US-50 Access Management Plan

BARTLETT & WEST

Prepared for:

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Section 1: Introduction

1.1 Project Location

Emporia, Kansas, located in Lyon County in east-central Kansas, is investigating the development of a 490 acre industrial area adjacent to a one mile stretch of US-50 on the west side of Emporia. The site is located on both the north and south sides of US-50, and is bound by Road F on the west, I-35 on the east, Road 180 on the north, and Road 170 on the south. This corridor serves as an essential transportation route as it connects the city of Emporia and the surrounding area to western Kansas through the cities of Newton, Hutchinson, McPherson, Great Bend, and Dodge City. It lies within one mile of the Kansas Turnpike and I-35 providing northern travel to Topeka and Kansas City, and southern travel to Wichita. Figure 1.1shows the project location.

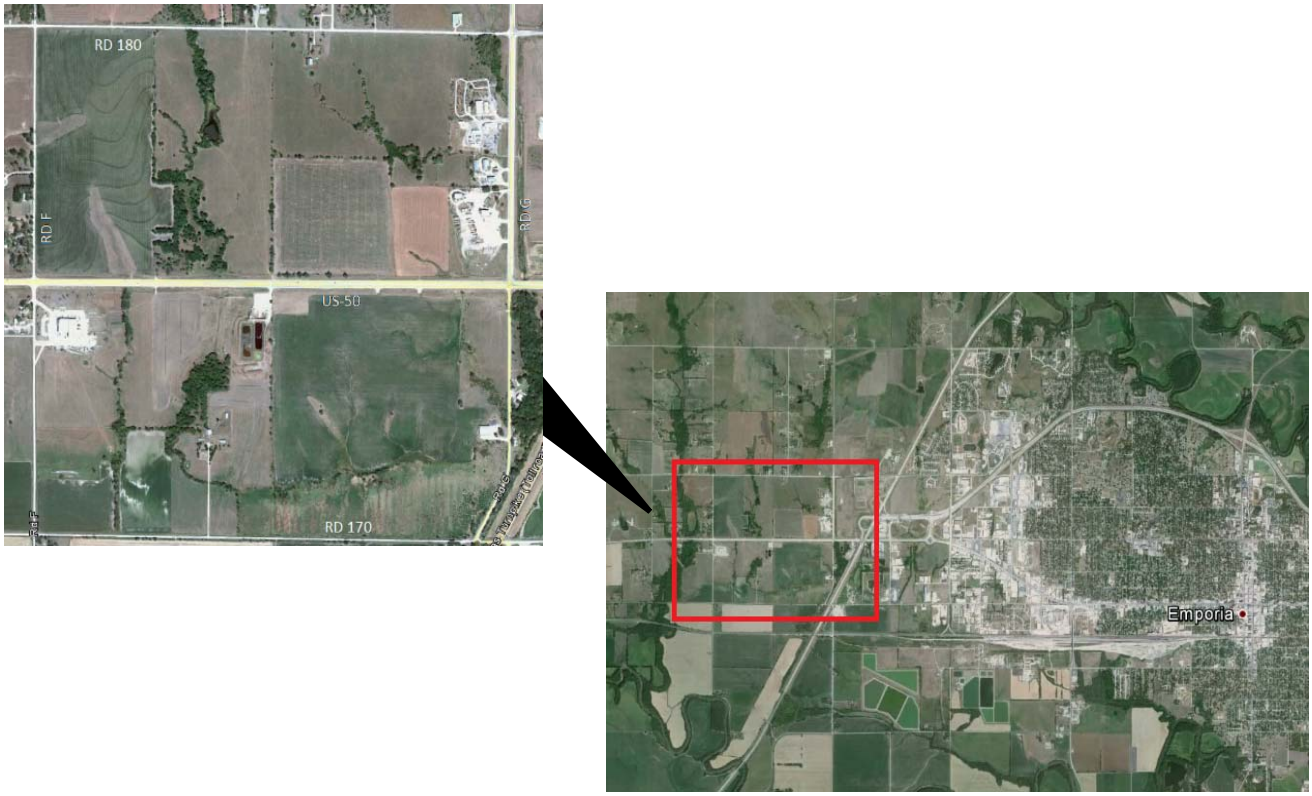

Figure 1.1 Project Location, Emporia KS (Google Earth, 2014)

1.2 Project Background

1.2.1 Purpose

This project is being conducted as a partnership between the Kansas Department of Transportation (KDOT), the City of Emporia, and Lyon County. As Emporia's industrialized economy continues to evolve, new sites are being explored to promote economic development. The properties along the previously outlined section of US-50 have been earmarked for future industrial development for a variety of reasons, but most important is that they are located near three major transportation corridors; US-50, I-35, and the Kansas Turnpike that provide a transportation link from the study area to the rest of the state. Therefore, as industrial development is completed, it is imperative that the transportation system serving these properties is also developed so that maximum safety, efficiency, and economic growth are attained.

Furthering the need for the project, KDOT has plans to widen US-50 to four lanes from the existing four-lane section west of Road G to a point approximately 1,100 feet west of Road F. It is important that the design plans for these improvements to US-50 consider the future access needs of the undeveloped industrial zoned property. KDOT's proactive approach to access management along the corridor initiated the need for this Access Management Plan.

1.2.2 Future Development

In its Comprehensive Plan, the City of Emporia designates the study's location for light industrial development. According to the Plan, light industry involves the manufacturing of a final product from partially completed goods. This type of activity requires little outside material storage, and has a minimal impact on the natural environment. Light industrial facilities primarily impact their surrounding area through increased traffic generation that results from incoming and outgoing shipping, and daily employee needs. Neighboring commercial properties are generally developed to serve facility and employee needs.

1.2.3 Project Goals

The purpose of this study is to develop a comprehensive access management strategy that will:

- Preserve and enhance US-50 as a safe and efficient high-speed corridor
- Develop recommendations for access to the properties within the study area that focus on maintaining safety and efficient traffic flow on US-50 while taking into account economic development within the area
- Effectively address future traffic conditions based on projected land development
- Develop a transportation system that will safely integrate light and heavy traffic while providing reliable and efficient movement throughout to promote economic development
- Outline the steps and funding mechanisms necessary to realize such a system

Section 2: Public Involvement

All roadway and highway projects impact the lives of the general population they serve. Because of this, it is critical that serious attention be paid to public coordination and awareness throughout the entirety of the planning process. Public forums that communicate access management purposes, goals, and concepts are important to ensure that stakeholders are aware of the implications behind an Access Management Plan throughout the development of the Plan. Public forums also provide an opportunity for feedback from those citizens most directly affected and concerned with the Plan.

Intergovernmental coordination and public involvement were a large component in the development of the US-50 Access Management Plan. As part of the public involvement strategy for the Plan, a Core Team was established to provide direction on goals and desired outcomes. The Core Team met periodically throughout Plan development and directed public involvement strategies.

The Core Team consisted of:

David Gurss, Corridor Planning Manager, Kansas Department of Transportation

Jessica Upchurch, Special Projects Engineer, Kansas Department of Transportation

Steve Baalman, Area Engineer, Kansas Department of Transportation

Mark McAnarney – City Manager, City of Emporia

Jerry Menefee – City Engineer, City of Emporia

Jon Proehl – City of Emporia

Chip Woods – Lyon County Engineer

Brian Austin – Project Manager, Bartlett & West, Inc.

Brian Armstrong – Unit Operations Manager, Bartlett & West, Inc.

Public involvement strategy for the Plan consisted of presentations to the City of Emporia/City Commission, the Lyon County Commission, a public open house, and stakeholder interviews with property owners and businesses that would be directly affected by outcomes of the Plan.

Representatives from KDOT and Bartlett & West presented to the City Commission on February 12, 2014 and to the Lyon County Commission on February 13, 2014. The presentations focused on the purpose, process, schedule, and anticipated outcomes of the Plan. The public open house, held on March 11, 2014 as a means of providing constituents an opportunity to offer feedback, was also discussed during the presentations to the Commissioners.

The public open house was held as scheduled at the Flint Hills Technical College. It presented the public an opportunity to provide feedback on issues or concerns they had with the development of the Plan and also provide input on what outcomes they wanted to see as a result of it. Comment cards were available to those who did not wish to speak publicly and the opportunity to meet individually with members of the Core Team was also provided. Comments from the open house are provided in the appendix.

The public open house resulted in additional stakeholder interviews held in April, May, and June of 2014 that were requested by property owners within the study area. By request, the stakeholder interviews were held with:

Kent Heerman and the Emporia Enterprises/Regional Development Association Board

Dave Holland with Emporia Truck Wash

Jeff DeBauge with Coca-Cola Distributors

Comments from both the public open house and individual interviews centered on property owner desires to maintain or have the option for future access points on US-50 and also to lower the speed limit of US-50 within the study area. These comments were considered in the development of the Plan, but ultimately conflicted with the KDOT Corridor Management Policy for Class B and Partial Access Control 2 designation of the highway. However, because of the comments received, opportunities to mitigate the concerns of removing access points along the highway were focused on in the development of the Plan. Consideration of the property owner's comments and concerns was balanced against the need to keep public safety and mobility in mind.

Section 3: Access Management Overview

3.1 Purpose of Access Management

Access points provide a link between road networks and the land adjacent to them. The intended function of any access point is to improve overall system performance. However, access points also have the potential to introduce roadway hazards in the form of vehicles entering the roadway, vehicles exiting the roadway, and at pedestrian crossings. Any instance where vehicle or pedestrian collisions can occur in intersections or access points are referred to as conflict or friction points. Conflict points are situations that have the potential to cause a physical crash, while friction points do not result in contact, but interrupt the flow of traffic. The goal of applying access management to a transportation corridor is to reduce the number and severity of any conflicts, while increasing mobility and efficiency.

As development continues to occur along US-50, it is vital that the development does not decrease the safety or efficiency of the highway. Access points to future developments must be designed in a systematic manner to preserve safety and traffic flow while providing reasonable access points to promote economic development along the corridor.

3.2 Goals of Access Management

3.2.1 Access Planning

Access planning is the process of developing a road access network that provides safety for vehicles, bicycles, and pedestrians while maintaining traffic efficiency through the use of management techniques such as consolidated access points, frontage and backage roads, sidewalks, raised medians, and access spacing. Logical access planning is applicable to both immediate needs and foreseeable circumstances, and the result of such planning is a transportation system that is highly functional, cost effective, and promotes economic activity.

3.2.2 Transportation Engineering

Transportation engineering is important to access management because all management decisions should be based upon sound engineering principles. Scientific investigations such as existing traffic studies/counts and projected traffic simulations should be conducted so that all recommendations and final decisions are comprehensive and site specific.

3.2.3 Access Permitting

The focus of access permitting is to establish a fair and consistent process for determining whether or not access points should be allowed along a roadway. All proposals must be evaluated to ensure that the proposed access is feasible under existing conditions, as well as projected scenarios, and contributes positively to the overall objectives of the surrounding area. KDOT's access permitting policy can be found in the KDOT Access Management Policy available on the internet at http://ksdot1.ksdot.org/PDF_Files/Access_Management_Policy_Jan2013.pdf.

3.3 Benefits of Access Management

There are many advantages to implementing access management strategies within a road network. The three most important benefits that result are safety, efficiency, and economic development. Together, these benefits can have a significant impact on the growth and development of an area.

3.3.1 Safety

Each day approximately 15,400 crashes occur nationwide, including 92 fatalities and 6,500 injuries involving vehicles, bicycles, and pedestrians. Research conducted by the National Highway Traffic Safety Administration indicates that nearly 40% of all crashes are related to access points (NHTSA National Center for Statistics and Analysis, 2012). In urban areas, where access points are denser, this percentage increases significantly. However, according to the Federal Highway Administration, areas that have employed access management policies have experienced a considerable reduction in the overall number of crashes along two-lane rural highways and a reduction in the number of severe or injury crashes along urban arterials.

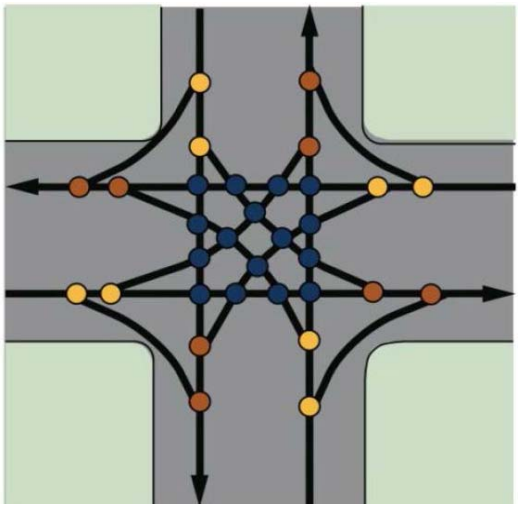

Figure 3.1 Intersection Conflict Points (No Management) (Kansas Department of Transportation, 2013)

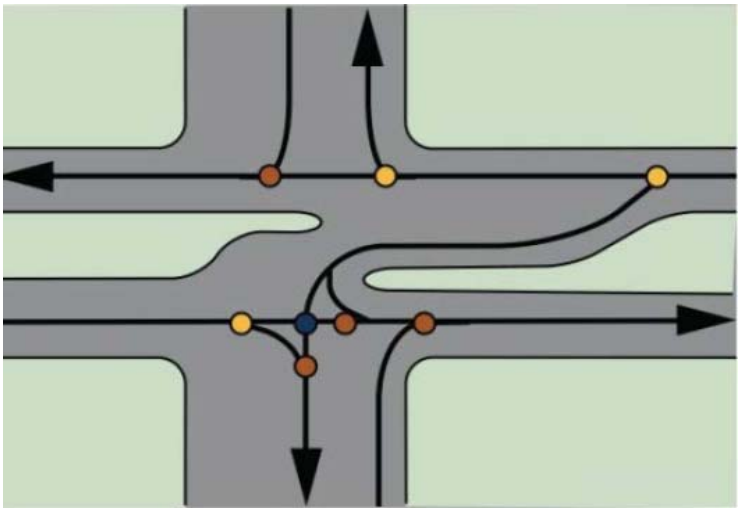

Figure 3.2 Intersection Conflict Points (Management) (Kansas Department of Transportation, 2013)

Intersection conflict points between roadway users most notably occur where vehicle, bicycle, or pedestrian paths directly cross, but can also occur in the form of rear end collisions and merging or sideswipe collisions. Figure 3.1 shows that the typical intersection has 32 vehicle to vehicle conflict points. Figure 3.2 shows an example of an intersection to which access management practices have been applied. The total number of collisions at the intersection has been reduced to eight.

The presence of conflict points does not guarantee that a crash is going to occur. In most cases, vehicles will not make contact with one another at a conflict point. Rather, they will apply brakes or maneuver to avoid the collision. When this happens, the free flow of traffic is disrupted and a friction point arises, greatly reducing efficiency.

3.3.2 Efficiency

Efficiency of a roadway is determined by consistency and safety. Roads are considered efficient when users can expect to reach their destination within a reasonable amount of time while maintaining safe travel. Figure 3.3 shows that as the number of access points per mile of road increases, the average travel speed of the road, and thus efficiency, decreases.

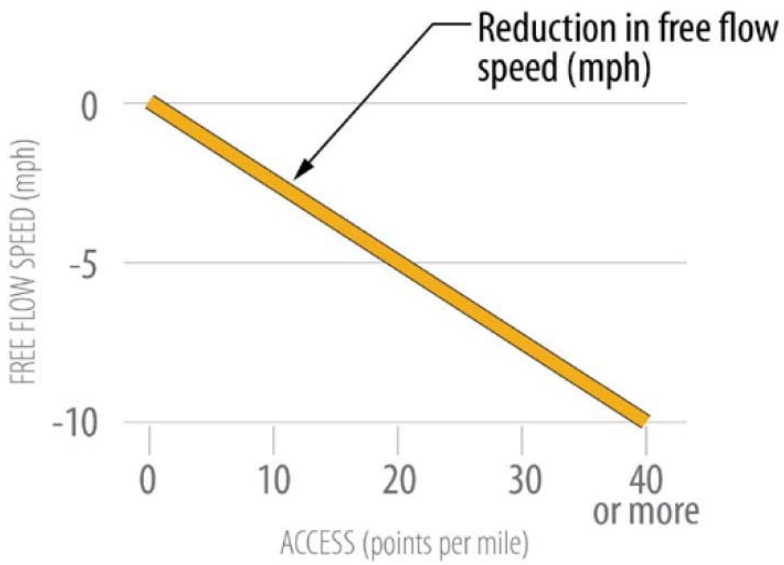

Figure 3.3 Free Flow Speed vs Access Points per Mile (Kansas Department of Transportation, 2013)

This issue could be addressed by employing access management strategies such as shared access points and frontage roads to create an internal road network that would require a minimal number of access points to provide sufficient connection to the main road. The result would be a reduction in overall access density, and preserved entry to adjacent properties. Together these tools would help to create an efficient transportation corridor defined by uniformity and safety.

3.3.3 Economic Development

Just as safety contributes to the efficiency of a road, the efficiency of a road can have a major impact on the economy surrounding it. When people and goods are able to move safely and consistently within a road network, they are much more likely to use that network. Additionally, when users are comfortable with a road, they are willing to travel a longer distance. Figure 3.4 demonstrates the effect of travel speed on the market area. Market areas grow as road efficiency improves.

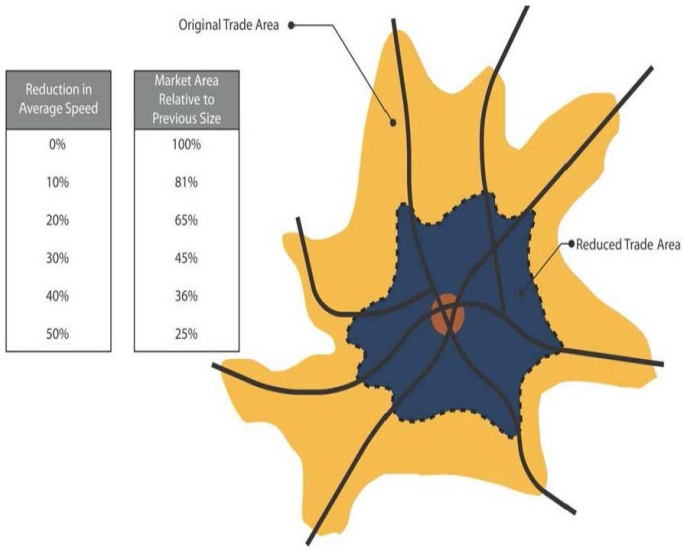

Figure 3.4 Average Speed vs Market Area (Kansas Department of Transportation, 2013)

Section 4: Existing Conditions of Study Area

4.1 Characteristics of US-50

In order to develop an extensive Access Management Plan for a roadway, it is important to first know fundamental details about both the road and its surrounding area. Thorough and accurate information is crucial to developing a sound strategy for developing a Plan to enhance the area. Additionally, knowledge of the local area and its uses helps to guarantee a Plan that will integrate the goals of the study location with those of the broader region.

4.1.1 Route Classification

The KDOT Route Classification System characterizes roads based on daily traffic volumes, route continuity, access to major cities, trip length, and route spacing. The System divides all corridors into five classes, A through E. Class A roadways are reserved for interstate routes which have the highest interstate travel, traffic volumes, and speeds. The lowest classification, Class E, is composed of routes that connect traffic to a small area or region, have small traffic volumes, and operate at reduced speeds.

Because it is on the National Highway System, has limited access, experiences high-speed travel (65 mph), is used for long distance truck traffic, and has statewide significance, US-50 has been designated as a Class B route. This is important to note not only for use in design calculations, but also shows the significance of this particular road to the city of Emporia, its surrounding area, and the state of Kansas.

4.1.2 Route Access Control

Based upon future road upgrades and the potential for development in an area, KDOT assigns all roads an access control designation. Full access control is reserved for existing and future freeway corridors (Class A) where access is restricted to interchange systems. Rural roads that have little potential for future upgrade, and are located in areas with no planned development, are designated as no access control roads. Figure 4.1 shows that US-50 west of Emporia is designated as Partial Access Control 2.

4.1.2.1 Partial Access Control 2

As a Partial Access Control 2 highway, US-50 is labeled as an expressway that has no plans of being upgraded to a freeway. Additionally, all new access points along the road are limited to public roads, and access control must be applied to these roads to prevent them from interrupting progress of the highway. Existing access points are generally allowed to remain in place, provided the land use of the properties they are serving does not change. On Partial Access Control 2 routes, access drives must be brought up to access management standards even if they are permitted under the KDOT Access Management Policy. Direct access points are allowed to remain if the joining property is landlocked, but should be closed if additional access by frontage road or other means is, or becomes, available.

Figure 4.1 KDOT Access Control Classification (Kansas Department of Transportation, 2013)

4.1.3 Speed Limit

Existing speed limits within the study area are shown in Figure 4.2. As of the time of this Plan, the existing speed limit on US-50 within the study area is 65 mph. A transition from 65mph to 45mph occurs at the east limit of the study area just west of the I-35 overpass. It is understood that KDOT is preparing to lower the speed limit from 65mph to 55 mph from the existing 65/45mph transition to a point approximately 1,000 foot west of Road G. Roads G and F south of US-50 have no posted speed limit, while the same roads north of US-50 have speed limits of 45mph and 35mph respectively.

There are two important details to note about the study area's existing speed limits: the speed along US-50, and the overall variance in speed limits throughout the entire network. Because of its role as a major shipping and transportation corridor, it is desired for the speed along US-50 to remain as close to existing as possible. To accomplish this while preserving safety and promoting efficiency, careful consideration must be paid to access management of adjacent properties. Furthermore, it will be critical to establish a more uniform speed limit structure for Roads F, G, 170, and 180 as properties develop. Doing so will encourage drivers to travel all roadways and prevent overuse and congestion along a single road.

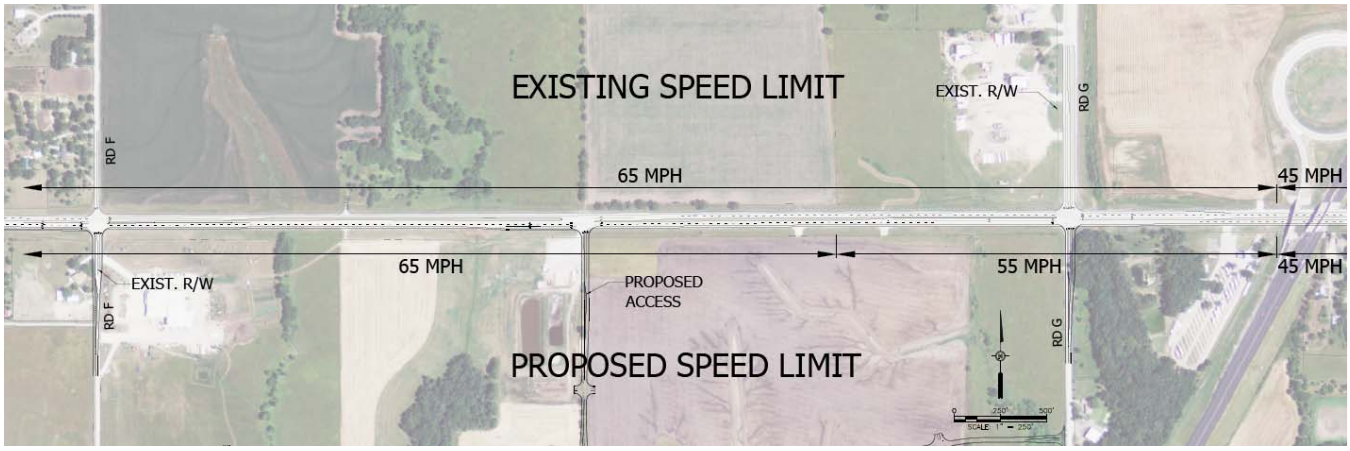

Figure 4.2 Existing and Proposed Speed Limits

4.1.4 Area Type

The area surrounding an access point is considered when determining where a point can be located because of the effect that it can have on the flow of traffic within the area. For example, a roadway that is lined either by residential lots or business fronts is typically going to experience traffic that is frequently entering and exiting resulting in a high number of potential conflict points. Additionally, streets that are located near industrial parks are subject to a high percentage of heavy freight vehicles and high peak-hour traffic volumes due to entering and exiting employees.

The KDOT Access Management Policy classifies an area as either developed or undeveloped. Again, this classification is used to determine specific design aspects. The Policy states that in order for an area to be considered developed it must meet one of the following criteria:

- Be located within the corporate limits of a city
- Have a posted speed limit below 40 mph
- Have 50% of the land adjacent to the highway developed with residencies, businesses, or industry

The area surrounding US-50 between Road G and Road F does not meet any of these requirements, and is therefore considered to be undeveloped.

4.1.5 Land Use

The area located adjacent to US-50 between Road G and Road F is composed of 592.2 total acres. Of those acres, 101.78 are currently developed leaving 490.42 acres available for future development. Of the land that has been developed, 48.4 acres are residential and 53.38 acres are commercial. Commercial property is primarily composed of agriculture and heavy truck based industries. Figure 4.3 shows current land status and ownership information.

