Cottonwood Subdivision
Traffic Impact Analysis

Cottonwood Road
Walla Walla, Washington

Prepared for:
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Purpose and Scope

The applicant proposes to develop a large undeveloped lot on Cottonwood Road, west of Kendall Road. The parcel consists of approximately 104.6 acres that are currently within the Walla Walla County (County) jurisdiction but will soon be annexed into the City of Walla Walla (City). The anticipated built-out date of the residential lots is 2025. This report analyzes the traffic impacts generated by the completed development as required by the City and County.

The client provided a current site plan for the proposed development showing an approximate 4,550,000-square-foot lot to be subdivided into approximately 408 residential lots. The Cottonwood Subdivision development will occupy one parcel (3600604120029). The project proposes five public accesses into the subdivision: three access points along Cottonwood Road, and two public access points to Kendall Road (one of which will be an extension of existing Eagle Crest Drive to Kendall Road).

The following intersections were identified for this traffic impact analysis (TIA):

1. Howard Street/2nd Avenue/Abbott Road
2. Cottonwood Road/Prospect Avenue/Howard Street/Reser Road
3. Kendall Road/Reser Road
4. Cottonwood Road/Eagle Crest Drive
5. Kendall Road/Rooster Road
6. Cottonwood Road/Rosewood Place
7. Kendall Road/Valley Vista Avenue
8. Langdon Road/Plaza Way
9. Cottonwood Road/Power Line Road/Langdon Road (broken into three study intersections, see Figure 3 for intersection numbers)
10. Ranch Road/Cottonwood Road

Findings

The findings of this TIA are listed below.

Traffic volumes in the study area vicinity will continue to increase with or without the project. A background 1.0 percent annual growth rate is applied throughout the study area, and the traffic impacts of one in-process project are added to the study area to evaluate the background conditions.

The proposed Cottonwood subdivision is estimated to generate 3,852 weekday trips, including 302 trips during the AM peak hour, 404 trips during the PM peak hour. These trips will be distributed through five access points into and out of the proposed subdivision.

The 2013–2017 collision history at the study intersections was reviewed; all intersections have collision rates lower than the critical rate, and no patterns of collision types or of severe collisions were identified.

Cottonwood will have a relatively complete sidewalk on the east side from the site to the schools to the north. Some of the missing sections are in-process of being built by other developments but there is a missing

section of sidewalk near the Russell Creek that is not funded. Until the missing sections can be installed, the local street network will provide a safe alternative pedestrian path

Cottonwood currently serves as an important bicycle route and has bike lanes north of the project.

No current transit routes travel through the study area.

Twelve intersections were evaluated for operational performance based on level of service (LOS) and volume to capacity (v/c) ratio, which measure traffic operations. With the exception of two intersections, all locations operate within the applicable LOS standard during all analysis scenarios, both without and with the project trips. The intersection of Howard Street and S 2nd Avenue/Abbott Road operates at LOS "F," exceeding the applicable LOS E standard during the AM peak hour. The intersection of Howard Street/Cottonwood Road and Prospect Avenue/Reser Road operates at LOS E during the PM peak hour. LOS E is acceptable according to the January 2007 *Walla Walla Urban Area Transportation Impact Analysis Guidelines,* but no existing intersection may be worsened by more than two levels of service.

The installation of left turn lanes on Howard Street, north and south of S 2nd Avenue/Abbott Road, improved the LOS to D. This will require restricting parking for 300 feet on both sides of Howard Street north and south of S 2nd Avenue/Abbott Road.

The installation of left turn lanes on Cottonwood Road/Howard Street, north and south Prospect Avenue/Reser Road, improved the LOS to C. This will require restricting parking for 300 feet on both sides of Cottonwood Road/Howard Street north of Prospect Avenue/Reser Road and narrowing the bike lane to 4 feet wide south of Prospect Avenue/Reser Road.

Except for one site access, all proposed intersections into the site have adequate turning sight distance out of the site. The intersection of Kendall Road and Valley Vista Avenue has inadequate turning sight distance to the south due to a berm.

Recommendations

The traffic impact analysis supports the following recommendations.

Install left turn lanes on Howard Street at S 2nd Avenue/Abbott Road.

Install left turn lanes on Howard Street/Cottonwood Road at Prospect Avenue/Reser Road.

The project shall connect a walkway to Wenaha Drive.

The applicant should install sidewalks along their frontages to Cottonwood Road and Kendall Road. All sidewalks shall be designed to meet current ADA accessibility standards.

Cottonwood Road should be widened to provide shoulder width for future bike lanes.

Design all roadway intersections, especially those on Cottonwood Road and Kendall Road, to meet AASHTO Standards for intersection sight distance. Special attention is needed at the Kendall Road and Valley Vista Avenue intersection due to the berm.

1 INTRODUCTION

The purpose of this study is to determine the impacts of the traffic generated by the Cottonwood Subdivision project on the surrounding roadway infrastructure. The project site, shown on the vicinity map (Figure 1), is along Cottonwood Road, and west of Kendall Road. This study will determine if mitigation is required to keep the roadways operating safely and at capacity levels acceptable under the current level of service standards. This report documents the findings and conclusions of a traffic impact analysis (TIA) conducted for the proposed site plan (Figure 2) application for property located in Walla Walla, Washington.

1.1 Scope of Study

This study documents the existing and proposed conditions, traffic data, safety analysis, and intersection operations in accordance with the requirements of the City of Walla Walla (City) and Walla Walla County (County).

The scope of this TIA was refined in phone conversations and email correspondence with City and County staff. The following intersections were identified for analysis:

1. Howard Street/2nd Avenue/Abbott Road
2. Cottonwood Road/Prospect Avenue/Howard Street/Reser Road
3. Kendall Road/Reser Road
4. Cottonwood Road/Eagle Crest Drive
5. Kendall Road/Rooster Road
6. Cottonwood Road/Rosewood Place
7. Kendall Road/Valley Vista Avenue
8. Langdon Road/Plaza Way
9. Cottonwood Road/Power Line Road/Langdon Road
10. Cottonwood Road/Power Line Int
11. Power Line Road/Power Line Int
12. Ranch Road/Cottonwood Road

This TIA includes analysis of future background conditions growth based on an assumed 1.0 percent annual growth rate and the addition of traffic from in-process projects.

This TIA is prepared for submission to the City. The traffic-related issues addressed in this report include:

- Existing traffic conditions including in-process trips and background growth
- Site-generated traffic volumes and trip distribution
- Build-out year (2025) conditions without and with the project
- Capacity analysis of the existing and future conditions for weekday AM and PM peak hours
- Safety analysis of the existing and future conditions
- Recommendations for mitigation of traffic impacts and conclusions

1.2 Existing Site Conditions

The existing site spans across one tax lot between Cottonwood Road on the west and Kendall Road on the east. The parcel is currently undeveloped farm land on the boundary of Walla Walla city limits. To the northwest of the site is the 101-lot Tablerock Subdivision that is currently occupied with single-family homes. Tablerock Subdivision will be internally connected to the proposed subdivision after the project site is developed. Several other smaller subdivisions surround the project site but will not be internally connected with the development of the site and are separated by a major collector or minor arterial. All surrounding existing subdivisions will remain after the development of the project site.

1.3 Existing Infrastructure

The existing infrastructure and operational traffic conditions in the study area were documented. Roadway conditions were studied to confirm that the roadway is currently operating in a safe and efficient manner.

1.3.1 Land Uses

The land uses surrounding the site are documented to help identify the site location and provide reference for any discussion of conditions that might impact the adjacent properties. The land uses surrounding the site are shown in Table 1.

Table 1. Land Uses Around the Site

North of Site	
Zoning	R-96
Description	Suburban
Existing Use	Residential

West of Site	
Zoning	R-96*
Description	Single Family
Existing Use	Residential

SITE

East of Site	
Zoning	R-5
Description	Rural
Existing Use	Residential

South of Site	
Zoning	R-5
Description	Rural
Existing Use	Residential

* City of Walla Walla Classification

The site is zoned Suburban Residential (R-96) and is currently undeveloped and unoccupied. Zones surrounding the project site are classified by County classifications.

1.3.2 Existing Roadways

The site is on the existing minor arterial roadway (Cottonwood Road), but has access off the existing local roadway (Eagle Crest Drive) and existing major collector roadway (Kendall Road). Data was gathered on this and other roadways in the study area to inform operations analysis of the existing roadway system. The pertinent information regarding the study area roadways is tabulated in Table 2.

Table 2. Existing Roadway Information

Roadway Name	Classification	Speed Limit	Lane Configuration		
			Lanes	Sidewalks	Bike Lanes
S 2nd Avenue	Principle Arterial	30	2	Partial	Partial
Howard Street	Minor Arterial	25	2	Yes	Yes
Abbott Road	Major Collector	25	2	Yes	No
Prospect Avenue	Minor Arterial	35	2	Yes	Yes
Reser Road	Minor Arterial	25	2	Yes	Yes
Cottonwood Road	Minor Arterial	40**	2	Partial	Partial
Kendall Road	Major Collector	45**	2	No	No
Eagle Crest Drive	Local	25	2*	Yes	No
Langdon Road	Major Collector	35	2	No	No
Plaza Way	Minor Arterial	35	2	No	No
Power Line Road	Major Collector	35	2	No	No
Power Line Int	Major Collector	25	2*	No	No
Rosewood Place	Local	25	2*	No	No
Rooster Road	Local	25	2*	No	No
Valley Vista Avenue	Local	25	2*	No	No
Ranch Road	Local	25	2*	No	No

* Unstriped 2-lane

** Based on speed study, see Appendix A

1.3.3 Major Intersections and Traffic Control

The following are the intersections, identified through communication with the City and County, being reviewed in the study area:

- Howard Street/2nd Avenue/Abbott Road
- Cottonwood Road/Prospect Avenue/Howard Street/Reser Road
- Kendall Road/Reser Road
- Cottonwood Road/Eagle Crest Drive
- Kendall Road/Rooster Road
- Cottonwood Road/Rosewood Place
- Kendall Road/Valley Vista Avenue
- Langdon Road/Plaza Way
- Cottonwood Road/Power Line Road/Langdon Road
- Cottonwood Road/Power Line Int
- Power Line Road/Power Line Int
- Ranch Road/Cottonwood Road

The information shown in Table 3 was gathered and is relevant to the intersection operations analysis noted above. Table 3 presents the existing geometrics and traffic control at the study intersections.

Table 3. Major Intersections: Existing Lanes and Traffic Controls

Intersection	Howard Street/2nd Avenue/Abbott Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Stop	Stop
Number of Lanes	1	1	1	1

Intersection	Cottonwood Road/Prospect Avenue/Howard Street/Reser Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Stop	Stop
Number of Lanes	1	1	1	1

Intersection	Kendall Road/Reser Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Unc.	Unc.
Number of Lanes	1	1	1	1

Intersection	Cottonwood Road/Eagle Crest Drive			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	Stop	N/A
Number of Lanes	1	1	1	N/A

Intersection	Kendall Road/Rooster Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	Stop	N/A
Number of Lanes	1	1	1	N/A

Intersection	Cottonwood Road/Rosewood Place			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	N/A	Stop
Number of Lanes	1	1	N/A	1

Intersection	Kendall Road/Valley Vista Avenue			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	Stop	N/A
Number of Lanes	1	1	1	N/A

Intersection	Langdon Road/Plaza Way			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	Stop	N/A
Number of Lanes	1	1	1	N/A

Intersection	Cottonwood Road/Power Line Road/Langdon Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	Stop	Stop	Stop
Number of Lanes	1	1	1	1

Intersection	Cottonwood Road/Power Line Int			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	N/A	Unc.	Unc.
Number of Lanes	1	N/A	1	1

Intersection	Power Line Road/Power Line Int			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Unc.	Unc.	Stop	N/A
Number of Lanes	1	1	1	N/A

Intersection	Ranch Road/Cottonwood Road			
Leg	**NB**	**SB**	**WB**	**EB**
Control	Stop	N/A	Unc.	Unc.
Number of Lanes	1	N/A	1	1

Stop = Stop controlled leg of intersection
Unc. = Uncontrolled leg approaching intersection – does not stop or yield

The project area is defined as the vicinity of the site encompassed by the study intersections. The operation of the intersections is controlled with stop signing. Table 3 refers to the type of control and number of approach lanes for each leg of each intersection. The existing lane configurations and traffic controls for all intersections are shown in Figure 3.

