-2016-145
-2016-147

Traffic Impact Study

3rd Street and View High Drive
Lee's Summit, Missouri

Prepared for:

Parrot Properties, Inc.

Prepared by TranSystems

July 2016

TranSystems
EXPERIENCE | Transportation

TranSystems
2400 Pershing Road
Suite 400
Kansas City, MO 64108
Tel 816 329 8600
Fax 816 329 8601
www.transystems.com

July 21, 2016

Mr. John Bondon
Parrot Properties, Inc.
11303 View High Drive
Kansas City, MO 64134

RE: 3rd Street and View High Traffic Impact Study
Lee's Summit, Missouri

Dear Mr. Bondon:

In response to your request and authorization, TranSystems has completed a traffic impact study for the proposed mixed-use development to be located generally in the northeast corner of the 3rd Street and View High Drive intersection 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 impact of the proposed development on the adjacent street network and identified improvements to mitigate deficiencies for the following scenarios:

- Existing Conditions
- Existing plus Approved
- Existing plus Approved plus Development Conditions
- Future Year 2040 Conditions

We trust that the enclosed information proves beneficial to you and the City of Lee's Summit and the City of Kansas City 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: _____
Chris Roberts, EIT

JJW:CSR/jw/P101160197
Enclosure

Introduction

TranSystems has completed a traffic impact study for the proposed mixed-use development to be located generally in the northeast corner of the 3rd Street and View High Drive intersection 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 development site relative to the major streets in the area is shown on ***Figure A-1*** in ***Appendix A***. This study also contains a description of the proposed development and the surrounding transportation infrastructure along with trip generation estimates, trip distribution estimates, capacity analyses, and a summary of the findings.

Proposed Development Plan

The proposed development consists of commercial land uses, senior adult housing, and apartments. The commercial land uses are included in several buildings and pad sites in the southern portion of the development, adjacent to 3rd Street and to View High Drive. The total size of the commercial uses is 256,766 square feet. The northern portion of the site includes a 304-unit apartment complex. To the east of the apartment complex is a senior adult housing facility.

Four access points will be provided for the development. There will be two new driveways onto View High Drive, one of which will be a full-access driveway, aligning with the existing golf course driveway, referred to in this study as Drive A. Drive B will be located roughly 660 feet to the south of Drive A, and will be limited to right-turn movements only. Drive C is a new full-access driveway on the north side of 3rd Street aligning with an existing driveway on the south side of the street, roughly 700 feet east of View High Drive. The final access point will be an extension of Kessler Drive, to the north of 3rd Street. A copy of the proposed site plan showing the access points 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 A.M. and P.M. periods.

- Chipman Road and View High Drive
- 109th Street and View High Drive
- View High Drive and golf course driveway
- 3rd Street and View High Drive
- 3rd Street and driveway 700 feet east of View High Drive
- 3rd Street and Kessler Drive
- 3rd Street and Bridlewood Drive

Traffic Counts

Turning-movement traffic volume counts were collected at most of the study intersections on Tuesday, May 17, 2016 and Wednesday, May 18, 2016. The count at View High Drive and 109th Street was

collected on Tuesday, May 24, 2016, and the City of Lee's Summit provided a count for 3rd Street and Bridlewood Drive which was collected on Thursday, April 26, 2016.

The turning movement counts were collected at each intersection from 7:00 to 9:00 A.M. and from 4:00 to 6:00 P.M., with the exception of the city provided count at 3rd Street and Bridlewood Drive which was conducted from 7:00 to 8:30 A.M. and 4:30 to 6:00 P.M. The A.M. peak hour for all intersections occurred between 7:00 and 8:00 A.M., while the P.M. peak hour generally occurred between 5:00 and 6:00 P.M. The existing lane configurations, traffic control devices, and peak hour traffic volumes have been illustrated on ***Figures A-3*** through ***A-5***.

Surrounding Street Network and Land Uses

View High Drive is a four-lane divided major arterial roadway with curbs and gutters and a raised median. It has a posted speed limit of 45 mph adjacent to the development site. View High Drive runs north/south along the western edge of the development site. The city limit line for Lee's Summit and Kansas City also runs north/south, and is located less than 100 feet east of View High Drive. Therefore, the segment of View High Drive that is adjacent to the development site is located within Kansas City. View High Drive provides access to the regional highway system via an interchange with I-470, approximately one-half mile north of Chipman Road.

Along the south edge of the site, 3rd Street is a four-lane divided major arterial roadway with curbs and gutters and a raised median. There is sidewalk along the south side of 3rd Street, and a shared use path along the north side. The posted speed limit for 3rd Street is 40 mph. There are several intersections along 3rd Street, some of which have median breaks and turn lanes.

The development site itself currently consists of undeveloped agricultural land and several single-family residences along View High Drive. There are a variety of different land uses surrounding the site. To the west across View High Drive is the Fred Arbanas Golf Course and Longview Lake Park. South of the site across 3rd Street are the New Longview commercial and residential developments, some of which have not yet been completed. East of the site is the Winterset single-family residential development, which is also not fully built out. North of the site the land is mostly undeveloped with some single-family residences along View High Drive.

Approved Developments

A number of developments have been approved by Lee's Summit in recent years in the vicinity of the site, including New Longview Commercial, Residences at New Longview, Winterset Valley, Goddard School, Kessler Ridge, Autumn Leaves and Summit Church. The land uses for these developments are residential, commercial and institutional. City staff provided traffic impact studies for these developments. The locations of the approved developments are shown on the map on ***Figure A-6*** in ***Appendix A***.

At the time of this study the approved developments are in different stages of the development process. Kessler Ridge, Goddard School, Autumn Leaves and Summit Church have all started construction but

are not operational. The Residences at New Longview development is 90-percent complete and occupied, while the most recent phases of Winterset Valley are approximately 10-percent complete and occupied. Portions of the some of the New Longview Commercial development are also complete and operational.

Future Traffic Volume Projections

Future traffic projections for this study were developed using future volumes provided by Lee's Summit staff from the City's travel demand model. Daily traffic volumes were provided from the 2040 model for the major streets surrounding the site. These 2040 volumes were compared to current daily traffic volumes for the same streets, which are shown on the City's traffic count map. In general, the traffic model projects traffic volumes on the streets adjacent to the site increase at a rate of 0.8% per year. This growth rate was then applied to the existing traffic volumes to establish background traffic volumes for future year 2040 conditions.

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 using the Institute of Transportation Engineer's Trip Generation, 9th Edition. ***Table 1*** below shows the expected trips to be generated by the proposed development.

Table 1
Trip Generation

Land Use	Intensity	ITE Code	Average Weekday	A.M. Peak Hour			P.M. Peak Hour		
				Total	In	Out	Total	In	Out
Shopping Center	256,766 sf	820	12,535	278	172	106	1,127	541	586
Senior Adult Housing - Attached	25 du	252	96	5	2	3	8	4	4
Apartments	304 du	220	1,966	153	31	122	185	120	65
Total New Development Trips			***14,597***	***436***	***205***	***231***	***85***	***88***	***29***

Trip Distribution

The estimated trips generated by the proposed development were distributed onto the surrounding grid street network based on the trip distributions summarized on the following page in ***Table 2***. These

distributions are based on existing travel patterns, expected service area of the development, and engineering judgment. The detailed distribution patterns through the study intersections are shown in ***Appendix B***.

Table 2
Trip Distribution

Direction To/From	Retail Percentage	Residential Percentage
North on View High Drive	40%	60%
East on Chipman Road	10%	5%
East on 3rd Street	40%	30%
South on Longview Boulevard	10%	5%
Total	**100%**	**100%**

Traffic Operation Assessment

An assessment of traffic operations was made for the scenarios listed below. These scenarios allowed for comparison of the before and after impacts of the proposed development on the street network.

- Existing Conditions
- Existing plus Approved Conditions
- Existing plus Approved plus Development Conditions
- Future Year 2040 Conditions

The study intersections were evaluated using the Synchro traffic analysis software package. Calculations were performed based on the methodologies outlined in the Highway Capacity Manual (HCM), 2000 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 least congested condition with free-flow movement of traffic and 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*** shows the upper limit of delay associated with each level of service for signalized and unsignalized intersections.

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

While LOS measurements apply 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.

Unsignalized intersections, in contrast, are evaluated based on the movement groupings which are required to 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. At unsignalized intersections lower LOS ratings (D, E and F) do not, in themselves, indicate 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 minor when compared to the major street traffic, and traffic signal installation may increase the average delay to all users of the intersection.

Traffic queues are also evaluated as part of the analyses. Long traffic queues which extend beyond the amount of storage available, either between intersections or within turn lanes, can have significant impacts on operations. The projected vehicular queues are analyzed to ensure the analyses are reflective of the physical constraints of the study intersections and to identify if additional storage is needed for turn lanes.

The LOS rating deemed acceptable varies by community, facility type and traffic control device. The City of Lee's Summit has designated LOS C, and the City of Kansas City has designated LOS D as the minimum desirable standard for signalized intersections. At unsignalized intersections LOS D, E, or even F are often considered acceptable 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.

Existing Conditions

The results of the Existing Conditions intersection analyses are summarized in ***Table 4***. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-3*** through ***A-5***. The Synchro output files are included in ***Appendix C***.

Table 4
Intersection Operational Analysis
Existing Conditions

Intersection	A.M. Peak Hour		P.M. Peak Hour	
Movement	LOS[1]	Delay[2]	LOS[1]	Delay[2]
Chipman Road and View High Drive				
Westbound Left-Turn	*C*	*20.1*	***D***	***28.2***
Westbound Right-Turn	*B*	*11.5*	*B*	*10.1*
Southbound Left-Turn	*A*	*9.5*	*A*	*8.7*
109th Street and View High Drive				
Eastbound Left-Turn	*C*	*20.9*	***D***	***34.6***
Eastbound Right-Turn	*A*	*9.1*	*B*	*14.8*
Northbound Left-Turn	*A*	*8.1*	*A*	*9.6*

Table 4 – Continued
Intersection Operational Analysis
Existing Conditions

Intersection	A.M. Peak Hour		P.M. Peak Hour	
Movement	LOS[1]	Delay[2]	LOS[1]	Delay[2]
View High Drive and golf course drive				
Eastbound	*B*	*10.5*	*B*	*10.5*
Northbound Left-Turn	*A*	*7.6*	*C*	*21.1*
3rd Street and View High Drive				
Traffic Signal	*B*	*16.2*	*B*	*18.3*
3rd Street and existing driveway				
Westbound Left-Turn	*A*	*7.5*	*A*	*8.5*
Northbound	*B*	*11.9*	*B*	*13.2*
3rd Street and Kessler Drive				
Eastbound Left-Turn	*A*	*8.4*	*A*	*7.9*
Westbound Left-Turn	*A*	*7.4*	*A*	*8.6*
Northbound Left-Turn	*B*	*11.6*	*C*	*17.8*
Northbound Shared Right-Turn/Through	*A*	*8.6*	*B*	*10.3*
Southbound Left-Turn	*B*	*14.6*	*C*	*17.3*
Southbound Shared Right-Turn/Through	*B*	*11.3*	*B*	*12.4*
3rd Street and Bridlewood Drive				
Eastbound Left-Turn	*A*	*8.4*	*A*	*8.1*
Westbound Left-Turn	*A*	*7.5*	*A*	*8.8*
Northbound Left-Turn	*B*	*14.7*	***D***	***25.9***
Northbound Shared Right-Turn/Through	*A*	*9.3*	*B*	*13.5*
Southbound Left-Turn	*C*	*19.1*	***D***	***26.8***
Southbound Shared Right-Turn/Through	*B*	*11.1*	*B*	*12.0*

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

As shown in the table, most movements at the study intersections currently operate within acceptable levels of service during the peak hours. There are three movements that operate at LOS D during the P.M. peak hour. These intersections are discussed in the following paragraphs. The peak hour traffic signal warrant analyses are included in ***Appendix D***.

Chipman Road and View High Drive

The westbound left-turn movement currently operates at LOS D during the P.M. peak hour. Existing total minor street traffic volumes appear to satisfy the peak hour traffic signal warrant during the P.M. peak hour. However, the Manual on Uniform Traffic Control Devices (MUTCD) states that when there is a separate right-turn lane on the minor street approach, the right-turn volume should not be included in the warrant analysis if the movement enters the major street with minimal conflict. Since the westbound right-turn movement experiences little delay it should not be included in the warrant analysis. Without the westbound right turn volume, the peak hour warrant is not satisfied at this intersection.

109th Street and View High Drive

The eastbound left-turn movement is projected to operate at LOS D during the P.M. peak hour. Existing total minor street traffic volumes appear to satisfy the peak hour traffic signal warrant during the P.M.

peak hour. However, the eastbound right-turn movement experiences little delay and should not be included in the warrant analysis. Without the eastbound right turn volume, the peak hour warrant is nearly satisfied, since the lower single-lane minor street threshold is applicable.

Typically, the peak hour signal warrant is applied only in unusual cases such as at facilities that attract or discharge a large number of vehicles over a short time. Existing conditions at the intersection do not satisfy these conditions, therefore it is not likely that a signal is warranted at this time. However, when projecting traffic volumes into the future, the peak hour warrant can provide a good indication of the potential for future signalization.

3rd Street and Bridlewood Drive

The northbound and southbound left-turn movements are projected to operate at LOS D during the P.M. peak hour. Existing traffic volumes are less than the warranting volumes for the peak hour traffic signal warrant. Therefore it is not likely that a signal is warranted at this time.

Existing plus Approved Conditions

The development trips generated by the unbuilt portion of each approved development in the vicinity of the site were compiled to determine the effects of traffic from the approved developments that are yet to be completed. The results of the Existing plus Approved Conditions intersection analyses are summarized in ***Table 5***. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-7*** through ***A-9***. The Synchro output files are included in ***Appendix C***.

