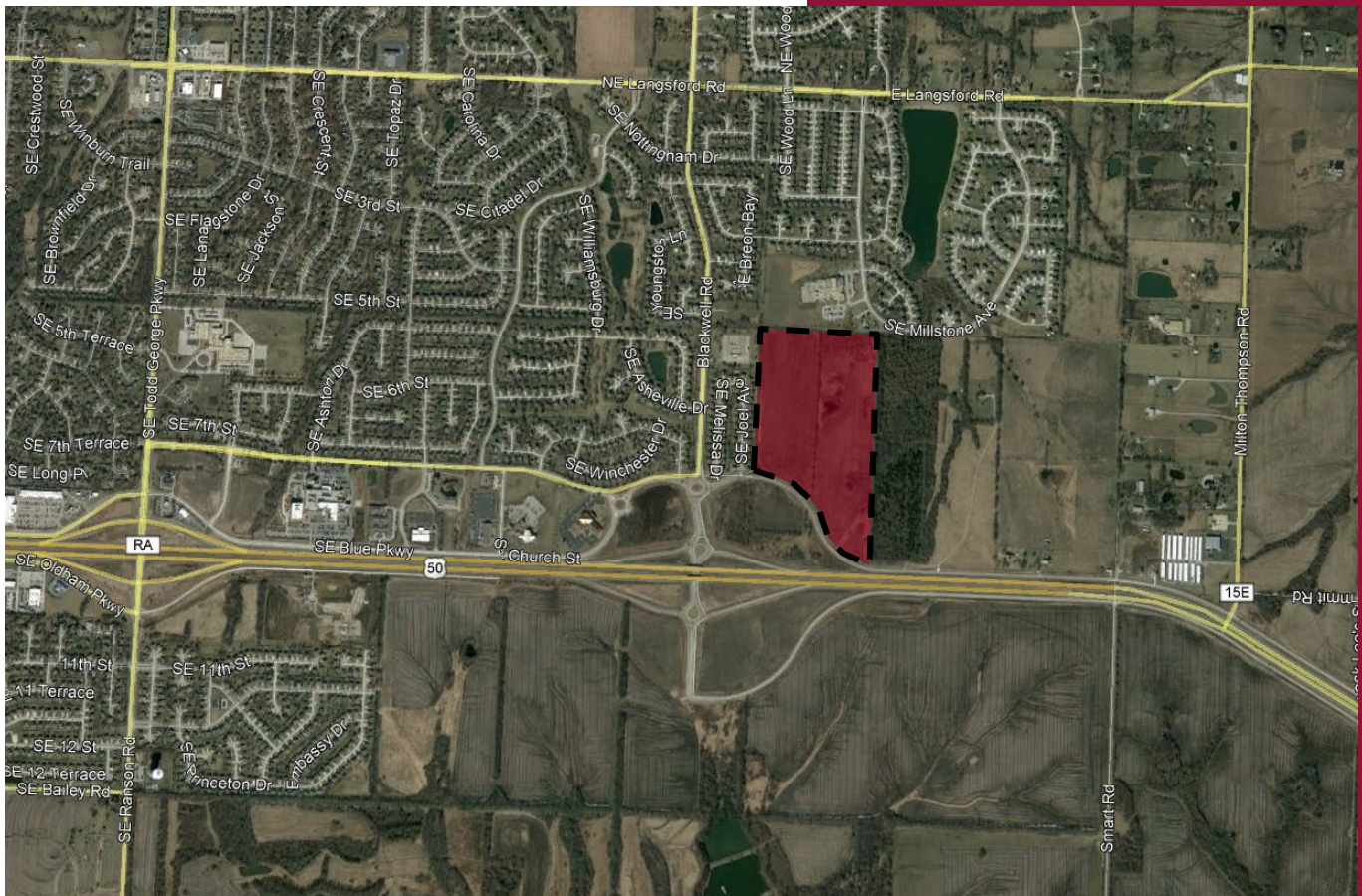


Blackwell Road and Blue Parkway Lee's Summit, Missouri



Prepared by TranSystems
July 2021



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

July 21, 2021

Mr. Jake Loveless
Griffin Riley Property Group
21 SE 29th Terrace
Lee's Summit, MO 64082

**RE: Blue Parkway Development Traffic Impact Study
Blackwell Road and Blue Parkway
Lee's Summit, Missouri**

Dear Mr. Loveless:

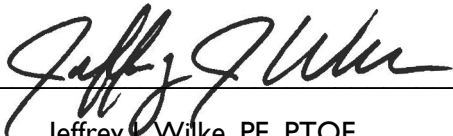
In response to your request and authorization, TranSystems has completed a traffic impact study for the proposed residential and commercial development to be located generally to the north and east of the US-50 Highway and Blackwell Road interchange along Blue Parkway in Lee's Summit, Missouri. The purpose 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 Development Conditions
- ▶ Future 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

JJW/jw/PI01210245
Enclosure

Introduction

TranSystems has completed a traffic impact study for the proposed residential and commercial development to be located generally to the north and east of the US-50 Highway and Blackwell Road interchange along Blue Parkway 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 both residential and commercial land uses. A 42,500 square foot retail building is proposed in the southwest portion of the site. North of the retail building, there are 80 lots for single-family homes. To the east of the single-family homes there are 118 attached homes that are planned to be senior housing for residents age 55 and over. In the southeast corner of the site a 252-unit apartment complex is proposed.

Access to the development will primarily be provided from Blue Parkway. The retail building will have one site driveway onto Blue Parkway (referred to as Site Drive A), roughly 850 feet east of Blackwell Road. The apartments will be access from a site driveway on Blue Parkway (Site Drive B), located approximately 700 feet west of the property line.

A new collector street will be constructed through the development, extending northeast from Blue Parkway to the west property line. The collector street will separate the apartment complex from the senior housing. A roundabout will be constructed at the intersection of the proposed collector street with Blue Parkway. Access to the residential portions of the development will be provided from the collector street. Several public and private streets are proposed along the collector, each spaced at least 200 feet apart. A second driveway to the apartment complex (Site Drive C) will also be provided from the collector street at the intersection 425 feet north of the roundabout. A copy of the proposed site plan showing the proposed 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.

- ▶ Blackwell Road and Blue Parkway
- ▶ Site Driveways

Surrounding Land Uses and Street Network

The development site currently consists of undeveloped land used for agricultural purposes. There are several different land uses surrounding the site. To the east of the site, much of the adjacent land is

undeveloped, with a few single-family residences on large lots. Directly to the north of the site is Highland Park Elementary School. The school is accessed from Millstone Avenue, which is a residential collector street within the Summit Mill subdivision of single-family homes. To the west of the site is the Asbury Park subdivision of single-family homes which is accessed from Blue Parkway. North of Asbury Park is a substation for the electrical utility company and Canterbury Park. A short paved trail runs adjacent to the north edge of the site, connecting the park to Highland Park Elementary School. The south side of the site is bounded by Blue Parkway. There are roughly 17 acres of undeveloped land south of Blue Parkway in the northeast corner of the US-50 Highway and Blackwell Road interchange.

The proposed development site is located to the north and east of the US-50 Highway and Blackwell Road interchange. The diamond interchange has multi-lane roundabouts at each ramp terminal. There is also a multi-lane roundabout north of the interchange on Blackwell Road at the intersection with Blue Parkway.

Blackwell Road is classified as minor arterial street with curbs and gutters and continuous street lighting. The posted speed limit is 35 mph. In the interchange area Blackwell Road is a four-lane divided street. There is a shared-use path along the east side of the street and a sidewalk on the west side. To the north of the roundabout at Blue Parkway, the street section changes. The shared-use path on the east side of the street reduces to a sidewalk, the raised median ends, and the street is striped as a three-lane roadway with a center two-way left-turn lane and paved shoulders on each side.

Blue Parkway is the frontage road that runs along the north side of US-50 Highway. The roadway is classified as a commercial collector street with a posted speed limit of 40 mph. Blue Parkway is a two-lane roadway with six-foot wide paved shoulders. East of Blackwell Road, there are reverse curves in the roadway that change the alignment of the road to provide separation between Blue Parkway and the interchange ramps. The development site is adjacent to the reverse curves. West of the development site, the paved shoulders on Blue Parkway transition to curbs and gutters on the approach to the roundabout intersection at Blackwell Road. The road widens for two westbound lanes at the roundabout, one being a dedicated left-turn lane and the other lane allowing all movements.

Traffic Counts

Turning-movement traffic volume counts were collected at the study intersection of Blackwell Road and Shenandoah Drive on Thursday, March 15, 2018 for a previous traffic impact study. The turning movement counts were collected from 7:00 to 9:00 A.M. and from 4:00 to 6:00 P.M. The A.M. peak hour for all intersections occurred between 7:30 and 8:30 A.M., while the P.M. peak hour occurred between 4:45 and 5:45 P.M.

As a part of the previous study, 24-hour traffic counts were recorded along Blackwell Road and Blue Parkway from March 13, 2018 through March 15, 2018. Machine traffic volume counters were placed on Blackwell Road north of the Blue Parkway intersection, and on Blue Parkway adjacent to the development site. Based on these counts, the daily traffic volume on Blackwell Road to the north of Blue

Parkway was 4,670 vehicles. The daily traffic volume on Blue Parkway adjacent to the development site was 1,700 vehicles.

Since the counts were collected in 2018, some annual background growth was assumed to calibrate the counts to current conditions for 2021. Background growth was assumed at a rate of two-percent per year to approximate existing conditions. The existing lane configurations, traffic control devices, and peak hour traffic volumes are illustrated on **Figures A-3** through **A-5**.

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, 10th Edition. Trips for the attached senior housing units and the apartment complex were both estimated using the Multifamily Housing (Low-Rise) land use code. **Table 1** shows the expected trips to be generated by the proposed development.

Table 1
Proposed Development Trip Generation

Land Use	Intensity	ITE Code	Average Weekday	A.M. Peak Hour			P.M. Peak Hour		
				Total	In	Out	Total	In	Out
Single-Family Detached Homes	80 du	210	847	62	16	46	83	53	30
Multifamily Housing (Low-Rise)	118 du	220	852	56	13	43	69	44	25
Multifamily Housing (Low-Rise)	252 du	220	1,865	115	27	88	135	86	49
Shopping Center	42,500 sf	820	3,360	174	108	66	289	139	150
<i>Subtotal Development Trips</i>			6,924	407	164	243	576	322	254
<i>Pass By Trips (20% of PM Shopping Center)</i>			—	—	—	—	58	29	29
Total New Development Trips			6,924	407	164	243	518	293	225

Pass-by traffic occurs when drivers stop at the proposed development while in route to their final destination. Pass-by traffic is common for retail land uses. A pass-by percentage of 20% was applied to the shopping center trips during the P.M. peak hour only. This rate corresponds to the 15th percentile

of pass-by rates listed in the ITE Trip Generation Handbook. No pass-by percentage is provided for A.M. peak hour shopping center trips in the handbook.

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 existing traffic patterns, access to the highway system, 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 Blackwell Road	20%
South on Blackwell Road (to/from US-50)	60%
West on Shenandoah Drive	15%
East on Shenandoah Drive	5%
Total	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 Development Conditions
- ▶ Future Conditions

The study intersections were evaluated using the Synchro and Sidra traffic analysis software packages. Synchro was used for the stop controlled intersections, and Sidra was used for roundabouts. Calculations were performed based on the methodologies outlined in the Highway Capacity Manual (HCM), 6th 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** on the subsequent page shows the upper limit of delay associated with each level of service for unsignalized intersections.

Unsignalized intersections 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 routes to avoid the longer delays. Other times the volumes on the unsignalized approaches are relatively minor when compared to the major street traffic, and improvements such as traffic signal installation may increase the average delay to all users of the intersection.

Table 3
Intersection Level of Service Delay Thresholds

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

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 if the installation of a traffic signal would have negative impacts on the surrounding transportation system.

The LOS rating deemed acceptable varies by community, facility type and traffic control device. Lee's Summit has identified LOS C as the minimum desirable goal. However, at unsignalized intersections LOS D, E, or even F may be 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.

In addition to delay (and the corresponding Level of Service), a secondary means of evaluation is often utilized to assess the overall capacity of the intersection or unsignalized movement. This evaluation is a ratio of volume to capacity (v/c) that reflects, regardless of delay, the ability to accommodate existing or projected traffic volumes over the course of a peak hour. A v/c ratio of 1.00 reflects the capacity of a signalized intersection or stop controlled movement. At roundabouts, a v/c ratio of 0.85 is considered the threshold for stable operation on an approach leg.

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.

Existing Conditions

The results of the Existing Conditions intersection analyses are summarized below in **Table 4**. The study intersection was evaluated with the lane configurations, traffic volumes, and traffic control devices shown on **Figures A-3** through **Figure A-5**. The Sidra output files are included in **Appendix C**. The 95th percentile queues for each peak hour are illustrated on **Figure A-6**.

Table 4 Intersection Operational Analysis Existing Conditions							
Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS ¹	Delay ²	v/c ³	LOS ¹	Delay ²	v/c ³
Blackwell Road and Blue Parkway							
	Northbound	A	3.6	0.13	A	5.0	0.28
	Westbound	A	3.6	0.05	A	4.6	0.08
	Southbound	A	4.0	0.11	A	4.0	0.11
	Eastbound	A	4.0	0.06	A	4.5	0.12

1 – Level of Service

2 – Delay in seconds per vehicle

3 – Volume-to-Capacity Ratio

As shown in the table, all approaches to the study intersection of Blackwell Road and Blue Parkway currently operate at excellent levels of service during the peak hours with minimal delay. The 95th percentile queues on each approach are minimal, with no more than two vehicles in any lane.

Existing plus Development Conditions

The proposed development includes several new streets and driveways. A new collector street is proposed through the development, extending north and east from Blue Parkway. The City's Thoroughfare Master Plan depicts a commercial collector street in this same general location as indicated in orange on **Figure 1**. As the commercial collector street continues east, it becomes a residential collector street, which is indicated by the yellow line. Since the surrounding land uses proposed with this project would all be residential, the proposed collector street would actually function as a residential collector for its entire length.

There are several new street and driveway connections proposed along the collector street. These connections are all spaced at more than 200 feet apart. This meets the minimum connection spacing standards provided in the Lee's Summit Access Management Code (AMC) for a

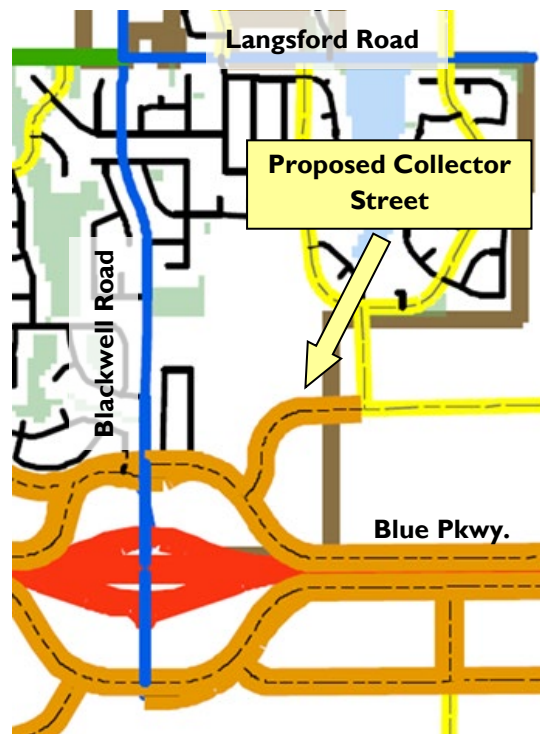


Figure 1 – Thoroughfare Master Plan

residential collector type street. As residential access points, left- or right-turn lanes are not required at any of the intersections along the proposed collector street, according to the AMC.

The first intersection north of Blue Parkway (Site Drive C) along the collector street is spaced more than 400 feet from Blue Parkway. This is ample distance away from the proposed roundabout intersection. A single-lane roundabout is proposed at this intersection for consistency with the Blue Parkway corridor and adjacent interchange.

As a commercial collector street, all proposed site driveways along Blue Parkway meet the minimum connection spacing requirements of the AMC. Left-turn lanes are required on Blue Parkway at Site Drive A and Site Drive B. The left-turn lanes should have a minimum storage length of 150 feet, plus an appropriate taper. Right-turn lanes are not necessary at either site driveway intersection.

The results of the existing plus development conditions intersection analyses are summarized below in **Table 5**. This study scenario assessed the street system with the addition of 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-7** through **A-9**. The Synchro and Sidra output files are included in **Appendix C**. The 95th percentile queues projected for each peak hour are illustrated on **Figure A-10**.

Table 5 Intersection Operational Analysis Existing plus Development Conditions							
Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS ¹	Delay ²	v/c ³	LOS ¹	Delay ²	v/c ³
Blackwell Road and Blue Parkway	Northbound	A	3.9	0.14	A	6.1	0.31
	Westbound	A	4.6	0.16	A	5.9	0.20
	Southbound	A	5.0	0.15	A	5.1	0.16
	Eastbound	A	5.1	0.11	A	6.1	0.20
Blue Parkway and Site Drive A	Eastbound Left-Turn	A	8.1	0.09	A	7.9	0.10
	Southbound	B	10.5	0.10	B	11.9	0.24
Blue Parkway and proposed collector street	Westbound	A	3.8	0.12	A	4.1	0.12
	Southbound	A	4.2	0.12	A	3.7	0.78
	Eastbound	A	3.4	0.08	A	4.6	0.23
Blue Parkway and Site Drive B	Eastbound Left-Turn	A	7.4	0.01	A	7.5	0.03
	Southbound	A	9.0	0.05	A	9.0	0.03
proposed collector street and Site Drive C	Eastbound	A	9.0	0.06	A	9.2	0.05
	Westbound	A	9.9	0.07	B	10.4	0.05

1 – Level of Service

2 – Delay in seconds per vehicle

3 – Volume-to-Capacity Ratio

As shown in **Table 5**, all study intersections are projected to operate at very good levels of service (LOS A and B) during the peak hours with the addition of development traffic. All queues are projected to be no more than two vehicles in length for any lane.

Future Conditions

This study scenario assessed the street system with the additional traffic generated by the proposed development, development assumptions for adjacent undeveloped parcels, and background traffic growth on the surrounding street network. It was assumed that undeveloped land south of the site between the westbound US-50 exit ramp and Blue Parkway would be developed in the future scenario. For a conservative estimate of trips, it was assumed that 20 percent of the land would be developable, resulting in 150,000 square feet of shopping center land uses. The 150-acre undeveloped property east of the site was assumed to be single-family residences at a density of three houses per acre.

Trip generation estimates for the future developments were prepared in the same manner as the proposed development, using the Institute of Transportation Engineer's Trip Generation, 10th Edition. Trip generation estimates for future developments are included in **Appendix B**. These future development trips were assumed to use the same general trip distribution patterns as shown in **Table 2**. All of the shopping center trips from the south of the site were distributed through the proposed roundabout intersection to access that site. The trips for the future residential development were split between the proposed collector street and Blue Parkway.

Background growth of two-percent per year was applied over the 20-year planning horizon to the existing conditions traffic volumes on Blackwell Road and on Blue Parkway. This growth factor is based on review of traffic volumes and projections shown in the Access Justification Report for the US-50 and Blackwell Road interchange project, and comparison to the counts collected. The future projections traffic volumes are assumed to represent conditions in the year 2041.

The results of the future conditions intersection analyses are summarized on the following page in **Table 6**. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on **Figures A-11** through **Figure A-13**. The Sidra output files are included in **Appendix C**. The 95th percentile queues projected for each peak hour are illustrated on **Figure A-14**.

The table indicates that delays are projected to increase at the study intersections in the future. However, all study intersections are projected to operate within the thresholds for acceptable levels of service during the peak hours. Queues are projected to increase at the Blackwell Road and Blue Parkway roundabout. During the P.M. peak hour, the 95th percentile queue is approximately three vehicles in both of the westbound lanes. The northbound right-turn queue is projected to be roughly 200 feet during the P.M. peak hour, which will not impact the roundabout at the US-50 interchange.

The single-lane roundabout on Blue Parkway at the proposed collector street is projected to operate acceptably in the future. Queue lengths are projected to be 142 feet in the eastbound direction during

the P.M. peak hour. The addition of an eastbound right-turn lane to accommodate shopping center traffic would reduce the queue length on the eastbound approach.

Table 6
Intersection Operational Analysis
Future Conditions

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS ¹	Delay ²	v/c ³	LOS ¹	Delay ²	v/c ³
Blackwell Road and Blue Parkway	<i>Northbound</i>	A	5.5	0.27	B	13.5	0.68
	<i>Westbound</i>	A	7.2	0.36	B	11.4	0.48
	<i>Southbound</i>	A	8.7	0.31	A	9.2	0.35
	<i>Eastbound</i>	A	8.9	0.26	B	14.0	0.50
Blue Parkway and Site Drive A	<i>Eastbound Left-Turn</i>	A	9.4	0.12	A	9.2	0.14
	<i>Southbound</i>	C	15.2	0.17	D	28.4	0.52
Blue Parkway and proposed collector street	<i>Northbound</i>	A	4.2	0.09	A	9.7	0.41
	<i>Westbound</i>	A	6.2	0.31	A	8.3	0.35
	<i>Southbound</i>	A	7.8	0.32	A	6.4	0.21
	<i>Eastbound</i>	A	5.2	0.28	A	9.8	0.60
Blue Parkway and Site Drive B	<i>Eastbound Left-Turn</i>	A	7.9	0.01	A	7.9	0.04
	<i>Southbound</i>	B	10.3	0.07	B	10.1	0.04
proposed collector street and Site Drive C	<i>Eastbound</i>	A	9.8	0.07	B	10.1	0.06
	<i>Westbound</i>	B	11.5	0.09	B	12.8	0.07

1 – Level of Service

2 – Delay in seconds per vehicle

3 – Volume-to-Capacity Ratio

Site Drive A is to be stop sign controlled at the intersection with Blue Parkway. In the future, the stop controlled southbound approach is projected to operate at LOS C and LOS D during the peak hours. While LOS D is generally not desirable, the delays will only impact traffic exiting the private driveway. It would be appropriate to construct Site Drive A with two exiting lanes to allow right-turn traffic to bypass vehicles that are queued while waiting to turn left.

