South Kansas Avenue Traffic Report

An analysis of current conditions and recommendations for future improvements along South Kansas Avenue between SE 24th Street and SE 36th Street.

Digitally signed by geigerb@pbworld.com
DN: cn=geigerb@pbworld.com, email=geigerb@pbworld.com
Reason: I am approving this document
Location: Lenexa, KS
Date: 2013.10.15 16:07:18 -05'00'

October 2013

PARSONS BRINCKERHOFF

Table of Contents

Figures

Tables

1 Introduction and Executive Summary

This study consists of a review of existing conditions, distribution of future trips, traffic operations analysis and recommended future improvements based on projected development along South Kansas Avenue between SE 24th Street and SE 36th Street in Newton, Kansas.

A similar study was recently completed along South Kansas Avenue between SE 14th Street and SE 24th Street in December 2012. Recommendations included continuing with the four-lane divided section along South Kansas Avenue and also included specific intersection and median improvements. Traffic signals were also recommended at several intersections in this area when signal warrants are met. The SE 24th Street to SE 36th Street study is considered a continuation of the investigation that took place to the north.

1.1 Purpose of Report and Study Objectives

The purpose of the study is to evaluate existing transportation conditions along South Kansas Avenue, look for ways to improve connectivity between existing developments and proposed developments as well as estimate the impact of future commercial development along the corridor.

A site visit was conducted to review the existing infrastructure and conditions, and traffic counts were collected at key locations throughout the corridor. This information will be utilized to analyze the corridor. Results from the study will indicate ways for the corridor to continue to grow and support additional economic development, as well as provide a list of transportation improvements that will support this future growth.

The City of Newton's Comprehensive Plan– *The ReNewton Project: Comprehensive Plan (2010 - 2030)* was utilized as part of the study. The study reflects the community Vision, Values and Goals as presented in the ReNewton Project. The core of the City's Vision Statement is "Between 2010 and 2030, Newton will expand its tax base and enhance community amenities, while preserving its richness of character, heritage, and way of life".

This study touches many of the Values of the City including: Vibrant Economy, Livability, Innovations in Transportation, Healthy Living, Preserving Our Town Character and Housing for All.

1.2 Executive Summary

The existing roadway and land uses adjacent to South Kansas Avenue may appear fairly undeveloped and open to multiple land uses and roadway networks, but after investigation the existing zoning, platted developments, and natural features restrict the options available. Some ideas such as frontage or backage roads were unable to be fully developed as envisioned.

With additional development along the corridor, an increase in traffic volume is expected which will generate enough traffic to warrant additional traffic signals on South Kansas Avenue. Multiple types of intersection control were evaluated along the corridor, but traffic signals were determined to be the optimal system to retain capacity along the corridor.

Although coordinated traffic signals will be required along this corridor to provide progression, it may be worthwhile for the city to implement an adaptive traffic control system. A coordinated traffic control system uses time of day plans that provide fixed cycle lengths with detection that assists with determining splits or green times for each approach based on a single analysis that is placed into the field. An adaptive system essentially modifies both splits and cycle lengths at all times based on current field information. This means an adaptive system is great for shopping areas or developing areas where each new office or retail establishment has the potential to significantly change the traffic patterns. If this occurs with a typical coordinated system using time of day plans, the plans have to be re-timed. If it's an adaptive system, the system will self-adjust to the new traffic patterns in the area.

Traffic signals should be installed when the Manual on Uniform Traffic Control Devices (MUTCD) traffic signal warrants are met and an engineering study is performed to justify the installation of a signal. "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal"(Federal Highway Administration, 2009). From an operational standpoint, the city may want to wait until Warrant 1 is met before installing a traffic signal. However, Warrant 7, Crash Experience should continue to be monitored at all intersections. Waiting until Warrant 1 is met may lower overall delay throughout the day when compared to installing a signal when only Warrant 2 or 3 are met.

Traffic signal warrants 1 through 3 are based on vehicular volumes using multiple tables and charts which assist with determining if a traffic signal is warranted. The tables and charts utilize the mainline traffic volumes along with side street volumes. The current edition of the MUTCD should be used to determine the thresholds for installing signals. There is not a single traffic volume figure that a public agency can utilize to determine if a traffic signal is warranted at an intersection. As a result, ongoing data collection and engineering analysis must be undertaken before determining that a signal should be installed. These traffic volume thresholds may be met before or after additional development occurs.

Access management techniques were stressed through a brainstorming session with city staff. Also discussed were options for providing development access to the roadway, while maintaining throughput along the road for the general public. The brainstorming session left the study team with multiple ideas which were investigated through the process of determining the recommended option for the development of the transportation network. One idea that was continued from the previous study along South Kansas Avenue between SE 14th Street and SE 24th Street in December 2012 was the implementation of a four-lane divided roadway with a center raised median. This center raised median would be narrowed at signalized intersections to provide left turn lanes. The center raised median does a great job of restricting additional access points along the roadway, because even if they were added, they become right-in-right-out only. It is common practice in Kansas for a city to construct a center raised median with turn lanes for future development, and negotiate an agreement with the developers that they will fund the applicable portions of the construction that are specifically for the development, such as turn lanes.

While much of this report is focused on vehicular transportation, travel by pedestrians and bicyclists were also evaluated. There is a wide shared use path on the east side of South Kansas Avenue that begins just south of 14th Street in the previous study area and continues south to just north of Autumn Glen Parkway. The shared use path should be continued south to SE 36th Street as development occurs. Sidewalks or shared use paths should be constructed on each side of South Kansas Avenue, and all traffic signals should have pedestrian equipment installed during the initial installation phase.

2 Existing Conditions

This section provides an overview of the existing study area, land uses, intersection types, site accessibility, and traffic volumes. The City of Newton's Comprehensive Plan– *The ReNewton Project: Comprehensive Plan (2010 - 2030)* was utilized as part of the study. The Comprehensive Plan was adopted by the Newton City Commission in January 2011.

2.1 Study Area

Within the City of Newton, the study area extends along South Kansas Avenue from SE 24th Street on the north to SE 36th Street on the south. Land uses which connect to South Kansas Avenue up to one mile east (I-135) and west (Old Main Street) of South Kansas Avenue were reviewed as part of the study (Figure 1).

2.2 Land Uses

This section describes the current land uses, land usage policies, and anticipated land uses in the future.

2.2.1 Existing Land Uses

Existing land uses along South Kansas Avenue within the study area are generally agricultural. The Autumn Glen Subdivision contains approximately 74 houses on the east side of South Kansas Avenue. A few individual homes are present along the west side of South Kansas Avenue and there are a few new small business developments along SE 36th Street east of South Kansas Avenue. A new fire station is located approximately 750 feet south of the SE 24th Street intersection on the east side of the corridor.

There is a utility pipeline which runs northeast to southwest through the southern section of the corridor which intercepts the utility station on the east side of South Kansas Avenue approximately 1,100 feet north of SE 36th Street.

Outside of the immediate study area, the majority of the development occurs within the previous study area to the north. Nearly everything east, south, and west of the study area is currently undeveloped agricultural land. There are efforts being made north and east of the study area towards the creation of the Kansas Logistics Park (Figure 2). Hundreds of acres of land are available for the development of the Kansas Logistics Park, specifically focused on manufacturing and distribution. When the Park is fully developed and operational, it will bring hundreds of jobs to the Newton area and spur additional development needed to support this Park. Trips were not included to or from the Kansas Logistics Park area in relation to the South Kansas Avenue study area as specific affects are unknown. We do know that traffic along South Kansas Avenue will increase when the Kansas Logistics Park is completed, however the amount of increase would be speculative at this time. More information about the Kansas Logistics Park can be obtained at the following website: http://www.kansaslogisticspark.com.

Figure 1 - Existing South Kansas Avenue between SE 24th Street and SE 36th Street
Source – Google Earth 2013

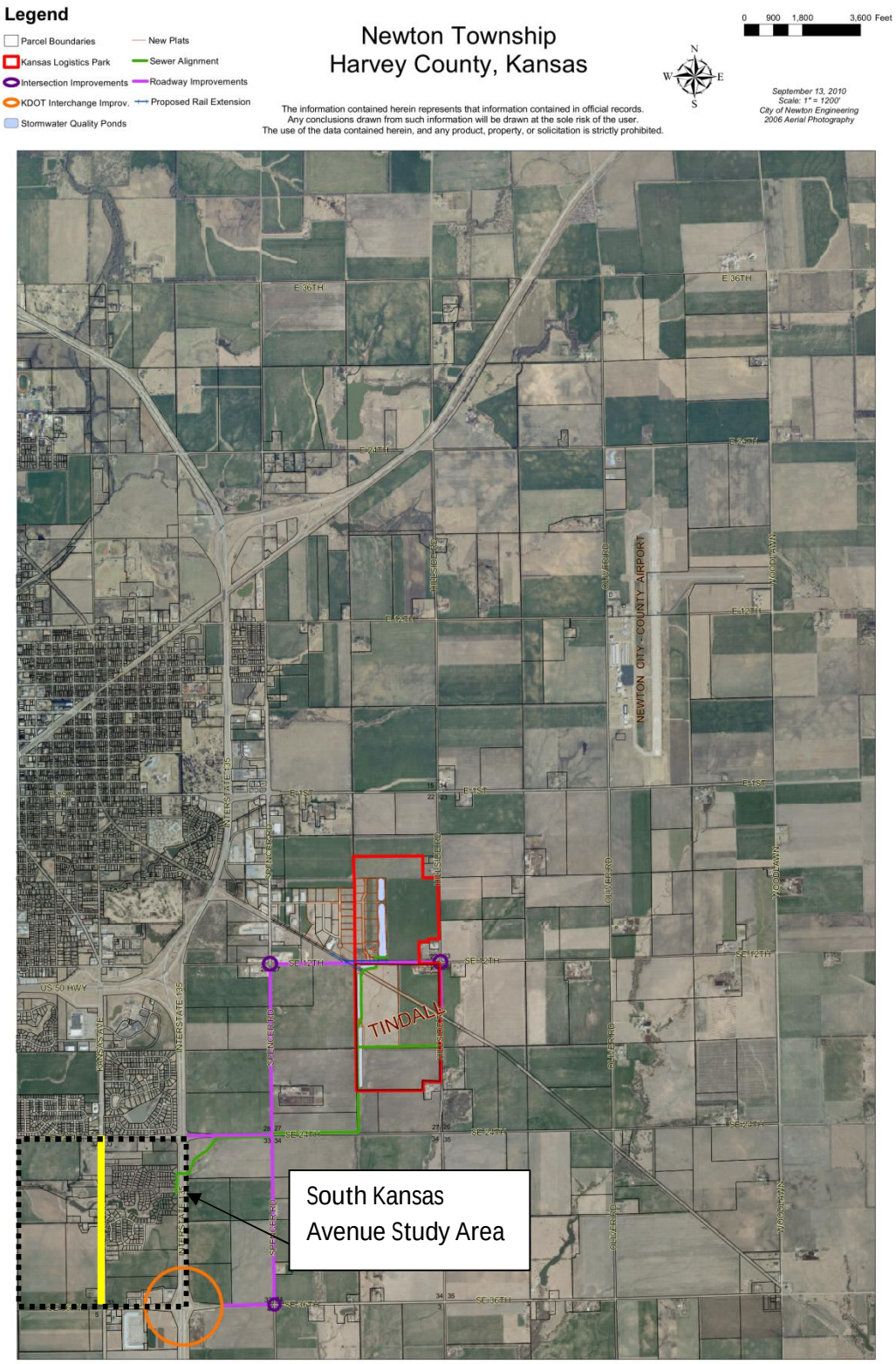


Figure 2 - Kansas Logistics Park Map in Relation to South Kansas Study Area
Source: http://www.newtonkansas.com

2.2.2 Existing Zoning and Comprehensive Plan

Three documents produced by the City of Newton provide an overview of the existing, proposed, and desired land uses along South Kansas Avenue. These three documents are the current City of Newton Zoning Maps and Codes, the ReNewton Comprehensive Plan, and the South Newton/I-135 Corridor Land Use Plan.

The existing zoning for areas within the current Newton city limits are shown in Figure 3. Although very little development has occurred, it does follow the current zoning guidelines. The proposed zoning along South Kansas Avenue is shown in Figure 4. This figure provides information about zoning outside of the city limits, while maintaining the current Newton zoning within the city limits. The study area limits are a mix of undeveloped land within the city limits and just outside the city limits.

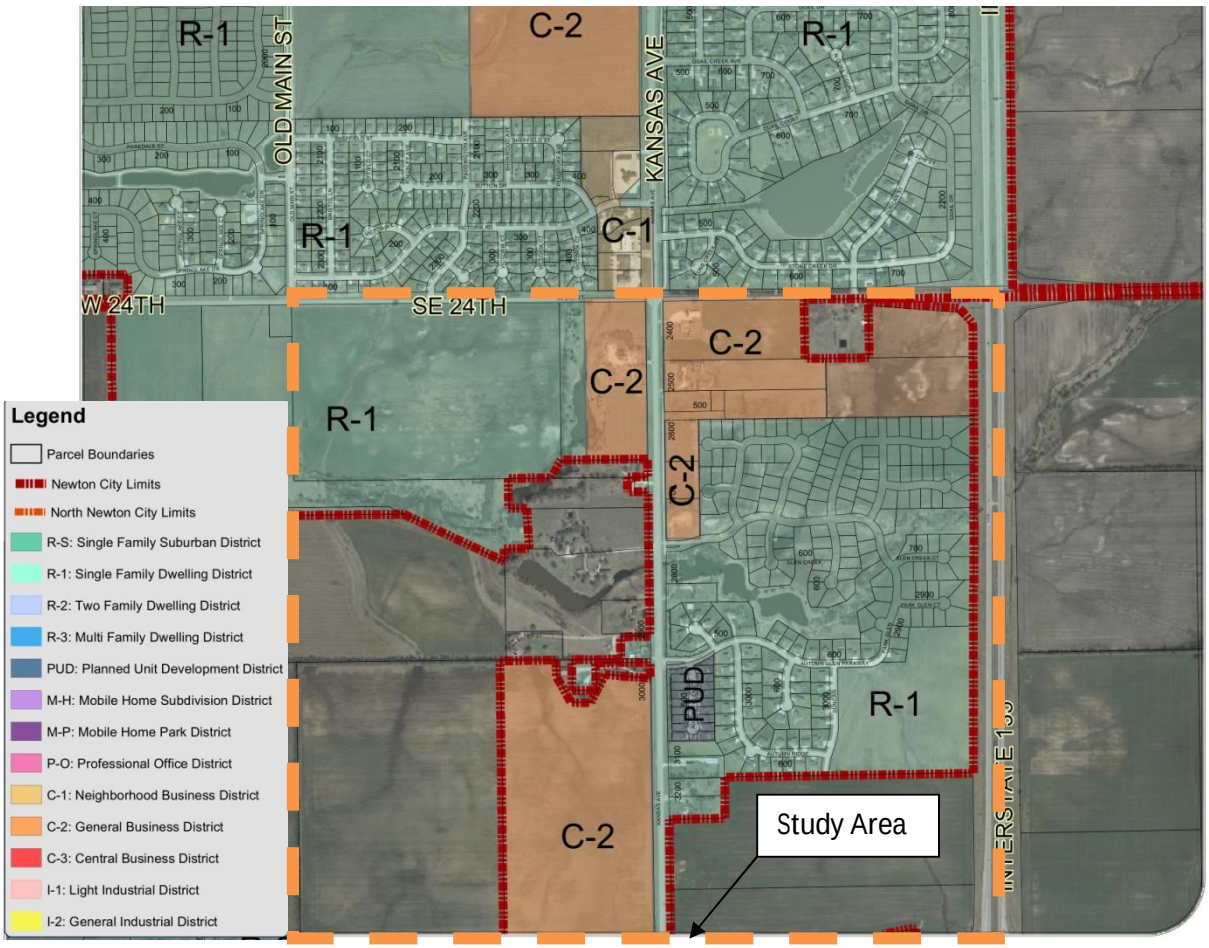


Figure 3 - Existing Zoning Surrounding South Kansas Avenue
Source – City of Newton

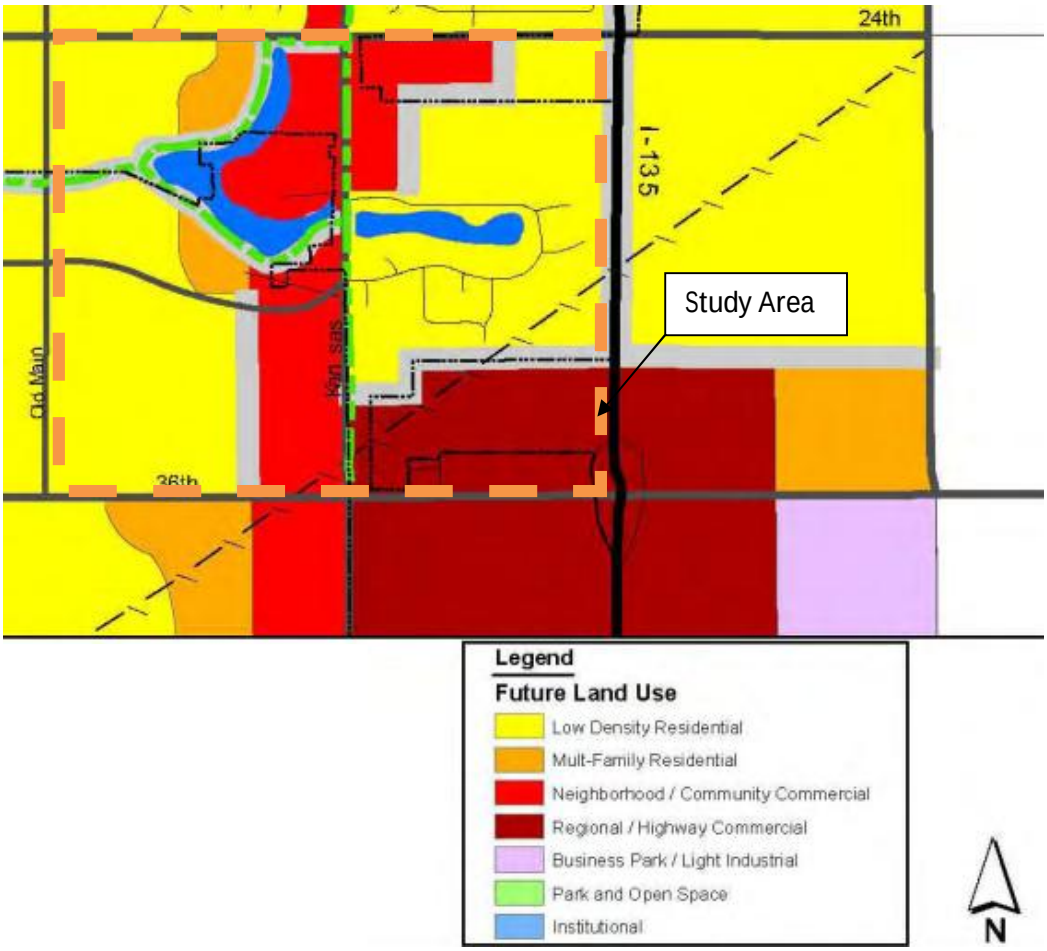


Figure 4 - Proposed Zoning Surrounding South Kansas Avenue
Source – 2008 South Newton I-135 Corridor Land Use Plan

The ReNewton Project discusses future land uses, urban growth, and sustainable development and includes the following selected goals (City of Newton, Kansas, 2011):

- Encourage urban development in areas where urban roads and infrastructure can be provided.
- Encourage new residential, commercial, and industrial development that creates a pedestrian-friendly environment that emphasizes walking, biking, and connectivity with nearby neighborhoods or the community.
- Design a community development pattern to enable people to walk and bike.

The comprehensive plan also has specific land use policies (selected) for South Kansas Avenue:

- Continue to strengthen the Newton Medical Center on Kansas Avenue as a focal point for a medical district to accommodate additional medical offices, diagnostic centers, laboratories, and related uses.

- The streetscape or civil spaces on (South) Kansas Avenue should have sidewalks on each side of the street, street trees, and unique street and pedestrian lighting in order to create an aesthetically pleasing and safe environment.

The plan suggests that commercial businesses which would serve the South Kansas Avenue corridor would be "big-box" retailers, multi-tenant retail shops, and national food and service franchisees (City of Newton, Kansas, 2011).

Other notable directions the ReNewton plan provides, which are also suggested in this study are:

- Provide crosswalks at intersections.
- Construct five-foot sidewalks on both sides of roads classified as arterial and collector streets. Ensure a seven-foot landscape area from the back-of-curb to the edge of the sidewalk for street trees.
- Provide walkways to connect subdivisions to reduce walking/bicycling distances.
- Provide a continuous interconnected roadway system to preserve mobility throughout the community.

It was interesting to note that ReNewton recommends that all arterial and collector streets in the city should have 6-foot bike lanes constructed.

ReNewton suggests that a future collector street be constructed midway between SE 24th Street and SE 36th Street on the west side of South Kansas Avenue as shown in Figure 5.

