:00 AM	276.3601	28.297699	N	N	N
5:00 AM	6:00 AM	276.3601	28.297699	N	N	N
6:00 AM	7:00 AM	1105.949	111.17852	Y	Y	Y
7:00 AM	8:00 AM	1108.077	113.5681	Y	Y	Y
8:00 AM	9:00 AM	1108.077	113.5681	Y	Y	Y
9:00 AM	10:00 AM	1108.077	113.5681	Y	Y	Y
10:00 AM	11:00 AM	1108.077	113.5681	Y	Y	Y
11:00 AM	12:00 PM	1108.077	113.5681	Y	Y	Y
12:00 PM	1:00 PM	1108.077	113.5681	Y	Y	Y
1:00 PM	2:00 PM	1108.077	113.5681	Y	Y	Y
2:00 PM	3:00 PM	1108.077	113.5681	Y	Y	Y
3:00 PM	4:00 PM	1108.077	113.5681	Y	Y	Y
4:00 PM	5:00 PM	1108.077	113.5681	Y	Y	Y
5:00 PM	6:00 PM	1108.077	113.5681	Y	Y	Y
6:00 PM	7:00 PM	276.3601	28.297699	N	N	N
7:00 PM	8:00 PM	276.3601	28.297699	N	N	N
8:00 PM	9:00 PM	276.3601	28.297699	N	N	N
9:00 PM	10:00 PM	276.3601	28.297699	N	N	N
10:00 PM	11:00 PM	276.3601	28.297699	N	N	N
11:00 PM	12:00 AM	276.3601	28.297699	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 12

Hours Required: 8

Condition A is satisfied

Warrant 1 satisfied.

Warrant 1: Eight- Hour Volumes

Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	276.3601	28.297699	N	N	N
1:00 AM	2:00 AM	276.3601	28.297699	N	N	N
2:00 AM	3:00 AM	276.3601	28.297699	N	N	N
3:00 AM	4:00 AM	276.3601	28.297699	N	N	N
4:00 AM	5:00 AM	276.3601	28.297699	N	N	N
5:00 AM	6:00 AM	276.3601	28.297699	N	N	N
6:00 AM	7:00 AM	1105.949	111.17852	Y	Y	Y
7:00 AM	8:00 AM	1108.077	113.5681	Y	Y	Y
8:00 AM	9:00 AM	1108.077	113.5681	Y	Y	Y
9:00 AM	10:00 AM	1108.077	113.5681	Y	Y	Y
10:00 AM	11:00 AM	1108.077	113.5681	Y	Y	Y
11:00 AM	12:00 PM	1108.077	113.5681	Y	Y	Y
12:00 PM	1:00 PM	1108.077	113.5681	Y	Y	Y
1:00 PM	2:00 PM	1108.077	113.5681	Y	Y	Y
2:00 PM	3:00 PM	1108.077	113.5681	Y	Y	Y
3:00 PM	4:00 PM	1108.077	113.5681	Y	Y	Y
4:00 PM	5:00 PM	1108.077	113.5681	Y	Y	Y
5:00 PM	6:00 PM	1108.077	113.5681	Y	Y	Y
6:00 PM	7:00 PM	276.3601	28.297699	N	N	N
7:00 PM	8:00 PM	276.3601	28.297699	N	N	N
8:00 PM	9:00 PM	276.3601	28.297699	N	N	N
9:00 PM	10:00 PM	276.3601	28.297699	N	N	N
10:00 PM	11:00 PM	276.3601	28.297699	N	N	N
11:00 PM	12:00 AM	276.3601	28.297699	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met:	12
Hours Required:	8

Condition B is satisfied

Warrant 1 satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** The required traffic is present for at least four hours.**

Warrant 2 is satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume

This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This w is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 is N/A.