Summary

TranSystems has completed a traffic impact study for the proposed residential and commercial development to be located generally to the north and east of the US-50 Highway and Blackwell Road interchange along Blue Parkway 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 development consists of single-family residential, multifamily residential, and commercial land uses. As part of the project, a new collector street is proposed to be constructed through the site

from Blue Parkway. The site will be accessed from two new driveways on Blue Parkway and from other new streets and driveways along the proposed collector street.

The following improvements are identified in accordance with the Lee's Summit Access Management Code, and to provide acceptable operations at the study intersections.

Blue Parkway and Site Drive A

- ▶ Construct an eastbound left-turn lane with a minimum storage length of 150 feet, plus an appropriate taper.
- ▶ Construct Site Drive A with two southbound lanes exiting the site.

Blue Parkway and Site Drive B

- ▶ Construct an eastbound left-turn lane with a minimum storage length of 150 feet, plus an appropriate taper.

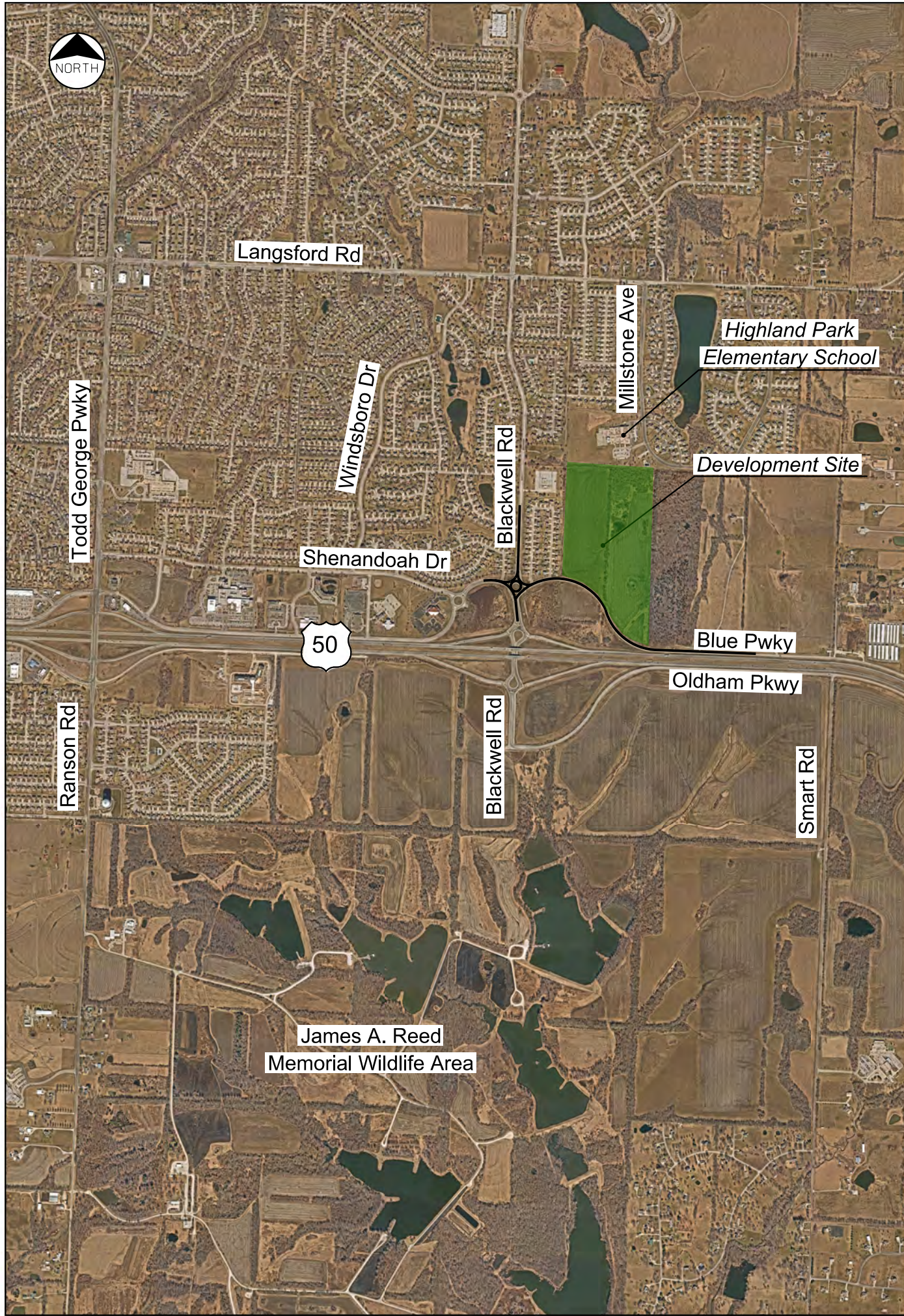
Blue Parkway and proposed collector street

- ▶ Construct a single-lane roundabout.

With the aforementioned improvements, all intersections are projected to operate at acceptable levels of service with the addition of development traffic.

Appendix A - Figures

Figure A-1	Location Map
Figure A-2	Proposed Development Site Plan
Figure A-3	Existing Conditions Lane Configurations
Figure A-4	Existing Conditions A.M. Peak Hour Traffic Volumes
Figure A-5	Existing Conditions P.M. Peak Hour Traffic Volumes
Figure A-6	Existing Conditions 95th Percentile Queue Lengths
Figure A-7	Existing plus Development Conditions Lane Configurations
Figure A-8	Existing plus Development Conditions A.M. Peak Hour Traffic Volumes
Figure A-9	Existing plus Development Conditions P.M. Peak Hour Traffic Volumes
Figure A-10	Existing plus Development Conditions 95th Percentile Queue Lengths
Figure A-11	Future Conditions Lane Configurations
Figure A-12	Future Conditions A.M. Peak Hour Traffic Volumes
Figure A-13	Future Conditions P.M. Peak Hour Traffic Volumes





PROPOSED DEVELOPMENT
SITE PLAN

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale



Figure A-2

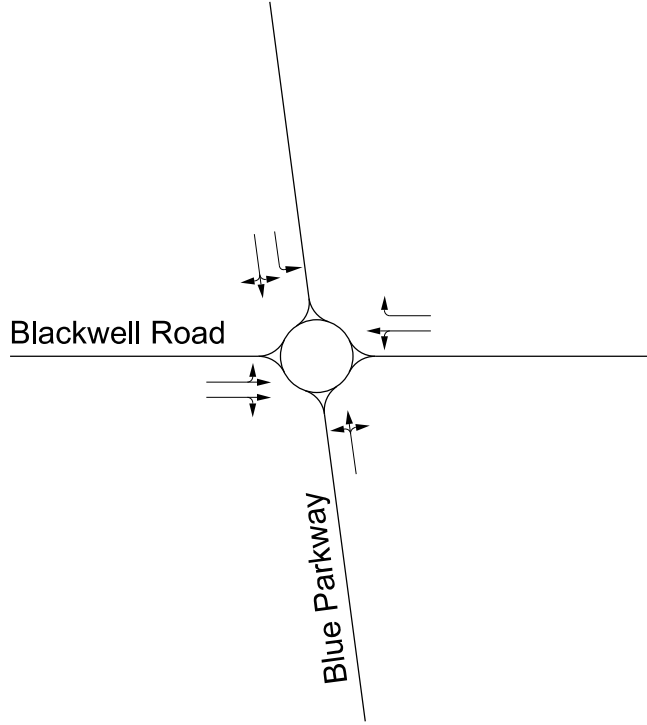
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- Roundabout



- Lane Configuration



EXISTING CONDITIONS
LANE CONFIGURATIONS

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

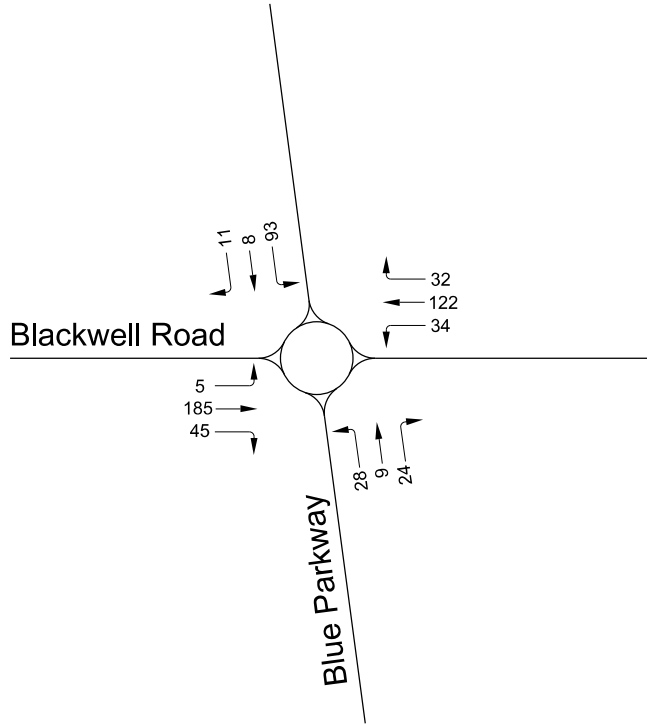
July 2021

No Scale

Figure A-3

Legend

123 - Total Hourly Volume



EXISTING CONDITIONS A.M. PEAK HOUR TRAFFIC VOLUMES

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

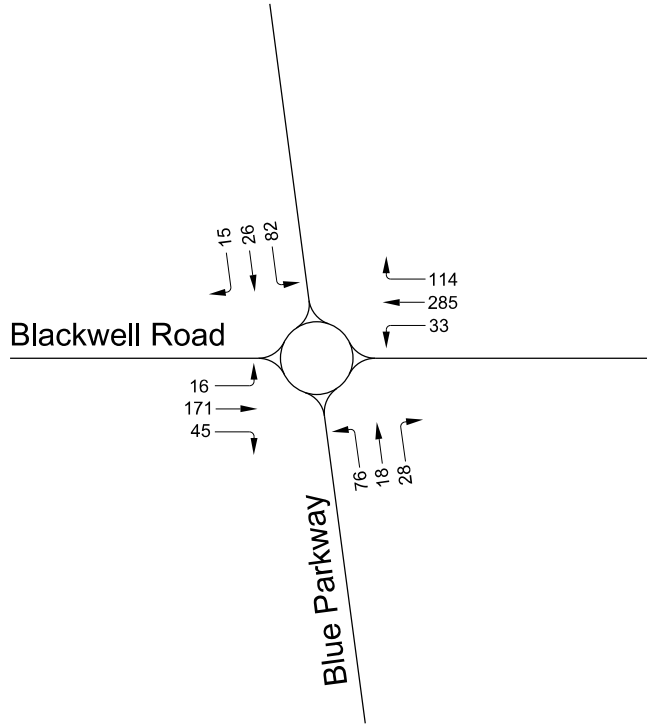
July 2021

No Scale

Figure A-4

Legend

123 - Total Hourly Volume



EXISTING CONDITIONS P.M. PEAK HOUR TRAFFIC VOLUMES

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale

Figure A-5



Legend



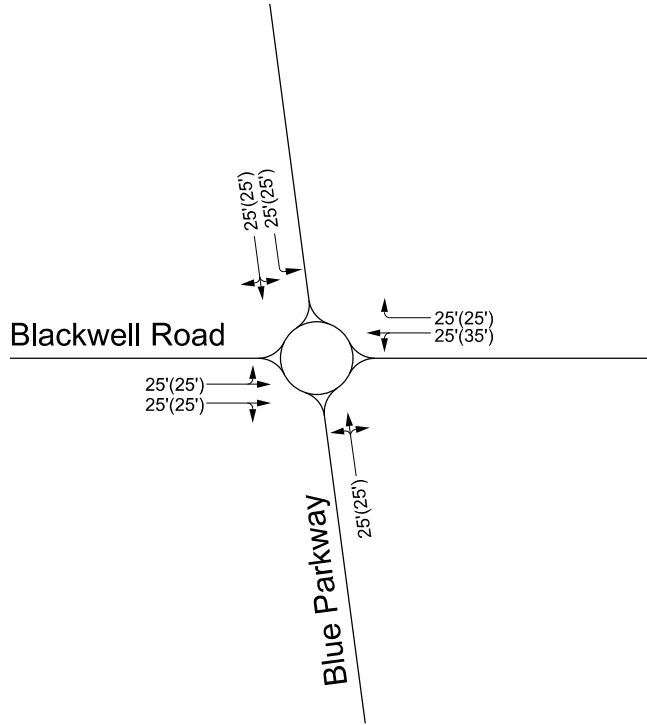
- Roundabout



- Lane Configuration

123'(45') — A.M. 95th Percentile Queue Length

— P.M. 95th Percentile Queue Length



EXISTING CONDITIONS QUEUE ANALYSIS RESULTS



Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

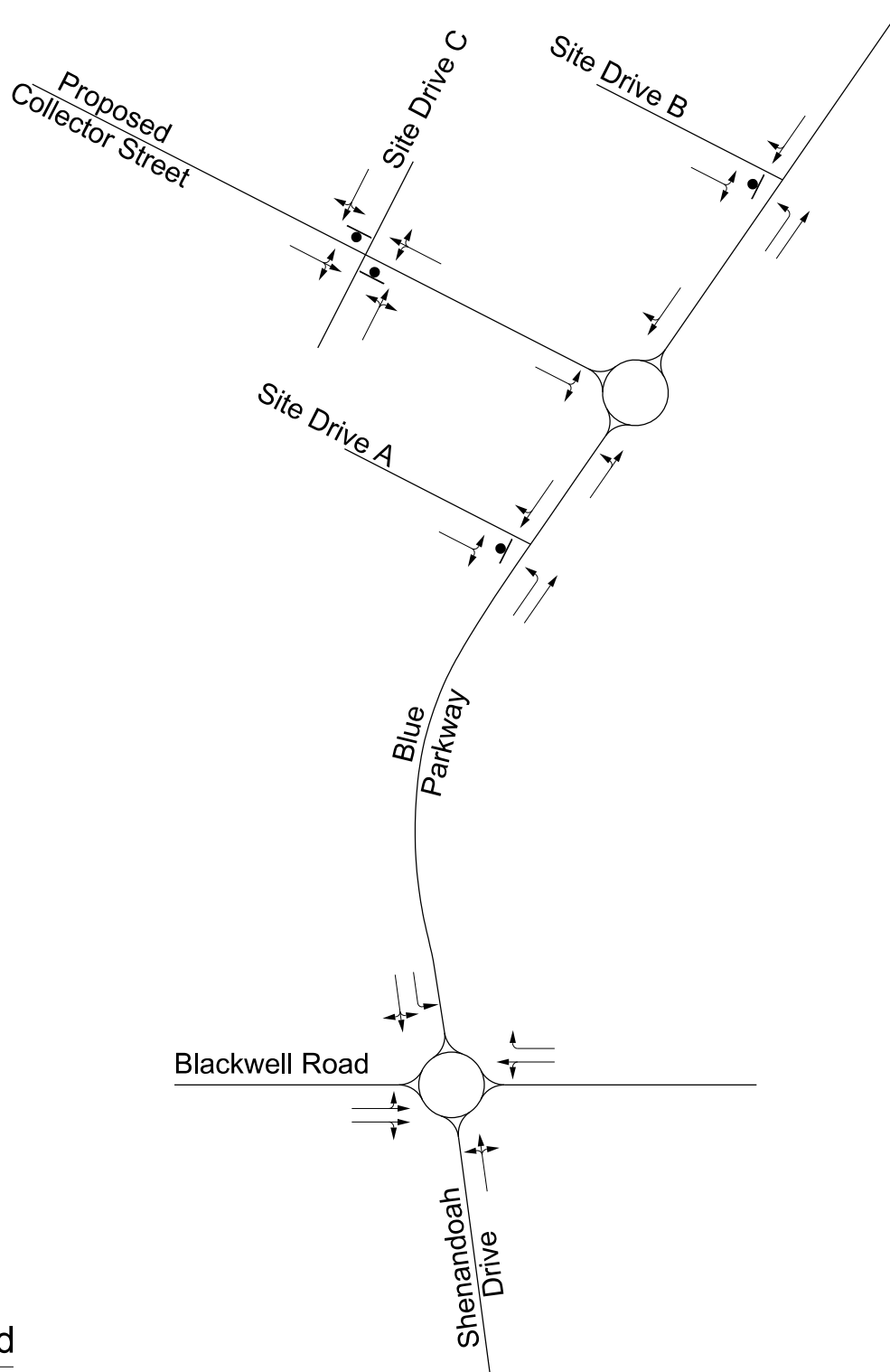
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Figure A-6



Legend

-  - Stop Sign
-  - Roundabout
-  - Lane Configuration



EXISTING PLUS DEVELOPMENT CONDITIONS LANE CONFIGURATIONS



Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

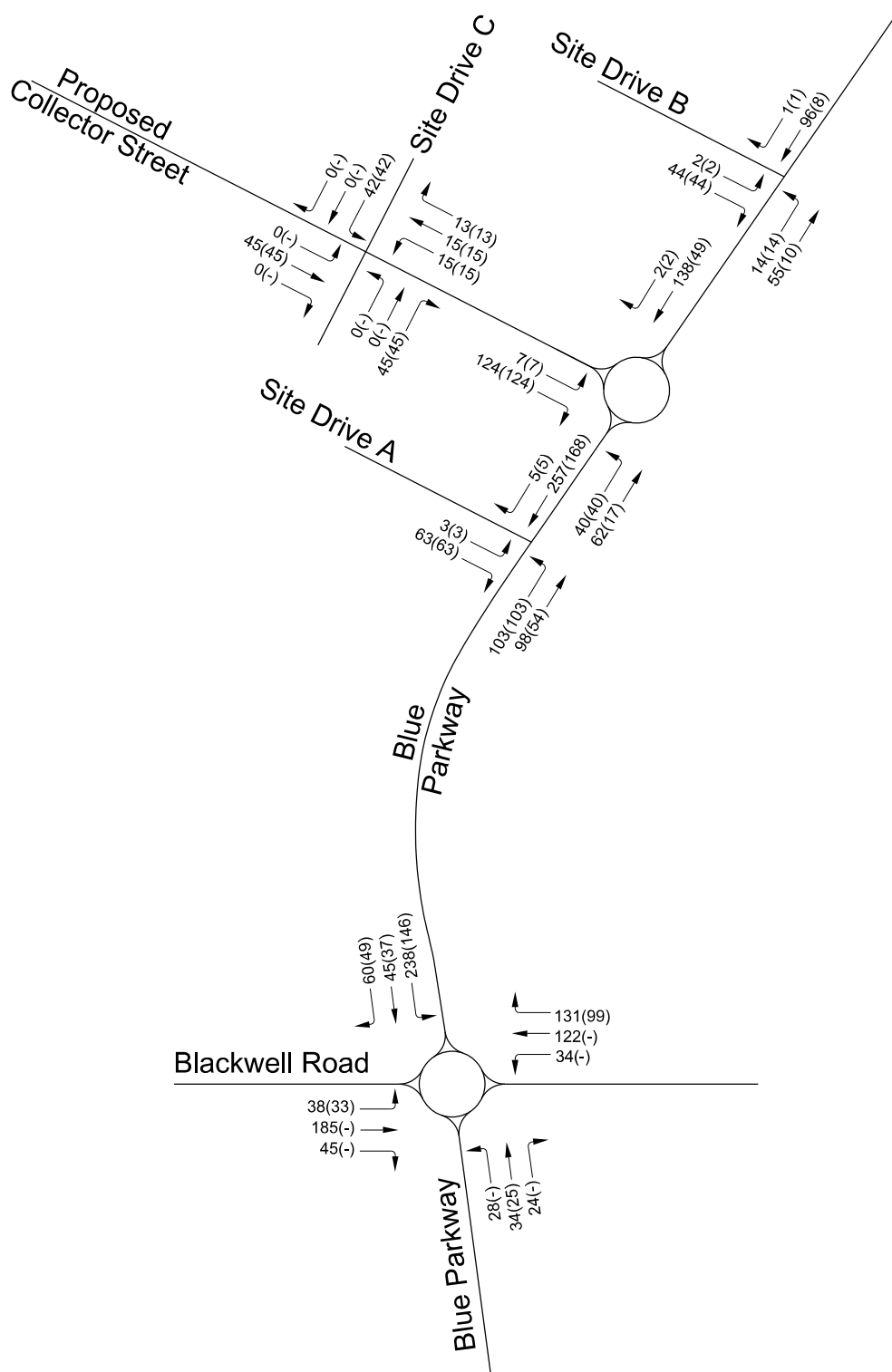
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Figure A-7