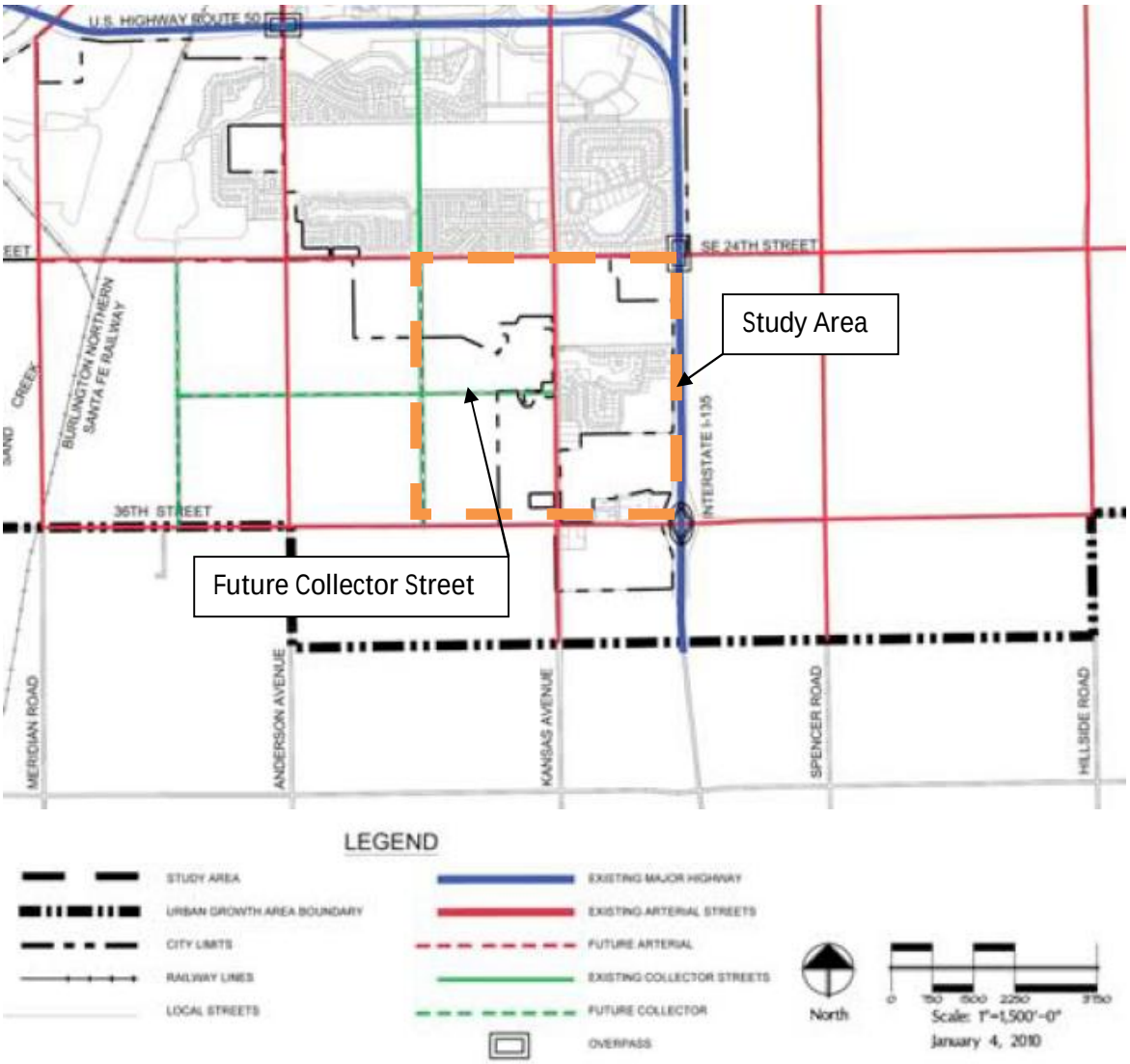


Figure 5 - ReNewton Future Transportation Map
Source – ReNewton Comprehensive Plan

2.3 Site Accessibility

The land adjacent to South Kansas Avenue is currently restricted by the lack of a transportation network. South Kansas Avenue is the sole method of accessing all of the existing development adjacent to the corridor. There are no alternative routes that currently connect to SE 24th Street or SE 36th Street if South Kansas Avenue were obstructed. Additional transportation modes and routes would be beneficial in order to provide network redundancy and provide access to adjacent land uses which would not require accessing South Kansas Avenue.

2.3.1 Roadway Network

South Kansas Avenue provides for the exclusive movement of people and goods to adjunct land uses.

2.3.1.1 Existing Roadway Network

Since South Kansas Avenue is the single arterial providing access between SE 24th Street and SE 36th Street, there is no additional roadway network at this time. The Autumn Glenn subdivision east of the corridor currently has a single connection to South Kansas Avenue.

On a larger scale, the roadway network surrounding the study area is typically a one-mile grid system. Not all of the roadways which make up the one-mile grid are paved, as some are unpaved.

Located one-half mile east of South Kansas Avenue sits I-135 which runs north/south paralleling the corridor. The presence of I-135 restricts the ability of travelers to cross the Interstate east/west except at specific locations. Crossings are typically every one mile, such as at SE 24th Street and also at SE 36th Street.

2.3.1.2 Existing Intersection Geometry and Traffic Control

South Kansas Avenue is considered an arterial street in *The ReNewton Project: Comprehensive Plan (2010 - 2030)* between SE 24th Street and SE 36th Street. A description of existing intersection geometry and traffic control along South Kansas Avenue is provided:

SE 24th Street – This is a two-way STOP controlled intersection (SE 24th Street) with two through lanes in each direction on South Kansas Avenue (four-lane undivided) and one through lane in each direction on SE 24th Street. SE 24th Street is an important east/west roadway as it travels over I-135 to the east (no access to I-135) and connects with both Old Main Street and Anderson Road to the west. SE 24th Street is considered an arterial street in ReNewton.

Autumn Glen Parkway – This is a STOP controlled three-leg intersection with Autumn Glen Pkwy on the east side of South Kansas Avenue leading to a residential subdivision. Autumn Glen Parkway has a center raised median on the east leg with a stone subdivision monument and low height landscaping. There are no pedestrian facilities present leading up to or crossing any legs of the intersection. A single overhead luminary provides light directly at the intersection in the northeast corner. Additional light may be provided by other nearby roadway street lights, one of which is located near the intersection in the southeast corner approximately 100 feet to the south.

SE 36th Street – This is a two-way STOP controlled intersection with two through lanes in each direction on South Kansas Avenue (four-lane undivided) and one through lane in each direction on SE 36th Street. On the westbound SE 36th Street approach there is an added right-turn-only lane. The west leg of SE 36th Street is an unpaved road which has very low traffic volumes even during the PM peak hour. The intersection is lit by two overhead luminaries, one in the northwest corner and the other in the southeast corner. There are no pedestrian facilities present leading up to or crossing any legs of the intersection.

2.3.2 Programmed Improvements

The programmed improvements along South Kansas Avenue, within or near the study area, are listed below as well as depicted on Figure 6. This information was current in 2012, however the expected year(s) of the infrastructure modifications may have changed since that time.

- South Kansas Avenue Mill and Overlay from SE 24th Street to Autumn Glen Parkway in calendar year 2014.
- South Kansas Avenue Mill and Overlay from Autumn Glen Parkway to SE 36th Street in calendar year 2015.
- I-135 & SE 36th Street interchange modifications in calendar year 2014 (southeast of study area).

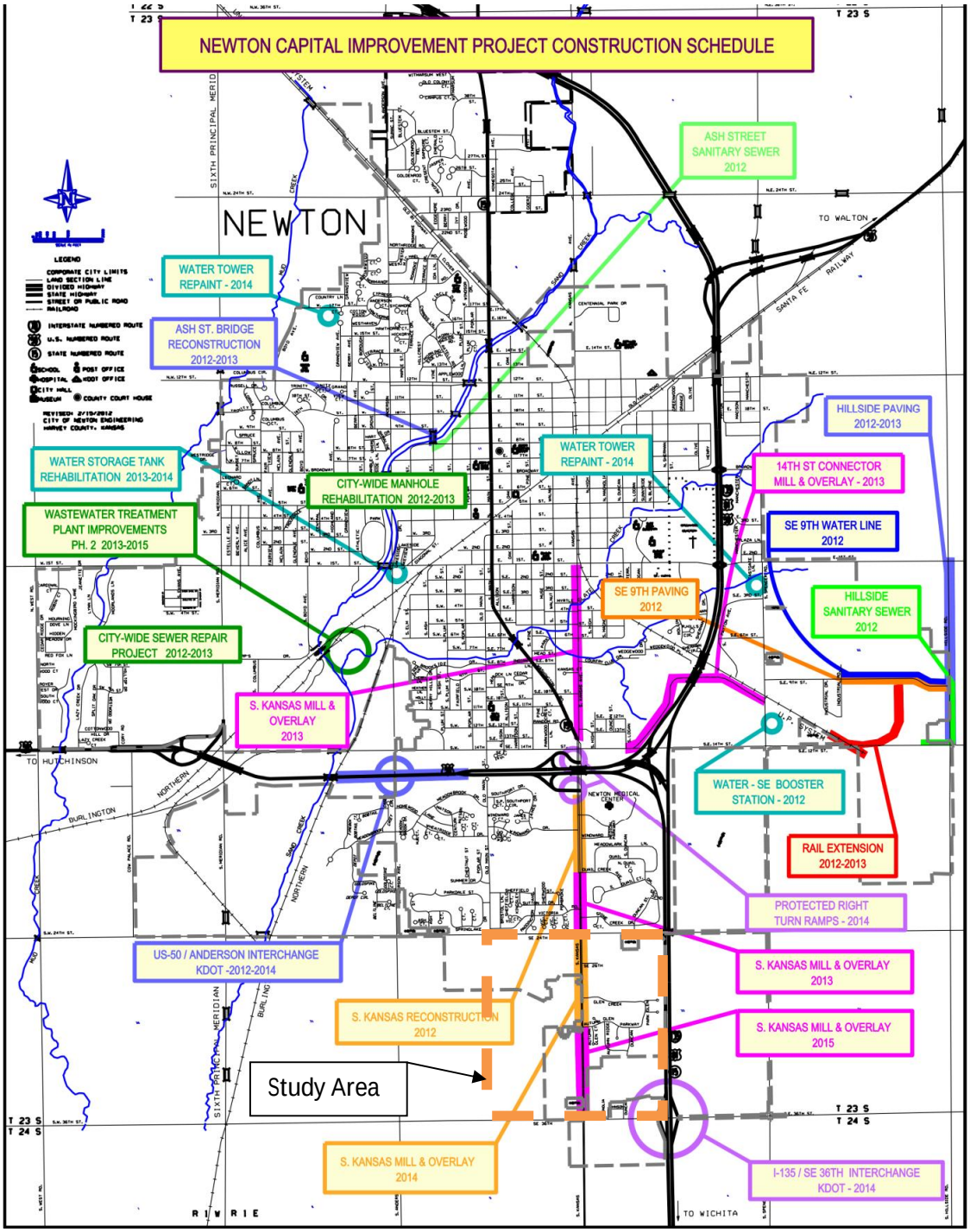


Figure 6 - Newton Capital Improvement Project Schedule (2012)
Source – City of Newton Public Works Department

2.3.3 Alternate Transportation Mode Choices

Other modes of transportation may also be used to move people and goods to and from land uses adjacent to South Kansas Avenue. These modes of transportation include transit, cycling, and walking.

2.3.3.1 Transit

The City of Newton does not operate a general public transit service. Harvey County, which the City of Newton is located in, does operate a limited demand response transit system weekdays from 8 am to 5 pm (Harvey County, 2012) (Kansas University Transportation Center).

2.3.3.2 Cycling and Walking

There is an existing shared-use path along the study area extending from just south of 14th Street in the previous study area and continues south to just north of Autumn Glen Parkway. A picture of the shared-use path near Medical Center Drive to the north of the study area is shown in Figure 7. Shared-use paths are attractive to cyclists and pedestrians for shorter distance trips. Shared-use path designs, such as the one constructed which have a very limited number of street crossings and driveways protruding into the path, could be extended south to SE 36th Street as development occurs along the corridor. These types of paths encourage more active transportation and should increase the health of those who use them consistently.

The existing shared use path should be extended to SE 36th Street which would provide a connection to Autumn Glen Parkway for local residents.

Figure 7 - Shared-Use Path on the East side of South Kansas Avenue (12th Street to SE 24th Street)
Source: Parsons Brinckerhoff

2.4 EXISTING TRAFFIC VOLUMES

Existing traffic volumes were obtained in two formats for the study. PM peak hour turning movement counts were collected in the field by observing traffic during this time while hourly vehicle counts were also collected using pneumatic tubes. Turning movements were only obtained during the PM peak hour as it was determined during a traffic study along South Kansas Avenue from SE 14th Street to SE 24th Street that the PM peak hour turning movement counts were much higher overall than the AM traffic counts.

The turning movement traffic counts were obtained for three different intersections within the study area on South Kansas Avenue:

- *South Kansas Avenue & SE 24th Street* which was counted as part of a previous study on Wednesday, August 8, 2012 from 4:00 pm to 6:00 pm.
- *South Kansas Avenue & Autumn Glen Parkway* which was counted on Thursday, March 28, 2013 from 4:00 pm to 6:00 pm
- *South Kansas Avenue & SE 36th Street* which was also counted on Thursday, March 28, 2013 from 4:00 pm to 6:00 pm

The peak hour during the PM traffic counts was from 4:45 pm to 5:45 pm.

Pneumatic tube counters were placed at three locations in the study area. These counters were placed at the north, east, and south legs of the South Kansas Avenue & SE 36th Street intersection.

Heavy vehicle (truck) volumes were generally at or below 3% of all vehicles. Some low volume movements resulted in truck percentages of up to 17 percent. A heavy vehicle percentage of 2% will be used for all turning movements at all intersections.

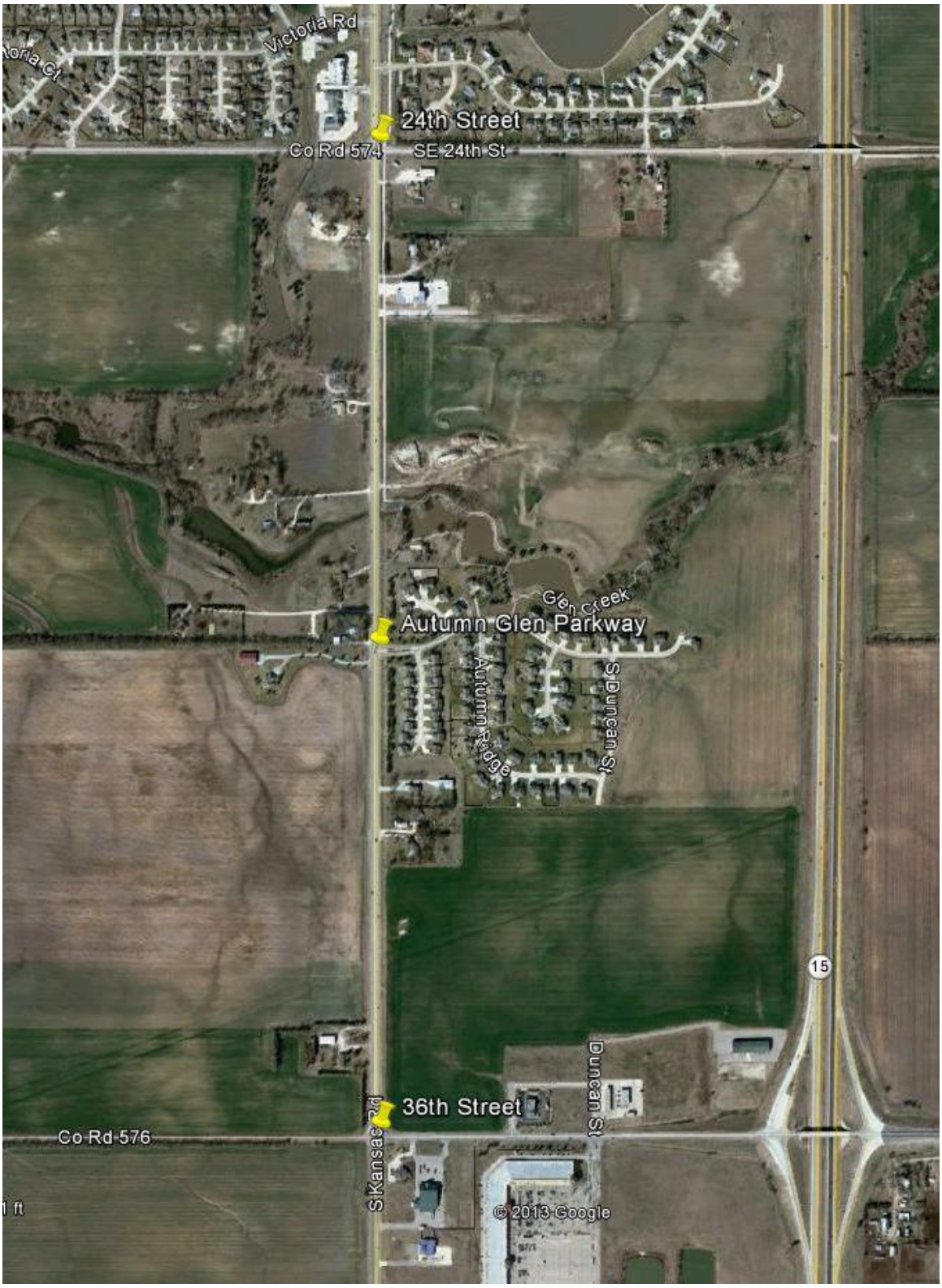


Figure 8 - South Kansas Avenue Traffic Study Turning Movement Traffic Count Locations Labeled by Cross-Street
Source – Google Earth 2013

2.4.1 Traffic Volumes

The existing 2013 PM peak hour traffic volumes are shown in Figure 9.

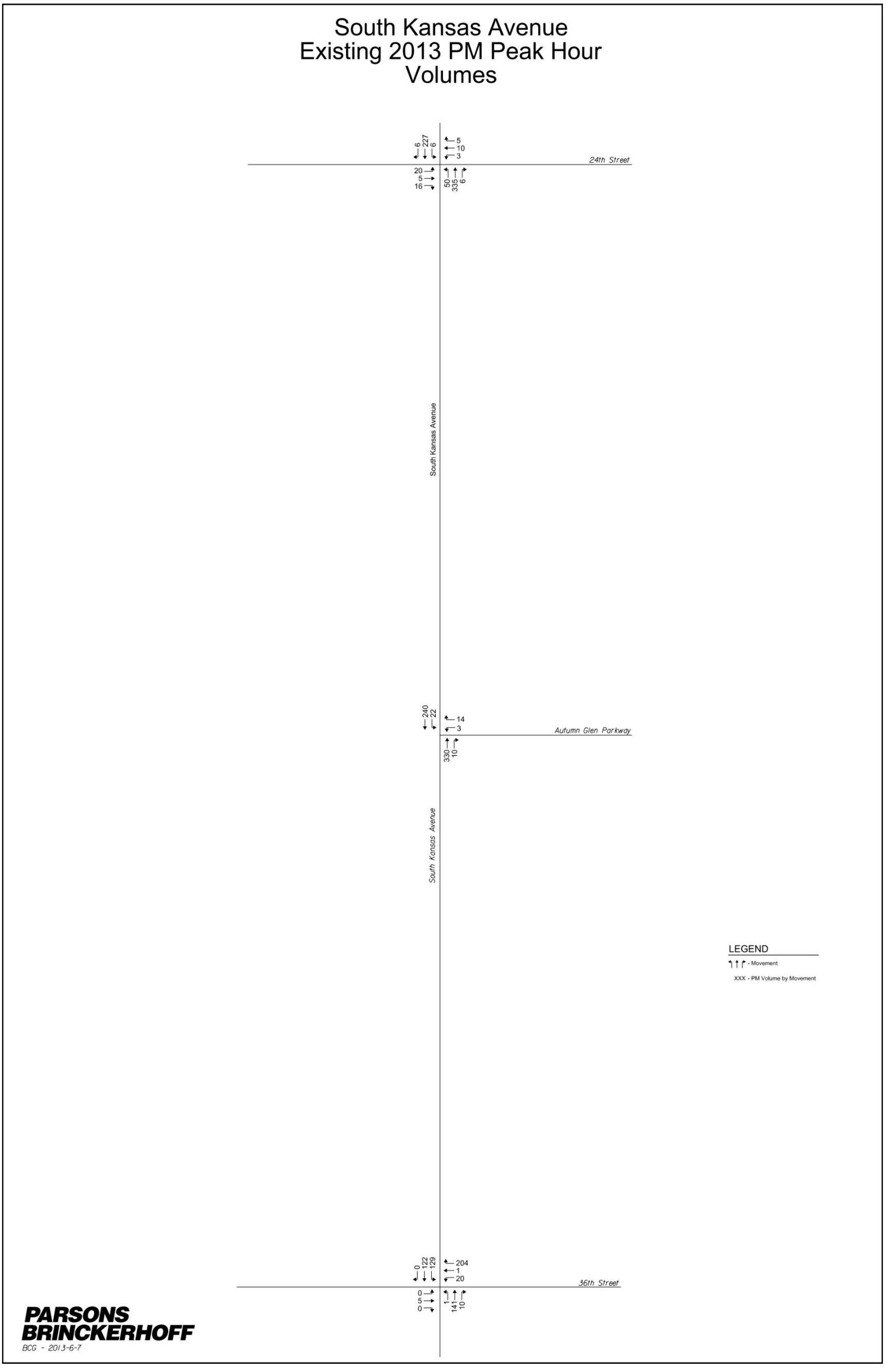


Figure 9 - 2012 Existing PM Peak Hour Volumes

2.4.2 Traffic Signal Warrants

There are nine categories of traffic signal warrants which can be used to assist with justifying the installation of a traffic control signal at an intersection. The warrants are listed in the Manual of Uniform Traffic Control Devices (MUTCD) – 2009 Edition. The most commonly analyzed warrants are Warrant 1 (8-Hour Vehicular Volume) and Warrant 3 (Peak Hour). Some of the higher volume intersections which are not currently controlled by a signal were analyzed within this section using the existing peak hour and 24-hour 2013 volumes. The MUTCD provides guidance on this topic and states in section 4C.01 that "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."

None of the intersections along South Kansas Avenue between SE 24th Street and SE 36th Street currently meet any of the traffic signal warrants in the MUTCD.

2.4.3 Capacity and Level of Service

Capacity and Level of Service (LOS) calculations are provided throughout the report for both existing 2013 volumes and for projected 2030 volumes. The 2010 Highway Capacity Manual (HCM) defines ranges that correspond to performance indicators known as LOS (see Table 1 and Table 2). LOS calculations are based on the driver's perception of the traffic conditions. LOS A is the best operating condition from the driver's perspective and LOS F has the longest delays, therefore being the worst operating condition. LOS D or better is considered acceptable in most urban settings during the peak hour. None of these vehicular LOS indicators take into account the user's perspective from other modes and the LOS provided to them such as pedestrians, cyclists, or transit users. The application used for operational analysis was Trafficware's Synchro v8.