Warrant 4: Pedestrian Volume

Required*	Existing
100 or more for each of any four hours	_____
OR	
190 or more during any one hour	_____

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: 1, 2

Warrants not satisfied: none

Warrants not applicable: 3, 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

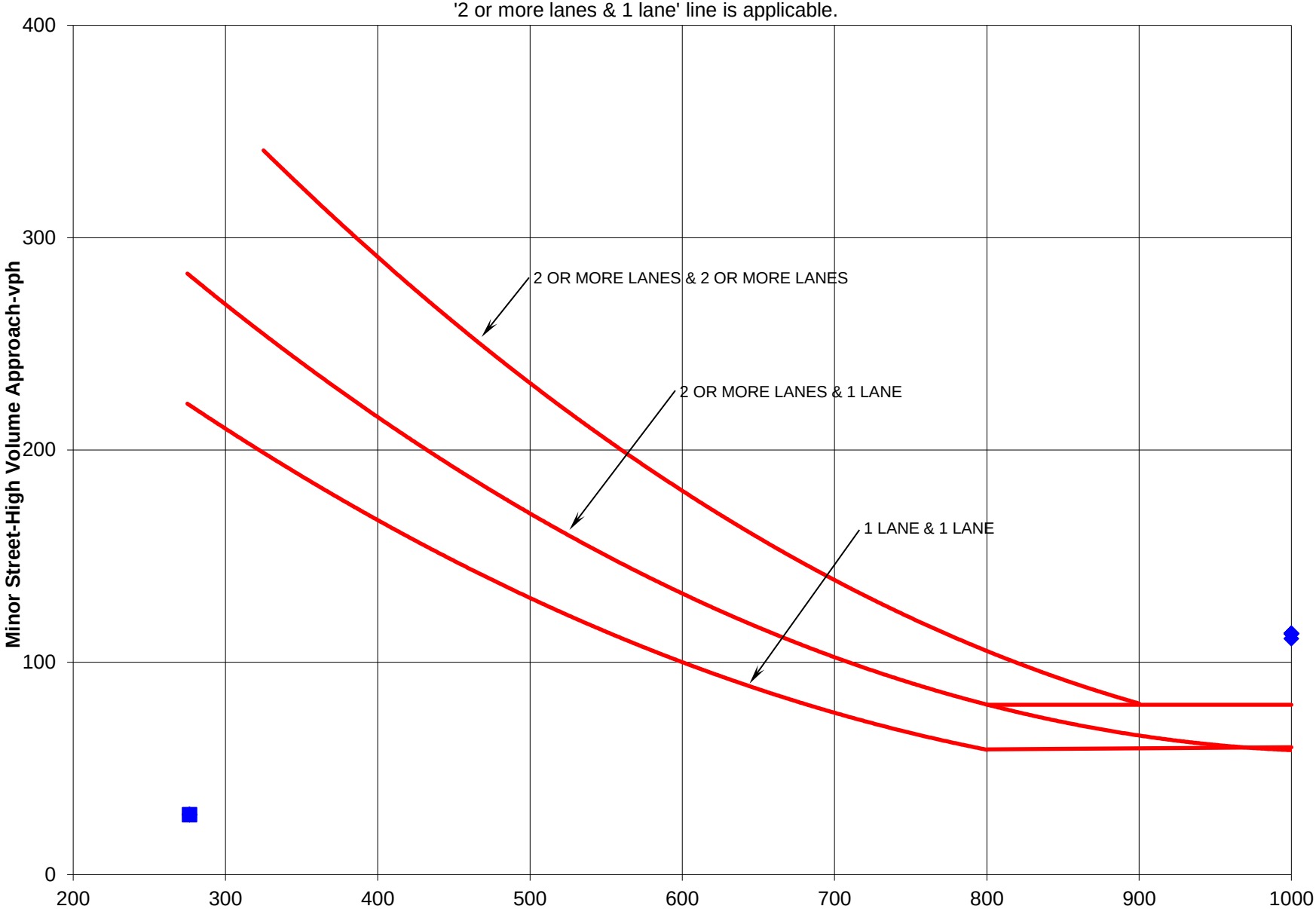
Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	276.3600831	28.2976992	-	-	-	-	N	-
2	276.3600831	28.2976992	-	-	-	-	N	-
3	276.3600831	28.2976992	-	-	-	-	N	-
4	276.3600831	28.2976992	-	-	-	-	N	-
5	276.3600831	28.2976992	-	-	-	-	N	-
6	276.3600831	28.2976992	-	-	-	-	N	-
7	276.3600831	28.2976992	-	-	-	-	N	-
8	1105.949101	111.178516	-	-	-	-	Y	-
9	1108.077236	113.568099	-	-	-	-	Y	-
10	1108.077236	113.568099	-	-	-	-	Y	-
11	1108.077236	113.568099	-	-	-	-	Y	-
12	1108.077236	113.568099	-	-	-	-	Y	-
13	1108.077236	113.568099	-	-	-	-	Y	-
14	1108.077236	113.568099	-	-	-	-	Y	-
15	1108.077236	113.568099	-	-	-	-	Y	-
16	1108.077236	113.568099	-	-	-	-	Y	-
17	1108.077236	113.568099	-	-	-	-	Y	-
18	1108.077236	113.568099	-	-	-	-	Y	-
19	1108.077236	113.568099	-	-	-	-	Y	-
20	276.3600831	28.2976992	-	-	-	-	N	-
21	276.3600831	28.2976992	-	-	-	-	N	-
22	276.3600831	28.2976992	-	-	-	-	N	-
23	276.3600831	28.2976992	-	-	-	-	N	-
24	276.3600831	28.2976992	-	-	-	-	N	-
			0	0	0	0	12	0
Warrant 2 is satisfied.			N	N	N	N	Y	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).