Legend

 Total Hourly Volume
 Proposed Development Traffic



EXISTING PLUS DEVELOPMENT CONDITIONS A.M. PEAK HOUR TRAFFIC VOLUMES

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale

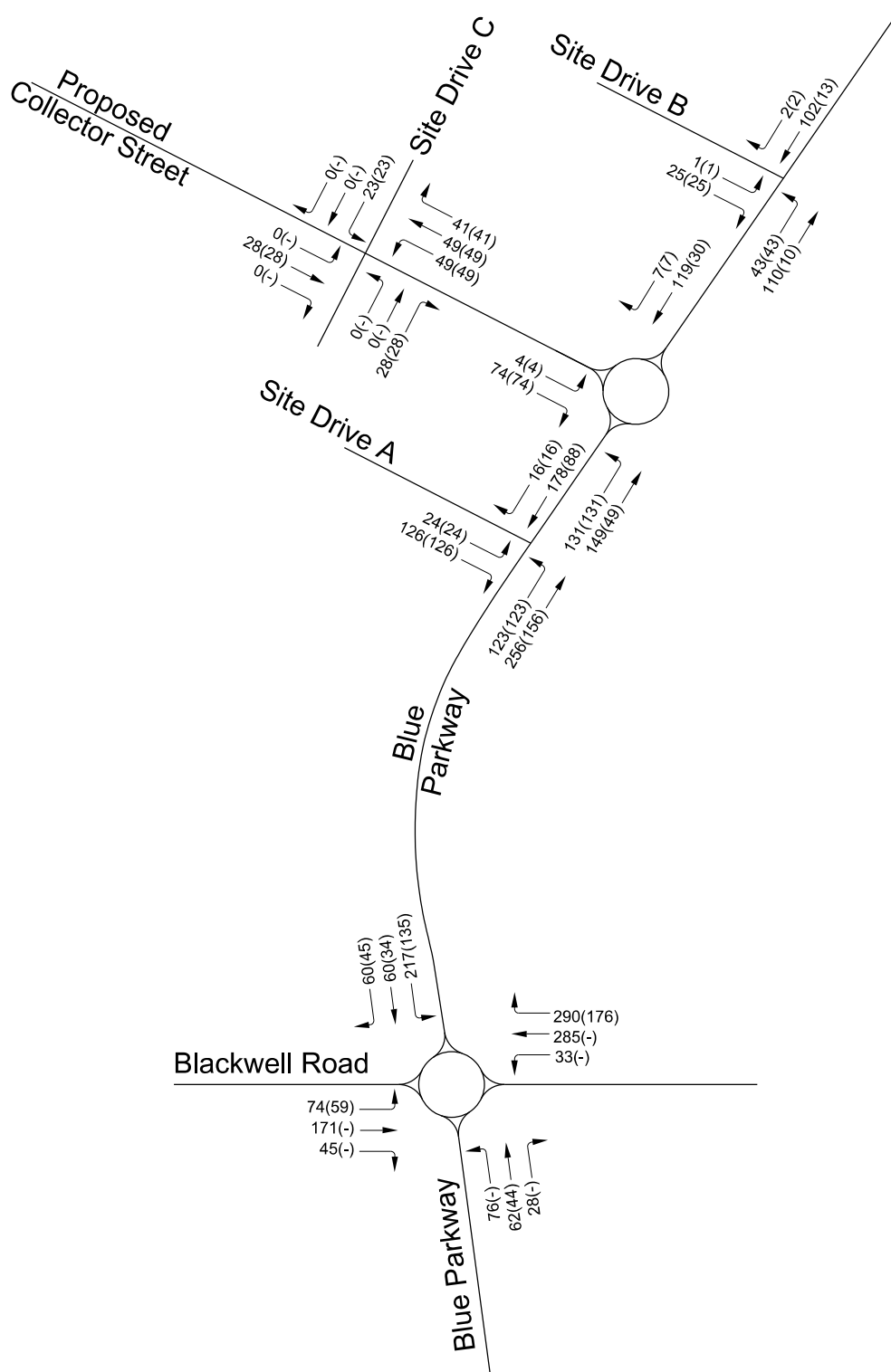


Figure A-8



Legend

 Total Hourly Volume
 Proposed Development Traffic



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

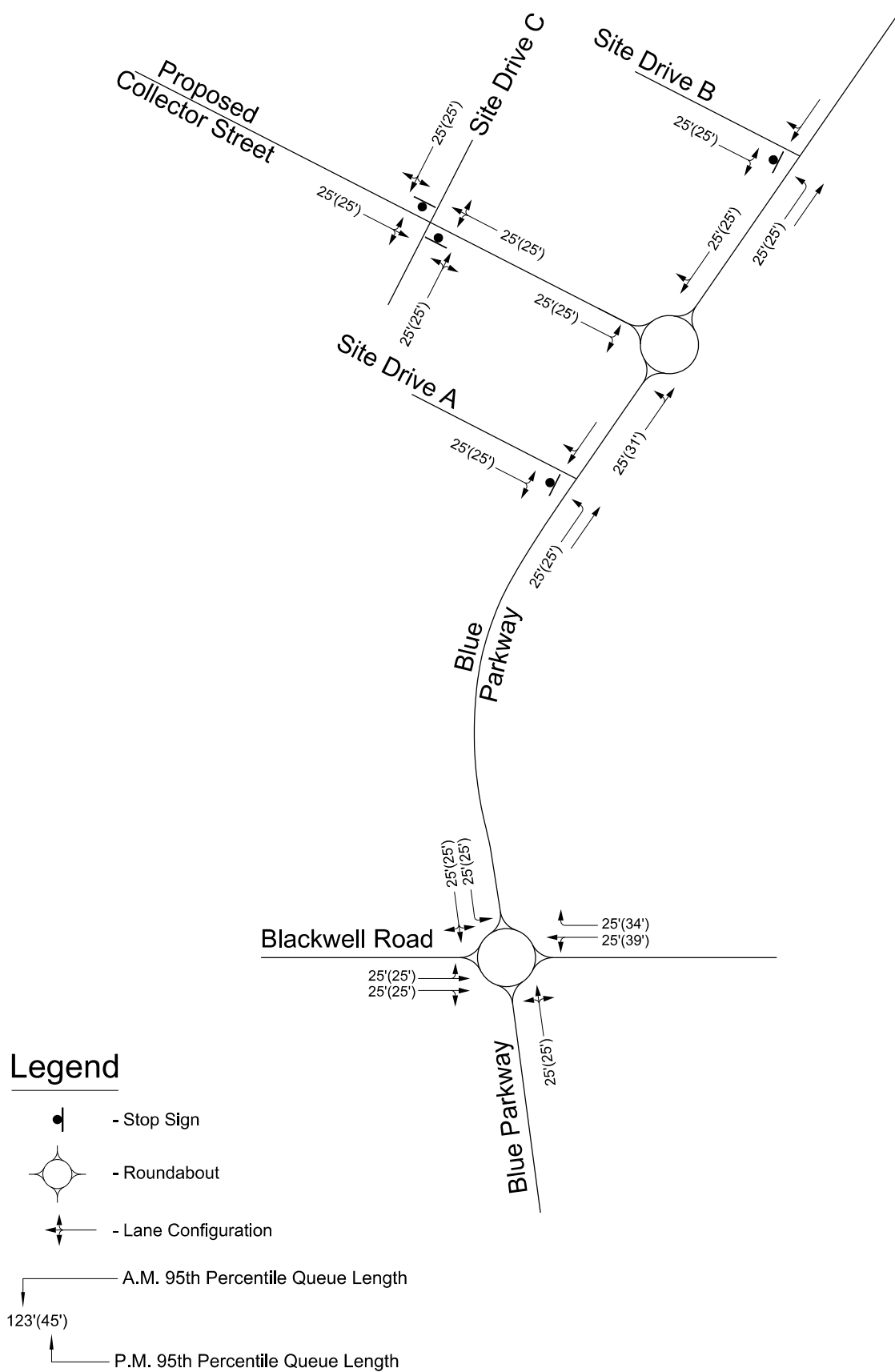
Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale



Figure A-9





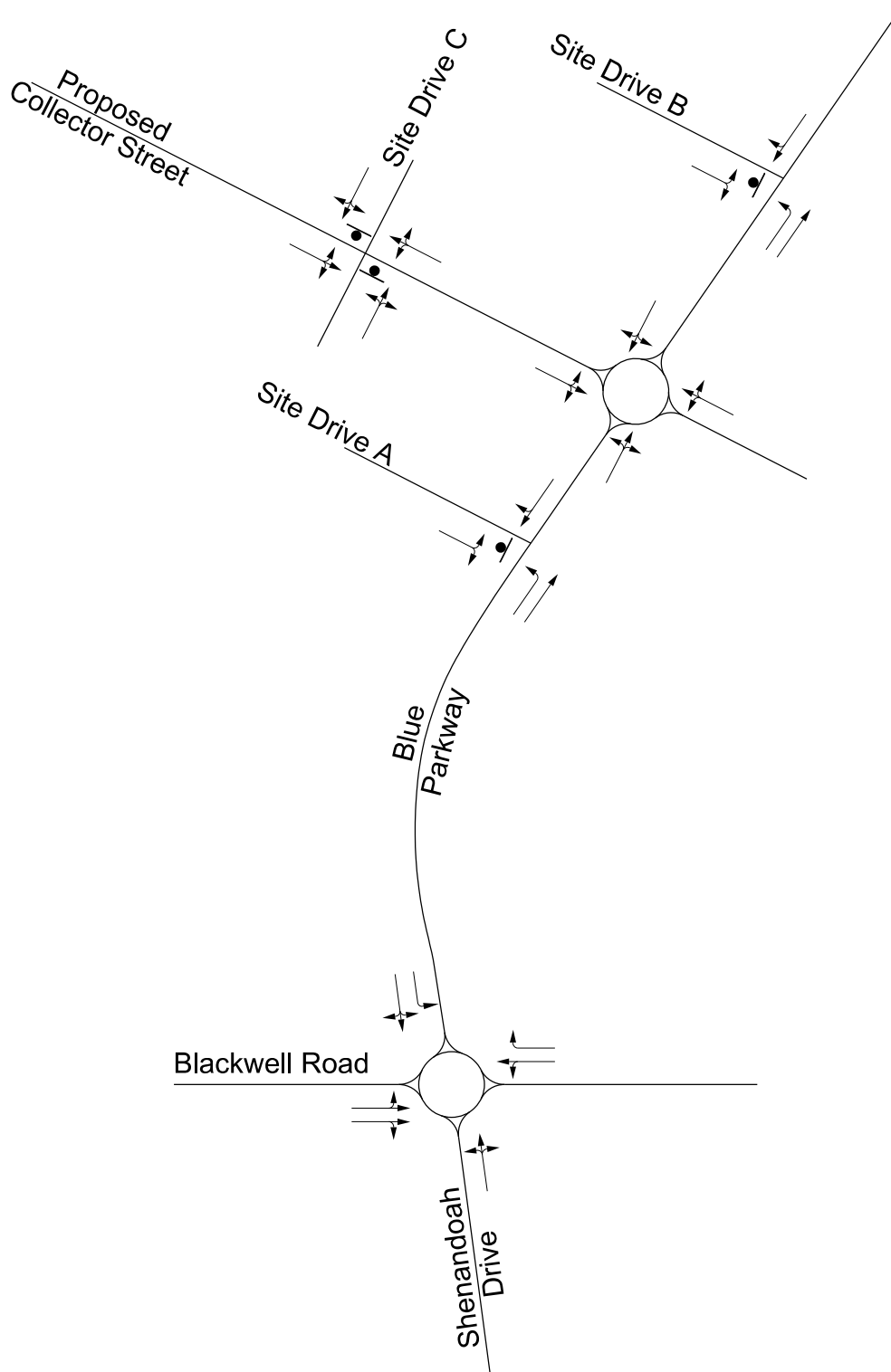
Legend



- Roundabout



- Lane Configuration



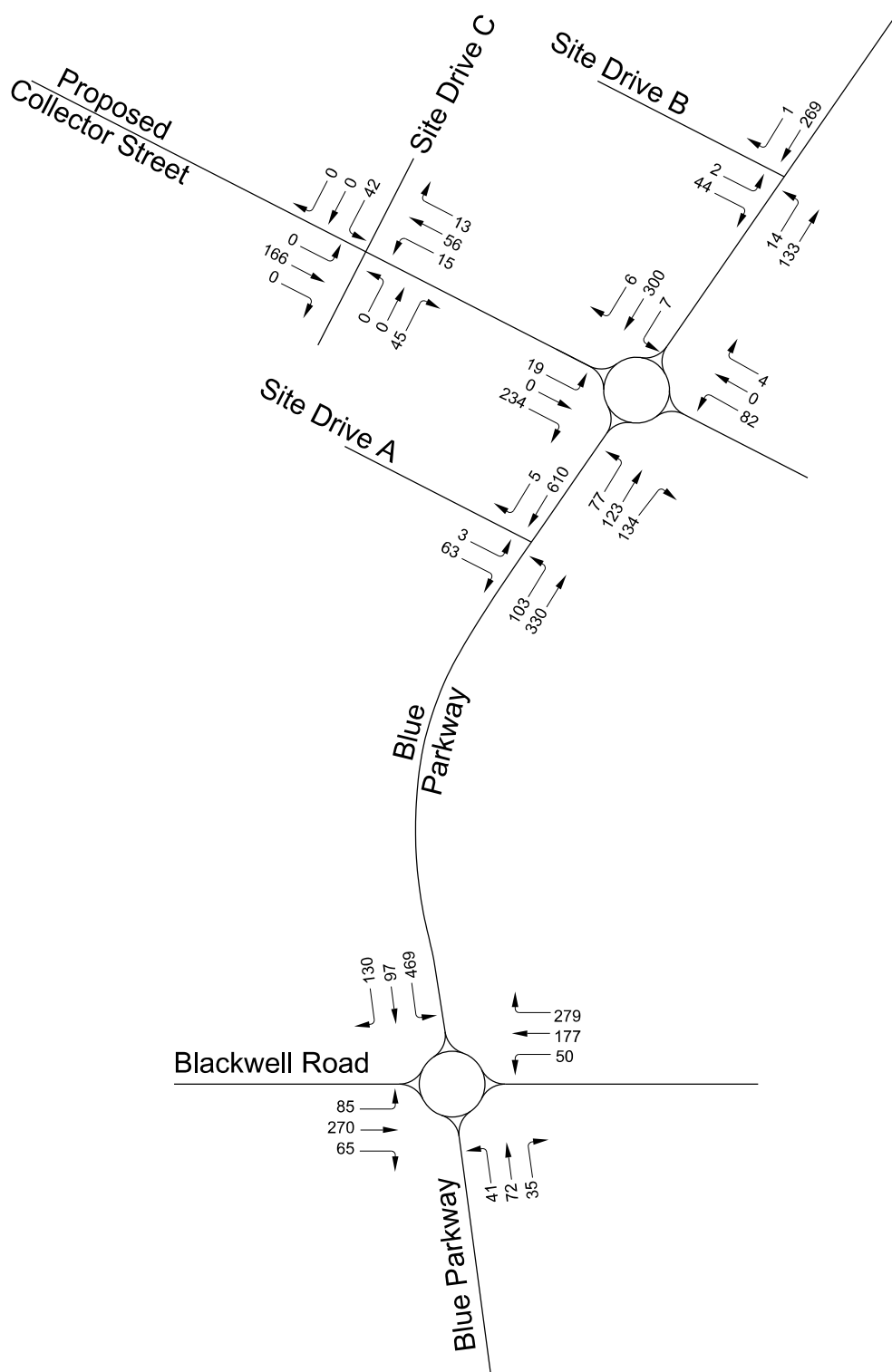
FUTURE CONDITIONS LANE CONFIGURATIONS

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale

Figure A-11



Legend

123 - Total Hourly Volume



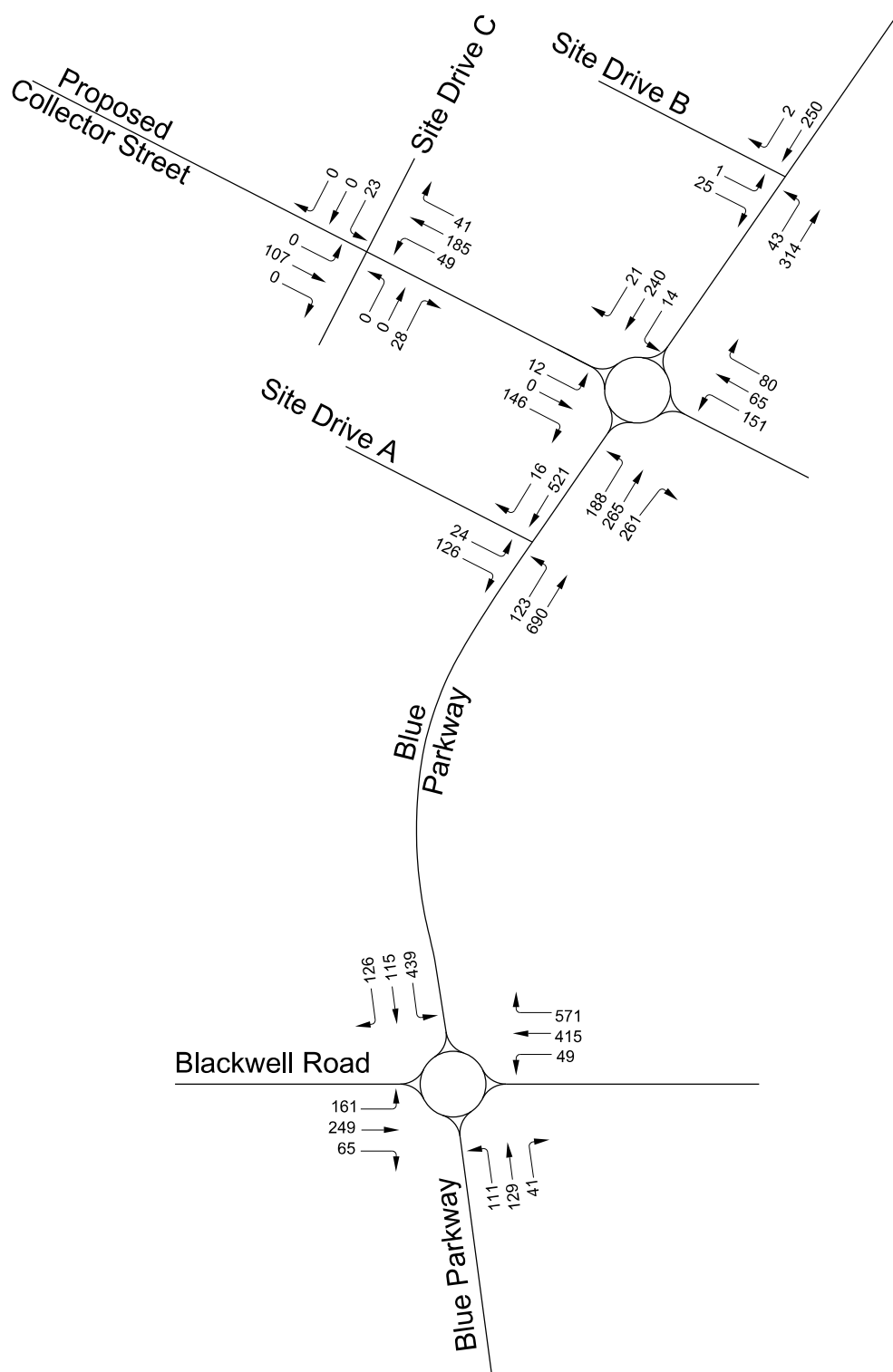
FUTURE CONDITIONS A.M. PEAK HOUR TRAFFIC VOLUMES

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale

Figure A-12



Legend

123 - Total Hourly Volume



FUTURE CONDITIONS P.M. PEAK HOUR TRAFFIC VOLUMES

Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

July 2021

No Scale

Figure A-13



Legend



- Stop Sign



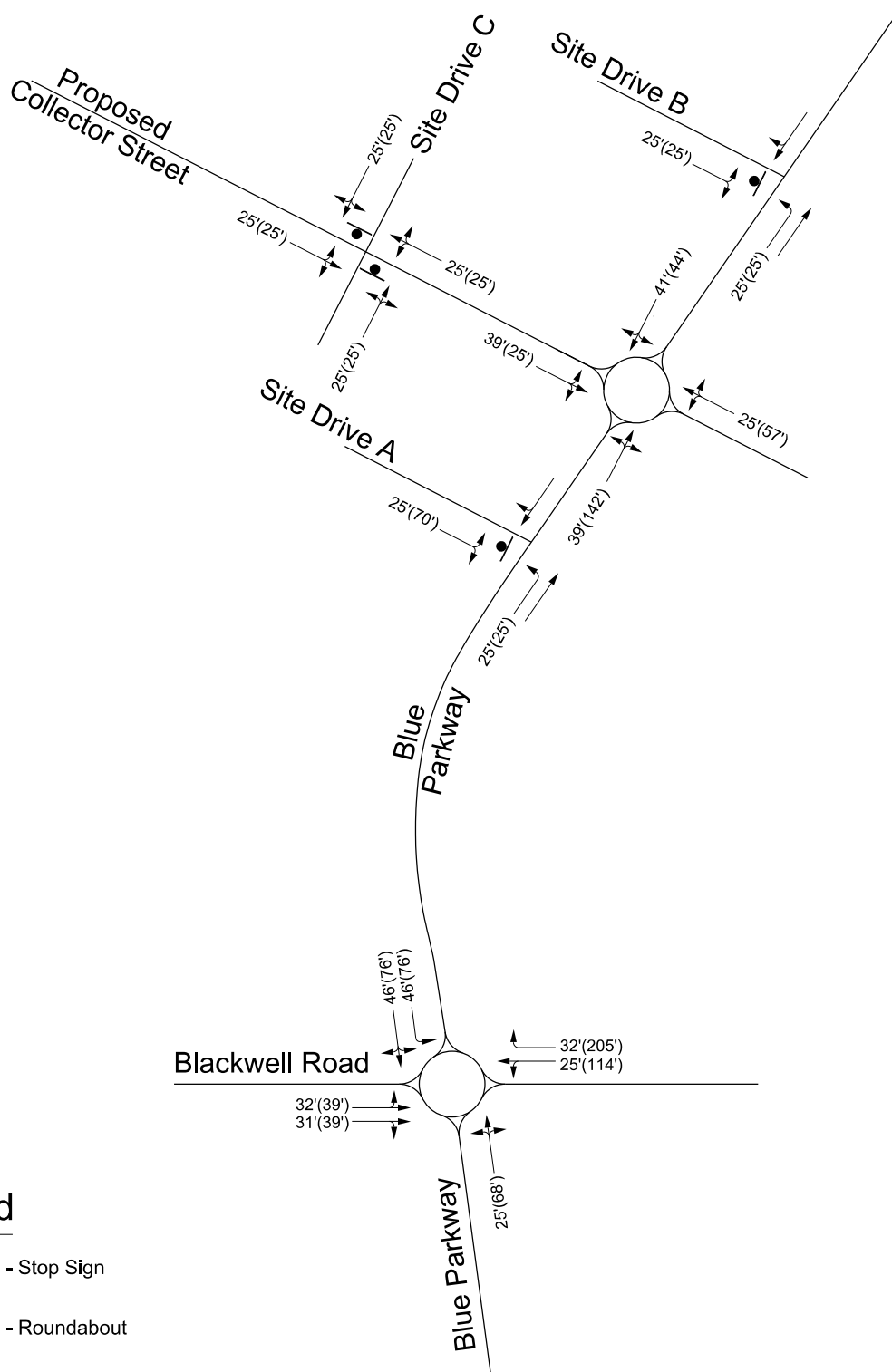
- Roundabout



- Lane Configuration

123'(45') — A.M. 95th Percentile Queue Length

— P.M. 95th Percentile Queue Length



Blue Parkway Development
Traffic Impact Study
Lee's Summit, Missouri

FUTURE CONDITIONS
QUEUE ANALYSIS RESULTS

July 2021

No Scale



Figure A-14



Appendix B – Traffic Volume Data and Trip Generation/Distribution

See attached worksheets.

Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Trip Generation

Proposed Development Land Use	Intensity	ITE Code	Daily	A.M. Peak Hour			P.M. Peak Hour		
				Total	% In	% Out	Total	% In	% Out
Single-Family Detached Home	80 units	210	847	62	25%	75%	83	63%	37%
Muti-Family Housing (Low-	118 units	220	852	56	23%	77%	69	63%	37%
Muti-Family Housing (Low-	252 units	220	1,865	115	23%	77%	135	63%	37%
Shopping Center	42,500 sf	820	3,360	174	62%	38%	289	48%	52%
Subtotal Proposed Development Trips				407		164	576	322	254
Pass-By Trips (20% of PM Shopping Center)							58	29	29
Total New Proposed Development Trips				407		164	518	293	225

Future Development South of Blue Pkwy. Land Use	Intensity	ITE Code	Daily	A.M. Peak Hour			P.M. Peak Hour		
				Total	% In	% Out	Total	% In	% Out
Shopping Center	150,000 sf	820	7,921	227	62%	38%	572	48%	52%
Total Future Residential Development Trips				227		141	572	275	297

Future Development East of site Land Use	Intensity	ITE Code	Daily	A.M. Peak Hour			P.M. Peak Hour		
				Total	% In	% Out	Total	% In	% Out
Single-Family Detached Home	450 units	210	4,149	325	25%	75%	431	63%	37%
Total Future Commercial Development Trips				325		82	431	272	159

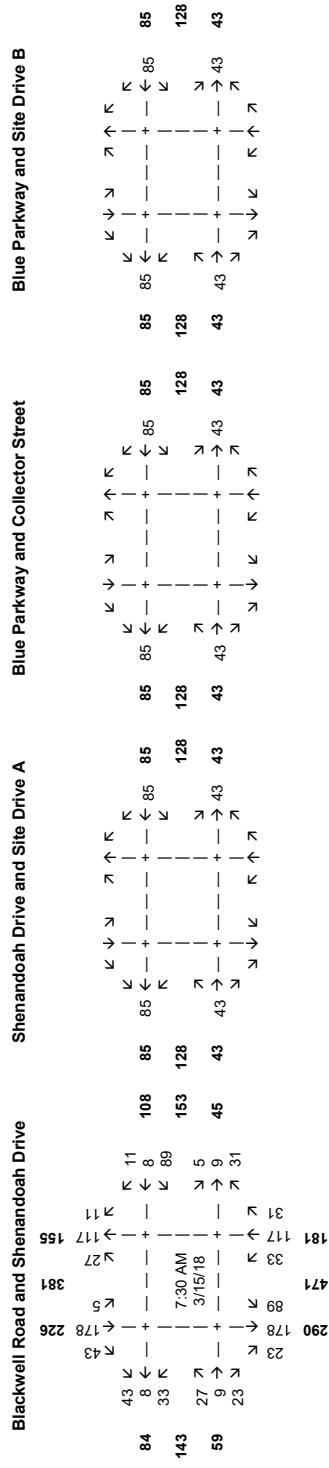
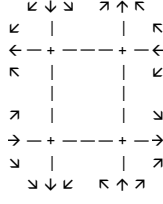
Trip generation estimates based on 10th edition

Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

2018 Traffic Volumes A.M. Peak Hour

Collector Street and Site Drive C

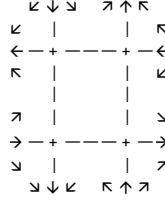


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

2018 Traffic Volumes
P.M. Peak Hour

Collector Street and Site Drive C



Blackwell Road and Shenandoah Drive	Shenandoah Drive and Site Drive A	Blue Parkway and Collector Street	Blue Parkway and Site Drive B
100 43 25 32 100 217 73 17 27 117 27 17 27 4:45 PM 3/15/18 270 27 164 79 32 274 110 416 686 270 222 164 15 73 274 361 583	86 118 86 182 260 182 96 142 96 86 25 79 14 25 14 86 25 79 14 25 14	86 86 86 182 182 182 96 96 96 86 86 86 182 182 182 96 96 96	86 86 86 182 182 182 96 96 96 86 86 86 182 182 182 96 96 96

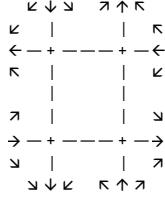
Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

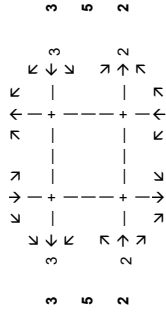
Volume Adjustments to 2021 Conditions A.M. Peak Hour

Annual Growth Rate = 2%
Planning Horizon = 3 years
0.04

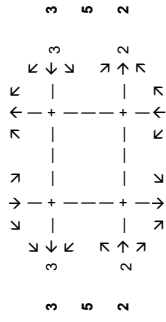
Collector Street and Site Drive C



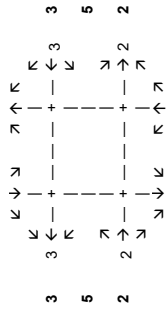
Blue Parkway and Site Drive B



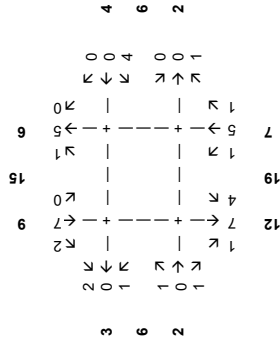
Blue Parkway and Collector Street



Shenandoah Drive and Site Drive A



Blackwell Road and Shenandoah Drive



Blue Parkway Development Traffic Impact Study

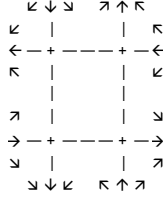
Lee's Summit, Missouri

Volume Adjustments to 2021 Conditions

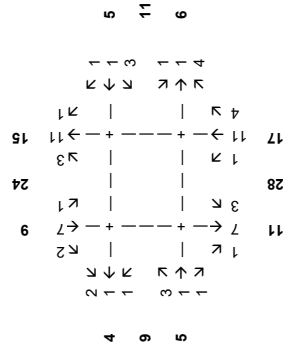
P.M. Peak Hour

Annual Growth Rate = 2%
 Planning Horizon = 3 years
 0.04

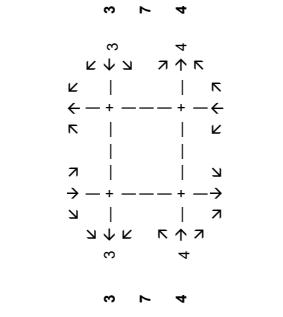
Collector Street and Site Drive C



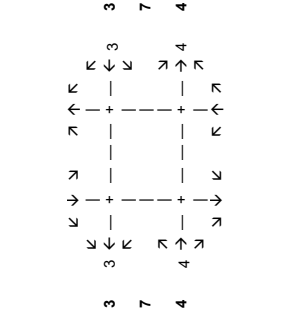
Blackwell Road and Shenandoah Drive



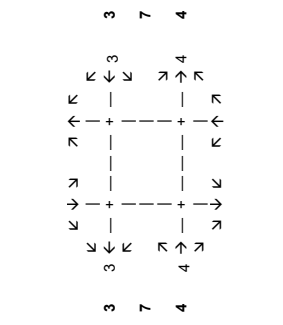
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

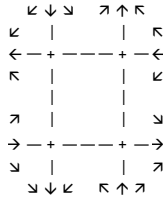


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Existing Traffic Volumes A.M. Peak Hour

Collector Street and Site Drive C

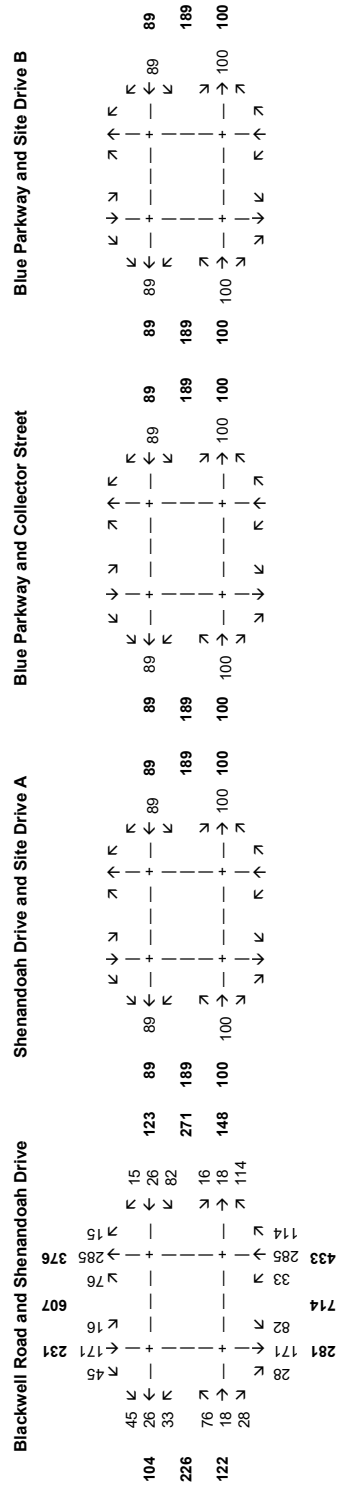
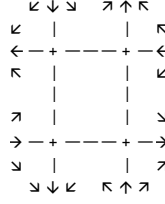
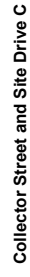


Blackwell Road and Shenandoah Drive		Shenandoah Drive and Site Drive A		Blue Parkway and Collector Street		Blue Parkway and Site Drive B	
87	45	88	88	88	88	88	88
149	34	133	133	133	133	133	133
61	28	45	45	45	45	45	45
	9						
	24						
	45						
	185						
	235						
	396						
	28						
	122						
	161						
	11						
	11						
	8						
	11						
	32						
	185						
	302						
	490						
	188						

Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

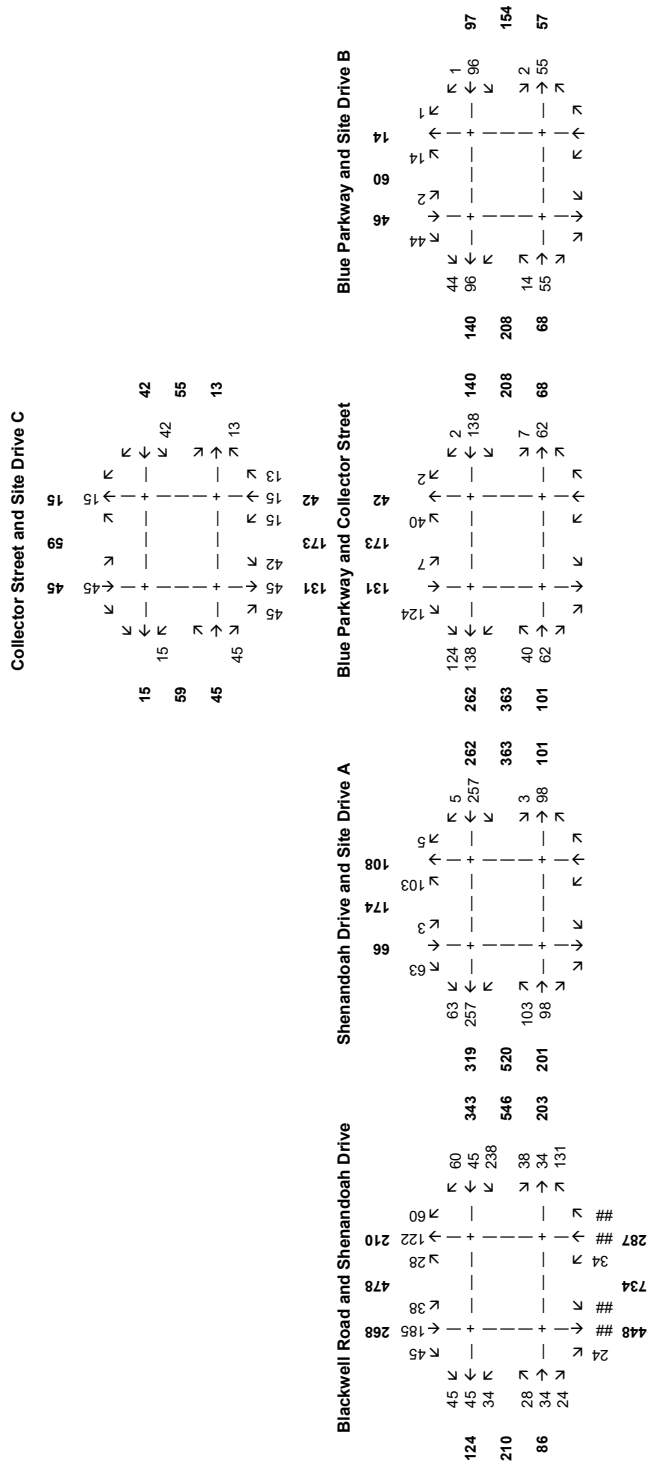
**Existing Traffic Volumes
P.M. Peak Hour**



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

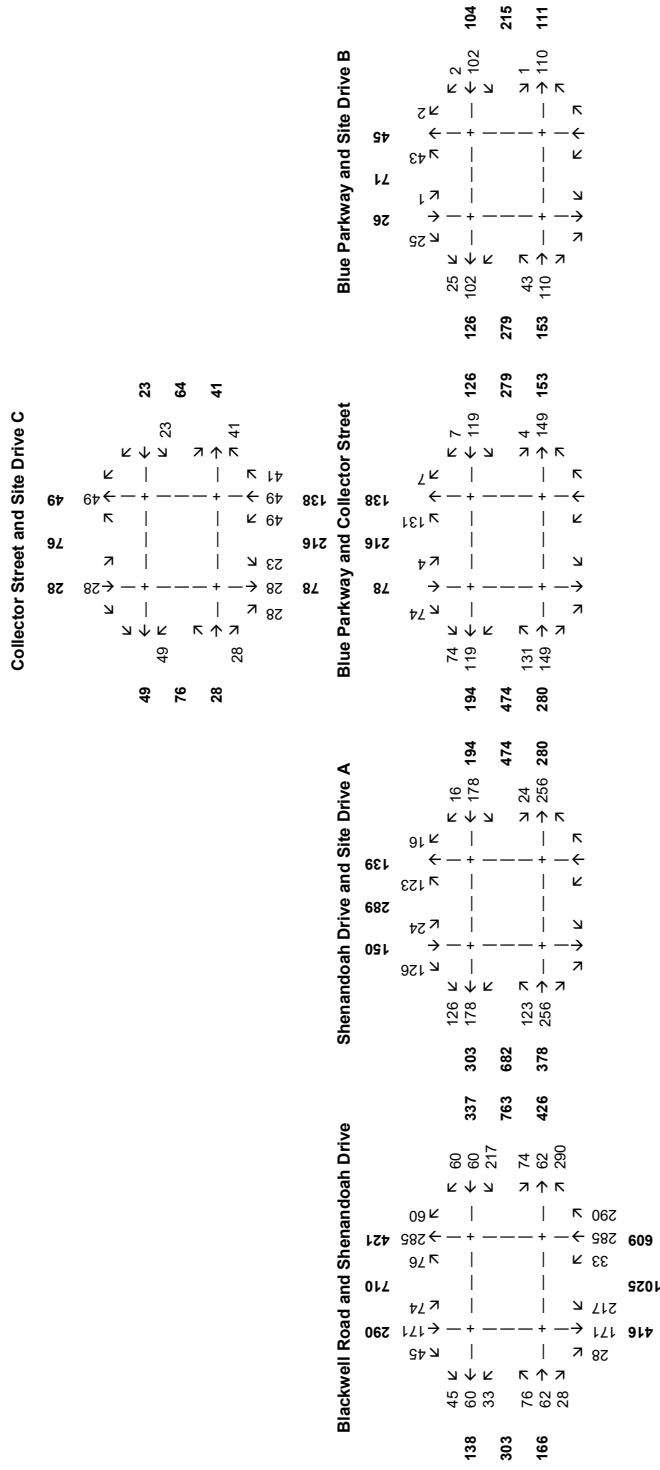
Existing plus Development Traffic Volumes A.M. Peak Hour



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

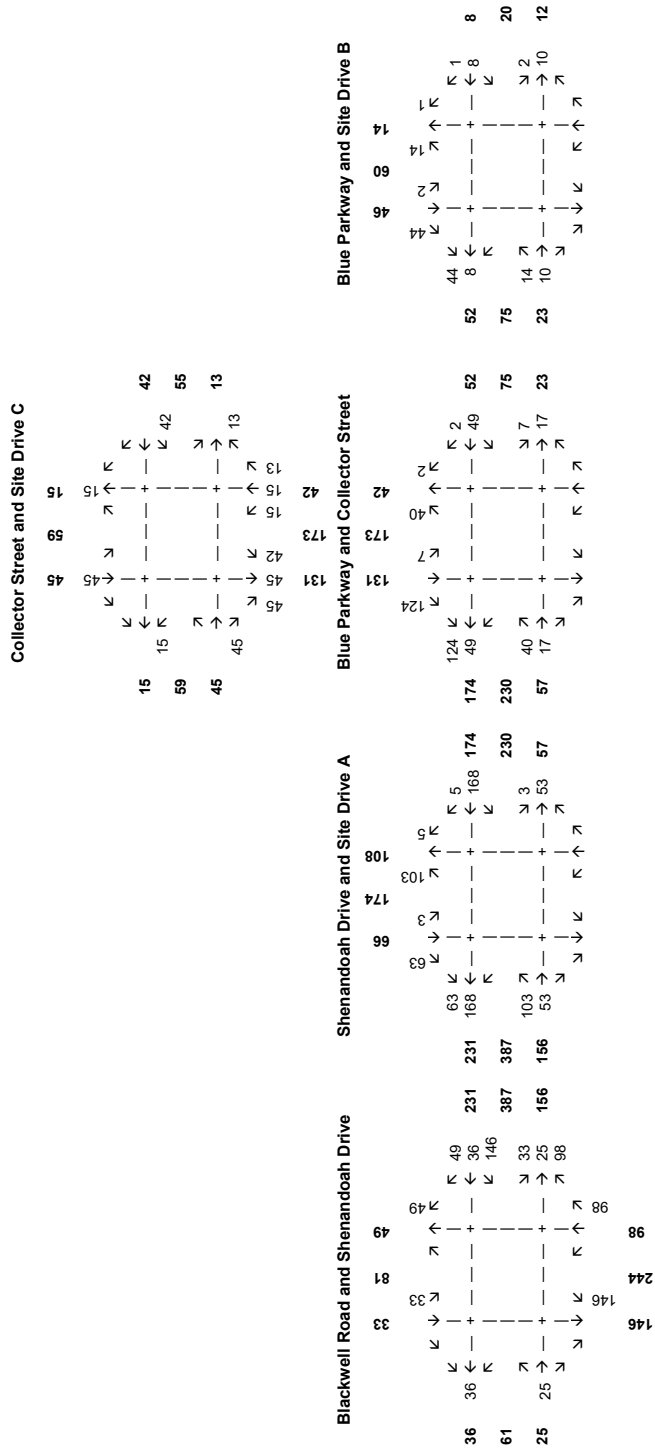
Existing plus Development Traffic Volumes P.M. Peak Hour