Table 1 - Signalized Intersection Level of Service Criteria

Level of Service	Description	Average Control Delay per Vehicle (seconds/vehicle)
A	Little to no delay. Progression is either exceptionally favorable or the cycle length is very short.	≤ 10
B	Volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short.	> 10 - 20
C	Progression is favorable or the cycle length is moderate. Individual cycle failures may begin to appear at this level.	> 20 - 35
D	Volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are noticeable.	> 35 - 55
E	Volume-to-capacity ratio is very high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	> 55 - 80
F	Volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear to the queue.	> 80

Table 2 - Two-Way and All-Way Stop Controlled Intersection Level of Service Criteria

Level of Service	Description	Average Control Delay per Vehicle (seconds/vehicle)
A	Little or no delay.	≤ 10
B	Short traffic delays.	> 10 - 15
C	Average traffic delays.	> 15 - 25
D	Long traffic delays.	> 25 - 35
E	Very long traffic delays.	> 35 - 50
F	Demand exceeds capacity resulting in extreme delays and queuing.	> 50

2.4.4 Existing 2013 LOS

The current day (2013) LOS can be seen in Figure 10.

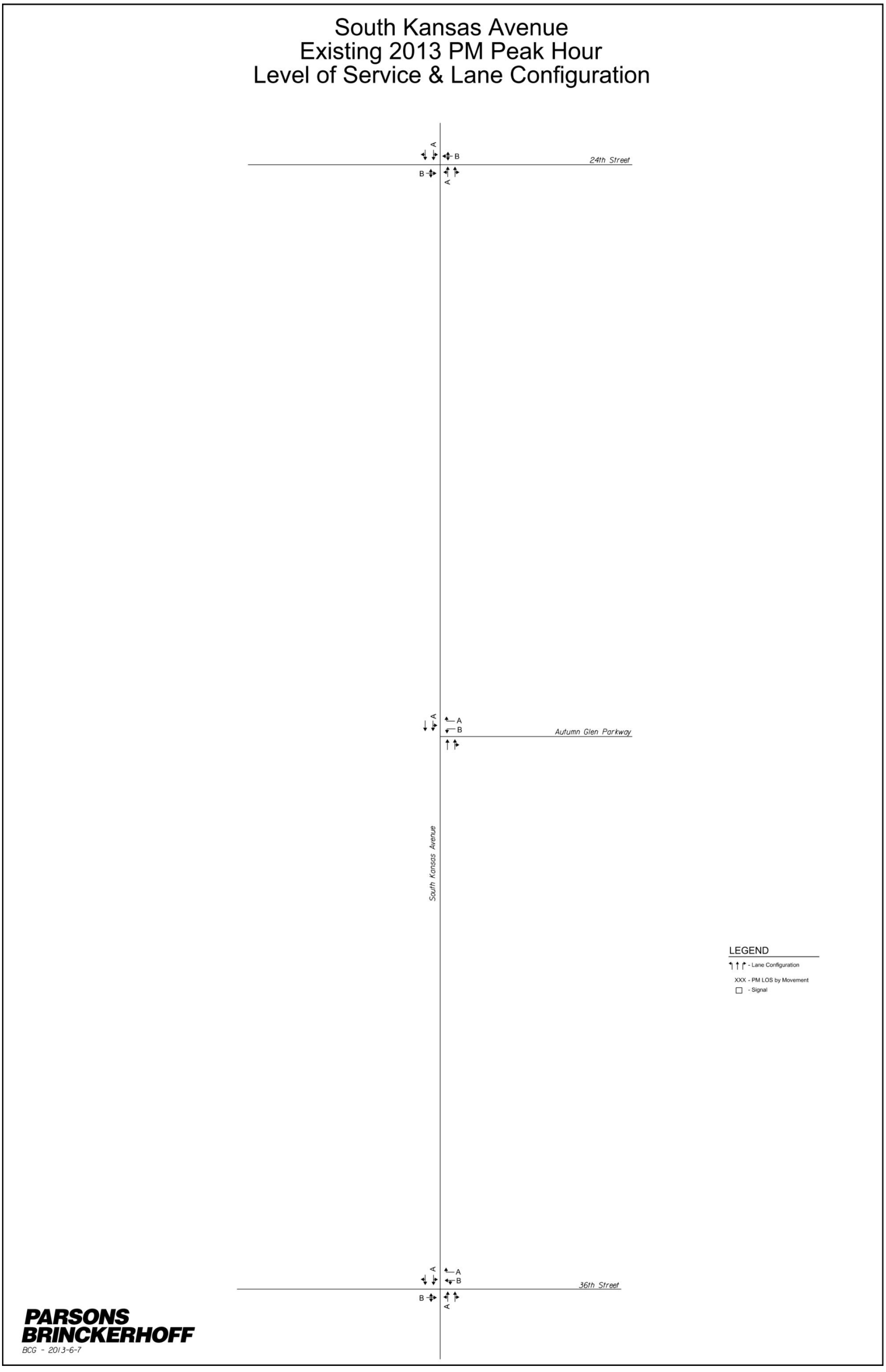


Figure 10 - 2012 Existing LOS

2.5 Transportation System Management Programs

The City of Newton does not currently have a transportation system management program in place for South Kansas Avenue. Access management should be used along this corridor to reduce the existing number of direct connections to South Kansas Avenue, or to limit the number of future connections made. More on this topic will be discussed in later sections.

2.6 Existing Crash Analysis

Crash reports were obtained from the City of Newton Police Department along South Kansas Avenue, between SE 24th Street and SE 36th Street, from January 1, 2010 to December 31, 2012 (three years). Of the reports submitted, only four of the crashes occurred within the study limits. The other crashes occurred outside of the study area on South Kansas Avenue, typically to the north side of the project, or in private parking lots.

Crash rates were calculated for the roadway section as well as individual intersections and were compared against statewide averages for each as well as with a critical crash rate. When the calculated crash rate (section or intersection) is above the critical crash rate, there is a statistically significant crash rate at the intersection that needs to be reviewed in more detail. Table 3 shows the Statewide Average Crash Rates (2007 – 2011) for the Kansas State Highway System. This was used to evaluate the calculated and critical crash rates along this segment of South Kansas Avenue.

As there are only four crashes, each will be described in more detail. The first crash occurred at the South Kansas Avenue and SE 24th Street intersection when a northbound left turning driver did not yield the right-of-way to a southbound through driver (Property Damage Only (PDO)). There were no injuries in the crash. The remaining three crashes occurred at the South Kansas and SE 36th Street intersection. The first involved a southbound through driver that struck a southbound left-turn driver from behind who was yielding to other vehicles (PDO). The second involved a southbound left-turning driver that strayed from the correct turning path hitting a yielding westbound left-turning vehicle (PDO). The third crash involved a northbound left turning driver that did not yield to a southbound through vehicle (injury).

Table 3 - Statewide Average Crash Rates (2007-2011) on the Kansas Highway System

Accidents for Years 2007 - 2011

Lane Class	Access Control	Urban/Rural	Miles	MVM*	Five Year Statistics: Accidents Total	Fatal	Injury	PDO	Rates: Accident	Fatal	Injury
2 Lane Divided	FULL	URBAN	3.110	37.10	14	0	7	7	0.377	0.000	0.189
	PARTIAL	RURAL	0.312	1.74	2	0	1	1	1.151	0.000	0.576
2 Lane Undivided	FULL	RURAL	48.313	295.08	379	9	65	305	1.284	3.050	0.220
		URBAN	13.740	111.51	122	6	24	92	1.094	5.381	0.215
	NONE	RURAL	7,768.411	23,256.50	34,920	450	6,127	28,343	1.502	1.935	0.263
		URBAN	111.155	1,039.41	2,774	13	640	2,121	2.669	1.251	0.616
	PARTIAL	RURAL	805.401	4,342.87	4,835	77	904	3,854	1.113	1.773	0.208
		URBAN	62.792	702.93	1,111	11	245	855	1.581	1.565	0.349
4 Lane Divided	FULL	RURAL	1,615.684	17,979.81	12,756	102	2,323	10,331	0.709	0.567	0.129
		URBAN	447.419	10,812.21	12,872	70	2,744	10,058	1.191	0.647	0.254
	NONE	RURAL	61.210	444.68	450	5	97	348	1.012	1.124	0.218
		URBAN	28.977	517.03	1,256	10	271	975	2.429	1.934	0.524
	PARTIAL	RURAL	453.420	3,444.63	3,323	51	702	2,570	0.965	1.481	0.204
		URBAN	259.123	4,250.57	7,988	48	2,150	5,790	1.879	1.129	0.506
4 Lane Undivided	FULL	URBAN	0.539	6.78	42	0	8	34	6.192	0.000	1.179
	NONE	RURAL	84.337	628.05	1,258	5	265	988	2.003	0.796	0.422
		URBAN	101.051	2,152.44	8,817	31	2,082	6,704	4.096	1.440	0.967
	PARTIAL	RURAL	22.011	228.58	317	2	80	235	1.387	0.875	0.350
		URBAN	24.011	733.57	2,811	4	720	2,087	3.832	0.545	0.982
6 Lane Divided	FULL	RURAL	23.572	759.71	657	1	119	537	0.865	0.132	0.157
		URBAN	157.904	10,725.07	14,765	50	3,580	11,135	1.377	0.466	0.334
	PARTIAL	URBAN	6.620	225.94	250	0	64	186	1.106	0.000	0.283
8 Lane Divided	FULL	URBAN	18.768	2,106.84	2,599	5	650	1,944	1.234	0.237	0.309

*MVM is per million vehicles miles traveled

Friday, August 24, 2012

Source: Kansas Department of Transportation, Bureau of Transportation Planning (2012)

Crashes along the South Kansas Avenue corridor were reviewed in a single segment. From SE 24th Street to SE 36th Street, South Kansas Avenue is a four-lane undivided roadway with no access control in an urban area. The statewide average crash rate for the segment is 2.003 crashes per million vehicle miles (crashes/MVM) per Table 4. The calculated crash rate for this section of South Kansas Avenue is 0.79 crashes/MVM which is below the statewide average of 2.003 crashes/MVM and the critical rate of 3.21 crashes/MVM per Table 4.

Table 4 - South Kansas Avenue Route Crash Characteristics

Limits	Length (Mile)	Speed (MPH)	Through Lanes	Div./ Undiv.	Curb/ Shoulder	Average ADT (VPD)	Total Crashes (Oct 09 to July 12)	Crash Rates (Crashes/MVM)		Note
								Rate	Critical Rate	
SE 24th Street to SE 36th Street	1.00	45 mph	4	Undiv.	Shoulder	6,785	4	0.79	3.21	

Table 5 shows the crash rate information for the intersections along South Kansas Avenue from SE 24th Street to SE 36th Street. The statewide average crash rate for similar urban intersections across the state is 8 to 10 crashes per ten million entering vehicles (crashes/TMEV). Eight crashes/TMEV was selected as the average intersection crash rate along the corridor for critical crash rate calculation purposes. The calculated crash rate at the South Kansas Avenue & SE 24th Street intersection is 3.39 crashes/TMEV which is below the statewide average (8 crashes/TMEV) and the critical crash rate of 18.01 crashes/TMEV. The calculated crash rate at the South Kansas Avenue & SE 36th Street intersection is 11.01 crashes/TMEV which is above the statewide average (8 crashes/TMEV) but below the critical crash rate of 18.41 crashes/TMEV.

Table 5 - South Kansas Avenue Intersection Characteristics

Intersection	Traffic Control		Entering Traffic (ADT)	Total Crashes (Jan 2010 to Dec 2013)	Crash Rates (Crashes/TMEV)		Note
	East Leg	West Leg			Rate	Critical Rate	
SE 24th Street	R1-1	R1-1	7,109	1	3.39	18.01	
SE 36th Street	R1-1	R1-1	4,975	3	11.01	18.41	

Note: R1-1 is a STOP sign at the intersection

The crashes analyzed as part of the South Kansas Avenue from SE 24th Street to SE 36th Street study appear to not have a discernible pattern based on the crash attributes available. The crashes can generally be attributed to driver error with no roadway or geometric changes needed. The intersection crashes are of various types which would not be susceptible to a specific engineering safety modification. There are no interim or long-term countermeasures which are recommended for potential safety improvements within the study area based on existing crash history.

2.7 PUBLIC INVOLVEMENT

An open house was held at Fire Station #3 along the South Kansas Corridor on September 12, 2013. Local business owners, land owners, residents and other stakeholders were invited to attend and discuss the Traffic Study process and the recommended improvements to South Kansas Avenue and adjacent roadways between now and 2030. Eleven people signed in at the open house; however no written comments were received. An on-line open house, or "virtual public meeting" was also posted online for those who could not attend the in-person meeting. Comments were collected through September 30, 2013. Six written comments were received with responses including support for the study, a hope that bicycle and pedestrians would be accommodated, a question about the use of traffic signals instead of roundabouts and a concern about the use of a raised median.

3 Planned Development Information

This section addresses the development which is expected to occur before 2030 adjacent to South Kansas Avenue between SE 24th Street and SE 36th Street.

3.1 Land Uses

There are a mix of land uses proposed by the City of Newton for the area bordered by SE 24th Street on the north, I-135 on the east, SE 36th Street on the south, and directly south of Old Main Street on the west.

The development is expected to primarily be single family residential with commercial and retail adjacent to South Kansas Avenue. Other land uses may include an elementary school, religious facilities, and apartments. The area will be divided into quadrants for further discussion although a full scale map of the analyzed land use is shown in Figure 11.

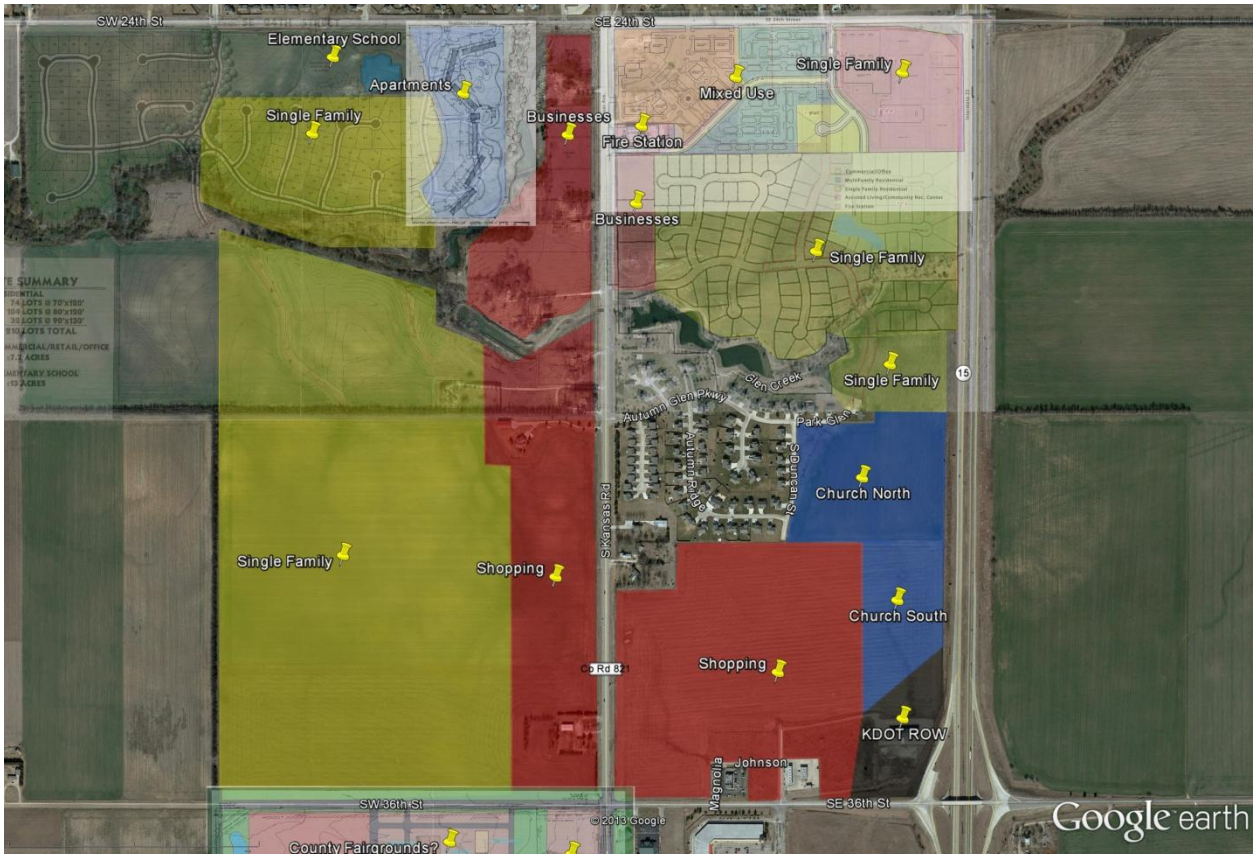


Figure 11 - Land Uses Overview

3.1.1 Northwest Site Development

The development in the northwest quadrant is expected to be primarily residential. A mix of commercial and retail businesses are expected to front South Kansas Avenue. There is potential for an elementary school along with some apartments adjacent to SE 24th Street. A graphical depiction of development in the northwest quadrant of the study area is shown in Figure 12.

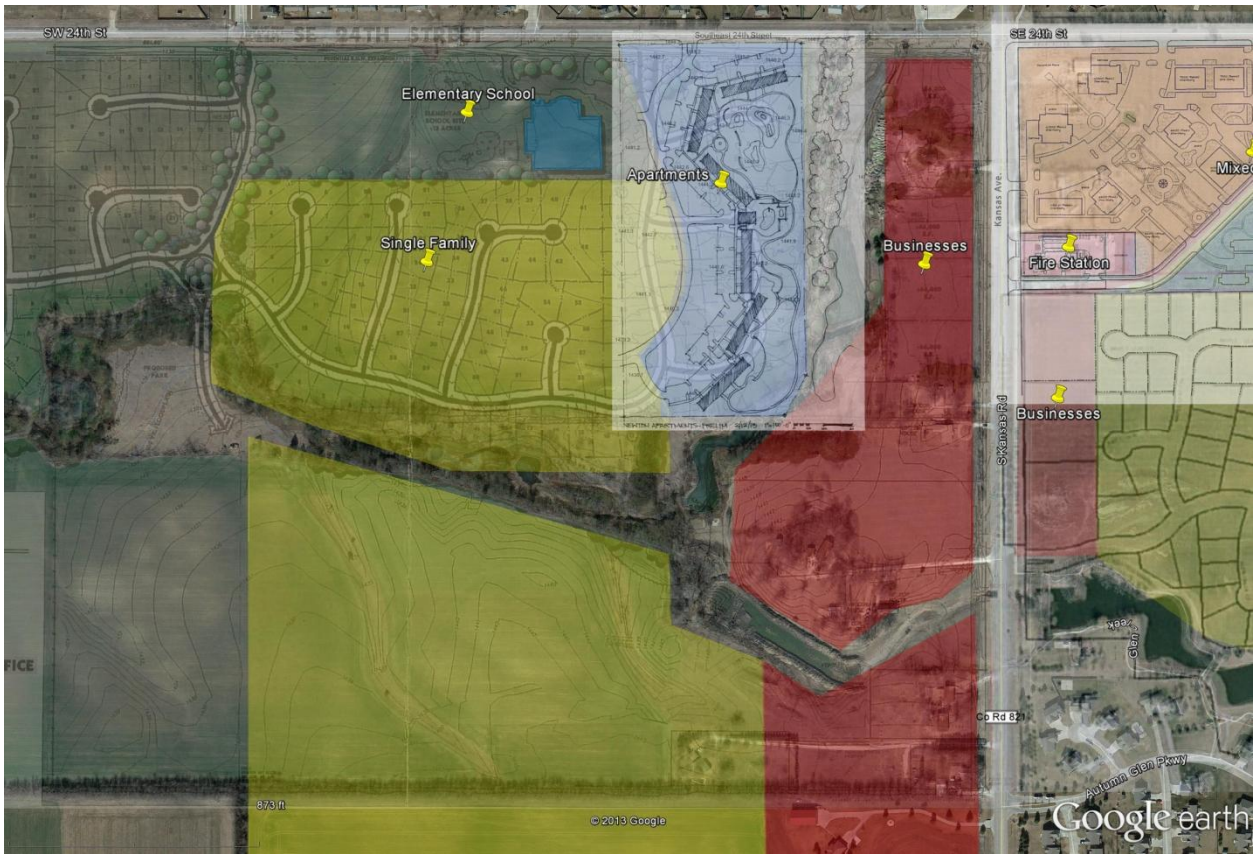


Figure 12 - Land Use in the Northwest Quadrant

3.1.2 Southwest Site Development

The development in the southwest quadrant is expected to be primarily residential. Fronting along South Kansas Avenue is expected to be retail businesses. Development in the northwest is shown in Figure 13.

Figure 13 - Land Use in the Southwest Quadrant

3.1.3 Northeast Site Development

The development in the northeast quadrant is expected to be a mix of uses. Fronting along South Kansas Avenue is expected to be mixed use, the existing fire station, new businesses and existing residential. Apartments and single family residences are expected to front SE 24th Street. Development in the northwest is shown in Figure 14.