General Description of Intersection

2021 With Project Without Tangerine Access

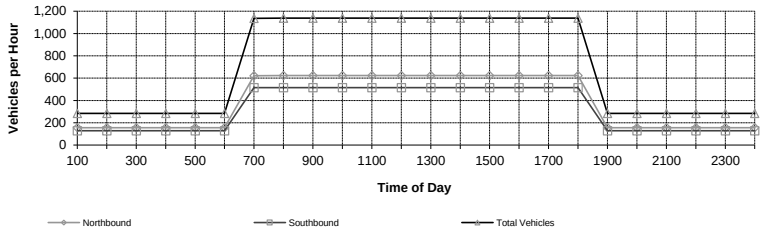
Project Number:	20059
Name of Major Roadway:	First Avenue
Direction:	N/S
# of NB Lanes:	2
# of SB Lanes:	2
85th percentile speed:	45 *mph*
Control #:	
Section #:	
Route #:	
Name of Minor Roadway:	Kai Drive
Direction:	E/W
# of EB Lanes:	1
# of WB Lanes:	1
85th percentile speed:	25 *mph*
Control #:	
Section #:	
Route #:	
City:	Oro Valley
Population:	45,395
County:	
District:	
Data Source:	AM/PM Peak Hour Count
Date of Survey:	10/5/2016 *(press Ctrl + ;)*
Day of Week:	Wednesday
Weather:	Sunny
Surface Conditions:	Dry / Smooth

Enter Traffic Volumes:

Automated Traffic Counts

Street: **First Avenue**
Location: **Kai Drive**

City/State: **Oro Valley, AZ**
Project #: **20059**
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **17,063**

Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	155		128	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	155		128	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	155		128	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	155		128	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	155		128	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	155		128	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	621		515	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	623		515	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	623		515	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	623		515	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	623		515	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	623		515	

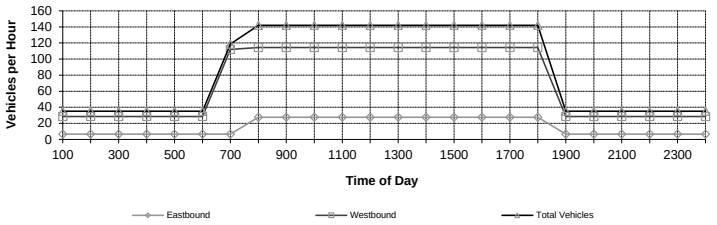
Time	Northbound		Southbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:15 PM				
12:30 PM				
12:45 PM				
1:00 PM	623		515	
1:15 PM				
1:30 PM				
1:45 PM				
2:00 PM	623		515	
2:15 PM				
2:30 PM				
2:45 PM				
3:00 PM	623		515	
3:15 PM				
3:30 PM				
3:45 PM				
4:00 PM	623		515	
4:15 PM				
4:30 PM				
4:45 PM				
5:00 PM	623		515	
5:15 PM				
5:30 PM				
5:45 PM				
6:00 PM	623		515	
6:15 PM				
6:30 PM				
6:45 PM				
7:00 PM	155		128	
7:15 PM				
7:30 PM				
7:45 PM				
8:00 PM	155		128	
8:15 PM				
8:30 PM				
8:45 PM				
9:00 PM	155		128	
9:15 PM				
9:30 PM				
9:45 PM				
10:00 PM	155		128	
10:15 PM				
10:30 PM				
10:45 PM				
11:00 PM	155		128	
11:15 PM				
11:30 PM				
11:45 PM				
12:00 AM	155		128	0
	9,344		7,719	
			24-Hour Volume	17,063