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - TOTAL A.M. Peak Hour

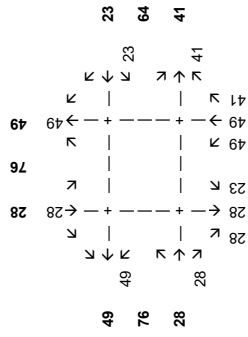


Blue Parkway Development Traffic Impact Study

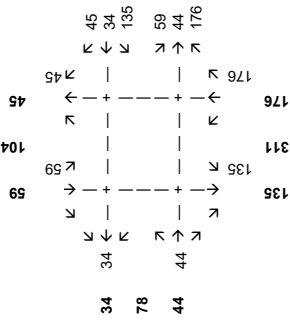
Lee's Summit, Missouri

Development Trips - TOTAL P.M. Peak Hour

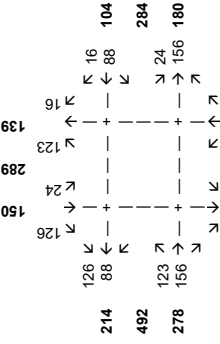
Collector Street and Site Drive C



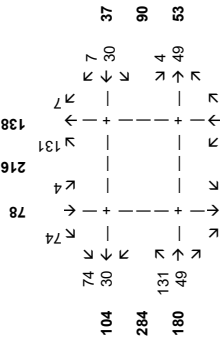
Blackwell Road and Shenandoah Drive



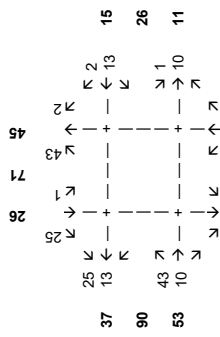
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

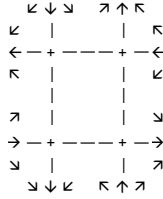


Blue Parkway Development Traffic Impact Study

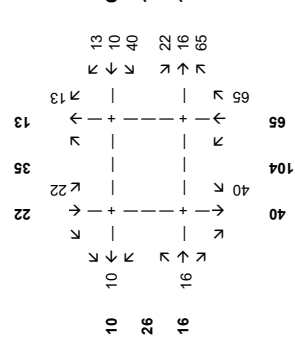
Lee's Summit, Missouri

Development Trips - Retail A.M. Peak Hour

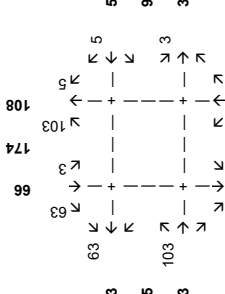
Collector Street and Site Drive C



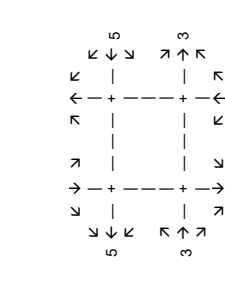
Blackwell Road and Shenandoah Drive



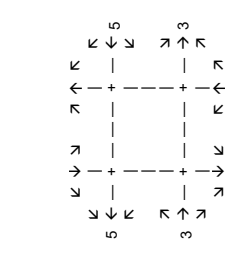
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

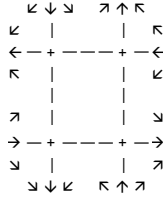


Blue Parkway Development Traffic Impact Study

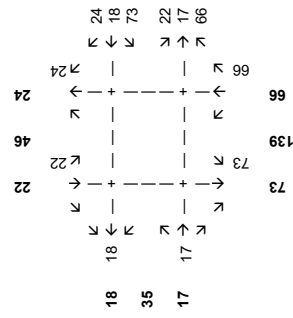
Lee's Summit, Missouri

Development Trips - Retail P.M. Peak Hour

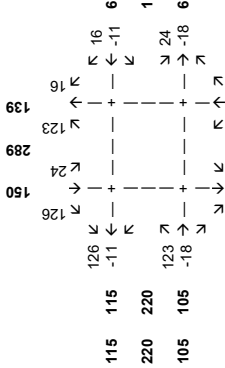
Collector Street and Site Drive C



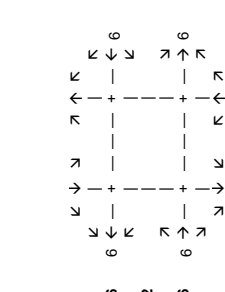
Blackwell Road and Shenandoah Drive



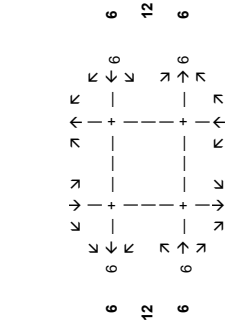
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

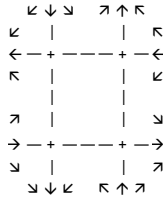


Blue Parkway Development Traffic Impact Study

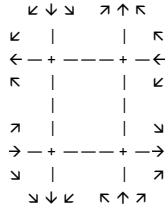
Lee's Summit, Missouri

Pass-By Trips - Retail P.M. Peak Hour

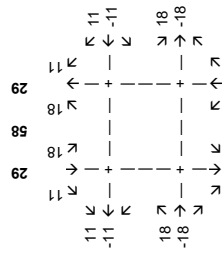
Collector Street and Site Drive C



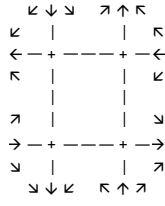
Blackwell Road and Shenandoah Drive



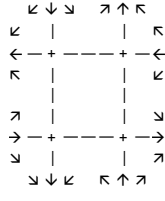
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

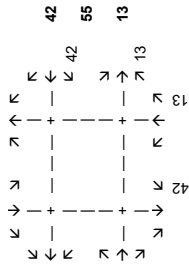


Blue Parkway Development Traffic Impact Study

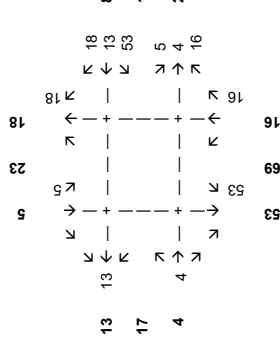
Lee's Summit, Missouri

Development Trips - Apartments A.M. Peak Hour

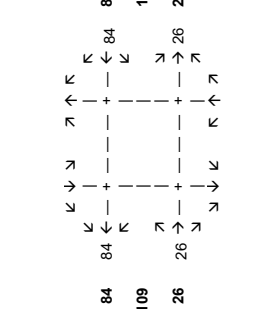
Collector Street and Site Drive C



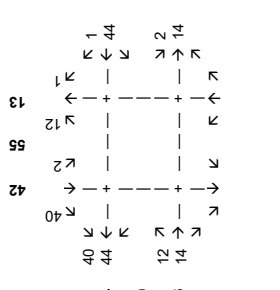
Blackwell Road and Shenandoah Drive



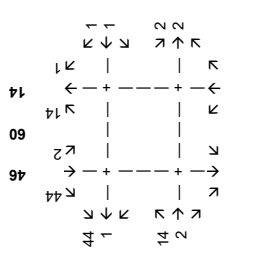
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

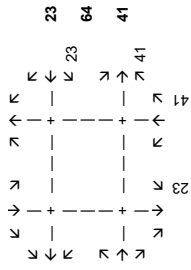


Blue Parkway Development Traffic Impact Study

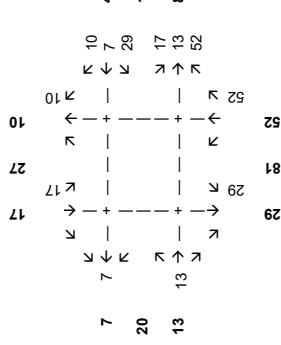
Lee's Summit, Missouri

Development Trips - Apartments P.M. Peak Hour

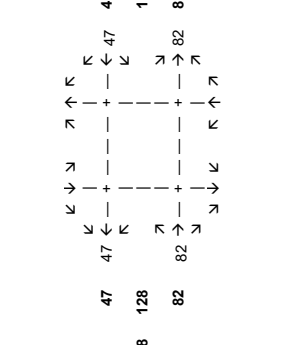
Collector Street and Site Drive C



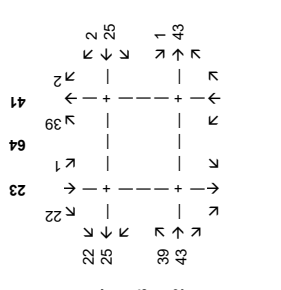
Blackwell Road and Shenandoah Drive



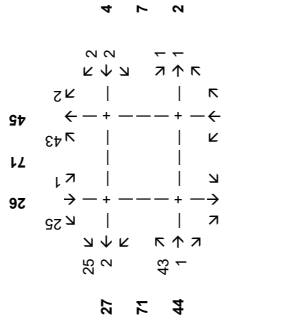
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

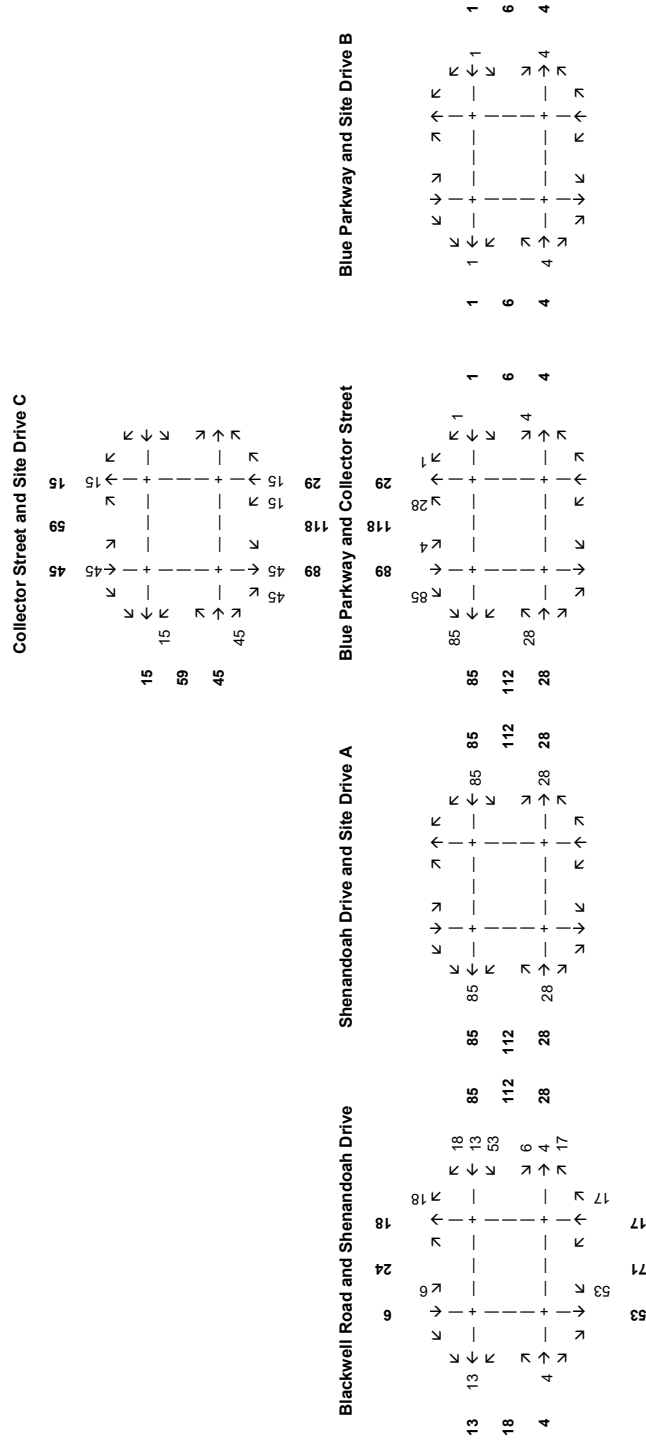


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - North Residential Area

A.M. Peak Hour

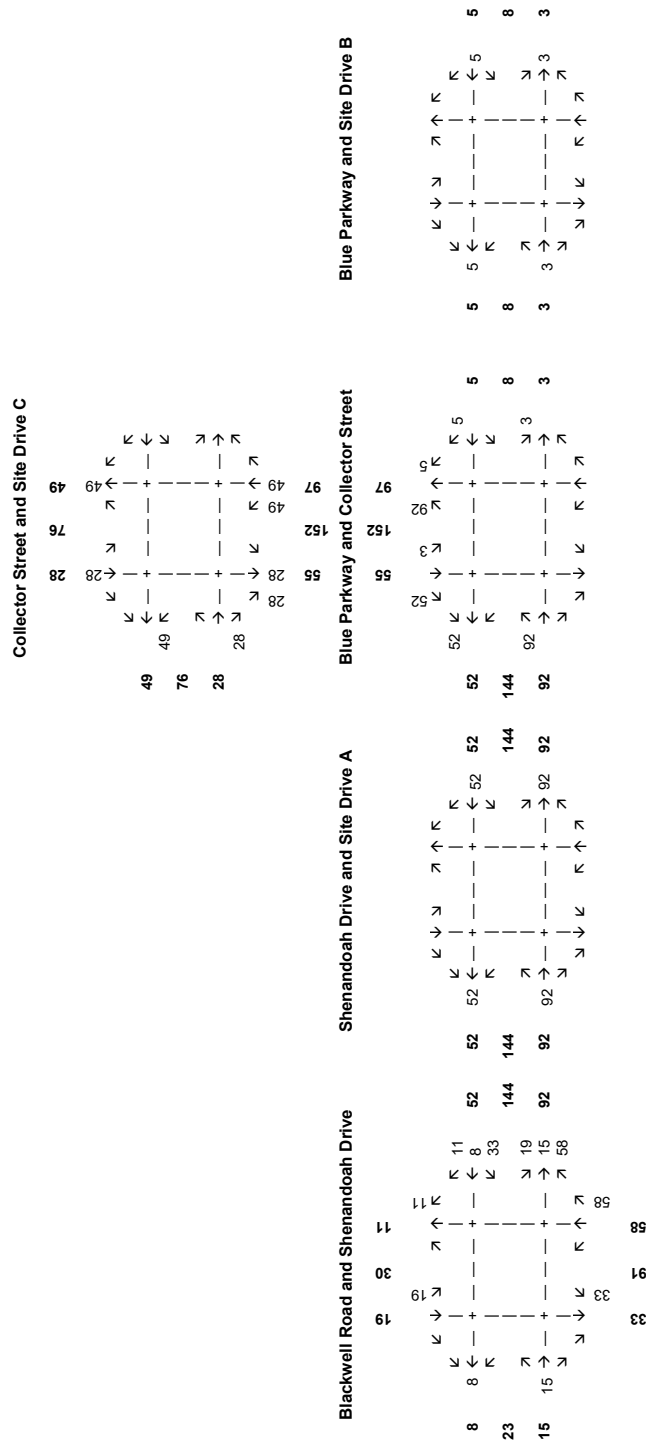


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - North Residential Area

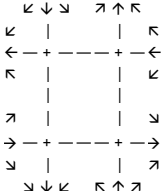
P.M. Peak Hour



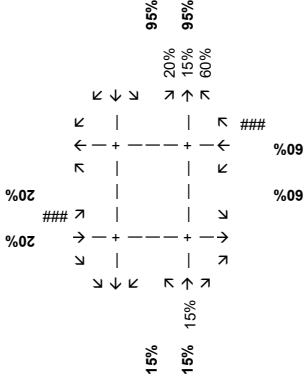
Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - Retail
INBOUND

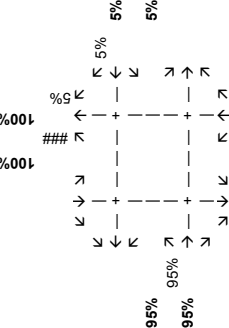
Collector Street and Site Drive C



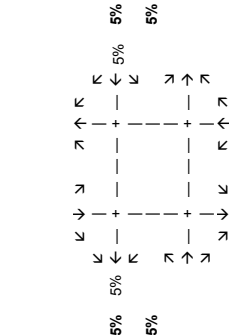
Blackwell Road and Shenandoah Drive



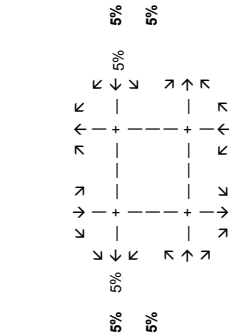
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



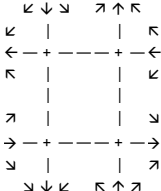
Blue Parkway and Site Drive B



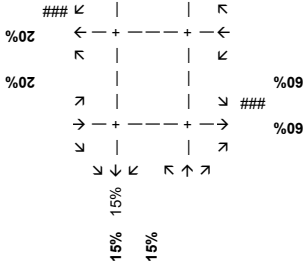
Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - Retail
OUTBOUND

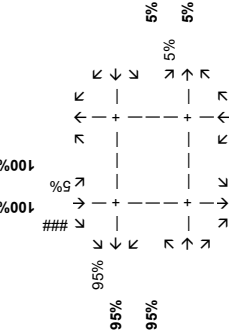
Collector Street and Site Drive C



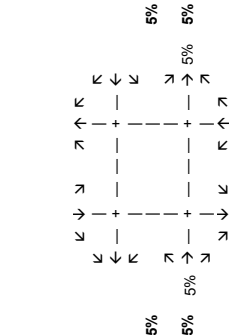
Blackwell Road and Shenandoah Drive



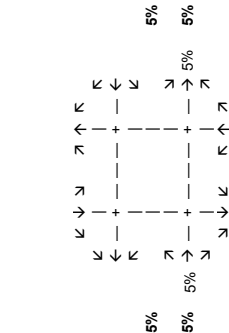
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B



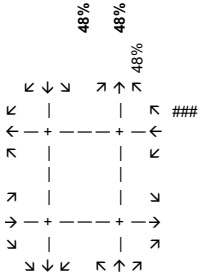
Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

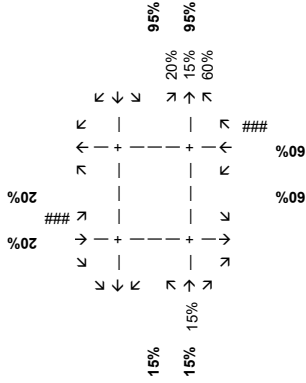
Trip Distribution - Apartments

INBOUND

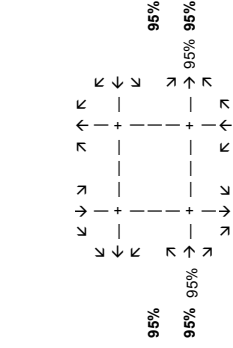
Collector Street and Site Drive C



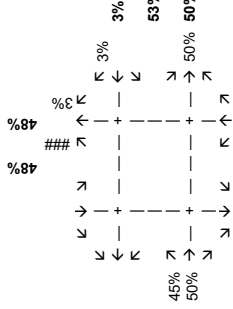
Blackwell Road and Shenandoah Drive



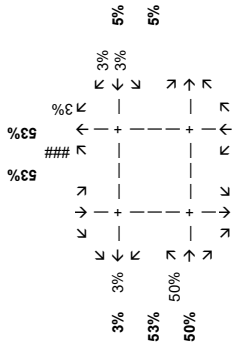
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

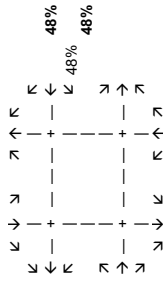


Blue Parkway Development Traffic Impact Study

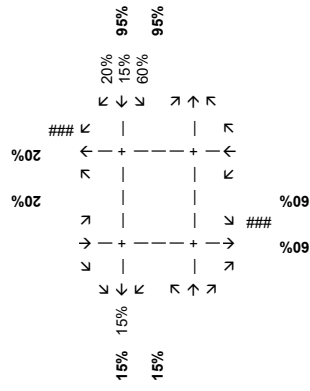
Lee's Summit, Missouri

Trip Distribution - Apartments OUTBOUND

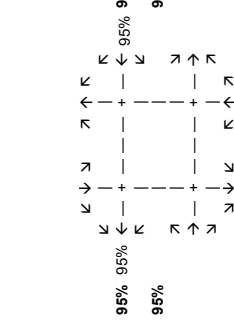
Collector Street and Site Drive C



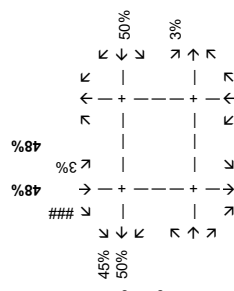
Blackwell Road and Shenandoah Drive



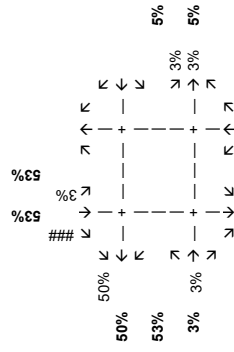
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street