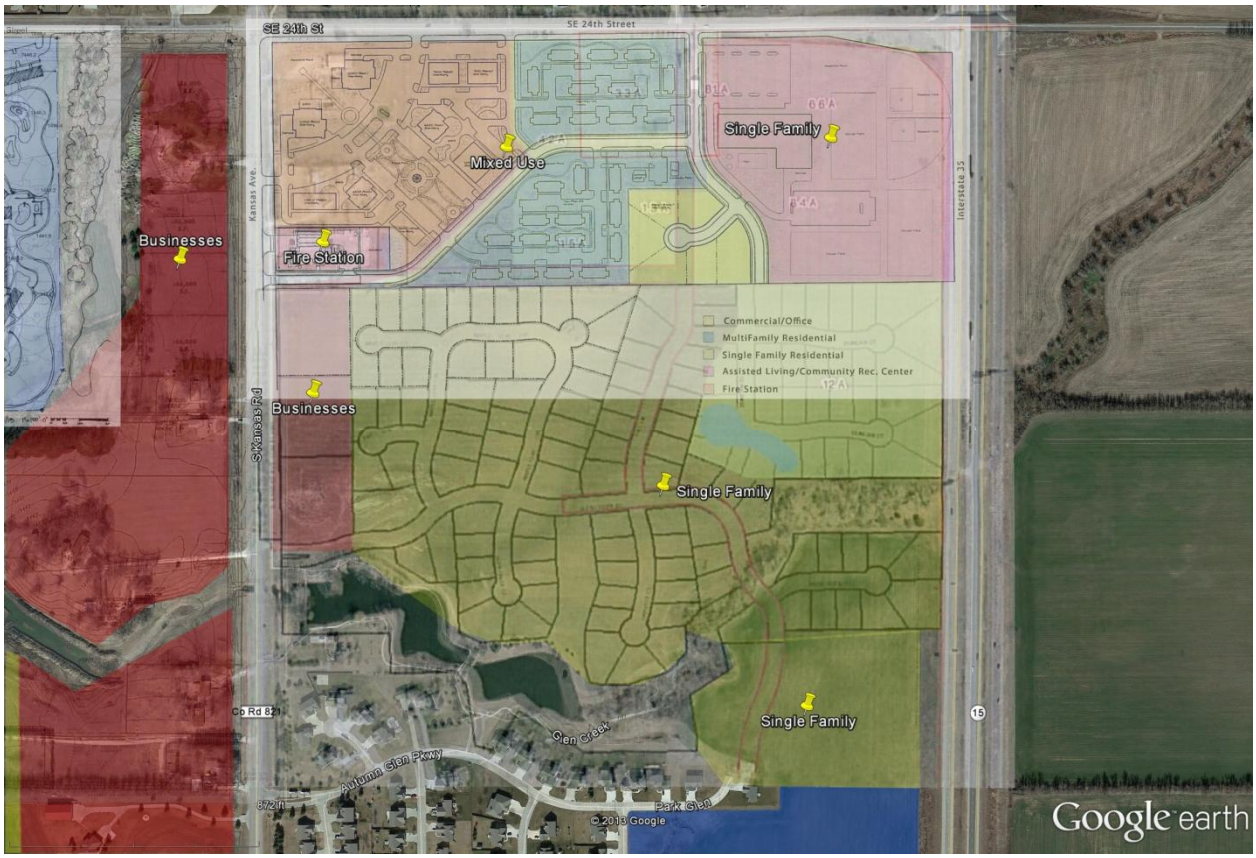


Figure 14 - Land Use in the Northeast Quadrant

3.1.4 Southeast Site Development

The development in the southeast quadrant is expected to be primarily Interstate-oriented shopping with the potential for religious facilities adjacent to I-135. This quadrant has the most expected square footage of retail. Development in the southeast is shown in Figure 15.

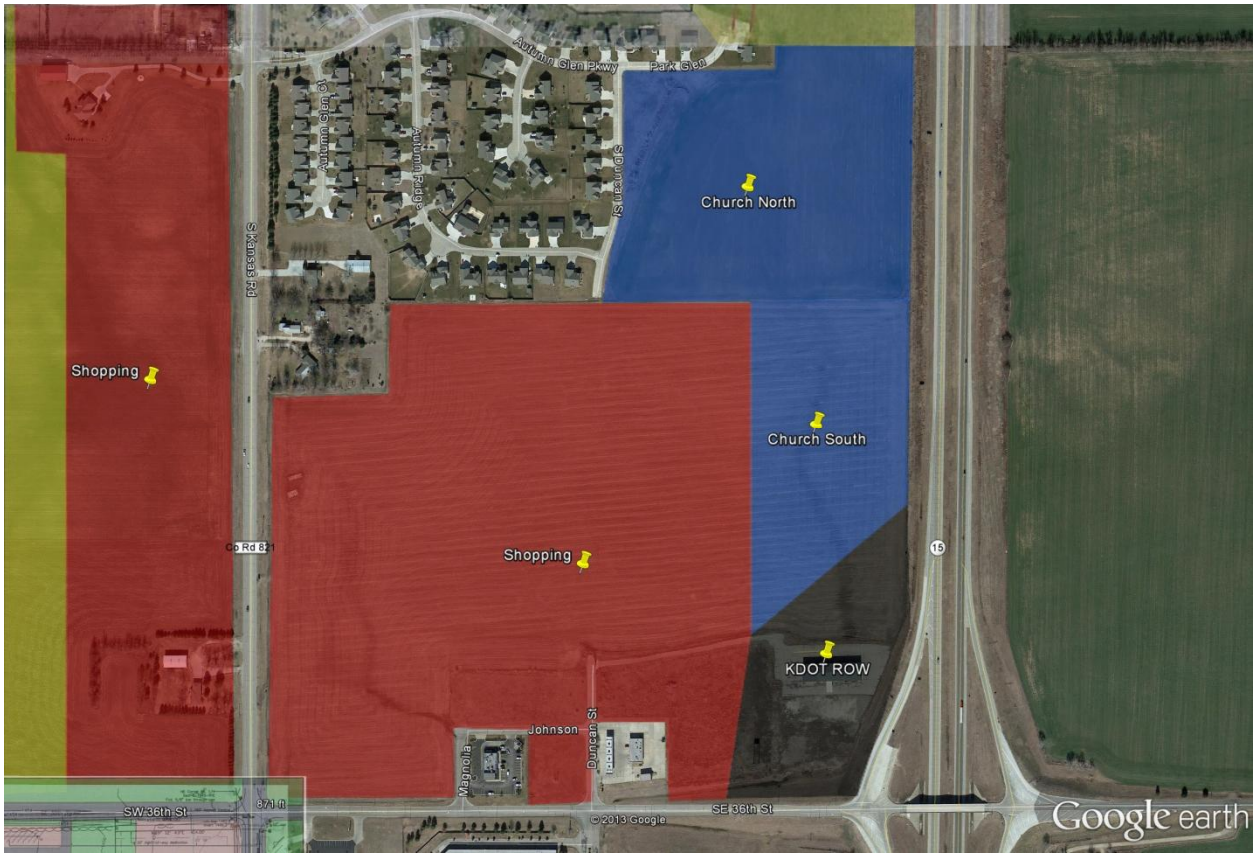


Figure 15 - Land Use in the Southeast Quadrant

3.2 VEHICULAR TRIP GENERATION

Calculating the site generated traffic for both of the developments involves multiple steps and assumptions. The steps include trip generation, reductions for pass-by and/or diverted link trips, trip distribution, modal split, and trip assignment. Assumptions that are made for each step are discussed within each step in the process.

3.2.1 Trip Generation

Vehicular demand for each development was estimated using data from the Institute of Transportation Engineers' "Trip Generation, 8th Ed: An ITE Informational Report" (Institue of Transportation Engineers, 2008).

The land use codes used for the South Kansas Avenue Traffic Report were: 210 Single-Family Detached Housing, 220 Apartment, 520 Elementary School, 560 Church, 750 Office Park, and 820 Shopping Center.

Various lines from the description of 820 Shopping Center state *"A shopping center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. … Some*

of these centers contained non-merchandising facilities such as office buildings, movie theaters, restraints, post offices, banks, health clubs and recreational facilities. … Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels. … These buildings are typically drive-in banks, retail stores, restraints, or small offices."

The number of trips generated by each of the land uses was estimated using either preliminary site plans or an estimate of the number of square feet that could be developed as part of the building per acre of land. For the shopping center development on South Kansas Avenue, existing "big-box" type stores were located and the square footage of the building per acre was calculated for three different stores. The square footage per acre was very similar for the stores measured and was then used to calculate an estimated number of square feet that would be developed for the development.

Table 6 and Table 7 estimate the number of trips in and out of the developments during specific times.

Table 6 - Trip Generation with ITE Defaults

			ITE Vehicle Trip Generation Rates (peak hours are for peak hour of adjacent street traffic)							Total Generated Trips			Total Distribution of Generated Trips			
Description/ITE Code	Units	Value	Weekday	AM	PM	AM In	AM Out	PM In	PM Out	Daily	AM Hour	PM Hour	AM In	AM Out	PM In	PM Out
East Central North Single Family Platted Plus - 210	DU	181	9.57	0.75	1.00	25%	75%	63%	37%	1732	136	181	34	102	114	67
East Central South Single Family - 210	DU	22	9.57	0.75	1.00	25%	75%	63%	37%	211	17	22	4	12	14	8
NE Apartments - 220	DU	96	6.65	0.51	0.62	25%	75%	63%	37%	638	49	60	12	37	37	22
NE Office Park - 750	KSF	133	11.42	1.71	1.48	89%	11%	14%	86%	1519	227	197	202	25	28	169
NW Apartments - 220	DU	120	6.65	0.51	0.62	20%	80%	65%	35%	798	61	74	12	49	48	26
NW Elementary School - 520	KSF	59	15.43	5.20	1.21	56%	44%	45%	55%	910	307	71	172	135	32	39
NW Office Park - 750	KSF	167	11.42	1.71	1.48	89%	11%	14%	86%	1907	286	247	254	31	35	213
SE Shopping Center - 820	KSF	432	Eqn 1	Eqn 2	Eqn 3	62%	38%	48%	52%	17579	381	1597	236	145	767	830
SW Shopping Center - 820	KSF	315	Eqn 1	Eqn 2	Eqn 3	62%	38%	48%	52%	14317	314	1292	195	119	620	672
WestCentral Single Family - 210	DU	373	9.52	0.75	1.00	25%	75%	63%	37%	3551	280	373	70	210	235	138
NW Single Family - 210	DU	82	9.57	0.75	1.00	25%	75%	63%	37%	785	62	82	15	46	52	30
East Church North - 560	KSF	235	9.11	0.56	0.55	62%	38%	48%	52%	2141	132	129	82	50	62	67
East Church South - 560	KSF	140	9.11	0.56	0.55	62%	38%	48%	52%	1275	78	77	49	30	37	40
Development Total													1337	991	2081	2322

Table 7 - ITE Trip Generation Equations

X = 1000 Sq. Ft. GFA	
Eqn1	Ln(T) = 0.65 * Ln(X) + 5.83
Eqn2	Ln(T) = 0.61 * Ln(X) + 2.24
Eqn3	Ln(T) = 0.67 * Ln(X) + 3.31

3.2.2 Reductions for Pass-By and Diverted-Link Trips

Pass-by and diverted-link trips are vehicles that are already on the road network within the area and will travel to the new development on their way to or from somewhere else. These are not new trips to the roadway network, and as such, need to be removed or re-routed using existing trips. There are no expected diverted-link trips for either the east or west development due to the lack of roadway network redundancy in the area, and the location of the developments on the fringes of the city. The shopping center development on the west side of South Kansas Avenue is expected to attract some pass-by trips. Pass-by trips involve drivers which are already traveling along South Kansas Avenue and decide to "drop-in" to visit one of the businesses in the future development and then continue along their original path.

The percentage of generated trips which are pass-by trips can be estimated using ITE's Trip Generation Handbook (Institute of Transportation Engineers, 2004). For the land use 820 Shopping Center with a floor space of approximately 535,000 square feet it is estimated that 24% of all trips will be pass-by trips. These trips can be removed from the additional trips generated by the development and future drivers can be routed into the development and back onto South Kansas Avenue to account for the 24% of the trips ITE predicts will be pass-by trips.

3.2.3 Trip Distribution

Using the PM Peak turning movement counts from the existing intersections, the trip distributions for the new developments were estimated. Overall, it appears that about 60% of the trips were turning north on South Kansas Avenue with 40% of the trips turning south. Of the 40% of the trips that were turning north off of SE 36th Street, a considerable percentage appeared to be arriving from the I-135 ramps.

Final origin and designation percentages for the developments were: 60% from the north side of South Kansas Avenue, 25% from I-35 ramps, and 15% from the south side of South Kansas Avenue.

In order to avoid South Kansas Avenue becoming a corridor like SW Wannamaker Road in Topeka, Kansas, where there are full access intersections nearly every 600 feet and drivers avoid the area due to the delays caused by too much access to local land uses, it was assumed that there would be limited access to the land uses adjacent to the arterial street which is South Kansas Avenue.

3.2.4 Development Trip Assignment

The trip assignment is conducted by taking into account the trip generation, reductions for pass-by and/or diverted link trips, and trip distribution. The final traffic volumes expected to be generated by the developments are displayed below for the year 2030 (Figure 16).

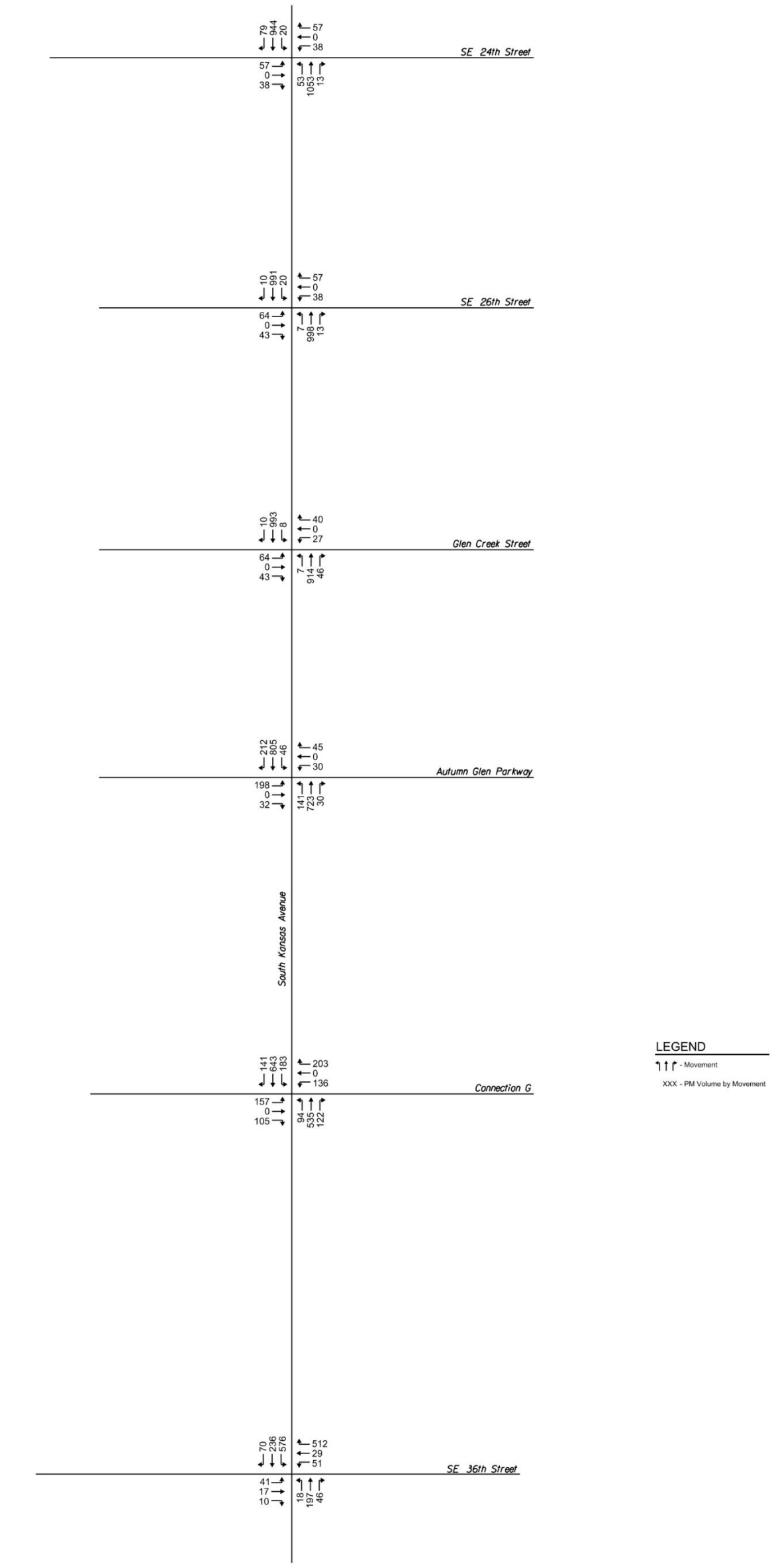


Figure 16 - 2030 PM Peak Hour Development Volumes

3.3 Future Background Traffic

The traffic volumes which exist in 2013 were grown to estimate future traffic in the year 2030 without the impact of any developments in this section of the corridor from SE 24th Street to SE 36th Street, but included the future developments along South Kansas Avenue from SE 14th Street to SE 24th Street (previous traffic study to the north). The volumes were grown for 17 years at 2% per year which was approved by the City of Newton staff with the northern development future trips added. Given this growth rate, the following equation was used to increase the existing turning movement volumes along the study corridor.

Growth Rate Equation
Growth factor = (1+r)^t, growth over t years
Where
r = Rate (% in decimal form)
t = Time period (in years)
Growth rate from 2013 to 2035:
Growth factor = (1+.02)^17 = 1.400

Figure 17 shows the future 2030 background traffic volumes without any new development from SE 24th Street to SE 36th Street.

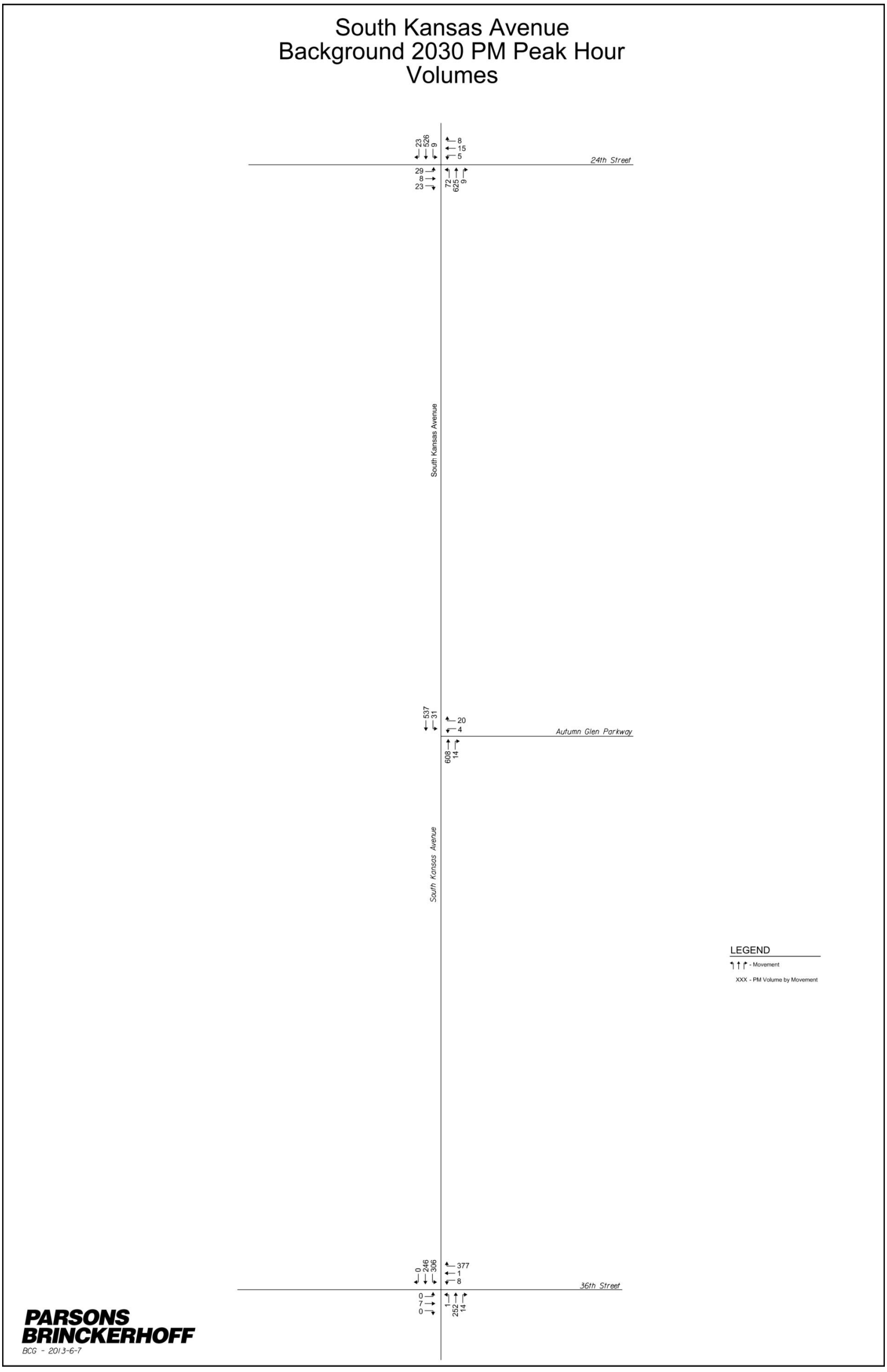


Figure 17 - 2030 PM Peak Hour Background Volumes

3.4 COMBINED DEVELOPMENT AND BACKGROUND TRAFFIC IN 2030

Figure 18 shows the future 2030 background traffic volumes with development included.

These are the future volumes that will be used for the 2030 future volumes traffic analysis.