1.4 Traffic Volumes

1.4.1 Existing Traffic Volumes

Traffic volume data was gathered using All Traffic Data (ATD) for the site vicinity for the weekday AM peak hour (7:00–9:00 AM) and the weekday PM peak hour (1:30–5:30 PM). ATD collected the data on January 10, 2019, which had a typical school schedule. Copies of the count data used are provided in Appendix A.

The traffic volume data demonstrated the AM peak hour was either between the hour of 7:15–8:15 AM or 7:30–8:30 AM for all the intersections in the study area. The volumes associated to the measured peak hour for each individual intersection was input to the intersection operations analyses addressed later in this TIA. A system peak hour was not used for AM volume inputs.

For the PM volume data, a system peak hour calculation was performed to identify the hour within the PM peak time frame that had highest total entering volume. Traffic volume data was collected in 15-minute intervals over the PM peak time frame. To calculate the system peak hour, the total traffic volume from each intersection during a single 15-minute interval were summed into hourly totals. The PM system peak hour was calculated to be from 2:45–3:45 PM with a total of 2,614 cars. The system peak hour calculation identified a secondary peak hour from 4:30–5:30 PM. The 2:45 PM resulting system peak hour was impacted by multiple

different factors that do not necessarily portray the study area accurately. The system peak hour that accurately portrays the behavior of the study area is 4:30–5:30 PM. The volumes associated to the 4:30 PM peak hour was input to the intersection operations analyses addressed later in this TIA.

The following existing minor intersections were not counted. The existing volumes are based on adjacent counts, trip generation and distribution of the existing land-use and professional judgement:

- Cottonwood Road and Rosewood Place
- Cottonwood Road and Rancho Road
- Kendall Road and Rooster Road
- Kendall Road and Valley Vista Avenue

1.4.2 Background Growth

Background growth is a generic increase in traffic volumes that either is not attributable to specific developments or is attributable to influences outside the study area. As a conservative estimate, a background growth rate of 1.0 percent per year was applied to all 2019 existing peak hour movement volumes between public roadways at the studied intersections. This estimate supports the growth rate expected by the City in the *2040 Walla Walla Comprehensive Plan Update*. The background growth volumes are presented in Figure 7 for growth between 2019 and 2025.

1.4.1 In-Process Projects

In-process trips from approved projects were requested from the City and County. The County currently does not have any in-progress projects. The following are the in-process projects noted by the City:

- Iron Gate II

This in-process project will add trips to the study area intersections. The in-process trips are included in Appendix B.

1.4.2 Future Volumes

The baseline volumes for 2025 intersection operations analysis, termed the 2025 Without Project volumes, represent the sum of existing traffic and background growth. Figure 7 presents the 2025 Without Project volumes for the weekday AM and PM peak hours.

2 PROPOSED CONDITIONS

The proposed development will add traffic to the roadway system. Where the project is located, the size of the project, and when it will be completed are all important elements that need to be considered to determine the impacts of this development on safety and capacity. It is also important to examine how the project will operate with the existing transportation system, estimate how much new traffic it will generate, and predict where traffic generated by the site will be distributed. Furthermore, this section will address any funded infrastructure changes planned by other agencies or developers. All of these elements are important in assessing the traffic impacts of this project.

2.1 Project Description

The proposed Cottonwood Subdivision development project will consist of approximately 408 residential lots on a 104.6-acre parcel. The residential lots will occupy approximately 104.6 acres of the site and are anticipated to be constructed and occupied in 2025. This report analyzes the traffic impacts generated by the completed development as required by the City.

2.2 Access and Circulation

The project has several access points, both existing and proposed, as shown in Figure 2.

The residential lots will access the proposed subdivision through five access points. The project proposes four new public accesses at existing intersections surrounding the project site, two accesses off of Cottonwood Road, and two off of Kendall Road. The fifth access will be an extension of the existing public road to the north of the project site, Eagle Crest Drive. Along Cottonwood, one access will be at the intersection of Rosewood Place on the west side of the site, and the other on the south side of the site at the intersection of Ranch Road. Along Kendall, one access will be at the intersection of Valley Vista Avenue, and the other at the intersection of Rooster Road. Both accesses off of Kendall are on the east side of the site. The proposed access at the intersection of Rooster Road the end of the extension of Eagle Crest Drive through the proposed development.

2.3 Trip Generation and Distribution

The following sections rely on data provided in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* (see References section). Detailed trip generation calculations are provided in Appendix C.

2.3.1 Proposed Trip Generation

The number of new trips from the proposed Cottonwood Subdivision development was estimated using the ITE *Trip Generation Manual,* 9th Edition (2012). The ITE trip generation rates for Single-Family Detached (ITE Land Use Code 210), with the number of dwellings as the independent variable was applied. See Figure 2 for the preliminary site plan and lot layout.

The new weekday trips generated by the project are shown in Table 4. The trip generation values are based on the ITE weighted average rates, and the independent variable is the number of single-family dwellings. Trip generation calculations are included in Appendix C.

Table 4. ITE Trip Generation

Land Use (ITE Code)	Single-Family Dwelling (210)			
Independent Variable	Dwellings			
Size	408			
Average Weekday Trips (ADT)	702			
Peak Hour Trips	**AM Peak Hour of Adjacent Street (7:00 to 9:00 AM)**		**PM Peak Hour of Adjacent Street (1:30 to 5:30 PM)**	
In	25%	76	64%	259
Out	75%	226	36%	145
Total Trips	100%	302	100%	404

2.3.2 Proposed Trip Distribution

The proposed distribution of new (primary) trips is based on a review of the land uses within the study area, on the distribution of existing traffic patterns, and on engineering judgment. The proposed distribution pattern is as follows:

- 10 percent to and from Plaza Way north of Langdon Road
- 5 percent to and from Plaza Way south of Langdon Road
- 15 percent to and from E Langdon Road west of Power Line Road
- 5 percent to and from Power Line Road south of Cottonwood Road
- 55 percent to and from Cottonwood Road south of Prospect Avenue
- 40 percent to and from Howard Street south of Abbott Road
- 20 percent to and from Howard Street north of Abbott Road
- 20 percent to and from S 2nd Avenue west of Howard Street
- 25 percent to and from Kendall Road south of Reser Road
- 10 percent to and from Reser Road east of Kendall Road
- 30 percent to and from Fern Avenue north of Reser Road

The distribution pattern above represents an external distribution of Cottonwood Subdivision entering and exiting the study area. The distribution and assignment of the net new trips to the Cottonwood Subdivision are shown on Figure 5 and Figure 6.

2.3.3 Future Volumes with Project

Figure 8 presents the 2020 With Project volumes, or the sum of Without Project volumes and the net site-generated trips, for the weekday AM and PM peak hours.

3 INTERSECTION OPERATIONS AND ROADWAY CAPACITY ANALYSES

3.1 Operations Description

Traffic operations are assessed in terms of level of service (LOS), a concept developed by transportation engineers to qualify the level of operation of intersections and roadways (*Highway Capacity Manual*, see References). LOS measures are classified in grades "A" through "F," indicating a range of operation, with LOS "A" signifying the best level of operation and LOS "F" representing the worst level.

LOS at unsignalized intersections is quantified in terms of average delay per vehicle. LOS "A" reflects full freedom of operation for a driver, while LOS "F" represents operational failure. The criteria are based on the theory of gap acceptance for stop-controlled approaches.

The volume-to-capacity (v/c) ratio quantifies the portion of the theoretical capacity consumed by traffic demand volume. A v/c ratio of zero (0.00) reflects none of the capacity is consumed and all the capacity is fully available. A v/c ratio of one (1.00) reflects all the capacity is consumed and represents operational failure. The v/c ratio can be calculated for an intersection approach lane or for a signalized intersection as a whole, with the latter calculation aggregating the v/c ratios of the critical movements.

3.2 Operation Standards

The City considers LOS D in the peak hour the minimum acceptable operation all critical movements of an arterial or collector unsignalized intersection as noted in the City's January 2007 *Walla Walla Urban Area Transportation Impact Analysis Guidelines*. In addition, no existing intersection or critical movement should worsen by more than two levels of service. If an existing or no-build condition intersection or critical movement is operating at an acceptable or less than acceptable LOS, then any proposed additional traffic must not increase the delay by more than 10 seconds. The City considers LOS E acceptable for critical movements at local roadways, and this value may be applied as a guideline at a private driveway.

Per *Walla Walla County Traffic Impact Analysis Guidelines* (see References), the County considers LOS C the minimum acceptable operation for any intersection within rural areas of Walla Walla County. In addition, the LOS of any intersection may drop more than two levels of service, provided final level of service is not below the minimum acceptable level of service.

The analysis should also include the volume to capacity (v/c) ratios for each lane group or movement. The v/c ratio indicates the amount of congestion for each movement. Any v/c ratio greater than one indicates that the movement is operating above capacity.

3.3 Analysis Methodology

Traffic impacts were estimated to determine the extent of change in traffic conditions caused by the development of this project. In order to make this determination, the following assumptions were employed:

- The proposed development will be completed and fully occupied by 2025.
- As noted previously, the measured AM peak hour discovered from volume counts will be used for each intersection. The PM peak hour was found to be 4:30–5:30 PM after further analysis of the volume data.
- The peak hour factor (PHF) for the overall intersection, as calculated from the count data, was applied for each analysis scenario. No adjustments were made for future year scenarios.
- The PHF for the proposed intersections (without volume data) were given a PHF value based on existing volume conditions. Intersections of Rooster Road/Kendall Road, Rosewood

Place/Cottonwood Road, Valley Vista Avenue/Kendall Road and Ranch Road/Cottonwood Road was given a PHF of 0.78. No adjustments were made for future year scenarios.

- The heavy vehicle percentage (HV%) for each movement, as calculated from the count data, was applied for all analysis scenarios. No adjustments were made for future year scenarios.
- As noted previously, trip generation estimates for the project were prepared for the weekday AM and PM peak hours on the surrounding street system.
- Cumulative traffic impacts of the proposed project were determined by superimposing the project-generated traffic onto the background weekday AM and PM peak traffic at all studied intersections. These are termed the 2020 With Project conditions.
- The LOS for all stop-controlled intersections were calculated with Trafficware's Synchro software, Version 10, based on *Highway Capacity Manual* (HCM) 2010 methodologies.

LOS calculation reports for the study area intersections are provided in Appendix D. The key analysis findings are listed in the following tables.

3.4 Level of Service Analyses

3.4.1 (2019) Existing Conditions

Table 5. Estimated 2019 Level of Service for Existing Conditions for Study Area Intersections

INTERSECTION *(critical lane group)*	AM Peak Hour			PM Peak Hour		
	LOS	***Delay (sec/veh)***	***v/c***	***LOS***	***Delay (sec/veh)***	***v/c***
Howard Street & 2nd Avenue/Abbott Road (NB LT)	C	19.6	0.675	B	10.5	0.331
Cottonwood Road/Howard Street & Prospect Avenue/Reser Road (AM - EB LT) (PM - SB LT)	B	14.0	0.513	B	13.1	0.450
Kendall Road/Coyle Lane & Reser Road (NB LT)	B	10.4	0.102	A	9.9	0.043
Cottonwood Road & Eagle Crest Drive (WB LT)	A	8.9	0.040	A	8.7	0.022
Kendall Road & Rooster Road (WB LT)	A	8.7	0.005	A	8.6	0.005
Cottonwood Road & Rosewood Place (EB LT)	A	8.9	0.003	A	9.0	0.003
Kendal Road & Valley Vista Avenue (WB LT)	A	8.6	0.005	A	8.5	0.005
Plaza Way & Langdon Road (WB LT)	B	10.4	0.084	B	10.3	0.047
Cottonwood Road/Power Line Road & Langdon Road (AM - NB LT) (PM - EB LT)	A	7.6	0.044	A	7.5	0.049
Power Line Int & Cottonwood Road (NB LT)	A	8.5	0.015	A	8.6	0.011
Power Line Road & Power Line Int (WB LT)	A	8.9	0.020	A	9.1	0.022
Ranch Road & Cottonwood Road (NB LT)	A	8.8	0.008	A	8.9	0.006

N/A = not available from Synchro reports

As shown in Table 5, all studied intersections currently operate at an acceptable LOS during the weekday AM and PM peak hours.

