The Summit Church Traffic Impact Study

Chipman Road and View High Drive
Lee's Summit, Missouri

Prepared for:

The Summit Church

Prepared by:

TranSystems

August 2015

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August 27, 2015

Ms. Robin Dawson
The Summit Church
114 SE Douglas
Lee's Summit, MO 64081

RE: The Summit Church Traffic Impact Study
Chipman Road and View High Drive
Lee's Summit, Missouri

Dear Ms. Dawson:

In response to your request and authorization, TranSystems has completed a traffic impact study for the proposed Summit Church to be located in the southeast quadrant of the intersection of Chipman Road and View High Drive in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

Included in this study is a discussion of the anticipated impacts of the proposed development on the adjacent street network for the following analysis scenarios:

- Existing Conditions
- Existing plus Approved Conditions
- Existing plus Approved plus Phase I Development Conditions
- Existing plus Approved plus Full Development Conditions

We trust that the enclosed information proves beneficial to you and the City of Lee's Summit in this phase of the development process. We appreciate the opportunity to be of service to you and will be available to review this study at your convenience.

Sincerely,

TranSystems

By: _____
Jeffrey J. Wilke, PE, PTOE

By: _____
Michael Hare, EI

MTH:JJW/jw:P101140275
Enclosure

Introduction

TranSystems has completed this traffic impact study for the proposed Summit Church development to be located in the southeast quadrant of the intersection of Chipman Road and View High Drive in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system. The location of the project relative to the major streets in the area is shown on ***Figure A-1*** in ***Appendix A***.

In addition to a description of the proposed development and the surrounding transportation infrastructure, this study includes trip generation estimates, trip distribution estimates, capacity analyses, and a summary of findings. The scope of this study was developed after consultation with City of Lee's Summit, Missouri and City of Kansas City, Missouri staff.

Proposed Development Plan

The proposed development is planned to be built in multiple phases. The Phase I portion of the development includes a 30,730 square church foot building with a 750-seat worship venue. The full development plan expands the initial church building to a total of 67,000 square feet with worship venues totaling 1,500 seats. The proposed development plan reserves a six-acre tract along the west edge of the site that is to be developed with commercial buildings.

Access to the site is being proposed via two new driveways. The north site drive is located along Chipman Road approximately 400 feet east of View High Drive. This driveway will provide full-access to and from the property off Chipman Road. The south site drive is located along View High Drive approximately 925 feet south of Chipman Road. This driveway is planned to be restricted to right turns only at View High Drive.

A copy of the proposed site plan is included on ***Figure A-2*** in ***Appendix A*** for reference.

Study Area

To assess the impacts of the proposed development, the intersections listed below were identified for study during the weekday P.M. and Sunday peak hours.

- Chipman Road and View High Drive
- Chipman Road and North Site Drive
- View High Drive and South Site Drive

Street Network

Chipman Road is a two-lane undivided roadway that is classified as a major arterial according to the City of Lee's Summit's street classification map. Chipman Road has a posted speed limit of 35 m.p.h. adjacent to the development site, and it runs east/west along the northern edge of the development site. At View High Drive, Chipman Road widens to include separate westbound left- and right-turn lanes. Curb and gutter is present along both sides of Chipman Road extending to the east from View High Drive approximately 420 feet. East of the curb and gutter section, the roadway has a more rural cross section with no shoulders, and the alignment includes horizontal and vertical curves. Farther east of the site,

Chipman Road narrows to a one-lane section as it enters a tunnel for a grade-separated railroad crossing. This one-lane section of roadway is controlled by a traffic signal on each side of the tunnel. The City of Lee's Summit has plans to widen this section of Chipman Road to three lanes with curb and gutter, add sidewalks, and eliminate the one-lane tunnel. These roadway improvements are designed and funded, therefore the improvements are included in the analyses.

View High Drive is a four-lane divided major arterial roadway with curb and gutter, sidewalks and a raised median. It has a posted speed limit of 40 m.p.h. adjacent to the development site. View High Drive runs north/south along the western edge of the development site. View High Drive provides access to I-470 via an interchange approximately one-half mile north of Chipman Road.

The city limit line between Lee's Summit and Kansas City runs along the west edge of the site, just east of View High Drive. Therefore, the segment of View High Drive that is adjacent to the development site is located in Kansas City along with a portion of Chipman Road and the intersection of Chipman Road and View High Drive.

Surrounding Land Uses

The proposed development site is located on vacant land and is situated in a partially developed area. North of the site, across Chipman Road, and south of the site, along View High Drive, are some large lot single-family residential homes which all have driveways that connect to either Chipman Road or View High Drive. Immediately east of the site is a residential subdivision. The land across View High Drive, west of the site is wooded and undeveloped.

Turning Movement Counts

Manual turning-movement traffic volume counts were collected at the intersection of Chipman Road and View High Drive on Thursday, August 21, 2014 from 4:00 to 6:00 P.M. and on Sunday, August 24, 2014 from 11:00 A.M. to 1:00 P.M. Based on the data collected, the peak hours in this area generally occur between 5:00 and 6:00 P.M. on weekdays and between 12:00 and 1:00 P.M. on Sundays. The Sunday period was chosen to be representative of the time church-related activities would most likely occur. The existing lane configurations, traffic control devices, and peak hour traffic volumes have been illustrated on ***Figure A-3***.

Approved Conditions

One development project has been approved by the City of Lee's Summit in recent years near the site. The Residences at New Longview is approved as an apartment complex with 309 units, and it is to be located approximately 1.25 miles south of the proposed site adjacent to Longview Road.

Future Traffic Projections

Based on discussion with City of Lee's Summit staff, reliable future traffic volume projections cannot be developed for the area since the city's travel demand model is currently being updated. The City is also updating the master plan for the View High Drive corridor. Therefore, the anticipated future land uses and development intensities are unknown at this time. Following the planned improvements project for

Chipman Road, both Chipman Road and View High Drive will be built-out, and there are no further plans to widen either roadway beyond the recommendations of this study.

Analysis

The scope of analysis for the assessment of the proposed development's impact on the surrounding transportation system is based in large part on the recommended practices of the Institute of Transportation Engineers (ITE), as outlined in their Traffic Engineering Handbook. ITE is a nationally-recognized organization of transportation professionals with members from both private and public sectors. The analysis of the proposed development's impact included development of trip generation and trip distribution estimates as well as a traffic operations assessment for each study scenario. Each of the analysis methodologies and findings are described in the subsequent sections.

Trip Generation

Trip generation estimates were prepared for the Phase I and Full Development scenarios using the Institute of Transportation Engineer's Trip Generation, 9th Edition. The trip generation calculations are summarized in ***Table 1***. Additional information regarding trip generation is included in ***Appendix B***.

Table 1
Trip Generation

Land Use	Intensity	ITE Code	Average Sunday	Average Weekday	Sunday Peak Hour			P.M. Peak Hour		
					Total	In	Out	Total	In	Out
Phase I Development										
Church	750 seats	560	1,388	458	458	229	229	*No Data Provided*		
	30,370 sf		890	280	373	183	190	16	8	8
Full Development										
Church	1,500 seats	560	2,775	915	915	458	458	*No Data Provided*		
	67,000 sf		1,409	610	717	351	366	28	13	15
Shopping Center	52,000 sf	820	---	4,440	*No Data Provided*			387	186	201
Total Full Development Trips			**2,775**	**5,050**	**915**	**458**	**458**	**415**	**199**	**216**

Trip Generation includes two methods for calculating trips for the church land use. The building square footage or the number of seats can be used. For the Sunday scenario, development trips for our analysis were calculated using the number of seats, as it is the more conservative of the two methods. The church land use does not provide data for trip generation estimates during the P.M. peak hour based on the number of seats in the building; therefore, the trips generated during the P.M. peak hour were calculated using the building square footage.

The proposed development plan includes a six-acre tract of land along the western edge of the site that is to be developed with commercial buildings. It was assumed that 20 percent of the six-acres will be developed into leasable floor area which results in the 52,000 square foot intensity that was used to calculate the development trips. The shopping center land use does not provide a method for estimating Sunday peak hour trips.

Trip Distribution

The estimated trips generated by the proposed development were distributed onto the street system based on the trip distributions summarized in ***Table 2***. These distributions are based on anticipated travel patterns and engineering judgment. The detailed distribution patterns through the study intersections are shown in ***Appendix B.***

Table 2
Trip Distribution

Direction To/From	Percentage
North on View High Drive	35%
South on View High Drive	35%
East on Chipman Road	30%
Total	**100%**

Traffic Operation Assessment

An assessment of traffic operations was made for the scenarios listed below.

- Existing Conditions
- Existing plus Approved Conditions
- Existing plus Approved plus Phase I Development Conditions
- Existing plus Approved plus Full Development Conditions

The study intersections were evaluated using the Synchro traffic analysis software package on the basis of the methodologies outlined in the Highway Capacity Manual (HCM), 2010 Edition, which is published by the Transportation Research Board. The operating conditions at an intersection are graded by the "level of service" experienced by drivers. Level of service (LOS) describes the quality of traffic operating conditions and is rated from "A" to "F". LOS A represents the most desirable conditions with free-flow movement of traffic with minimal delays. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in the average delay per stopped vehicle. Delay is measured in seconds per vehicle. ***Table 3***, on the next page, shows the upper limit of delay associated with each level of service for signalized and unsignalized intersections.