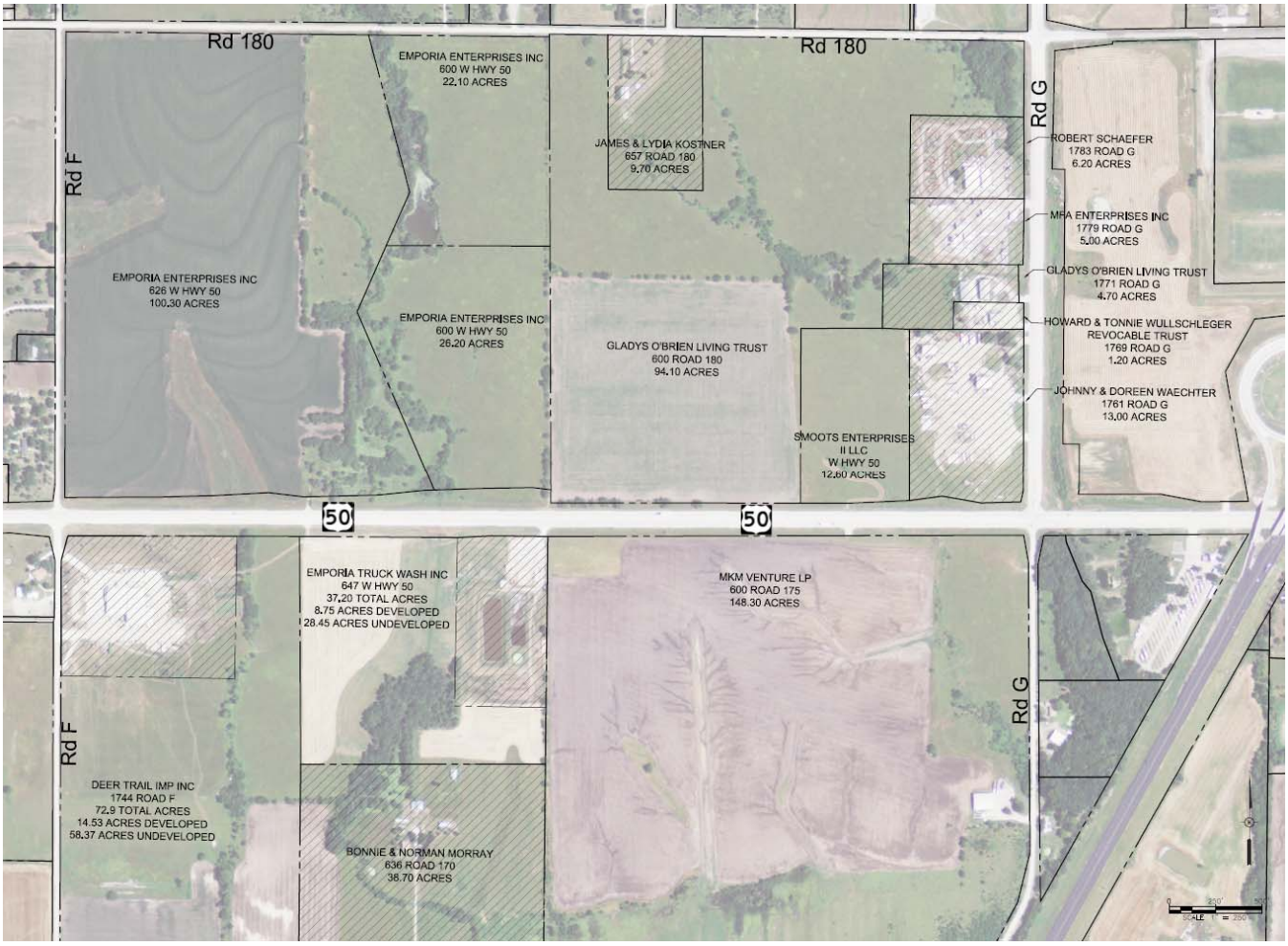

Figure 4.3 Parcel Information

4.2 Emporia Comprehensive Plan

The city of Emporia developed the "City of Emporia Comprehensive Plan" that outlines goals and guidelines for future development and improvement for the city and surrounding area. The Emporia Plan pays significant attention to the area being studied within this Access Management Plan. Objective 1.2 of the Emporia Plan specifies the need to "maximize new development opportunities west of the Kansas Turnpike" and lists Road G from US-50 to 30th Ave., US-50 from Road G to Road F, and Road F from US-50 to Road 180 as priority areas for development. Furthermore, Policy 1.2.3 of the Emporia Plan states the need for access management guidelines along US-50 as a city goal.

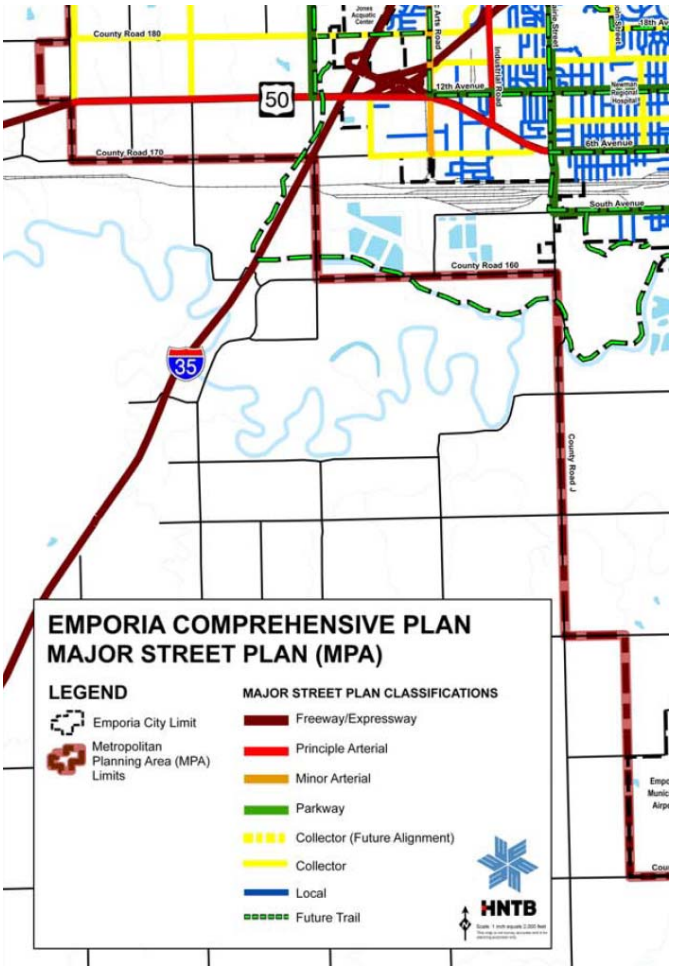

Figure 4.4 Emporia Major Street Plan (City of Emporia Planning Commission, 2008)

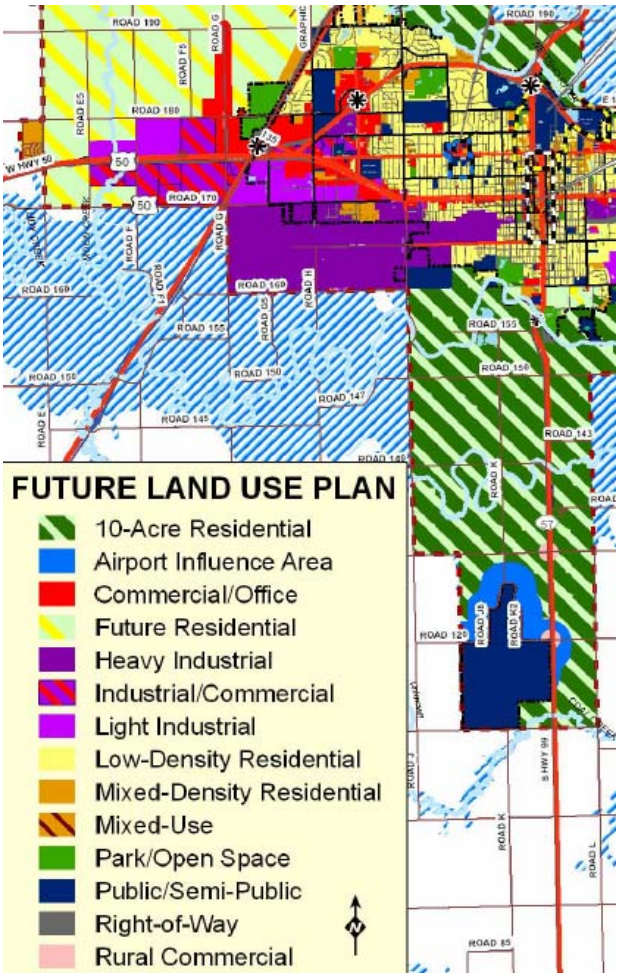

Figure 4.5 Emporia Land Use Plan (City of Emporia Planning Commission, 2008)

In addition to designating the area along US-50 between Road G and Road F as important for future development, the Emporia Plan also defines how the stretch of highway fits into the city's overall transportation strategy, and the planned future use of the area surrounding it. Figures 4.4 and 4.5 are taken from the Emporia Plan and show that US-50 is labeled as a principal arterial within the city's road network, and the adjacent land has been reserved for light industrial and commercial development.

4.2.1 Lane Configuration

The existing US-50 lane configuration within the study area varies from five lanes at Road G to four lanes at Road F. At the intersection of US-50 and Road G, dedicated left-turn lanes are provided for both eastbound and westbound motorists turning from US-50 onto Road G. Additionally, two eastbound and westbound through lanes are present to maintain traffic flow and prevent conflict points. An entrance to the Emporia Truck Wash is located approximately halfway between Road G and Road F. As vehicles approach this access point from the east, a dedicated left-turn lane is used to gain access to the truck wash, and a single through lane allows through vehicles to pass by uninterrupted. Motorists approaching from the west do not have dedicated turn-lanes to use, but two through lanes are available to access the truck wash and to continue travel along US-50. At the intersection of US-50 and Road F, motorists turning onto Road F are again able to utilize dedicated left-turn lanes from both the east and west directions. Westbound motorists on US-50 can also use a combination through and right-turn movement lane, while eastbound motorists use dedicated right-turn and through lanes.

4.2.2 Access Points

Figure 4.6 shows the location and use of access points between Road F and the I-35 overpass along US-50. Seven concrete, two gravel, and two grass access points are currently in use, not including the Road G and Road F intersections. Only three of the eleven points currently serve commercial properties. All other points provide direct access to adjacent agricultural land. This creates a safety concern because these points encourage the use of agricultural machinery within the highway corridor, meaning a potential increase of conflict and friction points due to the presence of heavy, slow-moving, and oversized vehicles on a high speed highway. Additionally, because the US-50 speed limit between Roads G and F is set at 65mph, the spacing of the existing access points does not meet the Kansas Department of Transportation's Access Management Policy which specifies that for this location, unsignalized access points be 955' apart.

Access Route Classification	Area Type	Posted Speed Limit (mph)										
		20	25	30	35	40	45	50	55	60	65	70
		(Distance in feet)										
B	Undeveloped				350	420	515	610	720	825	955	1075
	Developed	115	170	225	295	365	450	535	640	740		
	CBD	85	120	155	205							
C and D	Undeveloped				255	300	365	425	500	570	650	730
	Developed	85	120	155	200	245	300	350	420	485		
	CBD	65	90	125	165							
E	Undeveloped				190	230	285	335	400	460	535	605
	Developed	65	95	125	165	200	250	295	360	420		
	CBD	40	65	90	125							

Table 4.1 Access Spacing for Unsignalized Highways (Kansas Department of Transportation, 2013)

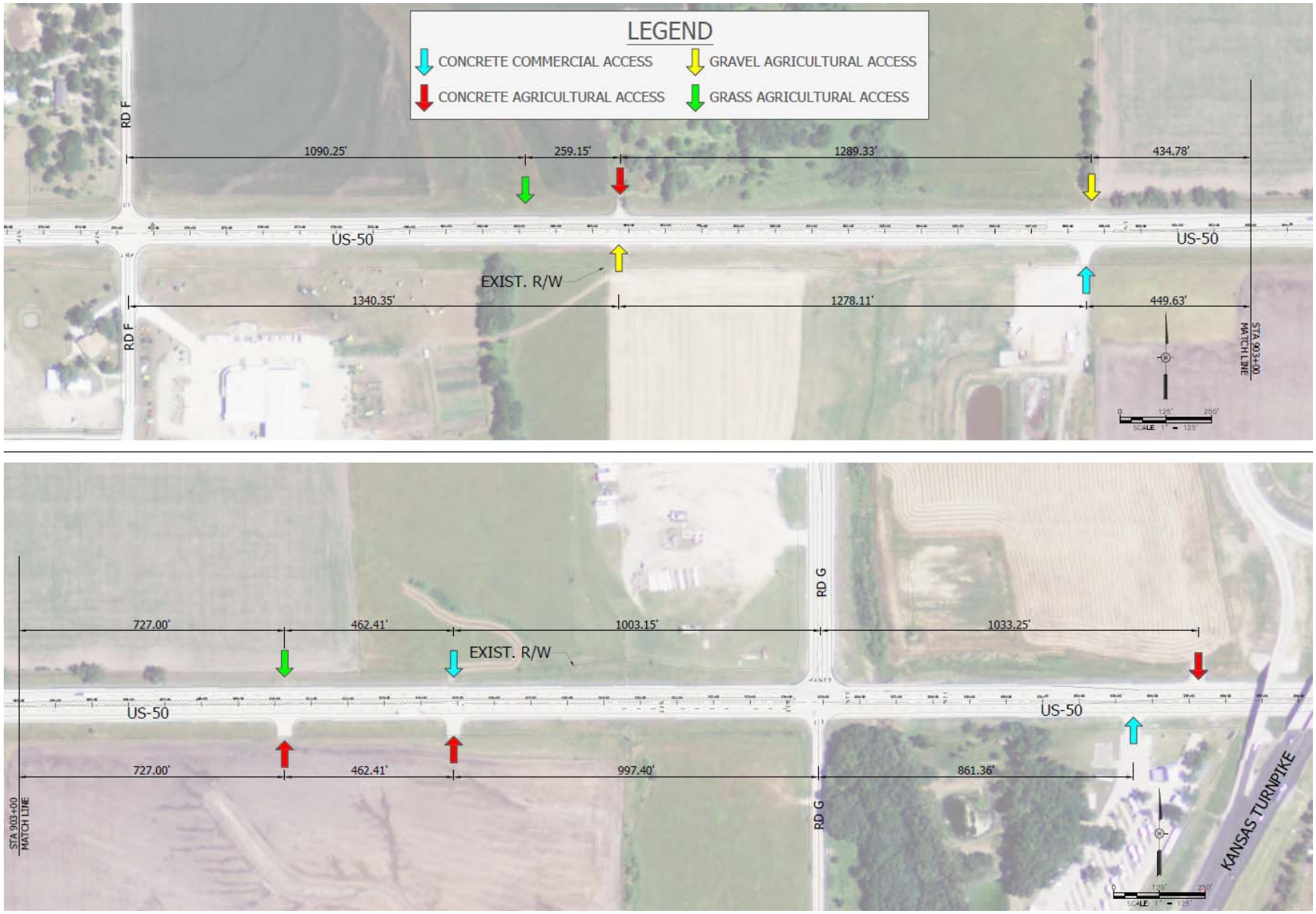

Figure 4.6 Existing Access Points

4.3 Traffic Analysis – Existing Conditions

In order to develop an accurate representation of future traffic projections within the project area, existing traffic conditions must first be evaluated. Traffic volumes and crash reports were collected and studied to obtain an accurate measurement of current traffic conditions.

4.3.1 Traffic Counts

On April 16th and 17th, 2014 manual traffic counts were completed for the intersections of US-50 and Road G, US-50 and Road F, Road F and Road 180, and Road G and Road 180 to determine the peak hour of traffic for each intersection. All traffic movements were recorded during 15-minute intervals from 7:00am to 9:00am, and 4:00pm to 6:00pm. Traffic counts were then analyzed to determine the four consecutive 15-minute periods that resulted in the highest traffic total (peak hour volume) for both AM and PM scenarios, as well as the percentage of heavy vehicles present during that time. As anticipated, the existing traffic volumes result in high levels of service for traffic along US-50, Road F, Road G, and Road 180 with all intersections currently operating at "Level of Service A". AM and PM peak hour times and volumes are highlighted and summarized in the following tables.

Summary of Existing Intersection Analysis				
Intersection	**US-50 & Road G**	**US-50 & Road F**	**Road F & Road 180**	**Road G & Road 180**
Peak AM Hour	7:15 - 8:15	7:00 – 8:00	7:00 – 8:00	7:15 – 8:15
AM Hour Volume	569	432	16	253
AM Level of Service	A	A	A	A
Peak PM Hour	4:45 – 5:45	4:45 – 5:45	5:00 – 6:00	4:30 – 5:30
PM Hour Volume	662	515	18	270
PM Level of Service	A	A	A	A

Table 4.2 Existing Intersection Traffic Analysis Summary

The manual traffic counts showed an approximate 25% heavy vehicle percentage during the AM and PM peak hours. The KDOT traffic count map shows 37% heavy vehicles for daily traffic.

4.3.1.1 US-50 & Road G

US-50 intersects Road G near the east edge of the project limits. Traffic along US-50 dominates the total intersection volume, but traffic using Road G is still significant for the region. Tables 4.3 and 4.4 show the raw data obtained, the determined peak hours, and the existing level of service for the intersection.

			Road G			US-50			Road G			US-50			
			NB			EB			SB			WB			Intersection
Period	Start Time	End Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Totals
AM Peak	7:00 AM	8:00 AM	1	2	1	33	185	1	95	4	13	1	165	56	557
	7:15 AM	8:15 AM	2	3	1	28	202	1	88	5	12	4	163	60	569
	7:30 AM	8:30 AM	2	3	3	27	217	3	75	6	8	3	161	56	564
	7:45 AM	8:45 AM	2	2	5	23	206	3	57	4	8	4	166	44	524
	8:00 AM	9:00 AM	3	3	4	20	188	5	52	2	10	4	152	35	478
PM Peak	4:00 PM	5:00 PM	0	2	2	10	219	2	49	2	21	0	222	56	585
	4:15 PM	5:15 PM	2	4	1	8	224	3	60	2	20	0	232	75	631
	4:30 PM	5:30 PM	2	3	0	11	242	2	62	1	17	2	225	74	641
	4:45 PM	5:45 PM	2	4	2	15	263	2	56	2	20	3	222	71	662
	5:00 PM	6:00 PM	2	3	2	17	251	1	49	2	18	3	217	68	633

Table 4.3 US-50 & Road G Traffic Counts (Two-way Stop Control)

Important notes:

- The AM peak hour is from 7:15am to 8:15am and the PM peak hour is from 4:45pm to 5:45pm for the intersection
- Through traffic along US-50 accounts for 69% of the total traffic volume
- Ninety-five percent (95%) of maneuvers from US-50 to Road G are to travel northbound along Road G for both the AM and PM peak hours

Level of Service Summary US-50 & Road G Existing Traffic																		
AM Peak Hour 7:15-8:15 AM									PM Peak Hour 4:45-5:45 PM									
Intersection		Approach			Movement				Intersection		Approach			Movement				
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	
A	2.0	EB	A	1.8	Left	A	1.3	13	A	1.8	EB	A	1.9	Left	A	1.9	17	
					Thru	A	1.9	0						Thru	A	1.9	0	
					Right	A	0.0	0						Right	A	1.5	0	
		WB	A	0.6	Left	A	0.2	0			WB	A	0.7	Left	A	0.2	0	
					Thru	A	0.6	0						Thru	A	0.7	0	
					Right	A	0.6	0						Right	A	0.6	0	
		NB	A	9.1	Left	B	10.3	27			NB	A	6.8	Left	A	8.7	28	
					Thru	B	10.3	27						Thru	A	7.8	28	
					Right	A	3.3	27						Right	A	2.7	28	
		SB	A	4.9	Left	A	5.0	53			SB	A	5.1	Left	A	6.3	45	
					Thru	B	11.1	20						Thru	A	3.2	10	
					Right	A	1.4	19						Right	A	2.5	23	

Table 4.4 US-50 & Road G Existing LOS (Two-way Stop Control)

4.3.1.2 US-50 & Road F

The intersection of US-50 and Road F is the western most intersection of the study area. Again, traffic along US-50 dominates overall volume for the intersection. Road F, a gravel road north of US-50, does not contribute a significant number of vehicles to the total count, but the majority of what it does contribute, executes movements onto eastbound US-50, and within the access management study area.

			Road F			US-50			Road F			US-50			
			NB			EB			SB			WB			Intersection
Period	Start Time	End Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Totals
AM Peak	7:00 AM	8:00 AM	0	0	6	0	237	1	4	1	0	23	159	1	432
	7:15 AM	8:15 AM	0	0	6	0	228	1	5	2	0	17	153	1	413
	7:30 AM	8:30 AM	0	0	7	0	232	0	5	2	0	3	158	3	410
	7:45 AM	8:45 AM	0	0	6	0	222	0	5	2	0	4	160	3	402
	8:00 AM	9:00 AM	0	0	5	0	193	0	5	1	0	4	146	2	356
PM Peak	4:00 PM	5:00 PM	2	1	5	0	229	3	2	0	3	7	236	2	490
	4:15 PM	5:15 PM	2	1	8	0	220	4	3	0	3	14	227	2	484
	4:30 PM	5:30 PM	2	1	11	0	247	5	1	0	3	14	221	3	508
	4:45 PM	5:45 PM	5	1	22	0	247	6	1	0	0	11	220	2	515
	5:00 PM	6:00 PM	5	0	26	0	230	3	2	0	0	9	216	2	493

Table 4.5 US-50 & Road F Traffic Counts (Two-way Stop Control)

Important notes:

- The AM peak hour is from 7:00am to 8:00am and the PM peak hour is from 4:45pm to 5:45pm for the intersection
- Ninety-six percent (96%) of all traffic entering the intersection during peak hours comes from US-50

Level of Service Summary US-50 & Road F Existing Traffic																		
AM Peak Hour 7:00-8:00 AM									PM Peak Hour 4:45-5:45 PM									
Intersection		Approach			Movement				Intersection		Approach			Movement				
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	
A	1.5	EB	A	0.5	Left	A	0.0	0	A	2.0	EB	A	0.9	Left	A	0.0	0	
					Thru	A	0.5	0						Thru	A	0.8	0	
					Right	A	4.2	0						Right	A	3.6	0	
		WB	A	2.4	Left	A	2.9	22			WB	A	2.6	Left	A	1.6	7	
					Thru	A	2.3	0						Thru	A	2.7	0	
					Right	A	0.0	0						Right	A	0.0	0	
		NB	A	5.5	Left	A	0.0	0			NB	A	5.0	Left	A	3.1	10	
					Thru	A	0.0	0						Thru	A	0.0	10	
					Right	A	5.5	24						Right	A	5.4	61	
		SB	A	4.1	Left	A	3.4	29			SB	A	3.7	Left	A	3.5	9	
					Thru	A	7.1	29						Thru	A	3.8	0	
					Right	A	0.0	29						Right	A	0.0	9	

Table 4.6 US-50 & Road F Existing LOS (Two-way Stop Control)

4.3.1.3 Road 180 & Road F

The intersection of Road 180 and Road F, located in the northwest corner of the project, experiences the least amount of traffic of the four intersections studied. Traffic counts conducted on the intersection revealed that Road 180 accounts for the majority of the traffic volume for the intersection.

Period	Start Time	End Time	Road F NB			Road 180 EB			Road F SB			Road 180 WB			Intersection Totals
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak	7:00 AM	8:00 AM	0	0	0	0	10	2	0	1	0	0	2	1	16
	7:15 AM	8:15 AM	0	0	0	0	10	1	0	2	0	0	1	1	15
	7:30 AM	8:30 AM	0	0	0	0	10	2	0	2	0	0	0	1	15
	7:45 AM	8:45 AM	1	0	1	0	9	2	0	1	0	0	0	0	14
	8:00 AM	9:00 AM	1	0	1	0	5	1	0	1	0	0	0	0	9
PM Peak	4:00 PM	5:00 PM	2	1	4	0	1	2	0	1	0	2	3	1	17
	4:15 PM	5:15 PM	2	2	5	0	2	1	0	1	0	3	1	1	18
	4:30 PM	5:30 PM	1	2	2	0	4	1	0	1	0	2	1	0	14
	4:45 PM	5:45 PM	1	2	1	0	4	1	0	3	0	1	3	0	16
	5:00 PM	6:00 PM	1	2	1	0	6	0	0	3	0	1	3	1	18

Table 4.7 Road 180 & Road F Traffic Counts (Two-way Stop Control)

Important notes:

- The AM peak hour is from 7:00am to 8:00am and the PM peak hour is from 5:00pm to 6:00pm for the intersection
- Seventy-six percent (76%) of all traffic entering the intersection comes from Road 180

Level of Service Summary Road 180 & Road F Existing Traffic																		
AM Peak Hour 7:00-8:00 AM									PM Peak Hour 5:00-6:00 PM									
Intersection		Approach			Movement				Intersection		Approach			Movement				
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	
A	6.6	EB	A	6.1	Left	A	0.0	47	A	5.4	EB	A	6.7	Left	A	0	40	
					Thru	A	7.1	47						Thru	A	6.7	40	
					Right	A	1.3	47						Right	A	0	40	
		WB	A	8.5	Left	A	0.0	20			WB	A	4.7	Left	A	6.9	20	
					Thru	A	8.5	20						Thru	A	4.4	20	
					Right	A	0.0	20						Right	A	0	20	
		NB	A	0.0	Left	A	0.0	0			NB	A	4.3	Left	A	0	20	
					Thru	A	0.0	0						Thru	A	5.3	20	
					Right	A	0.0	0						Right	A	1.4	20	
		SB	A	0.0	Left	A	0.0	0			SB	A	7.1	Left	A	0	18	
					Thru	A	0.0	0						Thru	A	7.1	18	
					Right	A	0.0	0						Right	A	0	18	

Table 4.8 Road 180 & Road F Existing LOS (Two-way Stop Control)

4.3.1.4 Road G & Road 180

Existing traffic data at the intersection of Road G and Road 180 revealed that this intersection plays an important role in commuter traffic to and from Emporia. The number of vehicles traveling southbound on Road G and toward Emporia is highest during the AM peak hour and decreases later in the day. Similarly, traffic moving away from Emporia on Road G and Road 180 is highest during the PM peak hour.