3.4.2 (2025) Future Conditions Without Project

Table 6. Estimated 2025 Level of Service without Project for Study Area Intersections

INTERSECTION *(critical lane group)*	AM Peak Hour			PM Peak Hour		
	LOS	***Delay (sec/veh)***	***v/c***	***LOS***	***Delay (sec/veh)***	***v/c***
Howard Street & 2nd Avenue/Abbott Road (NB LT)	D	25.5	0.757	B	11.1	0.363
Cottonwood Road/Howard Street & Prospect Avenue/Reser Road (AM - EB LT) (PM - SB LT)	C	15.5	0.565	B	14.4	0.502
Kendall Road/Coyle Lane & Reser Road (NB LT)	B	10.5	0.111	B	10.1	0.047
Cottonwood Road & Eagle Crest Drive (WB LT)	A	9.0	0.043	A	8.7	0.023
Kendall Road & Rooster Road (WB LT)	A	8.7	0.005	A	8.6	0.005
Cottonwood Road & Rosewood Place (EB LT)	A	8.9	0.003	A	9.0	0.003
Kendal Road & Valley Vista Avenue (WB LT)	A	8.7	0.005	A	8.6	0.005
Plaza Way & Langdon Road (WB LT)	B	10.5	0.090	B	10.4	0.051
Cottonwood Road/Power Line Road & Langdon Road (AM - NB LT) (PM - EB LT)	A	7.7	0.048	A	7.5	0.051
Power Line Int & Cottonwood Road (NB LT)	A	8.5	0.016	A	8.6	0.013
Power Line Road & Power Line Int (WB LT)	A	8.9	0.022	A	9.1	0.024
Ranch Road & Cottonwood Road (NB LT)	A	8.8	0.008	A	9.0	0.006

N/A = not available from Synchro reports

As shown in Table 6, all studied intersections will operate at an acceptable LOS in the forecast year 2025 of opening Without Project conditions during the weekday AM and PM peak hours.

3.4.3 (2025) Future Conditions with Project

Table 7. Estimated 2025 Level of Service with Project for Study Area Intersections

INTERSECTION *(critical lane group)*	AM Peak Hour			PM Peak Hour		
	LOS	***Delay (sec/veh)***	***v/c***	***LOS***	***Delay (sec/veh)***	***v/c***
Howard Street & 2nd Avenue/Abbott Road (NB LT)	**F**	**66.2**	**1.009**	B	14.8	0.529
Cottonwood Road/Howard Street & Prospect Avenue/Reser Road (AM - EB LT) (PM - SB LT)	C	20.8	0.653	**E**	**36.9**	**0.840**
Kendall Road/Coyle Lane & Reser Road (NB LT)	B	11.6	0.209	B	11.2	0.118
Cottonwood Road & Eagle Crest Drive (WB LT)	B	10.1	0.128	A	9.8	0.077
Kendall Road & Rooster Road (EB LT)	A	9.6	0.053	A	9.7	0.036
Cottonwood Road & Rosewood Place (EB LT)	B	10.0	0.004	A	9.6	0.003
Kendal Road & Valley Vista Avenue (EB LT)	A	9.2	0.033	A	9.1	0.022
Plaza Way & Langdon Road (WB LT)	B	10.8	0.141	B	10.8	0.090
Cottonwood Road/Power Line Road & Langdon Road (AM - NB LT) (PM - EB LT)	A	7.8	0.052	A	8.0	0.107
Power Line Int & Cottonwood Road (NB LT)	A	8.6	0.019	A	8.7	0.019
Power Line Road & Power Line Int (WB LT)	A	9.0	0.029	A	9.3	0.029
Ranch Road & Cottonwood Road (NB LT)	A	9.0	0.008	A	9.3	0.006

N/A = not available from Synchro reports

As shown in Table 7, with the exception of two intersections, all studied intersections will operate at an acceptable LOS in the forecast year 2025 of opening With Project conditions during the weekday AM and PM peak hours. The northbound Howard Street approach to S 2nd Avenue operates at LOS F during the AM peak hour. The southbound Howard Street approach to Reser Road operates at LOS E during the PM peak hour. LOS E is acceptable according to the January 2007 *Walla Walla Urban Area Transportation Impact Analysis Guidelines,* but no existing intersection may be worsened by more than two levels of service.

The LOS analysis used the measured peak hour factor (PHF) of 0.73 at Howard Street & 2nd Avenue/Abbott Road and 0.79 at Cottonwood Road/Howard Street & Prospect Avenue/Reser Road. Both low PHF's are associated with the school traffic congestion for a short period of the day. If a PHF of 0.92 is used at Howard Street/2nd Avenue/Abbott Road, as suggested by the Walla Walla TIA guidelines, the LOS is C. If a PHF of 0.93 is used at Cottonwood Road/Howard Street/Prospect Avenue/Reser Road as suggested by the Walla Walla

TIA guidelines, the LOS is C. Thus, expensive mitigation is not recommended to address short periods of congestion.

At the northbound approach of Howard Street at S 2nd Avenue/Abbott Road the recommended mitigated would be to add a left turn lane by restriping the approach to the intersection. The existing width of the roadway allows for three 10-foot-wide lanes (two travel lanes, one left-turn lane) with two 5-foot-wide bake lanes. To provide the width, parking will need to be restricted for approximately 300 feet.

At the southbound approach of Howard Street at S 2nd Avenue/Abbott Road a left turn lane is recommended for proper lane alignment and to meet driver expectations. To provide the width, parking will need to be restricted for approximately 300 feet.

For southbound Howard Street at Prospect Avenue/Reser Road the recommended mitigation would be to add a left turn lane by restriping the approach to the intersection. The existing width of the north leg of the intersection allows for three 10-foot-wide lanes (two travel lanes, one left-turn lane) with two 5-foot-wide bike lanes. To provide the width for the left turn lane, parking will need to be restricted for approximately 300 feet.

At the northbound approach of Howard Street at Prospect Avenue/Reser Road a left turn lane is recommended for proper lane alignment and to meet driver expectations. To provide the width for the left turn lanes, the travel lanes will need to be 10 feet wide and the bike lanes will to be narrowed to 4 feet for approximately 300 feet.

Table 8 demonstrate the change in LOS between the With Project conditions and the proposed Mitigated conditions. To maintain lane alignment and driver expectation, a left turn pocket is proposed for southbound on Howard Street at S 2nd Avenue/Abbott Road. This will impact parking on Howard Street.

Table 8. Comparison between With Project Conditions to Mitigated Conditions for Study Area Intersections

INTERSECTION *(critical lane group)*	With Project Trips Conditions			Mitigated Conditions		
	LOS	***Delay (sec/veh)***	***v/c***	***LOS***	***Delay (sec/veh)***	***v/c***
Howard Street & 2nd Avenue/Abbott Road (AM - NB LT MOVEMENT)	F	66.2	1.009	C	20.1	0.598
Cottonwood Road/Howard Street & Prospect Avenue/Reser Road (PM - SB LT MOVEMENT)	E	36.9	0.840	D	28.8	0.746

As shown in Table 8, with the improvements of a left turn lane on Howard Street, the LOS is improved to an acceptable level according to the January 2007 *Walla Walla Urban Area Transportation Impact Analysis Guidelines*. Traffic mitigation improvments can be completed by the City but funded by developments that impact the intersections above.

4 SAFETY ANALYSIS

4.1 Left-Turn Storage Analysis

The criteria for the analysis of left-turn lanes at uncontrolled intersection legs are based on the Washington State Department of Transportation (WSDOT) *Design Manual*, Exhibit 1310-7a, Left-Turn Storage Guidelines: Two-Lane, Unsignalized. The exhibit provides guideline curves for posted speeds of 40, 50, and 60 miles per hours (mph) and a minimum total traffic volume from both directions (DVH) of 300 vehicles. The site accesses are located on Cottonwood Road and Kendall Road. The speed on those roads requires the need to install a left-turn lane at each site access but at each intersection the total volume from each direction is less than the minimum of 300 vehicle. See Table 9 for total volume from each direction and the percent of left turns into the site.

Table 9. Total Volume (DVH) and Total Percent Turning Left (Single Turn Movement).

Roadway	PM		
COTTONWOOD RD – 40 mph	**Total DVH**	**Left Turns**	**% Left Turns**
Eagle Crest Drive	**384**	**80**	**21%**
Rosewood Place	**266**	**91**	**34%**
Ranch Road	**104**	**13**	**13%**
KENDALL RD – 45 mph	**Total DVH**	**Left Turns**	**% Left Turns**
Rooster Road	**147**	**0**	**0%**
Valley Vista Avenue	**81**	**0**	**0%**

As shown in Table 9, with the exception of one intersection, all of the proposed site access points have a total combined volume less than the minimum 300 vehicle. Also, each intersection has adequate sight distance to turn into the site and neither of them have any collisions that occurred due to left turn movements within the past five years. See sight distance at site access and collision analysis below. For the existing intersection of Cottonwood Road and Eagle Crest Drive, the total volume is greater than 300 vehicles and when plotted on Exhibit 1310-7a, the intersection does not need storage for the left turn movement. See Figure 9 for left turn storage exhibit.

4.2 Right-Turn Treatment Analysis

The criteria for the analysis of right-turn lanes at uncontrolled intersection legs are based on the *WSDOT Design Manual*, Right-Turn Lane Guidelines (Exhibit 1310-11), which note:

> Right-turn movements influence intersection capacity even though there is not conflict between right-turning vehicles and opposing traffic. Right-turn lanes might be needed to maintain efficient intersection operation. Use the following to determine when to consider right-turn lanes at unsignalized intersections:
>
> - For two-lane roadways and for multilane roadways with a posted speed of 45 mph or above, when recommended by Exhibit 1310-11.

The speeds of all uncontrolled roadways at study area intersections are 25 mph and below. With all study roadway speed limits set below the 45-mph threshold noted in the *WSDOT Design Manual* Right-Turn Lane Guidelines, no right-turn lane analyses are recommended for this project.

4.3 Collision Analysis

Collision data from the study area was obtained from WSDOT for the five-year period spanning from January 2014 through available data from 2019. This analysis assumes that a collision rate less than the critical collision rate for the intersection is typically considered to be within acceptable parameters. A collision rate above the critical rate is worthy of further examination. The detailed collision data can be found in Appendix E. The results of the collision analysis are shown in Table 10.

Table 10. Collision Analysis for Study Area Intersections (January 2014 through available 2019)

COLLISION TYPE	S Howard St / Abbott Rd	S Howard St / Prospect Ave	Cottonwood Rd / Eagle Crest Dr	Plaza Way / E Langdon Rd	Cottonwood Rd / E Langdon Rd
TOTAL COLLISIONS	1	2	1	1	3
CRITICAL RATE	0.96	0.91	1.15	1.02	1.18
COLLISION RATE	0.10	0.15	0.30	0.16	1.07

ADT: average weekday trips

To calculate the collision rate, the PM peak hour total entering volumes from the 2019 turning movement counts were multiplied by 10 to provide an approximation of the ADT. The calculation of the critical rate and collision rate are in Appendix E.

The collision history at the study area intersections shows no collision rate higher than the critical rate, and there were no severe or fatal injury types. No further review is recommended. At the request of the City, the collision history of Cottonwood Road and specifically at the Cottonwood Road/Langdon Road/Powerline Road intersection(s) was given a second evaluation. There have been 3 collisions near this intersection(s). None resulting in serious injuries. Inattention and right of way violation (running the stop sign) was attributed to 2 collisions. The main intersection is all-way stop sign controlled that tends to have a very high safety record. The frequency of the crashes in less than one per year and not likely it will significantly improve with additional signing and striping but stop lines on each approach would enhance stop sign compliance. It does not merit additional traffic control such as the suggested roundabout. No mitigation is recommended.