While one of the primary measurements of traffic operations, LOS, applies to both signalized and unsignalized intersections, there are significant differences between how these intersections operate and how they are evaluated. LOS for signalized intersections reflects the operation of the intersection as a whole. While the individual movements may operate with varying LOS ratings, that is largely a function of the signal timings and how the intersection is operating relative to other signals in the vicinity.

Table 3
Intersection Level of Service Delay Thresholds

Level of Service (LOS)	Signalized	Unsignalized
A	≤ 10 Seconds	≤ 10 Seconds
B	≤ 20 Seconds	≤ 15 Seconds
C	≤ 35 Seconds	≤ 25 Seconds
D	≤ 55 Seconds	≤ 35 Seconds
E	≤ 80 Seconds	≤ 50 Seconds
F	> 80 Seconds	> 50 Seconds

Unsignalized intersections, in contrast, are evaluated based on the movement or movement grouping which are required to stop or yield to other traffic. Typically, these are the left turns off of the major street and the side-street approaches for two-way stop-controlled intersections. Lower LOS ratings (D, E and F) do not, in themselves, indicate significant difficulties or the need for additional improvements. Many times there are convenient alternative paths to avoid the longer delays. Other times, the volumes on the unsignalized approaches are relatively low.

The decision to install a traffic signal, which is often considered when lower LOS ratings are projected, should be based on engineering studies and the warrants for traffic signal installation as outlined in the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD). Signals are typically not recommended in locations where there are convenient alternative paths, or the installation of a traffic signal would have negative impacts on the surrounding transportation system. For instance, if the new signalized intersection is located too close to existing traffic signals it may not be recommended despite meeting the minimum warrants.

The LOS rating deemed acceptable varies by community, facility type, and traffic control device. In Lee's Summit, LOS C has been identified as the minimum desirable goal for signalized and unsignalized intersections, while the City of Kansas City has designated LOS D as the minimum desirable goal for signalized and unsignalized intersections. At unsignalized intersections, lower LOS are often considered accepted for low to moderate traffic volumes where the installation of a traffic signal is not warranted by the conditions at the intersection or the location has been deemed undesirable for signalization for other reasons, e.g. the close proximity of an existing traffic signal or the presence of a convenient alternative path.

Existing Conditions

The results of the existing conditions intersection analyses are summarized on the following page in ***Table 4***. The study intersection was evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figure A-3.*** The Synchro output files are included in ***Appendix C***.

As shown in ***Table 4***, all movements at the study intersection currently operate within acceptable levels of service during each of the one-hour periods analyzed.

Table 4
Intersection Operational Analysis
Existing Conditions

Intersection / Movement	Sunday Peak Hour LOS[1]	Sunday Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
Chipman Road and View High Drive				
Southbound Left-Turn	*A*	*8.1*	*A*	*9.1*
Westbound Left-Turn	*B*	*12.6*	*C*	*22.1*
Westbound Right-Turn	*A*	*9.4*	*B*	*10.2*

1 – Level of Service
2 – Delay in seconds per vehicle

Existing plus Approved Conditions

The results of the Existing plus Approved conditions intersection analyses are summarized in ***Table 5.*** The development trips generated by the approved development in the vicinity of the site were compiled to account for traffic from the approved development which is not yet built. In this scenario, the development trips from the approved development were added to the existing P.M. peak hour traffic volumes at the study intersection and the Sunday peak hour traffic volumes remained the same as in the previous scenario. Detailed distribution of approved development traffic is shown in ***Appendix B***.

The study intersection was evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-4.*** The Synchro output files are included in ***Appendix C***.

Table 5
Intersection Operational Analysis
Existing plus Approved Conditions

Intersection / Movement	Sunday Peak Hour LOS[1]	Sunday Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
Chipman Road and View High Drive				
Southbound Left-Turn	*A*	*8.1*	*A*	*9.2*
Westbound Left-Turn	*B*	*12.6*	*C*	*23.8*
Westbound Right-Turn	*A*	*9.4*	*B*	*10.4*

1 – Level of Service
2 – Delay in seconds per vehicle

As shown in ***Table 5***, all movements at the study intersection are projected to operate within acceptable levels of service during each of the one-hour periods analyzed with the addition of traffic from the approved but unbuilt development in the vicinity of the project.

Existing plus Approved plus Phase 1 Development Conditions

The results of the Existing plus Approved plus Phase 1 Development conditions intersection analyses are summarized on the next page in ***Table 6***. This study scenario considered the addition of traffic from the Phase 1 portion of the proposed development of The Summit Church. The study intersections were

evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-5*** through ***A-7***. The Synchro output files are included in ***Appendix C***.

Table 6
Intersection Operational Analysis
Existing plus Approved plus Phase I Development Conditions

Intersection	Sunday Peak Hour		P.M. Peak Hour	
Movement	LOS[1]	Delay[2]	LOS[1]	Delay[2]
Chipman Road and View High Drive				
Southbound Left-Turn	*A*	*8.5*	*A*	*9.3*
Westbound Left-Turn	*C*	*18.5*	*C*	*24.4*
Westbound Right-Turn	*A*	*9.9*	*B*	*10.4*
Chipman Road and North Site Drive				
Northbound Left-Turn	*B*	*12.4*	*B*	*10.6*
Northbound Right-Turn	*A*	*9.5*	*A*	*9.8*
Westbound Left-Turn	*A*	*7.8*	*A*	*7.8*
View High Drive and South Site Drive				
Westbound Right-Turn	*A*	*9.7*	*B*	*10.1*

1 – Level of Service
2 – Delay in seconds per vehicle

According to the Lee's Summit Access Management Code, an eastbound right-turn lane should be constructed on Chipman Road at the north site driveway. However, there are several of overhead and underground utilities in the area where this turn lane would be constructed which could make construction of the lane more difficult and costly than would be expected of such an improvement. The turn lane does not appear to be needed from a traffic capacity standpoint because traffic volumes on Chipman Road are relatively low, especially during the Sunday peak hour. Further, since the intersection is just downstream from a stop controlled intersection, low vehicle speeds would be expected on Chipman Road near the north site driveway. In consideration of these findings an eastbound right –turn lane does not appear to be necessary on Chipman Road at the north site driveway intersection from an operational or safety perspective.

Based on the projected Existing plus Approved plus Phase I Development peak hour traffic volumes, it would be appropriate to construct the north site drive to include two outbound lanes to serve as separate left-turn and right-turn lanes and one inbound lane. The lane configuration is reflected in the analysis results, and all movements at the study intersections are projected operate within acceptable levels of service during the one-hour periods analyzed with the Phase I development traffic added to the street network.

Existing plus Approved plus Full Development Conditions

The results of the Existing plus Approved plus Full Development conditions intersection analyses are summarized in ***Table 7***. This study scenario considered the addition of traffic from the full development plan of the proposed Summit Church, and the commercial development site along View High Drive. The

study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-8*** through ***A-10***. The Synchro output files are included in ***Appendix C***.

Table 7
Intersection Operational Analysis
Existing plus Approved plus Full Development Conditions

Intersection / Movement	Sunday Peak Hour LOS[1]	Sunday Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
Chipman Road and View High Drive				
Southbound Left-Turn	*A*	*8.7*	*A*	*9.7*
Westbound Left-Turn	*C*	*18.8*	*D*	*32.7*
Westbound Right-Turn	*B*	*10.6*	*B*	*11.1*
Chipman Road and North Site Drive				
Northbound Left-Turn	*C*	*16.0*	*B*	*12.7*
Northbound Right-Turn	*B*	*10.2*	*B*	*10.5*
Westbound Left-Turn	*A*	*8.2*	*A*	*8.1*
View High Drive and South Site Drive				
Southbound Left-Turn	*A*	*8.0*	*A*	*8.6*
Westbound	*C*	*13.8*	*C*	*17.0*

1 – Level of Service
2 – Delay in seconds per vehicle

The addition of traffic for the full development of the site results in a heavy westbound left-turn volume at the Chipman Road and View High Drive intersection. The movement is projected to operate at LOS F during both of the peak hours. To improve this level of service, an alternate route can be provided for traffic exiting the site to travel south on View High Drive.

A median break should be constructed on View High Drive at the south site drive to allow for westbound left-turns at the intersection. In conjunction with the median break, a southbound left-turn lane should be constructed to be a minimum of 200 feet in length plus appropriate taper. Providing an additional access for drivers exiting the site to travel south on View High Drive will reduce the impact on the westbound left-turn movement at the intersection of Chipman Road and View High Drive. The median break and left-turn lane improvements are reflected in the analysis results, and all movements at the study intersections are projected operate within acceptable levels of service during the one-hour periods analyzed.

The northbound right-turn volume at the View High Drive and south site drive intersection is projected to be heavy during the Sunday scenario. As such, a northbound right-turn lane should be constructed along View High Drive at the south site driveway intersection. The right-turn lane should be a minimum of 150 feet in length plus appropriate taper. This turn lane is reflected in the analysis results.

Summary

TranSystems has completed this traffic impact study for the proposed Summit Church development to be located in the southeast quadrant of the intersection of Chipman Road and View High Drive in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

The proposed church is planned to be built in multiple phases. The analysis results from the Existing plus Approved plus Phase 1 Development scenario identifies the following improvements to mitigate the addition of Phase 1 development traffic:

- Construct the north site driveway to include two outbound lanes to serve as separate left-turn and right-turn lane and one inbound lane.