Table 5
Intersection Operational Analysis
Existing plus Approved Conditions

Intersection	A.M. Peak Hour		P.M. Peak Hour	
Movement	LOS[1]	Delay[2]	LOS[1]	Delay[2]
Chipman Road and View High Drive				
Westbound Left-Turn	**D**	***30.5***	***F***	***>100***
Westbound Right-Turn	*B*	*12.9*	*B*	*11.7*
Southbound Left-Turn	*B*	*10.6*	*A*	*9.9*
109th Street and View High Drive				
Eastbound Left-Turn	**D**	***30.7***	***F***	***>100***
Eastbound Right-Turn	*A*	*9.7*	*C*	*20.3*
Northbound Left-Turn	*A*	*8.6*	*B*	*11.3*
View High Drive and golf course drive				
Eastbound	*B*	*12.3*	***E***	***36.2***
Northbound Left-Turn	*A*	*8.0*	*B*	*12.4*
3rd Street and View High Drive				
Traffic Signal	*B*	*17.9*	*C*	*21.8*
3rd Street and existing driveway				
Westbound Left-Turn	*A*	*7.7*	*A*	*9.4*
Northbound	*C*	*14.9*	*C*	*19.0*

Table 5 – Continued
Intersection Operational Analysis
Existing plus Approved Conditions

Intersection / Movement	A.M. Peak Hour LOS[1]	A.M. Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
3rd Street and Kessler Drive				
Eastbound Left-Turn	A	8.6	A	8.4
Westbound Left-Turn	A	7.6	A	9.3
Northbound Left-Turn	C	19.3	**F**	**53.7**
Northbound Shared Right-Turn/Through	A	9.1	B	13.1
Southbound Left-Turn	C	22.8	**E**	**42.2**
Southbound Shared Right-Turn/Through	B	11.5	B	13.1
3rd Street and Bridlewood Drive				
Eastbound Left-Turn	A	8.7	A	8.7
Westbound Left-Turn	A	7.7	A	9.3
Northbound Left-Turn	C	18.7	**E**	**41.6**
Northbound Shared Right-Turn/Through	A	9.9	C	17.1
Southbound Left-Turn	**D**	**25.1**	**F**	**51.4**
Southbound Shared Right-Turn/Through	B	12.1	B	14.9

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

As shown in ***Table 5***, there are a number of movements at several study intersections that are projected to operate at undesirable levels of service during the peak hours with the addition of traffic from the approved but unbuilt developments. These undesirable levels of service are most prevalent in the P.M. peak hour, and are discussed in the following paragraphs. The peak hour traffic signal warrant analyses are shown in ***Appendix D***.

Chipman Road and View High Drive

The westbound left-turn movement is projected to operate at LOS D and LOS F during the A.M. and P.M. peak hours, respectively. As in the previous scenario, the westbound right-turn movement is projected to experience little delay and should be excluded from the warrant analysis. Without the westbound right-turn volume, the peak hour warrant is not satisfied at this intersection.

109th Street and View High Drive

The eastbound left-turn movement is projected to operate at LOS D and LOS F during the A.M. and P.M. peak hours, respectively. The peak hour warrant is projected to be satisfied during the P.M. peak hour with or without the eastbound right-turn volume. As such, the intersection should be monitored for traffic signal installation. Traffic signals are typically installed based on field measured traffic volumes, therefore the intersection should be regularly monitored as development continues in the area. A full warrant study should be conducted using the eight-hour signal warrants.

3rd Street and Kessler Drive

The northbound and southbound left-turn movements are projected to operate at LOS F and LOS E, respectively, during the P.M. peak hour. The northbound and southbound right-turn movements have a separate lane to bypass the left-turn traffic and are projected to experience minimal delays. With the

right-turn volumes excluded from the warrant analysis, the peak hour warrant is not projected to be satisfied at this intersection.

3rd Street and Bridlewood Drive

The northbound and southbound left-turn movements are projected to operate at LOS D to LOS F during the A.M. and P.M. peak hours. With the addition of traffic from the approved developments, traffic volumes are projected to be less than the warranting volumes for the peak hour traffic signal warrant. The volume of northbound or southbound left-turn traffic at the intersection will need to increase in order to satisfy the peak hour signal warrant. Future phases of Winterset Valley to the north of the intersection have the potential to increase southbound left-turn traffic at this intersection, depending on the routes drivers select. As such, the intersection should be regularly monitored as development continues in the area. A full warrant study should be conducted using the eight-hour signal warrants.

Existing plus Approved plus Development Conditions

The results of the Existing plus Approved plus Development conditions intersection analyses are summarized in ***Table 6***. This study scenario assessed the street system with the additional traffic generated by the proposed development. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-10*** through ***A-12***. The Synchro output files are included in ***Appendix C***.

Table 6
Intersection Operational Analysis
Existing plus Approved plus Development Conditions

Intersection / Movement	A.M. Peak Hour LOS[1]	A.M. Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
Chipman Road and View High Drive				
Westbound Left-Turn	E	48.8	F	>100
Westbound Right-Turn	B	13.9	B	14.5
Southbound Left-Turn	B	11.4	B	12.5
109th Street and View High Drive				
Eastbound Left-Turn	E	40.9	F	>100
Eastbound Right-Turn	B	10.1	D	34.8
Northbound Left-Turn	A	9.1	B	14.3
View High Drive and golf course drive/ Drive A				
Eastbound Left-Turn	F	58.7	F	>100
Eastbound Right-Turn	A	9.5	B	14.9
Westbound Left-Turn	F	86.9	F	>100
Westbound Right-Turn	C	16.2	B	14.5
Northbound Left-Turn	A	8.1	B	12.8
Southbound Left-Turn	B	12.6	B	12.7
View High Drive and Drive B				
Westbound Right-Turn	B	11.5	B	11.2
3rd Street and View High Drive				
Traffic Signal	B	18.2	C	23.3

Table 6 – Continued
Intersection Operational Analysis
Existing plus Approved plus Development Conditions

Intersection / Movement	A.M. Peak Hour LOS[1]	A.M. Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
3rd Street and Drive C				
Eastbound Left-Turn	*A*	*8.7*	*A*	*8.5*
Westbound Left-Turn	*A*	*7.8*	*A*	*9.5*
Northbound	*C*	*17.8*	***D***	***31.7***
Southbound Left-Turn	*C*	*22.3*	***F***	***29.2***
Southbound Shared Right-Turn/Through	*B*	*10.1*	*A*	*9.8*
3rd Street and Kessler Drive				
Eastbound Left-Turn	*A*	*8.9*	*A*	*9.6*
Westbound Left-Turn	*A*	*7.6*	*A*	*9.6*
Northbound Left-Turn	*C*	*21.1*	***F***	***>100***
Northbound Shared Right-Turn/Through	*A*	*9.1*	*C*	*15.9*
Southbound Left-Turn	***E***	***36.7***	***F***	***>100***
Southbound Shared Right-Turn/Through	*B*	*11.6*	*B*	*13.3*
3rd Street and Bridlewood Drive				
Eastbound Left-Turn	*A*	*9.0*	*A*	*9.8*
Westbound Left-Turn	*A*	*8.0*	*B*	*10.6*
Northbound Left-Turn	*C*	*23.6*	***F***	***>100***
Northbound Shared Right-Turn/Through	*B*	*10.5*	***D***	***30.6***
Southbound Left-Turn	***D***	***33.1***	***F***	***>100***
Southbound Shared Right-Turn/Through	*B*	*13.1*	*C*	*24.3*

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

Lee's Summit's Access Management Code (AMC) provides guidance on turn lane requirements, throat lengths, and spacings of intersections and driveways. All proposed site driveways are adequately spaced per the AMC, and have adequate throat lengths, with the exception of Drive C. The first access point along Drive C should be at least 125 feet north of 3rd Street, measured between adjacent curbs. Several turn lanes are to be constructed in accordance with the AMC, which are listed below. Each of these lanes should also include an appropriate taper in addition to the minimum storage length. These improvements are reflected in the analysis results shown in ***Table 6***.

View High Drive and Drive A

- Southbound left-turn lane with a minimum 300 feet of storage.
- Northbound right-turn lane with a minimum 200 feet of storage.
- Construct Drive A as a three-lane roadway with a center two-way left-turn lane.

View High Drive and Drive B

- Northbound right-turn lane with a minimum 150 feet of storage.

3rd Street and Drive C

- Eastbound left-turn lane with a minimum 200 feet of storage. This length may need to be reduced slightly, given the constraints of the available space to construct the turn lane within the existing raised median.

- Westbound right-turn lane with a minimum 150 feet of storage.

3rd Street and Kessler Drive

- Westbound right-turn lane with a minimum 200 feet of storage.
- Construct Kessler Drive into the site as a three-lane roadway with a center two-way left-turn lane.

As shown in ***Table 6***, there are movements at several study intersections that are projected to operate at undesirable levels of service during the peak hours with the addition of development traffic. Many of these intersections are candidates for signalization, as the peak hour traffic signal warrant is projected to be satisfied in this scenario at Chipman Road and View High Drive, 109th Street and View High Drive, and 3rd Street and Kessler Drive. The peak hour traffic signal warrant analyses are shown in ***Appendix D***.

The peak hour signal warrant is not projected to be met at View High Drive and Drive A. The majority of side-street traffic will consist of westbound right-turn traffic, which is projected to experience little delay. Eastbound and westbound left-turn volumes are projected to be relatively minor, but they will experience lengthy delays. The intersection is spaced nearly 2,000 feet from 3rd Street, and from 109th Street, making it a potential candidate for signalization. If a street connections are made in the future between the proposed development and the residential developments to the east, Drive A could increase in traffic volume. As such, the intersection should be monitored for traffic signal installation as development occurs.

The stop controlled northbound and southbound left-turn movements at 3rd Street and Drive C are projected to operate at LOS D and LOS F, respectively during the P.M. peak hour. This intersection is not a candidate for signalization, given that is spaced approximately 700 feet from the intersection with View High Drive. When a signal is installed at 3rd Street and Kessler Drive, it will provide an alternate route if delays become unacceptable to drivers. A channelizing island could also be constructed at the median opening on 3rd Street that would restrict side-street movements to right-turns only, which operate at desirable levels of service. The island could be constructed in a manner that would allow the the eastbound and westbound left-turn movements from the 3rd Street approaches.

To evaluate conditions with signalized intersections, the study intersections that are candidates for signalization were analyzed as shown on the next page in ***Table 7***. These intersections were analyzed with the same traffic volumes and lane configurations as shown in ***Figures A-10*** through ***A-12***. The Synchro output files are included in ***Appendix C***.

Table 7 indicates that all intersections are projected to operate acceptably as coordinated traffic signals. The 95th percentile queue length for the southbound left-turn movement at 3rd Street and Kessler Drive is projected to slightly exceed the available storage length. If Kessler Drive is constructed as a three-lane section, the center two-way left-turn lane will provide ample queue storage. All other 95th percentile queue lengths are projected to be contained within the storage lengths available in their respective turn lanes.

Table 7
Intersection Operational Analysis
Existing plus Approved plus Development Conditions – Signalization

Intersection		A.M. Peak Hour		P.M. Peak Hour	
	Movement	LOS[1]	Delay[2]	LOS[1]	Delay[2]
Chipman Road and View High Drive	*Traffic Signal*	*A*	*3.7*	*A*	*8.9*
109th Street and View High Drive	*Traffic Signal*	*A*	*3.1*	*B*	*12.6*
View High Drive and golf course drive/ Drive A	*Traffic Signal*	*B*	*11.2*	*B*	*10.9*
3rd Street and View High Drive	*Traffic Signal*	*B*	*18.6*	*C*	*22.5*
3rd Street and Kessler Drive	*Traffic Signal*	*C*	*20.2*	*B*	*16.2*
3rd Street and Bridlewood Drive	*Traffic Signal*	*B*	*15.9*	*C*	*29.9*

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

Traffic signals are projected to result in reduced delays for side-street movements. Conversely, signals will introduce delays for traffic on the major streets, and can increase the frequency of certain crash types. Therefore, signals should only be installed when warranted. These study intersections should be monitored for traffic signal installation as development occurs. Full warrant studies should be conducted using the eight-hour signal warrants. When signals are installed, they should be interconnected to ensure proper coordination and progression for through traffic along the arterial streets.

Development Phasing

The proposed development is to be constructed in phases. Drive A and Drive B are to be constructed with the initial phases of the development. These phases will include the apartments, senior adult housing, and the commercial area to the north of Drive B. All improvements identified for the View High Drive intersections with Drive A and Drive B will be necessary at the time these intersections are constructed.

As later phases of the development are constructed south of Drive B, the connection to Kessler Drive at 3rd Street will be constructed to provide circulation throughout the site. When this connection is made, the improvements identified for the 3rd Street and Kessler Drive intersection will be necessary. The improvements identified for 3rd Street and Drive C will be necessary when the intersection is constructed.

Future Year 2040 Conditions

The results of the future year 2040 conditions intersection analyses are summarized on the following page in ***Table 8***. This scenario provides an estimate of future traffic conditions in year 2040 by

considering the addition of background traffic growth to the existing plus approved plus development traffic volumes. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-13*** through ***A-15***. The Synchro output files are included in ***Appendix C***.

Table 8
Intersection Operational Analysis
Future Year 2040 Conditions

Intersection / Movement	A.M. Peak Hour LOS[1]	A.M. Peak Hour Delay[2]	P.M. Peak Hour LOS[1]	P.M. Peak Hour Delay[2]
Chipman Road and View High Drive				
Traffic Signal	A	3.9	B	10.4
109th Street and View High Drive				
Traffic Signal	A	3.3	B	19.0
View High Drive and golf course drive/ Drive A				
Traffic Signal	B	12.9	B	11.4
View High Drive and Drive B				
Westbound	B	12.6	B	10.7
3rd Street and View High Drive				
Traffic Signal	C	24.9	C	23.3
3rd Street and Drive C				
Eastbound Left-Turn	A	8.8	A	8.5
Westbound Left-Turn	A	7.9	A	9.9
Northbound	B	16.8	**D**	**37.8**
Southbound Left-Turn	C	22.8	**F**	**70.2**
Southbound Shared Right-Turn/Through	A	9.5	A	9.2
3rd Street and Kessler Drive				
Traffic Signal	C	18.1	B	16.9
3rd Street and Bridlewood Drive				
Traffic Signal	C	15.3	B	12.0

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

As shown in the table, the study intersections are projected to operate within acceptable levels of service during the peak hours, except some of the side-street movements at 3rd Street and Drive C. Alternate routes will be available if delays are unacceptable to drivers.