4.4 Transit, Pedestrian, and Bicycle Facilities

Valley Transit provides bus service to the greater Walla Walla urban area but no routes maneuver through the study area.

Pedestrian activity to and from the site is anticipated to be light. The bulk of walking activity will go to and from the existing schools which are approximately a mile north of the project site. This is beyond the typical walking distance to a school and is further compromised by missing sections of sidewalk. The existing adjacent subdivision to the north (Table Rock Subdivision) has a complete walkway network on the local streets. Recommendation: The Cottonwood subdivision should connect the sidewalk network to the sidewalk on Wenaha Drive.

Bicycle activity to and from the site is anticipated to be light to moderate. There are partial bike lanes on the roadways analyzed for this project. Bike lanes exist on Howard Street, Prospect Avenue, and Reser Road. Partial bike lanes exist on both S 2nd Avenue and Cottonwood Road. In the *2040 Walla Walla Comprehensive Plan Update*, Cottonwood Road is used as a County bike route. Cottonwood Road is the preferred route for

bicyclists traveling from the southeast of Walla Walla County. With limited bike lanes along Cottonwood Road, bicyclist have to use the vehicle travel lane or shoulder.

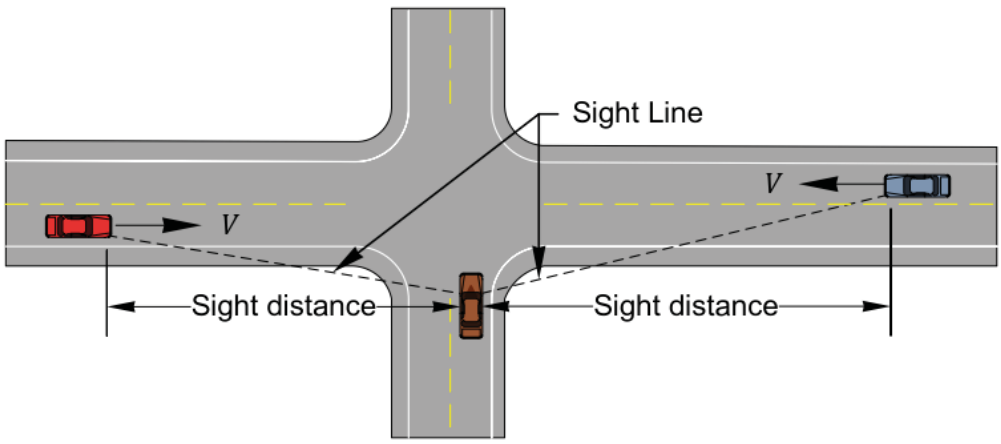
Recommendation: The project should install sidewalk along the Cottonwood Road and Kendall Road frontage. Cottonwood Road should be widened to provide shoulder width for future bike lanes.

4.5 Sight Distance at Site Access Location

The site accesses do not currently exist, so sight distance measurements are based on site improvement plans and field review of existing surroundings. All proposed site entrances along Cottonwood Road and Kendall Road should all be designed in accordance with Chapter 9.5.3 of the American Association of State Highway and Transportation Officials (AASHTO) policy (see References), based on the speed for Cottonwood Road and Kendall Road, 40 mph and 45 mph, respectively.

For intersections along Cottonwood Road, each access should have a minimum sight distance of 445 feet based on the speed of 40 mph. During field verification of each site access, the intersection of Cottonwood Road and Rosewood Place was determined to have adequate sight distance for both right and left turns from proposed Rosewood Place. The intersection of Cottonwood Road and Ranch Road was determined to have adequate sight distance for both right and left turns from proposed Ranch Road. No visible obstructions were located along the site side of Cottonwood Road.

For intersections along Kendall Road, each access should have a minimum sight distance of 500 feet based on the speed of 45 mph. During field verification of each site access, the intersection of Kendall Road and Rooster Road was determined to have adequate sight distance for both right and left turns from proposed Rooster Road. The intersection of Kendall Road and Valley Vista Avenue was determined to have adequate sight distance to the north of proposed Valley Vista Avenue. To the south, a berm along the frontage of the site limits the sight distance to approximately 450 feet. Recommendation: Grade the site to increase the sight distance to 500 feet. The following figure illustrates the sight distance measurement.



5 STUDY FINDINGS

The findings of this TIA are listed below.

5.1 Future Traffic Volumes Increase

Traffic volumes in the study area vicinity will continue to increase with or without the project. A background 1.0 percent annual growth rate is applied throughout the study area, and the traffic impacts of one in-process project are added to the study area to evaluate the background conditions.

5.2 Trip Generation

The proposed Cottonwood Subdivision is estimated to generate 3,852 weekday trips, including 302 trips during the AM peak hour, 404 trips during the PM peak hour. These trips will be distributed through five access points into and out of the proposed subdivision.

5.3 Collision Analysis

The 2013–2017 collision history at the study intersections was reviewed; all intersections have collision rates lower than the critical rate, and no patterns of collision types or of severe collisions were identified.

5.4 Transit, Pedestrian, and Bicycle Facilities

There is inadequate connection for pedestrians and bicyclists from the proposed site to the school to the north. The adjacent Table Rock Subdivision has a complete sidewalk network on the local streets and the Cottonwod Subdivision should connect to the existing sidewalk on Wehaha Dr.

Cottonwood Road currently serves as a bicycle route for Walla Walla County riders.

No current transit routes travel through the study area.

5.5 Intersection Performance

Twelve intersections were evaluated for operational performance based on LOS and v/c ratio, which measure traffic operations. With the exception of two intersections, all locations operate within the applicable LOS standard during all analysis scenarios, both without and with the project trips. The intersection of Howard Street and S 2nd Avenue/Abbott Road operates at LOS "F," exceeding the applicable LOS E standard during the AM peak hour. The intersection of Howard Street/Cottonwood Road and Prospect Avenue/Reser Road operates at LOS E during the PM peak hour. LOS E is acceptable according to the January 2007 *Walla Walla Urban Area Transportation Impact Analysis Guidelines,* but no existing intersection may be worsened by more than two levels of service.

The installation of left turn lanes on Howard Street, north and south of S 2nd Avenue/Abbott Road, improved the LOS to D. This will require restricting parking for 300 feet on both sides of Howard Street north and south of S 2nd Avenue/Abbott Road.

The installation of left turn lanes on Cottonwood Road/Howard Street, north and south Prospect Avenue/Reser Road, improved the LOS to C. This will require restricting parking for 300 feet on both sides of Cottonwood Road/Howard Street north of Prospect Avenue/Reser Road and narrowing the bike lane to 4 feet wide south of Prospect Avenue/Reser Road.

Except for one site access, all proposed intersections into the sight have adequate turning sight distance out of the site. The intersection of Kendall Road and Valley Vista Avenue has inadequate turning sight distance to the south due to a berm.

6 RECOMMENDATIONS

The traffic impact analysis supports the following recommendations.

6.1 Traffic Impact Mitigation

Install left turn lanes on Howard Street at S 2nd Avenue/Abbott Road.

Install left turn lanes on Howard Street/Cottonwood Road at Prospect Avenue/Reser Road.

6.2 Accessibility

The applicant should install sidewalk along their frontages to Cottonwood Road and Kendall Road. All sidewalks shall be designed to meet current ADA accessibility standards.

The project shall connect a walkway to Wenaha Drive.

Sidewalks should be installed along the Cottonwood Road and Kendall Road frontage of the site.

Cottonwood Road should be widened to provide shoulder width for future bike lanes.

6.3 Sight Distance at Site Access Location

Design all roadway intersections, especially those on Cottonwood Road and Kendall Road, to meet AASHTO Standards for intersection sight distance. Special attention is needed to grade the sight at the Kendall Road and Valley Vista Avenue intersection to meet the needed 500 feet of sight distance.

7 REFERENCES

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Figures

PBS

Vicinity Map

Cottonwood

FEB 2019

FIGURE 1

PBS

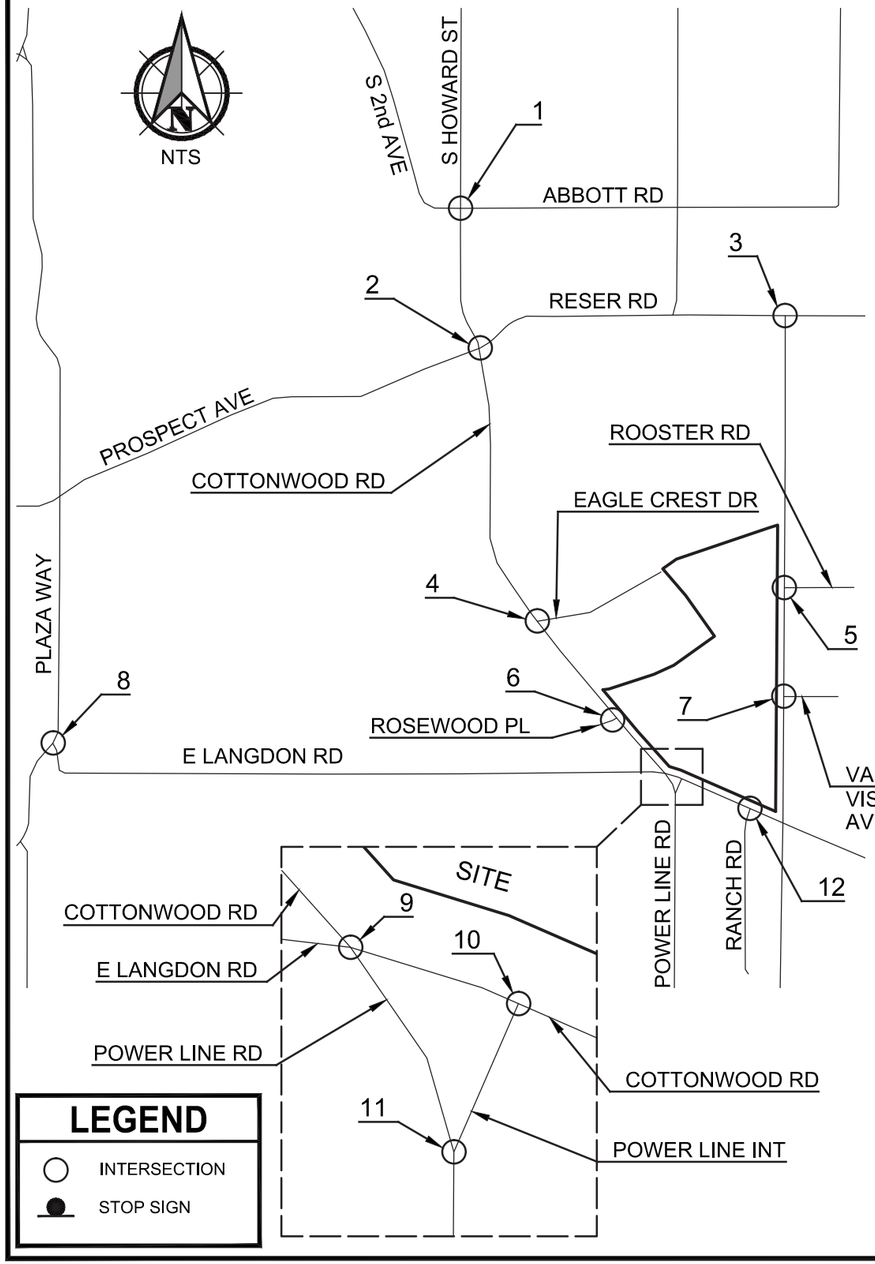
Site Plan

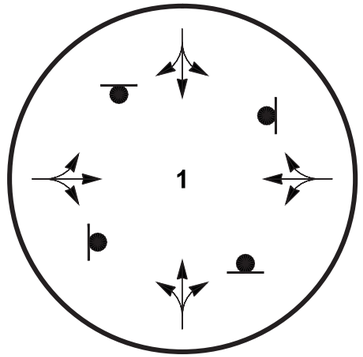
Cottonwood

FEB 2019

FIGURE

2





S Howard Street /
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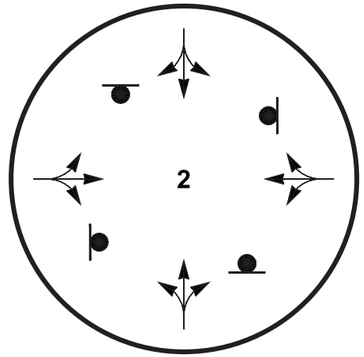
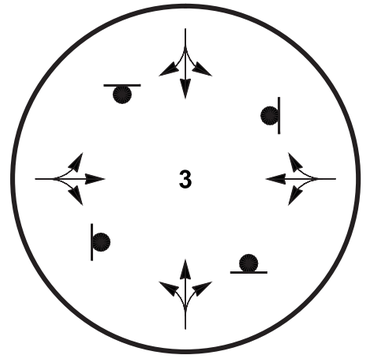
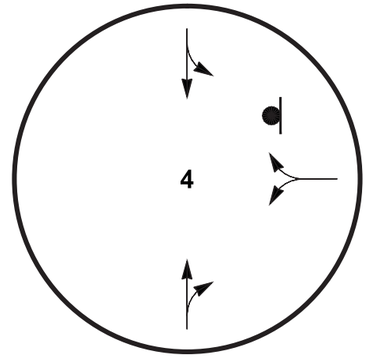