			Road G			Road 180			Road G			Road 180			
			NB			EB			SB			WB			Intersection
Period	Start Time	End Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Totals
AM Peak	7:00 AM	8:00 AM	2	40	26	3	9	2	54	75	0	21	2	11	245
	7:15 AM	8:15 AM	2	49	19	3	8	2	51	83	0	20	2	14	253
	7:30 AM	8:30 AM	1	45	17	2	9	2	46	79	0	16	1	12	230
	7:45 AM	8:45 AM	1	40	12	1	8	2	38	66	0	14	0	13	195
	8:00 AM	9:00 AM	3	31	10	0	6	3	25	60	0	7	1	8	154
PM Peak	4:00 PM	5:00 PM	5	68	12	0	3	4	35	57	0	16	10	32	242
	4:15 PM	5:15 PM	4	67	11	1	3	4	39	64	0	19	10	37	259
	4:30 PM	5:30 PM	4	73	15	3	5	4	37	59	1	20	6	43	270
	4:45 PM	5:45 PM	3	66	13	3	5	4	34	51	1	16	3	41	240
	5:00 PM	6:00 PM	2	67	11	3	5	3	25	46	1	19	4	42	228

Table 4.9 Road G & Road 180 Traffic Counts (Two-way Stop Control)

Important notes:

- The AM peak hour is from 7:15am to 8:15am and the PM peak hour is from 4:30pm to 5:30pm for the intersection
- Road G accounts for 81% of traffic entering the intersection during the AM peak hour and 70% during the PM peak hour

Level of Service Summary Road 180 & Road G Existing Traffic																		
AM Peak Hour 7:15-8:15 AM									PM Peak Hour 4:30-5:30 PM									
Intersection		Approach			Movement				Intersection		Approach			Movement				
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	
A	1.4	EB	A	8.0	Left	A	8.4	38	A	1.7	EB	A	6.4	Left	A	8.5	36	
					Thru	A	9.2	38						Thru	A	8.6	36	
					Right	A	2.1	38						Right	A	1.4	36	
		WB	A	3.6	Left	A	4.5	31			WB	A	3.2	Left	A	4.3	33	
					Thru	A	9.3	31						Thru	A	8.1	33	
					Right	A	1.5	24						Right	A	2.0	32	
		NB	A	0.6	Left	A	0.4	0			NB	A	1.0	Left	A	0.4	0	
					Thru	A	0.6	0						Thru	A	1.1	0	
					Right	A	0.5	0						Right	A	0.6	0	
		SB	A	0.7	Left	A	1.1	15			SB	A	0.6	Left	A	1.2	19	
					Thru	A	0.4	0						Thru	A	0.2	0	
					Right	A	0.0	0						Right	A	0.0	0	

Table 4.10 Road G & Road 180 Existing LOS (Two-way Stop Control)

4.3.2 Crash Data

Table 4.11 provides a summary of crash data along US-50 from 2003-2013. The data shows that this area experiences an average of four crashes each year with the vast majority of those crashes resulting in property damage only. Crash reports also revealed that two of the three fatal crashes experienced over that time involved heavy vehicles.

Figure 4.7 shows the location and severity of the crashes that have occurred along the roadway. From the exhibit it can be seen that crashes within the study area tend to occur around access points and intersections. This can be attributed not only to vehicles entering and exiting the roadway, but also to additional decisions that drivers must make in the form of turning movements, lane changes, speed changes, and other distractions. From the figure, it becomes clear that the location and use of access points within the project area will be critical to road safety and efficiency.

US-50 Crashes 2003-2013												
Type	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**
Fatal		1						1			1	3
Injury	2				2				1			5
PDO[1]	2	5	3	2	2	6	3	3	2	5	4	37
Total	4	6	3	2	4	6	3	4	3	5	5	45

[1]*Property Damage Only*

Table 4.11 US-50 Crash Data 2003-2013

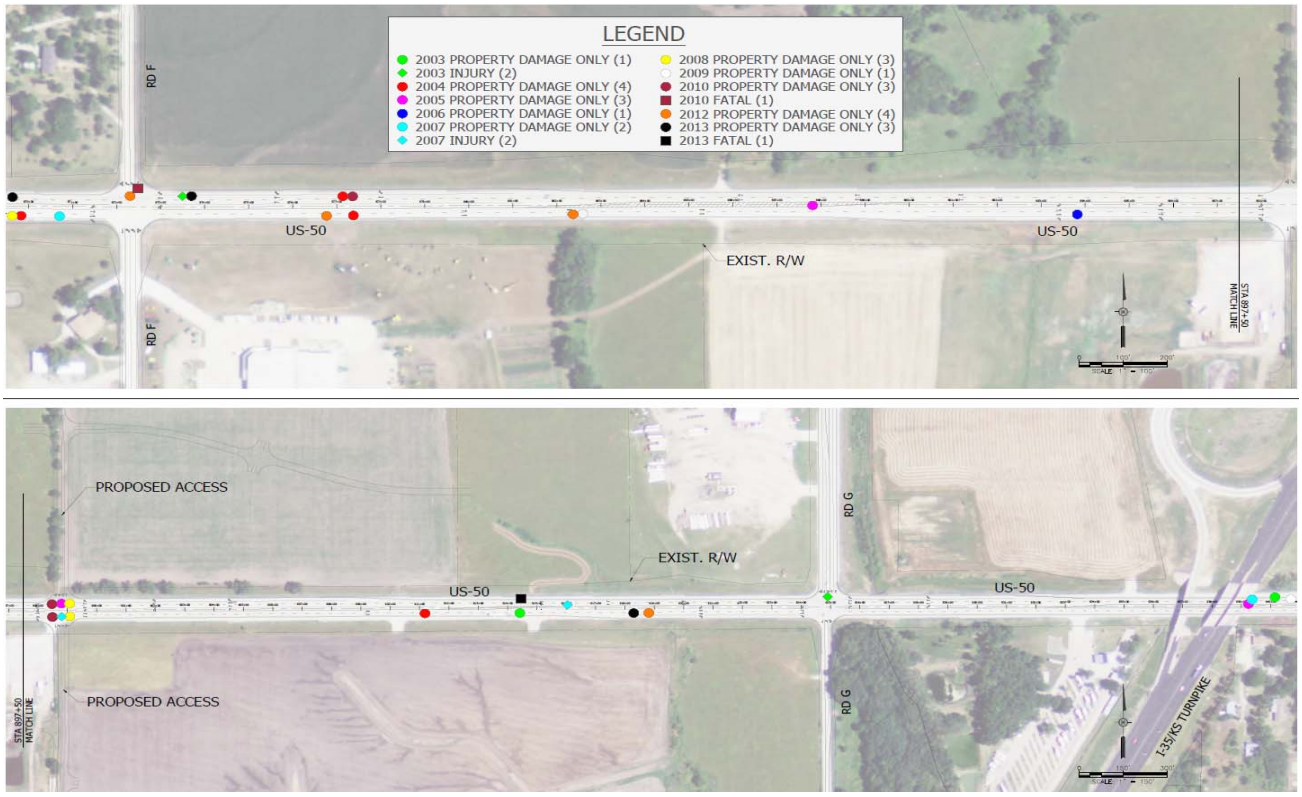

Figure 4.7 Crash Location and Severity

Section 5: Traffic Analysis – Full Development

5.1 Traffic Generation

The *Institute of Transportation Engineer's Trip Generation Manual* was used to estimate future traffic conditions within the study area. Projected daily and peak hour volumes were calculated based on anticipated land use classifications and property areas. Classifications were found in the Emporia Comprehensive Plan, which designates the area for light industrial or industrial/commercial development. Calculation results are summarized in Table 5.1. Lot labels used in the table correspond to Figure 5.1. From the table it can be seen that, once fully developed, an additional 3,500 vehicles during peak hours and 25,000 vehicles daily can be expected to travel within the study area.

Figure 5.1 Trip Generation Property Labels

TRIP GENERATION										
Proposed Development	Lot	ITE Code	Area (Acres)	Daily Traffic	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
General Light Industrial	EEW	110	100.3	5,196	753	625	128	728	160	568
General Light Industrial	EENE	110	22.1	1,145	166	138	28	160	35	125
General Light Industrial	EESE	110	26.2	1,357	197	163	34	190	42	148
General Light Industrial	GOLT	110	94.1	4,874	707	587	120	683	150	533
General Light Industrial	SME	110	12.6	653	95	79	16	91	20	71
General Light Industrial	DTE	110	58.73	3,042	441	366	75	426	94	332
General Light Industrial	ETW	110	28.45	1,474	214	177	37	207	45	162
General Light Industrial	MKM	110	148.3	7,682	1,114	924	190	1,077	237	840
Total			**491**	**25,422**	**3,686**	**3,059**	**628**	**3,563**	**783**	**2,780**

Table 5.1 Trip Generation Data

5.2 Traffic Distribution

Once the traffic volumes from the anticipated industrial developments were determined, they were distributed onto the road network within the study area. This distribution was estimated based on distributions from existing traffic counts, the relative location of the study area to the population center of Emporia, the location of the development relative to US-50, I-35, and the local road network in and surrounding the study area.

The traffic distributions consisted of two parts. The first was distributing the generated traffic to the access points anticipated to be used by trips to and from the properties within the study area. A conceptual interior road network (see page 37) was created to provide for access for the generated traffic onto the existing local road network. For a development area of this size, an interior road network will be required to provide access to all parts of the undeveloped land within the study area. The design of the interior road network will depend on the size and type of the development and how the study area develops over time.

The second component of the distribution consisted of distributing the generated traffic out of the access points and onto the local road network. This distribution was estimated based on the anticipated traffic flow into and out of the study area.

It is important to note these are anticipated distributions assuming the full development of all the properties within the study area according to the City of Emporia Comprehensive Plan. Actual distributions will vary depending on the type of development and the progression of how development occurs over time. The estimated distributions of the generated traffic within the study area are shown in Figures 5.2 and 5.3 below.

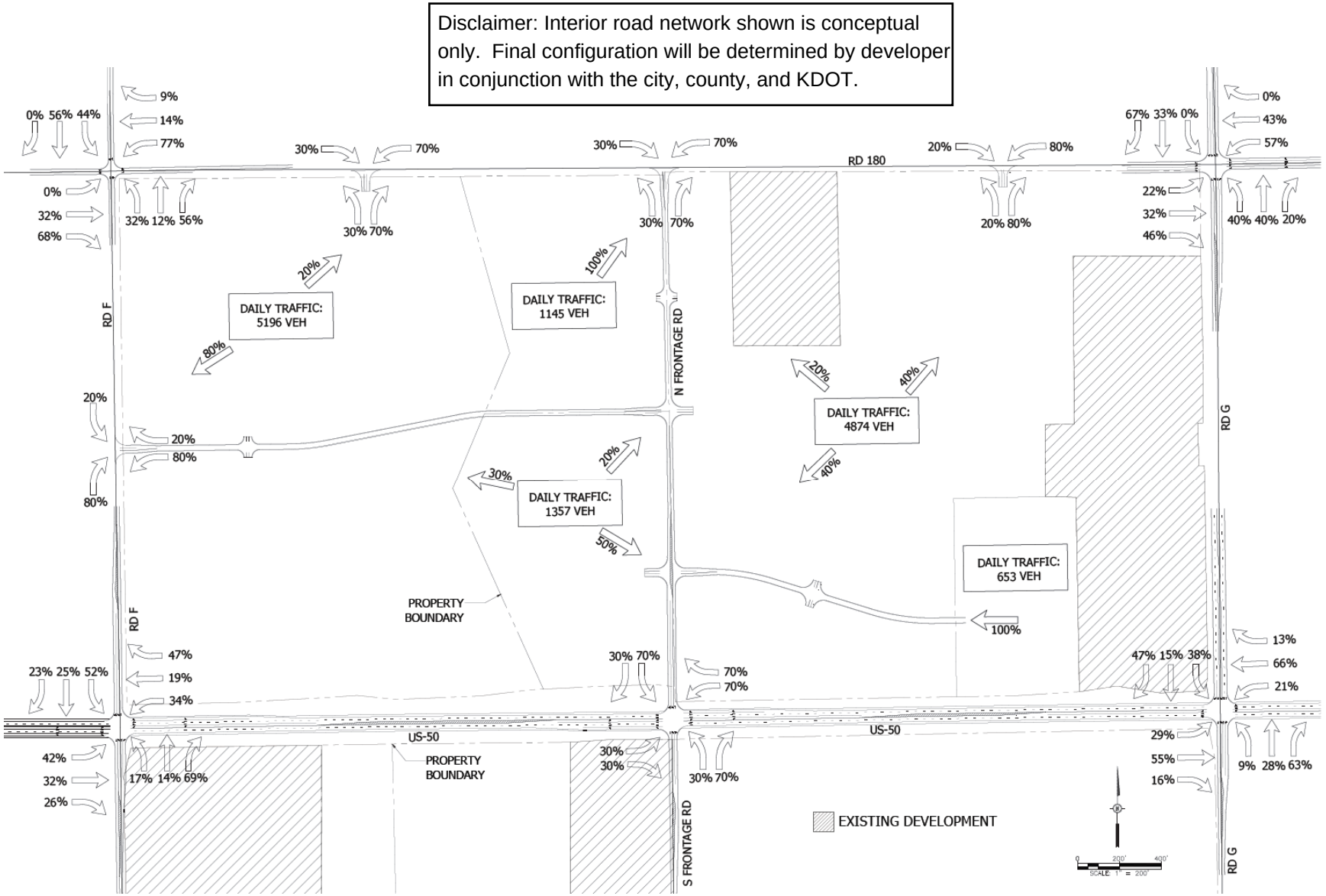

Figure 5.2 Traffic Distribution North of US-50 with Conceptual Interior Road Network (see Page 37)

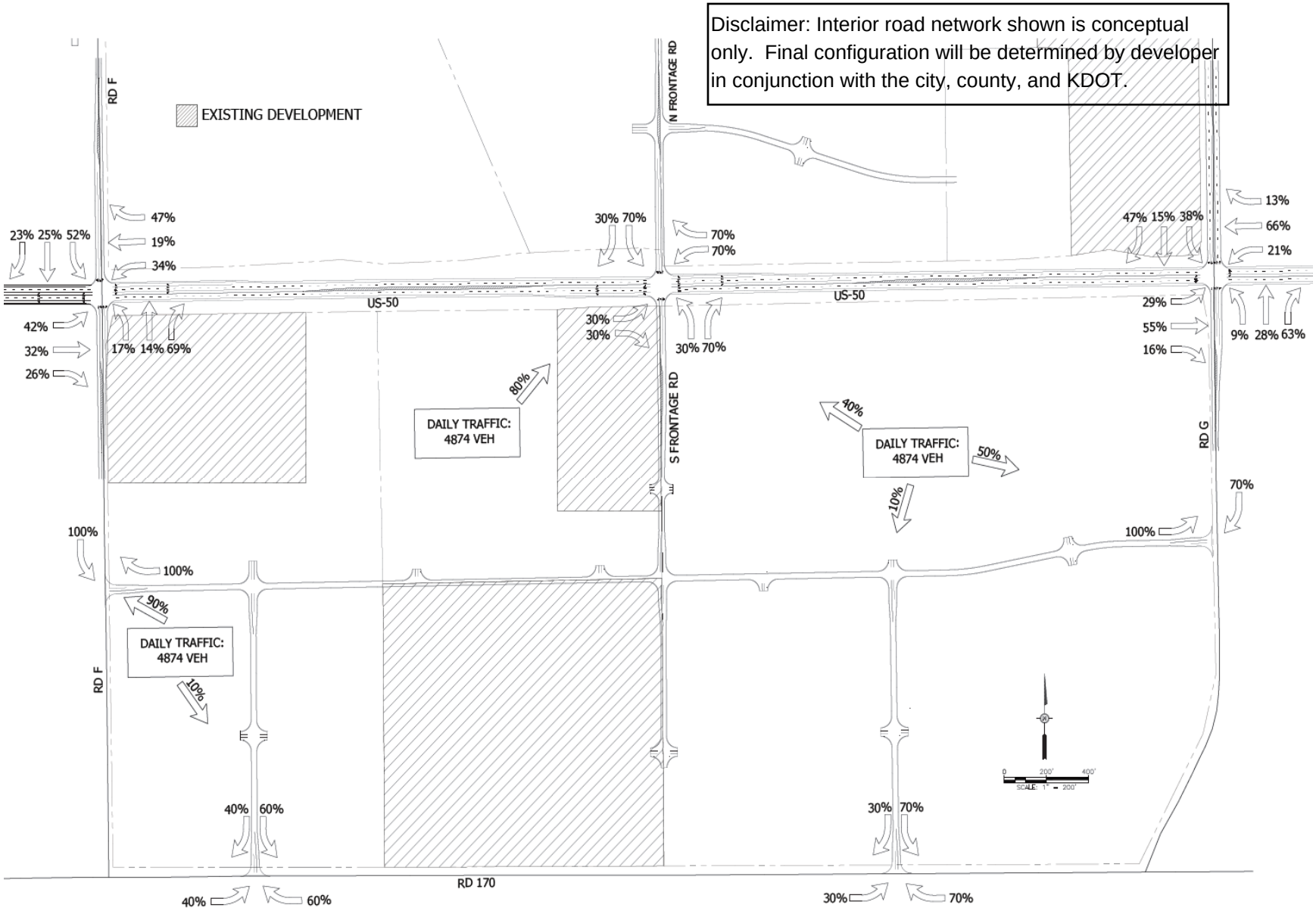

Figure 5.3 Traffic Distribution South of US-50 with Conceptual Interior Road Network (see Page 37)

5.3 Traffic Volumes

The generated traffic volumes and the estimated traffic distributions in and out of the properties within the study area were used to determine the anticipated traffic volumes and turning movements at the four existing intersections and one proposed access point in the study area. These generated intersection volumes were added to the existing traffic volumes, and are the basis for the intersection analysis performed to determine the net impact that full development will have on the street and highway network. Figures 5.4 and 5.5 show the generated traffic volumes within the study area for the AM and PM hours respectively, and Figures 5.6 and 5.7 show the generated plus existing volumes that were used for the full development traffic analysis.

The Kansas Department of Transportation estimates that traffic along US-50 will grow at a 1.5% growth rate over the next 20 years. However, for the purposes of the traffic analysis, it is assumed that the development within the study area will account for a majority of that traffic growth. Therefore, to avoid "double counting" traffic estimates and producing an overly conservative model, the traffic generated by full development was added to the existing traffic counts for the traffic analysis without adding a growth rate to the existing traffic.