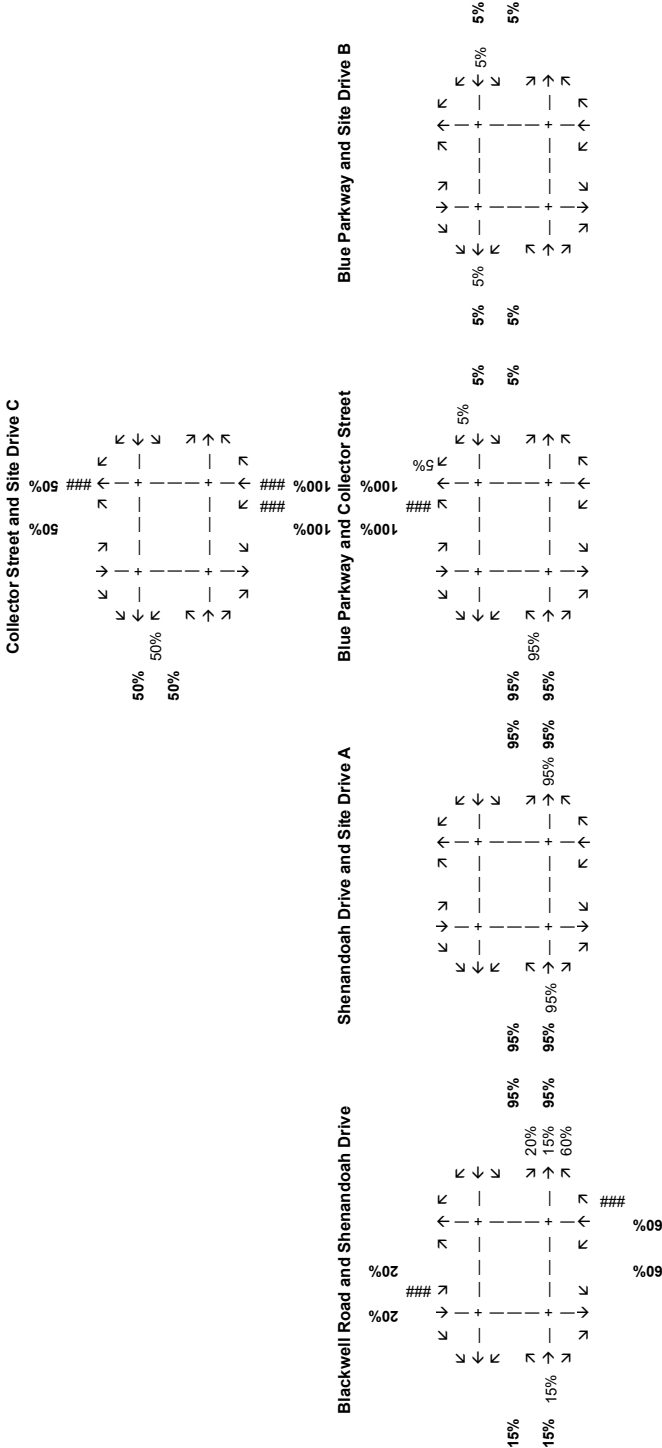


Blue Parkway and Site Drive B



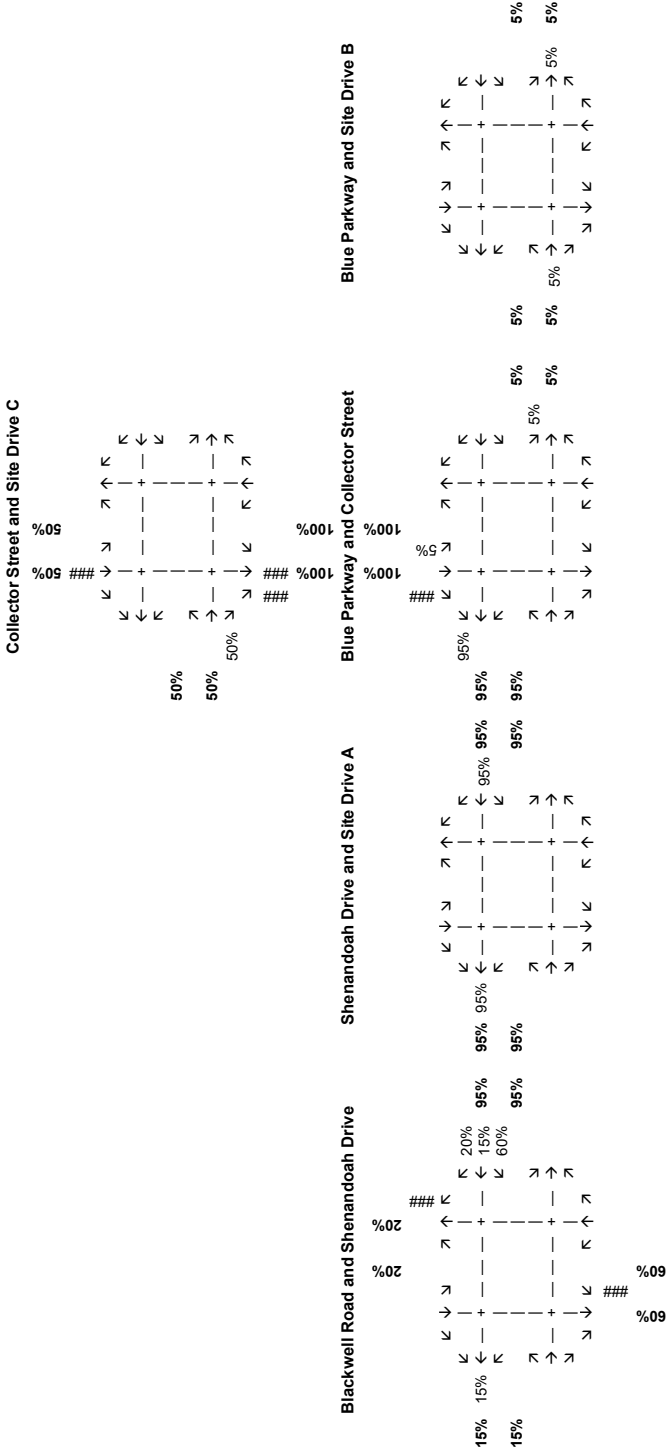
Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - North Residential Area
INBOUND



Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

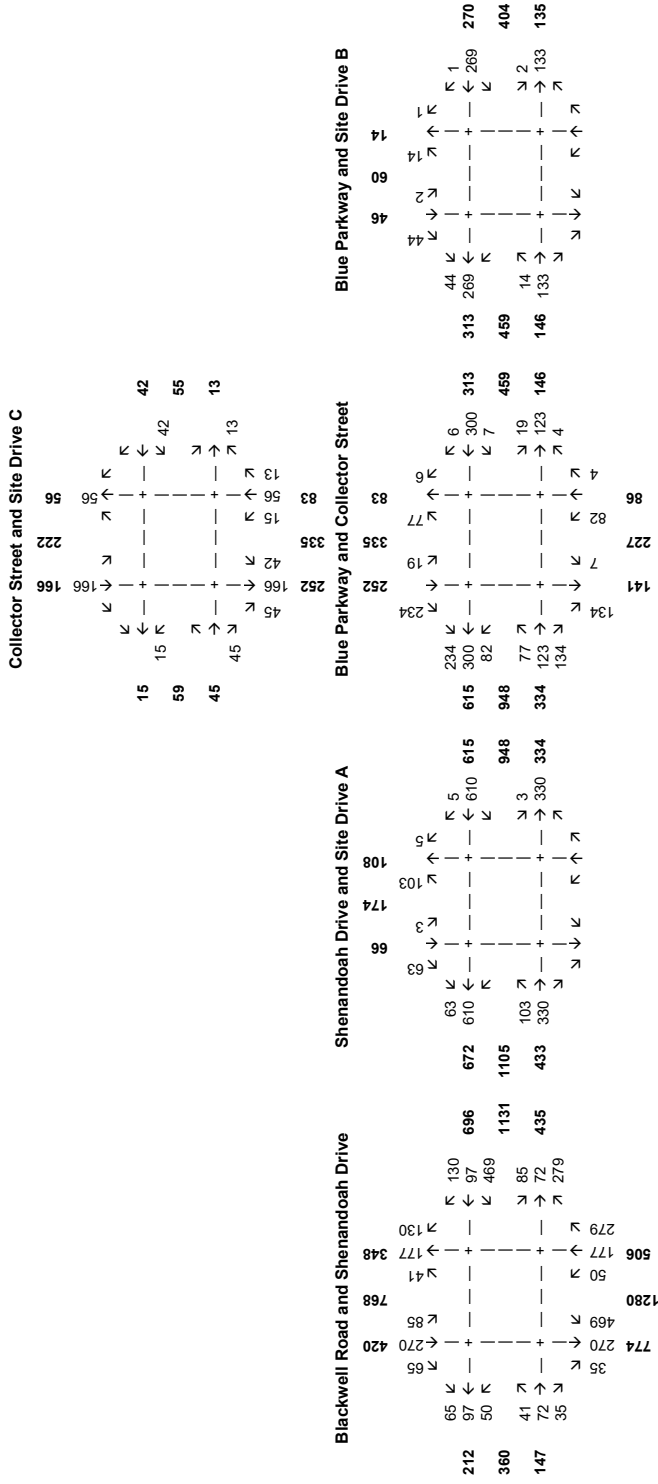
Trip Distribution - North Residential Area
INBOUND



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

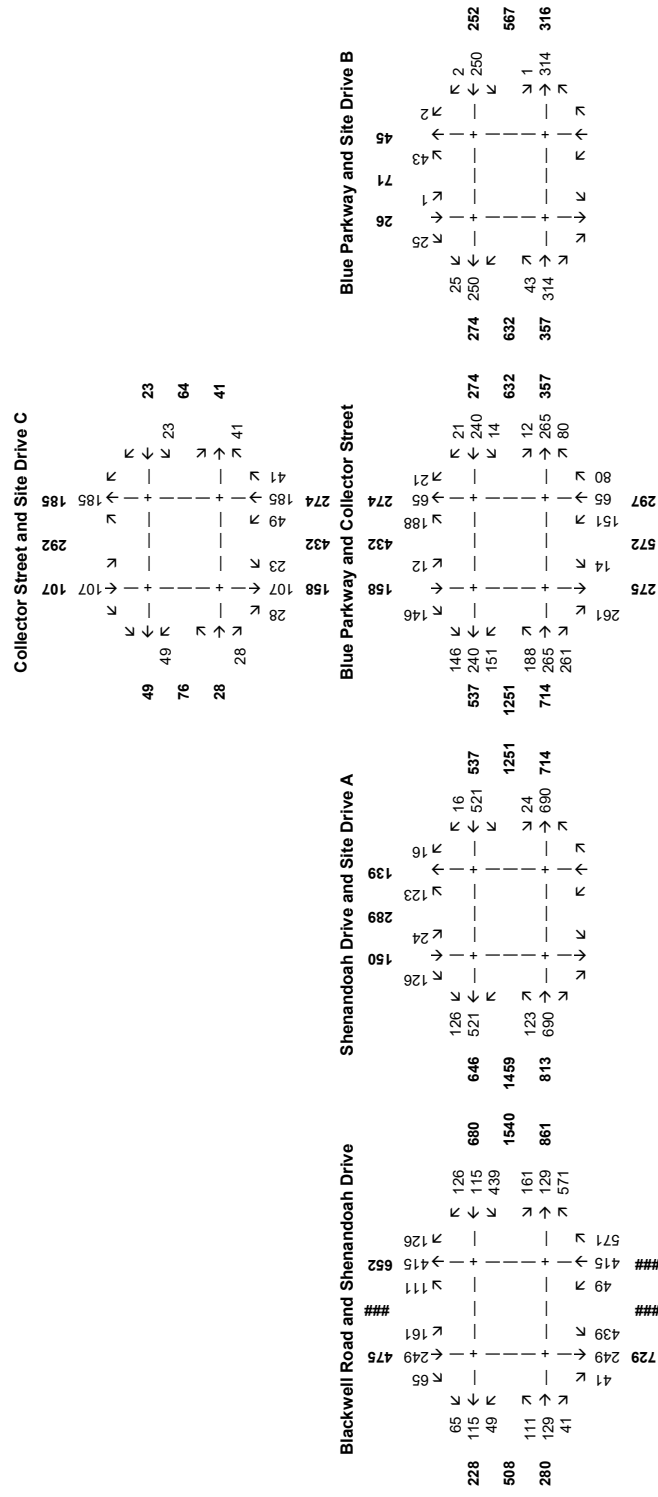
Future Conditions Traffic Volumes A.M. Peak Hour



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Future Conditions Traffic Volumes A.M. Peak Hour



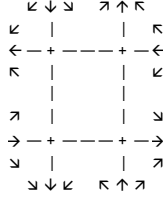
Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Background Traffic Growth A.M. Peak Hour

Collector Street and Site Drive C

Annual Growth Rate = 2%
Planning Horizon = 20 years
0.46

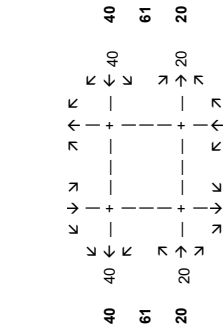
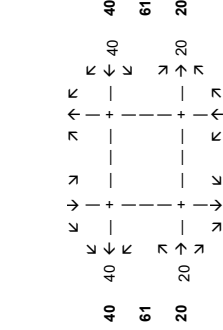
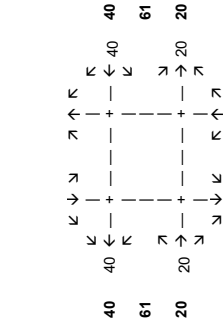
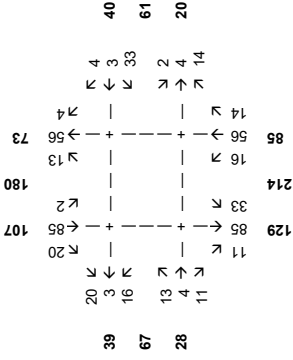


Blackwell Road and Shenandoah Drive

Shenandoah Drive and Site Drive A

Blue Parkway and Collector Street

Blue Parkway and Site Drive B



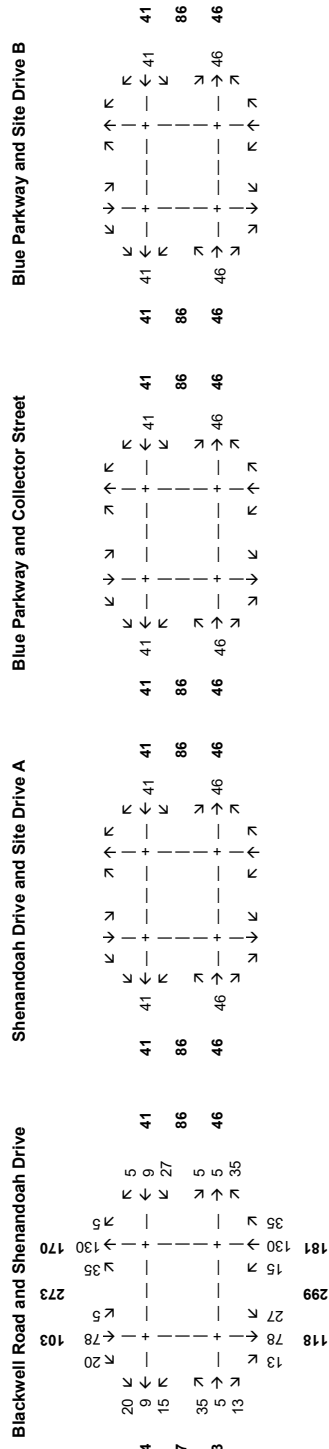
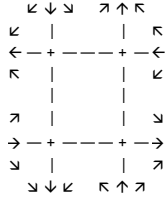
Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Background Traffic Growth P.M. Peak Hour

Collector Street and Site Drive C

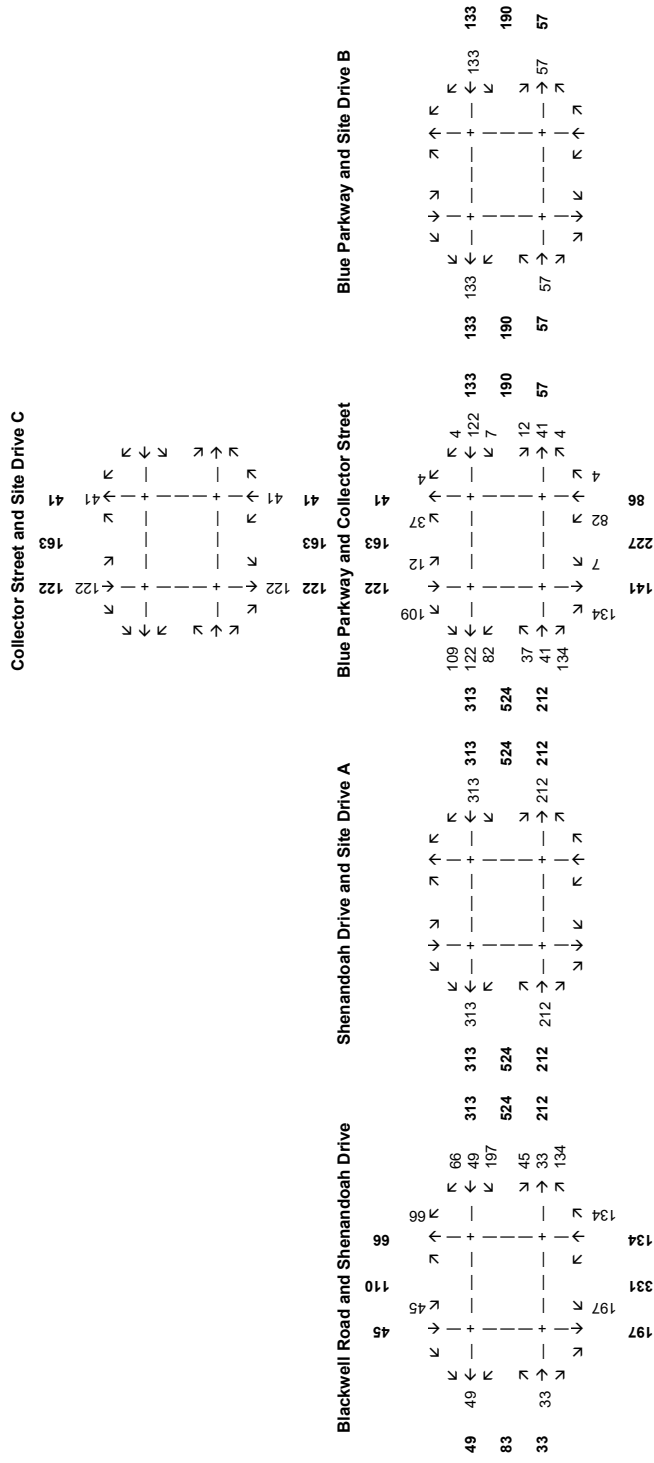
Annual Growth Rate = 2%
Planning Horizon = 20 years
0.46



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

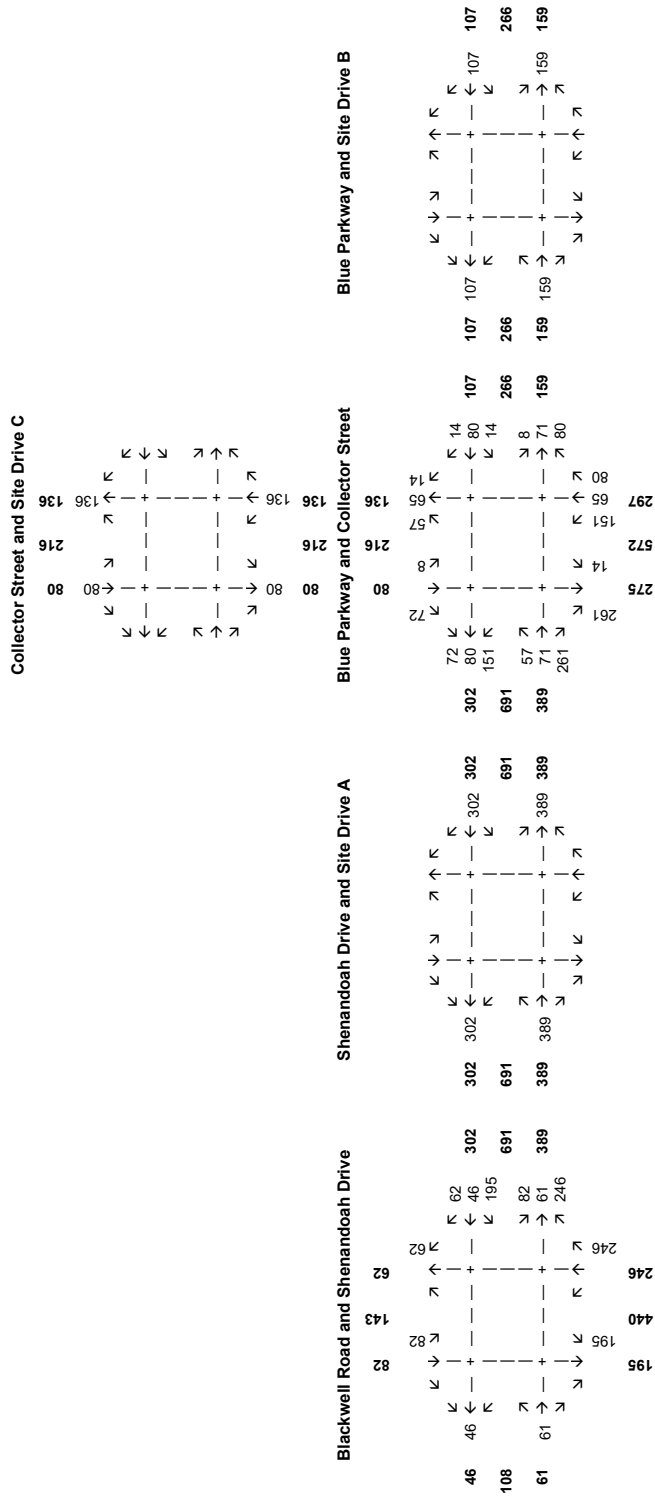
Future Development Trips - TOTAL A.M. Peak Hour



Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Future Development Trips - TOTAL P.M. Peak Hour

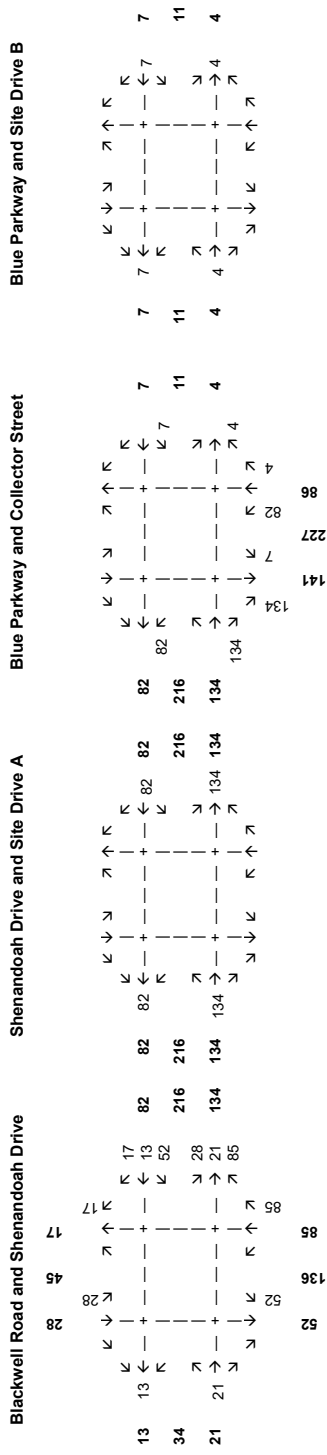
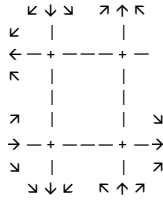


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - Future Retail A.M. Peak Hour

Collector Street and Site Drive C

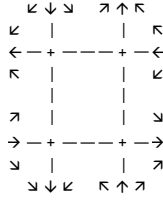


Blue Parkway Development Traffic Impact Study

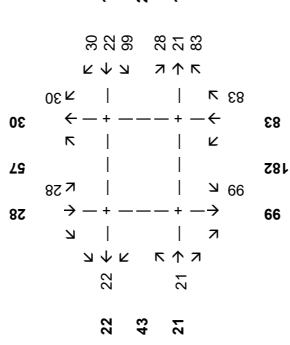
Lee's Summit, Missouri

Development Trips - Future Retail P.M. Peak Hour

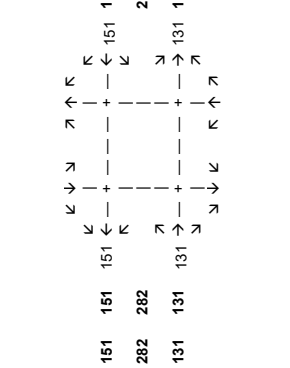
Collector Street and Site Drive C



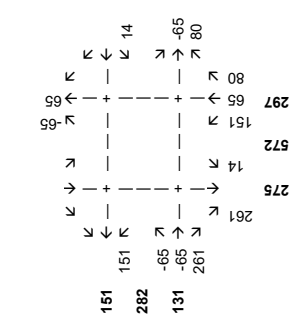
Blackwell Road and Shenandoah Drive



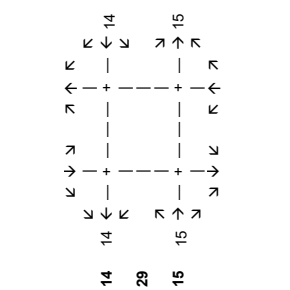
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



Blue Parkway and Site Drive B

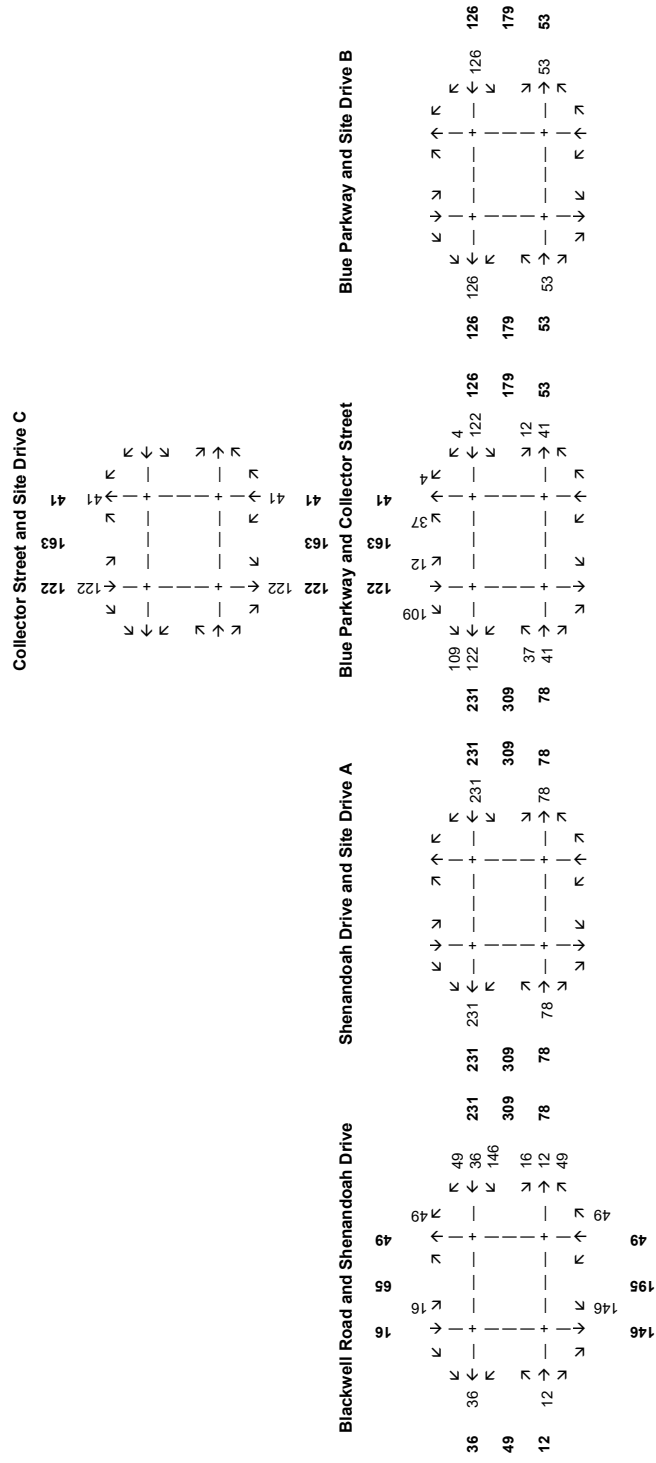


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - Future Single-Family Homes

A.M. Peak Hour

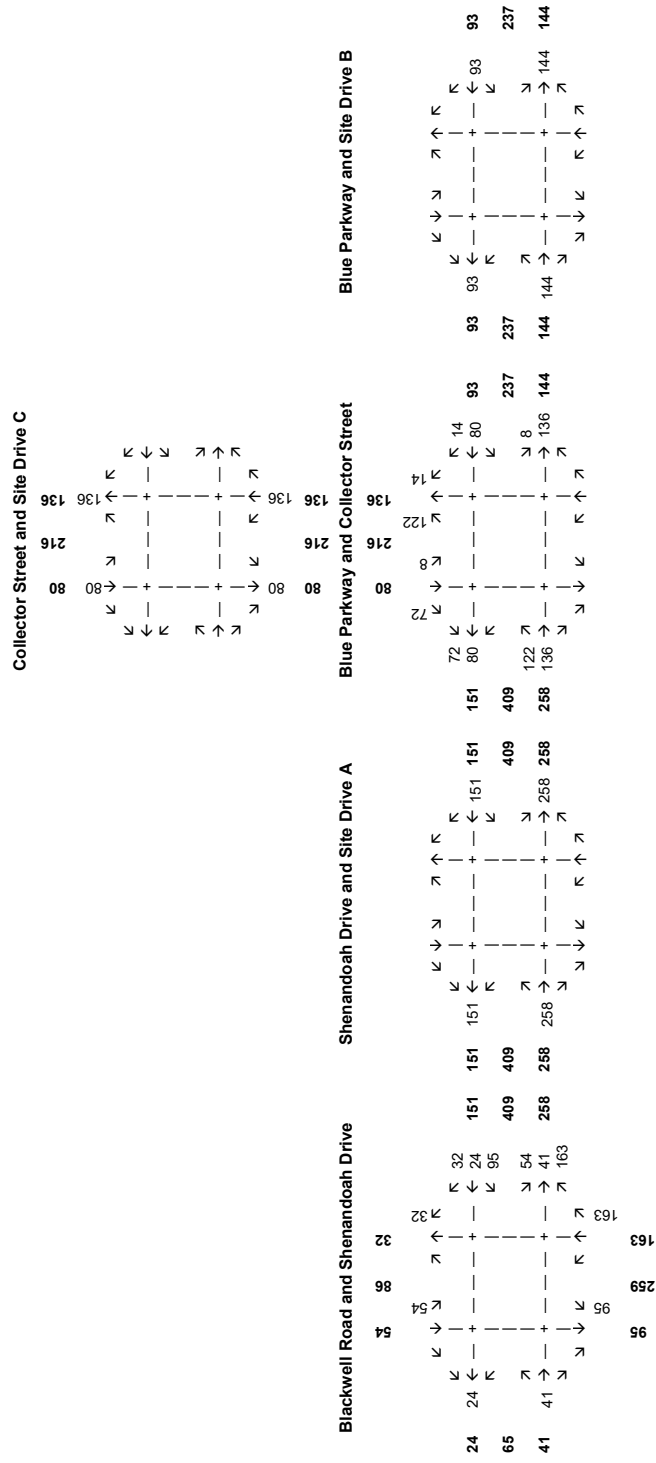


Blue Parkway Development Traffic Impact Study

Lee's Summit, Missouri

Development Trips - Future Single-Family Homes

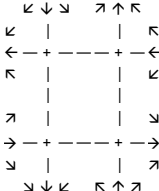
P.M. Peak Hour



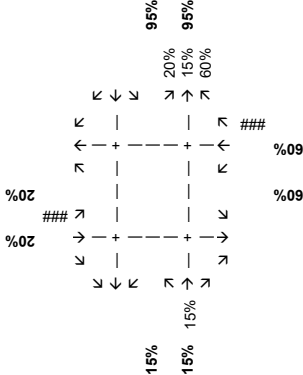
Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - Future Retail
INBOUND

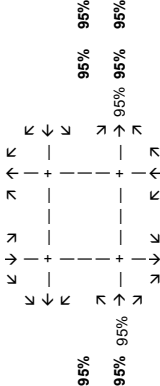
Collector Street and Site Drive C



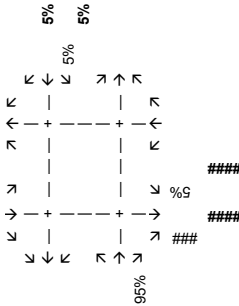
Blackwell Road and Shenandoah Drive



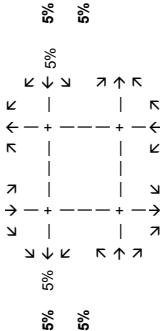
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



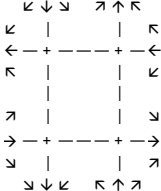
Blue Parkway and Site Drive B



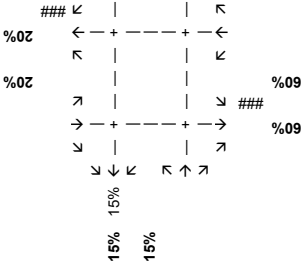
Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - Future Retail
OUTBOUND

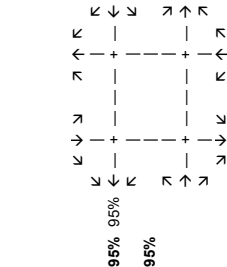
Collector Street and Site Drive C



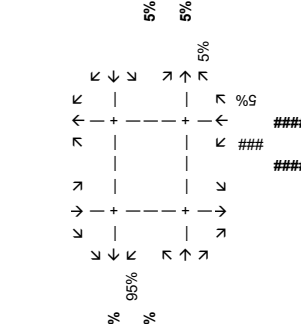
Blackwell Road and Shenandoah Drive



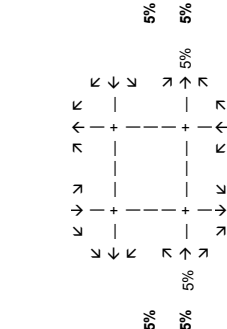
Shenandoah Drive and Site Drive A



Blue Parkway and Collector Street



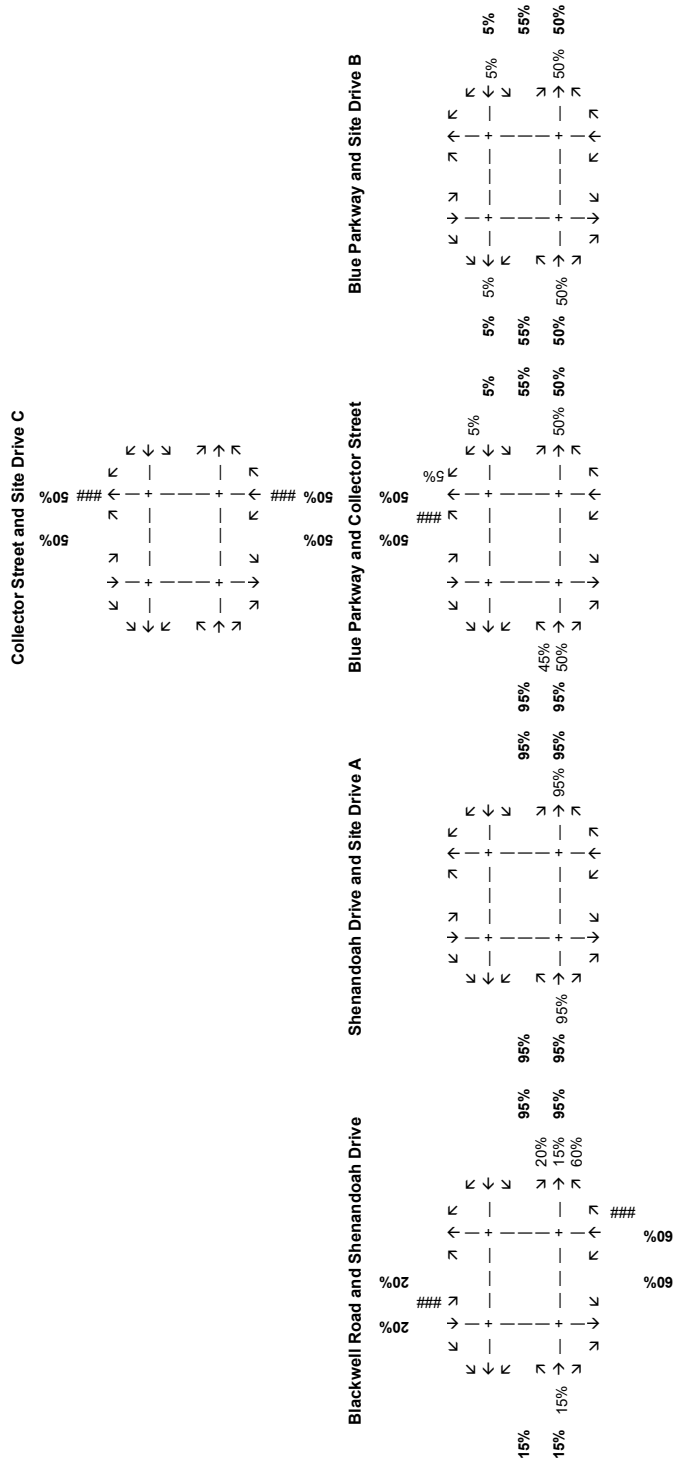
Blue Parkway and Site Drive B



Blue Parkway Development Traffic Impact Study

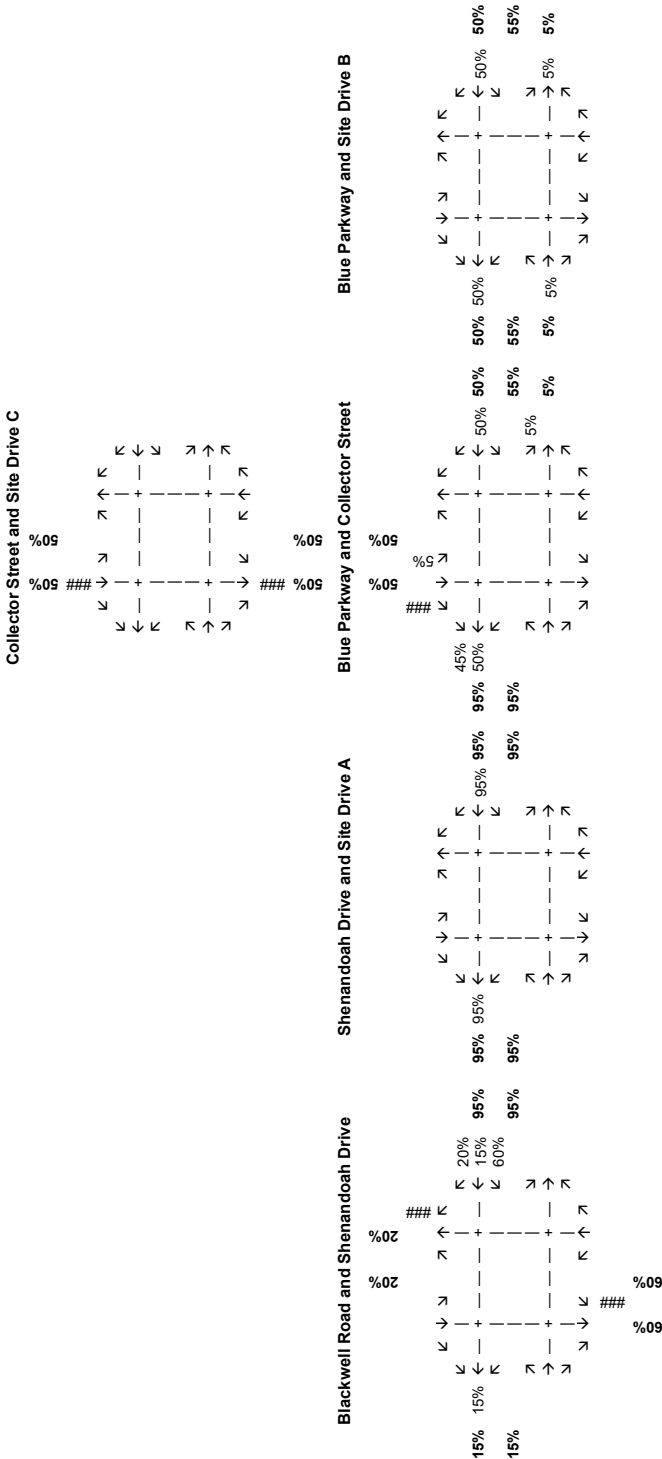
Lee's Summit, Missouri

Trip Distribution - Future Single-Family Homes INBOUND



Blue Parkway Development Traffic Impact Study
Lee's Summit, Missouri

Trip Distribution - Future Single-Family Homes
OUTBOUND





Appendix C – Peak Hour Capacity Analysis Reports

See attached reports.