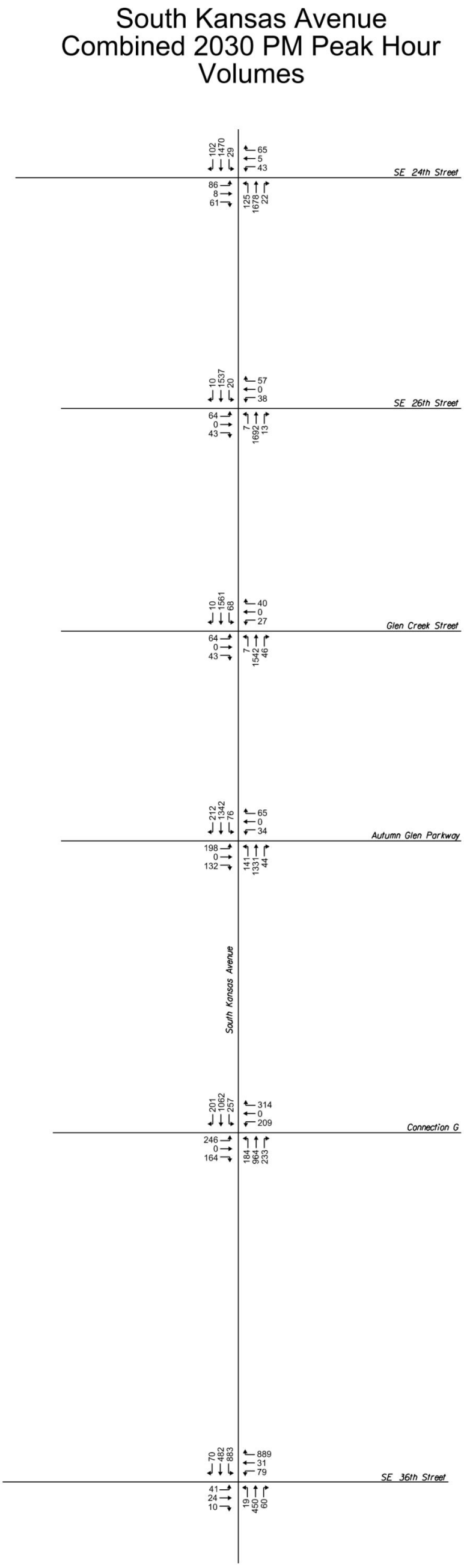


Figure 18 - 2030 PM Peak Hour Combined Volumes

4 Future 2030 Traffic Analysis

This section provides traffic analysis along South Kansas Avenue from SE 24th Street to SE 36th Street and the surrounding street system in the year 2030.

4.1 NoBuild Analysis

This analysis shows what can be expected in the future with additional development along South Kansas Avenue from SE 24th Street to SE 36th Street. This scenario assumes that no additional pavement is added at any of the intersections along South Kansas Avenue. Additional traffic control signals were added as simple two-phase signals in order to allow development trips to access South Kansas Avenue.

4.1.1 Site Access and Circulation

Limited additional access points were added so new development trips could access South Kansas Avenue. Additional access points included SE 26th Street, Glen Creek Street, and Connection G.

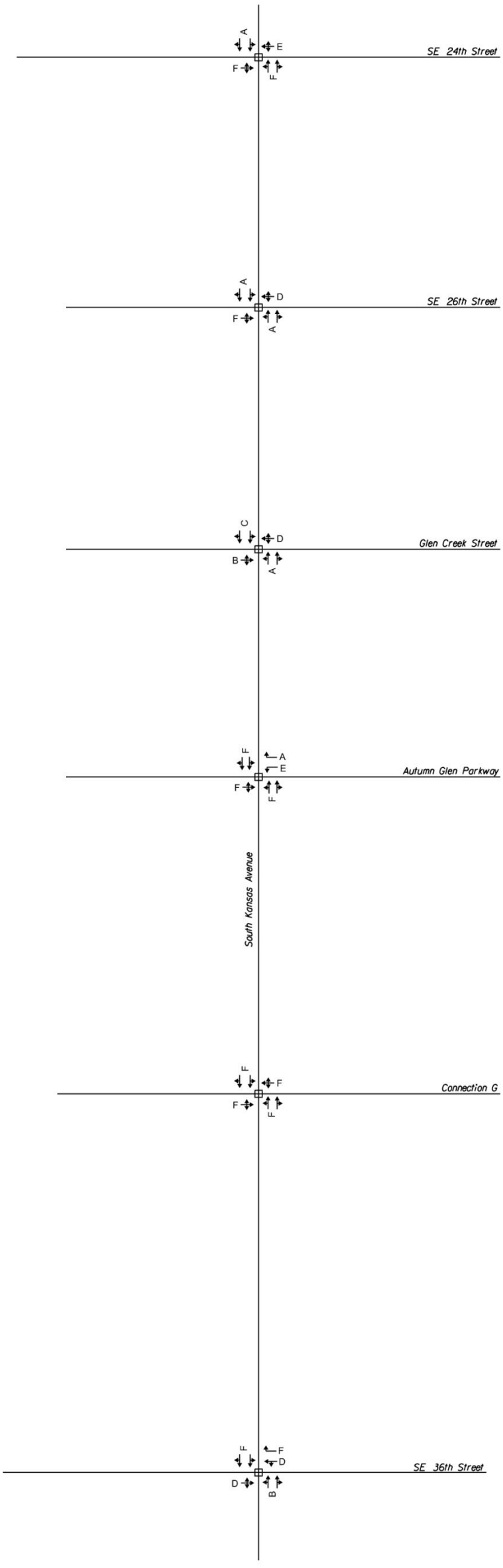
4.1.2 Traffic Signal Warrants

Without the addition of a west leg to the intersection of Autumn Glen Parkway and South Kansas Avenue, the expected volumes are not expected to warrant a traffic signal. The lack of a traffic signal will likely make it difficult for existing residents in the Autumn Glen Parkway development to turn south on to South Kansas Avenue due to the increased traffic volumes along the corridor. Some development trips on the west side of South Kansas Avenue in the vicinity of Autumn Glen Parkway were routed to Autumn Glen Parkway so that existing residents on the east side of South Kansas Avenue could access the corridor using a traffic signal.

4.1.3 Capacity and Level of Service

The LOS for 2030 NoBuild is shown in Figure 19. The traffic volume on South Kansas Avenue is expected to increase due to background traffic and the developments north of SE 24th Street.

South Kansas Avenue
NoBuild 2030 PM Peak Hour
Level of Service and Lane Configuration



PARSONS BRINCKERHOFF
BCG - 2013-9-18

Figure 19 - 2030 NoBuild LOS

4.2 Potential Improvement Analysis

Potential major improvements to South Kansas Avenue from SE 24th Street to SE 36th Street include reconfiguring the corridor from four-lane undivided to four-lane divided with traffic signals and turn bays at major intersections. This configuration would continue the recommended improvements from the previous study along South Kansas Avenue from SE 14th Street to SE 24th Street and extend the concept south to SE 36th Street.

Roundabouts were investigated at various intersections along the corridor from SE 24th Street to SE 36th Street. However, with the anticipated high traffic volumes, several of the intersections were unable to handle the demand with two-lane roundabouts. Mixing traffic signals and roundabouts along an arterial corridor would result in neither the roundabouts nor the traffic signals operating well. Traffic signals work best during peak hours when traffic can be "platooned," or kept together as a group, as they continue from one signal to the next. Roundabouts work best when traffic is not platooned and arrive randomly. The two systems are at odds with how they best handle incoming and outgoing traffic and it is best not to mix them unnecessarily. One modification from the previous study would be to change the recommended intersection control at South Kansas and SE 24th Street from a two-lane roundabout to a signalized intersection. With the number and spacing of traffic signals along South Kansas Avenue from SE 14th Street to SE 36th Street, two options are available regarding signal coordination. Fixed coordination with timing plans is an option, however with the amount and type of development being proposed along the South Kansas Corridor, an adaptive traffic signal system would be more flexible with traffic fluctuations and involved lower maintenance as it relates to updating timing plans.

4.2.1 Site Access and Circulation

All existing public road connections to South Kansas Avenue remain as they are in 2013. By 2030, or when additional development with resulting traffic volume increase occur, some of the existing two-way stop controlled intersection may need to be changed to signalized intersections. In order to install a traffic signal at least one or more of the MUTCD traffic signal warrants should be met and a traffic engineering study conducted prior to the installation of a traffic signal.

Internal connections to adjacent developments would need to be constructed as part of future developments (see Figure 20). On the west side of South Kansas Avenue, Old Main Street would be expected to be extended south to SE 36th Street. This Old Main Street extension would connect with an extension to the west from Autumn Glen Parkway along with a new east-west roadway (Connection G) which would be created for development in the southwest quadrant. A roadway which almost functions as a backage road (Connection H) is also recommended which would separate the retail development adjacent to South Kansas Avenue from the single family homes west of the retail.

On the east side of South Kansas Avenue, Duncan Street would be extended south to SE 36th Street. This street would likely need to meander through the residential area but connections would be expected to SE 26th Street, Autumn Glen Parkway, and a new east-west roadway (Connection G). Glen Creek Street is already planned as part of a single family residential development and should

connect with Duncan Street. SE 26th Street should also be extended to the east to connect with Duncan Street.

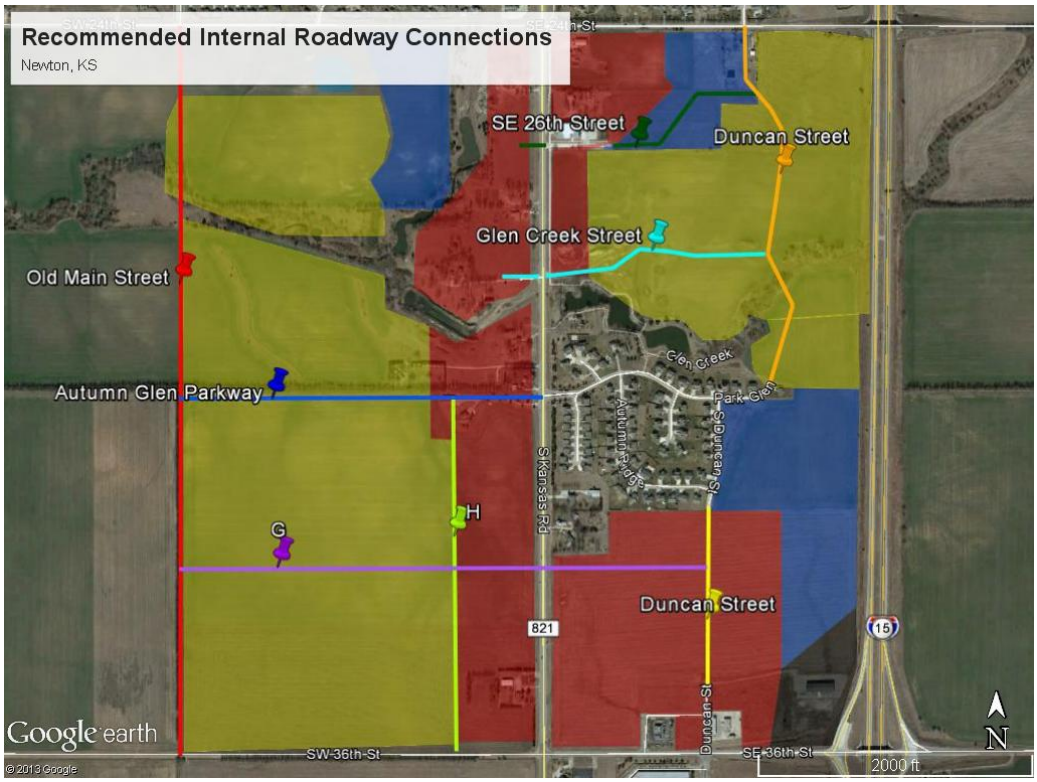


Figure 20 - Recommended Internal Roadway Connections
Source – Google Earth 2013

The estimated cost of these connections can be seen in Table 8. Further details about the cost estimates can be found in the appendix. Estimated costs of connections do not include left or right-turn lanes that may be funded when development occurs. Estimated costs of turn lanes on South Kansas Avenue are accounted for in Table 10.

Table 8 - Estimated Construction Costs of Recommended Local Connections

Connection Designation	Estimated Construction Cost*
A) Old Main Street Extension to SE 36th Street	$2,182,000
B) Extension of Duncan Street to Autumn Glen Parkway	$1,141,000
C) Extension of Duncan Street to SE 36th Street	$511,000
D) SE 26th Street extension to Duncan Street	$652,000
E) Glen Creek Street	$770,000
F) Autumn Glen Parkway extension to Old Main Street	$1,230,000
G) New Quarter Mile Road (Connection G)	$1,556,000
H) Backage road west of South Kansas Avenue between the Autumn Glen Parkway extension and SE 36th Street (Connection H)	$1,147,000

*Note: 2013 cost to construct does not include other costs such as preliminary engineering (PE), final design, acquisition of right-of-way, utility relocation or construction engineering (CE). Old Main Street Extension was quantified as 3-lane 6" concrete section (3-12' lanes with curb and gutter, 5' sidewalk on both sides). All other connection roads were quantified as 2-lane 6" concrete section (2-14' lanes with curb and gutter, 5' sidewalk on both sides). Storm sewer system, earthwork, pavement marking, signing, driveways, pavement removal included in costs. Right of way, lighting and utility relocations are not included in estimated costs. Estimated costs should be updated to reflect the proposed year of construction when that is determined by the City of Newton.

4.2.2 Traffic Signal Warrants

The following intersections would also meet MUTCD traffic signal control warrant 3B (peak hour) in the year 2030 under the potential improvements scenario:

- South Kansas Ave & SE 24th Street
- South Kansas Ave & Glen Creek Street
- South Kansas Ave & Autumn Glen Parkway
- South Kansas Ave & New East-West Roadway (Connection G)
- South Kansas Ave & SE 36th Street

When compared to the NoBuild scenario where there was no extension to the west of South Kansas Avenue or Autumn Glen Parkway, the potential improvement scenario extends Autumn Glen Parkway. This west leg of the intersection along with the commercial and retail development is expected to generate enough vehicular trips in the future to warrant a traffic signal at this location.

Many of the developments previously discussed may trigger the traffic volumes necessary to meet traffic signal warrants before 2030. As such, they should be monitored for the various signal warrants in order to form the basis of an engineering study to determine whether the installation of a traffic control signal is justified.

4.2.3 Traffic Signal Coordination

All traffic signals along South Kansas Avenue are assumed to be interconnected and coordinated by the year 2030. The signals are located close together at around 850 feet in some cases and South Kansas Avenue will function poorly without coordination. There are multiple ways to provide coordination both from a signal timing aspect, and a communications aspect.

The conventional method of providing traffic signal coordination and optimization is using multiple timing plans which change throughout the day (TOD plans). These timing plans are analyzed by engineers using data collected in the field and the resulting timings for each plan are deployed into the traffic signal controller in the field. These plans are typically not adjusted more than every two years and will not typically self-adjust based on irregular events.

A more recent method of providing traffic signal coordination is through adaptive traffic signal control. This method attempts to adjust to real-time fluctuations in the traffic volumes and communicate with adjacent signalized intersections to provide a “green wave” for drivers to travel

along a corridor. The Missouri Department of Transportation says that "Locations with frequently or rapidly changing traffic demands are good candidates for the installation of an adaptive traffic signal system" (Midwest Research Institute and Missouri Department of Transportation, 2012). Kansas communities such as Wichita, Topeka, Manhattan, and Lenexa currently have adaptive traffic signals along key corridors to improve travel times and reduce delay for through traffic. The estimated cost of implementation is approximately $30,000 per traffic signal. The estimated cost does not include communications between signals which is required for coordination along the corridor.

Communication between traffic signals can be accomplished using either wired or wireless technology. Current wired networks are typically fiber optic and not copper as was previously used. The other option is to use a wireless network for communications. Fiber optic networks are capital intensive, but generally more reliable and involve less maintenance. Wireless networks are less capital intensive, but can have degraded communications during inclimate weather and generally require more maintenance than fiber optic networks. It may be possible for additional city communications to use a fiber optic network, depending on the bandwidth required for the traffic signal operations. The estimated cost for a fiber optic network is $115,000 per mile, but costs vary significantly depending on the project location (urban / rural), length of the project and the capabilities of the network. Wireless networks require line of sight from one traffic signal to the next, and the equipment is approximately $8,000 per intersection.

4.2.4 Roadway Modifications

South Kansas Avenue should be modified from a four-lane undivided roadway to a four-lane divided roadway with a raised median island. The median should be a least 15 feet wide in order to support left turn bays at intersections. Several higher volume intersections may need to support dual left turns on South Kansas Avenue. See Figure 23 for a sketch of recommended improvements, Table 9 for a description of each improvement and Table 10 for the estimated costs.

The traffic signal at SE 24th Street and South Kansas Avenue will be designed to accommodate U-turns for the southbound movement to turn north. Other traffic signals will be designed to accommodate U-turn movements as needed. Figure 21 shows a typical right-turn / U-turn movement when a raised median island restricts a direct left-turn.

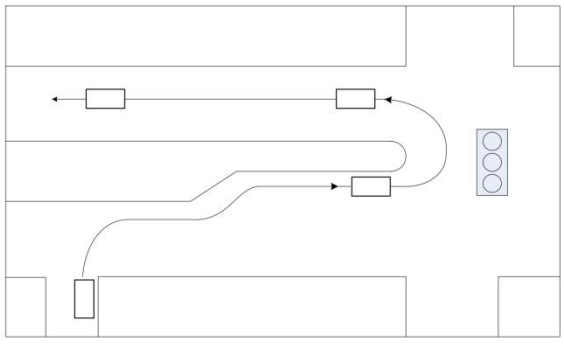


Figure 21 - Typical Right-Turn/U-turn Maneuver at Signalized Intersection
Source: (Lu, Liu, Fan, & Juan, 2004)

Traffic signals and additional turn lanes should occur on an as-needed basis after evaluation of the safety and operational conditions of the intersections. Expected issues if traffic volumes continue to rise are additional delay to drivers, traffic signal cycle failures, and queue spillback from adjacent intersections and turn lanes into adjacent through lanes. General guidance for urban areas during peak periods would suggest that LOS D is acceptable for overall intersection LOS. It is the preference of individual cities and their stakeholders, including the general public, elected officials, and city staff to determine an acceptable LOS for individual movements at a given intersection.

The recommended raised median island to be added on South Kansas Avenue from SE 24th Street to SE 36th Street could be constructed whenever funds are available. The construction of a median does not limit development opportunities. It provides the ability for the city to preemptively locate access points along a corridor. Some cities in the Kansas City metro region such as Overland Park and Olathe construct medians initially as part of their roadway design along with left and right-turn lanes and then install traffic signals later on if necessary. This gives them the ability to space the full access locations up to ¼ mile apart or more. When development does finally occur, cities typically charge the developer a site impact fee for the cost of the previously installed turn lanes. In some cases, an additional impact fee may be added to cover the costs of a future traffic signal where the initial development does not warrant it, but additional expected development would. In this way, the very last development that would tip the traffic volumes from a two-way stop control to a signalized intersection is not left paying for the full costs of signalization while the first development pays little to nothing. In this manner, developments are able to build and expand knowing where the future major access points will be and the city can provide access to the development while maintaining safety along the corridor through the use of a raised median.

The proposed center median outside of Fire/EMS Station #3 would be constructed as mountable in order to permit emergency vehicles to exit from the station directly onto southbound South Kansas Avenue. An example of a mountable median for a fire station can be found in the City of Lenexa at Lenexa's Fire Station #5 which is located at 96th and Prairie Star Parkway (Figure 22).

Figure 22 - Mountable Median for Fire Station #5, 96th Street & Prairie Star Parkway, Lenexa, KS

An emergency-vehicle hybrid beacon as discussed in MUTCD Section 4G may be installed (when appropriate) outside of Fire/EMS Station #3 on South Kansas Avenue. An emergency-vehicle hybrid beacon essentially functions as a traffic signal which is only utilized during emergency response deployment from that station. An example of an emergency signal that may have conformed to an older MUTCD can be found in the City of Overland Park's Fire Station #2 located at 9500 W. 95th Street (near 95th & Grant). The mountable median alone should be utilized before an emergency-vehicle hybrid beacon is installed. Reasons which may contribute to the installation of the signal include lack of gaps in traffic and inadequate stopping sight distances for vehicles traveling on the major street. A traffic study would need to be conducted for this beacon to be installed similar to the evaluation of the installation of a traffic signal at an intersection.

The construction cost estimates provided in Table 10 are the 2013 cost to construct (does not include other costs such as preliminary engineering (PE), acquisition of right-of-way, utility relocation or construction engineering (CE)). Estimated costs should be updated to reflect the proposed year of construction when that is determined by the City of Newton.