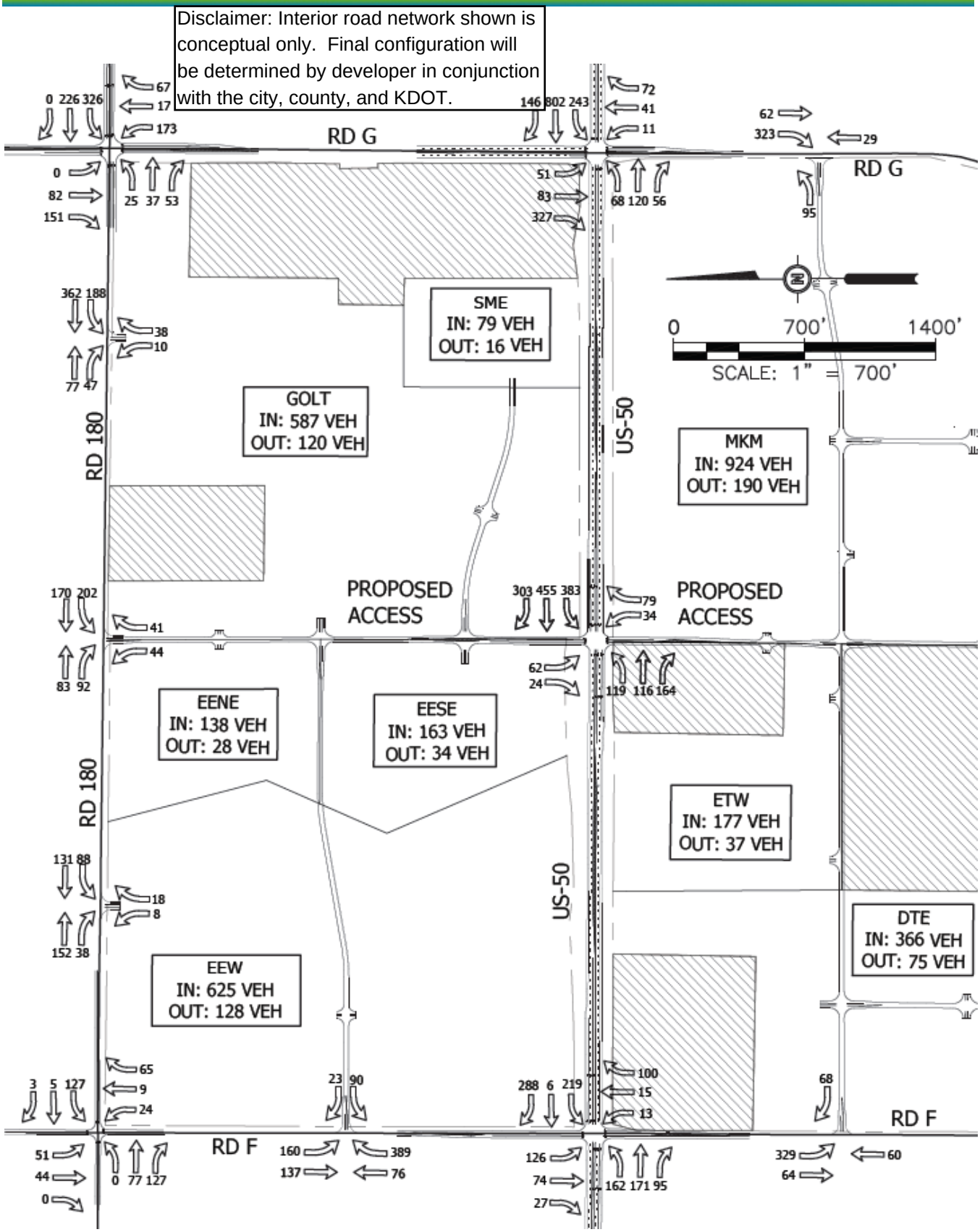

Figure 5.4 Generated Traffic with the Study Area at AM Peak Hour

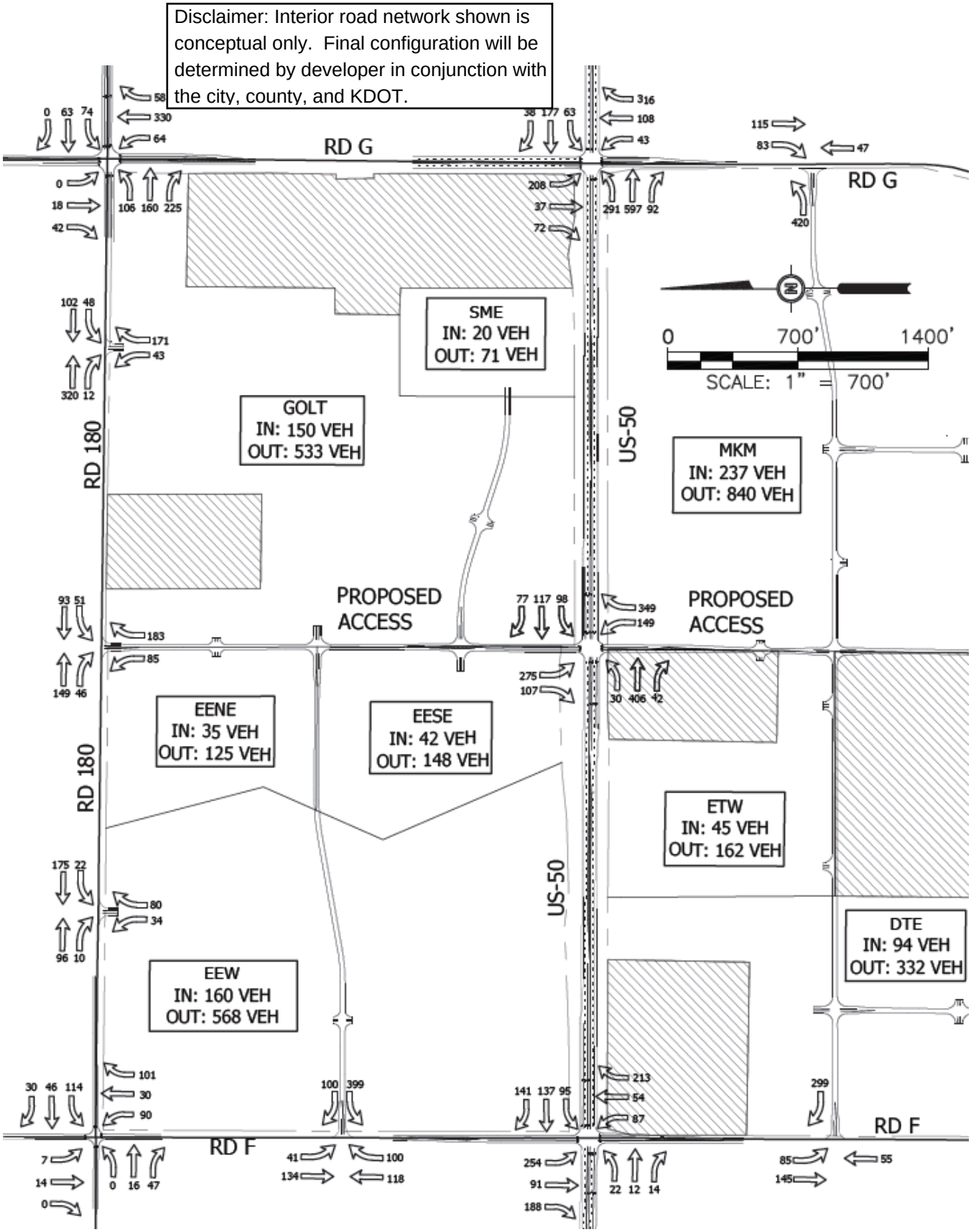

Figure 5.5 Generated Traffic within the Study Area at PM Peak Hour

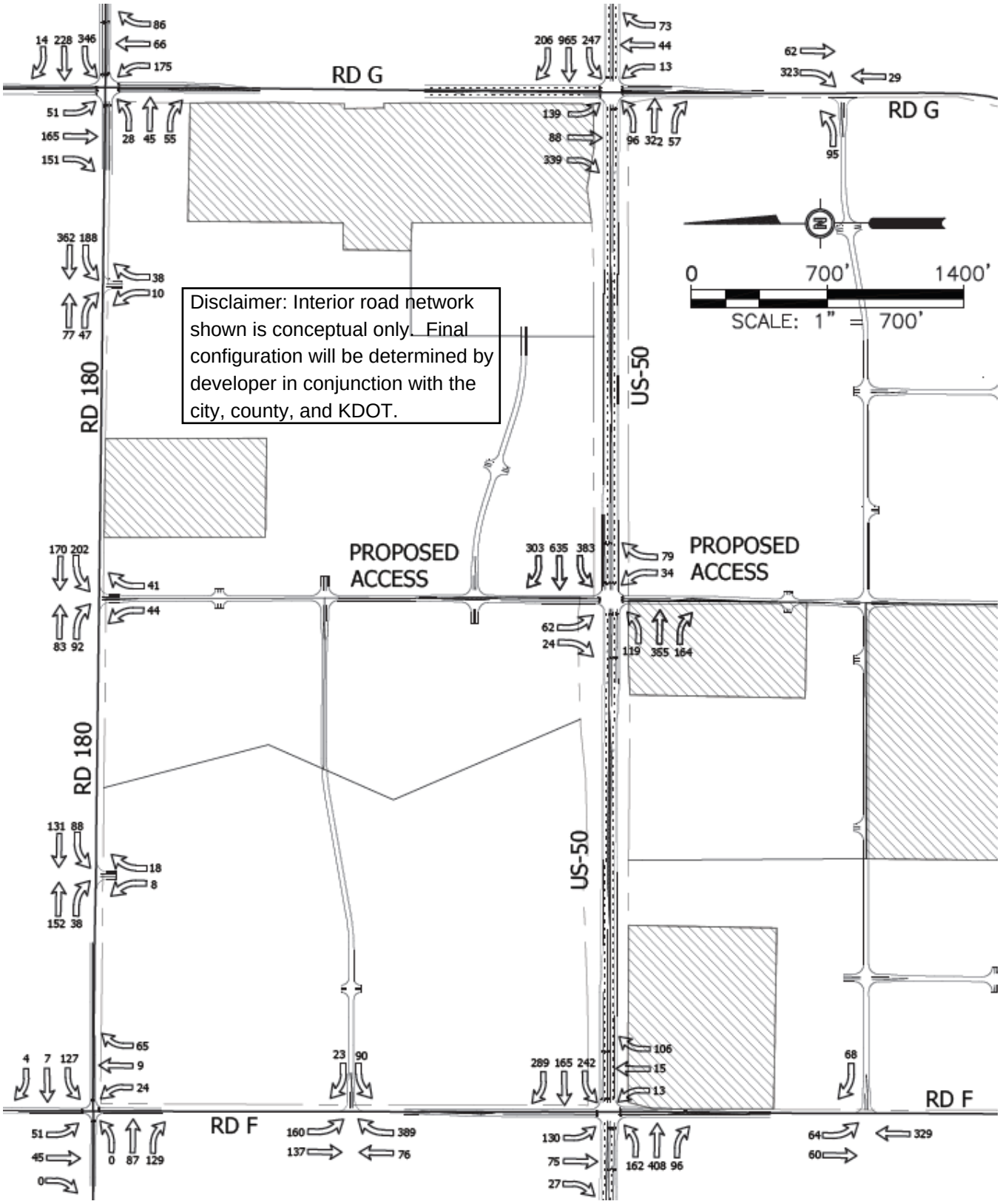

Figure 5.6 Generated Plus Existing Traffic within the Study Area at AM Peak Hour

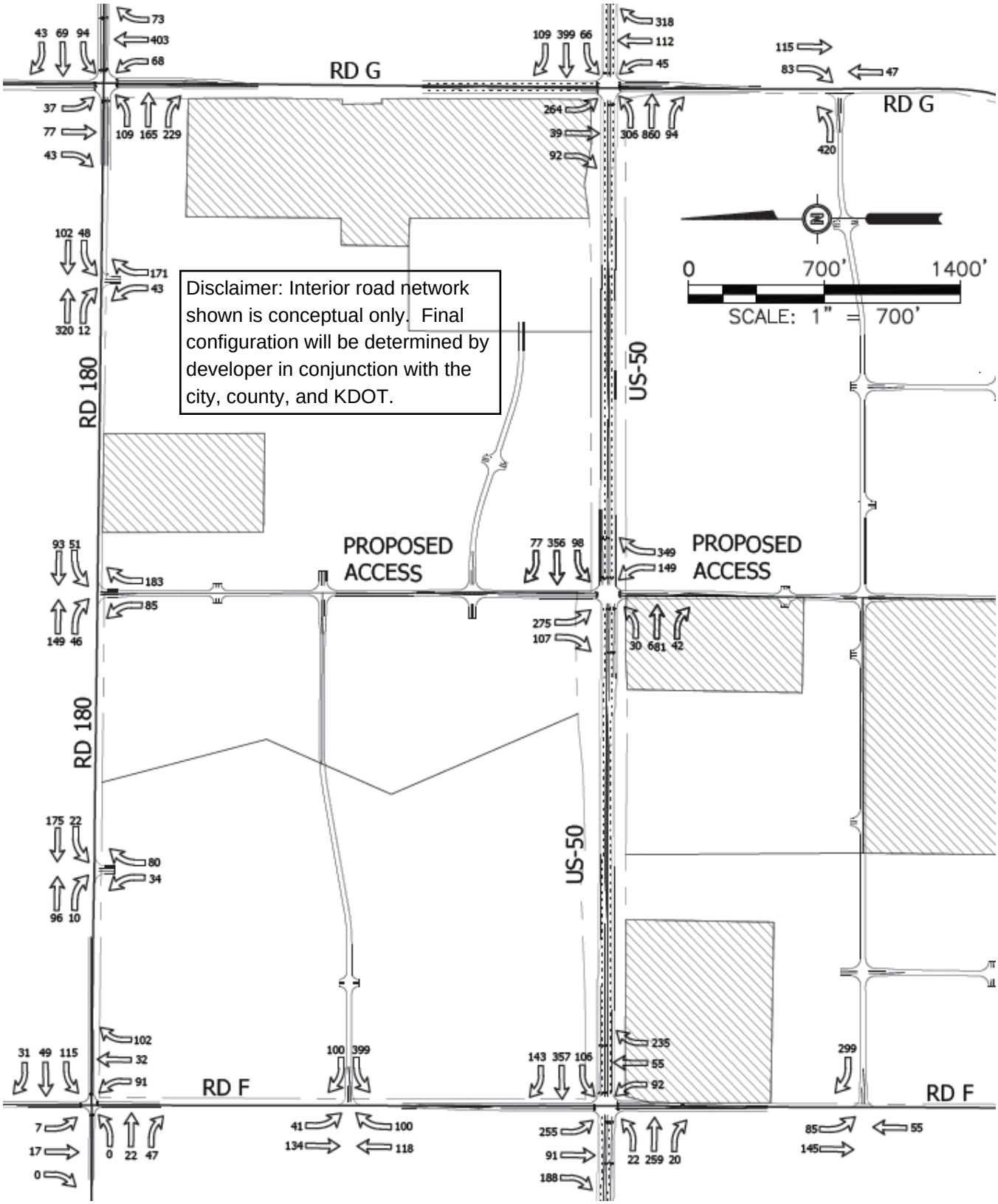

Figure 5.7 Generated Plus Existing Traffic at PM Peak Hour

5.4 Signal Warrant Analysis

The existing traffic, the estimated traffic generation, and the anticipated traffic distribution data were used to determine the traffic and turning movement volumes at each of the four study area intersections. These volumes were then used to perform signal warrants using the *Manual on Uniform Traffic Control Devices Peak Hour Warrant* for the four intersections. It is important to know how the anticipated volumes will impact the control of the intersections, and the Signal Warrant Analysis is one tool traffic engineers utilize to determine if signals are necessary. The results of the Signal Warrant Analysis are shown in Figures 5.8 – 5.12 below. The X-coordinate of the graphed point corresponds to the total traffic volume incurred along both approaches of the intersection's major street (higher contributing volume), and the Y-Coordinate coincides with the greater of the approaches associated with the intersection's minor road. According to the warrant criteria, if the graphed point lies above the line that describes the intersection's lane configuration, then the criteria for a signal is met at that intersection.

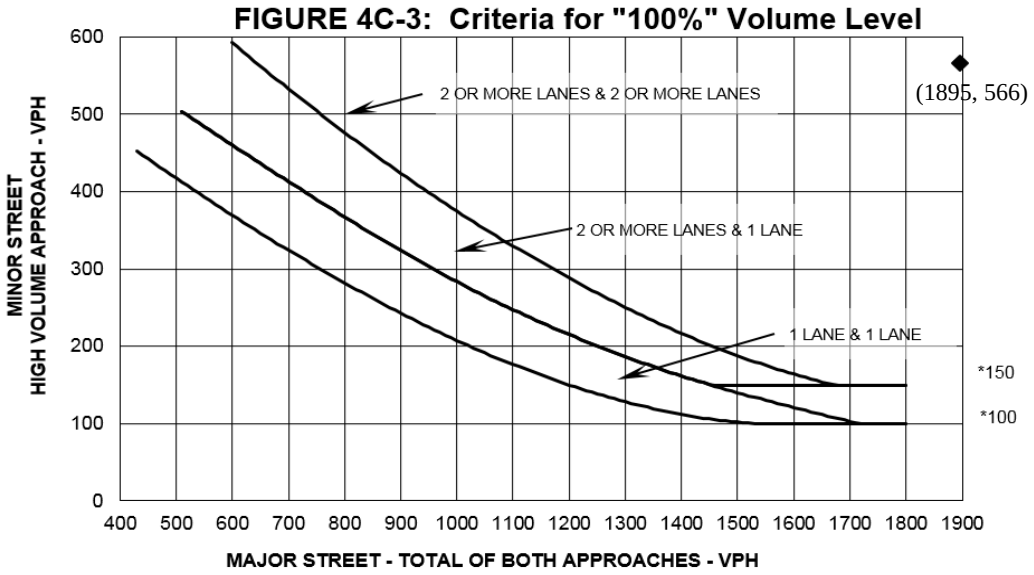

Figure 5.8 US-50 and Road G Signal Warrant

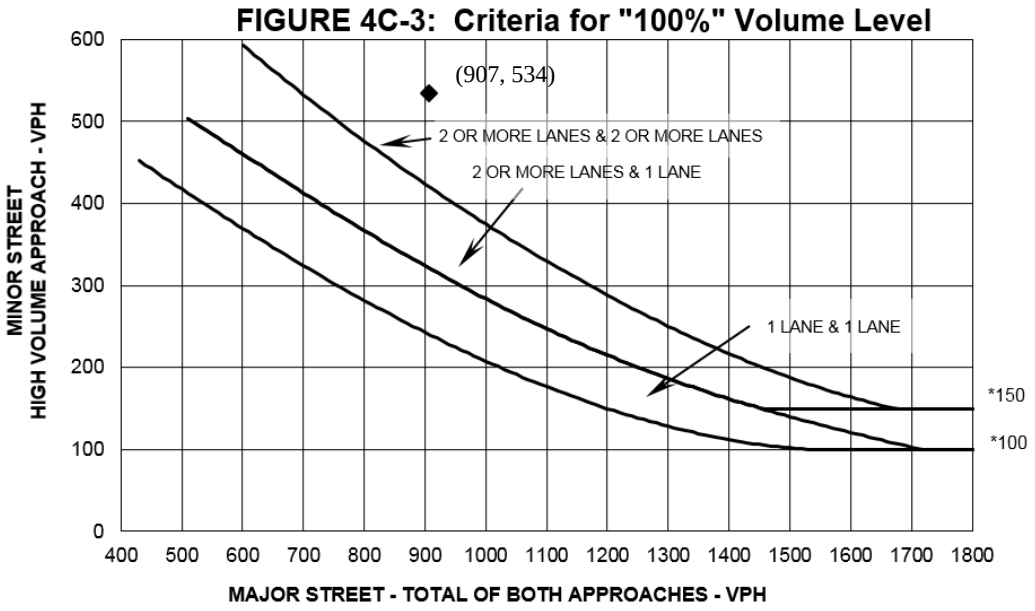

Figure 5.9 US-50 and Road F Signal Warrant

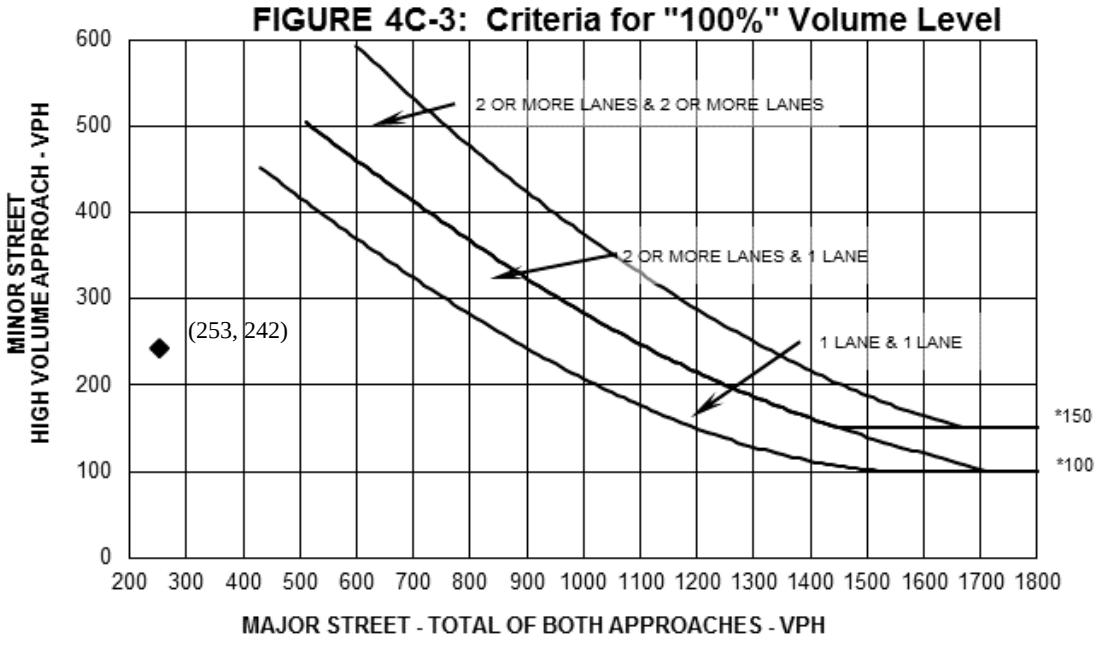

Figure 5.10 Road 180 and Road F Signal Warrant

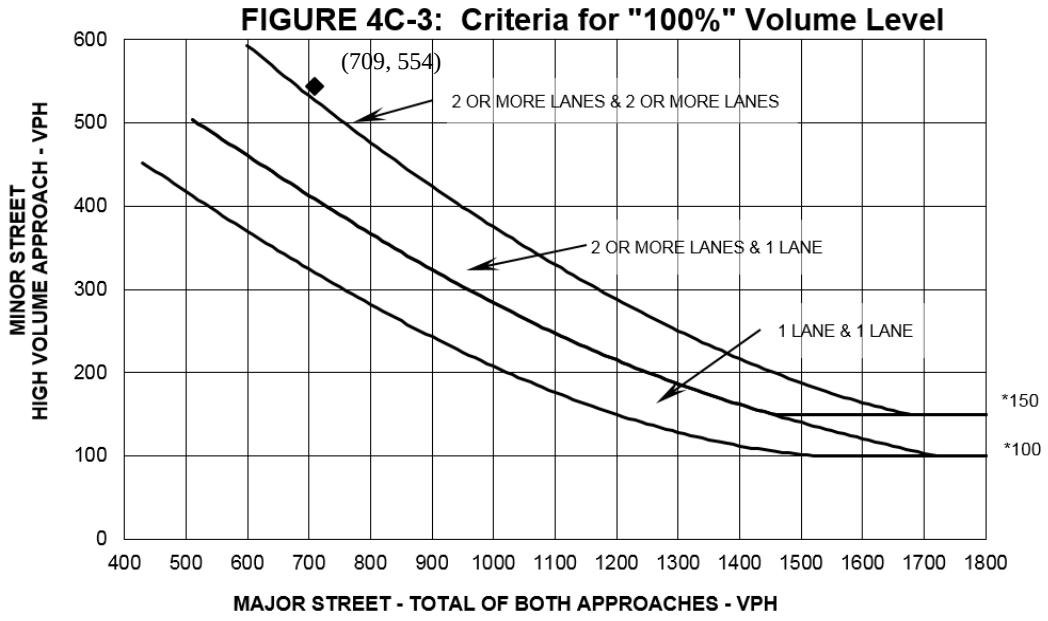

Figure 5.11 Road G and Road 180 Signal Warrant

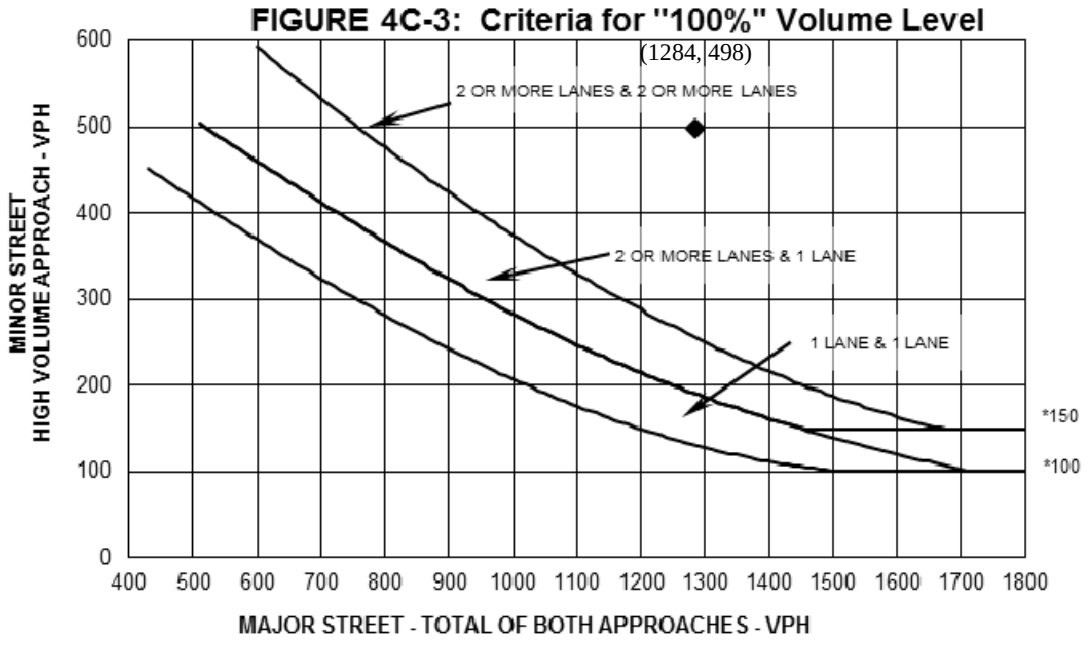

Figure 5.12 US-50 and Proposed Access Signal Warrant

The peak hour Signal Warrant Analyses show that the traffic volumes at the intersections at US-50 and Road F, US-50 and Road G, and Road 180 and Road G all exceed the peak hour signal warrant. The intersection at Road 180 and Road F does not meet the peak hour signal warrant, even after full development. The impact of meeting the signal warrant for both intersections along US-50 affects the allowed access spacing for US-50, and is further justification for removing the existing access drives between Road F and Road G on US-50. However, the access point at the mid-point between Road F and Road G nearly meets the KDOT Access Management criteria for signalized intersection spacing and is the most practical alternative to providing access to the properties along US-50. Therefore, an access point or intersection at the existing Emporia Truck Wash access point is recommended to serve as the main access to properties on both the north and south side of US-50. Using the existing plus generated traffic volumes and the distributions shown in Figures 5.2 and 5.3, the proposed access point exceeds the peak hour signal warrant in the full development scenario.

5.5 Traffic Simulation Models

Based on the results of Signal Warrant Analysis, the projected traffic volumes were input into Synchro, a traffic modeling software program, to analyze the intersection capacity and traffic level of service for the intersections. These models confirmed the results of the signal warrant analysis and provided results used to recommend the geometric improvements necessary to maintain a high traffic level of service on the road network within the study area. The results of the Synchro analysis for each of the study area intersections are shown below and the detailed reports are included in the appendix.

5.5.1 US-50 and Road G - Signalized

Level of Service Summary US-50 & Road G Existing + Generated Traffic																	
AM Peak Hour 7:15-8:15 AM									PM Peak Hour 4:45-5:45 PM								
Intersection		Approach			Movement				Intersection		Approach			Movement			
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)
C	32.9	EB	C	31.4	Left	D	40.8	87	C	21.1	EB	C	22.4	Left	C	32.9	126
					Thru	C	32.2	199						Thru	C	21.0	227
					Right	A	9.1	60						Right	A	8.1	46
		WB	D	38.1	Left	D	44.7	311			WB	C	20.9	Left	D	36.3	68
					Thru	D	42.9	542						Thru	C	22.6	143
					Right	A	9.9	90						Right	A	4.7	43
		NB	B	19.1	Left	D	48.1	42			NB	B	17.7	Left	C	20.7	62
					Thru	C	31.5	87						Thru	C	27.6	105
					Right	A	7.7	62						Right	B	13.3	100
		SB	C	25.5	Left	E	58.4	224			SB	C	20.3	Left	C	29.0	193
					Thru	B	14.2	95						Thru	B	12.9	34
					Right	B	17.6	233						Right	A	3.7	33

Table 5.2 Level of Service Summary: US-50 and Road G

5.5.2 US-50 and Road F – Signalized

Level of Service Summary US-50 & Road F Existing + Generated Traffic																	
AM Peak Hour 7:00-8:00 AM									PM Peak Hour 4:45-5:45 PM								
Intersection		Approach			Movement				Intersection		Approach			Movement			
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)
C	30.3	EB	C	32.8	Left	D	35.8	192	C	23.4	EB	C	26.0	Left	D	35.6	70
					Thru	D	37.4	210						Thru	C	26.5	131
					Right	A	9.6	60						Right	A	6.6	33
		WB	D	37.0	Left	E	56.5	338			WB	C	25.7	Left	D	40.9	152
					Thru	D	40.2	102						Thru	C	27.3	161
					Right	B	18.9	153						Right	A	6.7	45
		NB	B	11.8	Left	D	35.1	30			NB	B	16.9	Left	C	32.1	115
					Thru	B	15.8	49						Thru	C	21.5	84
					Right	A	9.1	60						Right	B	10.4	98
		SB	B	18.6	Left	C	34.2	179			SB	C	24.2	Left	D	37.1	249
					Thru	A	8.5	78						Thru	B	18.3	126
					Right	A	3.6	31						Right	A	8.1	86

Table 5.3 Level of Service Summary: US-50 and Road F

5.5.3 Road 180 & Road F - Unsignalized

Level of Service Summary Road 180 & Road F Existing + Generated Traffic																	
AM Peak Hour 7:00-8:00 AM									PM Peak Hour 5:00-6:00 PM								
Intersection		Approach			Movement				Intersection		Approach			Movement			
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)
A	4.8	EB	A	7.0	Left	A	0.0	94	A	8.1	EB	A	5.0	Left	A	0	57
					Thru	B	10.9	94						Thru	B	10.2	57
					Right	A	4.3	94						Right	A	3.3	57
		WB	A	5.4	Left	B	10.7	76			WB	B	11.2	Left	B	11.3	89
					Thru	A	3.9	76						Thru	B	13.4	89
					Right	A	3.4	76						Right	A	8.5	89
		NB	A	2.6	Left	A	6.9	67			NB	A	6.6	Left	A	7.4	85
					Thru	A	1.8	67						Thru	A	6.8	85
					Right	A	4.8	67						Right	A	5.5	85
		SB	A	7.6	Left	A	6.0	76			SB	A	7.1	Left	A	4	53
					Thru	A	9.2	76						Thru	A	8.5	53
					Right	A	0.0	76						Right	A	0	53

Table 5.4 Level of Service Summary: Road 180 and Road F

5.5.4 *Road 180 & Road G - Signalized*

Level of Service Summary Road 180 & Road G Existing + Generated Traffic																	
AM Peak Hour 7:15-8:15 AM									PM Peak Hour 4:30-5:30 PM								
Intersection		Approach			Movement				Intersection		Approach			Movement			
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)
B	17.9	EB	B	12.5	Left	C	27.4	59	B	15.0	EB	B	15.4	Left	C	21.3	90
					Thru	B	11.4	69						Thru	B	19.8	103
					Right	A	7.7	57						Right	A	8.1	90
		WB	C	22.5	Left	C	23.3	125			WB	B	18.1	Left	B	18.8	55
					Thru	C	22.1	176						Thru	B	18.2	69
					Right	A	1.8	14						Right	A	5.2	32
		NB	B	15.4	Left	C	27.6	150			NB	B	13.8	Left	C	21.4	72
					Thru	A	8.9	55						Thru	B	15.8	181
					Right	A	3.3	36						Right	A	5.9	30
		SB	B	16.4	Left	C	30.2	81			SB	B	13.9	Left	C	24.8	49
					Thru	B	19.4	110						Thru	B	12.1	66
					Right	A	8.3	71						Right	A	4.8	26

Table 5.5 Level of Service Summary: Road 180 and Road G

5.5.5 *US-50 & Proposed Access – Signalized*

Level of Service Summary US-50 & Proposed Access Existing + Generated Traffic																	
AM Peak Hour 7:00-8:00 AM									PM Peak Hour 4:30-5:30 PM								
Intersection		Approach			Movement				Intersection		Approach			Movement			
LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)	LOS	Delay (sec)	Direction	LOS	Delay (sec)	Movement	LOS	Delay (sec)	95% Queue (feet)
C	28.8	EB	C	27.0	Left	D	35.6	97	C	28.0	EB	C	34.7	Left	D	40.2	63
					Thru	C	31.2	163						Thru	D	35.9	301
					Right	B	13.5	107						Right	A	7.5	48
		WB	C	31.4	Left	D	39.0	188			WB	B	19.0	Left	C	26.0	78
					Thru	C	34.4	260						Thru	B	14.9	134
					Right	B	15.0	112						Right	A	7.4	41
		NB	B	14.9	Left	C	33.9	52			NB	C	25.2	Left	C	31.5	93
					Thru	A	0.0	0						Thru	A	0.0	0
					Right	A	6.9	56						Right	C	20.2	220
		SB	C	23.1	Left	C	28.3	72			SB	C	34.5	Left	C	33.8	141
					Thru	A	0.0	0						Thru	A	0.0	0
					Right	A	9.7	35						Right	A	9.5	73

Table 5.6 Level of Service Summary: US-50 and Proposed Access

Section 6: Recommendations

6.1 Speed Limits

Because of its classification as a Class B highway and regional importance as a statewide highway corridor, it is recommended that the posted speed limit of US-50 remain unchanged as development occurs. This recommendation considers that the posted speed limit of 55 mph extends from I-35 to a point approximately 1,000 feet west of Road G and then continues as a 65 mph facility to the west.