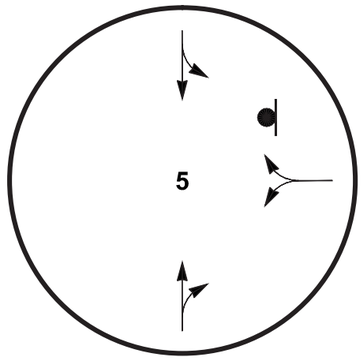
S Howard Street - Cottonwood Road /
Prospect Avenue - Reser Road



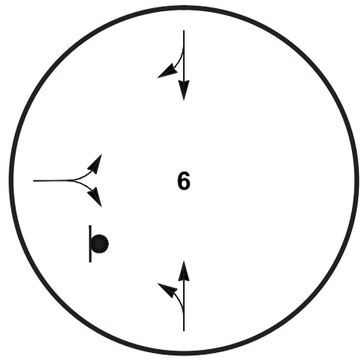
Kendall Road - Coyle Lane /
Reser Road



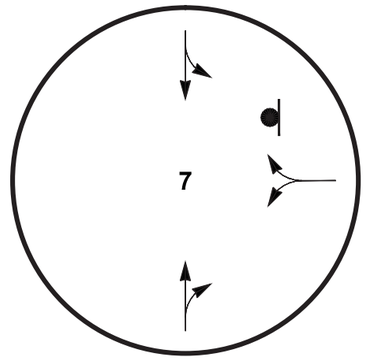
Cottonwood Road /
Eagle Crest Drive



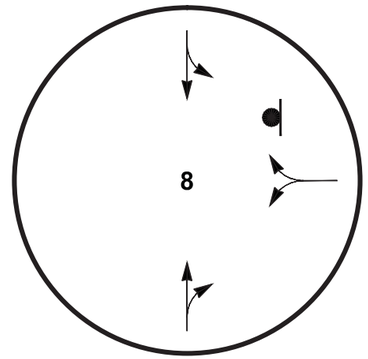
Kendall Road /
Rooster Road



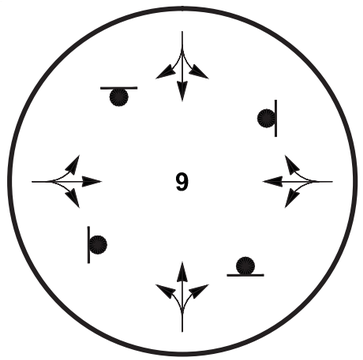
Cottonwood Road /
Rosewood Place



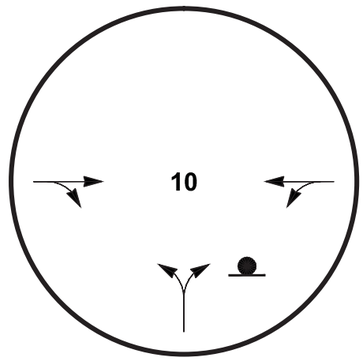
Kendall Road /
Valley Vista Avenue



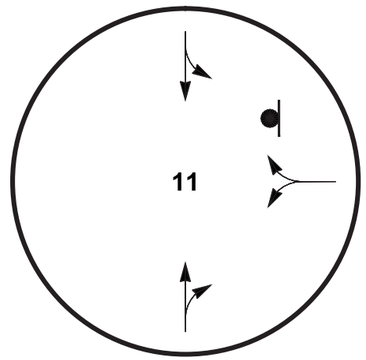
Plaza Way /
Langdon Road



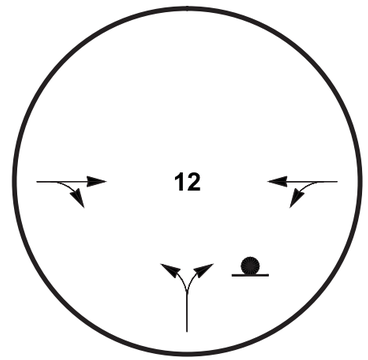
Cottonwood Road - Power Line Road /
E Langdon Road - Cottonwood Road



Power Line Int /
Cottonwood Road



Power Line Road /
Power Line Int



Ranch Road /
Cottonwood Road

PBS

Existing Lane Configuration

Cottonwood

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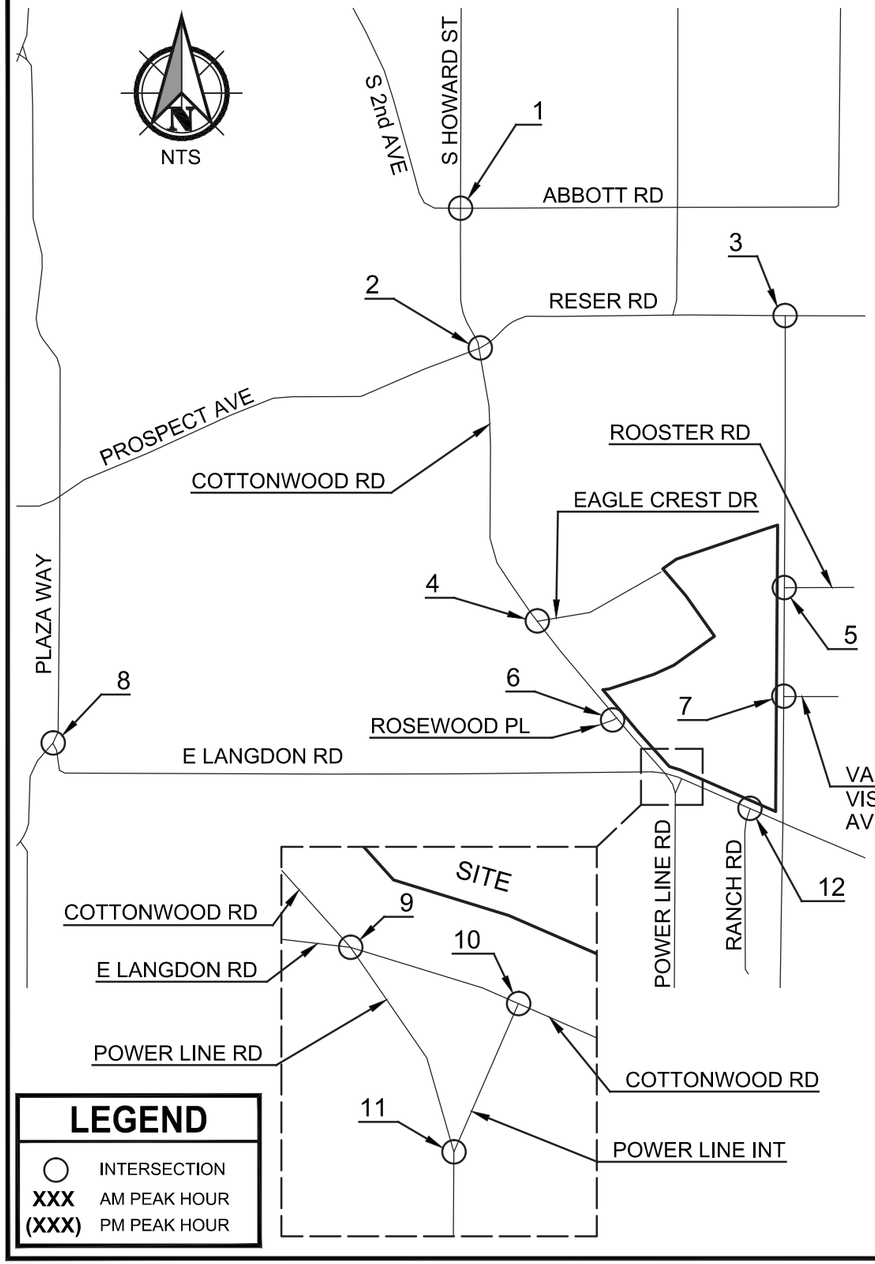
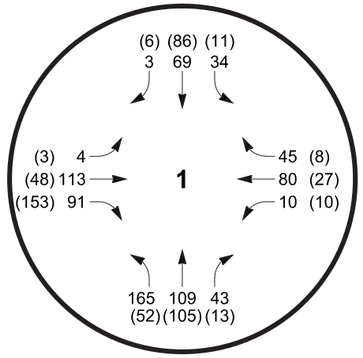
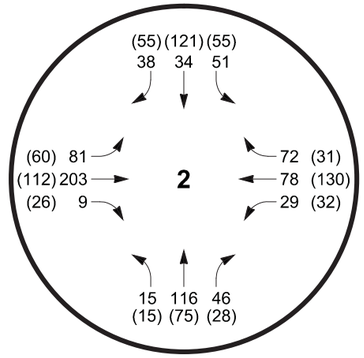
FIGURE

3





S Howard Street /
S 2nd Avenue - Abbot Road



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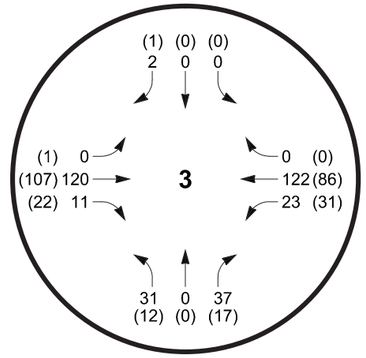
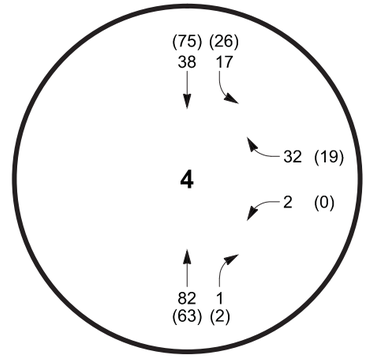
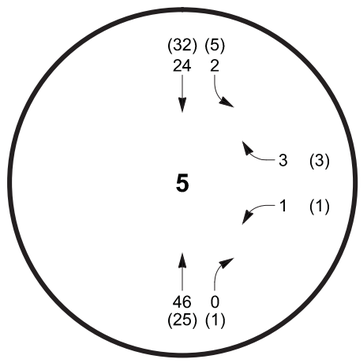
Prospect Avenue - Reser Road