Equipment ID#:

Automated Traffic Counts

Street: **Kai Drive**
Location: **First Avenue**

City/State: **Oro Valley, AZ**
Project #:
Date: **10/5/2016**
Day of Week: **Wednesday**
Data Source: **AM/PM Peak Hour Count**



24-Hour Volume: **2,102**

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 AM				
12:15 AM				
12:30 AM				
12:45 AM				
1:00 AM	7		28	
1:15 AM				
1:30 AM				
1:45 AM				
2:00 AM	7		28	
2:15 AM				
2:30 AM				
2:45 AM				
3:00 AM	7		28	
3:15 AM				
3:30 AM				
3:45 AM				
4:00 AM	7		28	
4:15 AM				
4:30 AM				
4:45 AM				
5:00 AM	7		28	
5:15 AM				
5:30 AM				
5:45 AM				
6:00 AM	7		28	
6:15 AM				
6:30 AM				
6:45 AM				
7:00 AM	7		112	
7:15 AM				
7:30 AM				
7:45 AM				
8:00 AM	28		114	
8:15 AM				
8:30 AM				
8:45 AM				
9:00 AM	28		114	
9:15 AM				
9:30 AM				
9:45 AM				
10:00 AM	28		114	
10:15 AM				
10:30 AM				
10:45 AM				
11:00 AM	28		114	
11:15 AM				
11:30 AM				
11:45 AM				
12:00 PM	28		114	

Time	Eastbound		Westbound	
	Vehicles	Peds	Vehicles	Peds
12:00 PM				
12:59 PM				
12:30 PM				
12:45 PM				
1:00 PM	28		114	
1:59 PM				
1:30 PM				
1:45 PM				
2:00 PM	28		114	
2:59 PM				
2:30 PM				
2:45 PM				
3:00 PM	28		114	
3:59 PM				
3:30 PM				
3:45 PM				
4:00 PM	28		114	
4:59 PM				
4:30 PM				
12:00 AM				
5:00 PM	28		114	
5:59 PM				
5:30 PM				
5:45 PM				
6:00 PM	28		114	
6:59 PM				
6:30 PM				
6:45 PM				
7:00 PM	7		28	
7:59 PM				
7:30 PM				
7:45 PM				
8:00 PM	7		28	
8:59 PM				
8:30 PM				
8:45 PM				
9:00 PM	7		28	
9:59 PM				
9:30 PM				
9:45 PM				
10:00 PM	7		28	
10:59 PM				
10:30 PM				
10:45 PM				
11:00 PM	7		28	
11:59 PM				
11:30 PM				
11:45 PM				
12:00 AM	7		28	
	390		1,712	
			24-Hour Volume	2,102

Equipment ID#:

TRAFFIC SURVEY - COUNT ANALYSIS

2009 MUTCD WARRANTS

2021 With Project Without Tangerine Access

County: _____ **District No.:** _____

City: Oro Valley **Population:** 45,395 **Survey Date:** 10/5/2016

	Route #	Name	Control	Section	85% Speed
Major		First Avenue		-	45
Minor		Kai Drive		-	25

Warrant 1: Eight- Hour Volumes

Condition A

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	500	350	150	105
2 or more		1	600	**420**	150	**105**
2 or more		2 or more	600	420	200	140
1		2 or more	500	350	200	140