6.2 Access Control

Access spacing is essential to any successful access management plan. Spacing alone addresses the three primary benefits of access management. When accesses are improperly spaced and their influence areas overlap, a high density of conflict points and delays exists along a roadway. The result is an unsafe and ineffective highway which motorists avoid using and, therefore, economic activity declines. On the contrary, when access spacing is optimized, conflicts are minimized, drivers feel safe, and industry grows. KDOT specifications utilize route classification, area type, access type, and posted speed limit to determine spacing requirements.

The presence of traffic signals at Road F, Road G, and the proposed access point will require that the existing field entrances on US-50 be removed and consolidated with an interior road network that will provide access to these properties from either Road F, Road G, or the proposed mid-point access on US-50. The access locations are within the intersection influence areas of the proposed signalized intersections and will create additional conflict points that will degrade the safety and efficiency of US-50. It is recommended that KDOT restrict access along US-50 within the intersection influence areas of the three proposed intersections. This will include access control along the length of US-50 from the I-35 overpass to a point approximately 1,000 feet west of Road F, except for the proposed mid-point access and the two side street intersections. Because of the high speed nature of the corridor, there will not be an opportunity to safely design access alternatives, such as right-in/right-out drives or three-quarter drives because curbed medians are not allowed within the clear zone on highways posted in excess of 45 mph. Figure 6.1 below shows the proposed access control.

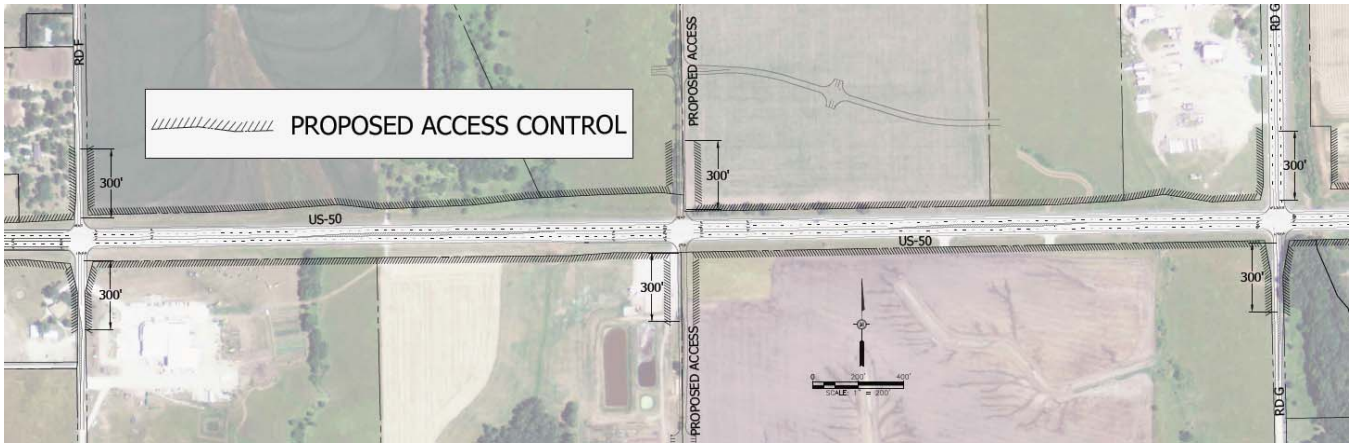

Figure 6.1 Proposed Access Control

However, there are two commercial entrances within this area that have been permitted through KDOT. These include the existing entrance to the east of Road G on the north side of US-50 and the entrance to Fanestil Meats on north side of US-50 approximately 1000' feet west of Road G. It is recommended that the property on the NE corner of US-50 and Road G be developed in such a way that the main access point will be on Road G and the existing access drive on US-50 be removed. Similarly, it is recommended that the existing commercial drive on the north side of US-50 1000' west of Road G be removed once the frontage road system is developed to provide alternate access to this property from US-50.

6.3 Interior Road Network

To provide access to all the properties along US-50, it is recommended that an internal road network be developed to provide access to all parcels from Road F, Road G, or the proposed access point. A conceptual internal road network is shown in Figure 6.2. The actual design of the internal road network should be designed in collaboration with the developer, the city of Emporia, and Lyon County. The interior road network will depend on the lot size needed by industry utilizing the lot, and therefore, it is important the developer, the city, and county work together to design an interior road network that will accommodate the needs of business, while still providing access to and from adjacent properties and the local road network.

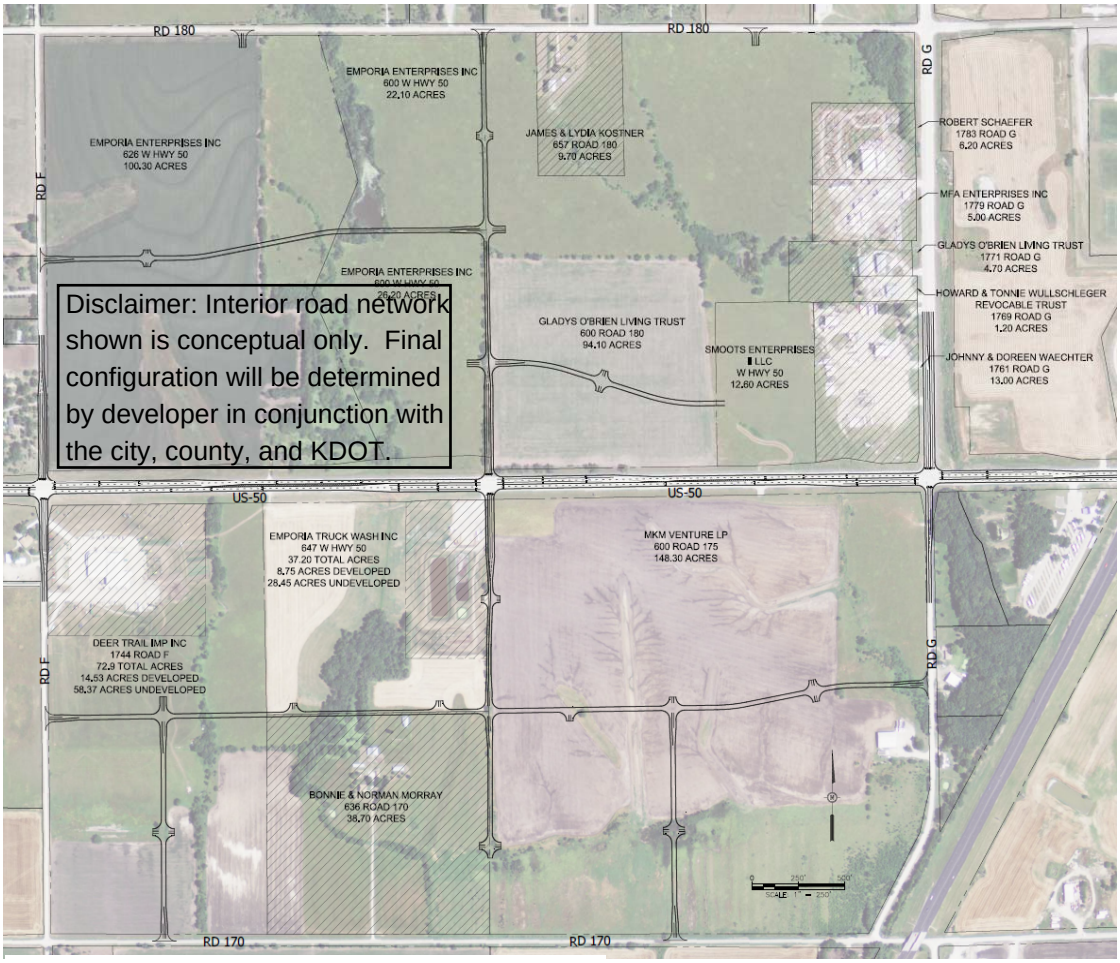

Figure 6.2 Study Area Interior Road Concept

Interior road networks typically include either frontage or backage roads to serve businesses adjacent to a highway. They provide a lower speed facility that focuses on access rather than high speed through traffic. They also route traffic generated by an industrial or commercial center to intersections spaced at longer distances along the adjacent highway. Figure 6.3 shows the minimum required distance between a highway and a frontage road. These limits are set to ensure that intersection influence areas are not encroached upon, and required sight distances are maintained. KDOT guidelines show the distance between a state highway and a frontage road be no less than 25 feet at mid-block (D1) and 300 feet at the intersections (D2).

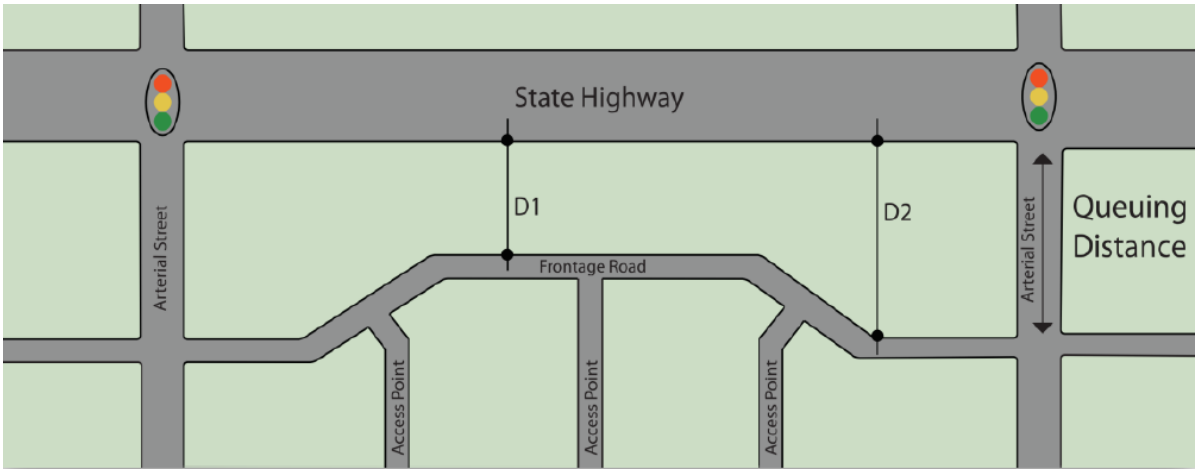

Figure 6.3 Frontage Road Spacing (Kansas Department of Transportation, 2013)

Backage roads offer an alternative to frontage roads and produce similar results: increased access and reduced conflict points. As the name implies, backage roads provide access from the back side of the properties that connect to the main road. Backage roads are located farther away from the main corridor which minimizes interference with intersection influence areas, and allows for development between the backage road and highway for improved visibility. Figure 6.4 provides an example backage road system.

Figure 6.4 Backage Road Example (Kansas Department of Transportation, 2013)

Again, the type and size of lot required by the business utilizing the property will impact the design of the frontage and backage roads comprising the interior road network. The interior road network shown in Figure 6.2 assumes large lot development which is less reliant on frontage and backage roads than smaller industrial, commercial, and retail developments such as convenience stores and restaurants.

6.4 Geometric Improvements

The traffic generated by anticipated industrial development will require modifications to the road network to accommodate traffic growth. The growth will occur over time, so it is essential that a Traffic Impact Study be performed with each development that occurs to determine when the thresholds for traffic signals and additional turn lanes are required. The geometric improvements recommended in the following pages assumes that all 490 acres of undeveloped ground between Road F and Road G and between Road 170 and Road 180 are developed as light industrial and the traffic generated by those developments approximately match the ITE Trip Generation volumes for light industrial development. The geometric improvements include turning lane additions for intersections within the study area assuming they are signalized as modeled in the traffic analysis for full development.

6.4.1 US-50 and Road G

The existing plus generated traffic at US-50 and Road G will satisfy the warrants for auxiliary turn lanes along US-50. As can be seen in Figures 5.6 and 5.7, the westbound right-turn volume in the existing plus generated scenario is 206 vph in the AM peak hour, and 109 vph in the PM peak hour. Using these values in conjunction with Table 6.1 below, both the AM and the PM peak hour volumes meet the KDOT Access Management warrant for right-turn lanes.

Highway DDHV (vph)	Highway Operating Speed (mph)											
	40		45		50		55		60		65	
	Lane	Taper	Lane	Taper	Lane	Taper	Lane	Taper	Lane	Taper	Lane	Taper
300						55	75	25	19	9	19	9
400			145	65	75	30	40	17	16	8	15	8
500		140	95	50	57	25	32	14	14	7	13	7
600	160	80	65	30	42	18	26	11	12	6	12	6
800	70	40	37	18	28	12	19	8	11	5	11	5
1200	25	14	20	10	18	8	14	6	8	4	8	4
1600	15	8	14	6	13	6	10	5	7	3	7	3
2000	10	6	9	6	9	4	8	4	6	3	6	3

Table 6.1- Right-Turn Lane Warrant (Kansas Department of Transportation, 2013)

Similar to the westbound right-turn volume, the US-50 eastbound right-turn volumes are 57 vph for the AM peak hour and 94 vph for the PM peak hour. Therefore, an eastbound right-turn lane is also warranted for US-50 at Road G.

Due to the high number of anticipated AM westbound left turns and PM east bound left turns at Road G, it is recommended that US-50 be widened to accommodate dual left turn lanes in both east and westbound directions. The storage lengths for the left-turn movement should be increased based on the

anticipated traffic at the intersection. For the full development scenario, the westbound left-turn storage lengths would need to be 550 feet, not including tapers, and the eastbound left-turn storage lengths will need to be 715 feet, not including deceleration lengths or tapers.

Full development will also result in increased traffic on Road G that will warrant auxiliary turn lanes. Road G north of US-50 is already a 5-lane road, so geometric modifications to the north approach of the intersection are not necessary.

The south approach of the intersection should be widened to provide a left-turn lane, a through-lane, and a right-turn only lane. Using the Synchro results shown in Appendix A, and the KDOT criteria for auxiliary lane lengths, the left-turn lane should be 260 feet long and the right-turn length should be 340 feet. A second receiving lane should also be added on the south leg of Road G to accommodate the dual left turn lanes recommended above. Figure 6.5 shows the recommended lane configuration for US-50 and Road G, assuming the intersection is signalized and full development has taken place within the study area.

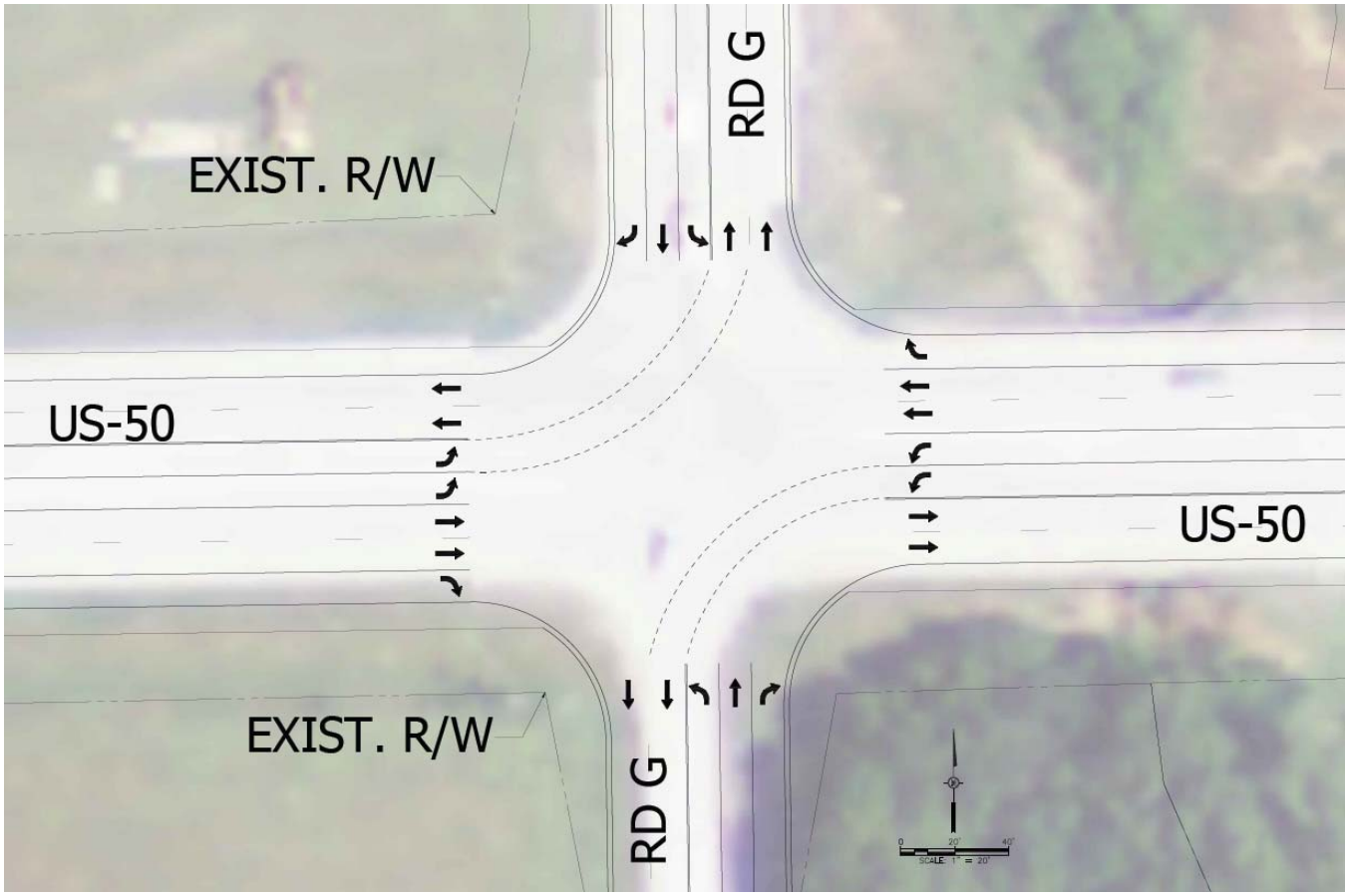

Figure 6.5 US-50 & Rd G Lane Configuration

The lane configuration shown in Figure 6.5 above will result in "Level of Service C" as a signalized intersection for both the AM and PM peak hours in the full development scenario.

6.4.2 US-50 and Road F

As at US-50 and Road G, the intersection at US-50 and Road F will also warrant left-turn and right-turn auxiliary lanes for both the east and westbound approaches. Because this intersection will be widened as part of KDOT's project to widen US-50 west of Road G, the auxiliary lanes will be added to the outside of the additional through-lane that will be added with the US-50 widening project. The Road F approaches should also be widened to accommodate additional turning lanes to increase the capacity of the intersection. The northbound approach should have a right-turn lane added to provide a left-, through-, and right-turn lane. The southbound approach should have two lanes to create a left, through, and right turn lanes. Figure 6.9 below shows the recommended lane configuration at US-50 and Road F assuming full development within the study area.

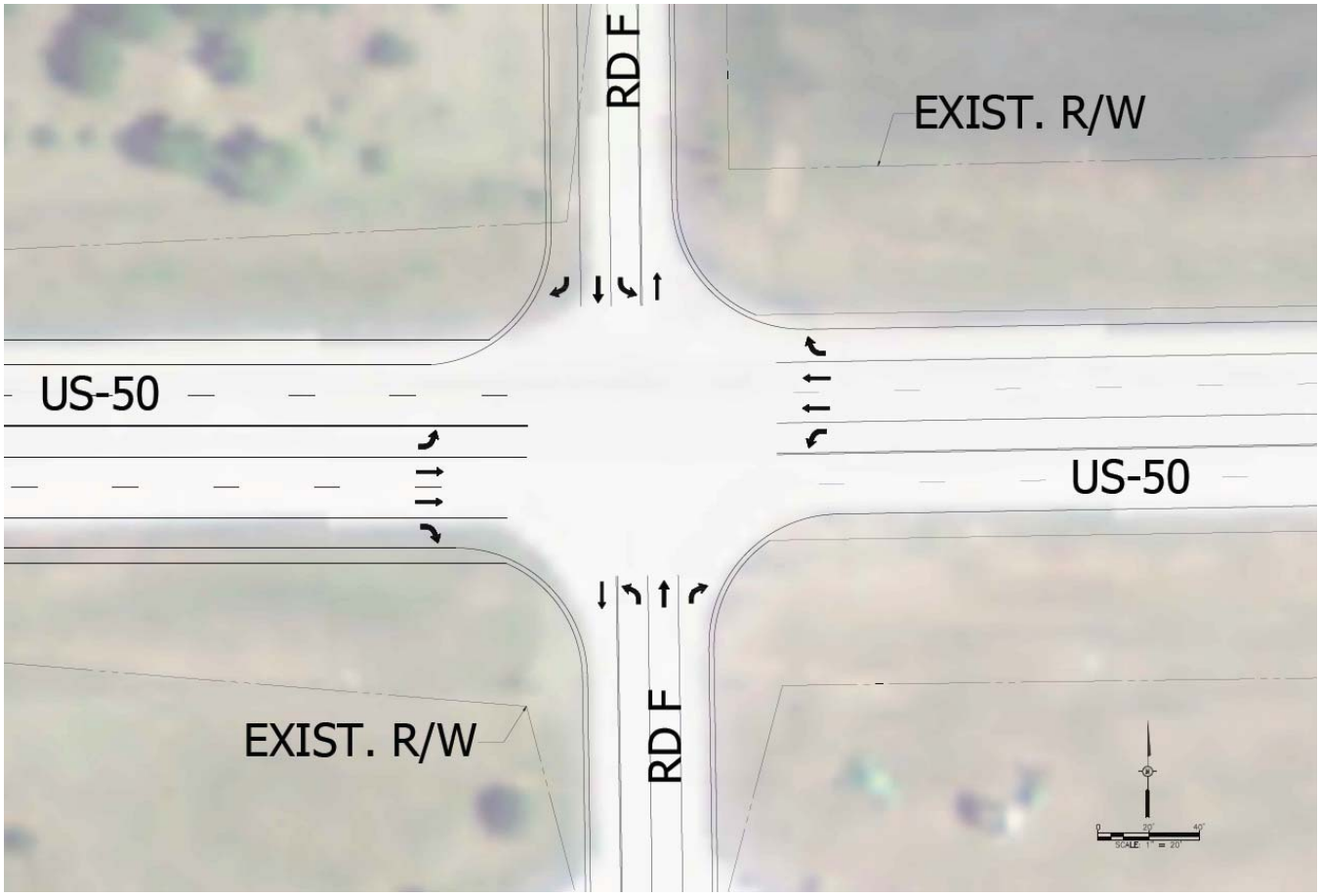

Figure 6.6 US-50 & Rd F Lane Configuration

The intersection configuration shown above will result in a "Level of Service C" as a signalized intersection for both the AM and PM peak hours in the full development scenario.

6.4.3 US-50 and the Proposed Mid-Point Access

The proposed mid-point access between Road F and Road G on US-50 will serve a majority of the undeveloped land within the study area. Therefore, it will see high turning movement volumes in all directions in both the AM and PM peak hours. Using the anticipated turning movement volumes shown in Figures 5.6 and 5.7, left turn and right turn auxiliary lanes are warranted for both the eastbound and westbound approaches to the intersection. Because of the high volume of left turn movements, it is recommended that all left turn movements be dual left turns. The anticipated turning moving volumes also warrant a right turn lane for the north and southbound approaches. The first access points off of the proposed north/south road should be at least 300 feet from US-50 in accordance with the KDOT Corridor Management Policy to avoid congestion and gridlock that may otherwise result.