The analysis results from the Existing plus Approved plus Full Development scenario identifies the following improvements to mitigate the addition of full development traffic:

- Construct a median break and a southbound left-turn lane on View High Drive at the south site drive to provide a minimum of 200 feet of storage plus appropriate taper.
- Construct a northbound right-turn lane on View High Drive at the south site drive to provide a minimum of 150 feet of storage plus appropriate taper.

Appendix A - Figures

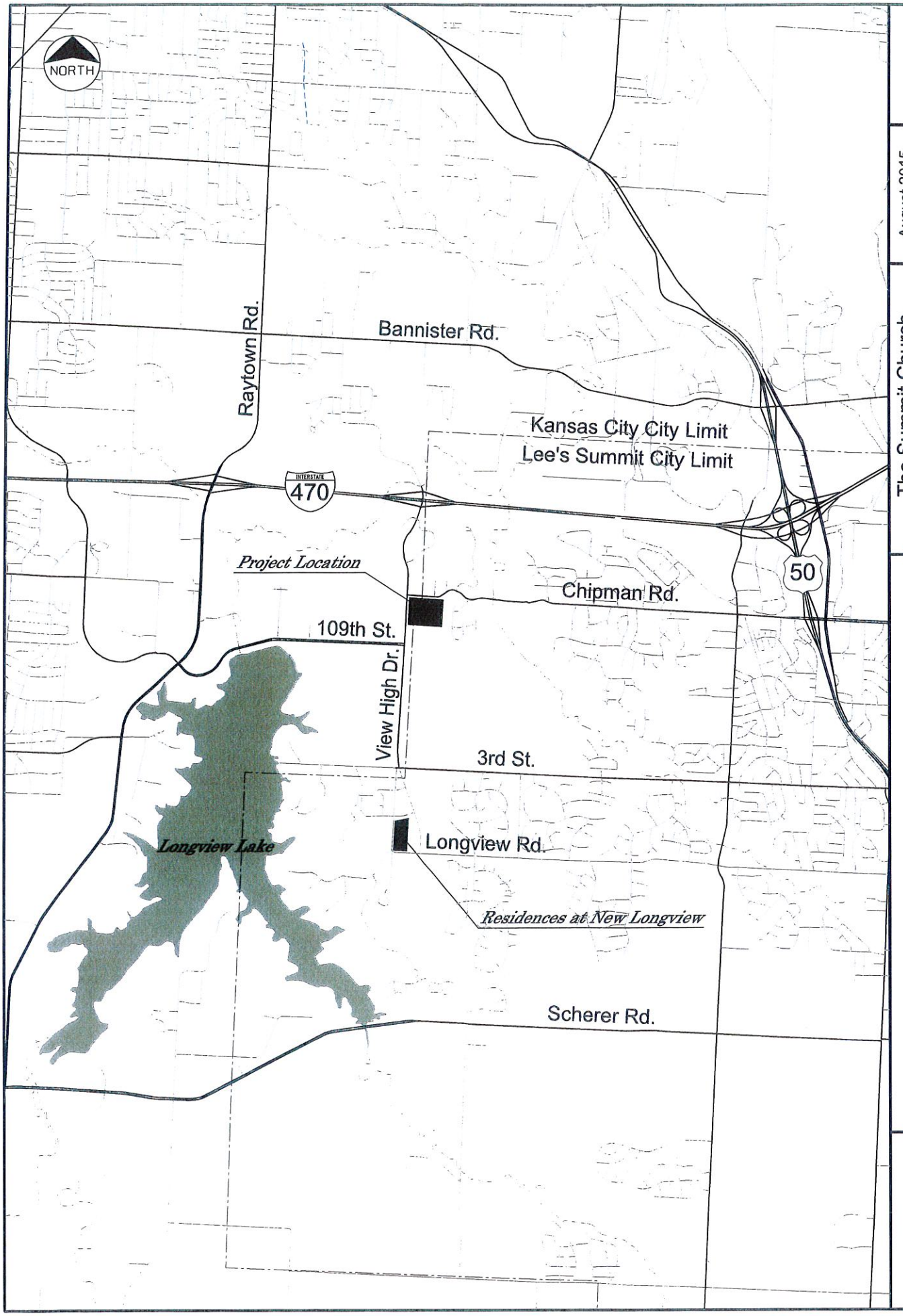

Figure A-1

August 2015

No Scale

The Summit Church
Traffic Impact Study
Lee's Summit, Missouri

LOCATION MAP

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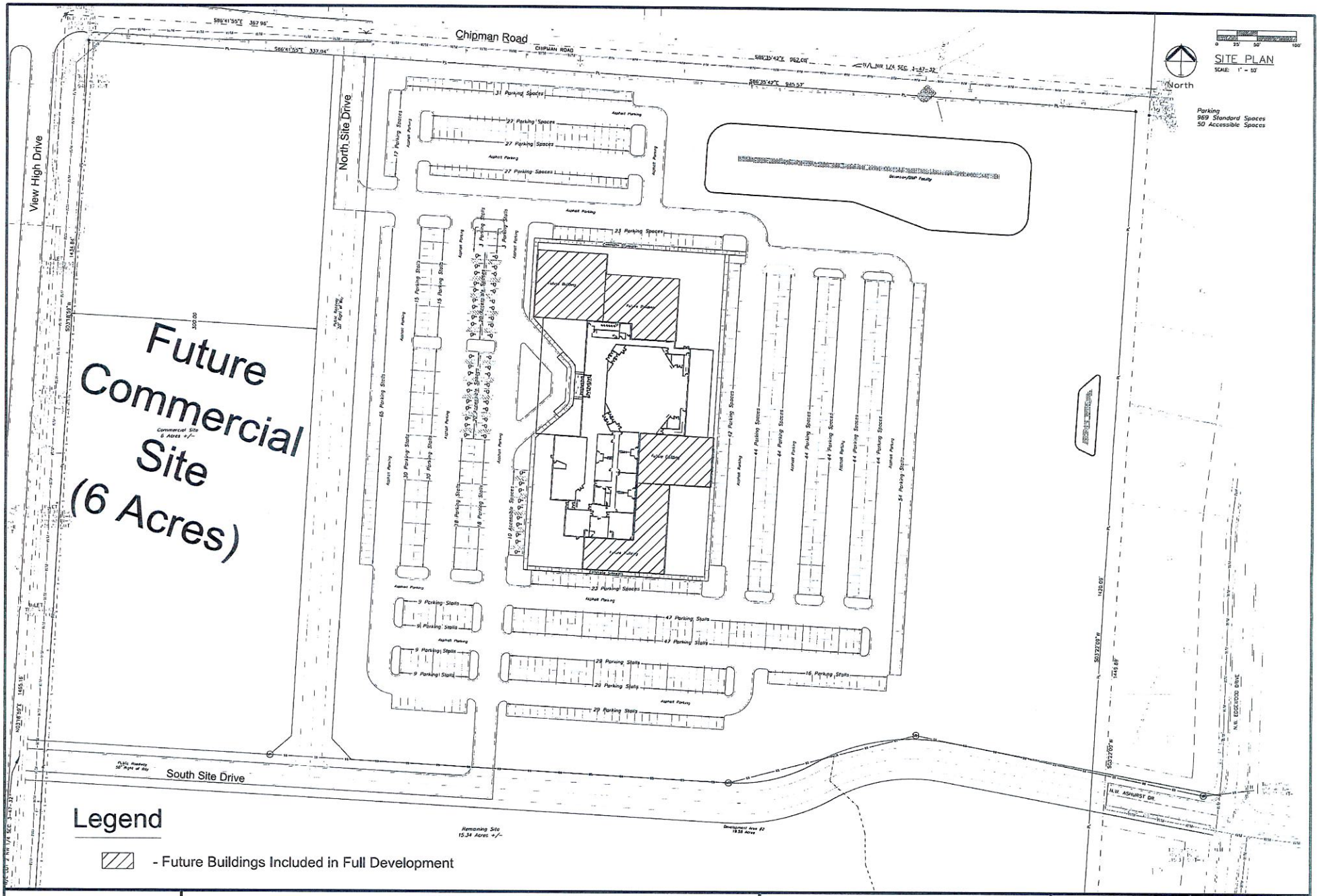

TranSystems	SITE PLAN	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 No Scale	Figure A-2