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 1

Time		Volume		Criteria		
Begin	End	Major	Minor	Major >= 420	Minor >= 105	Both Meet
12:00 AM	1:00 AM	283.8785	28.497448	N	N	N
1:00 AM	2:00 AM	283.8785	28.497448	N	N	N
2:00 AM	3:00 AM	283.8785	28.497448	N	N	N
3:00 AM	4:00 AM	283.8785	28.497448	N	N	N
4:00 AM	5:00 AM	283.8785	28.497448	N	N	N
5:00 AM	6:00 AM	283.8785	28.497448	N	N	N
6:00 AM	7:00 AM	1136.097	111.96331	Y	Y	Y
7:00 AM	8:00 AM	1138.225	114.36976	Y	Y	Y
8:00 AM	9:00 AM	1138.225	114.36976	Y	Y	Y
9:00 AM	10:00 AM	1138.225	114.36976	Y	Y	Y
10:00 AM	11:00 AM	1138.225	114.36976	Y	Y	Y
11:00 AM	12:00 PM	1138.225	114.36976	Y	Y	Y
12:00 PM	1:00 PM	1138.225	114.36976	Y	Y	Y
1:00 PM	2:00 PM	1138.225	114.36976	Y	Y	Y
2:00 PM	3:00 PM	1138.225	114.36976	Y	Y	Y
3:00 PM	4:00 PM	1138.225	114.36976	Y	Y	Y
4:00 PM	5:00 PM	1138.225	114.36976	Y	Y	Y
5:00 PM	6:00 PM	1138.225	114.36976	Y	Y	Y
6:00 PM	7:00 PM	283.8785	28.497448	N	N	N
7:00 PM	8:00 PM	283.8785	28.497448	N	N	N
8:00 PM	9:00 PM	283.8785	28.497448	N	N	N
9:00 PM	10:00 PM	283.8785	28.497448	N	N	N
10:00 PM	11:00 PM	283.8785	28.497448	N	N	N
11:00 PM	12:00 AM	283.8785	28.497448	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met: 12

Hours Required: 8

Condition A is satisfied

Warrant 1 satisfied.

Warrant 1: Eight- Hour Volumes

Condition B

Number of Lanes			Major Street Both Approaches Required		Minor Street High Volume Approach Required	
Major	Street	Minor Street	Urban	Rural*	Urban	Rural*
1		1	750	525	75	53
2 or more		1	900	**630**	75	**53**
2 or more		2 or more	900	630	100	70
1		2 or more	750	525	100	70

*Criteria when the 85th percentile speed is greater than 40 mph or when the population is less than 10,000

Warrant 2

Time		Volume		Criteria		
				Major	Minor	
Begin	End	Major	Minor	>= 630	> = 53	Both Meet
12:00 AM	1:00 AM	283.8785	28.497448	N	N	N
1:00 AM	2:00 AM	283.8785	28.497448	N	N	N
2:00 AM	3:00 AM	283.8785	28.497448	N	N	N
3:00 AM	4:00 AM	283.8785	28.497448	N	N	N
4:00 AM	5:00 AM	283.8785	28.497448	N	N	N
5:00 AM	6:00 AM	283.8785	28.497448	N	N	N
6:00 AM	7:00 AM	1136.097	111.96331	Y	Y	Y
7:00 AM	8:00 AM	1138.225	114.36976	Y	Y	Y
8:00 AM	9:00 AM	1138.225	114.36976	Y	Y	Y
9:00 AM	10:00 AM	1138.225	114.36976	Y	Y	Y
10:00 AM	11:00 AM	1138.225	114.36976	Y	Y	Y
11:00 AM	12:00 PM	1138.225	114.36976	Y	Y	Y
12:00 PM	1:00 PM	1138.225	114.36976	Y	Y	Y
1:00 PM	2:00 PM	1138.225	114.36976	Y	Y	Y
2:00 PM	3:00 PM	1138.225	114.36976	Y	Y	Y
3:00 PM	4:00 PM	1138.225	114.36976	Y	Y	Y
4:00 PM	5:00 PM	1138.225	114.36976	Y	Y	Y
5:00 PM	6:00 PM	1138.225	114.36976	Y	Y	Y
6:00 PM	7:00 PM	283.8785	28.497448	N	N	N
7:00 PM	8:00 PM	283.8785	28.497448	N	N	N
8:00 PM	9:00 PM	283.8785	28.497448	N	N	N
9:00 PM	10:00 PM	283.8785	28.497448	N	N	N
10:00 PM	11:00 PM	283.8785	28.497448	N	N	N
11:00 PM	12:00 AM	283.8785	28.497448	N	N	N

Total number of hours, both the major(both approaches) and minor(high volume approach) met:	12
Hours Required:	8

Condition B is satisfied

Warrant 1 satisfied.

Warrant 2: Four Hour Vehicular Volumes

This warrant is similar to Warrant 1A, except that the required traffic volumes must be present for at least four hours of an average day. The traffic volumes required are based on curves (Figure 4C-1) shown in the MUTCD.