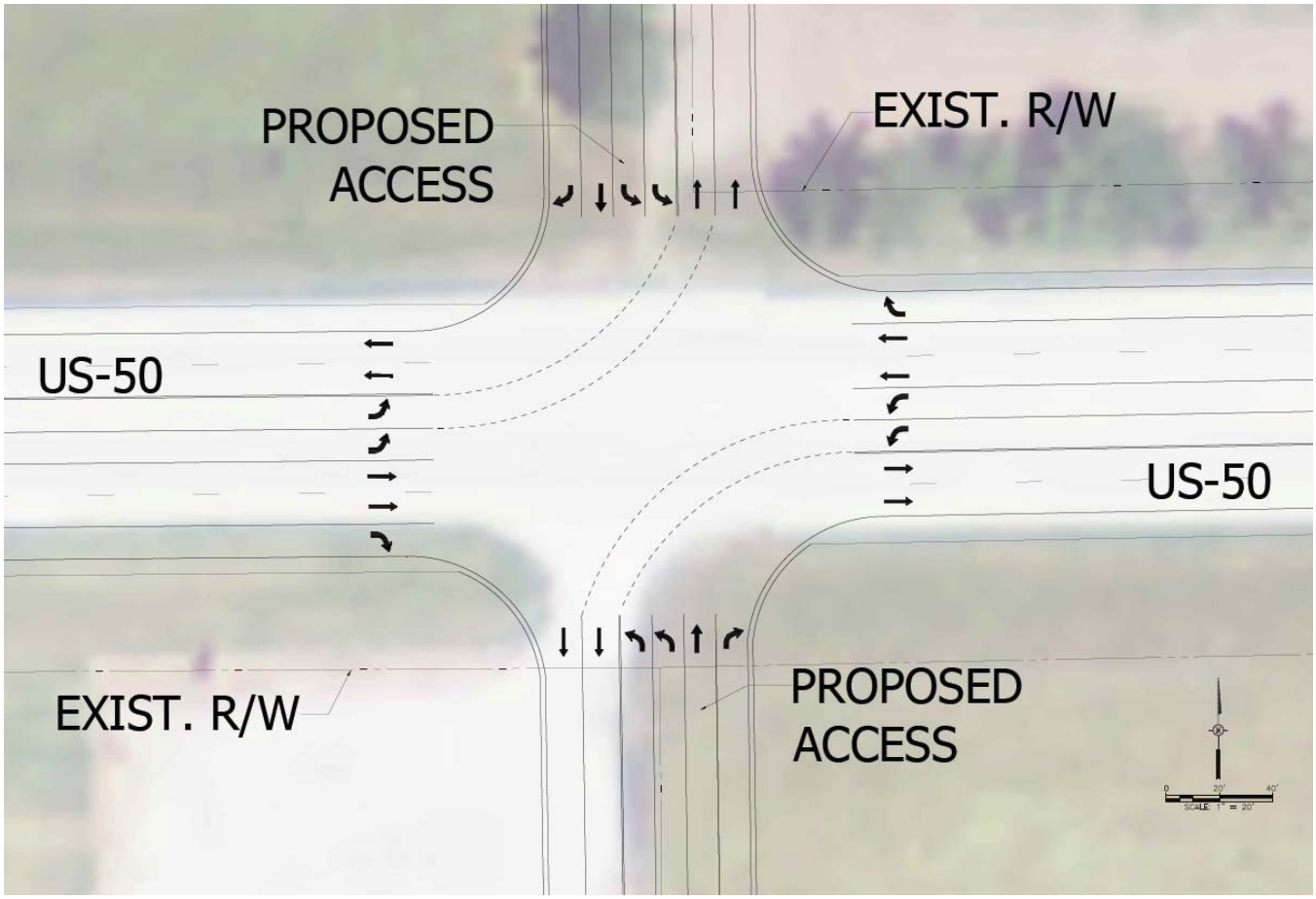

Figure 6.7 US-50 & Proposed Access Lane Configuration

Assuming the study area is fully developed, a signalized intersection as configured above will operate at "Level of Service C" for both the AM and PM peak hours in the full development scenario.

6.4.4 Road G and Road 180

Road G has already been widened to accommodate growth along the corridor. As such, the existing geometric layout of Road G at Road 180 will meet the traffic demands upon full development of the study area. However, Road 180 will require auxiliary turn lanes to meet the demand on that road. It is recommended that the eastbound approach on Road 180 have a left-turn and right-turn lane added. The westbound approach on Road 180 should be widened to accommodate a right-turn lane and dual left turn lanes. The recommended full development lane configuration of Road G and Road 180 is shown below in Figure 6.8. The full development traffic volumes warrant a traffic signal at this intersection.

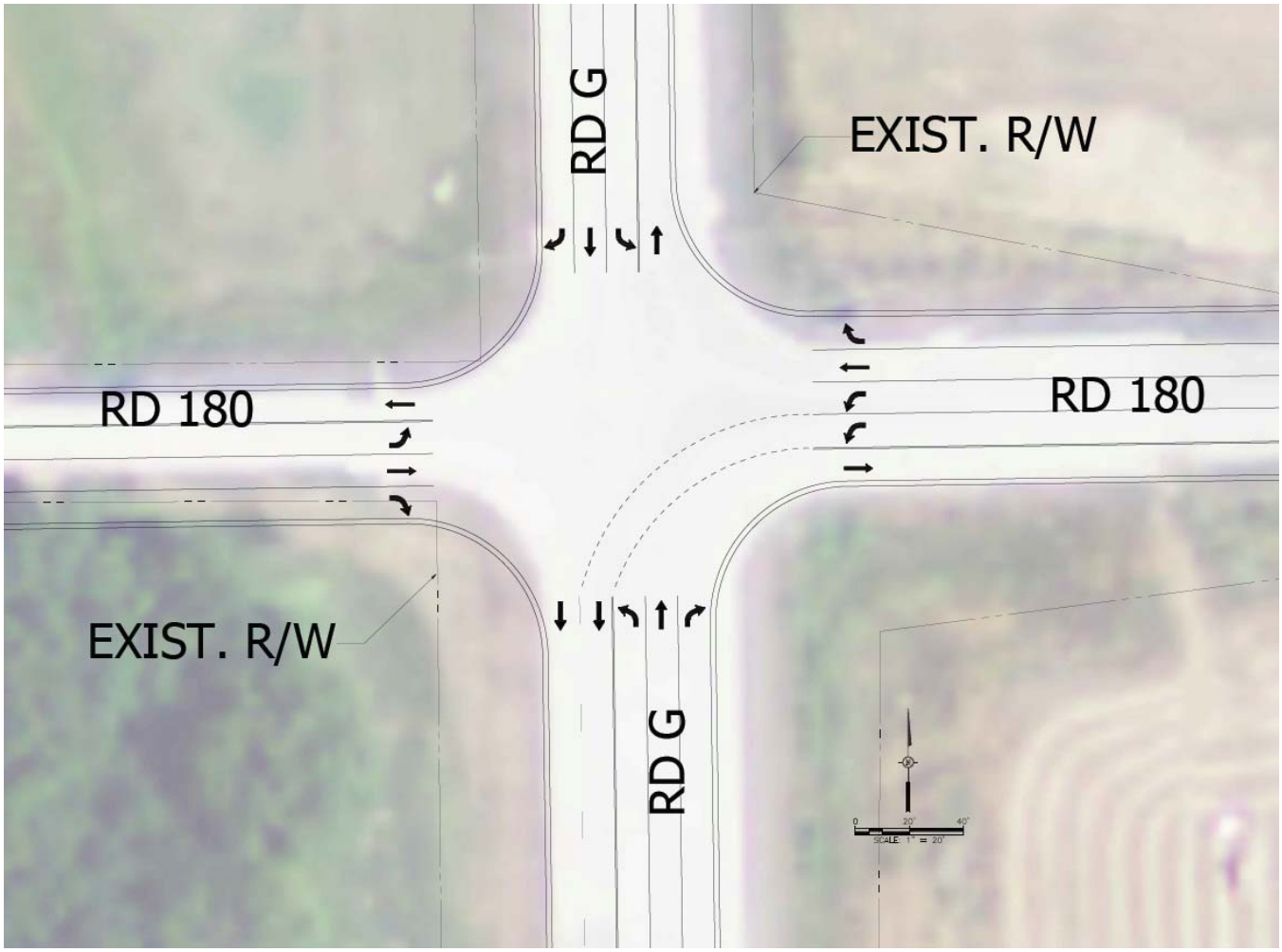

Figure 6.8 Rd G and Rd 180 Lane Configuration

Figure 6.8 shows the recommended lane configuration to provide "Level of Service B" as a signalized intersection after full development of the study area.

6.4.5 Road 180 and Road F

The intersection at Road 180 and Road F is the one intersection within the study area that will not require a signal after full development has occurred. Road 180 and Road F can continue to operate as a two-way stop controlled intersection with a single lane for every approach to the intersection. Road 180 and Road F are both gravel roads, and it is recommended that both roads be upgraded to city standards as the area develops.

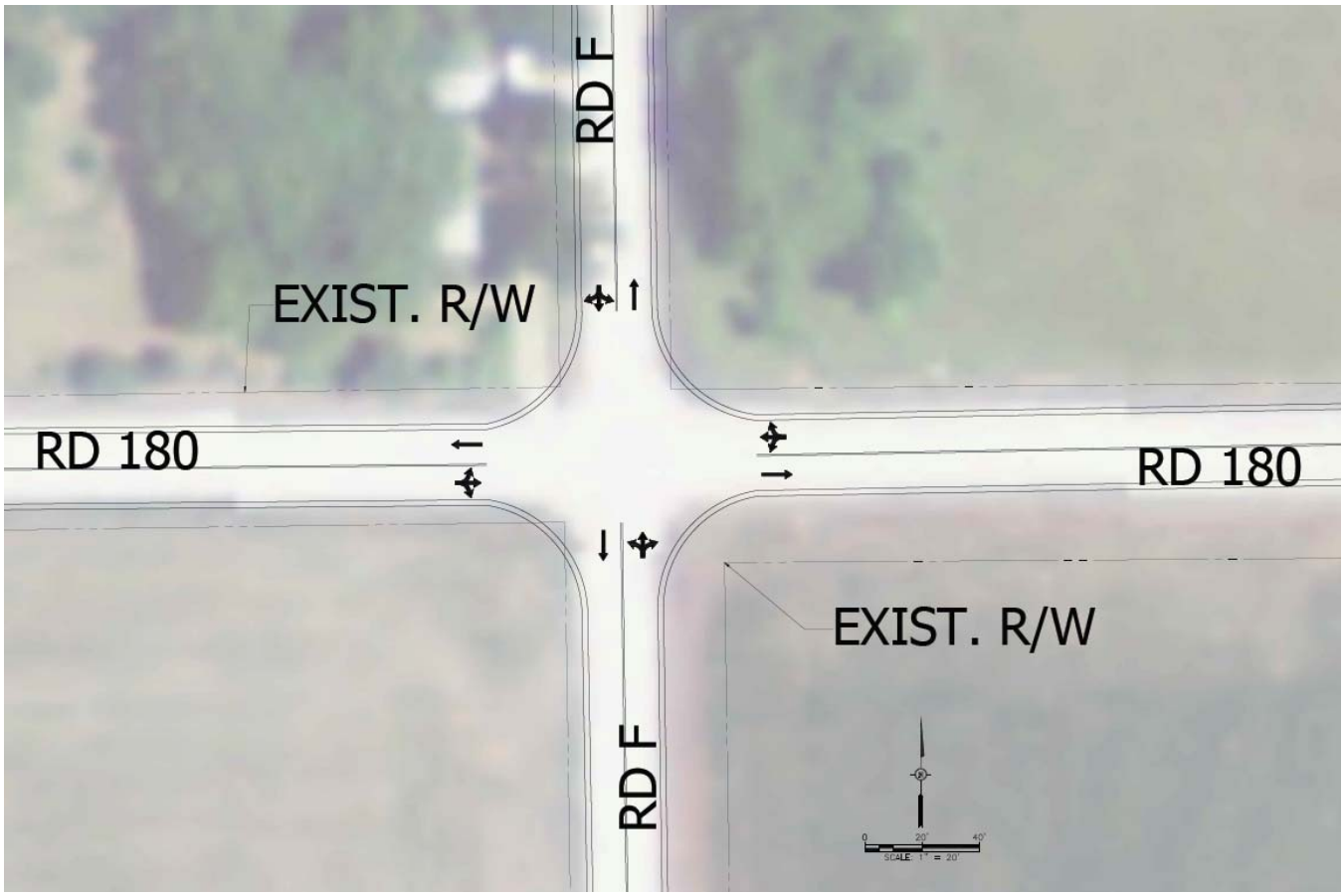

Figure 6.9 US-50 & Rd F Lane Configuration

It is anticipated that Road 180 and Road F will continue to operate with "Level of Service A" as an all-way stop control intersection through the course of development.

6.5 Summary of Recommendations

The following list summarizes the recommendations for the road and highway network within the study area:

- Maintain speed limits as currently posted at 65 mph to preserve the quality of US-50 as a Class B high speed intrastate highway, assuming KDOT's plan to introduce a 55 mph zone from the I-35 overpass to a point 1000' feet west of Road G has occurred.
- Restrict access along US-50 between Road F and Road G to improve the safety of the highway and reduce friction and conflict points along the highway.
- Develop an interior road network with the main access at the mid-point between Road F and Road G to serve future development on both the north and south side of US-50.
- Require all future developments within the study area to conduct a Traffic Impact Study based upon the size and type of development to determine when warrants for auxiliary lanes and traffic signals are met. It is anticipated that full development of the study area will result in traffic signals at:
    - US-50 and Road G
    - US-50 and Road F
    - US-50 and proposed mid-point access
    - Road 180 and Road G
- Improve Road F and Road 180 to city standards.
- Incorporate access management principles from the KDOT Corridor Management Policy into the local road network on Road F, Road G, and Road 180.

Section 7: Implementation

The recommendations shown in the Plan are under the assumption that the study area has been completely developed and the traffic generated is consistent with the *ITE Trip Generation Manual*. However, the study area includes undeveloped property in excess of 500 acres and development will certainly occur in stages over many years, possibly decades. Therefore, it will still be necessary to follow the KDOT Access Management guidelines for any new developments that will utilize one of the three intersections along US-50 as their main access point into the property. A Traffic Impact Study will need to be performed when any new development occurs to verify if the traffic generated and the anticipated distribution of that that traffic will meet the warrants for turn lanes, traffic signals, or other intersection improvements.

The geometric improvements recommended in Section 6.4 should be implemented in phases over time to avoid overbuilding for conditions that may not occur for many years. However, any Right-of-Way or easement acquisitions should take into account the full development recommendations to avoid property improvements that may make the recommended intersection improvements impractical. For instance, the dual left turn lanes at US-50 and the proposed mid-point access point will not be required until the left turning volumes reach 300 vehicles per hour. This volume will likely not occur until the entire project area is fully development. Due to the uncertainties in the development time frame, it is recommended that the Right-of-Way be acquired and the initial left turn lane be built when the signal is warranted, but project be designed that the future dual left turn lanes can be added at a later date without major modifications to the pavement geometry or signal locations. Table 6.2 on the following page shows the recommended improvements, the triggers, and approximate timeframe for the implementation of the recommended improvements.

It is recognized that the removal of existing access points along US-50 will impact the property owner's ability to access their property as their land use changes. KDOT has an Access Management Program that, through intergovernmental coordination and cooperation, provides money to fund projects that will improve the overall safety and efficiency of Kansas highways. These funds will provide 100% of construction costs of selected projects identified to have a positive impact on the safety and efficiency of a highway. Design and right-of-way cost for the projects are the responsibility of the city, county, or developer requesting the project. Projects that have been identified through an Access Management Plan are given priority over competing projects.

Other funding mechanisms typically used to fund access management projects include Capital Improvement Funds (CIF) by cities or counties, private dollars for development projects, Tax Increment Financing (TIF) districts, and sales tax dollars to fund certain types of projects. All these funding mechanisms can be used to develop the intersection improvement projects that could include turning lanes, signals, and/or a frontage/backage road internal road network.

In the development of any project, it is important that the developers, local governmental agency, and KDOT work together to meet the requirements of all parties. The existence of an Access Management Plan will assist in that coordination and provide a framework from which to build to develop the projects that will ultimately enhance the economical vitality of a community, while preserving the safety and efficiency of the local transportation network.

Recommended Improvements							
Route Segment/ Location	**Initial Improvement**	**Timing**	**Trigger**	**Future Improvement**	**Timing**	**Trigger**	**Page**
US-50 & proposed access	Traffic Signal Left turn lanes - all approaches Right turn lanes - all approaches	<5 years	Signal warrant met	Dual left turn lanes - all approaches	>10 years	300 left turns/hour	42
Interior road network	Interior road network	<5 years	US-50 & proposed access construction	Expansion of network	>5 years	Continued Development	37
US-50 and Road G	Traffic Signal Left turn lanes - all approaches Right turn lanes - all approaches	<5 years	Signal warrant met	Dual left turn lanes - all approaches	>10 years	300 left turns/ hour	40
US-50 & Road F	Left turn lanes - all approaches Right turn lanes - all approaches	<5 years	KDOT Project KA-2364-01	Traffic signal	>5 years	Signal warrant met	41
Road G & Road 180	Traffic Signal Left turn lanes - all approaches Right turn lanes - all approaches	>5 years	Signal warrant met	Dual left turn lanes - westbound approach	>10 years	300 left turns/ hour	43
Road 180	Improve to city standard	1 to 10 years	New development access along Road 180	None	N/A	N/A	N/A
Road F	Improve to city standard	1 to 10 years	New development access along Road F	None	N/A	N/A	N/A

Table 6.2 – Recommended Improvement Schedule

Appendix A: Synchro/SimTraffic Reports

SimTraffic Performance Report
Baseline

Existing AM Peak Hour
9/8/2014

1: US-50 & Road F Performance by movement

Movement	EBT	EBR	WBL	WBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
Delay / Veh (s)	0.5	4.2	2.9	2.3	5.5	3.4	7.1	1.5
Total Stops	0	0	4	0	5	3	2	14
Travel Dist (mi)	119.3	0.5	6.9	76.4	1.2	1.0	1.0	206.3
Travel Time (hr)	1.9	0.0	0.1	1.4	0.0	0.0	0.0	3.5
Avg Speed (mph)	63	53	52	57	32	33	32	59
Fuel Used (gal)	4.5	0.0	0.2	2.0	0.0	0.0	0.0	6.8
HC Emissions (g)	601	0	15	132	2	2	0	753
CO Emissions (g)	13492	3	371	3206	34	48	15	17169
NOx Emissions (g)	1397	1	35	335	6	7	1	1782
Vehicles Entered	240	1	16	197	5	3	2	464
Vehicles Exited	241	1	17	198	5	3	2	467
Hourly Exit Rate	241	1	17	198	5	3	2	467
Input Volume	237	1	23	207	6	4	1	480
% of Volume	102	100	74	96	83	75	200	97
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

2: US-50 & Road G Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3
Delay / Veh (s)	1.3	1.9	0.2	0.6	0.6	10.3	10.3	3.3	5.0	11.1	1.4	2.0
Total Stops	5	0	0	0	0	3	3	3	91	4	5	114
Travel Dist (mi)	11.3	102.8	2.0	100.7	44.8	1.0	1.0	1.0	45.0	2.0	2.5	314.3
Travel Time (hr)	0.2	2.0	0.0	1.9	0.9	0.0	0.0	0.0	1.2	0.1	0.1	6.5
Avg Speed (mph)	48	52	47	54	51	30	33	38	37	32	38	48
Fuel Used (gal)	0.3	2.5	0.0	2.9	1.2	0.0	0.0	0.0	1.2	0.1	0.1	8.2
HC Emissions (g)	1	55	0	30	6	0	0	0	17	0	0	110
CO Emissions (g)	57	1320	7	1128	318	2	2	3	500	19	5	3362
NOx Emissions (g)	13	213	2	172	55	1	1	1	74	2	2	535
Vehicles Entered	23	212	3	152	67	3	3	3	91	4	5	566
Vehicles Exited	22	211	3	150	66	3	3	3	90	4	5	560
Hourly Exit Rate	22	211	3	150	66	3	3	3	90	4	5	560
Input Volume	28	211	4	163	60	2	3	1	88	5	12	578
% of Volume	79	100	75	92	110	150	100	300	102	80	42	97
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

SimTraffic Report
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SimTraffic Performance Report
Baseline

Existing AM Peak Hour
9/8/2014

3: Road 180 & Road F Performance by movement

Movement	EBT	EBR	WBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0
Delay / Veh (s)	7.1	1.3	8.5	6.5
Total Stops	13	3	3	19
Travel Dist (mi)	6.9	1.3	3.5	11.8
Travel Time (hr)	0.2	0.0	0.1	0.3
Avg Speed (mph)	33	37	37	35
Fuel Used (gal)	0.2	0.0	0.1	0.3
HC Emissions (g)	13	0	1	13
CO Emissions (g)	197	4	33	234
NOx Emissions (g)	38	1	4	43
Vehicles Entered	14	2	4	20
Vehicles Exited	13	3	4	20
Hourly Exit Rate	13	3	4	20
Input Volume	10	2	3	18
% of Volume	130	150	133	111
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

4: Road 180 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Delay / Veh (s)	8.4	9.2	2.1	4.5	9.3	1.5	0.4	0.6	0.5	1.1	0.4	1.6
Total Stops	3	13	4	19	3	21	0	0	0	4	0	67
Travel Dist (mi)	2.5	11.5	2.3	11.4	1.7	11.5	0.5	25.1	12.1	21.8	30.3	130.6
Travel Time (hr)	0.1	0.3	0.1	0.3	0.0	0.3	0.0	0.6	0.3	0.6	0.7	3.4
Avg Speed (mph)	36	34	35	35	36	37	34	40	38	39	45	39
Fuel Used (gal)	0.1	0.4	0.1	0.3	0.0	0.3	0.0	0.9	0.4	0.5	0.8	3.8
HC Emissions (g)	0	22	0	1	0	1	0	8	3	2	13	52
CO Emissions (g)	18	408	9	28	3	33	6	552	212	100	325	1693
NOx Emissions (g)	2	65	2	8	1	9	0	36	15	19	58	216
Vehicles Entered	3	16	3	20	3	20	1	65	25	56	79	291
Vehicles Exited	3	16	4	19	3	21	1	61	24	57	77	286
Hourly Exit Rate	3	16	4	19	3	21	1	61	24	57	77	286
Input Volume	3	9	2	20	2	14	2	70	19	51	83	275
% of Volume	100	178	200	95	150	150	50	87	126	112	93	104
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing AM Peak Hour
9/8/2014

17: US-50 & Performance by movement

Movement	EBT	WBT	All
Total Delay (hr)	0.0	0.0	0.0
Delay / Veh (s)	0.4	0.4	0.4
Total Stops	0	0	0
Travel Dist (mi)	121.8	80.5	202.3
Travel Time (hr)	2.0	1.3	3.3
Avg Speed (mph)	63	61	62
Fuel Used (gal)	4.2	3.2	7.4
HC Emissions (g)	381	56	438
CO Emissions (g)	9099	3103	12202
NOx Emissions (g)	920	193	1113
Vehicles Entered	305	160	465
Vehicles Exited	302	163	465
Hourly Exit Rate	302	163	465
Input Volume	309	180	489
% of Volume	98	91	95
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	0.9
Delay / Veh (s)	4.2
Total Stops	214
Travel Dist (mi)	1228.9
Travel Time (hr)	29.5
Avg Speed (mph)	42
Fuel Used (gal)	37.2
HC Emissions (g)	1648
CO Emissions (g)	39374
NOx Emissions (g)	4438
Vehicles Entered	790
Vehicles Exited	773
Hourly Exit Rate	773
Input Volume	2471
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
Baseline

Existing AM Peak Hour
9/8/2014

Intersection: 1: US-50 & Road F

Movement	WB	NB	SB
Directions Served	L	R	LTR
Maximum Queue (ft)	42	46	51
Average Queue (ft)	4	5	6
95th Queue (ft)	22	24	29
Link Distance (ft)			2601
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	800	200	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: US-50 & Road G

Movement	EB	NB	SB	SB	SB
Directions Served	L	LTR	L	T	R
Maximum Queue (ft)	20	31	73	30	26
Average Queue (ft)	2	7	32	4	4
95th Queue (ft)	13	27	53	20	19
Link Distance (ft)		1809	2552	2552	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500				300
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Road 180 & Road F

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	79	29
Average Queue (ft)	14	4
95th Queue (ft)	47	20
Link Distance (ft)	2601	5231
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline

Existing AM Peak Hour
9/8/2014

Intersection: 4: Road 180 & Road G

Movement	EB	WB	WB	SB
Directions Served	LTR	LT	R	L
Maximum Queue (ft)	31	26	22	23
Average Queue (ft)	14	12	10	3
95th Queue (ft)	38	31	24	15
Link Distance (ft)	5231	3015	3015	2036
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 17: US-50 &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

SimTraffic Performance Report
Baseline

Existing PM Peak Hour
9/8/2014

1: US-50 & Road F Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBT	All
Total Delay (hr)	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3
Delay / Veh (s)	0.8	3.6	1.6	2.7	0.0	3.1	5.4	3.5	3.8	1.9
Total Stops	0	0	2	0	0	1	23	1	0	27
Travel Dist (mi)	132.1	4.0	5.7	115.0	0.7	0.2	5.5	0.5	0.8	264.5
Travel Time (hr)	2.2	0.1	0.1	2.1	0.0	0.0	0.2	0.0	0.0	4.7
Avg Speed (mph)	62	59	55	56	53	32	32	36	35	58
Fuel Used (gal)	4.8	0.1	0.2	2.8	0.0	0.0	0.1	0.0	0.0	8.2
HC Emissions (g)	568	30	4	136	5	0	18	0	0	760
CO Emissions (g)	12861	645	157	3321	97	0	293	9	22	17406
NOx Emissions (g)	1352	65	13	375	11	0	50	1	1	1868
Vehicles Entered	266	8	12	299	2	1	23	1	3	615
Vehicles Exited	266	8	11	294	2	1	23	1	3	609
Hourly Exit Rate	266	8	11	294	2	1	23	1	3	609
Input Volume	247	6	11	298	2	5	22	1	3	596
% of Volume	108	133	100	99	100	20	105	100	100	102
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing PM Peak Hour
9/8/2014