LANE CONFIGURATIONS

SUNDAY PEAK HOUR

P.M. PEAK HOUR

Legend

- Stop Sign
- Lane Configuration
- 123 - Total Hourly Volume

EXISTING CONDITIONS
LANE CONFIGURATIONS AND TRAFFIC VOLUMES

The Summit Church
Traffic Impact Study
Lee's Summit, Missouri

August 2015
No Scale

Figure A-3

TranSystems

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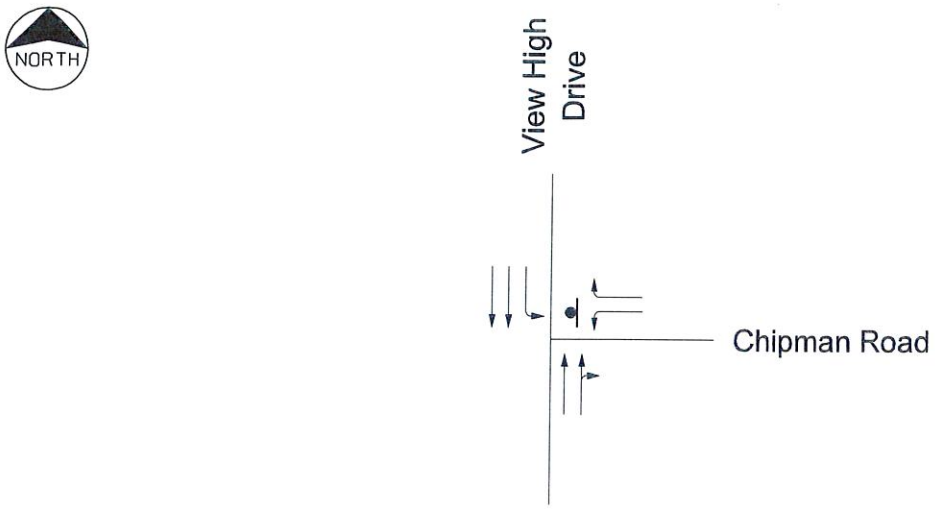
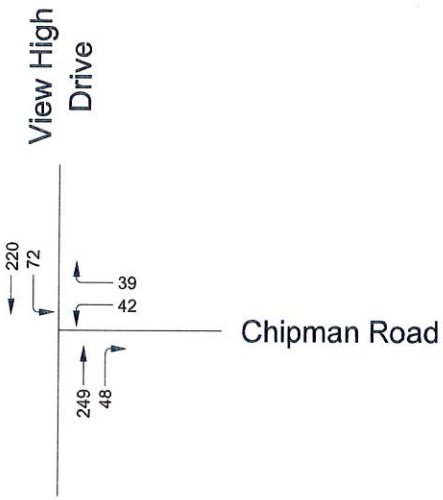
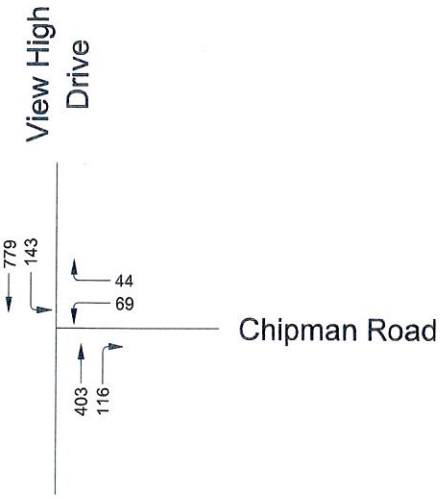


LANE CONFIGURATIONS



SUNDAY PEAK HOUR



P.M. PEAK HOUR

Legend

- Stop Sign
- Lane Configuration
- 123 - Total Hourly Volume

EXISTING PLUS APPROVED CONDITIONS
LANE CONFIGURATIONS AND TRAFFIC VOLUMES

The Summit Church
Traffic Impact Study
Lee's Summit, Missouri

August 2015
No Scale

Figure A-4

TranSystems

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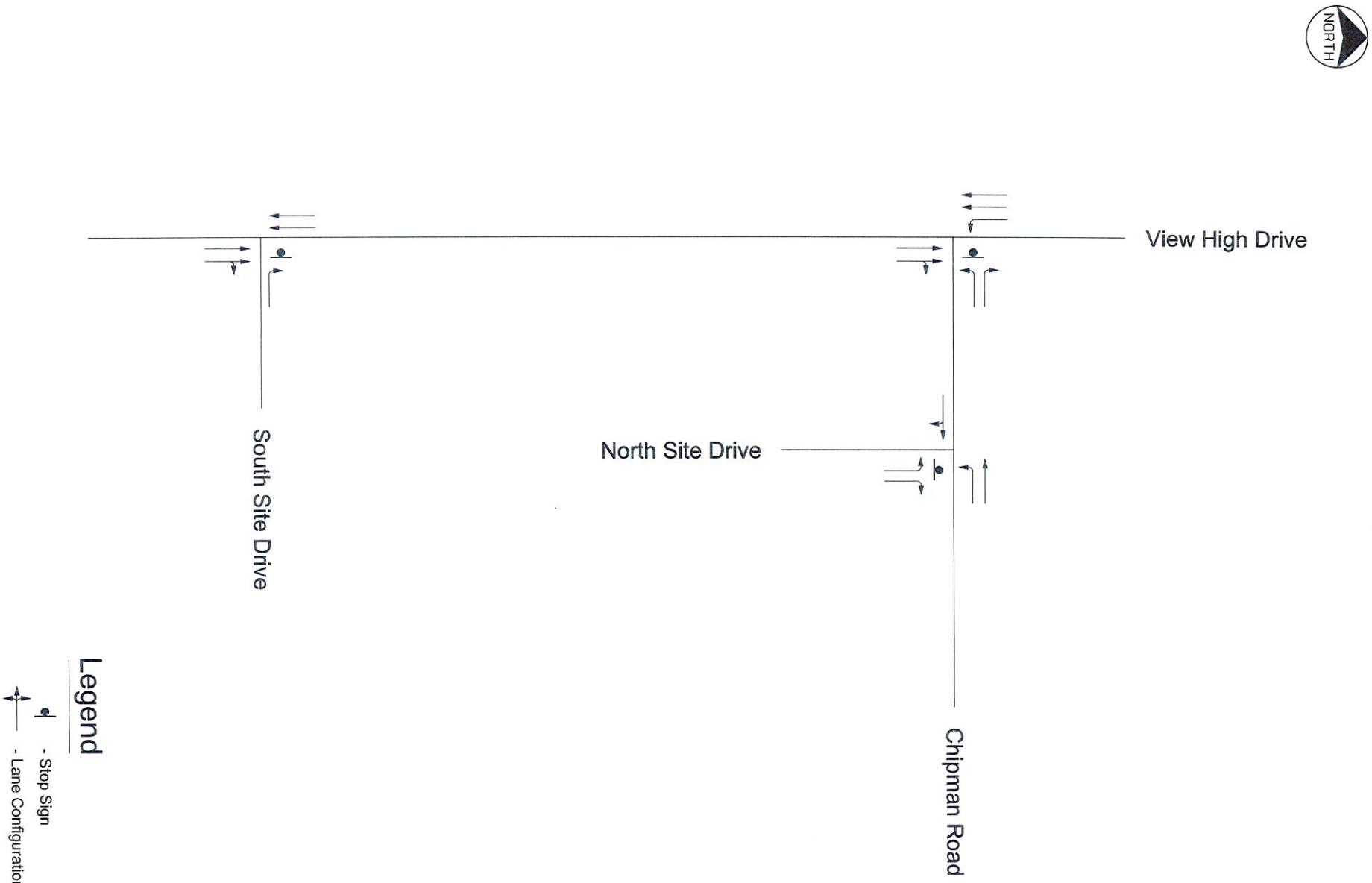

TranSystems	EXISTING PLUS APPROVED PLUS PHASE 1 DEVELOPMENT LANE CONFIGURATIONS	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 No Scale	Figure A-5

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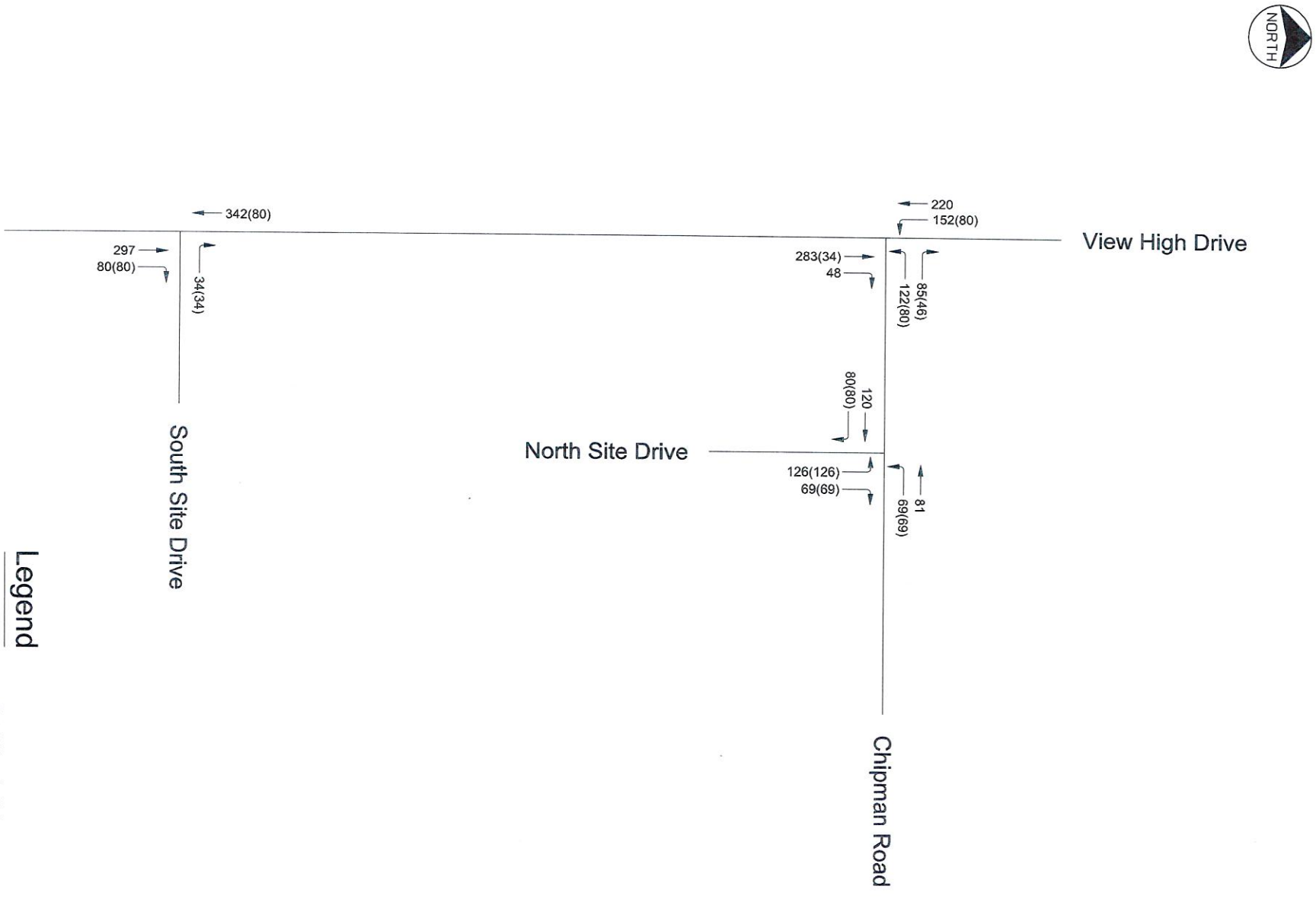