Summary

TranSystems has completed a traffic impact study for the proposed mixed-use development to be located generally in the northeast corner of the 3rd Street and View High Drive intersection in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

A number of development projects have been approved by the City in recent years in the vicinity of the proposed development site, but not all have been built and completed at the time of this study. These projects include New Longview Commercial, Residences at New Longview, Winterset Valley, Goddard

School, Kessler Ridge, Autumn Leaves, and Summit Church. Traffic from the approved but unbuilt portions of these developments were included in the analyses. With the addition of traffic from these developments, traffic signal warrants may be satisfied at the intersection of 109th Street and View High Drive, and possibly at 3rd Street and Bridlewood Drive. These intersections should be regularly monitored as development continues in the area. Full warrant studies should be conducted using the eight-hour signal warrants.

Several improvements are identified to accommodate traffic generated by the proposed development, which are listed below. All turn lanes are to be constructed to include an appropriate taper in addition to the minimum storage length.

Chipman Road and View High Drive

- Monitor the intersection for traffic signal installation.

View High Drive and Drive A

- Southbound left-turn lane with a minimum 300 feet of storage.
- Northbound right-turn lane with a minimum 200 feet of storage.
- Construct Drive A as a three-lane roadway with a center two-way left-turn lane.
- Monitor the intersection for traffic signal installation.

View High Drive and Drive B

- Northbound right-turn lane with a minimum 150 feet of storage.

3rd Street and Drive C

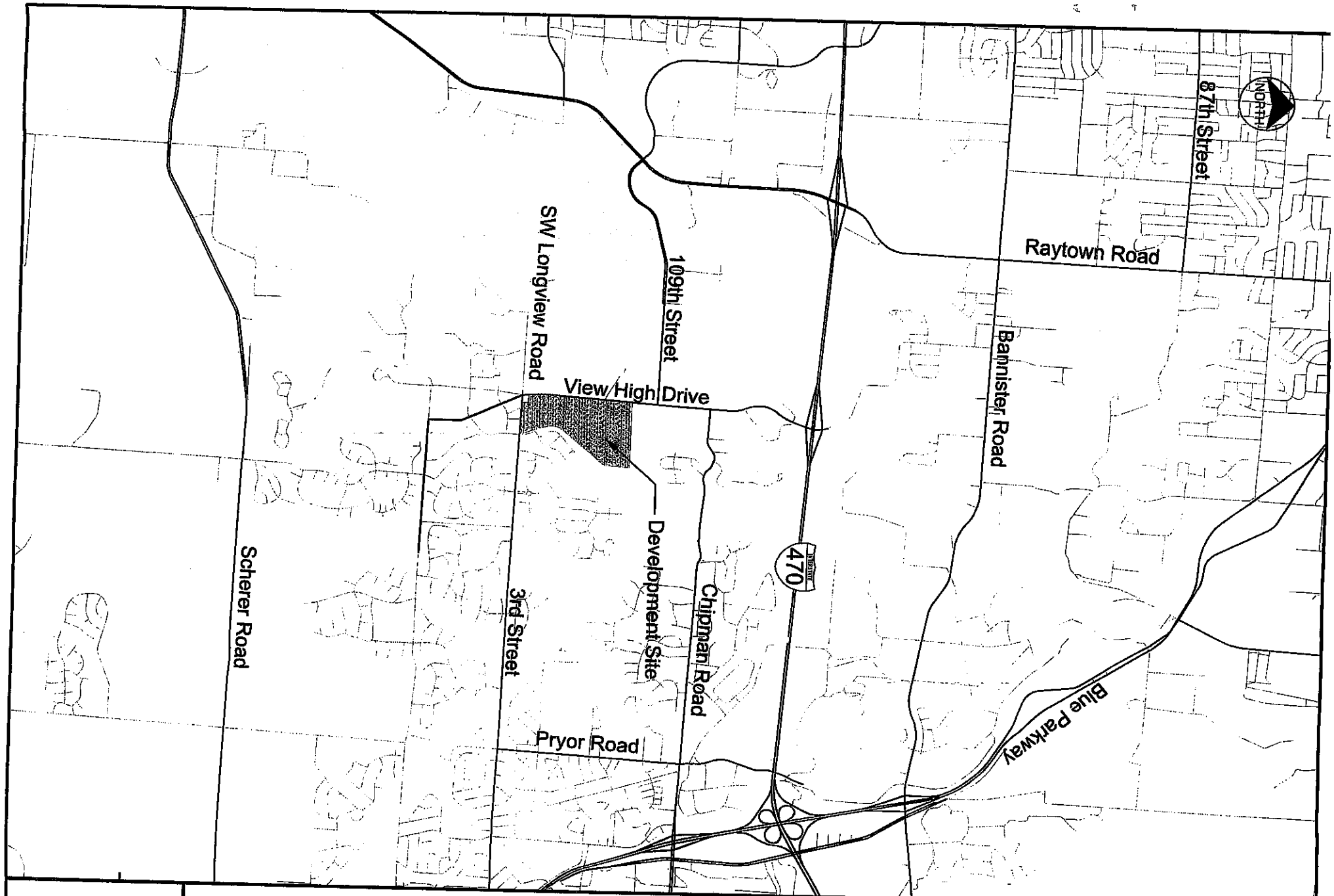
- Eastbound left-turn lane with a minimum 200 feet of storage. This length may need to be reduced slightly, given the constraints of the available space to construct the turn lane within the existing raised median.
- Westbound right-turn lane with a minimum 150 feet of storage.

3rd Street and Kessler Drive

- Westbound right-turn lane with a minimum 200 feet of storage.
- Construct Kessler Drive into the site as a three-lane roadway with a center two-way left-turn lane.
- Monitor the intersection for traffic signal installation.

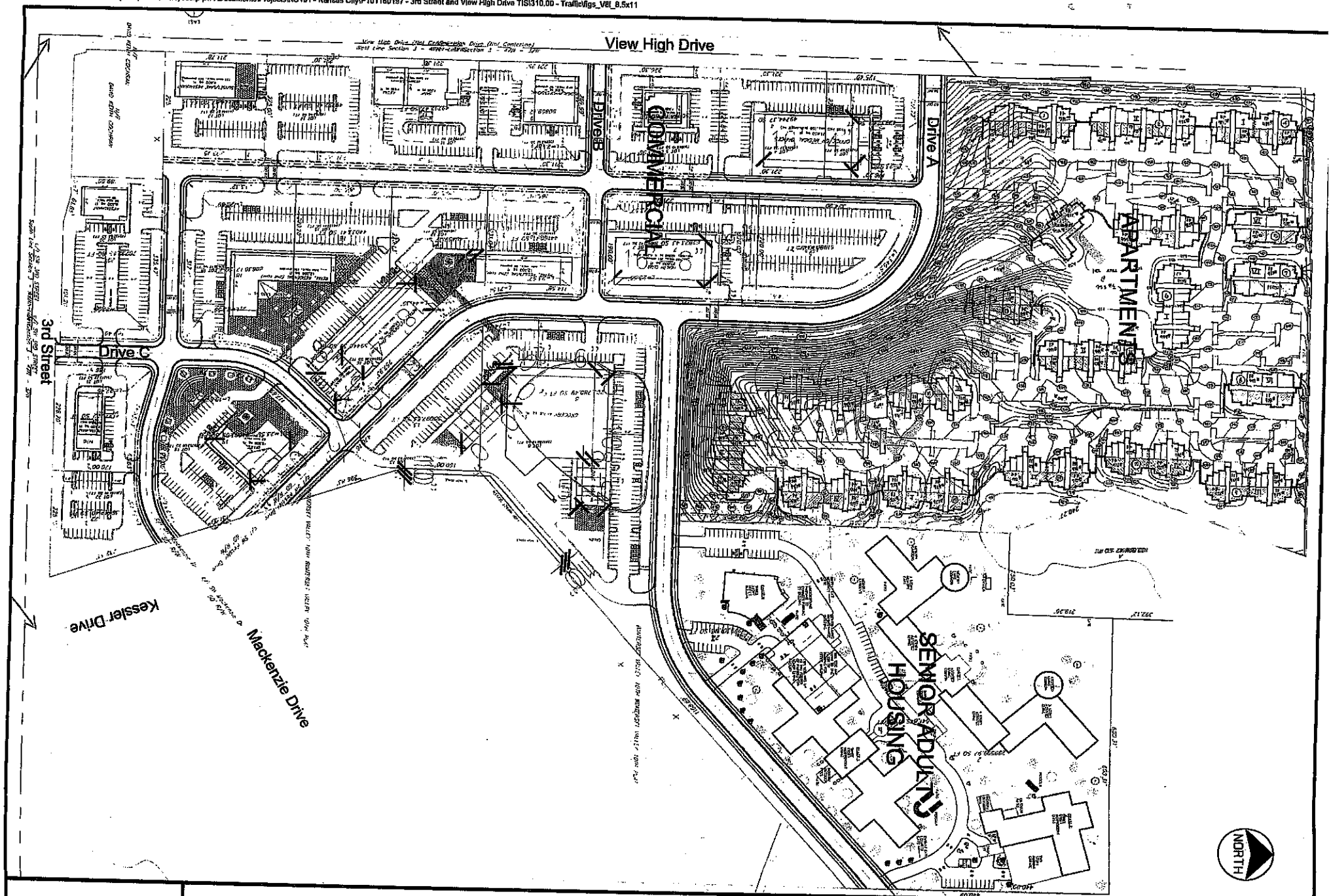
When traffic signals are installed at the study intersections, interconnection should be provided to ensure proper coordination and progression for through traffic along the arterial streets.