2: US-50 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Delay / Veh (s)	1.9	1.9	1.5	0.2	0.7	0.6	8.7	7.8	2.7	6.3	3.2	2.5
Total Stops	6	0	0	0	0	0	2	5	3	51	2	21
Travel Dist (mi)	7.9	136.1	0.7	1.3	150.1	44.3	0.7	1.7	1.0	25.3	2.8	10.9
Travel Time (hr)	0.2	2.6	0.0	0.0	2.8	0.9	0.0	0.1	0.0	0.7	0.1	0.3
Avg Speed (mph)	45	51	43	54	53	51	33	34	39	35	38	37
Fuel Used (gal)	0.2	3.2	0.0	0.0	4.4	1.1	0.0	0.0	0.0	0.7	0.1	0.3
HC Emissions (g)	1	30	0	0	48	6	0	0	0	9	0	1
CO Emissions (g)	34	979	10	17	1734	301	2	3	3	257	26	72
NOx Emissions (g)	9	179	1	2	265	54	1	1	1	38	3	11
Vehicles Entered	16	283	2	2	224	67	2	5	3	51	9	22
Vehicles Exited	16	277	2	2	225	66	2	5	3	51	9	21
Hourly Exit Rate	16	277	2	2	225	66	2	5	3	51	9	21
Input Volume	15	263	2	3	222	71	2	4	2	56	7	20
% of Volume	107	105	100	67	101	93	100	125	150	91	129	105
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

2: US-50 & Road G Performance by movement

Movement	All
Total Delay (hr)	0.3
Delay / Veh (s)	1.8
Total Stops	90
Travel Dist (mi)	382.9
Travel Time (hr)	7.8
Avg Speed (mph)	49
Fuel Used (gal)	10.1
HC Emissions (g)	97
CO Emissions (g)	3438
NOx Emissions (g)	565
Vehicles Entered	686
Vehicles Exited	679
Hourly Exit Rate	679
Input Volume	667
% of Volume	102
Denied Entry Before	0
Denied Entry After	0

SimTraffic Performance Report
Baseline

Existing PM Peak Hour
9/8/2014

3: Road 180 & Road F Performance by movement

Movement	EBT	WBL	WBT	NBT	NBR	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay / Veh (s)	6.7	6.9	4.4	5.3	1.4	7.1	5.9
Total Stops	10	1	3	3	1	3	21
Travel Dist (mi)	4.8	1.0	6.1	1.0	0.5	1.1	14.6
Travel Time (hr)	0.1	0.0	0.2	0.0	0.0	0.0	0.4
Avg Speed (mph)	33	40	34	34	32	34	34
Fuel Used (gal)	0.1	0.0	0.2	0.0	0.0	0.0	0.4
HC Emissions (g)	4	0	1	5	0	0	11
CO Emissions (g)	67	11	53	101	4	2	238
NOx Emissions (g)	13	1	5	13	0	1	34
Vehicles Entered	9	1	9	3	1	3	26
Vehicles Exited	10	1	9	4	1	3	28
Hourly Exit Rate	10	1	9	4	1	3	28
Input Volume	6	1	9	3	1	3	25
% of Volume	167	100	100	133	100	100	112
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

4: Road 180 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Delay / Veh (s)	8.5	8.6	1.4	4.3	8.1	2.0	0.4	1.1	0.6	1.2	0.2	1.8
Total Stops	2	11	4	16	7	58	0	0	0	7	0	105
Travel Dist (mi)	1.5	10.5	2.0	9.7	4.5	33.6	1.5	33.0	9.2	16.2	23.9	145.6
Travel Time (hr)	0.0	0.3	0.1	0.3	0.1	0.9	0.0	0.8	0.2	0.4	0.5	3.8
Avg Speed (mph)	32	34	36	34	33	36	36	40	39	39	44	38
Fuel Used (gal)	0.0	0.3	0.0	0.3	0.1	0.8	0.1	1.1	0.3	0.4	0.6	4.1
HC Emissions (g)	0	8	0	1	1	3	0	8	2	2	7	33
CO Emissions (g)	14	162	3	35	21	104	23	555	163	92	157	1329
NOx Emissions (g)	1	25	1	7	3	24	2	41	12	15	36	166
Vehicles Entered	2	14	4	17	8	57	3	68	18	42	61	294
Vehicles Exited	2	14	4	16	7	58	3	68	19	42	62	295
Hourly Exit Rate	2	14	4	16	7	58	3	68	19	42	62	295
Input Volume	3	6	4	20	6	43	4	73	15	37	59	271
% of Volume	67	233	100	80	117	135	75	93	127	114	105	109
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing PM Peak Hour
9/8/2014

17: US-50 & Truck Wash Access Performance by movement

Movement	EBT	WBT	All
Total Delay (hr)	0.0	0.1	0.1
Delay / Veh (s)	0.5	0.9	0.6
Total Stops	0	0	0
Travel Dist (mi)	144.9	126.0	270.9
Travel Time (hr)	2.4	2.1	4.5
Avg Speed (mph)	61	59	60
Fuel Used (gal)	5.0	5.2	10.2
HC Emissions (g)	379	74	453
CO Emissions (g)	9442	4475	13916
NOx Emissions (g)	949	281	1230
Vehicles Entered	362	249	611
Vehicles Exited	362	252	614
Hourly Exit Rate	362	252	614
Input Volume	346	246	592
% of Volume	105	102	104
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	1.3
Delay / Veh (s)	4.8
Total Stops	243
Travel Dist (mi)	1518.9
Travel Time (hr)	36.5
Avg Speed (mph)	42
Fuel Used (gal)	45.9
HC Emissions (g)	1634
CO Emissions (g)	40990
NOx Emissions (g)	4618
Vehicles Entered	957
Vehicles Exited	953
Hourly Exit Rate	953
Input Volume	2904
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Queuing and Blocking Report
Baseline

Existing PM Peak Hour
9/8/2014

Intersection: 1: US-50 & Road F

Movement	WB	NB	NB	SB
Directions Served	L	LT	R	LR
Maximum Queue (ft)	16	25	64	26
Average Queue (ft)	1	1	23	1
95th Queue (ft)	7	10	61	9
Link Distance (ft)		1270		2601
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	800		200	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: US-50 & Road G

Movement	EB	NB	SB	SB	SB
Directions Served	L	LTR	L	T	R
Maximum Queue (ft)	24	31	68	21	42
Average Queue (ft)	4	8	21	1	8
95th Queue (ft)	17	28	45	10	23
Link Distance (ft)		1809	2552	2552	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	500				300
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Road 180 & Road F

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	52	31	30	31
Average Queue (ft)	10	4	4	3
95th Queue (ft)	40	20	20	18
Link Distance (ft)	2601	5231	2601	1974
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Baseline

Existing PM Peak Hour
9/8/2014

Intersection: 4: Road 180 & Road G

Movement	EB	WB	WB	SB
Directions Served	LTR	LT	R	L
Maximum Queue (ft)	31	26	44	23
Average Queue (ft)	13	14	16	5
95th Queue (ft)	36	33	32	19
Link Distance (ft)	5231	3015	3015	2036
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 17: US-50 & Truck Wash Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

1: US-50 & Road F Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.7	4.2	0.3	4.1	1.6	1.6	0.1	0.1	0.3	1.3	0.4	0.0
Delay / Veh (s)	35.8	37.4	9.6	56.5	40.2	18.9	35.1	15.8	9.1	34.2	8.5	3.6
Total Stops	140	326	75	281	103	193	8	14	50	123	38	11
Travel Dist (mi)	85.2	200.6	50.0	131.4	73.5	155.1	1.8	5.2	25.3	65.2	58.9	12.2
Travel Time (hr)	3.4	7.6	1.3	6.8	2.8	4.8	0.1	0.2	1.0	3.2	2.1	0.4
Avg Speed (mph)	27	27	44	19	26	32	14	23	28	21	28	32
Fuel Used (gal)	3.0	7.2	1.9	6.5	3.5	6.9	0.1	0.2	0.8	2.5	2.5	0.4
HC Emissions (g)	261	723	170	616	287	680	5	11	46	157	103	25
CO Emissions (g)	6233	16752	4219	14237	7095	15545	83	207	999	3207	2531	540
NOx Emissions (g)	598	1646	397	1453	688	1661	13	30	121	418	297	70
Vehicles Entered	173	406	101	265	151	313	7	22	105	138	174	28
Vehicles Exited	171	410	103	261	144	307	8	22	106	140	173	27
Hourly Exit Rate	171	410	103	261	144	307	8	22	106	140	173	27
Input Volume	162	408	96	242	165	289	13	15	107	131	171	27
% of Volume	106	100	107	108	87	106	62	147	99	107	101	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

1: US-50 & Road F Performance by movement

Movement	All
Total Delay (hr)	15.8
Delay / Veh (s)	30.3
Total Stops	1362
Travel Dist (mi)	864.4
Travel Time (hr)	33.7
Avg Speed (mph)	26
Fuel Used (gal)	35.5
HC Emissions (g)	3084
CO Emissions (g)	71649
NOx Emissions (g)	7393
Vehicles Entered	1883
Vehicles Exited	1872
Hourly Exit Rate	1872
Input Volume	1826
% of Volume	103
Denied Entry Before	0
Denied Entry After	0

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

2: US-50 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	1.1	3.0	0.1	3.4	11.5	0.6	0.2	0.4	0.2	2.3	0.7	1.7
Delay / Veh (s)	40.8	32.2	9.1	44.7	42.9	9.9	48.1	31.5	7.7	58.4	14.2	17.6
Total Stops	83	203	33	246	772	102	11	40	48	164	63	199
Travel Dist (mi)	49.8	165.5	27.0	187.2	645.5	151.2	4.1	16.7	29.8	63.7	60.4	158.2
Travel Time (hr)	2.3	6.3	0.8	7.3	23.7	3.8	0.3	0.8	1.0	4.1	2.2	6.1
Avg Speed (mph)	22	26	36	26	28	42	16	21	34	16	28	26
Fuel Used (gal)	2.3	7.4	1.2	5.8	20.4	4.9	0.2	0.5	0.9	2.8	2.6	5.8
HC Emissions (g)	140	634	119	539	1969	433	16	52	63	105	75	324
CO Emissions (g)	3638	14375	2775	10744	39335	9384	286	938	1228	2599	2416	7375
NOx Emissions (g)	354	1596	296	1339	4963	1112	39	134	175	273	218	863
Vehicles Entered	100	334	53	281	965	227	12	49	88	142	174	349
Vehicles Exited	100	337	56	276	964	222	13	49	87	143	175	348
Hourly Exit Rate	100	337	56	276	964	222	13	49	87	143	175	348
Input Volume	96	323	58	247	965	206	13	44	73	139	193	339
% of Volume	104	104	97	112	100	108	100	111	119	103	91	103
Denied Entry Before	0	0	0	1	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	1	2	0	0	0	0	0	0	0

2: US-50 & Road G Performance by movement

Movement	All
Total Delay (hr)	25.3
Delay / Veh (s)	32.9
Total Stops	1964
Travel Dist (mi)	1559.0
Travel Time (hr)	58.6
Avg Speed (mph)	27
Fuel Used (gal)	54.8
HC Emissions (g)	4469
CO Emissions (g)	95093
NOx Emissions (g)	11363
Vehicles Entered	2774
Vehicles Exited	2770
Hourly Exit Rate	2770
Input Volume	2696
% of Volume	103
Denied Entry Before	1
Denied Entry After	3

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

3: Road 180 & Road F Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.3	0.2	0.4	0.5	0.0	0.1	0.2	0.1	0.1	0.1	1.8
Delay / Veh (s)	10.9	4.3	10.7	3.9	3.4	6.9	1.8	4.8	6.0	9.2	4.8
Total Stops	88	127	121	7	3	28	11	76	58	56	575
Travel Dist (mi)	42.8	63.2	121.1	222.7	2.5	13.9	102.2	38.2	21.9	21.2	649.8
Travel Time (hr)	1.3	1.9	3.6	6.4	0.1	0.5	3.3	1.2	0.7	0.7	19.7
Avg Speed (mph)	32	34	34	35	33	31	31	31	31	31	33
Fuel Used (gal)	1.1	1.6	3.7	7.8	0.1	0.5	4.9	1.4	0.6	0.5	22.2
HC Emissions (g)	40	58	109	148	0	25	463	72	34	20	970
CO Emissions (g)	738	1101	2341	4320	11	579	9431	1602	615	411	21151
NOx Emissions (g)	120	178	349	504	2	72	1239	201	98	61	2824
Vehicles Entered	87	129	122	433	2	28	392	80	59	58	1390
Vehicles Exited	88	127	121	435	3	28	390	76	58	56	1382
Hourly Exit Rate	88	127	121	435	3	28	390	76	58	56	1382
Input Volume	87	129	127	423	4	24	377	65	51	45	1332
% of Volume	101	98	95	103	75	117	103	117	114	124	104
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

4: Road 180 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.2	0.4	0.1	2.3	1.4	0.0	1.3	0.3	0.1	0.5	0.8	0.4
Delay / Veh (s)	27.4	11.4	7.7	23.3	22.1	1.8	27.6	8.9	3.3	30.2	19.4	8.3
Total Stops	26	34	36	271	169	6	156	42	27	54	100	97
Travel Dist (mi)	30.0	84.8	63.5	206.9	133.2	4.8	77.4	52.3	46.2	22.6	58.9	60.8
Travel Time (hr)	1.0	2.6	1.8	7.8	4.8	0.1	3.4	1.7	1.4	1.1	2.2	1.9
Avg Speed (mph)	29	32	35	27	28	37	23	30	34	22	28	34
Fuel Used (gal)	0.9	3.0	2.0	5.6	3.8	0.1	3.1	2.4	1.7	0.7	1.6	1.5
HC Emissions (g)	5	173	78	84	92	1	72	322	79	19	52	24
CO Emissions (g)	249	3611	1660	1858	1976	27	2332	6386	2014	420	1124	659
NOx Emissions (g)	27	493	234	299	288	4	221	821	225	61	161	93
Vehicles Entered	30	129	63	360	234	8	170	134	96	59	153	158
Vehicles Exited	30	127	62	357	233	9	169	136	95	60	150	155
Hourly Exit Rate	30	127	62	357	233	9	169	136	95	60	150	155
Input Volume	28	120	55	346	228	14	175	128	86	51	165	151
% of Volume	107	106	113	103	102	64	97	106	110	118	91	103
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	1	1

4: Road 180 & Road G Performance by movement

Movement	All
Total Delay (hr)	7.9
Delay / Veh (s)	17.9
Total Stops	1018
Travel Dist (mi)	841.5
Travel Time (hr)	30.0
Avg Speed (mph)	28
Fuel Used (gal)	26.5
HC Emissions (g)	1001
CO Emissions (g)	22314
NOx Emissions (g)	2927
Vehicles Entered	1594
Vehicles Exited	1583
Hourly Exit Rate	1583
Input Volume	1547
% of Volume	102
Denied Entry Before	0
Denied Entry After	2

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

17: US-50 & Proposed Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Total Delay (hr)	1.0	3.3	0.7	4.0	6.4	1.2	0.3	0.2	0.5	0.1	17.6
Delay / Veh (s)	35.6	31.2	13.5	39.0	34.4	15.0	33.9	6.9	28.3	9.7	28.8
Total Stops	82	246	114	319	450	140	33	42	54	15	1495
Travel Dist (mi)	47.9	179.9	89.4	179.2	323.7	142.6	6.7	15.5	14.4	6.4	1005.6
Travel Time (hr)	2.0	6.5	2.6	7.8	12.1	4.3	0.6	0.8	1.0	0.3	38.0
Avg Speed (mph)	24	28	34	23	27	33	12	23	16	23	27
Fuel Used (gal)	2.5	9.0	4.3	7.9	14.9	6.2	0.2	0.4	0.5	0.2	46.1
HC Emissions (g)	243	662	459	633	1368	607	15	30	30	19	4067
CO Emissions (g)	5812	17097	10742	14409	31143	13567	236	492	463	286	94248
NOx Emissions (g)	572	1613	1093	1566	3377	1507	35	74	72	51	9960
Vehicles Entered	97	379	180	363	671	291	38	87	59	26	2191
Vehicles Exited	97	373	181	369	674	291	37	87	60	24	2193
Hourly Exit Rate	97	373	181	369	674	291	37	87	60	24	2193
Input Volume	119	363	164	383	631	303	34	79	62	24	2162
% of Volume	82	103	110	96	107	96	109	110	97	100	101
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	70.2
Delay / Veh (s)	61.6
Total Stops	6415
Travel Dist (mi)	6046.7
Travel Time (hr)	221.7
Avg Speed (mph)	28
Fuel Used (gal)	225.4
HC Emissions (g)	16174
CO Emissions (g)	349638
NOx Emissions (g)	41356
Vehicles Entered	4126
Vehicles Exited	4075
Hourly Exit Rate	4075
Input Volume	12412
% of Volume	33
Denied Entry Before	1
Denied Entry After	5

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 1: US-50 & Road F

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	193	221	258	84	389	107	125	208	44	69	79	194
Average Queue (ft)	110	113	126	29	206	29	52	77	8	14	30	104
95th Queue (ft)	192	191	210	60	338	69	102	153	30	49	60	179
Link Distance (ft)		2598	2598			2551	2551		1252	1252		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	800			800	800			800			400	400
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: US-50 & Road F

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	91	53
Average Queue (ft)	36	9
95th Queue (ft)	78	31
Link Distance (ft)	2564	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		400
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 2: US-50 & Road G

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	71	94	194	237	72	243	424	640	577	128	57	109
Average Queue (ft)	32	43	81	117	23	87	150	318	272	47	14	40
95th Queue (ft)	61	87	157	199	60	156	311	542	465	90	42	87
Link Distance (ft)			2522	2522				3532	3532			1791
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	200	
Storage Blk Time (%)							0	4				
Queuing Penalty (veh)							0	10				

Intersection: 2: US-50 & Road G

Movement	NB	SB	SB	SB
Directions Served	R	L	T	R
Maximum Queue (ft)	66	257	102	257
Average Queue (ft)	29	121	45	127
95th Queue (ft)	62	224	95	233
Link Distance (ft)		2509	2509	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250			250
Storage Blk Time (%)				1
Queuing Penalty (veh)				0

Intersection: 3: Road 180 & Road F

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	116	118	73	103
Average Queue (ft)	58	42	40	45
95th Queue (ft)	94	76	67	76
Link Distance (ft)	2595	5225	2564	1968
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 4: Road 180 & Road G

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	L	T	R	L	T	R	L	T
Maximum Queue (ft)	74	74	72	142	157	211	18	175	82	65	107	130
Average Queue (ft)	24	29	23	72	76	94	3	85	25	12	40	63
95th Queue (ft)	59	69	57	120	125	176	14	150	55	36	81	110
Link Distance (ft)		5225				3016	3016	2509	2509			2024
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150		150	250	250					350	250	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 4: Road 180 & Road G

Movement	SB
Directions Served	R
Maximum Queue (ft)	85
Average Queue (ft)	37
95th Queue (ft)	71
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 17: US-50 & Proposed Access

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	95	109	198	218	174	226	239	262	261	154	67	72
Average Queue (ft)	26	53	81	94	57	101	123	165	141	62	18	16
95th Queue (ft)	68	97	148	163	107	168	188	260	247	112	52	47
Link Distance (ft)			2551	2551				2522	2522			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	250
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 17: US-50 & Proposed Access

Movement	NB	SB	SB	SB
Directions Served	R	L	L	R
Maximum Queue (ft)	65	67	101	42
Average Queue (ft)	25	17	31	11
95th Queue (ft)	56	50	72	35
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250	250	250	250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 10

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

1: US-50 & Road F Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	6.2	7.4	0.4	1.8	15.8
Delay / Veh (s)	32.8	37.0	11.8	18.6	30.3
Total Stops	541	577	72	172	1362
Travel Dist (mi)	335.8	360.0	32.3	136.3	864.4
Travel Time (hr)	12.2	14.4	1.4	5.7	33.7
Avg Speed (mph)	28	25	26	24	26
Fuel Used (gal)	12.1	16.9	1.0	5.4	35.5
HC Emissions (g)	1154	1583	62	285	3084
CO Emissions (g)	27204	36878	1289	6278	71649
NOx Emissions (g)	2642	3802	165	785	7393
Vehicles Entered	680	729	134	340	1883
Vehicles Exited	684	712	136	340	1872
Hourly Exit Rate	684	712	136	340	1872
Input Volume	666	696	135	329	1826
% of Volume	103	102	101	103	103
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: US-50 & Road G Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	4.3	15.5	0.8	4.7	25.3
Delay / Veh (s)	31.4	38.1	19.1	25.5	32.9
Total Stops	319	1120	99	426	1964
Travel Dist (mi)	242.2	983.9	50.6	282.3	1559.0
Travel Time (hr)	9.3	34.8	2.1	12.4	58.6
Avg Speed (mph)	26	29	26	23	27
Fuel Used (gal)	11.0	31.1	1.5	11.2	54.8
HC Emissions (g)	894	2941	131	504	4469
CO Emissions (g)	20788	59463	2452	12390	95093
NOx Emissions (g)	2246	7414	348	1355	11363
Vehicles Entered	487	1473	149	665	2774
Vehicles Exited	493	1462	149	666	2770
Hourly Exit Rate	493	1462	149	666	2770
Input Volume	477	1418	130	671	2696
% of Volume	103	103	115	99	103
Denied Entry Before	0	1	0	0	1
Denied Entry After	0	3	0	0	3

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

3: Road 180 & Road F Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.4	0.8	0.4	0.2	1.8
Delay / Veh (s)	7.0	5.4	2.6	7.6	4.8
Total Stops	215	131	115	114	575
Travel Dist (mi)	106.0	346.3	154.4	43.1	649.8
Travel Time (hr)	3.2	10.1	5.0	1.4	19.7
Avg Speed (mph)	33	34	31	31	33
Fuel Used (gal)	2.7	11.6	6.8	1.1	22.2
HC Emissions (g)	98	258	561	54	970
CO Emissions (g)	1840	6673	11613	1026	21151
NOx Emissions (g)	298	855	1511	159	2824
Vehicles Entered	216	557	500	117	1390
Vehicles Exited	215	559	494	114	1382
Hourly Exit Rate	215	559	494	114	1382
Input Volume	216	554	466	96	1332
% of Volume	100	101	106	119	104
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Road 180 & Road G Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.8	3.7	1.7	1.7	7.9
Delay / Veh (s)	12.5	22.5	15.4	16.4	17.9
Total Stops	96	446	225	251	1018
Travel Dist (mi)	178.3	344.9	175.9	142.4	841.5
Travel Time (hr)	5.5	12.8	6.5	5.2	30.0
Avg Speed (mph)	32	27	27	29	28
Fuel Used (gal)	5.9	9.6	7.2	3.8	26.5
HC Emissions (g)	256	176	473	96	1001
CO Emissions (g)	5520	3860	10732	2203	22314
NOx Emissions (g)	754	591	1266	315	2927
Vehicles Entered	222	602	400	370	1594
Vehicles Exited	219	599	400	365	1583
Hourly Exit Rate	219	599	400	365	1583
Input Volume	203	588	389	367	1547
% of Volume	108	102	103	99	102
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	2	2

SimTraffic Performance Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

17: US-50 & Proposed Access Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	4.9	11.6	0.5	0.5	17.6
Delay / Veh (s)	27.0	31.4	14.9	23.1	28.8
Total Stops	442	909	75	69	1495
Travel Dist (mi)	317.2	645.5	22.2	20.7	1005.6
Travel Time (hr)	11.1	24.3	1.4	1.3	38.0
Avg Speed (mph)	29	27	18	17	27
Fuel Used (gal)	15.8	29.0	0.7	0.7	46.1
HC Emissions (g)	1364	2608	46	49	4067
CO Emissions (g)	33652	59119	728	750	94248
NOx Emissions (g)	3278	6450	109	123	9960
Vehicles Entered	656	1325	125	85	2191
Vehicles Exited	651	1334	124	84	2193
Hourly Exit Rate	651	1334	124	84	2193
Input Volume	646	1317	113	86	2162
% of Volume	101	101	110	98	101
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

Total Network Performance

Total Delay (hr)	70.2
Delay / Veh (s)	61.6
Total Stops	6415
Travel Dist (mi)	6046.7
Travel Time (hr)	221.7
Avg Speed (mph)	28
Fuel Used (gal)	225.4
HC Emissions (g)	16174
CO Emissions (g)	349638
NOx Emissions (g)	41356
Vehicles Entered	4126
Vehicles Exited	4075
Hourly Exit Rate	4075
Input Volume	12412
% of Volume	33
Denied Entry Before	1
Denied Entry After	5

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 1: US-50 & Road F

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	193	221	258	84	389	107	125	208	44	69	79	194
Average Queue (ft)	110	113	126	29	206	29	52	77	8	14	30	104
95th Queue (ft)	192	191	210	60	338	69	102	153	30	49	60	179
Link Distance (ft)		2598	2598			2551	2551		1252	1252		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	800			800	800			800			400	400
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: US-50 & Road F

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	91	53
Average Queue (ft)	36	9
95th Queue (ft)	78	31
Link Distance (ft)	2564	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		400
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 2: US-50 & Road G