TranSystems	EXISTING PLUS APPROVED PLUS PHASE 1 DEVELOPMENT SUNDAY PEAK HOUR TRAFFIC VOLUMES	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 / No Scale	Figure A-6

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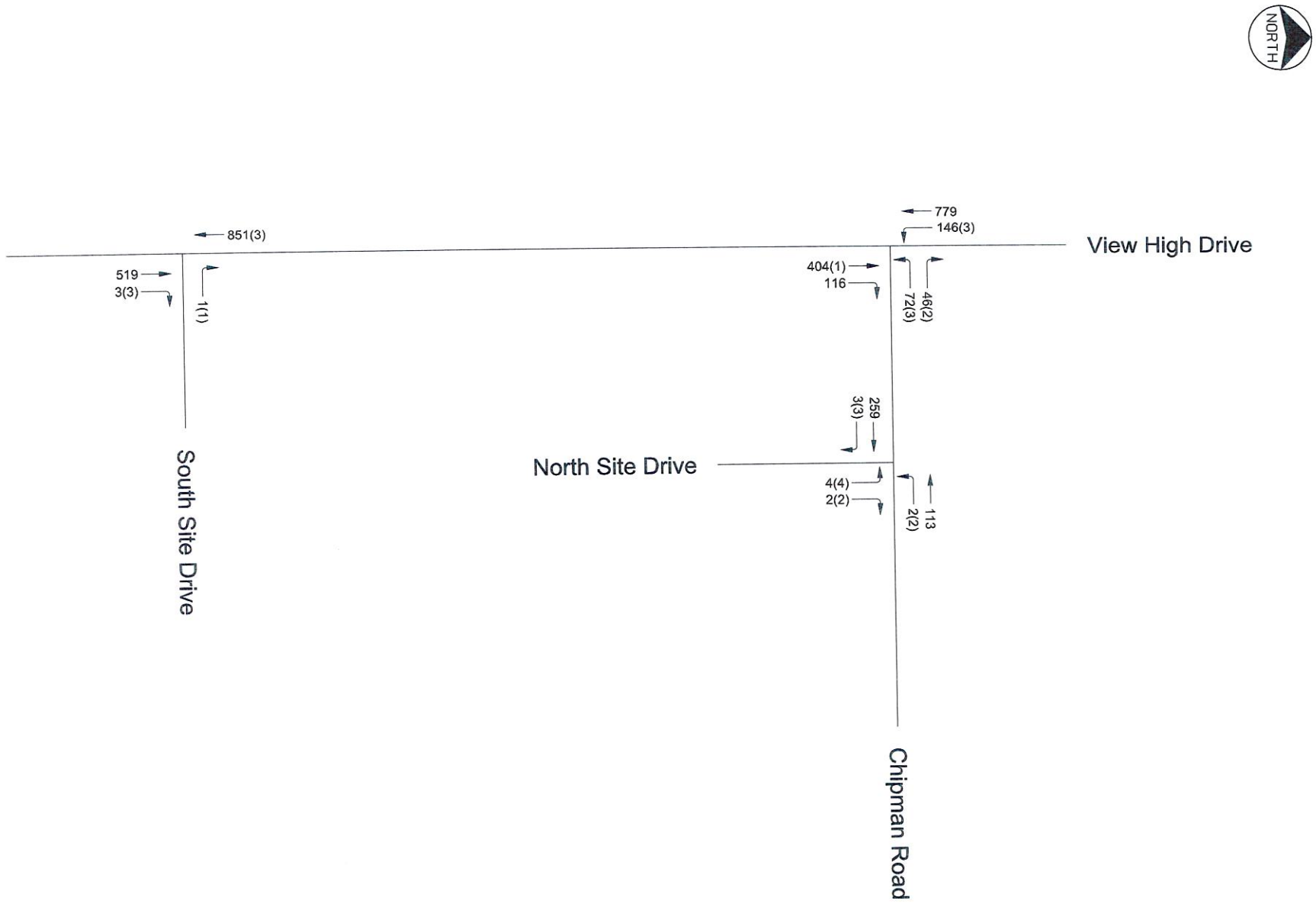

TranSystems	EXISTING PLUS APPROVED PLUS PHASE 1 DEVELOPMENT P.M. PEAK HOUR TRAFFIC VOLUMES	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 No Scale	Figure A-7

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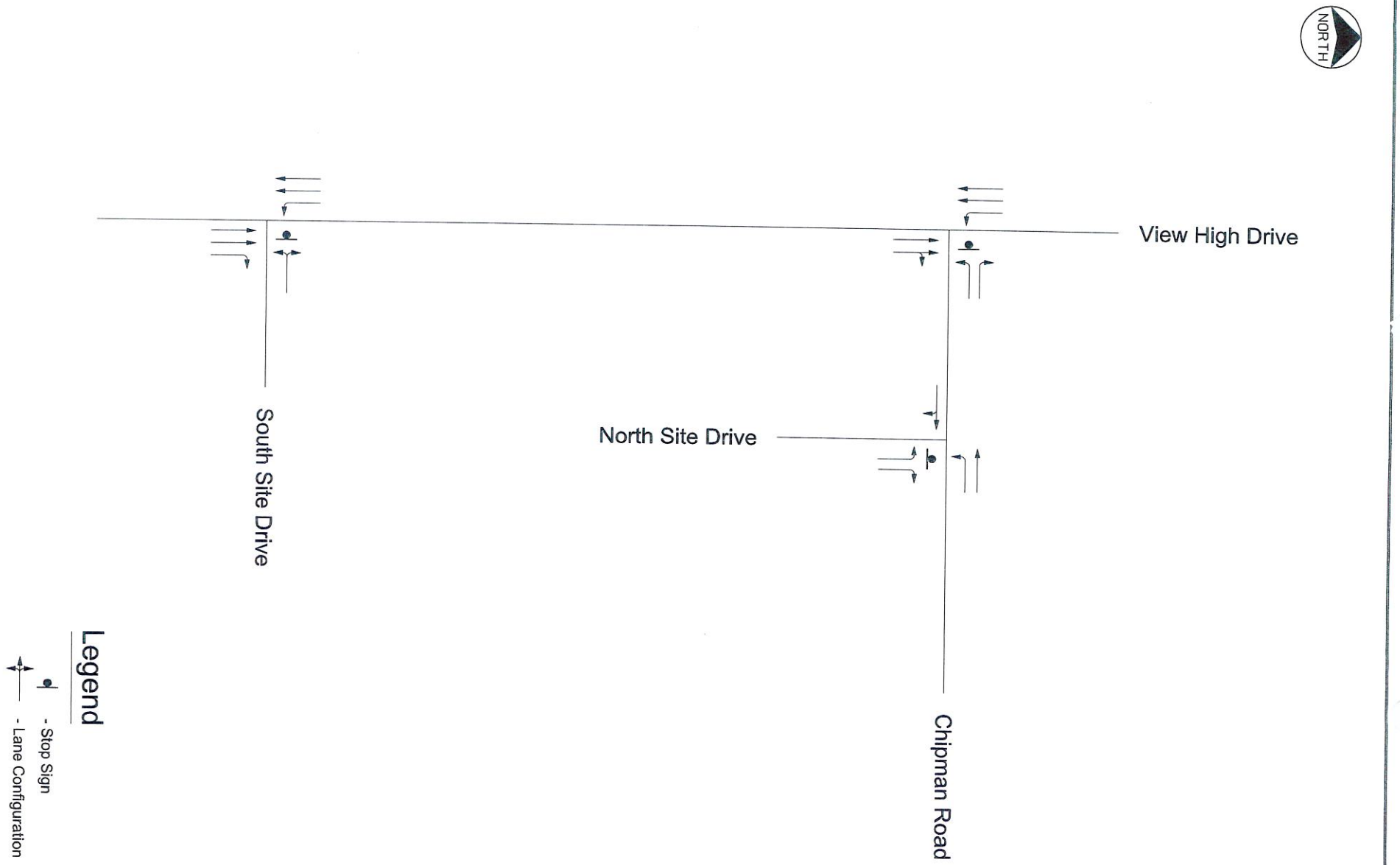

TranSystems	EXISTING PLUS APPROVED PLUS FULL DEVELOPMENT LANE CONFIGURATIONS	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 / No Scale	Figure A-8