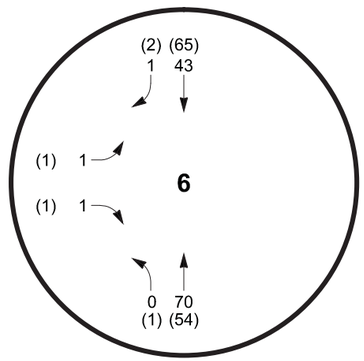
Kendall Road - Coyle Lane /
Reser Road



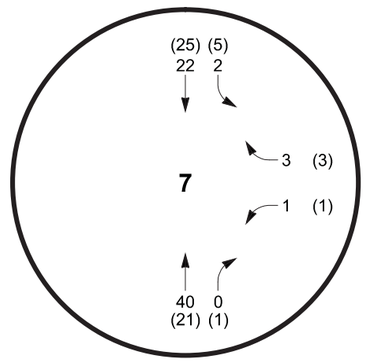
Cottonwood Road /
Eagle Crest Drive



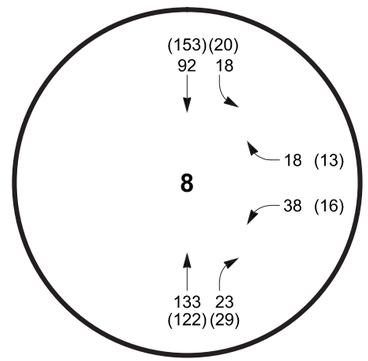
Kendall Road /
Rooster Road



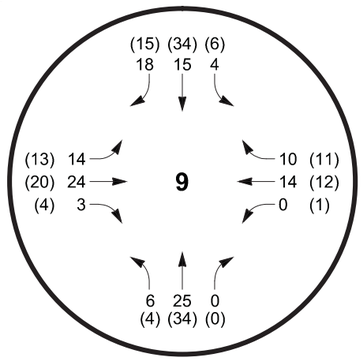
Cottonwood Road /
Rosewood Place



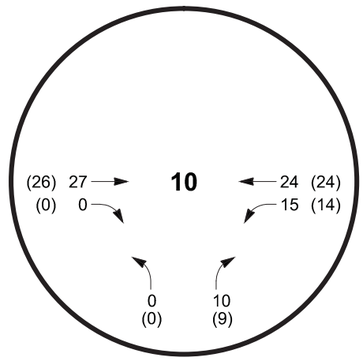
Kendall Road /
Valley Vista Avenue



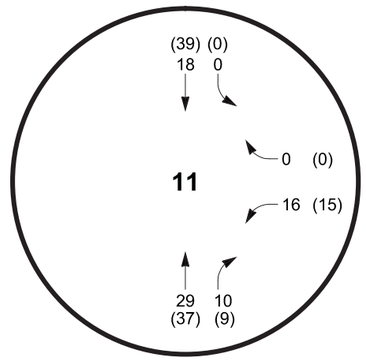
Plaza Way /
Langdon Road



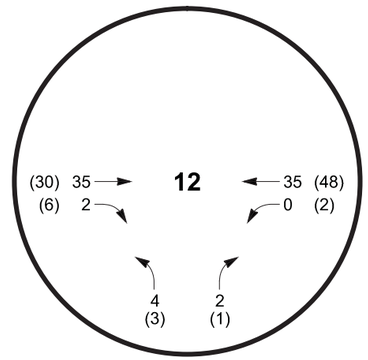
Cottonwood Road - Power Line Road /
E Langdon Road - Cottonwood Road



Power Line Int /
Cottonwood Road



Power Line Road /
Power Line Int



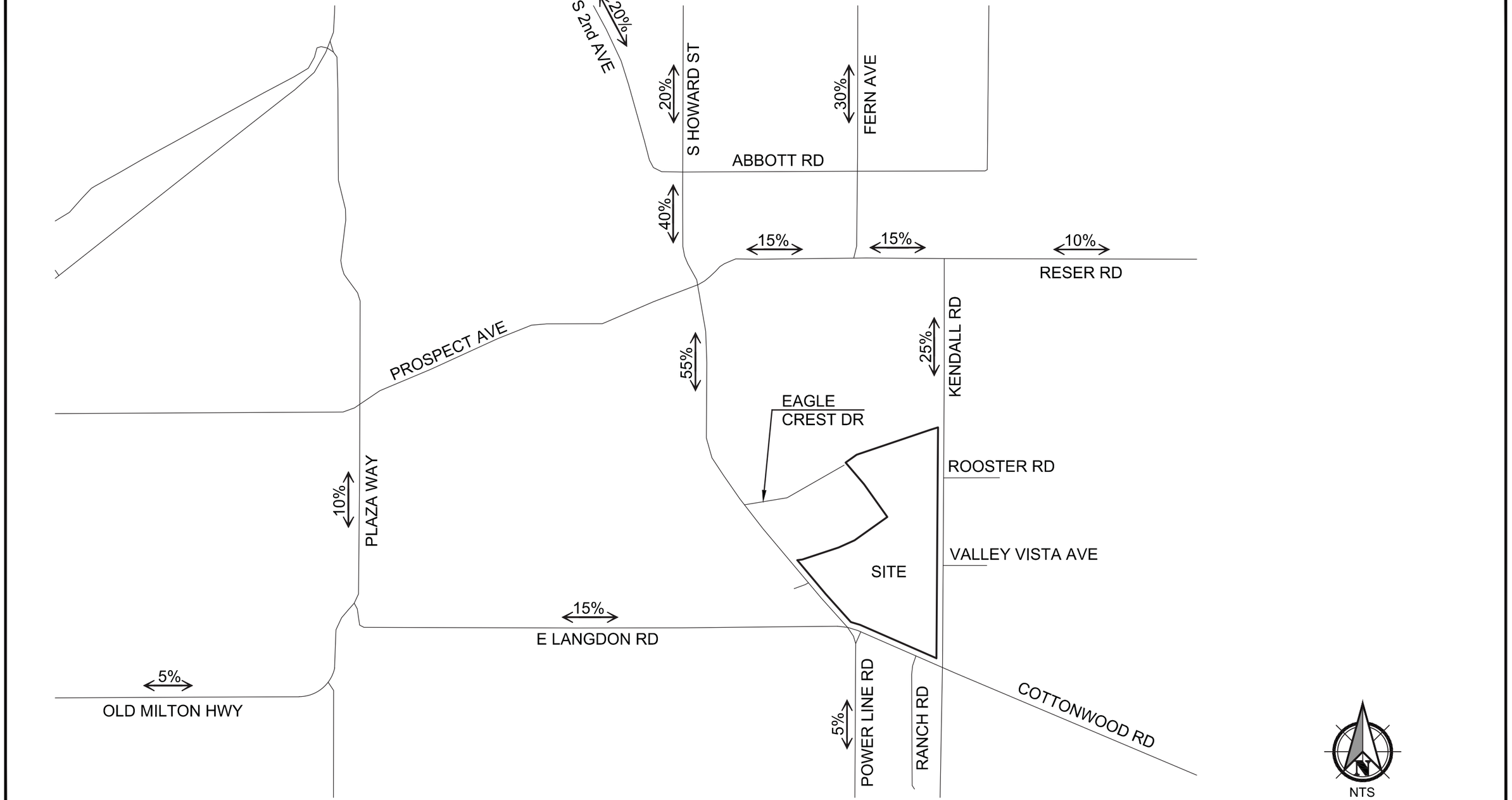
Ranch Road /
Cottonwood Road

PBS

2019 Existing Traffic Volumes
Cottonwood

FEB 2019

FIGURE
4



PBS

Trip Distribution

Cottonwood

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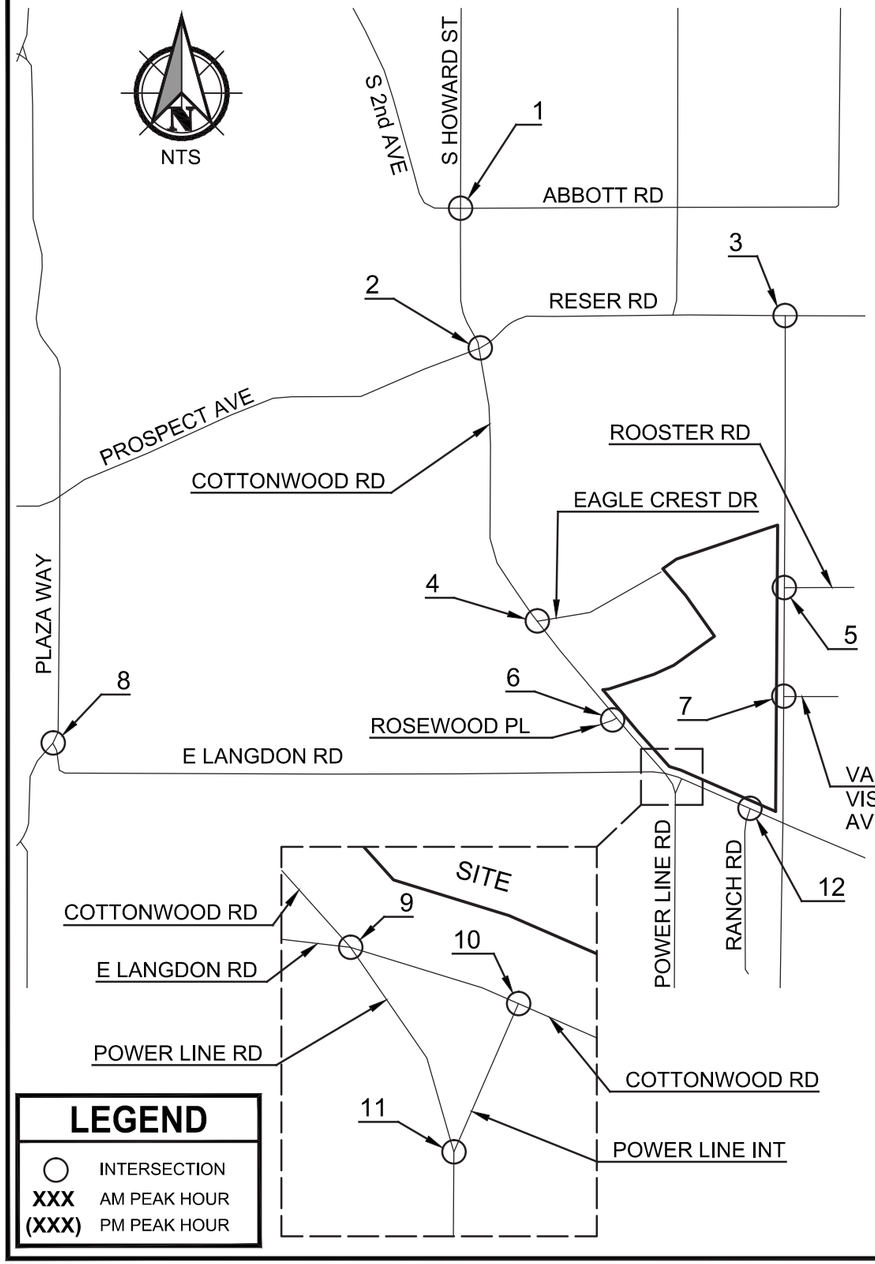
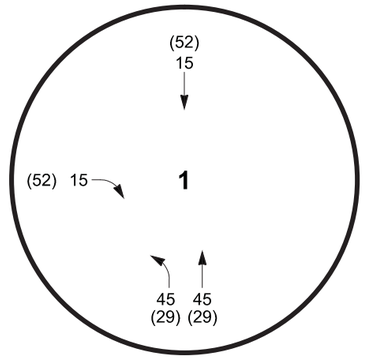
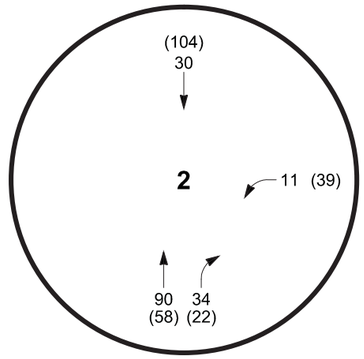
FIGURE