Appendix A - Figures

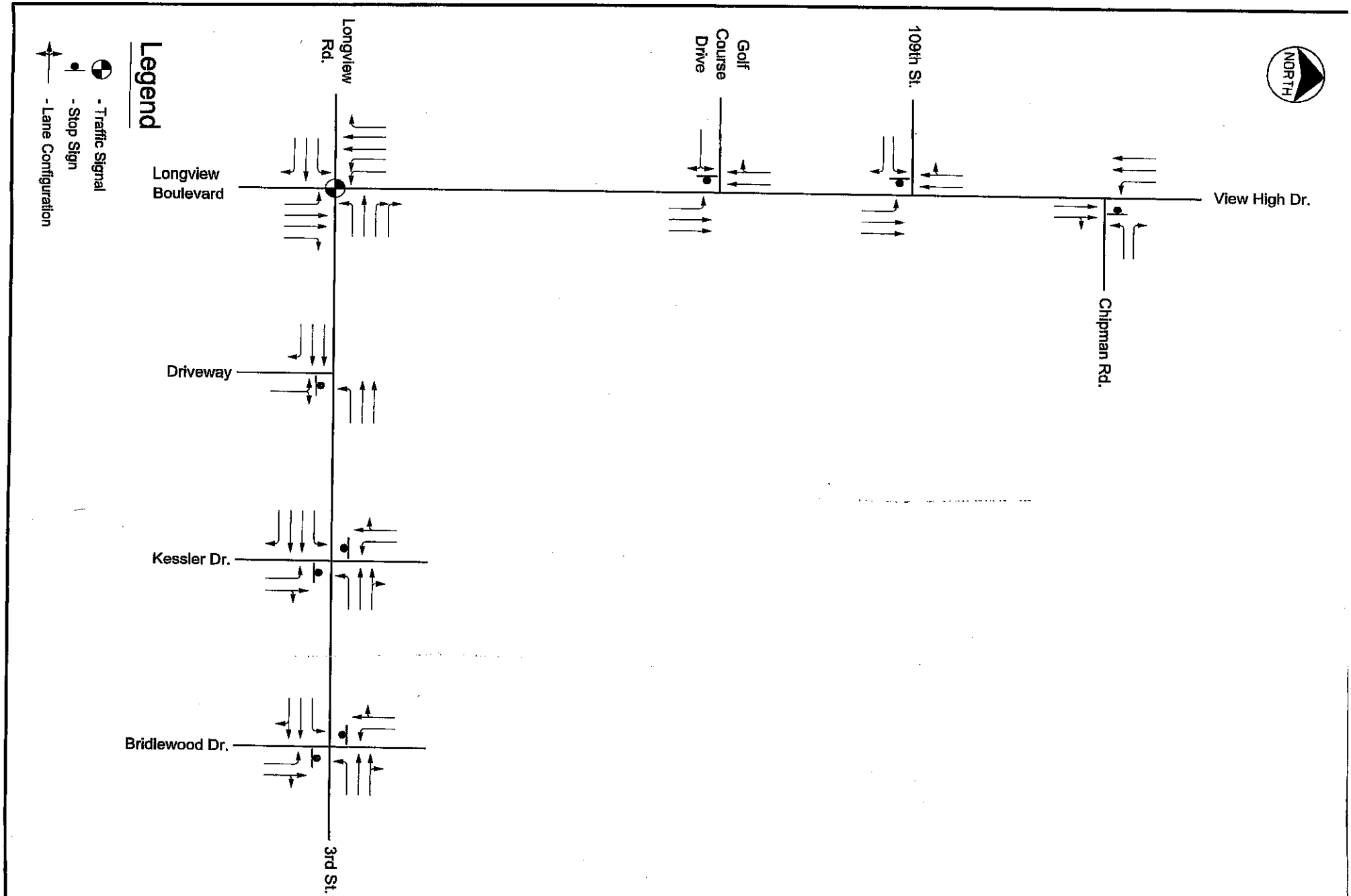


TranSystems	LOCATION MAP	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-1

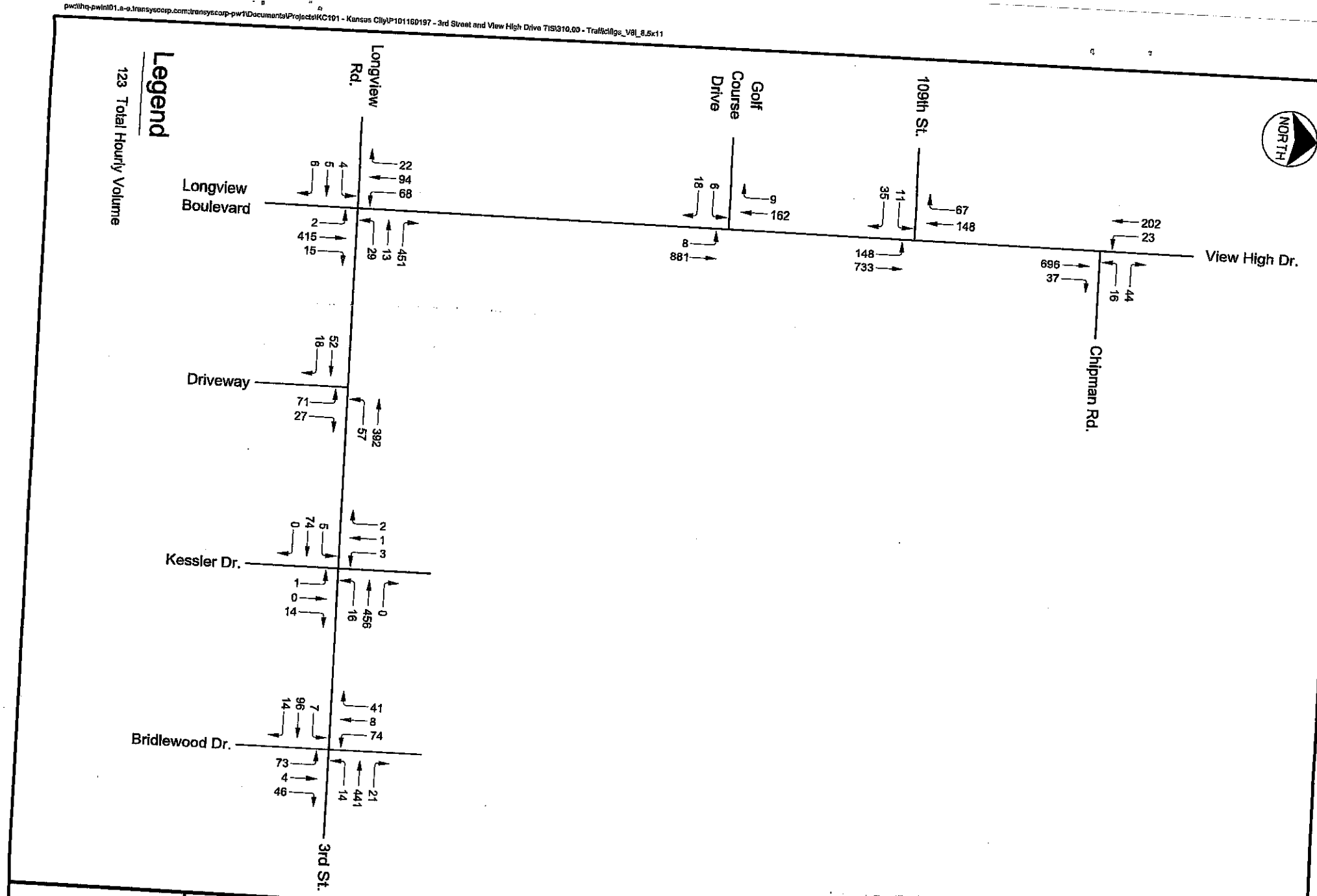
pw:\\hq-pwint01.a-e.transystems.com:transystems-pw1\Documents\Projects\KC101 - Kansas City\P101160197 - 3rd Street and View High Drive TIS\310.00 - Traffic\figs_V8_8.5x11



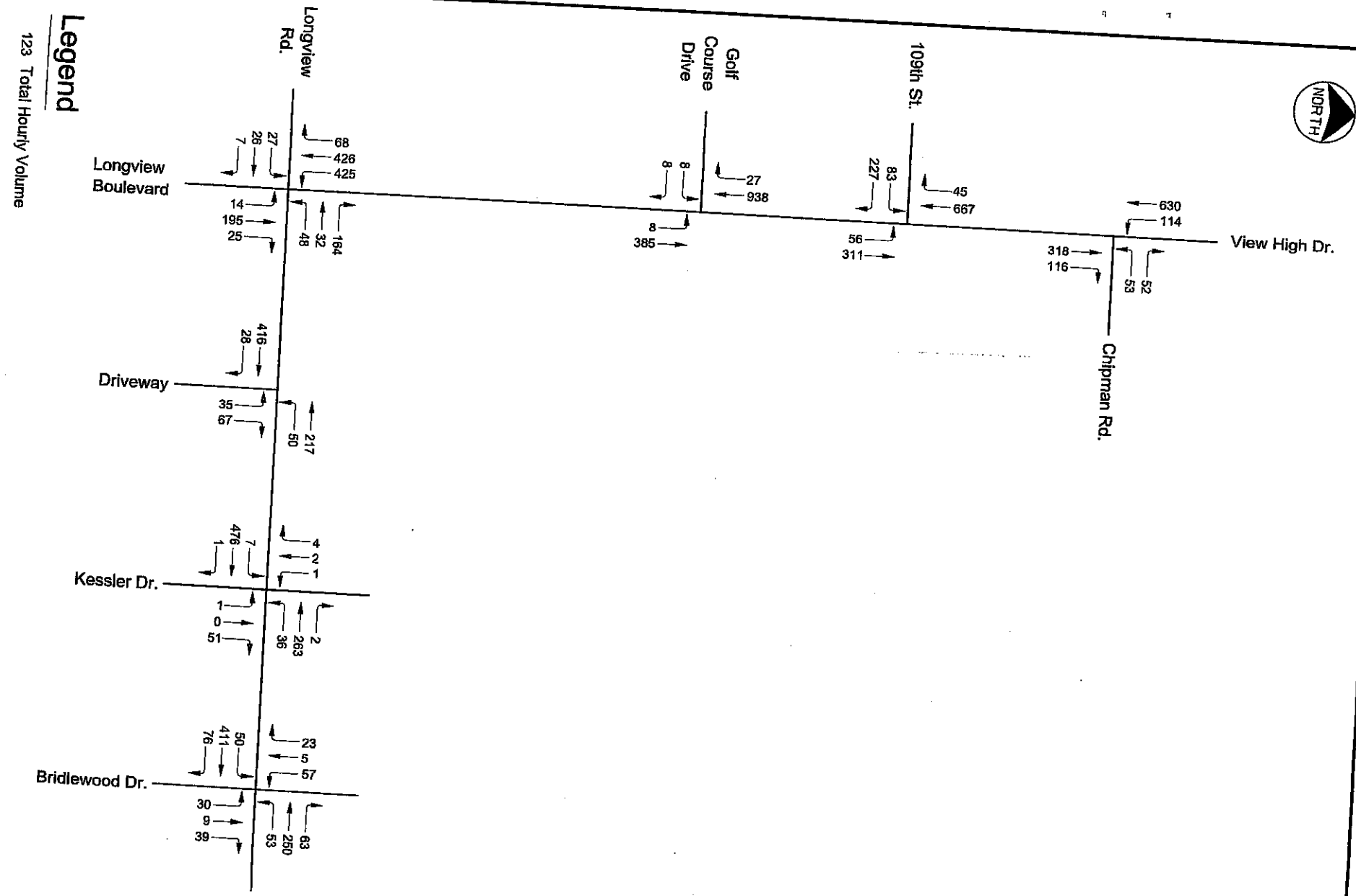
TranSystems	SITE PLAN	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-2



TranSystems	EXISTING LANE CONFIGURATIONS	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-3