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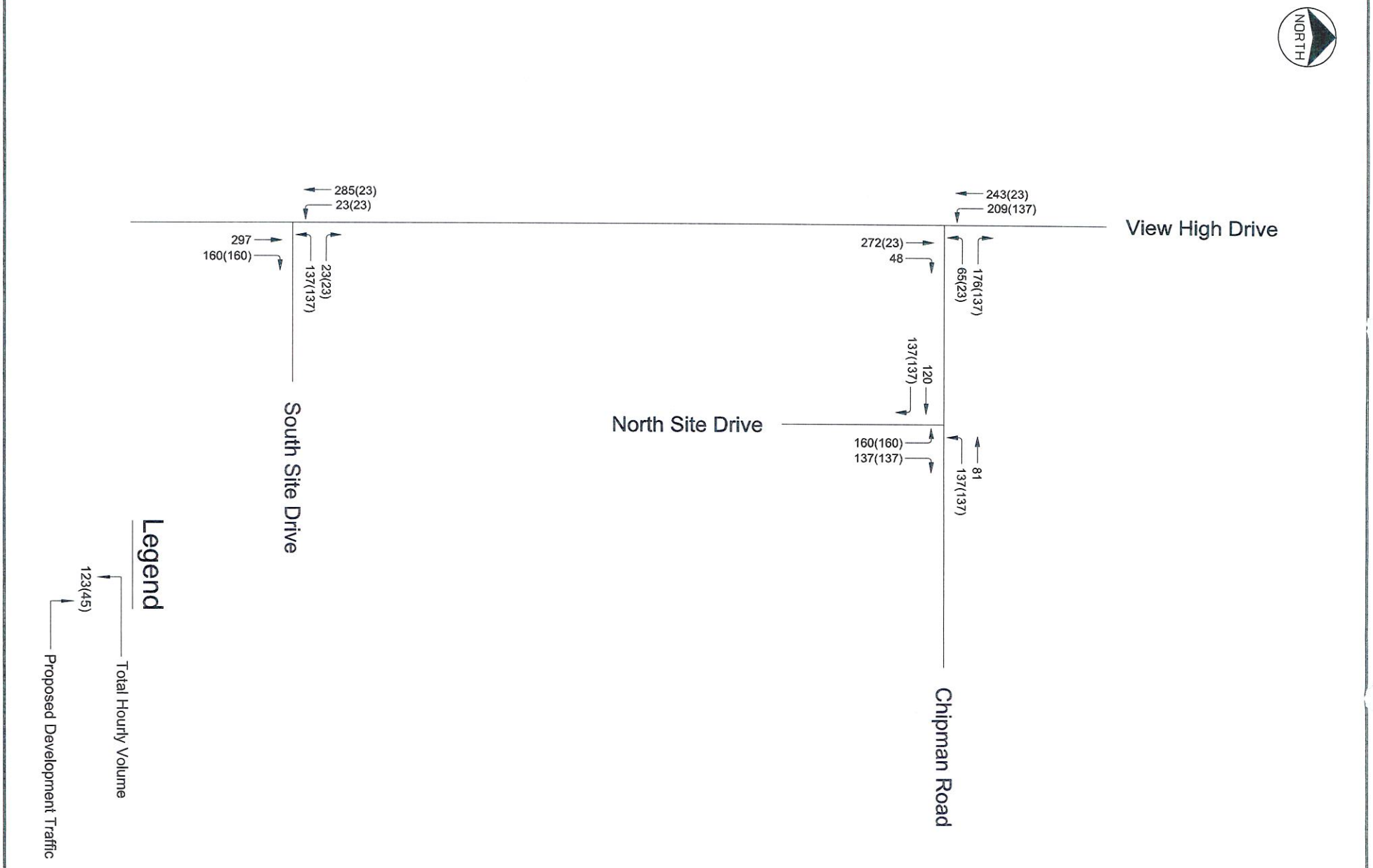

TranSystems	EXISTING PLUS APPROVED PLUS FULL DEVELOPMENT SUNDAY PEAK HOUR TRAFFIC VOLUMES	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 / No Scale	Figure A-9

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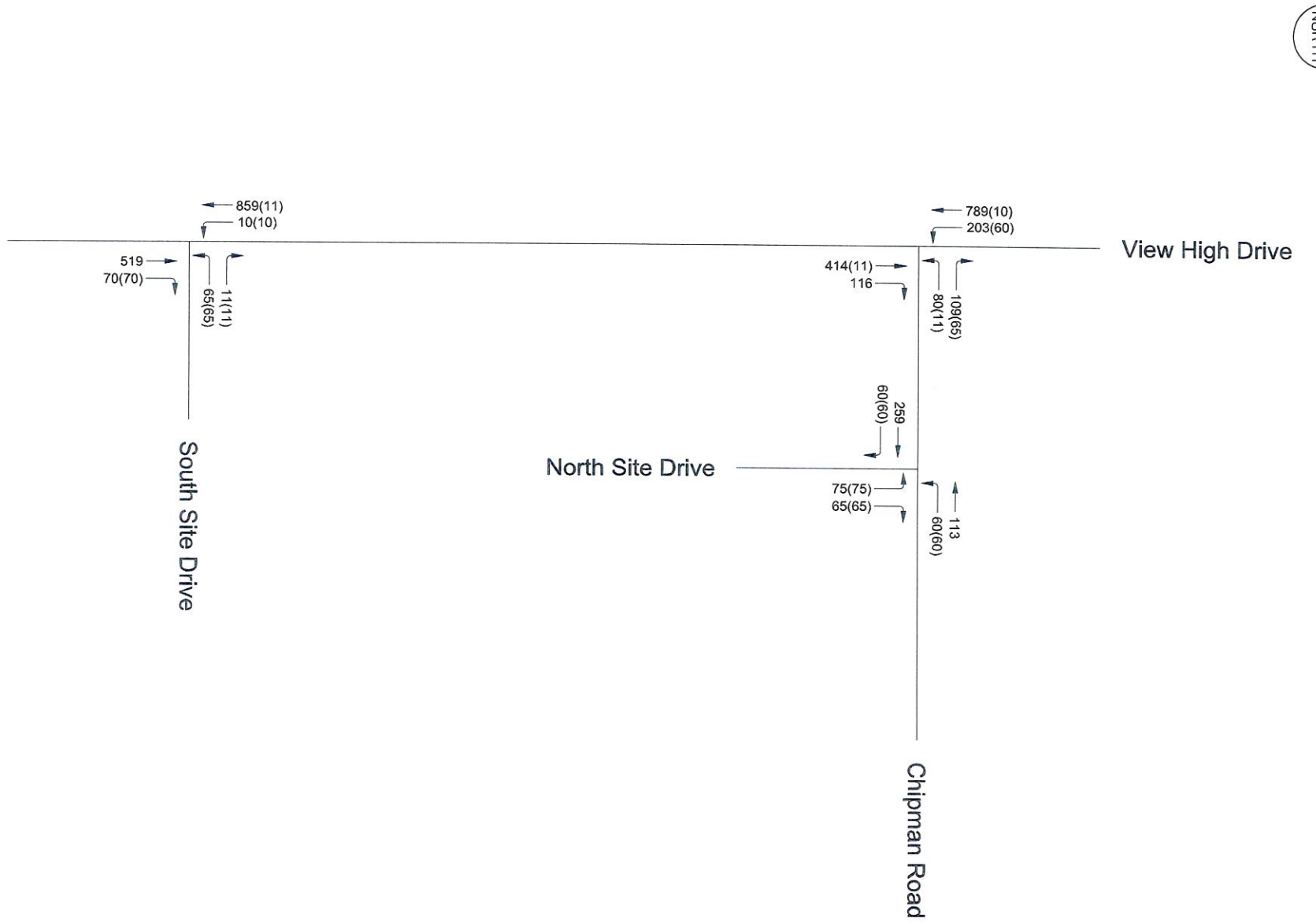


TranSystems	EXISTING PLUS APPROVED PLUS FULL DEVELOPMENT P.M. PEAK HOUR TRAFFIC VOLUMES	The Summit Church Traffic Impact Study Lee's Summit, Missouri	August 2015 No Scale	Figure A-10

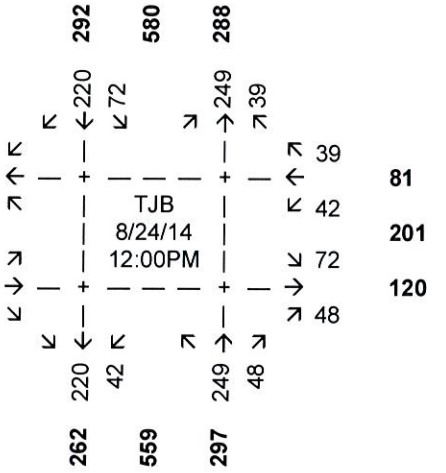
Appendix B - Trip Generation and Distribution

See attached worksheets.