5

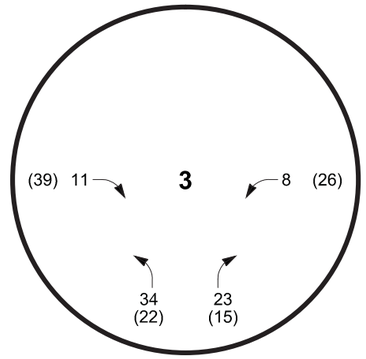




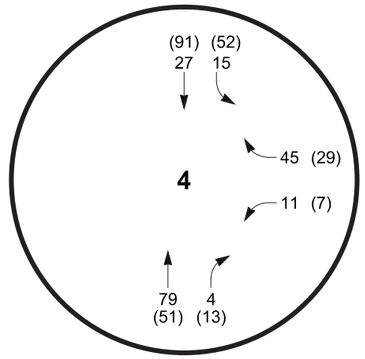
S Howard Street /
S 2nd Avenue - Abbot Road



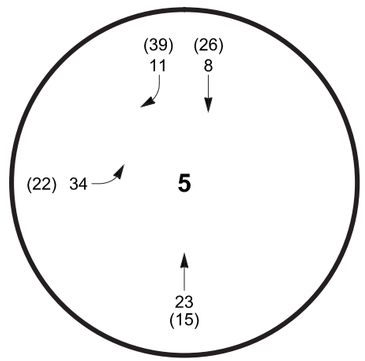
S Howard Street - Cottonwood Road /
Prospect Avenue - Reser Road



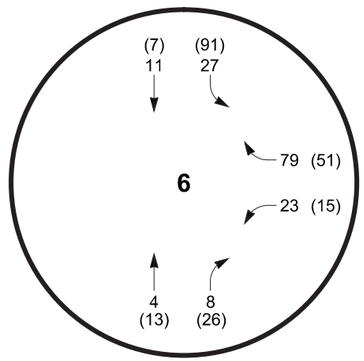
Kendall Road - Coyle Lane /
Reser Road



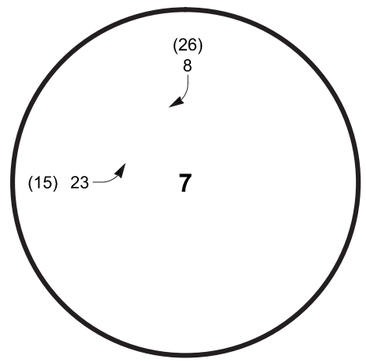
Cottonwood Road /
Eagle Crest Drive



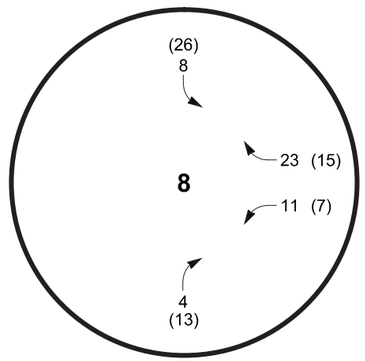
Kendall Road /
Rooster Road



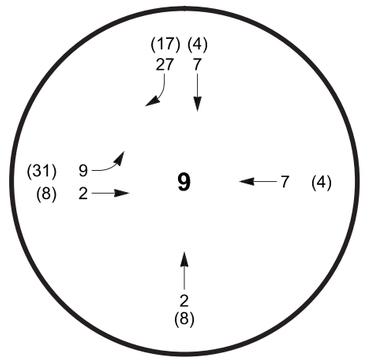
Cottonwood Road /
Rosewood Place



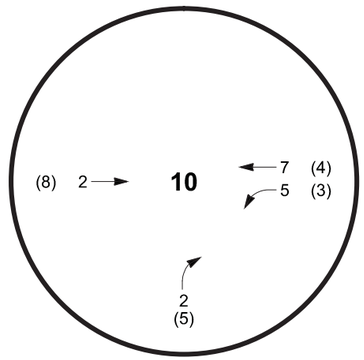
Kendall Road /
Valley Vista Avenue



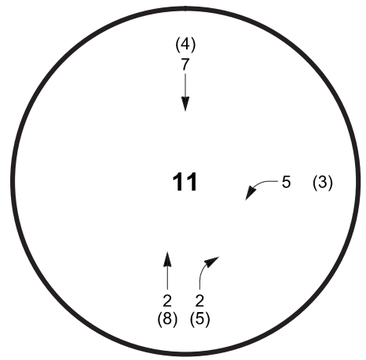
Plaza Way /
Langdon Road



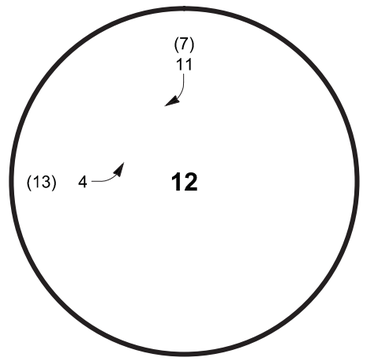
Cottonwood Road - Power Line Road /
E Langdon Road - Cottonwood Road



Power Line Int /
Cottonwood Road



Power Line Road /
Power Line Int



Ranch Road /
Cottonwood Road

PBS

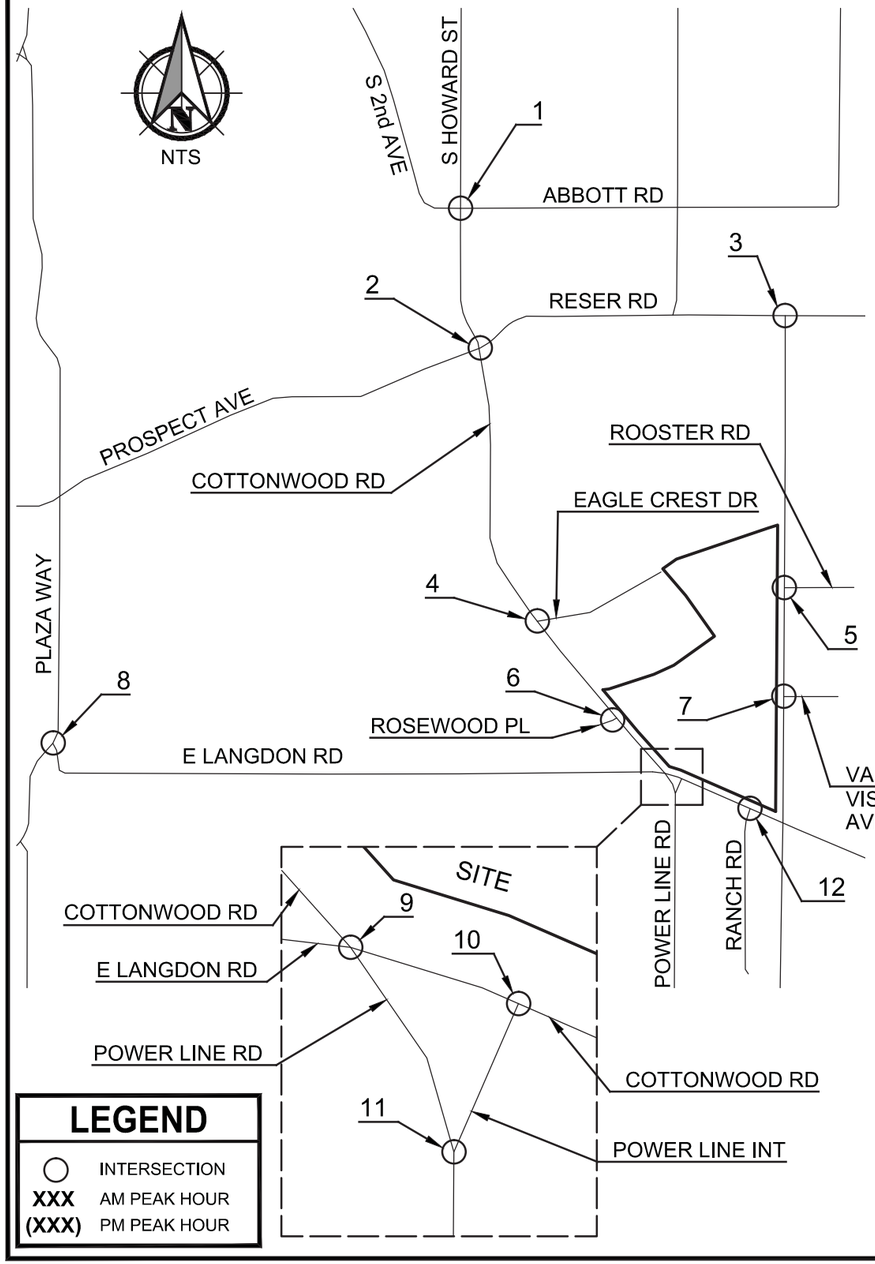
Trip Assignments

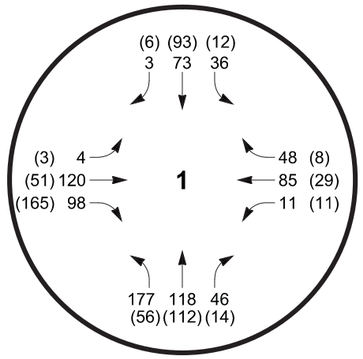
Cottonwood

FEB 2019

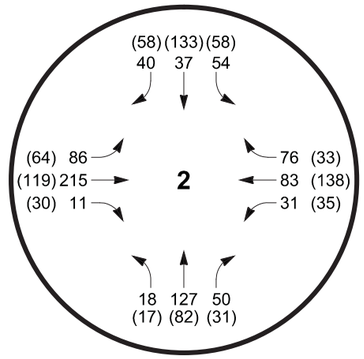
FIGURE

6

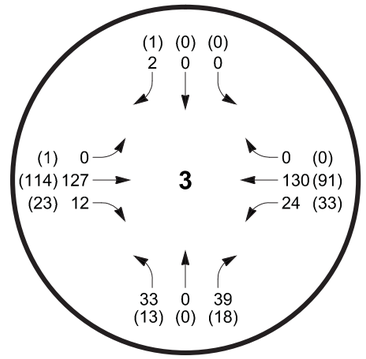




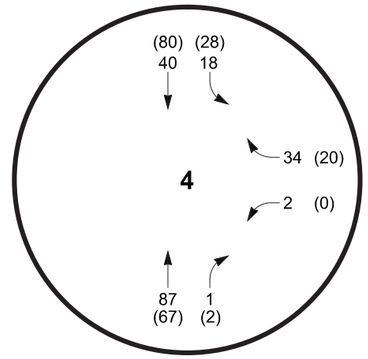
S Howard Street /
S 2nd Avenue - Abbot Road



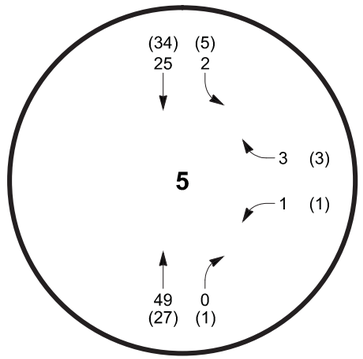
S Howard Street - Cottonwood Road /
Prospect Avenue - Reser Road