TranSystems	EXISTING A.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-4



TranSystems	EXISTING P.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-5

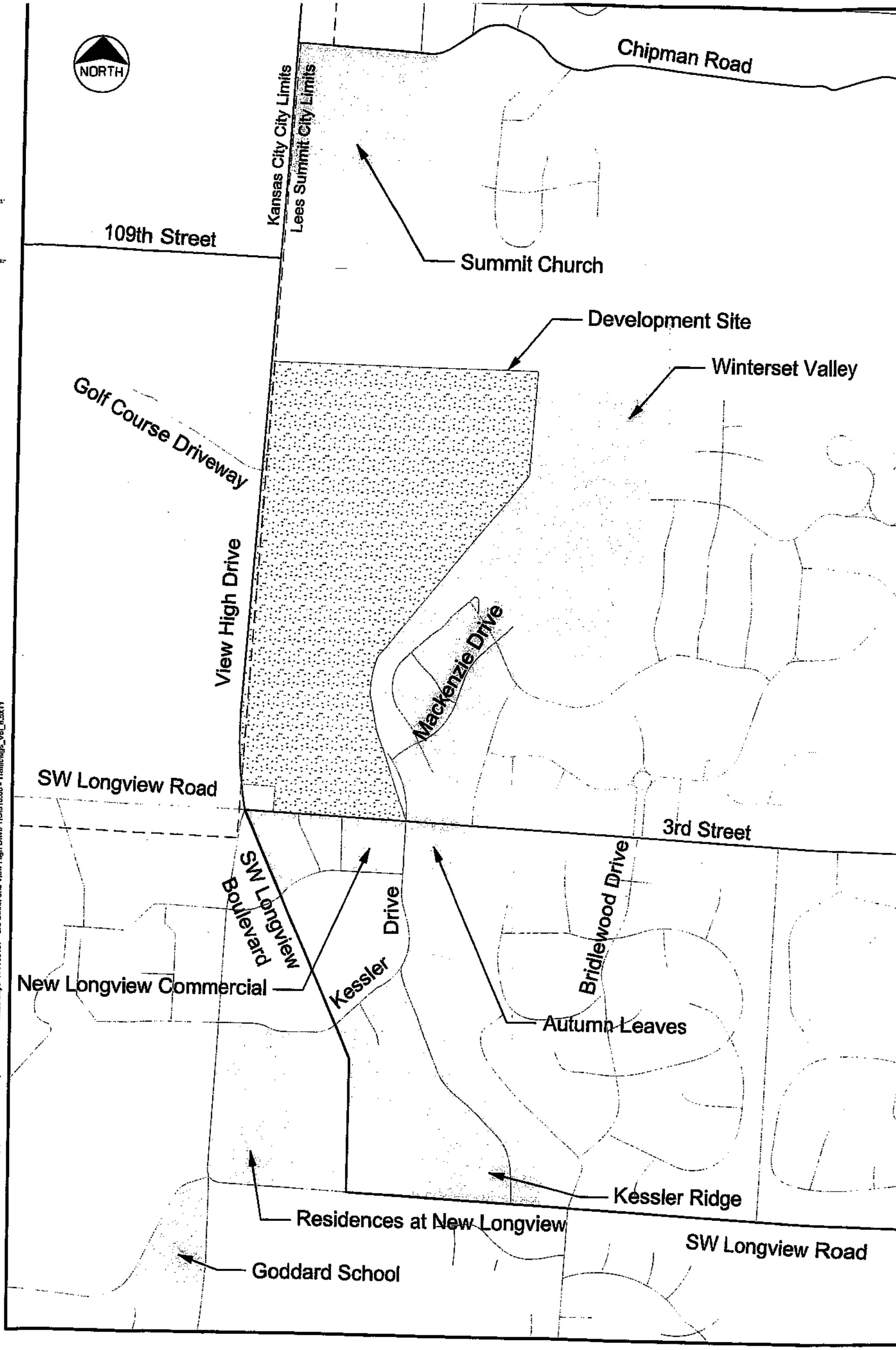


Figure A-6

July 2016

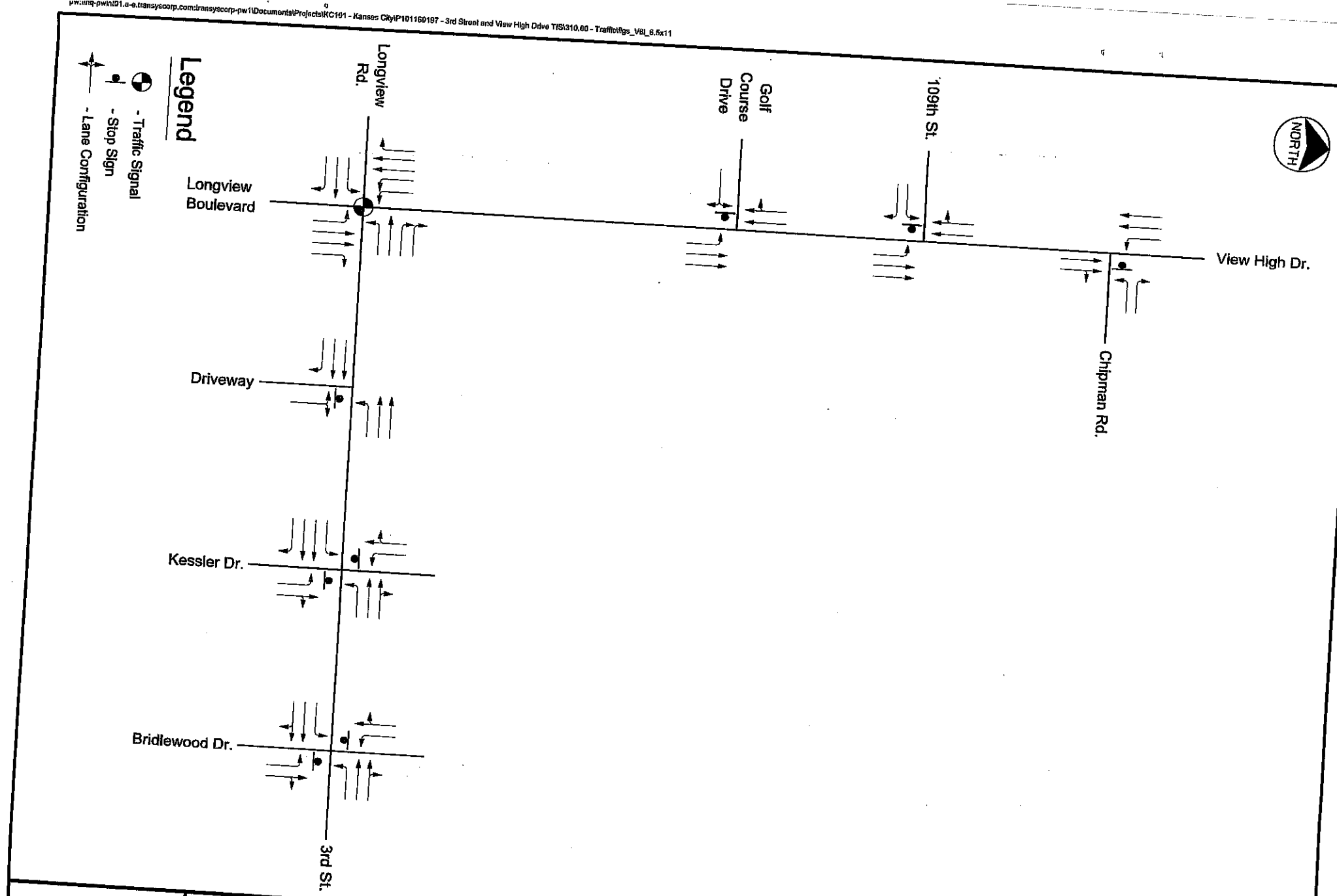
No Scale

3rd Street and View High Traffic Impact Study
Lee's Summit, Missouri

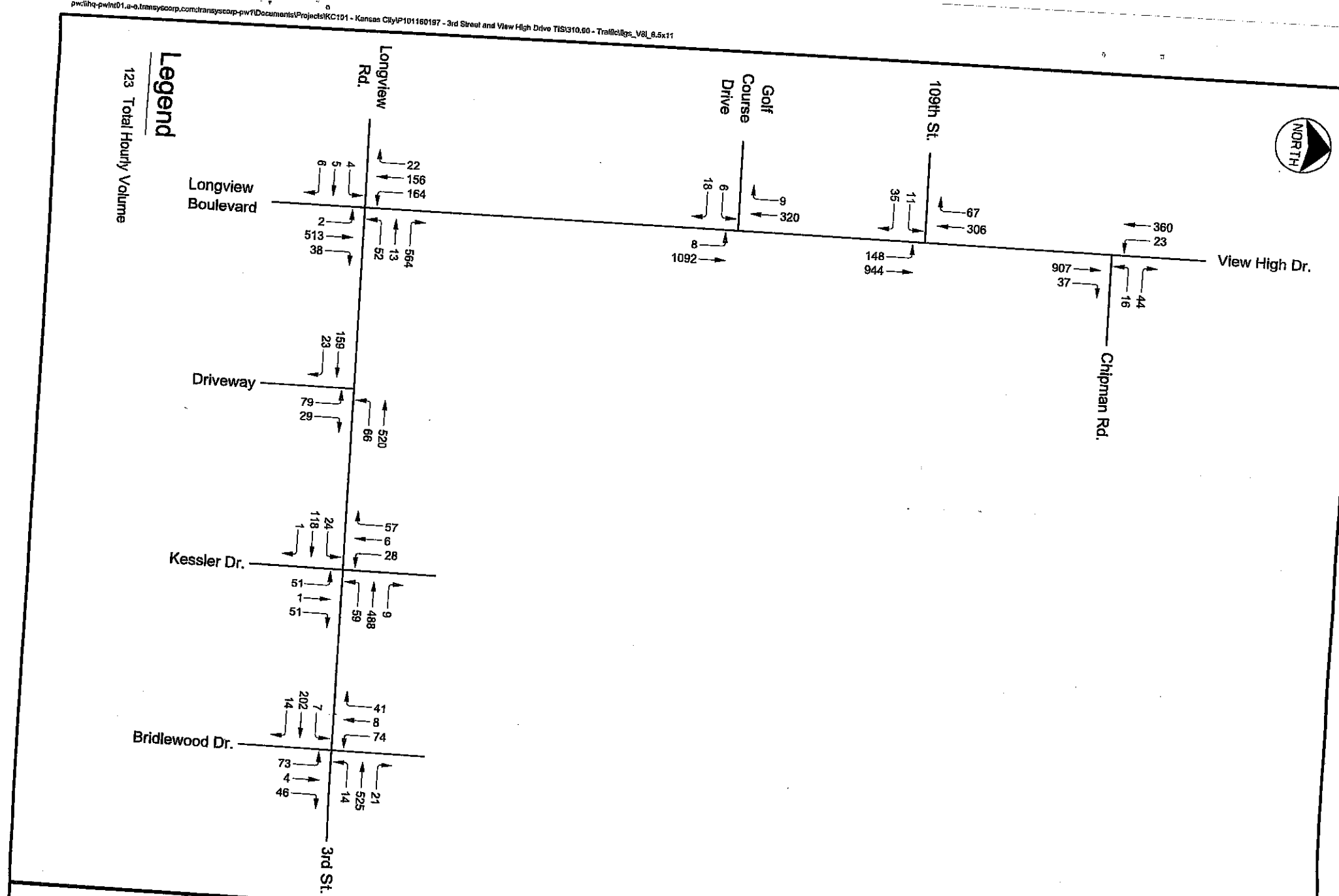
APPROVED DEVELOPMENTS MAP

TranSystems

pw:\\hq-pwint01.e-a.transyscorp.com:transyscorp-pw1\Documents\Projects\KC101 - Kansas City\P101160197 - 3rd Street and View High Drive TIS\310.00 - Traffic\figs_V8I_8.5x11



TranSystems	EXISTING PLUS APPROVED LANE CONFIGURATIONS	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-7