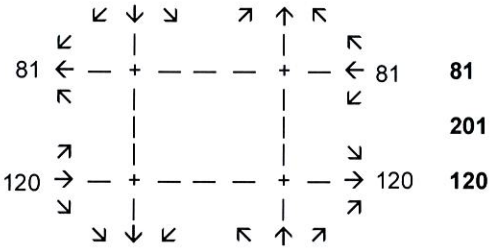
The Summit Church
Lee's Summit, Missouri

Existing Traffic Volumes
Sunday Peak Hour

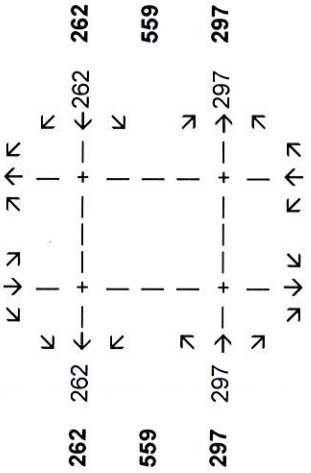
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



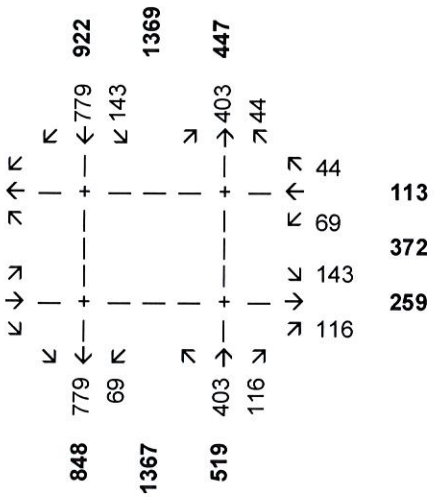
View High Dr. and South Site Drive



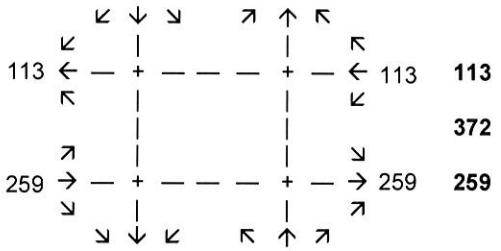
The Summit Church
Lee's Summit, Missouri

Existing plus Approved Traffic Volumes
Weekday PM Peak Hour

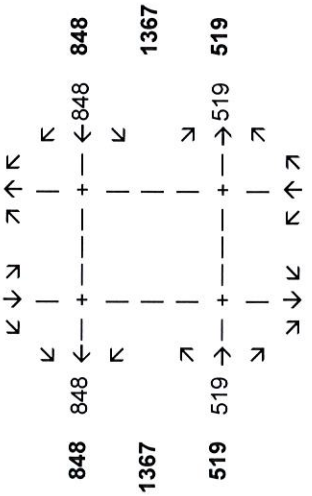
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



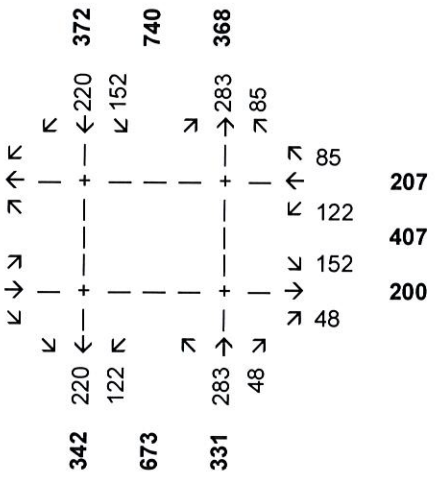
View High Dr. and South Site Drive



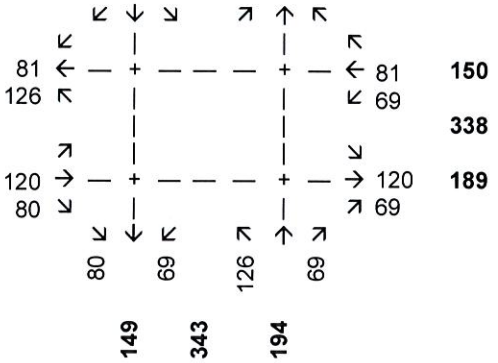
The Summit Church
Lee's Summit, Missouri

Existing plus Approved plus Phase I Traffic Volumes
Sunday Peak Hour

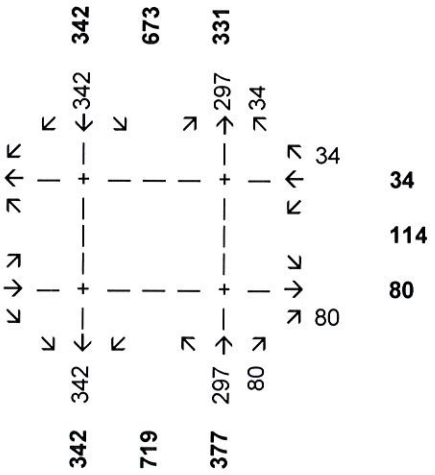
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



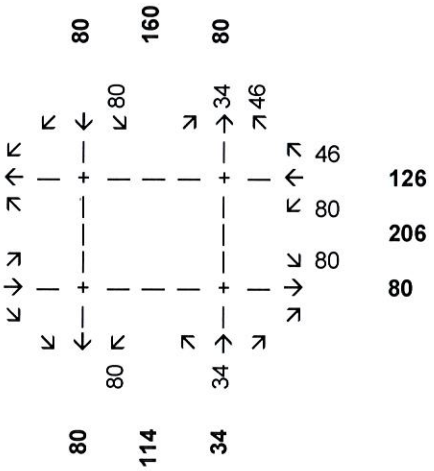
View High Dr. and South Site Drive



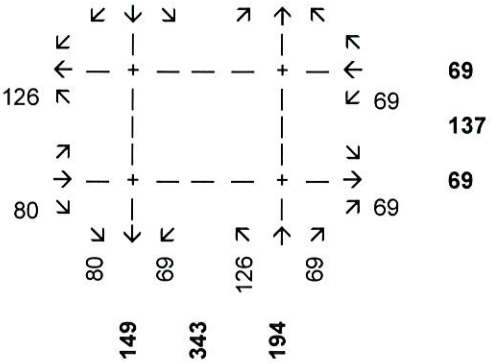
The Summit Church
Lee's Summit, Missouri

Phase I Development Trips
Sunday Peak Hour

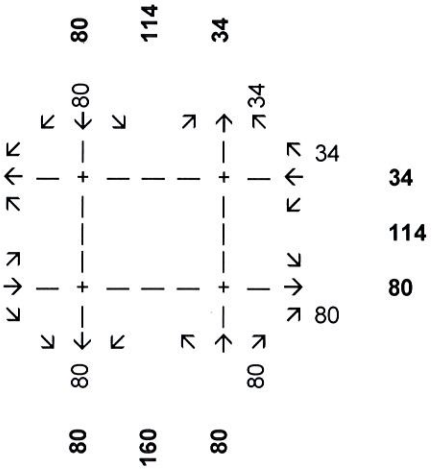
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



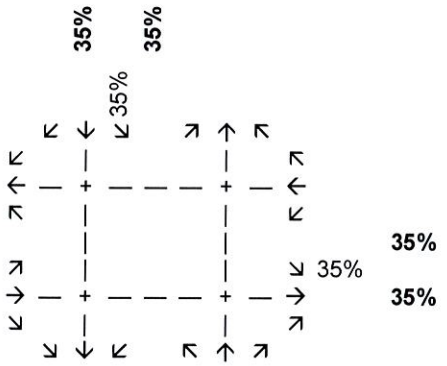
View High Dr. and South Site Drive



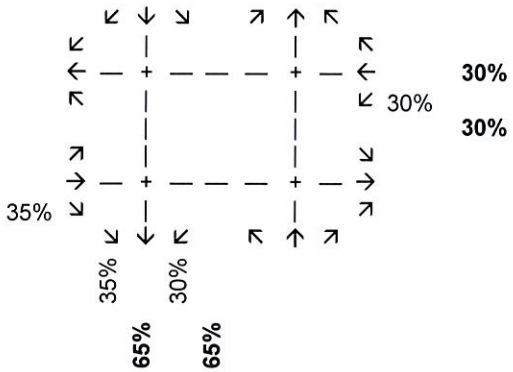
The Summit Church
Lee's Summit, Missouri

Phase I Trip Distribution
Inbound

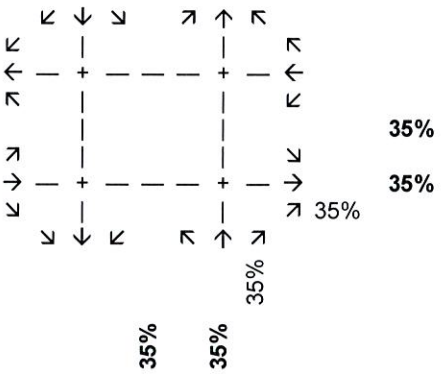
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



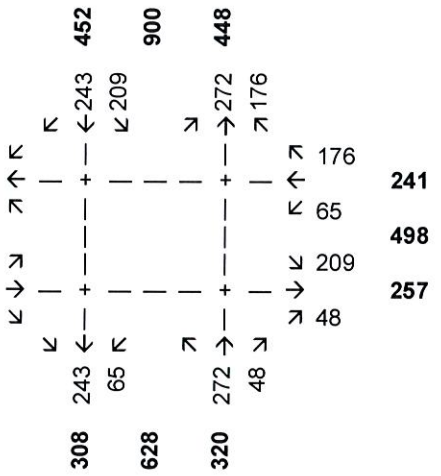
View High Dr. and South Site Drive



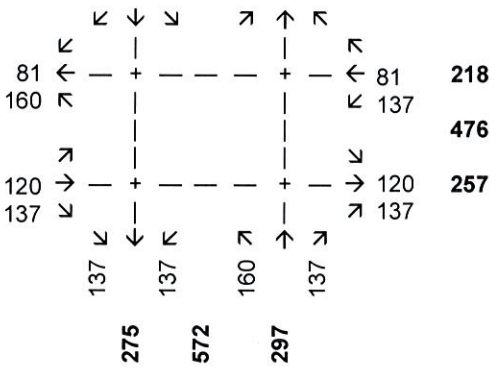
The Summit Church
Lee's Summit, Missouri