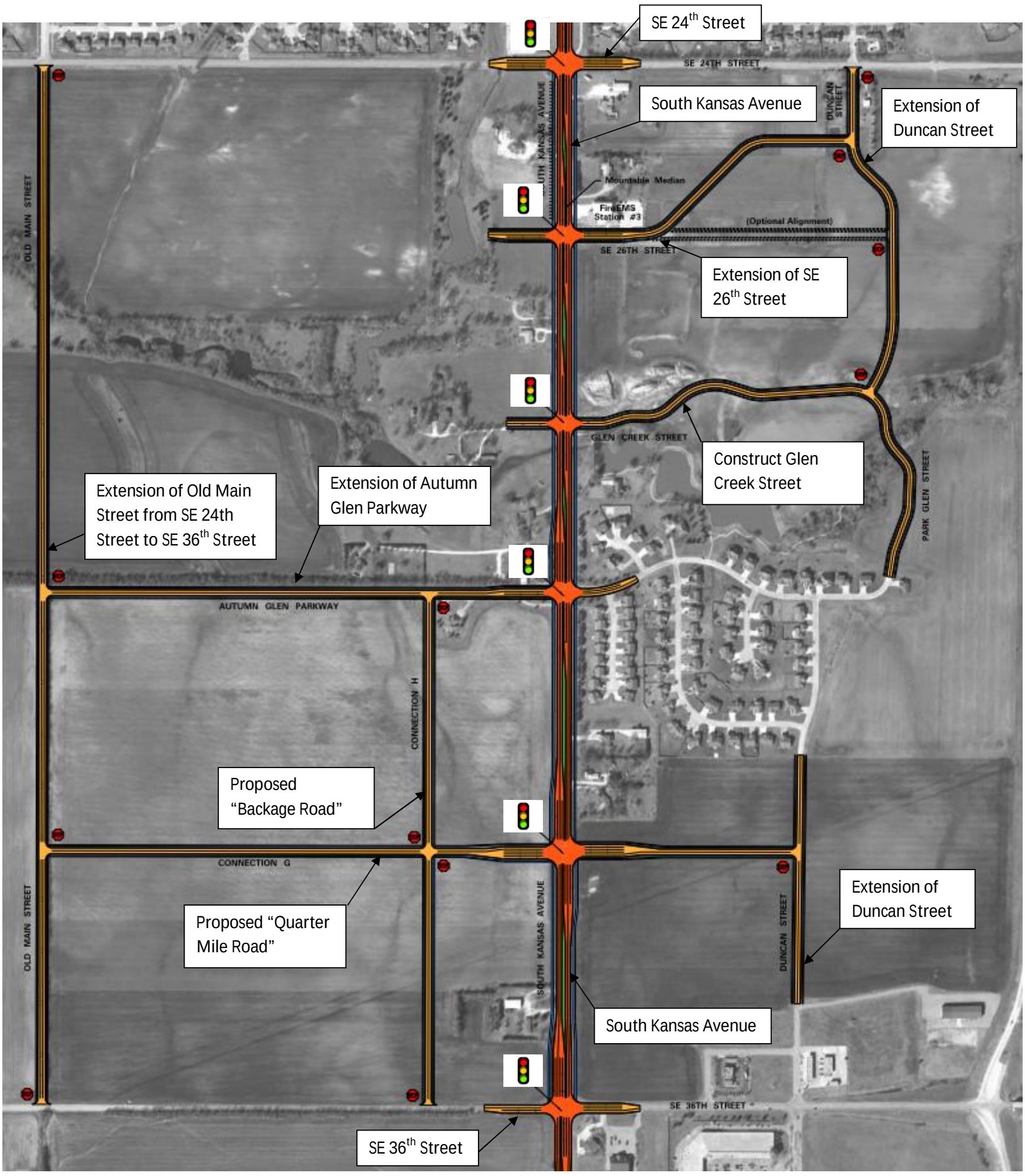


Figure 23 - 2030 Proposed Roadway Configuration Sketch

Table 9 - 2030 Recommended South Kansas Avenue Roadway Modifications

Intersection	Modifications
SE 24th Street	Add signal (future as development dictates) Add SBL, EBL, EBTR, NBL, WBL, and WBTR turn lanes
SE 26th Street	Add signal (future as development dictates) Add SBL, EBL, EBTR, NBL, WBL, and WBTR turn lanes
Glen Creek Street	Add signal (future as development dictates) Add SBL, NBL, EBLTR, WBLTR turn lanes
Autumn Glen Parkway	Add signal (future as development dictates) Add SBL, NBL, EBL, EBTR turn lanes
Connection G	Add signal (future as development dictates) Add SBL, SBR, NBL, NBR, EB dual left, EBT, EBR, WB dual left, WBT, WBR turn lanes
SE 36th Street	Add signal (future as development dictates) Add SB dual left, SBR, NBL, EBL, WBL turn lanes.

Table 10 - Estimated Construction Costs of South Kansas Avenue-related Recommended Improvements

Roadway Modification	Estimated Construction Cost*
South Kansas Avenue from SE 24th Street to SE 36th Street	$5,658,000

*Note: 2013 cost to construct does not include other costs such as preliminary engineering (PE), final design acquisition of right-of-way, utility relocation or construction engineering (CE). Storm sewer system, earthwork, pavement marking, signing, driveways, pavement removal included in costs. Right of way, lighting and utility relocations are not included in estimated costs. Improvements along SE 24th Street and SE 36th Street have not been accounted for in costs. An additional *$150,000* per traffic signal needs to be added for each intersection where a traffic signal is proposed between now and 2030. Estimated costs should be updated to reflect the proposed year of construction when that is determined by the City of Newton.

4.2.5 Street Naming Policy

The City of Newton does not have a consistent naming convention for existing streets. The city should scrutinize street naming and address standards from a city-wide perspective. Other cities such as Overland Park, Kansas have done so to clarify addresses and standardize the issue (City of Overland Park, KS, 2011)(City of Overland Park, KS). The *City of Overland Park Address Ordinance* would be an excellent document to start forming a system for the City of Newton.

In many cases either north-south or east-west streets are the numbered streets, while the other direction of travel are assigned street names. In this manner every street along a specific latitude or longitude can be located relative to other streets. For instance, if a driver lives in the north part of the city and is traveling through the south part, the street names are still in the same order as they are in the area they are familiar with. The driver is then able to realize roughly how much further they need to go, or if they have already traveled too far. With the current configuration of street names in the City of Newton, this is not possible without a map (Figure 24).

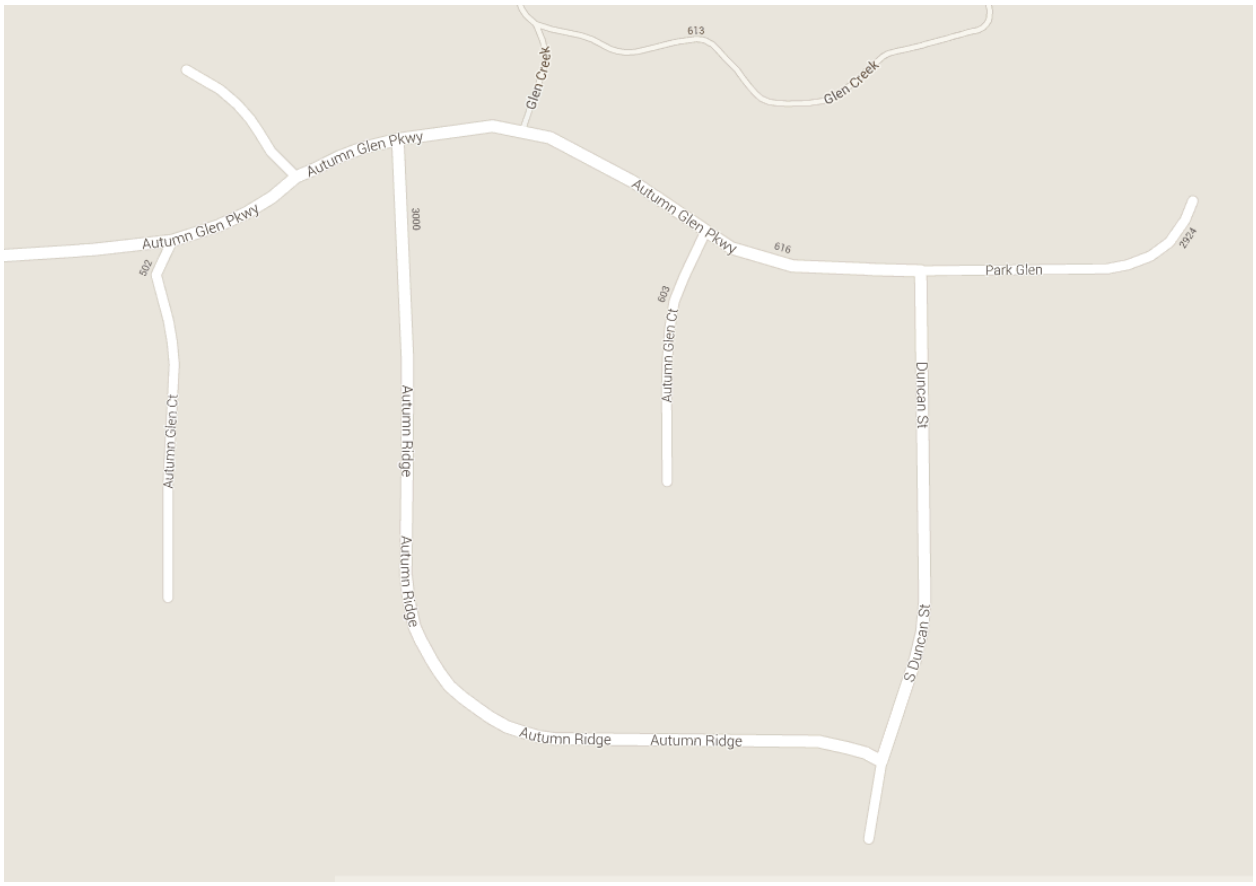


Figure 24 - Existing Subdivision Street Names

Consistent street naming also assists emergency responders (fire, police, ambulance) as they have a consistent order to street names and numbers. They can use consistent street naming to decrease response time and increase geospatial awareness. For example the street names of "Glen Creek Street," "Autumn Glen Parkway" and "Park Glen Street" may cause confusion due to the "Glen" in all three street names. There are also multiple "Autumn" street names with "Glen" and "Ridge." When the study team and City of Newton staff were having difficulty communicating street names accurately with a map in front of them, there seems to be a high probability that a person who is unfamiliar with the area would end up calling into 911 and mix up the street names or provide an incomplete street name.

4.2.6 Capacity and Level of Service

The estimated LOS in 2030 utilizing the changes recommended for a potential improvements alternative is shown in Figure 25.

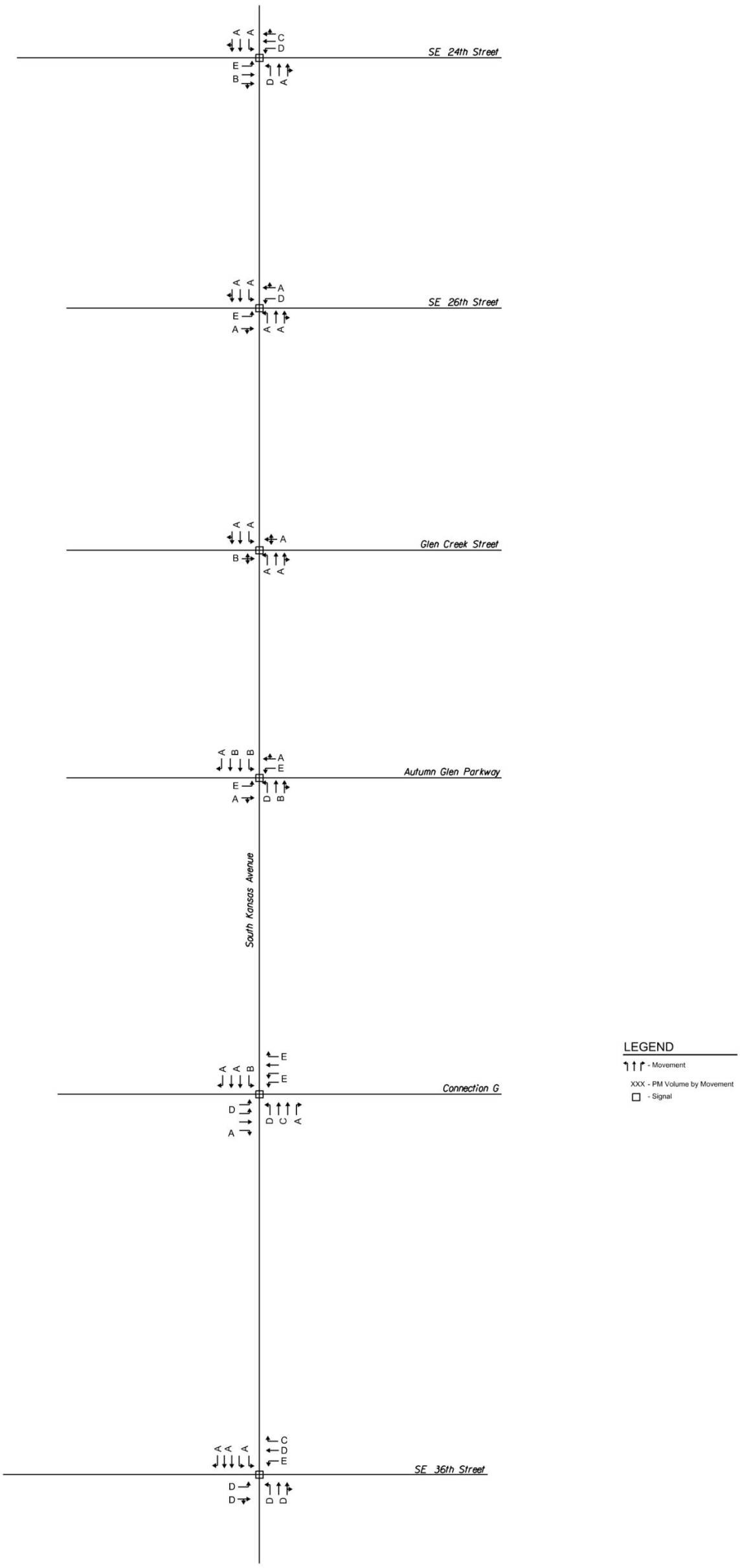


Figure 25 - 2030 Alt1 PM Peak Hour LOS

5 Summary

South Kansas Avenue from SE 24th Street to SE 36th Street is primarily an undeveloped corridor with Autumn Glen Parkway intersecting mid-corridor from the east. Future development in coordination with the recommendations provided in this study will determine the safety and operations of the South Kansas Avenue corridor.

5.1 Findings and Conclusions

The existing corridor configuration provides many possibilities for the future. Fine tuning these options to not only support potential developers but the general public and the city at large, is the primary objective. Limiting full access to only the public roadway intersections noted within this report will greatly increase driver expectancy and decrease delay, while providing access to future local businesses, residents, and emergency services.

Several proposed intersections are expected to warrant traffic signals in the future. As the number of traffic signals grows along the corridor, coordination will become an issue with tight spacing between intersections.

Continuing to build a local roadway system east and west of South Kansas Avenue will provide residents with choices and freedom in how they travel from their home to neighbors and local businesses. These local roadway connections may relieve potential congestion on South Kansas Avenue for a limited number of travelers who would be able to access adjacent land uses if the roadway network is fully connected.

One of the most beneficial improvements along South Kansas Avenue proper is the installation of bicycle and pedestrian accommodations. While there is a wide shared use path on the east side of South Kansas Avenue north of Autumn Glen Parkway, it does not continue to the south. There are currently no sidewalks on the west side of South Kansas Avenue from SE 24th Street to SE 36th Street. These pedestrian connections should be required along South Kansas Avenue as development occurs. If there is a gap in development with the sidewalk missing, the city should install the missing sidewalk in order to provide connectivity and then charge the future development a site fee for the sidewalk since it would need to be installed anyway.

5.2 Recommendations

There are two primary recommendations which were identified as part of the South Kansas Avenue Traffic Study. The first is future infrastructure improvements along the South Kansas Avenue corridor to accommodate increased trips as a result of future development. The second is site access and improving local roadway circulation for the area.

5.2.1 South Kansas Avenue Infrastructure

Modify South Kansas Avenue from four-lane undivided to four-lane divided in order to be prepared for future development and to avoid unnecessary reconfiguration at intersections as development occurs. The raised center median should be wide enough to accommodate left turn bays at most intersections with public roads, and dual left turns from South Kansas Avenue at intersections with heavier left turning volumes such as at SE 36th Street.

Pedestrian and bicycle accommodations should be extended or added as applicable along South Kansas Avenue from SE 24th Street to SE 36th Street. The previous South Kansas Avenue Traffic Study noted that the public desired these accommodations and it would be logical to expect the public to desire the same facilities in this section of South Kansas Avenue. All future traffic signals should have pedestrian accommodations installed at intersections along this corridor.

Traffic signals should be installed when warranted and coordination will be required due to the frequency of closely spaced intersections. Additional improvements away from South Kansas Avenue include additional connectivity between adjacent residential areas as well as connections between residential and commercial areas to fill in existing gaps in the local transportation network.

Signalized intersections will be designed to accommodate U-turns along the corridor where applicable such as at SE 24th Street.

5.2.2 Site Access and Circulation

There are a few network connections which are located on each side of South Kansas Avenue that should be constructed as development occurs in order to connect adjunct land uses internally. These roadways would enable travelers to access adjunct residential and commercial areas without using South Kansas Avenue. Any further development within these areas should require these connections as part of their development.

6 Works Cited

City of Newton, Kansas. (2011). *The ReNewton Project: Two cities. One community.* Newton, KS: City of Newton.

City of Overland Park, KS. (2011, December). *City of Overland Park, KS Street Map Front*. Retrieved October 31, 2012, from City of Overland Park, KS Street Map Front: http://www.opkansas.org/wp-content/uploads/downloads/street-map-front.pdf

City of Overland Park, KS. (n.d.). *The City of Overland Park Address Ordinance*. Retrieved October 31, 2012, from The City of Overland Park Address Ordinance: http://apps.opkansas.org/City-Government/Agendas-and-Minutes/Community-Development/Agendas/2005/2005-02-02/ACT-1-2.PDF

Federal Highway Administration. (2009). *Manual on Uniform Traffic Control Devices.* Washington, D.C.: U.S. Department of Transportation.

Florida Department of Transportation. (2009). *Quality/Level of Service Handbook.* Tallahassee, FL: Florida Department of Transportation.

Harvey County. (2012). *Transportation Home*. Retrieved 8 27, 2012, from Harvey County, KS: http://www.harveycounty.com/departments/transportation.html

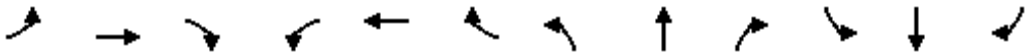
Institue of Transportation Engineers. (2008). *Trip Generation Manual, 8th Edition: An ITE Informational Report.* Washington, D.C.: Institue of Transportation Engineers.

Institute of Transportation Engineers. (2004). *Trip Generation Handbook, 2nd Edition.* Washington, D.C.: Institute of Transportation Engineers.

Kansas University Transportation Center. (n.d.). *Harvey County Commission*. Retrieved August 27, 2012, from Kansas University Transportation Center: http://www2.ku.edu/~kutc/cgi-bin/RTAP_agencies.php?ag=84

Lu, J., Liu, P., Fan, J., & Juan, P. (2004). *Operational Evaluation of Right Turns Followed by U-Turns at Signalized Intersections (6 or More Lanes) as an Alternative to Direct Left Turns.* Tallahassee: University of South Florida, Department of Civil and Environmental Engineering.

Midwest Research Institute and Missouri Department of Transportation. (2012). *Evaluation of an Adaptive Traffic Signal System: Route 291 in Lee's Summit, Missouri.* Kansas City, MO: Midwest Research Institute.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	5	16	3	10	5	50	335	6	6	227	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.948			0.964			0.998			0.996	
Flt Protected		0.976			0.992			0.994			0.999	
Satd. Flow (prot)	0	1724	0	0	1781	0	0	3511	0	0	3522	0
Flt Permitted		0.976			0.992			0.994			0.999	
Satd. Flow (perm)	0	1724	0	0	1781	0	0	3511	0	0	3522	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1629			1461			871			449	
Travel Time (s)		37.0			33.2			13.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	5	17	3	11	5	54	364	7	7	247	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	19	0	0	425	0	0	261	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	1.9

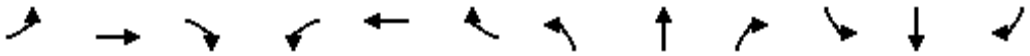
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	5	16	3	10	5	50	335	6	6	227	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	5	17	3	11	5	54	364	7	7	247	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	559	742	127	615	742	185	253	0	0	371	0	0
Stage 1	263	263	-	476	476	-	-	-	-	-	-	-
Stage 2	296	479	-	139	266	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	412	342	900	375	342	826	1309	-	-	1184	-	-
Stage 1	719	689	-	539	555	-	-	-	-	-	-	-
Stage 2	688	553	-	850	687	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	381	322	900	347	322	826	1309	-	-	1184	-	-
Mov Capacity-2 Maneuver	381	322	-	347	322	-	-	-	-	-	-	-
Stage 1	682	684	-	511	526	-	-	-	-	-	-	-
Stage 2	635	524	-	821	682	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.3	14.6	1.2	0.2
HCM LOS	B	B		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1309	-	-	478	393	1184	-	-
HCM Lane V/C Ratio	0.042	-	-	0.093	0.05	0.006	-	-
HCM Control Delay (s)	7.869	0.2	-	13.3	14.6	8.057	0	-
HCM Lane LOS	A	A		B	B	A	A	
HCM 95th %tile Q(veh)	0.13	-	-	0.307	0.157	0.017	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	0	0	0	391	0	0	246	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt												
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1742			1198			930			871	
Travel Time (s)		39.6			27.2			14.1			13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	425	0	0	267	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	425	0	0	267	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	0

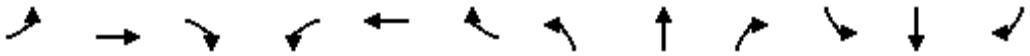
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	0	0	391	0	0	246	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	425	0	0	267	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	480	692	134	559	692	213	267	0	0	425	0	0
Stage 1	267	267	-	425	425	-	-	-	-	-	-	-
Stage 2	213	425	-	134	267	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	469	366	890	412	366	792	1294	-	-	1131	-	-
Stage 1	715	687	-	578	585	-	-	-	-	-	-	-
Stage 2	769	585	-	855	687	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	469	366	890	412	366	792	1294	-	-	1131	-	-
Mov Capacity-2 Maneuver	469	366	-	412	366	-	-	-	-	-	-	-
Stage 1	715	687	-	578	585	-	-	-	-	-	-	-
Stage 2	769	585	-	855	687	-	-	-	-	-	-	-

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

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1294	-	-	0	0	1131	-	-
HCM Lane V/C Ratio	-	-	-	+	+	-	-	-
HCM Control Delay (s)	0	-	-	0	0	0	-	-
HCM Lane LOS	A			A	A	A		
HCM 95th %tile Q(veh)	0	-	-	+	+	0	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	0	0	0	344	0	0	262	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt												
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1602			1744			880			930	
Travel Time (s)		36.4			39.6			13.3			14.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	374	0	0	285	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	374	0	0	285	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 12.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	0