TranSystems

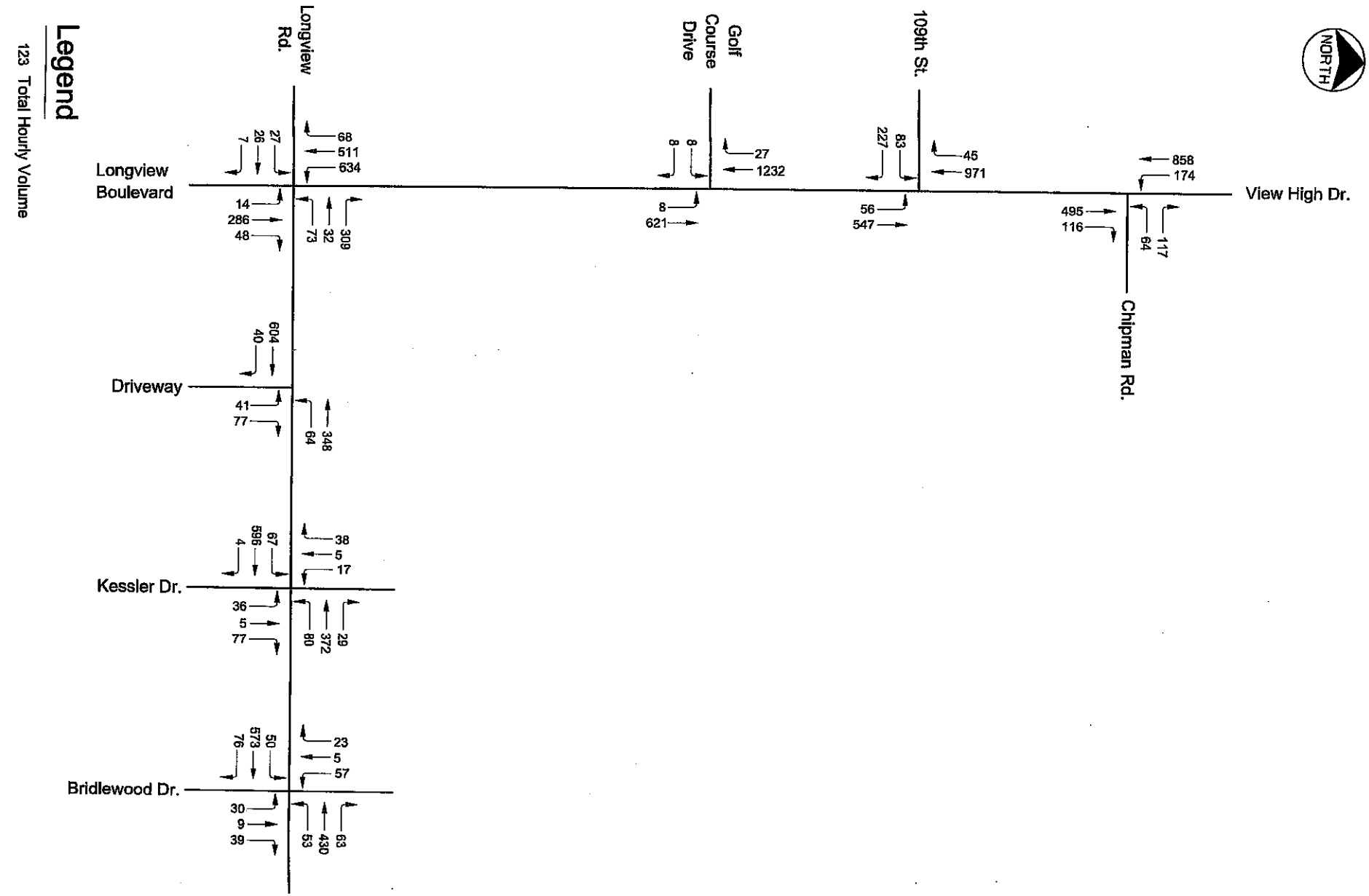
EXISTING PLUS APPROVED
A.M. PEAK HOUR TRAFFIC VOLUMES

3rd Street and View High
Traffic Impact Study
Lee's Summit, Missouri

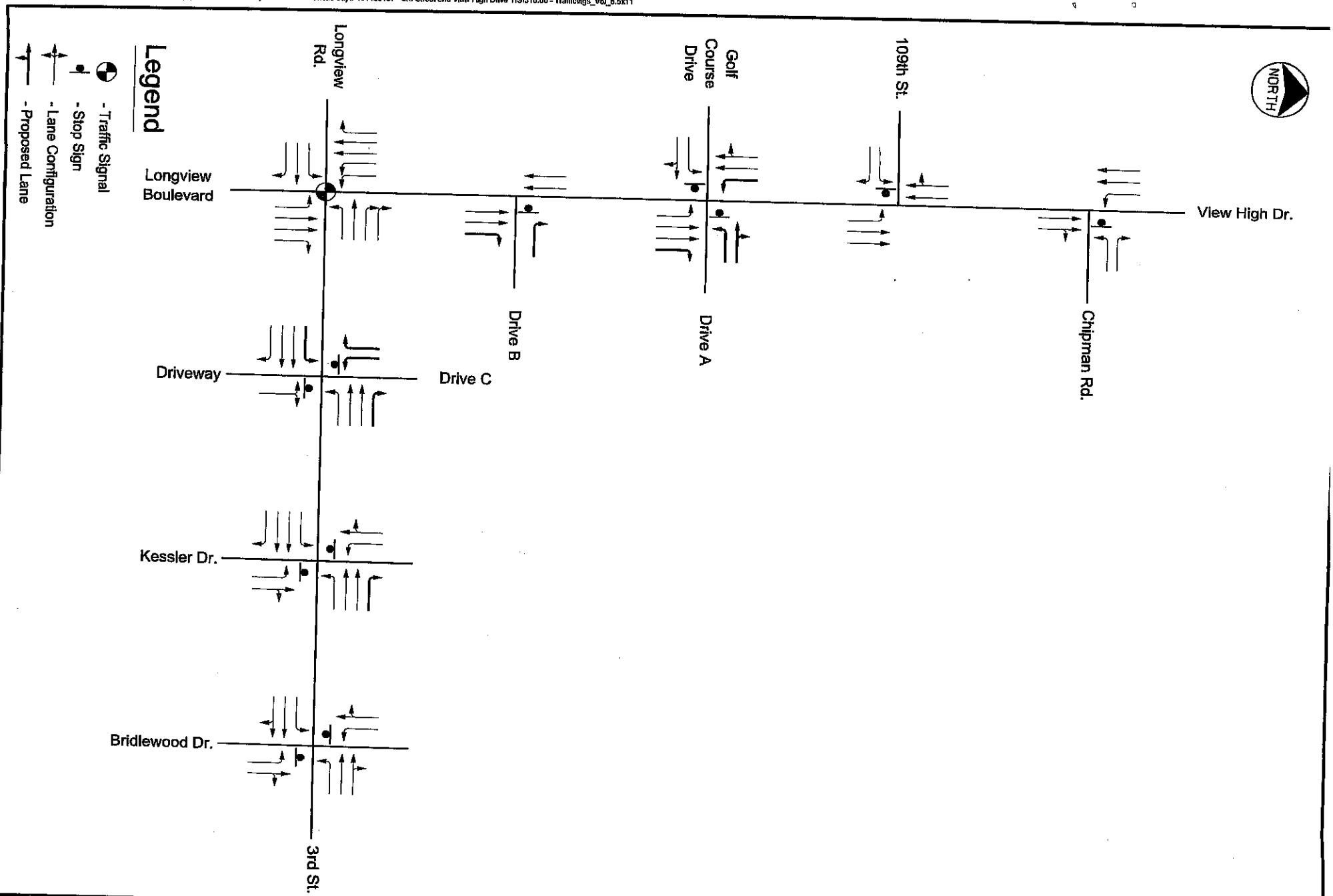
July 2016

No Scale

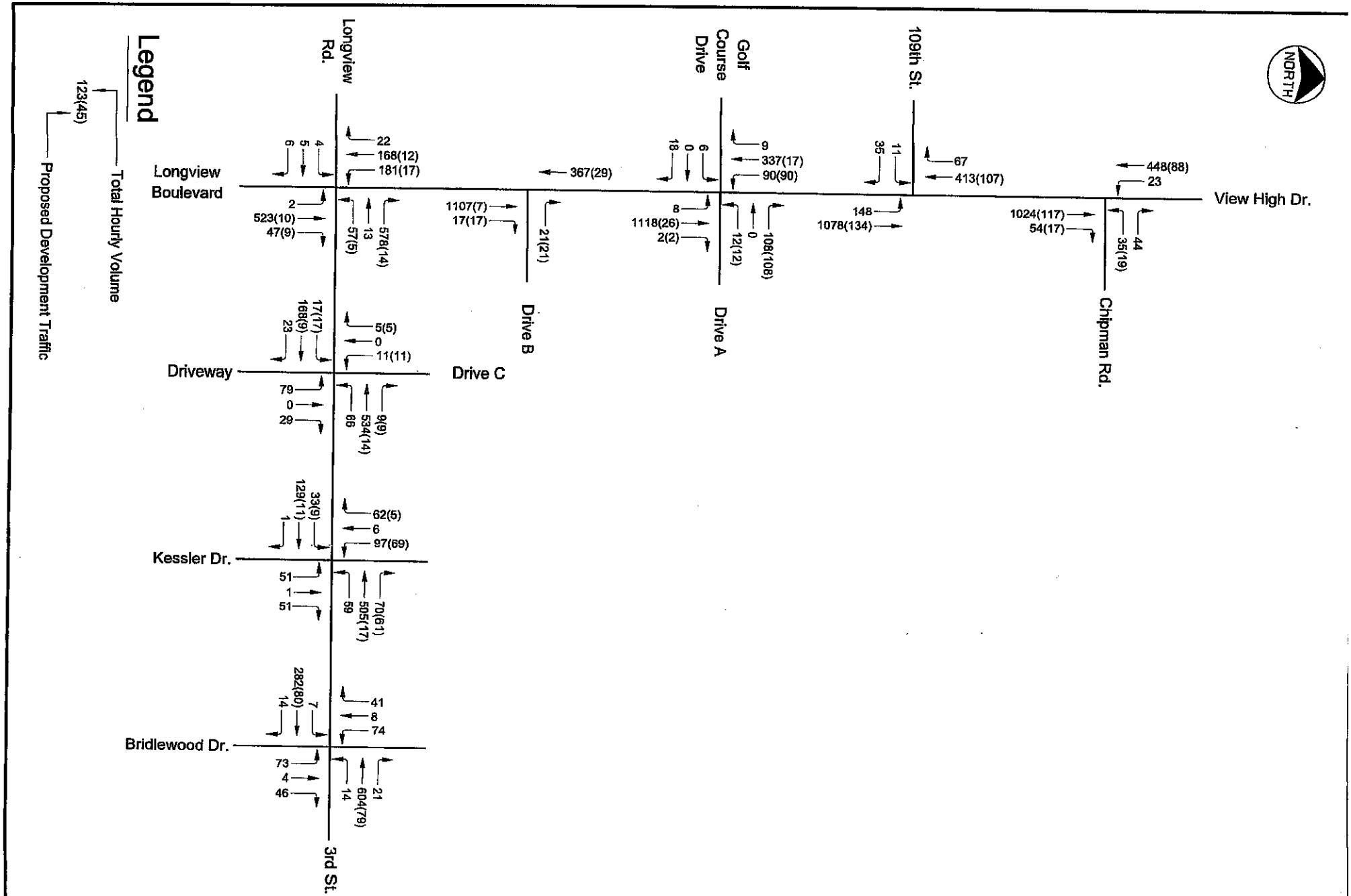
Figure A-8



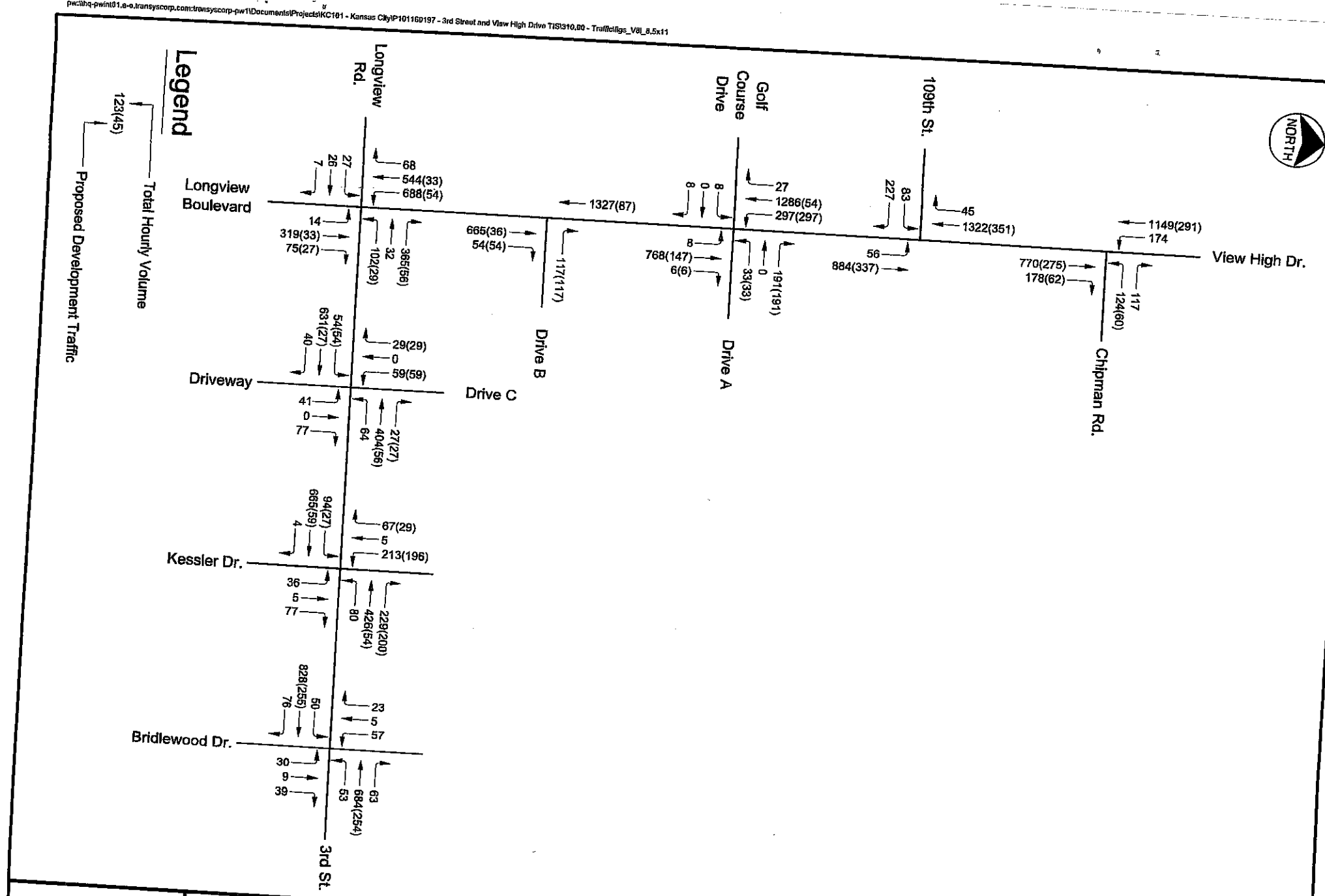
TranSystems	EXISTING PLUS APPROVED P.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-9



TranSystems	EXISTING PLUS APPROVED PLUS DEVELOPMENT LANE CONFIGURATIONS	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-10



TranSystems	EXISTING PLUS APPROVED PLUS DEVELOPMENT A.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 / No Scale	Figure A-11