Existing plus Approved plus Full Development Traffic Volumes
Sunday Peak Hour

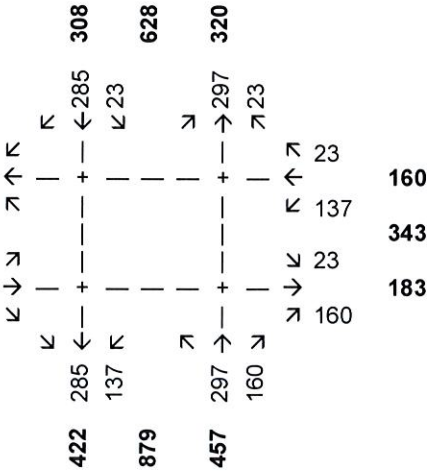
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



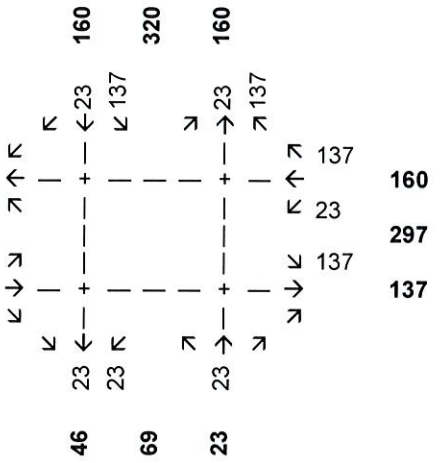
View High Dr. and South Site Drive



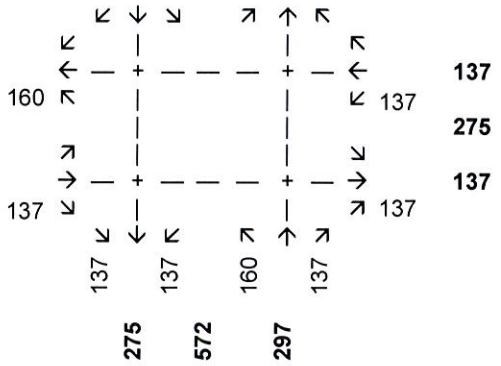
The Summit Church
Lee's Summit, Missouri

Full Development Trips (Church)
Sunday Peak Hour

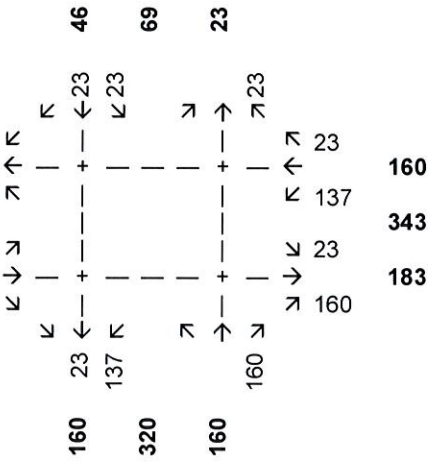
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



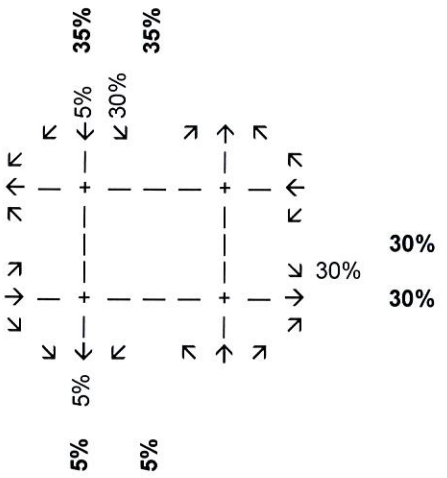
View High Dr. and South Site Drive



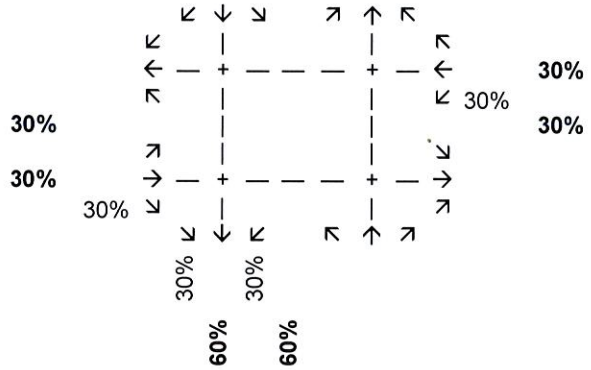
The Summit Church
Lee's Summit, Missouri

Full Development Trip Distribution
Inbound

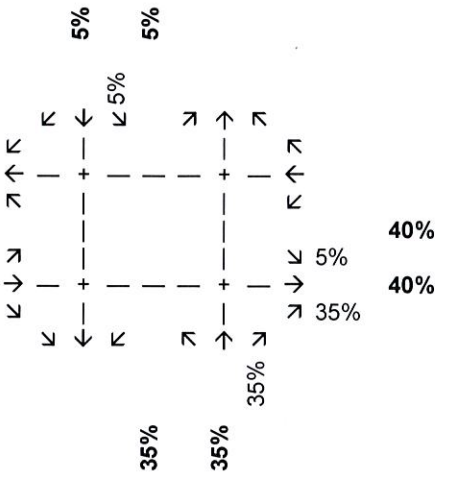
View High Dr. and Chipman Rd.



Chipman Rd. and North Site Drive



View High Dr. and South Site Drive



Appendix C – Capacity Analysis Reports

See attached Reports.

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	69	44	363	116	143	704
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	140	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	48	395	126	155	765

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1151	260	0	0	521	0
Stage 1	458	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	191	739	-	-	1041	-
Stage 1	604	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	163	739	-	-	1041	-
Mov Cap-2 Maneuver	285	-	-	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	389	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.5	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	285	739	1041	-
HCM Lane V/C Ratio	-	-	0.263	0.065	0.149	-
HCM Control Delay (s)	-	-	22.1	10.2	9.1	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1	0.2	0.5	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	69	44	403	116	143	779
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	140	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	48	438	126	155	847

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1235	282	0	0	564	0
Stage 1	501	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	169	715	-	-	1004	-
Stage 1	574	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	143	715	-	-	1004	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	574	-	-	-	-	-
Stage 2	369	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.6	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	266	715	1004	-
HCM Lane V/C Ratio	-	-	0.282	0.067	0.155	-
HCM Control Delay (s)	-	-	23.8	10.4	9.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.1	0.2	0.5	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	120	80	69	81	126	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	130	87	75	88	137	75

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	217	0	412	174
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	238	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1353	-	596	869
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1353	-	563	869
Mov Cap-2 Maneuver	-	-	-	-	621	-
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	758	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.6	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	621	869	-	-	1353	-
HCM Lane V/C Ratio	0.221	0.086	-	-	0.055	-
HCM Control Delay (s)	12.4	9.5	-	-	7.8	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.8	0.3	-	-	0.2	-

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	72	46	404	116	146	779
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	140	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	78	50	439	126	159	847

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1243	283	0	0	565	0
Stage 1	502	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	167	714	-	-	1003	-
Stage 1	573	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	141	714	-	-	1003	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	364	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.9	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	263	714	1003	-
HCM Lane V/C Ratio	-	-	0.298	0.07	0.158	-
HCM Control Delay (s)	-	-	24.4	10.4	9.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	0.2	0.6	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	1	519	3	0	851
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1	564	3	0	925

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1029	284	0	0	567	0
Stage 1	566	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	230	713	-	-	1001	-
Stage 1	532	-	-	-	-	-
Stage 2	600	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	230	713	-	-	1001	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	532	-	-	-	-	-
Stage 2	600	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	713	1001	-
HCM Lane V/C Ratio	-	-	0.002	-	-
HCM Control Delay (s)	-	-	10.1	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	6.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	120	137	137	81	160	137
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	130	149	149	88	174	149

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	279	0	591	205
Stage 1	-	-	-	-	205	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1284	-	470	836
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	687	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1284	-	415	836
Mov Cap-2 Maneuver	-	-	-	-	499	-
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	607	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.1	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	499	836	-	-	1284	-
HCM Lane V/C Ratio	0.349	0.178	-	-	0.116	-
HCM Control Delay (s)	16	10.2	-	-	8.2	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.5	0.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	80	109	414	116	203	789
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	165	0	-	-	140	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	118	450	126	221	858

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1383	288	0	0	576	0
Stage 1	513	-	-	-	-	-
Stage 2	870	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	135	709	-	-	993	-
Stage 1	566	-	-	-	-	-
Stage 2	370	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	105	709	-	-	993	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	566	-	-	-	-	-
Stage 2	288	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.2	0	2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	215	709	993	-
HCM Lane V/C Ratio	-	-	0.404	0.167	0.222	-
HCM Control Delay (s)	-	-	32.7	11.1	9.7	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	1.8	0.6	0.8	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	65	11	519	70	10	859
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	150	200	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	12	564	76	11	934

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1053	282	0	0	564	0
Stage 1	564	-	-	-	-	-
Stage 2	489	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	222	715	-	-	1004	-
Stage 1	533	-	-	-	-	-
Stage 2	582	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	220	715	-	-	1004	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	533	-	-	-	-	-
Stage 2	576	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	381	1004	-
HCM Lane V/C Ratio	-	-	0.217	0.011	-
HCM Control Delay (s)	-	-	17	8.6	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0	-