*** The required traffic is present for at least four hours.**

Warrant 2 is satisfied

Warrant 3, Condition A- Peak Hour Delay

This warrant is intended for application where traffic conditions will cause undue delay to traffic entering or crossing the major street. The peak hour delay warrant is satisfied when the following conditions exist for one hour (any four consecutive 15-minute periods) of an average weekday:

(1) The total delay by the traffic on a side street controlled by a stop sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach, **and**

(2) the volume on the side street (one direction) equals or exceeds 100 vph for one moving lane of traffic and 150 vph for two moving lanes, **and**

(3) the total traffic volume serviced during 1 hour equals or exceeds 800 vph for an intersection with four (or more) approaches or 650 vph for three approaches.

***Part 1 - N/A**
***Part 2 - N/A**
***Part 3 - N/A**

Warrant 3, Condition B - Peak Hour Volume

This warrant applies to traffic entering from the minor street which encounters undue delay crossing the main street. This w is satisfied when the main street and side street traffic volumes satisfy the curves shown in Figure 4C-4 of the TMUTCD.

Warrant 3 is N/A.

Warrant 4: Pedestrian Volume

Required*	Existing
100 or more for each of any four hours	_____
OR	
190 or more during any one hour	_____

* For predominant pedestrian crossing speeds less than 3.5 ft/sec, the pedestrian volume may be reduced as much as 50 percent.

Gap Requirements

YES	NO	Is the nearest signal located more than 300 feet away?
YES	NO	For traffic flow which is not platooned, are there less than 60 gaps per hour of adequate length for the pedestrians to cross the street?

Warrant 4 is N/A.

Warrant 5: School Crossing

YES NO Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?

Warrant 5 is N/A.

Warrant 6: Coordinate Systems

YES NO Are the adjacent signals in a signal system?
YES NO Would the resultant spacing be 1000 feet or more?

Warrant 6 is N/A.

Warrant 7: Crash Experience

YES NO Is 80% or more of one of Warrants #1, #2, or #3 met?
YES NO Have there been more than five accidents susceptible to correction by a traffic signal in 12 months?

Warrant 7 is N/A.

Warrant 8: Roadway Network

YES NO Does the major street having an existing or immediately projected entering volume of > 1000 vehicles per hour of a typical weekday?

YES NO Do 5-year projected traffic volumes meet Warrants 1, 2, or 3?

YES NO Is there an entering traffic volume of at least 1000 vehicles per hour for each of any 5 hours on a Saturday or Sunday?

Warrant 8 is N/A.

Summary:

Warrants satisfied: 1, 2

Warrants not satisfied: none

Warrants not applicable: 3, 4, 5, 6, 7, 8

Warrants not included in study: none

Warrant 2 - Four Hour Vehicular Volumes

85th % speed: > 40 mph
Population: >= 10,000

Major Street Lanes: 2
Minor Street Lanes: 1

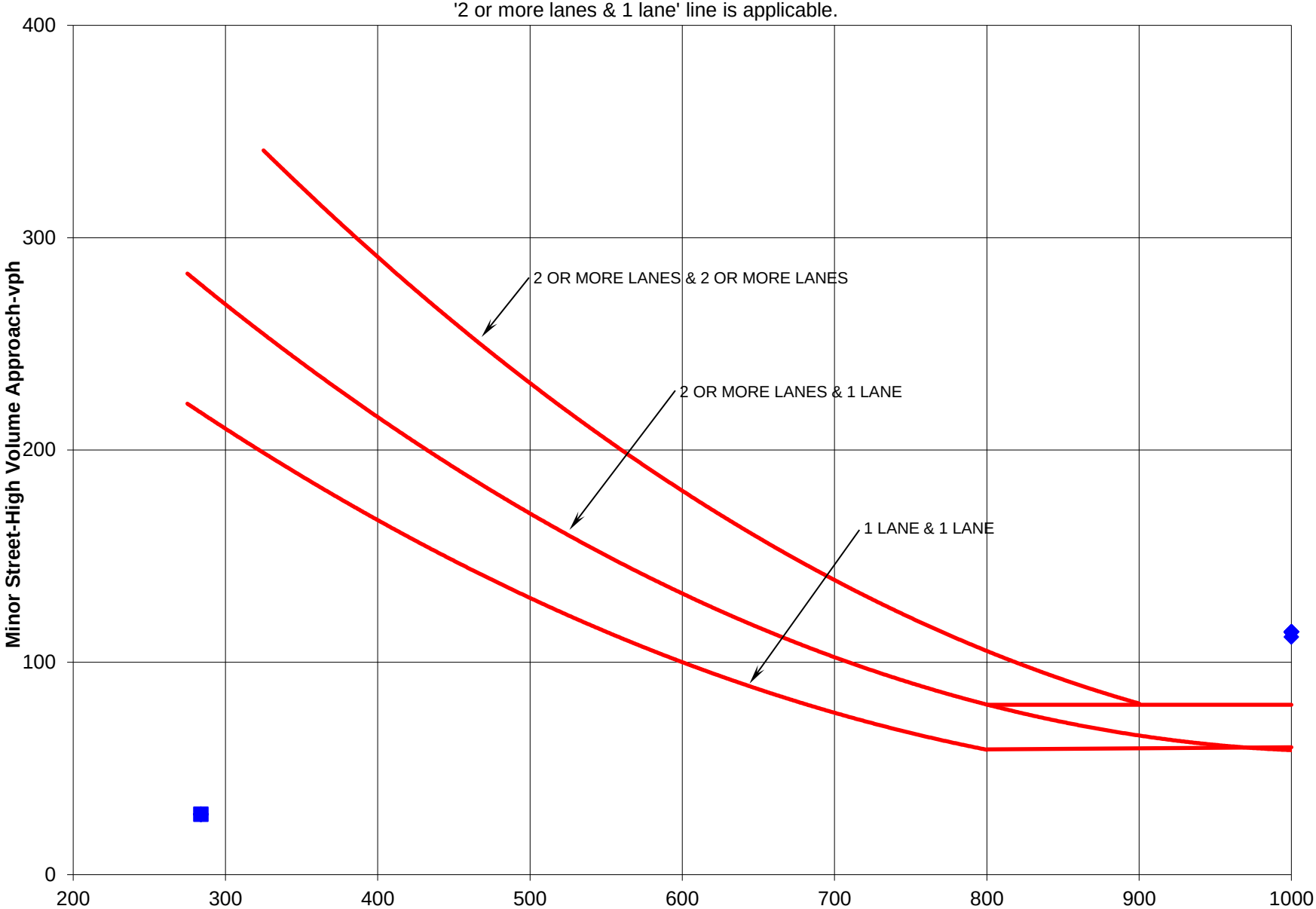
Use Figure: 4C-2 2&1

Rank	Major Street Volume	Minor Street Volume	Figure 4C-1			Figure 4C-2		
			1&1	2&1	2&2	1&1	2&1	2&2
1	283.8785284	28.4974477	-	-	-	-	N	-
2	283.8785284	28.4974477	-	-	-	-	N	-
3	283.8785284	28.4974477	-	-	-	-	N	-
4	283.8785284	28.4974477	-	-	-	-	N	-
5	283.8785284	28.4974477	-	-	-	-	N	-
6	283.8785284	28.4974477	-	-	-	-	N	-
7	283.8785284	28.4974477	-	-	-	-	N	-
8	1136.097322	111.963305	-	-	-	-	Y	-
9	1138.225457	114.369757	-	-	-	-	Y	-
10	1138.225457	114.369757	-	-	-	-	Y	-
11	1138.225457	114.369757	-	-	-	-	Y	-
12	1138.225457	114.369757	-	-	-	-	Y	-
13	1138.225457	114.369757	-	-	-	-	Y	-
14	1138.225457	114.369757	-	-	-	-	Y	-
15	1138.225457	114.369757	-	-	-	-	Y	-
16	1138.225457	114.369757	-	-	-	-	Y	-
17	1138.225457	114.369757	-	-	-	-	Y	-
18	1138.225457	114.369757	-	-	-	-	Y	-
19	1138.225457	114.369757	-	-	-	-	Y	-
20	283.8785284	28.4974477	-	-	-	-	N	-
21	283.8785284	28.4974477	-	-	-	-	N	-
22	283.8785284	28.4974477	-	-	-	-	N	-
23	283.8785284	28.4974477	-	-	-	-	N	-
24	283.8785284	28.4974477	-	-	-	-	N	-
			0	0	0	0	12	0
Warrant 2 is satisfied.			N	N	N	N	Y	N

Warrant 2

Figure 4C-2 Four Hour Volume Warrant (population<10,000 or >40 mph on major street)

'2 or more lanes & 1 lane' line is applicable.



* If data point is outside graph boundaries, it is plotted at the maximum shown value(s).