TranSystems

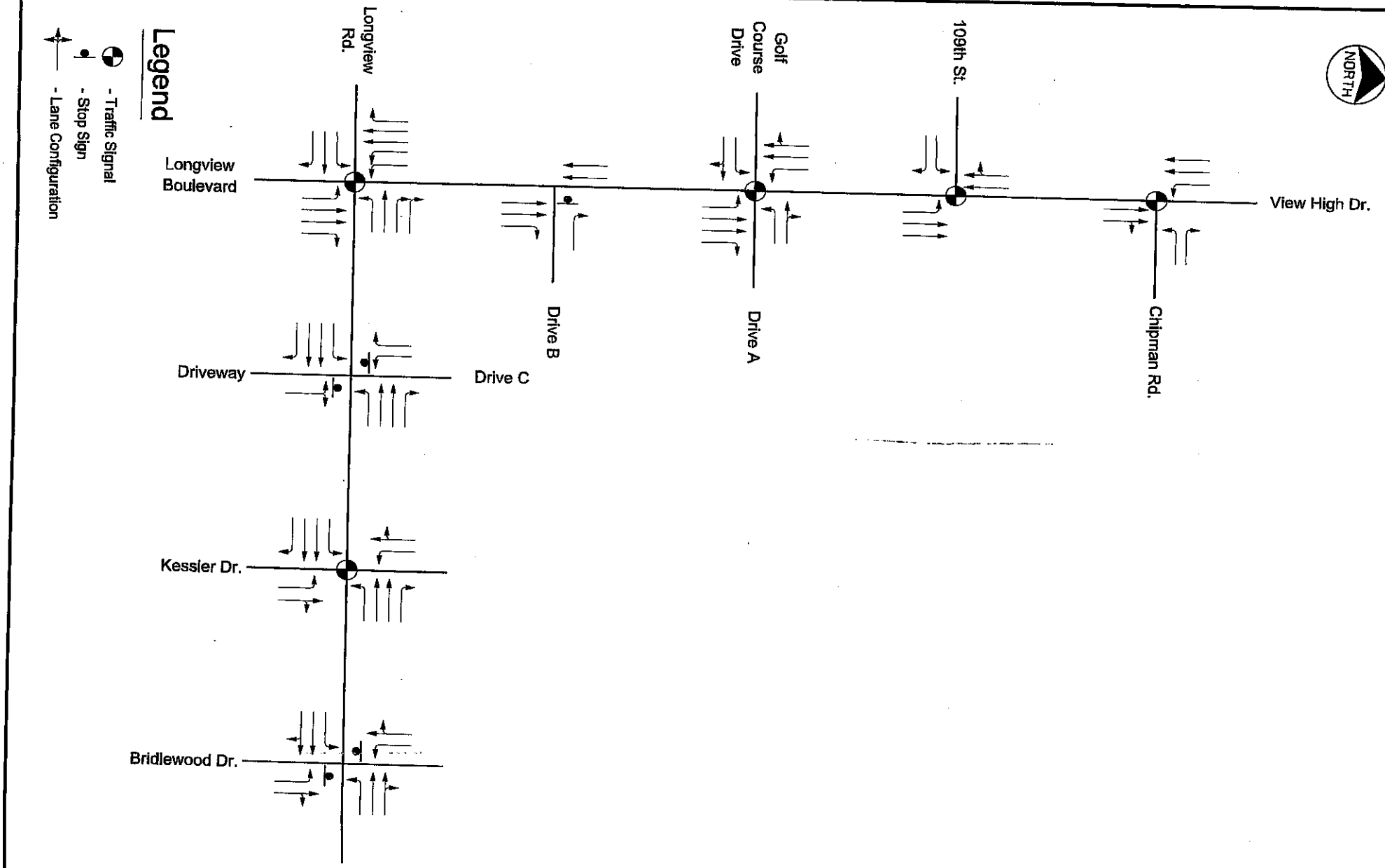
EXISTING PLUS APPROVED PLUS DEVELOPMENT P.M. PEAK HOUR TRAFFIC VOLUMES

3rd Street and View High Traffic Impact Study
Lee's Summit, Missouri

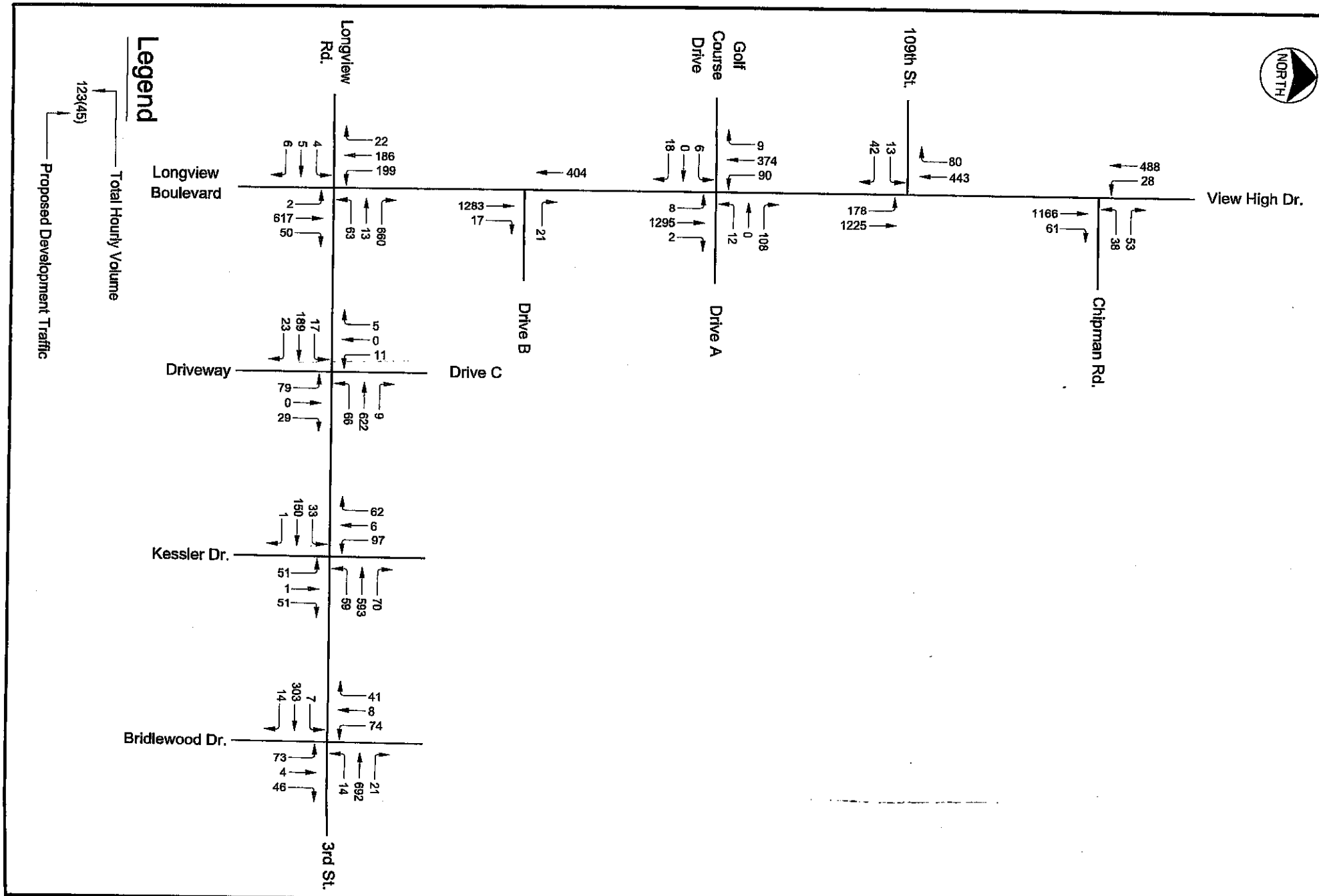
July 2016

No Scale

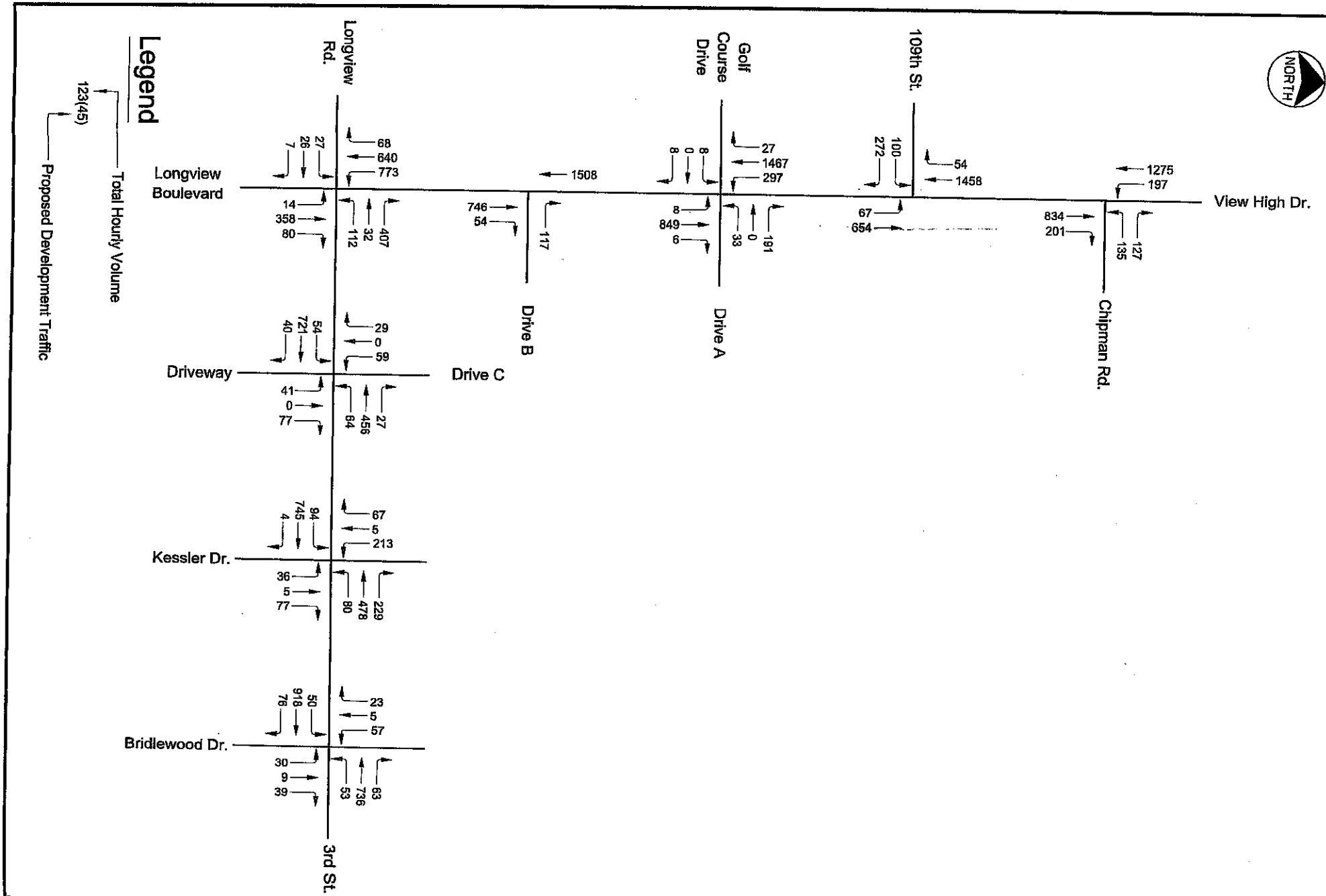
Figure A-12



TranSystems	FUTURE CONDITIONS LANE CONFIGURATIONS	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-13



TranSystems	FUTURE CONDITIONS A.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale	Figure A-14



TranSystems	FUTURE CONDITIONS P.M. PEAK HOUR TRAFFIC VOLUMES	3rd Street and View High Traffic Impact Study Lee's Summit, Missouri	July 2016 No Scale Figure A-15

Appendix B – Trip Generation and Distribution

See attached worksheets.

3rd Street and View High Traffic Impact Study

Lee's Summit, Missouri

Trip Generation

Land Use	Intensity	ITE Code	Daily (Weekday)	A.M. Peak Hour					P.M. Peak Hour				
				Total	% In	% Out	In	Out	Total	% In	% Out	In	Out
Shopping Center	256,766 sf	820	12,535	278	62%	38%	172	106	1,127	48%	52%	541	586
Senior Adult Housing - Attached	25 du	252	96	5	34%	66%	2	3	8	54%	46%	4	4
Apartments	304 du	220	1,966	153	20%	80%	31	122	185	65%	35%	120	65
Total Development Trips			***14,597***	***436***			***205***	***231***	***1,319***			***665***	***654***

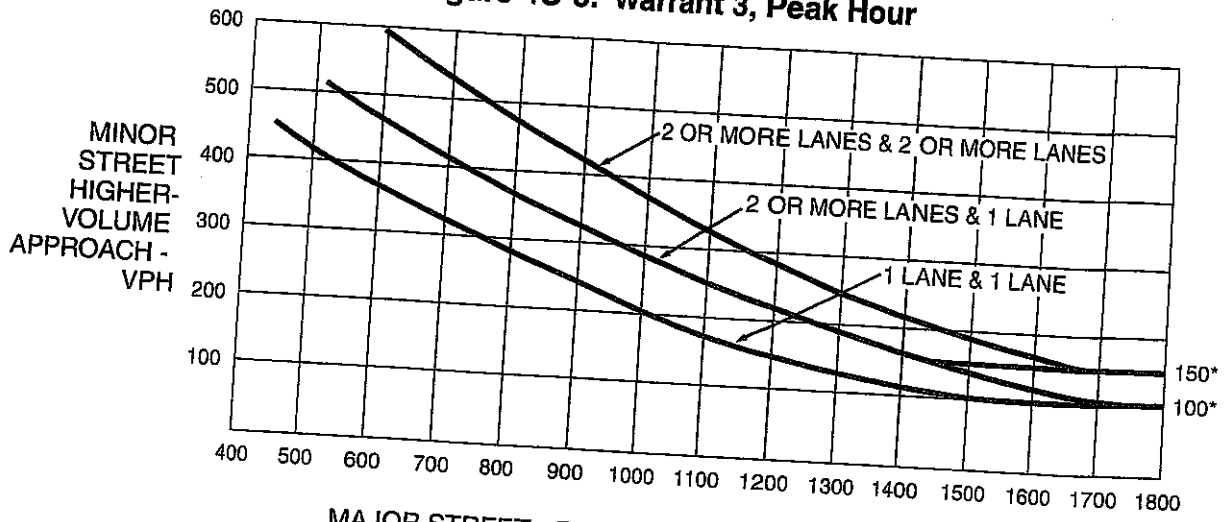
Notes:

Trip estimates for this study were developed using ITE's Trip Generation, 9th Edition.

Appendix D – Signal Warrant Analyses

See attached figures.