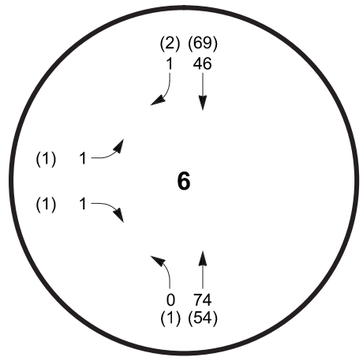
Kendall Road - Coyle Lane /
Reser Road



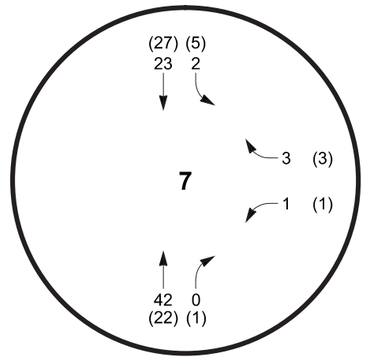
Cottonwood Road /
Eagle Crest Drive



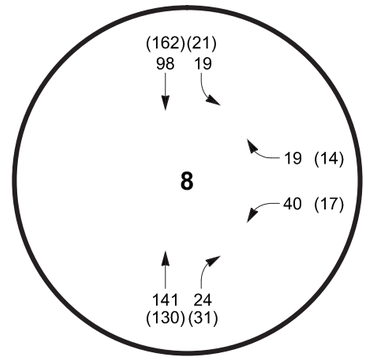
Kendall Road /
Rooster Road



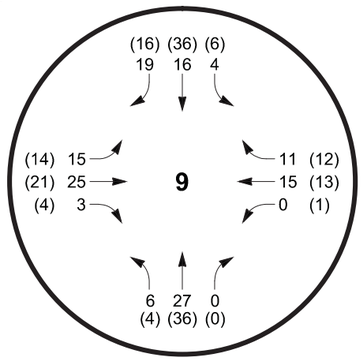
Cottonwood Road /
Rosewood Place



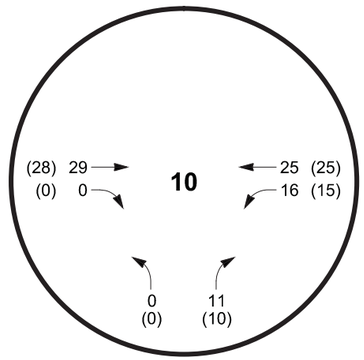
Kendall Road /
Valley Vista Avenue



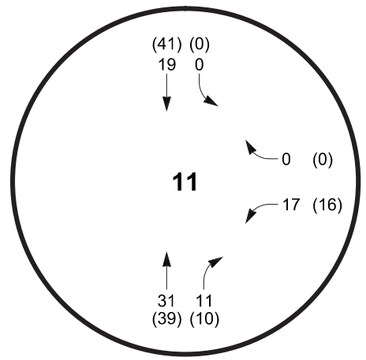
Plaza Way /
Langdon Road



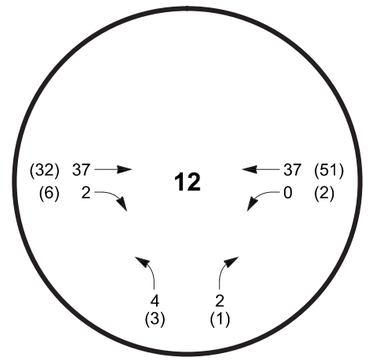
Cottonwood Road - Power Line Road /
E Langdon Road - Cottonwood Road



Power Line Int /
Cottonwood Road



Power Line Road /
Power Line Int



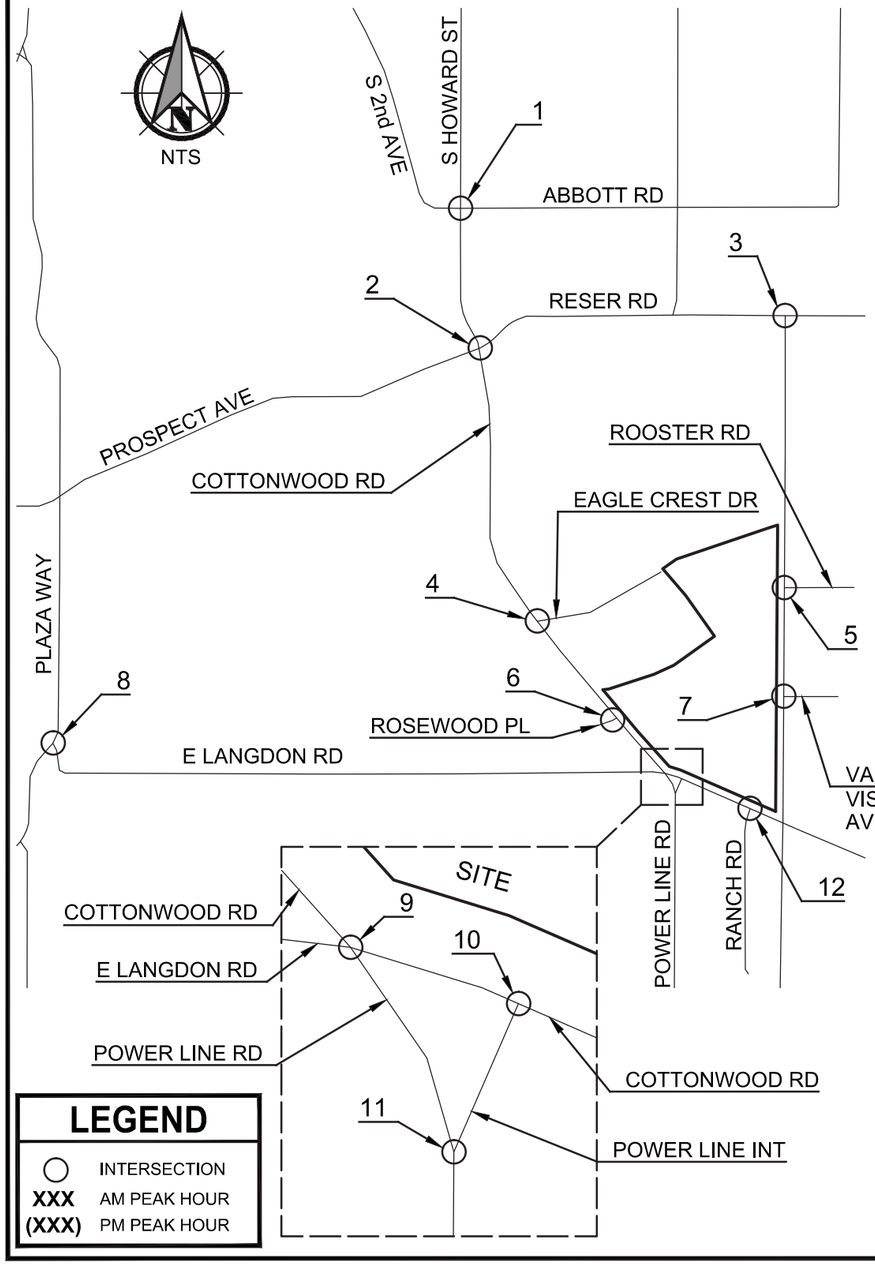
Ranch Road /
Cottonwood Road

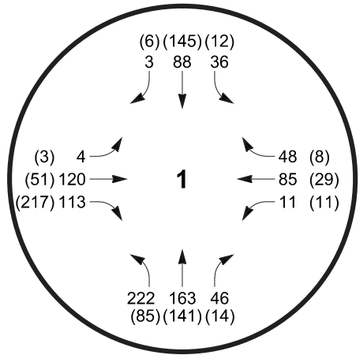
PBS

2025 Future Traffic Volumes Without Project
Cottonwood

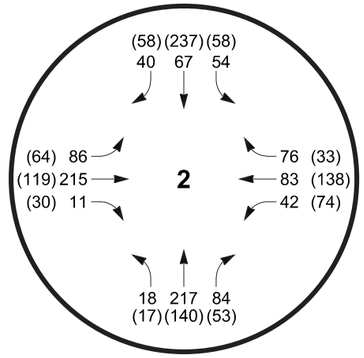
FEB 2019

FIGURE 7

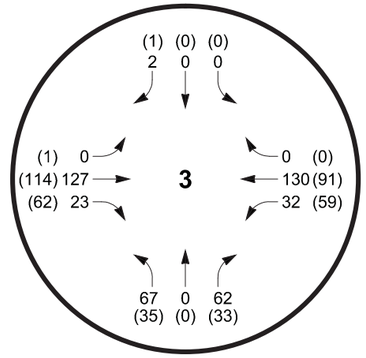




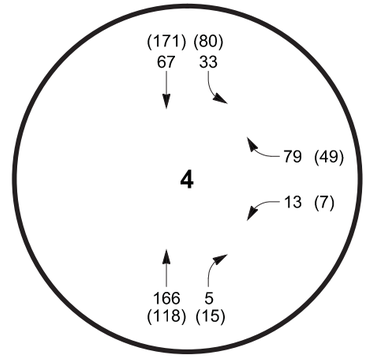
S Howard Street /
S 2nd Avenue - Abbot Road



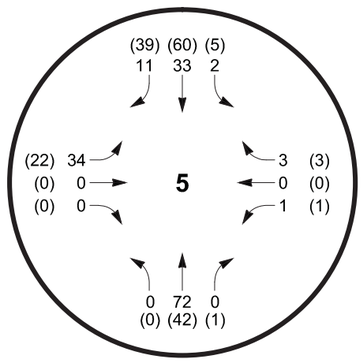
S Howard Street - Cottonwood Road /
Prospect Avenue - Reser Road



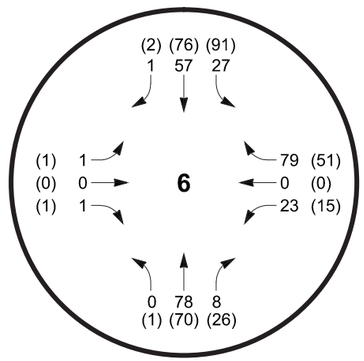
Kendall Road - Coyle Lane /
Reser Road



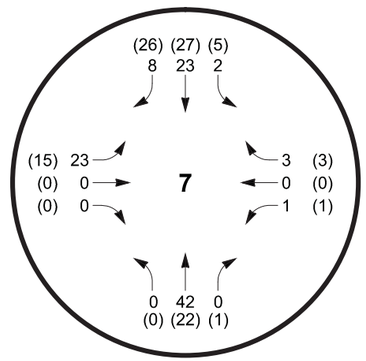
Cottonwood Road /
Eagle Crest Drive



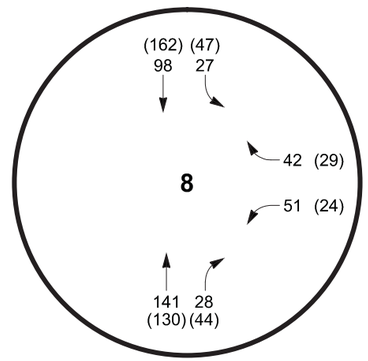
Kendall Road /
Rooster Road



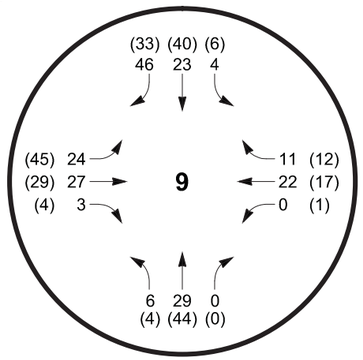
Cottonwood Road /
Rosewood Place



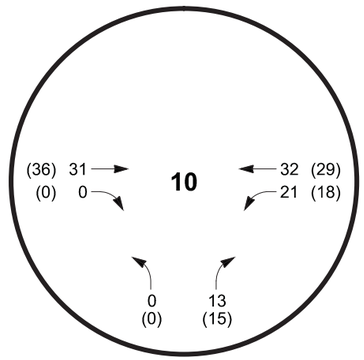
Kendall Road /
Valley Vista Avenue



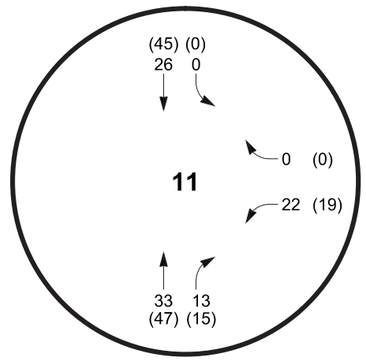
Plaza Way /
Langdon Road



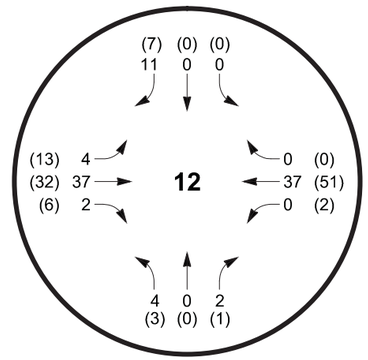
Cottonwood Road - Power Line Road /
E Langdon Road - Cottonwood Road



Power Line Int /
Cottonwood Road



Power Line Road /
Power Line Int



Ranch Road /
Cottonwood Road

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2025 Future Traffic Volumes With Project
Cottonwood

FEB 2019

FIGURE 8