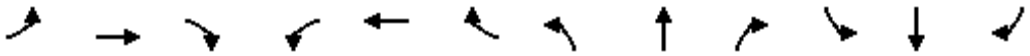
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	0	0	344	0	0	262	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	374	0	0	285	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	472	659	142	516	659	187	285	0	0	374	0	0
Stage 1	285	285	-	374	374	-	-	-	-	-	-	-
Stage 2	187	374	-	142	285	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	475	382	880	442	382	823	1274	-	-	1181	-	-
Stage 1	698	674	-	619	616	-	-	-	-	-	-	-
Stage 2	797	616	-	846	674	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	475	382	880	442	382	823	1274	-	-	1181	-	-
Mov Capacity-2 Maneuver	475	382	-	442	382	-	-	-	-	-	-	-
Stage 1	698	674	-	619	616	-	-	-	-	-	-	-
Stage 2	797	616	-	846	674	-	-	-	-	-	-	-

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

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1274	-	-	0	0	1181	-	-
HCM Lane V/C Ratio	-	-	-	+	+	-	-	-
HCM Control Delay (s)	0	-	-	0	0	0	-	-
HCM Lane LOS	A			A	A	A		
HCM 95th %tile Q(veh)	0	-	-	+	+	0	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	3	0	14	0	330	10	22	240	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		200	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00
Frt						0.850		0.996				
Flt Protected				0.950							0.996	
Satd. Flow (prot)	0	0	0	1770	0	1583	0	3525	0	0	3525	0
Flt Permitted				0.950							0.996	
Satd. Flow (perm)	0	0	0	1770	0	1583	0	3525	0	0	3525	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1764			1300			1208			880	
Travel Time (s)		40.1			29.5			18.3			13.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	3	0	15	0	359	11	24	261	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	3	0	15	0	370	0	0	285	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	0.6

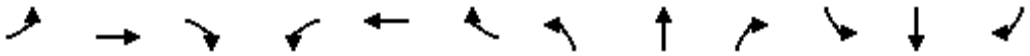
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	3	0	14	0	330	10	22	240	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	3	0	15	0	359	11	24	261	0

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	542	673	185	261	0	0	370	0	0
Stage 1	364	364	-	-	-	-	-	-	-
Stage 2	178	309	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	470	375	826	1300	-	-	1185	-	-
Stage 1	673	622	-	-	-	-	-	-	-
Stage 2	835	658	-	-	-	-	-	-	-
Time blocked-Platoon, %					-	-		-	-
Mov Capacity-1 Maneuver	459	0	826	1300	-	-	1185	-	-
Mov Capacity-2 Maneuver	459	0	-	-	-	-	-	-	-
Stage 1	673	0	-	-	-	-	-	-	-
Stage 2	815	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0.8
HCM LOS	B		

Minor Lane / Major Mvmt	NBL	NBT	NBR	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1300	-	-	459	826	1185	-	-
HCM Lane V/C Ratio	-	-	-	0.007	0.018	0.02	-	-
HCM Control Delay (s)	0	-	-	12.9	9.4	8.101	0.1	-
HCM Lane LOS	A			B	A	A	A	
HCM 95th %tile Q(veh)	0	-	-	0.021	0.056	0.062	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	0	0	0	345	0	0	251	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt												
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	1863	0	0	3539	0	0	3539	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1188			938			1402			1208	
Travel Time (s)		27.0			21.3			21.2			18.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	375	0	0	273	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	375	0	0	273	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 12.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	0

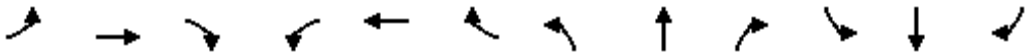
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	0	0	0	0	0	345	0	0	251	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	375	0	0	273	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	461	648	136	511	648	188	273	0	0	375	0	0
Stage 1	273	273	-	375	375	-	-	-	-	-	-	-
Stage 2	188	375	-	136	273	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	484	388	888	446	388	822	1287	-	-	1180	-	-
Stage 1	710	683	-	618	615	-	-	-	-	-	-	-
Stage 2	796	615	-	853	683	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	484	388	888	446	388	822	1287	-	-	1180	-	-
Mov Capacity-2 Maneuver	484	388	-	446	388	-	-	-	-	-	-	-
Stage 1	710	683	-	618	615	-	-	-	-	-	-	-
Stage 2	796	615	-	853	683	-	-	-	-	-	-	-

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

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1287	-	-	0	0	1180	-	-
HCM Lane V/C Ratio	-	-	-	+	+	-	-	-
HCM Control Delay (s)	0	-	-	0	0	0	-	-
HCM Lane LOS	A			A	A	A		
HCM 95th %tile Q(veh)	0	-	-	+	+	0	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	5	0	20	1	204	1	141	10	129	122	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		215	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt						0.850		0.990				
Flt Protected					0.954						0.975	
Satd. Flow (prot)	0	1863	0	0	1777	1583	0	3504	0	0	3451	0
Flt Permitted					0.954						0.975	
Satd. Flow (perm)	0	1863	0	0	1777	1583	0	3504	0	0	3451	0
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2668			1177			1968			1402	
Travel Time (s)		60.6			26.8			29.8			21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	5	0	22	1	222	1	153	11	140	133	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5	0	0	23	222	0	165	0	0	273	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.2%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Intersection Delay, s/veh	5.3

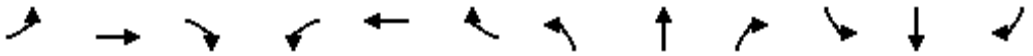
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	5	0	20	1	204	1	141	10	129	122	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	215	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	5	0	22	1	222	1	153	11	140	133	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	492	579	66	510	574	82	133	0	0	164	0	0
Stage 1	413	413	-	161	161	-	-	-	-	-	-	-
Stage 2	79	166	-	349	413	-	-	-	-	-	-	-
Follow-up Headway	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Capacity-1 Maneuver	460	425	984	446	428	961	1449	-	-	1412	-	-
Stage 1	587	592	-	825	764	-	-	-	-	-	-	-
Stage 2	921	760	-	640	592	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	324	379	984	405	382	961	1449	-	-	1412	-	-
Mov Capacity-2 Maneuver	324	379	-	405	382	-	-	-	-	-	-	-
Stage 1	586	529	-	824	763	-	-	-	-	-	-	-
Stage 2	707	759	-	566	529	-	-	-	-	-	-	-

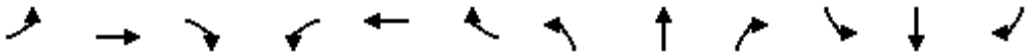
Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	9.9	0	4.1
HCM LOS	B	A		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1449	-	-	379	725	961	1412	-	-
HCM Lane V/C Ratio	0.001	-	-	0.014	0.133	0.154	0.099	-	-
HCM Control Delay (s)	7.486	0	-	14.6	10.7	9.4	7.83	0.1	-
HCM Lane LOS	A	A		B	B	A	A	A	
HCM 95th %tile Q(veh)	0.002	-	-	0.044	0.459	0.542	0.33	-	-

Notes
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	8	61	43	15	65	124	1678	22	28	1470	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.947			0.928			0.998			0.990	
Flt Protected		0.973			0.983			0.997			0.999	
Satd. Flow (prot)	0	1716	0	0	1699	0	0	3522	0	0	3500	0
Flt Permitted		0.620			0.788			0.532			0.825	
Satd. Flow (perm)	0	1094	0	0	1362	0	0	1879	0	0	2891	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			29			3			17	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1629			1461			871			1342	
Travel Time (s)		37.0			33.2			13.2			20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	9	66	47	16	71	135	1824	24	30	1598	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	168	0	0	134	0	0	1983	0	0	1739	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	

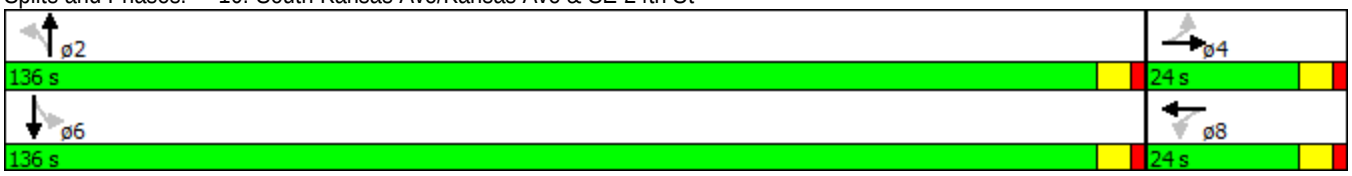


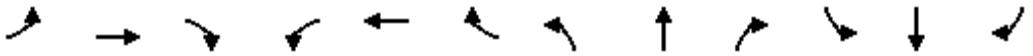
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	24.0	24.0		24.0	24.0		136.0	136.0		136.0	136.0	
Total Split (%)	15.0%	15.0%		15.0%	15.0%		85.0%	85.0%		85.0%	85.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		130.0	130.0		130.0	130.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0			130.0			130.0	
Actuated g/C Ratio		0.11			0.11			0.81			0.81	
v/c Ratio		1.23			0.75			1.30			0.74	
Control Delay		200.1			78.9			158.8			9.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		200.1			78.9			158.8			9.4	
LOS		F			E			F			A	
Approach Delay		200.1			78.9			158.8			9.4	
Approach LOS		F			E			F			A	
Queue Length 50th (ft)		~200			109			~1397			378	
Queue Length 95th (ft)		#363			#216			#1528			452	
Internal Link Dist (ft)		1549			1381			791			1262	
Turn Bay Length (ft)												
Base Capacity (vph)		137			178			1527			2352	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.23			0.75			1.30			0.74	

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 93.3 Intersection LOS: F
Intersection Capacity Utilization 124.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: South Kansas Ave/Kansas Ave & SE 24th St



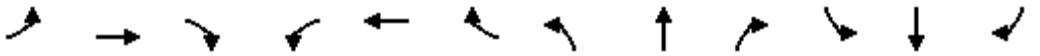


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	0	42	38	0	57	6	1691	13	19	1536	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0	300		0	300		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.946			0.919			0.999			0.999	
Flt Protected		0.971			0.980						0.999	
Satd. Flow (prot)	0	1711	0	0	1678	0	0	3536	0	0	3532	0
Flt Permitted		0.683			0.807			0.945			0.884	
Satd. Flow (perm)	0	1204	0	0	1381	0	0	3341	0	0	3126	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			39			2			1	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1742			1198			930			871	
Travel Time (s)		39.6			27.2			14.1			13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	0	46	41	0	62	7	1838	14	21	1670	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	0	103	0	0	1859	0	0	1702	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	28.0	28.0		28.0	28.0		132.0	132.0		132.0	132.0	
Total Split (%)	17.5%	17.5%		17.5%	17.5%		82.5%	82.5%		82.5%	82.5%	
Maximum Green (s)	22.0	22.0		22.0	22.0		126.0	126.0		126.0	126.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)		16.6			16.6			126.1			126.1	
Actuated g/C Ratio		0.11			0.11			0.82			0.82	
v/c Ratio		0.78			0.56			0.68			0.67	
Control Delay		87.7			52.2			8.0			7.9	
Queue Delay		0.0			0.0			0.7			0.7	
Total Delay		87.7			52.2			8.7			8.6	
LOS		F			D			A			A	
Approach Delay		87.7			52.2			8.7			8.6	
Approach LOS		F			D			A			A	
Queue Length 50th (ft)		94			62			354			316	
Queue Length 95th (ft)		168			128			494			447	
Internal Link Dist (ft)		1662			1118			850			791	
Turn Bay Length (ft)												
Base Capacity (vph)		188			229			2723			2547	
Starvation Cap Reductn		0			0			469			467	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.61			0.45			0.82			0.82	

Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 154.7			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 75.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 11: South Kansas Ave & SE 26th St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	0	42	26	0	40	6	1541	45	68	1560	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.946			0.918			0.996			0.999	
Flt Protected		0.971			0.981						0.998	
Satd. Flow (prot)	0	1711	0	0	1678	0	0	3525	0	0	3529	0
Flt Permitted		0.754			0.806			0.943			0.653	
Satd. Flow (perm)	0	1329	0	0	1378	0	0	3324	0	0	2309	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			39			7			1	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1602			1744			880			930	
Travel Time (s)		36.4			39.6			13.3			14.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	0	46	28	0	43	7	1675	49	74	1696	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	0	71	0	0	1731	0	0	1781	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	

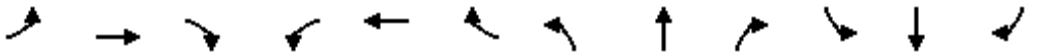
Lanes, Volumes, Timings
12: South Kansas Ave & Glen Creek St 9/19/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		136.0	136.0		136.0	136.0	
Total Split (%)	15.0%	15.0%		15.0%	15.0%		85.0%	85.0%		85.0%	85.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		130.0	130.0		130.0	130.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Act Effct Green (s)		15.2			15.2			130.1			130.1	
Actuated g/C Ratio		0.10			0.10			0.83			0.83	
v/c Ratio		0.78			0.42			0.63			0.93	
Control Delay		89.4			41.1			6.4			21.9	
Queue Delay		0.0			0.0			0.6			2.5	
Total Delay		89.4			41.1			7.0			24.4	
LOS		F			D			A			C	
Approach Delay		89.4			41.1			7.0			24.4	
Approach LOS		F			D			A			C	
Queue Length 50th (ft)		96			31			301			653	
Queue Length 95th (ft)		#183			85			364			#1014	
Internal Link Dist (ft)		1522			1664			800			850	
Turn Bay Length (ft)												
Base Capacity (vph)		170			192			2749			1909	
Starvation Cap Reductn		0			0			575			66	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.67			0.37			0.80			0.97	

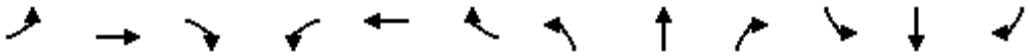
Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 157.3
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 18.6 Intersection LOS: B
Intersection Capacity Utilization 112.9% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: South Kansas Ave & Glen Creek St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	198	0	132	34	0	64	141	1331	44	76	1341	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	0		0	300		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.946			0.850			0.996			0.981	
Flt Protected		0.971		0.950				0.995			0.998	
Satd. Flow (prot)	0	1711	0	1770	1583	0	0	3507	0	0	3465	0
Flt Permitted		0.776		0.593				0.497			0.603	
Satd. Flow (perm)	0	1367	0	1105	1583	0	0	1752	0	0	2094	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			78			5			27	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1764			1300			1202			880	
Travel Time (s)		40.1			29.5			18.2			13.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	0	143	37	0	70	153	1447	48	83	1458	229
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	358	0	37	70	0	0	1648	0	0	1770	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	



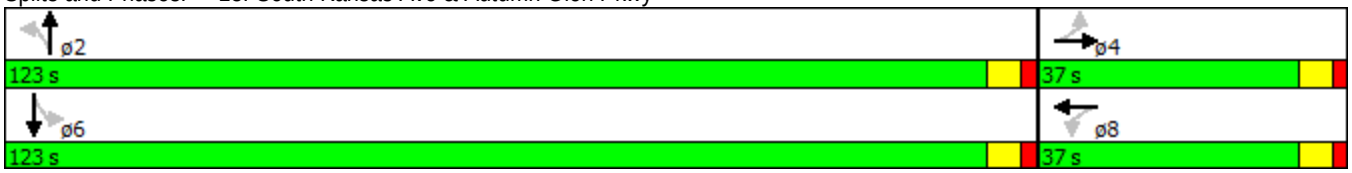
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	37.0	37.0		37.0	37.0		123.0	123.0		123.0	123.0	
Total Split (%)	23.1%	23.1%		23.1%	23.1%		76.9%	76.9%		76.9%	76.9%	
Maximum Green (s)	31.0	31.0		31.0	31.0		117.0	117.0		117.0	117.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		6.0		6.0	6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	11.0	11.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		31.0		31.0	31.0			117.0			117.0	
Actuated g/C Ratio		0.19		0.19	0.19			0.73			0.73	
v/c Ratio		1.28		0.17	0.19			1.29			1.15	
Control Delay		196.6		56.4	9.7			157.8			98.6	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		196.6		56.4	9.7			157.8			98.6	
LOS		F		E	A			F			F	
Approach Delay		196.6			25.8			157.8			98.6	
Approach LOS		F			C			F			F	
Queue Length 50th (ft)		~456		33	0			~1153			~1140	
Queue Length 95th (ft)		#669		70	39			#1292			#1276	
Internal Link Dist (ft)		1684			1220			1122			800	
Turn Bay Length (ft)				200								
Base Capacity (vph)		280		214	369			1282			1538	
Starvation Cap Reductn		0		0	0			0			10	
Spillback Cap Reductn		0		0	0			0			0	
Storage Cap Reductn		0		0	0			0			0	
Reduced v/c Ratio		1.28		0.17	0.19			1.29			1.16	

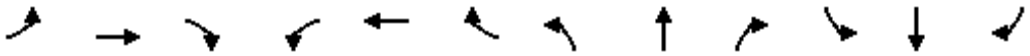
Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 160			
Natural Cycle: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.29			
Intersection Signal Delay: 130.8		Intersection LOS: F	
Intersection Capacity Utilization 129.0%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

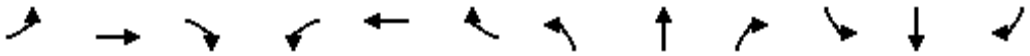
Queue shown is maximum after two cycles.

Splits and Phases: 13: South Kansas Ave & Autumn Glen Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	0	164	209	0	313	183	963	232	256	1061	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	300		0	300		300	300		300
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.946			0.919			0.975			0.980	
Flt Protected		0.971			0.980			0.993			0.992	
Satd. Flow (prot)	0	1711	0	0	1678	0	0	3427	0	0	3441	0
Flt Permitted		0.527			0.763			0.490			0.497	
Satd. Flow (perm)	0	929	0	0	1306	0	0	1691	0	0	1724	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			45			33			24	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1188			938			1408			1202	
Travel Time (s)		27.0			21.3			21.3			18.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	267	0	178	227	0	340	199	1047	252	278	1153	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	445	0	0	567	0	0	1498	0	0	1648	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	45.0	45.0		45.0	45.0		115.0	115.0		115.0	115.0	
Total Split (%)	28.1%	28.1%		28.1%	28.1%		71.9%	71.9%		71.9%	71.9%	
Maximum Green (s)	39.0	39.0		39.0	39.0		109.0	109.0		109.0	109.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.0			6.0			6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		39.0			39.0			109.0			109.0	
Actuated g/C Ratio		0.24			0.24			0.68			0.68	
v/c Ratio		1.85			1.61			1.57dl			1.74dl	
Control Delay		427.7			322.2			162.0			207.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		427.7			322.2			162.0			207.7	
LOS		F			F			F			F	
Approach Delay		427.7			322.2			162.0			207.7	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~692			~815			~1044			~1207	
Queue Length 95th (ft)		#920			#1059			#1185			#1347	
Internal Link Dist (ft)		1108			858			1328			1122	
Turn Bay Length (ft)												
Base Capacity (vph)		241			352			1162			1182	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.85			1.61			1.29			1.39	

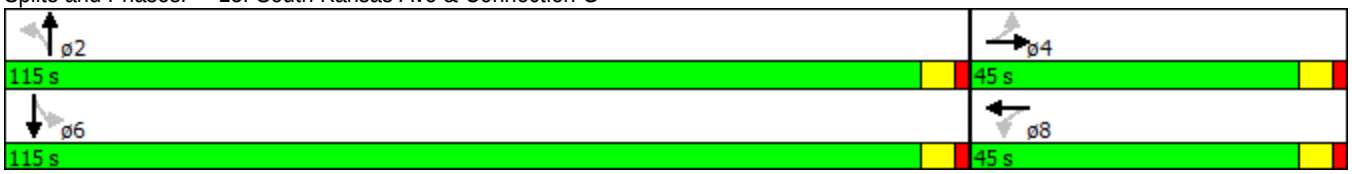
Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 160			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.85			
Intersection Signal Delay: 230.4		Intersection LOS: F	
Intersection Capacity Utilization 134.2%		ICU Level of Service H	
Analysis Period (min) 15			

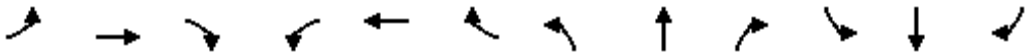
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

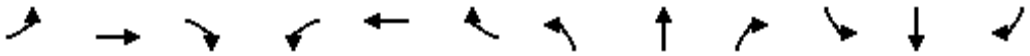
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 15: South Kansas Ave & Connection G





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	24	10	78	30	889	19	449	59	882	482	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	300		500	300		0	300		300
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.982				0.850		0.983			0.993	
Flt Protected		0.973			0.965			0.998			0.970	
Satd. Flow (prot)	0	1780	0	0	1798	1583	0	3472	0	0	3409	0
Flt Permitted		0.799			0.750			0.801			0.564	
Satd. Flow (perm)	0	1462	0	0	1397	1583	0	2787	0	0	1982	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				390		16			6	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2668			1177			1968			1408	
Travel Time (s)		60.6			26.8			29.8			21.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	26	11	85	33	966	21	488	64	959	524	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	118	966	0	573	0	0	1559	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	24.0	24.0		24.0	24.0	
Total Split (s)	56.0	56.0		56.0	56.0	56.0	104.0	104.0		104.0	104.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	65.0%	65.0%		65.0%	65.0%	
Maximum Green (s)	50.0	50.0		50.0	50.0	50.0	98.0	98.0		98.0	98.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	
Act Effct Green (s)		50.0			50.0	50.0		98.0			98.0	
Actuated g/C Ratio		0.31			0.31	0.31		0.61			0.61	
v/c Ratio		0.18			0.27	1.27		0.33			2.05dl	
Control Delay		38.9			43.4	157.5		15.3			162.4	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		38.9			43.4	157.5		15.3			162.4	
LOS		D			D	F		B			F	
Approach Delay		38.9			145.0			15.3			162.4	
Approach LOS		D			F			B			F	
Queue Length 50th (ft)		59			93	~975		143			~1088	
Queue Length 95th (ft)		106			152	#1242		180			#1227	
Internal Link Dist (ft)		2588			1097			1888			1328	
Turn Bay Length (ft)						500						
Base Capacity (vph)		460			436	762		1713			1216	
Starvation Cap Reductn		0			0	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.18			0.27	1.27		0.33			1.28	