Figure 4C-3. Warrant 3, Peak Hour

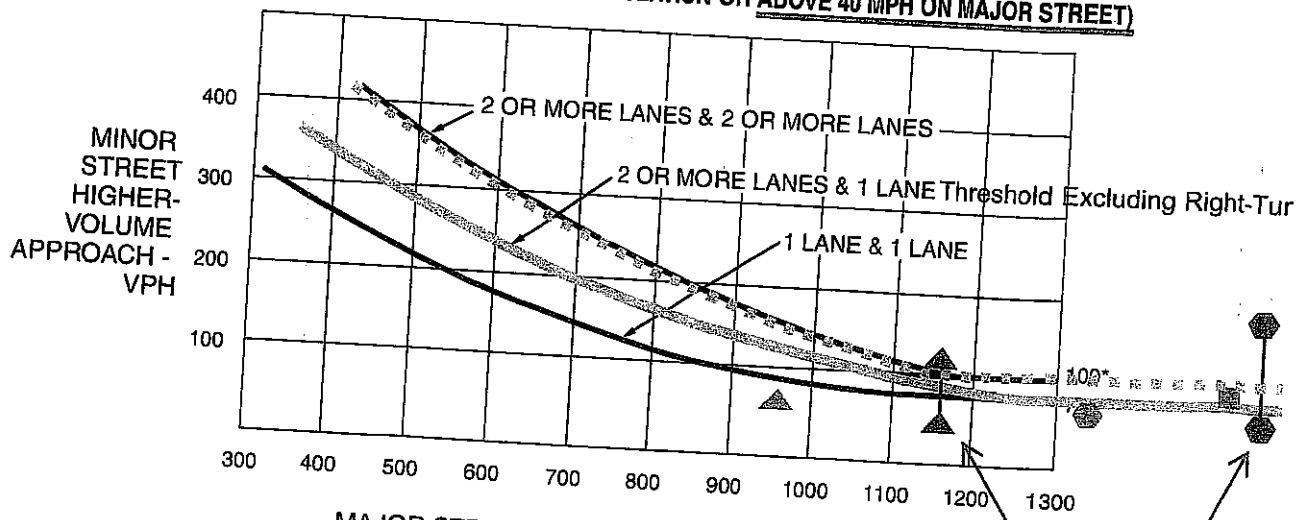


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

View High Drive and Chipman Road

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



M Peak

PM Peak

Existing

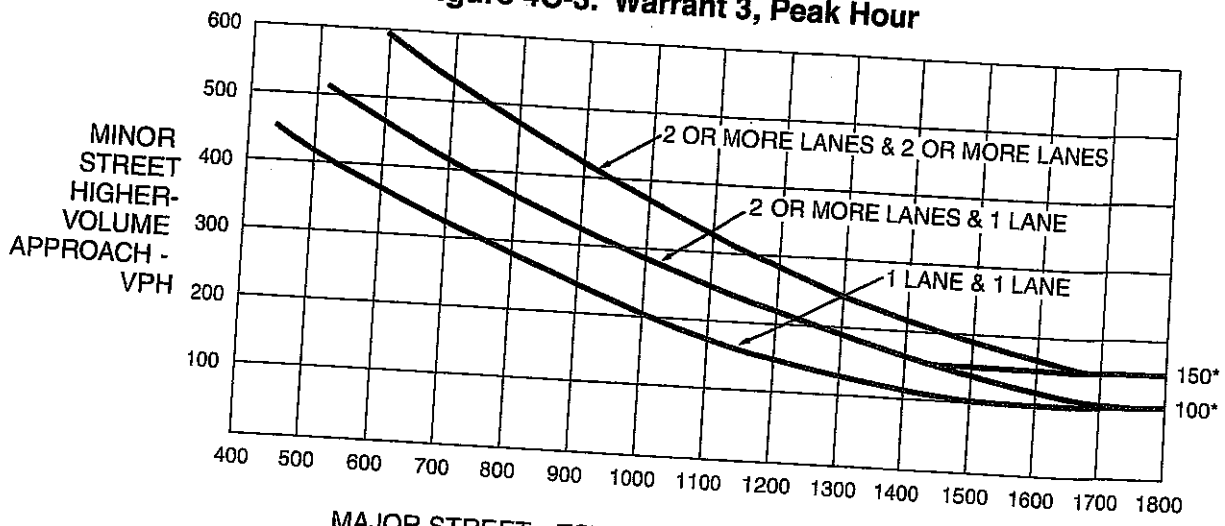
Existing+Approved

Existing+Approved+Development

Future Year 2040

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-3. Warrant 3, Peak Hour

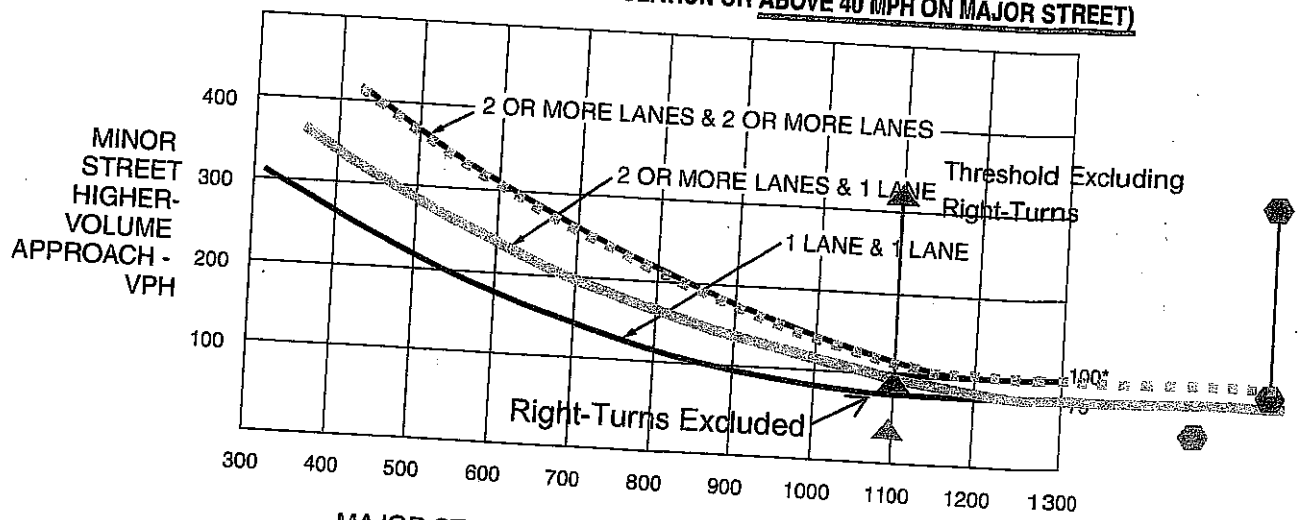


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

109th Street and View High Drive

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

AM Peak

PM Peak

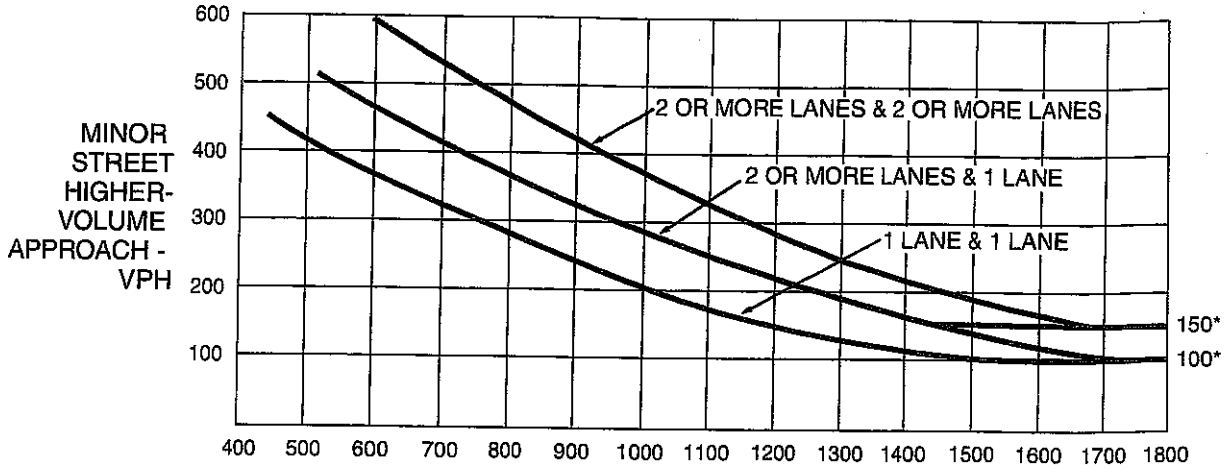
Existing

Existing+Approved

Existing+Approved+Development

Future Year 2040

Figure 4C-3. Warrant 3, Peak Hour

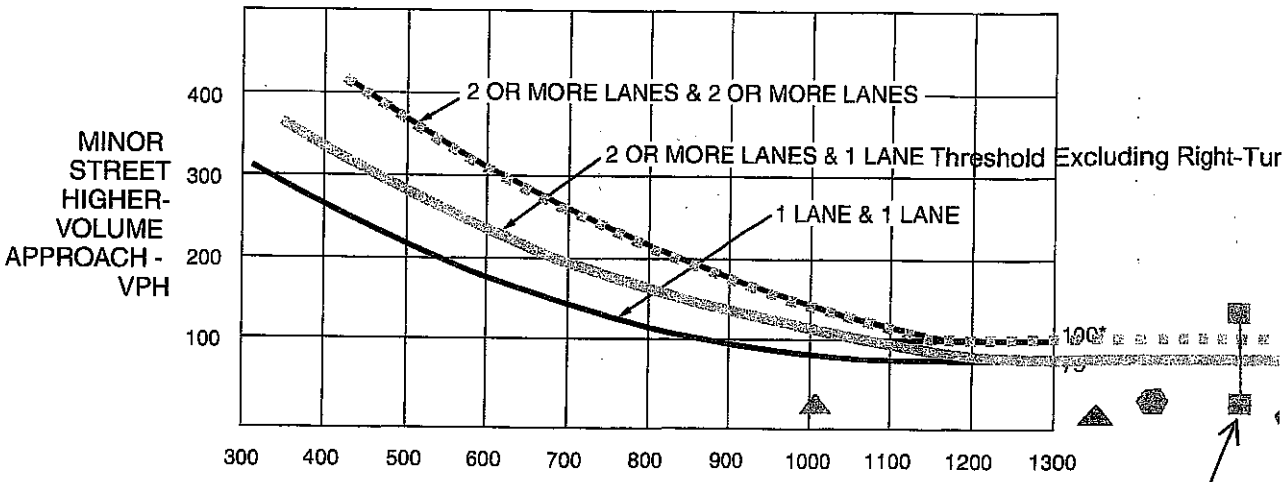


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

View High Drive and Drive A

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



AM Peak

PM Peak

Existing

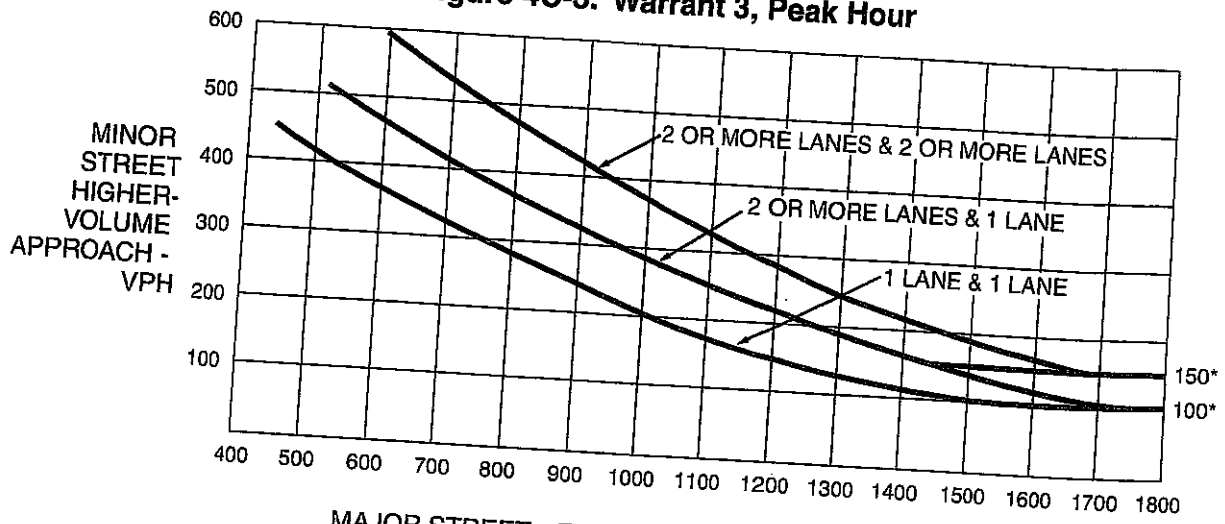
Existing+Approved

Existing+Approved+Development

Future Year 2040

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-3. Warrant 3, Peak Hour

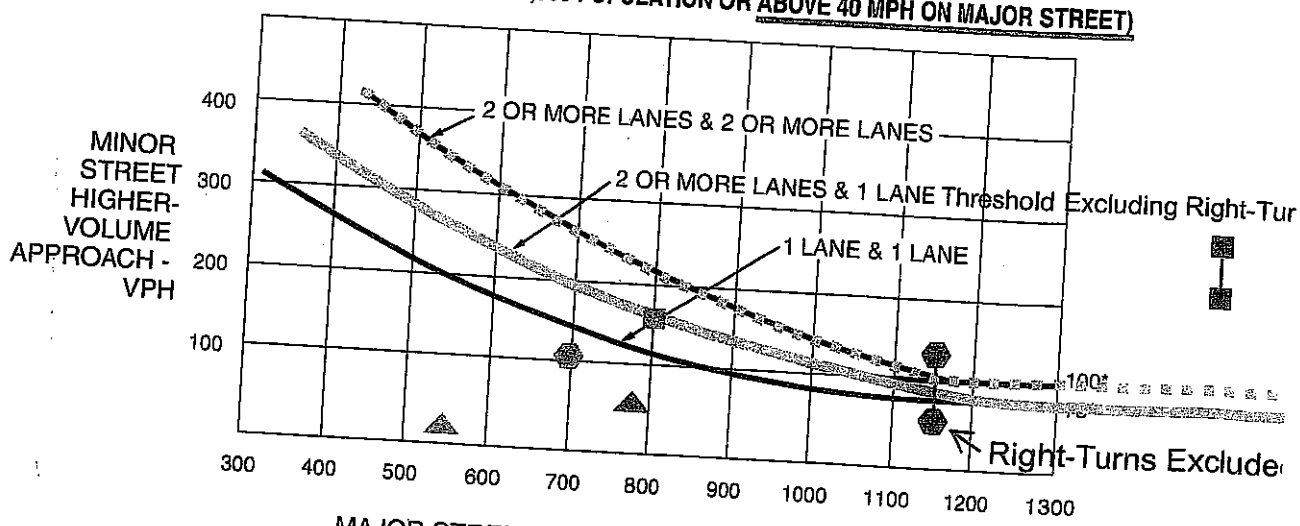


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

3rd Street and Kessler Drive

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

M Peak

PM Peak

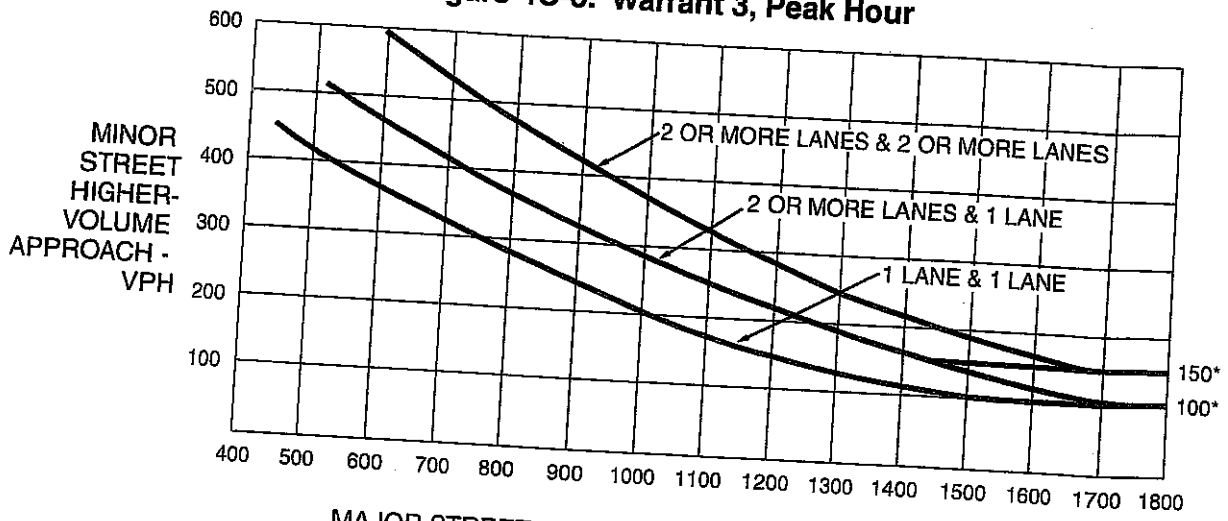
Existing

Existing+Approved

Existing+Approved+Development

Future Year 2040

Figure 4C-3. Warrant 3, Peak Hour

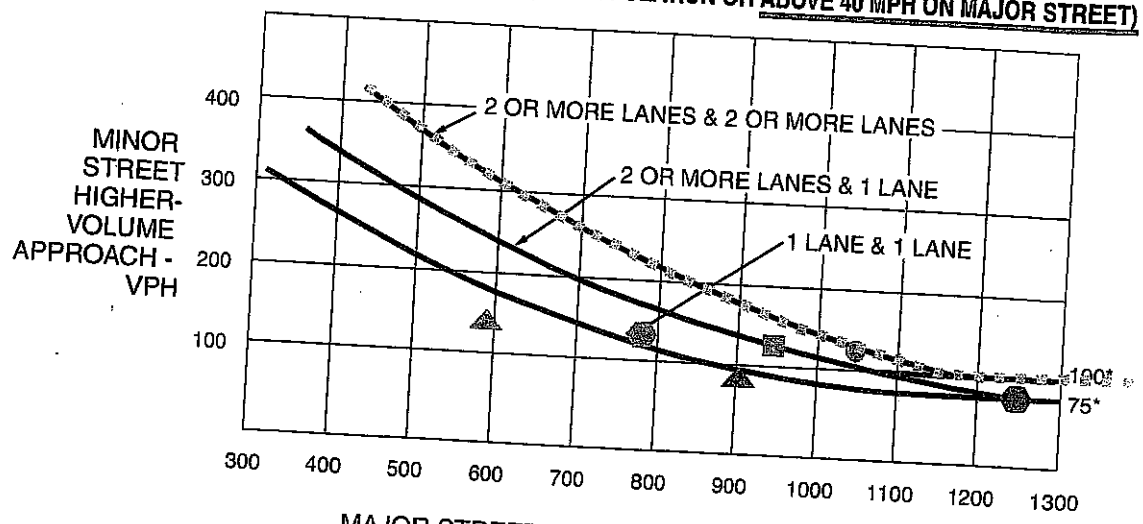


*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

3rd Street and Bridlewood Drive

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

M Peak

PM Peak

Existing

Existing+Approved

Existing+Approved+Development

Future Year 2040