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	71	94	194	237	72	243	424	640	577	128	57	109
Average Queue (ft)	32	43	81	117	23	87	150	318	272	47	14	40
95th Queue (ft)	61	87	157	199	60	156	311	542	465	90	42	87
Link Distance (ft)			2522	2522				3532	3532			1791
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	200	
Storage Blk Time (%)							0	4				
Queuing Penalty (veh)							0	10				

Intersection: 2: US-50 & Road G

Movement	NB	SB	SB	SB
Directions Served	R	L	T	R
Maximum Queue (ft)	66	257	102	257
Average Queue (ft)	29	121	45	127
95th Queue (ft)	62	224	95	233
Link Distance (ft)		2509	2509	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250			250
Storage Blk Time (%)				1
Queuing Penalty (veh)				0

Intersection: 3: Road 180 & Road F

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	116	118	73	103
Average Queue (ft)	58	42	40	45
95th Queue (ft)	94	76	67	76
Link Distance (ft)	2595	5225	2564	1968
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 4: Road 180 & Road G

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	L	T	R	L	T	R	L	T
Maximum Queue (ft)	74	74	72	142	157	211	18	175	82	65	107	130
Average Queue (ft)	24	29	23	72	76	94	3	85	25	12	40	63
95th Queue (ft)	59	69	57	120	125	176	14	150	55	36	81	110
Link Distance (ft)		5225				3016	3016	2509	2509			2024
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150		150	250	250					350	250	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 4: Road 180 & Road G

Movement	SB
Directions Served	R
Maximum Queue (ft)	85
Average Queue (ft)	37
95th Queue (ft)	71
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Baseline

Existing + Generated AM Peak Hour
11/18/2014

Intersection: 17: US-50 & Proposed Access

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	95	109	198	218	174	226	239	262	261	154	67	72
Average Queue (ft)	26	53	81	94	57	101	123	165	141	62	18	16
95th Queue (ft)	68	97	148	163	107	168	188	260	247	112	52	47
Link Distance (ft)			2551	2551				2522	2522			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	250
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 17: US-50 & Proposed Access

Movement	NB	SB	SB	SB
Directions Served	R	L	L	R
Maximum Queue (ft)	65	67	101	42
Average Queue (ft)	25	17	31	11
95th Queue (ft)	56	50	72	35
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250	250	250	250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 10

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

1: US-50 & Road F Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.3	2.0	0.0	1.3	2.7	0.3	0.8	0.3	0.7	2.6	0.6	0.4
Delay / Veh (s)	35.6	26.5	6.6	40.9	27.3	6.7	32.1	21.5	10.4	37.1	18.3	8.1
Total Stops	26	189	17	112	218	48	88	32	140	231	60	93
Travel Dist (mi)	14.5	129.9	12.1	57.4	177.4	71.1	22.4	12.9	61.3	81.2	36.3	66.2
Travel Time (hr)	0.6	4.2	0.3	2.6	6.0	1.8	1.5	0.7	2.6	4.9	1.5	2.4
Avg Speed (mph)	27	31	46	22	30	40	15	20	27	17	25	29
Fuel Used (gal)	0.6	5.0	0.4	2.8	8.3	3.3	0.9	0.4	2.0	2.9	1.2	2.2
HC Emissions (g)	57	581	47	229	737	260	49	40	155	229	74	122
CO Emissions (g)	1341	13315	1083	5825	18227	6736	1014	748	3166	4268	1537	2616
NOx Emissions (g)	132	1327	110	531	1750	626	123	101	397	572	199	326
Vehicles Entered	29	263	24	117	355	143	93	54	255	249	109	188
Vehicles Exited	30	266	25	117	362	143	92	54	257	249	109	192
Hourly Exit Rate	30	266	25	117	362	143	92	54	257	249	109	192
Input Volume	22	259	20	106	357	143	92	55	235	255	91	188
% of Volume	136	103	125	110	101	100	100	98	109	98	120	102
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

1: US-50 & Road F Performance by movement

Movement	All
Total Delay (hr)	12.0
Delay / Veh (s)	23.0
Total Stops	1254
Travel Dist (mi)	742.6
Travel Time (hr)	29.1
Avg Speed (mph)	26
Fuel Used (gal)	30.1
HC Emissions (g)	2580
CO Emissions (g)	59877
NOx Emissions (g)	6192
Vehicles Entered	1879
Vehicles Exited	1896
Hourly Exit Rate	1896
Input Volume	1823
% of Volume	104
Denied Entry Before	0
Denied Entry After	0

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

2: US-50 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	2.8	6.4	0.2	0.7	2.6	0.2	0.3	0.9	1.1	2.1	0.2	0.1
Delay / Veh (s)	32.9	21.0	8.1	36.3	22.6	4.7	20.7	27.6	13.3	29.0	12.9	3.7
Total Stops	254	484	49	67	277	54	39	94	182	256	20	35
Travel Dist (mi)	136.2	423.4	40.9	48.7	278.4	78.3	17.9	42.6	103.8	130.8	20.3	48.3
Travel Time (hr)	6.0	15.3	1.2	1.7	7.8	1.7	0.8	1.9	3.9	5.7	0.7	1.4
Avg Speed (mph)	23	28	37	29	36	46	26	23	29	23	29	34
Fuel Used (gal)	5.8	19.6	1.7	1.4	8.0	2.2	0.5	1.1	2.6	5.0	0.9	1.7
HC Emissions (g)	118	1827	35	7	89	26	9	9	16	65	58	30
CO Emissions (g)	4928	40993	1590	387	3574	1177	216	315	704	2933	1302	1186
NOx Emissions (g)	354	4629	112	57	440	124	31	39	85	242	156	105
Vehicles Entered	307	1094	93	73	415	116	52	125	305	271	49	99
Vehicles Exited	303	1088	92	72	422	118	53	122	305	262	49	100
Hourly Exit Rate	303	1088	92	72	422	118	53	122	305	262	49	100
Input Volume	306	1156	94	66	399	109	45	112	318	264	51	92
% of Volume	99	94	98	109	106	108	118	109	96	99	96	109
Denied Entry Before	0	0	0	0	0	0	0	0	1	0	0	0
Denied Entry After	0	1	1	0	0	0	0	0	0	0	0	0

2: US-50 & Road G Performance by movement

Movement	All
Total Delay (hr)	17.7
Delay / Veh (s)	21.2
Total Stops	1811
Travel Dist (mi)	1369.7
Travel Time (hr)	48.0
Avg Speed (mph)	29
Fuel Used (gal)	50.7
HC Emissions (g)	2289
CO Emissions (g)	59305
NOx Emissions (g)	6374
Vehicles Entered	2999
Vehicles Exited	2986
Hourly Exit Rate	2986
Input Volume	3012
% of Volume	99
Denied Entry Before	1
Denied Entry After	2

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

3: Road 180 & Road F Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.4	0.2	0.1	0.2	0.1	0.2	0.0	0.1	1.3
Delay / Veh (s)	10.2	3.3	11.3	13.4	8.5	7.4	6.8	5.5	4.0	8.5	8.2
Total Stops	18	50	120	53	40	99	39	97	6	24	546
Travel Dist (mi)	8.3	24.6	116.3	52.9	36.6	47.6	25.5	42.2	2.2	8.9	365.3
Travel Time (hr)	0.3	0.7	3.5	1.6	1.1	1.6	0.9	1.4	0.1	0.3	11.3
Avg Speed (mph)	32	34	33	34	33	31	30	31	32	32	32
Fuel Used (gal)	0.2	0.6	3.5	1.6	1.1	1.5	1.0	1.4	0.1	0.2	11.2
HC Emissions (g)	6	28	67	52	66	69	141	49	0	8	488
CO Emissions (g)	119	512	1594	1083	1253	1524	2640	1135	4	166	10028
NOx Emissions (g)	20	85	227	166	191	197	367	143	1	26	1423
Vehicles Entered	16	50	119	53	39	100	67	98	6	24	572
Vehicles Exited	18	50	120	53	40	99	67	98	6	24	575
Hourly Exit Rate	18	50	120	53	40	99	67	98	6	24	575
Input Volume	22	47	115	49	31	91	66	102	7	17	547
% of Volume	82	106	104	108	129	109	102	96	86	141	105
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

4: Road 180 & Road G Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.6	0.9	0.5	0.5	0.4	0.1	0.5	1.7	0.1	0.3	0.3	0.1
Delay / Veh (s)	21.3	19.8	8.1	18.8	18.2	5.2	21.4	15.8	5.9	24.8	12.1	4.8
Total Stops	81	124	139	81	51	30	71	207	31	39	48	22
Travel Dist (mi)	62.9	104.9	142.9	54.7	41.7	21.8	37.8	194.1	39.8	15.0	32.7	17.2
Travel Time (hr)	2.3	3.6	4.5	2.0	1.4	0.6	1.5	6.5	1.2	0.6	1.0	0.5
Avg Speed (mph)	28	29	33	28	29	34	26	30	33	24	32	37
Fuel Used (gal)	1.8	3.0	3.8	1.5	1.2	0.6	1.5	7.3	1.4	0.5	0.9	0.5
HC Emissions (g)	17	53	103	40	19	13	46	126	21	2	4	7
CO Emissions (g)	468	1201	2119	829	428	283	1370	4995	905	136	225	212
NOx Emissions (g)	67	181	326	130	67	45	132	426	73	14	30	26
Vehicles Entered	100	173	235	97	73	39	76	400	84	39	86	44
Vehicles Exited	100	168	234	96	74	38	78	391	83	39	84	45
Hourly Exit Rate	100	168	234	96	74	38	78	391	83	39	84	45
Input Volume	109	165	229	94	69	43	68	403	73	37	77	43
% of Volume	92	102	102	102	107	88	115	97	114	105	109	105
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

4: Road 180 & Road G Performance by movement

Movement	All
Total Delay (hr)	5.9
Delay / Veh (s)	14.9
Total Stops	924
Travel Dist (mi)	765.4
Travel Time (hr)	25.8
Avg Speed (mph)	30
Fuel Used (gal)	23.9
HC Emissions (g)	451
CO Emissions (g)	13171
NOx Emissions (g)	1518
Vehicles Entered	1446
Vehicles Exited	1430
Hourly Exit Rate	1430
Input Volume	1410
% of Volume	101
Denied Entry Before	0
Denied Entry After	0

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

17: US-50 & Proposed Access Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Total Delay (hr)	0.4	6.9	0.1	0.7	2.1	0.2	1.4	1.8	2.4	0.3	16.2
Delay / Veh (s)	40.2	35.9	7.5	26.0	14.9	7.4	31.5	20.2	33.8	9.5	25.5
Total Stops	34	569	18	80	166	33	135	236	237	71	1579
Travel Dist (mi)	18.1	339.4	21.9	45.6	187.0	36.7	28.0	57.4	63.5	26.8	824.2
Travel Time (hr)	0.8	13.6	0.6	1.7	5.4	0.9	2.4	4.0	4.7	1.3	35.4
Avg Speed (mph)	22	25	36	28	35	41	13	16	15	23	24
Fuel Used (gal)	0.8	16.2	1.1	2.1	9.9	1.8	1.1	1.9	2.3	0.8	37.9
HC Emissions (g)	67	1608	93	77	425	81	54	108	132	39	2685
CO Emissions (g)	1636	37343	2253	2865	15141	2792	911	1767	2116	640	67464
NOx Emissions (g)	159	3841	230	190	1054	200	127	250	304	95	6450
Vehicles Entered	37	691	44	102	498	81	158	323	258	108	2300
Vehicles Exited	36	689	43	101	494	81	159	325	254	109	2291
Hourly Exit Rate	36	689	43	101	494	81	159	325	254	109	2291
Input Volume	30	677	42	98	479	77	149	349	275	107	2283
% of Volume	120	102	102	103	103	105	107	93	92	102	100
Denied Entry Before	0	0	0	0	0	0	0	1	1	0	2
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	57.2
Delay / Veh (s)	48.2
Total Stops	6114
Travel Dist (mi)	5994.8
Travel Time (hr)	220.2
Avg Speed (mph)	28
Fuel Used (gal)	217.8
HC Emissions (g)	10160
CO Emissions (g)	241657
NOx Emissions (g)	26631
Vehicles Entered	4293
Vehicles Exited	4258
Hourly Exit Rate	4258
Input Volume	12850
% of Volume	33
Denied Entry Before	3
Denied Entry After	2

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 1: US-50 & Road F

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	104	154	147	51	212	175	206	64	134	106	113	394
Average Queue (ft)	26	63	74	9	80	73	86	18	60	37	54	156
95th Queue (ft)	70	123	131	33	152	142	161	45	115	84	98	249
Link Distance (ft)		2598	2598			2551	2551		1252	1252		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	800			800	800			800			200	400
Storage Blk Time (%)												0
Queuing Penalty (veh)												0

Intersection: 1: US-50 & Road F

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	152	105
Average Queue (ft)	52	40
95th Queue (ft)	126	86
Link Distance (ft)	2564	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		400
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 2: US-50 & Road G

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	114	162	269	285	64	53	73	181	158	53	69	111
Average Queue (ft)	72	83	120	136	22	18	38	80	86	25	27	58
95th Queue (ft)	106	126	199	227	46	44	68	142	143	43	62	105
Link Distance (ft)			2522	2522				3532	3532			1791
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: US-50 & Road G

Movement	NB	SB	SB	SB
Directions Served	R	L	T	R
Maximum Queue (ft)	108	211	45	42
Average Queue (ft)	64	113	13	13
95th Queue (ft)	100	193	34	33
Link Distance (ft)		2509	2509	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250			250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Road 180 & Road F

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	55	118	100	77
Average Queue (ft)	32	58	56	21
95th Queue (ft)	57	89	85	53
Link Distance (ft)	2595	5225	2564	1968
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 4: Road 180 & Road G

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	L	T	R	L	T	R	L	T
Maximum Queue (ft)	117	117	155	69	59	90	44	90	177	41	70	111
Average Queue (ft)	53	65	48	22	27	32	11	36	94	13	23	27
95th Queue (ft)	90	103	90	45	55	69	32	72	181	30	49	66
Link Distance (ft)		5225				3016	3016	2509	2509			2024
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150		150	250	250					350	250	
Storage Blk Time (%)			0									
Queuing Penalty (veh)			0									

Intersection: 4: Road 180 & Road G

Movement	SB
Directions Served	R
Maximum Queue (ft)	36
Average Queue (ft)	9
95th Queue (ft)	26
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 17: US-50 & Proposed Access

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	68	77	350	328	74	77	90	158	137	44	102	126
Average Queue (ft)	5	31	169	183	14	23	44	65	68	19	51	49
95th Queue (ft)	31	63	280	301	48	56	78	134	131	41	86	93
Link Distance (ft)			2551	2551				2522	2522			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	250
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 17: US-50 & Proposed Access

Movement	NB	SB	SB	SB
Directions Served	R	L	L	R
Maximum Queue (ft)	274	150	160	80
Average Queue (ft)	125	70	82	37
95th Queue (ft)	220	122	141	73
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250	250	250	250
Storage Blk Time (%)	0			
Queuing Penalty (veh)	1			

Network Summary

Network wide Queuing Penalty: 1

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

1: US-50 & Road F Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	2.3	4.4	1.9	3.7	12.3
Delay / Veh (s)	26.0	25.7	16.9	24.2	23.4
Total Stops	235	398	260	393	1286
Travel Dist (mi)	156.0	308.0	97.0	184.1	745.1
Travel Time (hr)	5.1	10.5	4.8	9.0	29.4
Avg Speed (mph)	31	29	22	22	26
Fuel Used (gal)	5.9	14.5	3.3	6.4	30.2
HC Emissions (g)	682	1230	245	430	2587
CO Emissions (g)	15619	30972	4964	8499	60054
NOx Emissions (g)	1554	2915	623	1103	6195
Vehicles Entered	315	619	404	548	1886
Vehicles Exited	320	626	405	552	1903
Hourly Exit Rate	320	626	405	552	1903
Input Volume	301	606	382	534	1823
% of Volume	106	103	106	103	104
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: US-50 & Road G Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	9.3	3.5	2.4	2.4	17.5
Delay / Veh (s)	22.4	20.9	17.7	20.3	21.1
Total Stops	787	404	311	301	1803
Travel Dist (mi)	601.7	406.1	164.6	199.9	1372.3
Travel Time (hr)	22.3	11.3	6.6	7.7	47.9
Avg Speed (mph)	27	36	27	26	29
Fuel Used (gal)	26.6	11.6	4.3	7.7	50.2
HC Emissions (g)	1898	123	34	154	2209
CO Emissions (g)	45238	5127	1251	5459	57075
NOx Emissions (g)	4916	620	158	505	6199
Vehicles Entered	1494	605	483	420	3002
Vehicles Exited	1483	610	482	415	2990
Hourly Exit Rate	1483	610	482	415	2990
Input Volume	1556	574	475	407	3012
% of Volume	95	106	101	102	99
Denied Entry Before	1	0	1	0	2
Denied Entry After	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

3: Road 180 & Road F Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.1	0.7	0.5	0.1	1.3
Delay / Veh (s)	5.0	11.2	6.6	7.1	8.1
Total Stops	68	213	238	30	549
Travel Dist (mi)	32.9	205.9	116.3	11.2	366.2
Travel Time (hr)	1.0	6.2	3.8	0.3	11.3
Avg Speed (mph)	34	33	30	33	32
Fuel Used (gal)	0.8	6.2	3.9	0.3	11.3
HC Emissions (g)	34	190	257	8	489
CO Emissions (g)	639	4038	5289	158	10123
NOx Emissions (g)	104	592	703	26	1426
Vehicles Entered	66	211	268	30	575
Vehicles Exited	68	213	266	30	577
Hourly Exit Rate	68	213	266	30	577
Input Volume	69	195	259	24	547
% of Volume	99	109	103	125	105
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Road 180 & Road G Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	2.2	1.0	2.1	0.6	6.0
Delay / Veh (s)	15.4	18.1	13.8	13.9	15.0
Total Stops	346	173	281	107	907
Travel Dist (mi)	312.4	118.2	271.7	64.9	767.2
Travel Time (hr)	10.6	4.2	9.0	2.2	25.9
Avg Speed (mph)	30	29	30	30	30
Fuel Used (gal)	8.7	3.3	10.3	1.9	24.1
HC Emissions (g)	174	70	198	14	456
CO Emissions (g)	3831	1479	7443	616	13369
NOx Emissions (g)	577	237	647	72	1533
Vehicles Entered	510	209	561	169	1449
Vehicles Exited	500	208	558	168	1434
Hourly Exit Rate	500	208	558	168	1434
Input Volume	503	206	544	157	1410
% of Volume	99	101	103	107	102
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

SimTraffic Performance Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

17: US-50 & Proposed Access Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	7.4	3.6	3.4	3.5	17.9
Delay / Veh (s)	34.7	19.0	25.2	34.5	28.0
Total Stops	543	277	368	320	1508
Travel Dist (mi)	380.6	270.2	85.2	90.1	826.2
Travel Time (hr)	15.2	8.6	6.6	6.7	37.1
Avg Speed (mph)	25	32	15	14	23
Fuel Used (gal)	18.2	13.9	3.0	3.2	38.3
HC Emissions (g)	1791	574	164	180	2709
CO Emissions (g)	41565	20532	2746	2852	67695
NOx Emissions (g)	4281	1418	382	412	6494
Vehicles Entered	773	680	480	366	2299
Vehicles Exited	770	679	480	362	2291
Hourly Exit Rate	770	679	480	362	2291
Input Volume	749	654	498	382	2283
% of Volume	103	104	96	95	100
Denied Entry Before	0	0	1	1	2
Denied Entry After	0	0	1	0	1

Total Network Performance

Total Delay (hr)	59.1
Delay / Veh (s)	49.7
Total Stops	6055
Travel Dist (mi)	6008.2
Travel Time (hr)	222.4
Avg Speed (mph)	27
Fuel Used (gal)	218.1
HC Emissions (g)	10133
CO Emissions (g)	240454
NOx Emissions (g)	26559
Vehicles Entered	4300
Vehicles Exited	4273
Hourly Exit Rate	4273
Input Volume	12850
% of Volume	33
Denied Entry Before	4
Denied Entry After	1

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 1: US-50 & Road F

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	104	154	132	57	190	254	254	66	134	106	130	394
Average Queue (ft)	25	71	71	10	81	77	94	22	59	34	58	160
95th Queue (ft)	70	129	125	34	148	156	180	54	114	80	103	259
Link Distance (ft)		2598	2598			2557	2557		1252	1252		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	800			800	800			800			200	400
Storage Blk Time (%)												0
Queuing Penalty (veh)												1

Intersection: 1: US-50 & Road F

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	172	101
Average Queue (ft)	55	37
95th Queue (ft)	132	77
Link Distance (ft)	2564	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		400
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 2: US-50 & Road G

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	115	114	179	227	43	69	74	182	158	53	69	130
Average Queue (ft)	72	80	118	134	22	19	37	83	86	24	26	57
95th Queue (ft)	103	110	166	199	41	48	66	143	141	41	61	107
Link Distance (ft)			2528	2528				3532	3532			1791
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: US-50 & Road G

Movement	NB	SB	SB	SB
Directions Served	R	L	T	R
Maximum Queue (ft)	152	234	44	61
Average Queue (ft)	68	114	13	12
95th Queue (ft)	115	197	33	34
Link Distance (ft)		2509	2509	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250			250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Road 180 & Road F

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	55	120	121	77
Average Queue (ft)	33	61	59	21
95th Queue (ft)	54	94	93	53
Link Distance (ft)	2595	5225	2564	1968
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 4: Road 180 & Road G

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	L	T	R	L	T	R	L	T
Maximum Queue (ft)	75	161	90	48	96	90	44	90	235	65	70	111
Average Queue (ft)	51	72	45	25	28	34	13	37	98	13	23	27
95th Queue (ft)	75	121	77	46	64	77	34	74	196	33	51	63
Link Distance (ft)		5225				3016	3016	2509	2509			2024
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150		150	250	250					350	250	
Storage Blk Time (%)		0										
Queuing Penalty (veh)		1										

Intersection: 4: Road 180 & Road G

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	8
95th Queue (ft)	22
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	250
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Baseline

Existing + Generated PM Peak Hour
11/18/2014

Intersection: 17: US-50 & Proposed Access

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	50	89	288	348	74	77	129	135	158	61	258	306
Average Queue (ft)	5	31	179	195	16	28	51	66	68	16	107	10
95th Queue (ft)	26	67	285	328	48	67	92	116	124	46	188	101
Link Distance (ft)			2557	2557				2528	2528			929
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			800	400	400			800	250	
Storage Blk Time (%)											0	
Queuing Penalty (veh)											1	

Intersection: 17: US-50 & Proposed Access

Movement	NB	SB	SB	SB
Directions Served	R	L	T	R
Maximum Queue (ft)	274	274	498	106
Average Queue (ft)	117	182	50	45
95th Queue (ft)	230	292	266	93
Link Distance (ft)			1294	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250	250		250
Storage Blk Time (%)	0	4		
Queuing Penalty (veh)	1	4		

Network Summary

Network wide Queuing Penalty: 7

Appendix B: Open House Comments

Question 1: How did you hear about this meeting?

Method	Number
Newspaper	2
Radio/Television	5
Mail	2
Posted Announcement/Flyer	-
Roadside Message Board	-
Other	3
Total	12

Question 2: What is the best way to inform you about meetings?

Method	Number
Newspaper	1
Radio/Television	3
Mail	4
Posted Announcement/Flyer	-
Roadside Message Board	-
Other	1
Total	9

Question 3: Was the meeting notice timely?

	Number
Yes	6
No	-
Total	6

Question 4: Was the meeting time and location convenient?

	Number
Yes	7
No	-
Total	7

Question 5: Were your questions answered satisfactorily?

	Number
Yes	5
No	-
Total	5

Question 6: Were the handouts and displays easy to understand?

	Number
Yes	5
No	1
Total	6

Question 7: Did the following individuals genuinely listen to your questions or concerns?

	KDOT	Consultants	Public Officials
Yes	6	4	5
No	1	1	1
Total	7	5	6

Question 8: Would you like a follow-up contact?

	Number
Yes	2
No	2
Total	4

Question 9: How would you rate the meeting overall?

Rating	Number
Great	-
Good	5
Average	2
Below Average	-
Poor	-
Total	6

Comments/Concerns about US-50 Plan

Will the existing entrances stay the same or will any be removed? Will the same number of entrances be the same on both North and South? Will it be a 4 Lane with exit lanes? Will fast lane be the inside lane? What is the existing right of way from the middle line and then what will be the future existing right of way be? Will the addition be the same on both sides of road?

I am with the chamber of commerce and Emporia Enterprises. Emporia Enterprises has approximately 150 acres in the NW corner of the area you are studying Rd F-Hwy 50 Corner (NW). It is important for the future development of this land to have it be safe and accessible. Future land use plans for this area is light industrial, so I would anticipate heave truck (semi) usage and employee transportation. I would hope at the very least four lanes would be considered and a possible traffic light. Access to this property is also vital. Past discussions with KDOT have given us (or show) 3 entrances w/internal roads. Of course, keeping these entrances would be preferable. Thank You!

Need to keep my entrances and land. Excessive drainage from North drains on my property.

Appropriate entrances/exits for industrial park on North side of Hwy 50.

Have concern about types of developments and access and how this may affect our home, lifestyle and property resale value. What will be around us?? This is a major concern in a dying town where resale is already an issue. What is planned? What rights do the land owners have?

Appendix C: Works Cited

City of Emporia Planning Commission. (2008). *City of Emporia Comprehensive Plan.* Emporia. Retrieved 2014

Google Earth. (2014, August 11). Emporia, KS. Retrieved July 2014

Kansas Department of Transportation. (2013). *KDOT Access Management Policy.* Topeka.

NHTSA National Center for Statistics and Analysis. (2012). *Traffic Safety Facts.* U.S. Department of Transportation, National Highway Traffic Safety Administration, Washington.