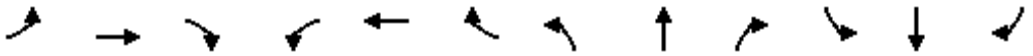
Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 160			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.28			
Intersection Signal Delay: 128.1		Intersection LOS: F	
Intersection Capacity Utilization 93.2%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

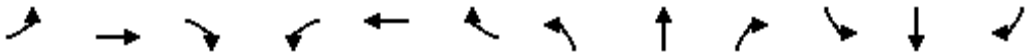
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 16: South Kansas Ave & SE 36th St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	8	61	43	15	65	124	1678	22	28	1470	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	300		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.868			0.878			0.998			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3072	0	1770	3107	0	1770	3532	0	1770	3504	0
Flt Permitted	0.698			0.706			0.111			0.090		
Satd. Flow (perm)	1300	3072	0	1315	3107	0	207	3532	0	168	3504	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		63			41			3			17	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1629			1461			871			1342	
Travel Time (s)		37.0			33.2			13.2			20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	9	66	47	16	71	135	1824	24	30	1598	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	75	0	47	87	0	135	1848	0	30	1709	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	



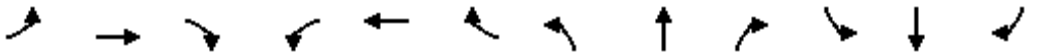
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		96.0	96.0		96.0	96.0	
Total Split (%)	20.0%	20.0%		20.0%	20.0%		80.0%	80.0%		80.0%	80.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		90.0	90.0		90.0	90.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	13.9	13.9		13.9	13.9		94.1	94.1		94.1	94.1	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.78	0.78		0.78	0.78	
v/c Ratio	0.62	0.18		0.31	0.22		0.83	0.67		0.23	0.62	
Control Delay	67.7	15.6		52.8	27.6		44.0	3.5		8.9	6.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	67.7	15.6		52.8	27.6		44.0	3.6		8.9	6.9	
LOS	E	B		D	C		D	A		A	A	
Approach Delay		44.5			36.5			6.3			7.0	
Approach LOS		D			D			A			A	
Queue Length 50th (ft)	70	4		34	17		15	73		5	239	
Queue Length 95th (ft)	123	26		71	41		m#204	141		21	349	
Internal Link Dist (ft)		1549			1381			791			1262	
Turn Bay Length (ft)	300			300			300			300		
Base Capacity (vph)	195	514		197	500		162	2770		131	2751	
Starvation Cap Reductn	0	0		0	0		0	48		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.48	0.15		0.24	0.17		0.83	0.68		0.23	0.62	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 63 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 9.2 Intersection LOS: A
Intersection Capacity Utilization 81.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: South Kansas Ave & SE 24th St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	0	42	38	0	57	6	1691	13	19	1536	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.850			0.850			0.999			0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1583	0	1770	3536	0	1770	3536	0
Flt Permitted	0.717			0.727			0.120			0.070		
Satd. Flow (perm)	1336	1583	0	1354	1583	0	224	3536	0	130	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		164			156			1			1	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1742			1198			930			871	
Travel Time (s)		39.6			27.2			14.1			13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	0	46	41	0	62	7	1838	14	21	1670	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	46	0	41	62	0	7	1852	0	21	1681	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	

Lanes, Volumes, Timings
11: South Kansas Ave & SE 26th St

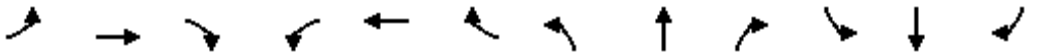
9/19/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		16.0	24.0		16.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		16.0	80.0		16.0	80.0	
Total Split (%)	20.0%	20.0%		20.0%	20.0%		13.3%	66.7%		13.3%	66.7%	
Maximum Green (s)	18.0	18.0		18.0	18.0		10.0	74.0		10.0	74.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	12.3	12.3		12.3	12.3		94.9	94.9		95.7	96.9	
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.79	0.79		0.80	0.81	
v/c Ratio	0.50	0.15		0.30	0.21		0.03	0.66		0.11	0.59	
Control Delay	63.0	1.0		54.6	1.5		1.3	1.9		5.6	5.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	63.0	1.0		54.6	1.5		1.3	1.9		5.6	5.2	
LOS	E	A		D	A		A	A		A	A	
Approach Delay		38.0			22.6			1.9			5.2	
Approach LOS		D			C			A			A	
Queue Length 50th (ft)	51	0		30	0		0	20		3	127	
Queue Length 95th (ft)	96	0		65	0		m0	42		m8	256	
Internal Link Dist (ft)		1662			1118			850			791	
Turn Bay Length (ft)	200			200			300			300		
Base Capacity (vph)	200	376		203	370		303	2797		240	2856	
Starvation Cap Reductn	0	0		0	0		0	0		0	65	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.12		0.20	0.17		0.02	0.66		0.09	0.60	

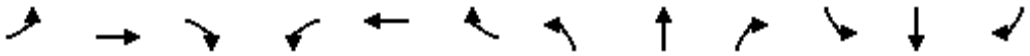
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 75 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 5.0 Intersection LOS: A
Intersection Capacity Utilization 67.3% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: South Kansas Ave & SE 26th St



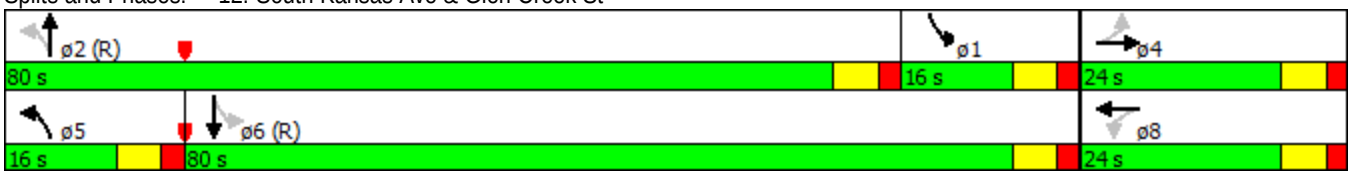
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	0	42	26	0	40	6	1541	45	68	1560	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	300		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.946			0.918			0.996			0.999	
Flt Protected		0.971			0.981		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1678	0	1770	3525	0	1770	3536	0
Flt Permitted		0.802			0.815		0.087			0.092		
Satd. Flow (perm)	0	1413	0	0	1394	0	162	3525	0	171	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		136			136			4			1	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1602			1744			880			930	
Travel Time (s)		36.4			39.6			13.3			14.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	0	46	28	0	43	7	1675	49	74	1696	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	0	71	0	7	1724	0	74	1707	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	

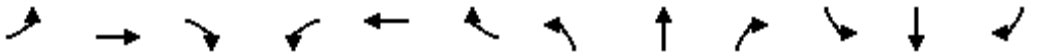


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		16.0	24.0		16.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		16.0	80.0		16.0	80.0	
Total Split (%)	20.0%	20.0%		20.0%	20.0%		13.3%	66.7%		13.3%	66.7%	
Maximum Green (s)	18.0	18.0		18.0	18.0		10.0	74.0		10.0	74.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		10.1			10.1		85.1	85.1		94.7	94.7	
Actuated g/C Ratio		0.08			0.08		0.71	0.71		0.79	0.79	
v/c Ratio		0.47			0.29		0.03	0.69		0.28	0.61	
Control Delay		12.1			3.1		1.8	3.2		7.4	2.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		12.1			3.1		1.8	3.2		7.4	2.8	
LOS		B			A		A	A		A	A	
Approach Delay		12.1			3.1			3.2			3.0	
Approach LOS		B			A			A			A	
Queue Length 50th (ft)		0			0		1	90		6	84	
Queue Length 95th (ft)		40			0		m1	101		m20	28	
Internal Link Dist (ft)		1522			1664			800			850	
Turn Bay Length (ft)							200			300		
Base Capacity (vph)		327			324		248	2502		267	2791	
Starvation Cap Reductn		0			0		0	9		0	65	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.35			0.22		0.03	0.69		0.28	0.63	

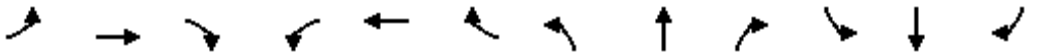
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 78 (65%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 3.4		Intersection LOS: A	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 12: South Kansas Ave & Glen Creek St





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	198	0	132	34	0	64	141	1331	44	76	1341	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		0	300		0	300		300
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.850			0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1583	0	1770	1583	0	1770	3522	0	1770	3539	1583
Flt Permitted	0.421			0.666			0.091			0.085		
Satd. Flow (perm)	784	1583	0	1241	1583	0	170	3522	0	158	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		176			181			4				229
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1764			1300			1186			880	
Travel Time (s)		40.1			29.5			18.0			13.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	0	143	37	0	70	153	1447	48	83	1458	229
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	143	0	37	70	0	153	1495	0	83	1458	229
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	7	4			8		5	2		1	6	7
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		8	8		5	2		1	6	7

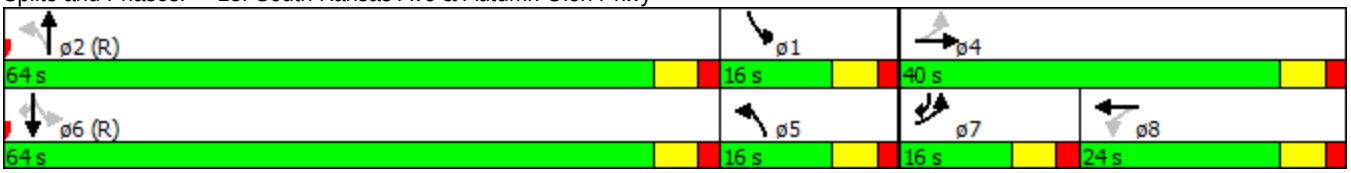


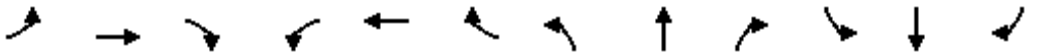
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	10.0		7.0	10.0	7.0
Minimum Split (s)	16.0	24.0		24.0	24.0		16.0	24.0		16.0	24.0	16.0
Total Split (s)	16.0	40.0		24.0	24.0		16.0	64.0		16.0	64.0	16.0
Total Split (%)	13.3%	33.3%		20.0%	20.0%		13.3%	53.3%		13.3%	53.3%	13.3%
Maximum Green (s)	10.0	34.0		18.0	18.0		10.0	58.0		10.0	58.0	10.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag		Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	None
Walk Time (s)		7.0										
Flash Dont Walk (s)		11.0										
Pedestrian Calls (#/hr)		0										
Act Effct Green (s)	24.2	24.2		10.7	10.7		79.0	71.1		77.8	68.5	80.4
Actuated g/C Ratio	0.20	0.20		0.09	0.09		0.66	0.59		0.65	0.57	0.67
v/c Ratio	0.88	0.31		0.34	0.23		0.65	0.72		0.37	0.72	0.20
Control Delay	76.9	4.4		59.5	1.8		36.6	11.0		13.5	17.4	1.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	76.9	4.4		59.5	1.8		36.6	11.0		13.5	17.4	1.2
LOS	E	A		E	A		D	B		B	B	A
Approach Delay		47.9			21.7			13.4			15.1	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	150	0		28	0		47	230		13	276	0
Queue Length 95th (ft)	#262	31		62	0		m106	268		m27	275	38
Internal Link Dist (ft)		1684			1220			1106			800	
Turn Bay Length (ft)	300			200			300			300		300
Base Capacity (vph)	245	574		186	391		246	2088		237	2020	1135
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.88	0.25		0.20	0.18		0.62	0.72		0.35	0.72	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 68 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 17.6		Intersection LOS: B	
Intersection Capacity Utilization 84.2%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

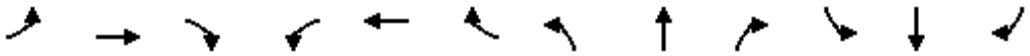
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: South Kansas Ave & Autumn Glen Pkwy





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	0	164	209	0	313	183	963	232	256	1061	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	300		300	300		300	300		300
Storage Lanes	2		1	2		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.102			0.255		
Satd. Flow (perm)	3433	1863	1583	3433	1863	1583	190	3539	1583	475	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			255			136			252			217
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1188			938			1424			1186	
Travel Time (s)		27.0			21.3			21.6			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	267	0	178	227	0	340	199	1047	252	278	1153	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	267	0	178	227	0	340	199	1047	252	278	1153	217
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Perm	Prot		pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases			4			8	2		2	6		6
Detector Phase	7	4	4	3	8	1	5	2	3	1	6	7

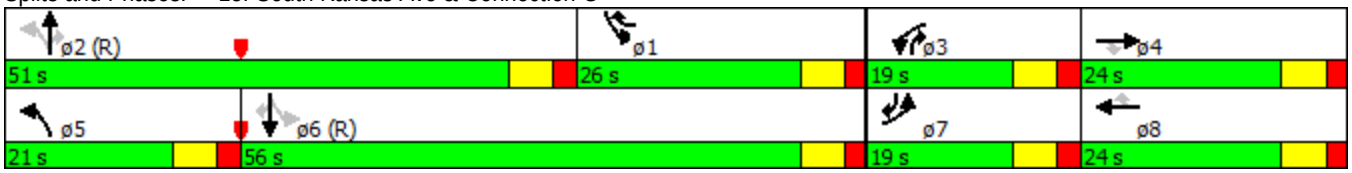


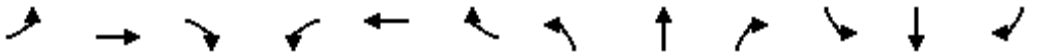
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	7.0	7.0	10.0	7.0	7.0	10.0	7.0
Minimum Split (s)	16.0	24.0	24.0	16.0	24.0	16.0	16.0	24.0	16.0	16.0	24.0	16.0
Total Split (s)	19.0	24.0	24.0	19.0	24.0	26.0	21.0	51.0	19.0	26.0	56.0	19.0
Total Split (%)	15.8%	20.0%	20.0%	15.8%	20.0%	21.7%	17.5%	42.5%	15.8%	21.7%	46.7%	15.8%
Maximum Green (s)	13.0	18.0	18.0	13.0	18.0	20.0	15.0	45.0	13.0	20.0	50.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	
Flash Dont Walk (s)		11.0	11.0		11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0		0			0			0	
Act Effct Green (s)	28.1		10.0	12.1		20.0	53.9	53.9	66.0	59.5	59.5	93.5
Actuated g/C Ratio	0.23		0.08	0.10		0.17	0.45	0.45	0.55	0.50	0.50	0.78
v/c Ratio	0.33		0.49	0.66		0.90	0.72	0.66	0.26	0.62	0.66	0.17
Control Delay	39.3		5.6	61.5		57.0	44.1	28.5	1.4	17.6	7.4	0.7
Queue Delay	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.3		5.6	61.5		57.0	44.1	28.5	1.4	17.6	7.4	0.7
LOS	D		A	E		E	D	C	A	B	A	A
Approach Delay								26.0			8.3	
Approach LOS								C			A	
Queue Length 50th (ft)	88		0	87		163	113	290	5	69	164	3
Queue Length 95th (ft)	127		10	130		#337	m149	m333	m10	156	277	m13
Internal Link Dist (ft)		1108			858			1344			1106	
Turn Bay Length (ft)	300		300	300		300	300		300	300		300
Base Capacity (vph)	802		454	371		377	299	1591	994	451	1753	1281
Starvation Cap Reductn	0		0	0		0	0	0	0	0	0	0
Spillback Cap Reductn	0		0	0		0	0	0	0	0	0	0
Storage Cap Reductn	0		0	0		0	0	0	0	0	0	0
Reduced v/c Ratio	0.33		0.39	0.61		0.90	0.67	0.66	0.25	0.62	0.66	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 94 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 23.4		Intersection LOS: C	
Intersection Capacity Utilization 69.5%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

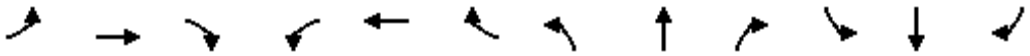
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: South Kansas Ave & Connection G





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	24	10	78	30	889	19	449	59	882	482	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	300		500	300		0	300		300
Storage Lanes	1		0	1		1	1		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.97	0.95	1.00
Frt		0.955				0.850		0.983				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1779	0	1770	1863	1583	1770	3479	0	3433	3539	1583
Flt Permitted	0.736			0.733			0.458			0.950		
Satd. Flow (perm)	1371	1779	0	1365	1863	1583	853	3479	0	3433	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				35		10				76
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2668			0			1968			1424	
Travel Time (s)		60.6			0.0			29.8			21.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	26	11	85	33	966	21	488	64	959	524	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	37	0	85	33	966	21	552	0	959	524	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	Perm
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					6
Detector Phase	4	4		8	8	1	2	2		1	6	6

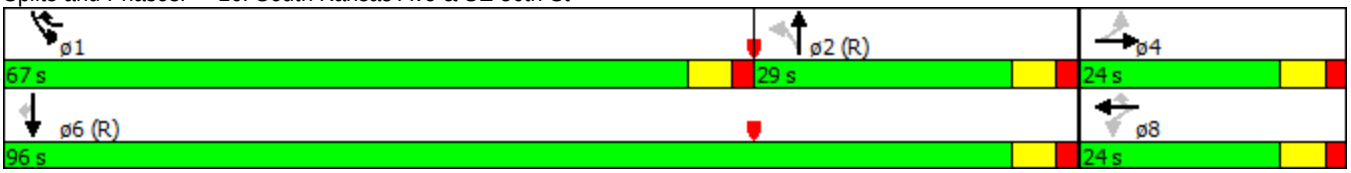


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	7.0	10.0	10.0		7.0	10.0	10.0
Minimum Split (s)	24.0	24.0		24.0	24.0	16.0	24.0	24.0		16.0	24.0	24.0
Total Split (s)	24.0	24.0		24.0	24.0	67.0	29.0	29.0		67.0	96.0	96.0
Total Split (%)	20.0%	20.0%		20.0%	20.0%	55.8%	24.2%	24.2%		55.8%	80.0%	80.0%
Maximum Green (s)	18.0	18.0		18.0	18.0	61.0	23.0	23.0		61.0	90.0	90.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag						Lead	Lag	Lag		Lead		
Lead-Lag Optimize?						Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	0
Act Effct Green (s)	13.3	13.3		13.3	13.3	80.3	27.7	27.7		64.2	99.1	99.1
Actuated g/C Ratio	0.11	0.11		0.11	0.11	0.67	0.23	0.23		0.54	0.83	0.83
v/c Ratio	0.30	0.18		0.57	0.16	0.90	0.11	0.68		0.52	0.18	0.06
Control Delay	53.0	37.8		64.6	48.5	28.3	42.2	48.0		7.2	0.9	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	53.0	37.8		64.6	48.5	28.3	42.2	48.0		7.2	0.9	0.3
LOS	D	D		E	D	C	D	D		A	A	A
Approach Delay		46.1			31.8			47.8			4.7	
Approach LOS		D			C			D			A	
Queue Length 50th (ft)	33	19		64	24	478	14	214		69	6	0
Queue Length 95th (ft)	68	50		113	54	745	38	#294		129	6	m0
Internal Link Dist (ft)		2588			1			1888			1344	
Turn Bay Length (ft)	300			300		500	300			300		300
Base Capacity (vph)	205	276		204	279	1070	197	811		1837	2923	1321
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.22	0.13		0.42	0.12	0.90	0.11	0.68		0.52	0.18	0.06

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 65 (54%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 22.1		Intersection LOS: C	
Intersection Capacity Utilization 92.7%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 16: South Kansas Ave & SE 36th St



South Kansas Avenue Traffic Study from 24th Street to 36th Street

1. Please share your thoughts on the study recommendations from the South Kansas Avenue Traffic Study from SE 24th Street to SE 36th Street.

	Response Count
	6
answered question	**6**
skipped question	**0**

Q1. Please share your thoughts on the study recommendations from the South Kansas Avenue Traffic Study from SE 24th Street to SE 36th Street.

1	The way the Newton sewer rates are rising, no one will be moving to Newton any time soon. No sense in wasting money on the theory of "if you build it, they will come," they won't be able to afford the sewer/water rates.	Oct 3, 2013 6:34 AM
2	There is no mention made of accommodations for pedestrians or bicyclists. I hope there will be crosswalks, and a way to get from the west side of S Kansas to the east side, or sidewalk/bike paths on both sides.	Sep 27, 2013 9:05 PM
3	One thought is to use roundabouts more often instead fo the traditional stop lights. traffic flows much quicker this way. If stop lights are the primary means, then electronically activated lights when a car triggers a sensor/switch. In the middle of newton cars can sit for a while with no traffic moving, this is tremendous waste and prevents folks from wanting to travel north and south. Example, wife says lets have pizza, i say no bc i would have to go through all those lights. conversation ends their, business is slowed down. Or lights in sequence so a a whole slew of cars can go from one end to another. Cars go in packs (bc of the lights) so allow the packs of cars time to make it through. Happier citizens more spending occurring. My phone is [redacted] if so desired. Thanks for the this survey.	Sep 18, 2013 9:56 AM
4	This seems to be a positive planned approach to the area studied. I think it will serve our community well.	Sep 17, 2013 5:59 PM
5	Not sure a raised median is indicated. Yes safer however restrictive to access on opposite side of S Kansas from direction of travel. Would inhibit access to retail/commercial properties along corridor forcing drivers to make unsafe u turns	Sep 17, 2013 3:43 PM
6	Thanks for the study and looking into the future. I know a similar study was done from 24th street north to where the recent construction starts. Where can that study be found? I missed the opportunity to see that study. [redacted]	Sep 17, 2013 3:23 PM