LANE SUMMARY



Site: 102 [Blackwell Road and Blue Parkway]

A.M. Peak Hour
Existing Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1 ^d	170	3.0	1321	0.128	100	3.8	LOS A	0.5	13.9	Full	1600	0.0	0.0
Lane 2	35	3.0	1321	0.026	100	2.9	LOS A	0.1	2.6	Full	1600	0.0	0.0
Approach	204	3.0		0.128		3.6	LOS A	0.5	13.9				
East: Blue Parkway													
Lane 1	61	3.0	1143	0.053	100	3.6	LOS A	0.2	5.2	Short	250	0.0	NA
Lane 2 ^d	61	3.0	1143	0.053	100	3.6	LOS A	0.2	5.2	Full	1600	0.0	0.0
Approach	122	3.0		0.053		3.6	LOS A	0.2	5.2				
North: Blackwell Road													
Lane 1	124	3.0	1141	0.109	100	4.1	LOS A	0.4	10.8	Short	250	0.0	NA
Lane 2 ^d	132	3.0	1212	0.109	100	3.9	LOS A	0.4	10.6	Full	1600	0.0	0.0
Approach	255	3.0		0.109		4.0	LOS A	0.4	10.8				
West: Blue Parkway													
Lane 1 ^d	66	3.0	1053	0.063	100	4.0	LOS A	0.2	5.8	Full	1600	0.0	0.0
Approach	66	3.0		0.063		4.0	LOS A	0.2	5.8				
Intersection	648	3.0		0.128		3.8	LOS A	0.5	13.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY



Site: 102 [Blackwell Road and Blue Parkway]

P.M. Peak Hour
Existing Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1 ^d	346	3.0	1232	0.280	100	5.5	LOS A	1.4	35.0	Full	1600	0.0	0.0
Lane 2	124	3.0	1232	0.101	100	3.7	LOS A	0.4	10.4	Full	1600	0.0	0.0
Approach	470	3.0		0.280		5.0	LOS A	1.4	35.0				
East: Blue Parkway													
Lane 1	67	3.0	923	0.072	100	4.6	LOS A	0.3	6.9	Short	250	0.0	NA
Lane 2 ^d	67	3.0	923	0.072	100	4.6	LOS A	0.3	6.9	Full	1600	0.0	0.0
Approach	134	3.0		0.072		4.6	LOS A	0.3	6.9				
North: Blackwell Road													
Lane 1	122	3.0	1134	0.108	100	4.1	LOS A	0.4	10.8	Short	250	0.0	NA
Lane 2 ^d	130	3.0	1206	0.108	100	3.9	LOS A	0.4	10.5	Full	1600	0.0	0.0
Approach	252	3.0		0.108		4.0	LOS A	0.4	10.8				
West: Blue Parkway													
Lane 1 ^d	133	3.0	1067	0.124	100	4.5	LOS A	0.5	12.0	Full	1600	0.0	0.0
Approach	133	3.0		0.124		4.5	LOS A	0.5	12.0				
Intersection	988	3.0		0.280		4.6	LOS A	1.4	35.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 **Site: 102 [Blackwell Road and Blue Parkway]**

A.M. Peak Hour
Existing plus Development Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1 ^d	170	3.0	1245	0.136	100	4.0	LOS A	0.6	14.6	Full	1600	0.0	0.0
Lane 2	142	3.0	1245	0.114	100	3.8	LOS A	0.5	12.0	Full	1600	0.0	0.0
Approach	312	3.0		0.136		3.9	LOS A	0.6	14.6				
East: Blue Parkway													
Lane 1	186	3.0	1143	0.163	100	4.6	LOS A	0.7	17.6	Short	250	0.0	NA
Lane 2 ^d	186	3.0	1143	0.163	100	4.6	LOS A	0.7	17.6	Full	1600	0.0	0.0
Approach	373	3.0		0.163		4.6	LOS A	0.7	17.6				
North: Blackwell Road													
Lane 1	140	3.0	946	0.148	100	5.2	LOS A	0.6	14.7	Short	250	0.0	NA
Lane 2 ^d	151	3.0	1020	0.148	100	4.9	LOS A	0.6	14.4	Full	1600	0.0	0.0
Approach	291	3.0		0.148		5.0	LOS A	0.6	14.7				
West: Blue Parkway													
Lane 1 ^d	93	3.0	889	0.105	100	5.1	LOS A	0.4	9.6	Full	1600	0.0	0.0
Approach	93	3.0		0.105		5.1	LOS A	0.4	9.6				
Intersection	1070	3.0		0.163		4.6	LOS A	0.7	17.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY



Site: 101 [Blue Parkway and Collector Street]

A.M. Peak Hour
Existing plus Development Conditions
Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
East: Blue Parkway													
Lane 1 ^d	152	3.0	1280	0.119	100	3.8	LOS A	0.5	13.8	Full	1600	0.0	0.0
Approach	152	3.0		0.119		3.8	LOS A	0.5	13.8				
North: Proposed collector street													
Lane 1 ^d	142	3.0	1144	0.124	100	4.2	LOS A	0.6	14.1	Full	1600	0.0	0.0
Approach	142	3.0		0.124		4.2	LOS A	0.6	14.1				
West: Blue Parkway													
Lane 1 ^d	111	3.0	1329	0.083	100	3.4	LOS A	0.4	9.5	Full	1600	0.0	0.0
Approach	111	3.0		0.083		3.4	LOS A	0.4	9.5				
Intersection	405	3.0		0.124		3.8	LOS A	0.6	14.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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HCM 6th TWSC
1: Blue Parkway & Site Drive A

A.M. Peak Hour
Existing Plus Development

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	103	98	257	5	3	63
Future Vol, veh/h	103	98	257	5	3	63
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	-	-	-	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	112	107	279	5	3	68

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	284	0	0 613 282
Stage 1	-	-	- - 282 -
Stage 2	-	-	- - 331 -
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	1278	-	- - 456 757
Stage 1	-	-	- - 766 -
Stage 2	-	-	- - 728 -
Platoon blocked, %		-	- -
Mov Cap-1 Maneuver	1278	-	- - 416 757
Mov Cap-2 Maneuver	-	-	- - 416 -
Stage 1	-	-	- - 699 -
Stage 2	-	-	- - 728 -

Approach	EB	WB	SB
HCM Control Delay, s	4.1	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1278	-	-	-	730
HCM Lane V/C Ratio	0.088	-	-	-	0.098
HCM Control Delay (s)	8.1	-	-	-	10.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.3

HCM 6th TWSC
2: Blue Parkway & Site Drive B

A.M. Peak Hour
Existing Plus Development

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	55	96	1	2	44
Future Vol, veh/h	14	55	96	1	2	44
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	-	-	-	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	15	60	104	1	2	48

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	105	0	0 195 105
Stage 1	-	-	- 105 -
Stage 2	-	-	- 90 -
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	1486	-	- 794 949
Stage 1	-	-	- 919 -
Stage 2	-	-	- 934 -
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1486	-	- 786 949
Mov Cap-2 Maneuver	-	-	- 786 -
Stage 1	-	-	- 910 -
Stage 2	-	-	- 934 -

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1486	-	-	-	941
HCM Lane V/C Ratio	0.01	-	-	-	0.053
HCM Control Delay (s)	7.4	-	-	-	9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 6th TWSC

3: Proposed Collector & Site Drive C

A.M. Peak Hour
Existing Plus Development

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	5	45	42	5	5	15	15	13	5	45	5
Future Vol, veh/h	5	5	45	42	5	5	15	15	13	5	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	49	46	5	5	16	16	14	5	49	5
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	122	124	52	144	119	23	54	0	0	30	0	0
Stage 1	62	62	-	55	55	-	-	-	-	-	-	-
Stage 2	60	62	-	89	64	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	853	766	1016	825	771	1054	1551	-	-	1583	-	-
Stage 1	949	843	-	957	849	-	-	-	-	-	-	-
Stage 2	951	843	-	918	842	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	835	755	1016	773	760	1054	1551	-	-	1583	-	-
Mov Cap-2 Maneuver	835	755	-	773	760	-	-	-	-	-	-	-
Stage 1	939	840	-	946	840	-	-	-	-	-	-	-
Stage 2	930	834	-	866	839	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	9		9.9		2.6		0.7					
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1551	-	-	967	792	1583	-	-				
HCM Lane V/C Ratio	0.011	-	-	0.062	0.071	0.003	-	-				
HCM Control Delay (s)	7.3	0	-	9	9.9	7.3	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-				

LANE SUMMARY

 **Site: 102 [Blackwell Road and Blue Parkway]**

P.M. Peak Hour
Existing plus Development Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1 ^d	346	3.0	1111	0.311	100	6.3	LOS A	1.5	38.4	Full	1600	0.0	0.0
Lane 2	315	3.0	1111	0.284	100	5.9	LOS A	1.3	34.0	Full	1600	0.0	0.0
Approach	661	3.0		0.311		6.1	LOS A	1.5	38.4				
East: Blue Parkway													
Lane 1	183	3.0	923	0.198	100	5.9	LOS A	0.8	20.8	Short	250	0.0	NA
Lane 2 ^d	183	3.0	923	0.198	100	5.9	LOS A	0.8	20.8	Full	1600	0.0	0.0
Approach	366	3.0		0.198		5.9	LOS A	0.8	20.8				
North: Blackwell Road													
Lane 1	152	3.0	952	0.159	100	5.3	LOS A	0.6	16.0	Short	250	0.0	NA
Lane 2 ^d	164	3.0	1026	0.159	100	5.0	LOS A	0.6	15.7	Full	1600	0.0	0.0
Approach	315	3.0		0.159		5.1	LOS A	0.6	16.0				
West: Blue Parkway													
Lane 1 ^d	180	3.0	888	0.203	100	6.1	LOS A	0.8	19.9	Full	1600	0.0	0.0
Approach	180	3.0		0.203		6.1	LOS A	0.8	19.9				
Intersection	1523	3.0		0.311		5.8	LOS A	1.5	38.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Project: F:\Traffic\JJWilke\Traffic Study Proposals\BLUE PKWY\Ex+Dev PM Blackwell & Blue.sip8

LANE SUMMARY



Site: 101 [Blue Parkway and Collector Street]

P.M. Peak Hour
Existing plus Development Conditions
Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
East: Blue Parkway													
Lane 1 ^d	137	3.0	1154	0.119	100	4.1	LOS A	0.5	13.5	Full	1600	0.0	0.0
Approach	137	3.0		0.119		4.1	LOS A	0.5	13.5				
North: Proposed collector street													
Lane 1 ^d	85	3.0	1170	0.072	100	3.7	LOS A	0.3	7.9	Full	1600	0.0	0.0
Approach	85	3.0		0.072		3.7	LOS A	0.3	7.9				
West: Blue Parkway													
Lane 1 ^d	304	3.0	1334	0.228	100	4.6	LOS A	1.2	30.5	Full	1600	0.0	0.0
Approach	304	3.0		0.228		4.6	LOS A	1.2	30.5				
Intersection	526	3.0		0.228		4.4	LOS A	1.2	30.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Project: F:\Traffic\JJWilke\Traffic Study Proposals\BLUE PKWY\Ex+Dev PM Blue & Collector.sip8

HCM 6th TWSC
1: Blue Parkway & Site Drive A

P.M. Peak Hour
Existing Plus Development

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	123	256	178	16	24	126
Future Vol, veh/h	123	256	178	16	24	126
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	-	-	-	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	134	278	193	17	26	137
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	210	0	-	0	748	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	546	-
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	1361	-	-	-	380	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	580	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1361	-	-	-	343	839
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	580	-
Approach	EB	WB		SB		
HCM Control Delay, s	2.6	0		11.9		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1361	-	-	-	681	
HCM Lane V/C Ratio	0.098	-	-	-	0.239	
HCM Control Delay (s)	7.9	-	-	-	11.9	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.3	-	-	-	0.9	

HCM 6th TWSC
2: Blue Parkway & Site Drive B

P.M. Peak Hour
Existing Plus Development

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	110	102	2	1	25
Future Vol, veh/h	43	110	102	2	1	25
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	-	-	-	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	47	120	111	2	1	27

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	113	0	0	326	112
Stage 1	-	-	-	112	-
Stage 2	-	-	-	214	-
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	1476	-	-	668	941
Stage 1	-	-	-	913	-
Stage 2	-	-	-	822	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1476	-	-	647	941
Mov Cap-2 Maneuver	-	-	-	647	-
Stage 1	-	-	-	884	-
Stage 2	-	-	-	822	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1476	-	-	-	925
HCM Lane V/C Ratio	0.032	-	-	-	0.031
HCM Control Delay (s)	7.5	-	-	-	9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM 6th TWSC
3: Proposed Collector & Site Drive C

P.M. Peak Hour
Existing Plus Development

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	28	23	5	5	49	49	41	5	28	5
Future Vol, veh/h	5	5	28	23	5	5	49	49	41	5	28	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	30	25	5	5	53	53	45	5	30	5
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	230	247	33	242	227	76	35	0	0	98	0	0
Stage 1	43	43	-	182	182	-	-	-	-	-	-	-
Stage 2	187	204	-	60	45	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	725	655	1041	712	672	985	1576	-	-	1495	-	-
Stage 1	971	859	-	820	749	-	-	-	-	-	-	-
Stage 2	815	733	-	951	857	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	695	629	1041	666	646	985	1576	-	-	1495	-	-
Mov Cap-2 Maneuver	695	629	-	666	646	-	-	-	-	-	-	-
Stage 1	936	856	-	790	722	-	-	-	-	-	-	-
Stage 2	775	707	-	915	854	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	9.2		10.4		2.6		1					
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1576	-	-	904	697	1495	-	-				
HCM Lane V/C Ratio	0.034	-	-	0.046	0.051	0.004	-	-				
HCM Control Delay (s)	7.4	0	-	9.2	10.4	7.4	0	-				
HCM Lane LOS	A	A	-	A	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	0	-	-				

LANE SUMMARY

 **Site: 102 [Blackwell Road and Blue Parkway]**

A.M. Peak Hour
Future Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1	247	3.0	1130	0.218	100	5.2	LOS A	1.0	24.7	Full	1600	0.0	0.0
Lane 2 ^d	303	3.0	1130	0.268	100	5.7	LOS A	1.2	31.9	Full	1600	0.0	0.0
Approach	550	3.0		0.268		5.5	LOS A	1.2	31.9				
East: Blue Parkway													
Lane 1	378	3.0	1049	0.361	100	7.2	LOS A	1.8	45.5	Short	250	0.0	NA
Lane 2 ^d	378	3.0	1049	0.361	100	7.2	LOS A	1.8	45.5	Full	1600	0.0	0.0
Approach	757	3.0		0.361		7.2	LOS A	1.8	45.5				
North: Blackwell Road													
Lane 1	215	3.0	695	0.310	100	9.0	LOS A	1.2	31.6	Short	250	0.0	NA
Lane 2 ^d	238	3.0	767	0.310	100	8.3	LOS A	1.2	31.3	Full	1600	0.0	0.0
Approach	453	3.0		0.310		8.7	LOS A	1.2	31.6				
West: Blue Parkway													
Lane 1 ^d	161	3.0	631	0.255	100	8.9	LOS A	0.9	23.6	Full	1600	0.0	0.0
Approach	161	3.0		0.255		8.9	LOS A	0.9	23.6				
Intersection	1921	3.0		0.361		7.2	LOS A	1.8	45.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Project: F:\Traffic\JJWilke\Traffic Study Proposals\BLUE PKWY\Future AM Blackwell & Blue.sip8

LANE SUMMARY

 **Site: 101 [Blue Parkway and Collector Street]**

A.M. Peak Hour
Future Conditions
Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Proposed collector street													
Lane 1 ^d	95	3.0	1043	0.091	100	4.2	LOS A	0.4	9.8	Full	1600	0.0	0.0
Approach	95	3.0		0.091		4.2	LOS A	0.4	9.8				
East: Blue Parkway													
Lane 1 ^d	340	3.0	1116	0.305	100	6.2	LOS A	1.6	41.1	Full	1600	0.0	0.0
Approach	340	3.0		0.305		6.2	LOS A	1.6	41.1				
North: Proposed collector street													
Lane 1 ^d	276	3.0	859	0.321	100	7.8	LOS A	1.5	39.2	Full	1600	0.0	0.0
Approach	276	3.0		0.321		7.8	LOS A	1.5	39.2				
West: Blue Parkway													
Lane 1 ^d	363	3.0	1299	0.279	100	5.2	LOS A	1.5	39.4	Full	1600	0.0	0.0
Approach	363	3.0		0.279		5.2	LOS A	1.5	39.4				
Intersection	1074	3.0		0.321		6.1	LOS A	1.6	41.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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HCM 6th TWSC
1: Blue Parkway & Site Drive A

A.M. Peak Hour
Future Conditions

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	103	330	610	5	3	63
Future Vol, veh/h	103	330	610	5	3	63
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	-	-	-	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	112	359	663	5	3	68

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	668	0	0	1249	666
Stage 1	-	-	-	666	-
Stage 2	-	-	-	583	-
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	922	-	-	191	459
Stage 1	-	-	-	511	-
Stage 2	-	-	-	558	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	922	-	-	168	459
Mov Cap-2 Maneuver	-	-	-	168	-
Stage 1	-	-	-	449	-
Stage 2	-	-	-	558	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	922	-	-	-	425
HCM Lane V/C Ratio	0.121	-	-	-	0.169
HCM Control Delay (s)	9.4	-	-	-	15.2
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	0.6

HCM 6th TWSC
2: Blue Parkway & Site Drive B

A.M. Peak Hour
Future Conditions

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	133	269	1	2	44
Future Vol, veh/h	14	133	269	1	2	44
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	-	-	-	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	15	145	292	1	2	48

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	293	0	0 468 293
Stage 1	-	-	- 293 -
Stage 2	-	-	- 175 -
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	1269	-	- 553 746
Stage 1	-	-	- 757 -
Stage 2	-	-	- 855 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1269	-	- 546 746
Mov Cap-2 Maneuver	-	-	- 546 -
Stage 1	-	-	- 748 -
Stage 2	-	-	- 855 -

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1269	-	-	-	734
HCM Lane V/C Ratio	0.012	-	-	-	0.068
HCM Control Delay (s)	7.9	-	-	-	10.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 6th TWSC
3: Proposed Collector & Site Drive C

A.M. Peak Hour
Future Conditions

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	5	45	42	5	5	15	56	13	5	166	5
Future Vol, veh/h	5	5	45	42	5	5	15	56	13	5	166	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	49	46	5	5	16	61	14	5	180	5

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	298	300	183	320	295	68	185	0	0	75	0	0
Stage 1	193	193	-	100	100	-	-	-	-	-	-	-
Stage 2	105	107	-	220	195	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	654	612	859	633	616	995	1390	-	-	1524	-	-
Stage 1	809	741	-	906	812	-	-	-	-	-	-	-
Stage 2	901	807	-	782	739	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	638	602	859	586	606	995	1390	-	-	1524	-	-
Mov Cap-2 Maneuver	638	602	-	586	606	-	-	-	-	-	-	-
Stage 1	799	738	-	895	802	-	-	-	-	-	-	-
Stage 2	879	797	-	729	736	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	9.8		11.5		1.4		0.2	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1390	-	-	803	612	1524	-
HCM Lane V/C Ratio	0.012	-	-	0.074	0.092	0.004	-
HCM Control Delay (s)	7.6	0	-	9.8	11.5	7.4	0
HCM Lane LOS	A	A	-	A	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-

LANE SUMMARY

 **Site: 102 [Blackwell Road and Blue Parkway]**

P.M. Peak Hour
Future Conditions

Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Blackwell Road													
Lane 1	504	3.0	916	0.550	100	11.4	LOS B	4.4	113.8	Full	1600	0.0	0.0
Lane 2 ^d	621	3.0	916	0.677	100	15.1	LOS C	8.0	205.1	Full	1600	0.0	0.0
Approach	1125	3.0		0.677		13.5	LOS B	8.0	205.1				
East: Blue Parkway													
Lane 1	370	3.0	767	0.482	100	11.4	LOS B	3.0	75.6	Short	250	0.0	NA
Lane 2 ^d	370	3.0	767	0.482	100	11.4	LOS B	3.0	75.6	Full	1600	0.0	0.0
Approach	739	3.0		0.482		11.4	LOS B	3.0	75.6				
North: Blackwell Road													
Lane 1	246	3.0	704	0.349	100	9.6	LOS A	1.5	39.1	Short	250	0.0	NA
Lane 2 ^d	271	3.0	777	0.349	100	8.8	LOS A	1.5	38.5	Full	1600	0.0	0.0
Approach	516	3.0		0.349		9.2	LOS A	1.5	39.1				
West: Blue Parkway													
Lane 1 ^d	305	3.0	615	0.497	100	14.0	LOS B	2.7	67.9	Full	1600	0.0	0.0
Approach	305	3.0		0.497		14.0	LOS B	2.7	67.9				
Intersection	2686	3.0		0.677		12.1	LOS B	8.0	205.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY



Site: 101 [Blue Parkway and Collector Street]

P.M. Peak Hour
Future Conditions
Site Category: (None)
Roundabout

Lane Use and Performance													
	Demand Total veh/h	Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Proposed collector street													
Lane 1 ^d	322	3.0	788	0.408	100	9.7	LOS A	2.2	57.2	Full	1600	0.0	0.0
Approach	322	3.0		0.408		9.7	LOS A	2.2	57.2				
East: Blue Parkway													
Lane 1 ^d	299	3.0	845	0.354	100	8.3	LOS A	1.7	43.9	Full	1600	0.0	0.0
Approach	299	3.0		0.354		8.3	LOS A	1.7	43.9				
North: Proposed collector street													
Lane 1 ^d	173	3.0	844	0.205	100	6.4	LOS A	0.9	22.8	Full	1600	0.0	0.0
Approach	173	3.0		0.205		6.4	LOS A	0.9	22.8				
West: Blue Parkway													
Lane 1 ^d	776	3.0	1299	0.597	100	9.8	LOS A	5.5	141.8	Full	1600	0.0	0.0
Approach	776	3.0		0.597		9.8	LOS A	5.5	141.8				
Intersection	1570	3.0		0.597		9.1	LOS A	5.5	141.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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HCM 6th TWSC
1: Blue Parkway & Site Drive A

P.M. Peak Hour
Future Conditions

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	123	690	521	16	24	126
Future Vol, veh/h	123	690	521	16	24	126
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	-	-	-	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	134	750	566	17	26	137

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	583	0	0 1593 575
Stage 1	-	-	- 575 -
Stage 2	-	-	- 1018 -
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	991	-	- 118 518
Stage 1	-	-	- 563 -
Stage 2	-	-	- 349 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	991	-	- 102 518
Mov Cap-2 Maneuver	-	-	- 102 -
Stage 1	-	-	- 487 -
Stage 2	-	-	- 349 -

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	28.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	991	-	-	-	313
HCM Lane V/C Ratio	0.135	-	-	-	0.521
HCM Control Delay (s)	9.2	-	-	-	28.4
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	2.8

HCM 6th TWSC
2: Blue Parkway & Site Drive B

P.M. Peak Hour
Future Conditions

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	314	250	2	1	25
Future Vol, veh/h	43	314	250	2	1	25
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	-	-	-	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	47	341	272	2	1	27
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	274	0	-	0	708	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	435	-
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	1289	-	-	-	401	766
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1289	-	-	-	387	766
Mov Cap-2 Maneuver	-	-	-	-	387	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	653	-
Approach	EB	WB		SB		
HCM Control Delay, s	1	0		10.1		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1289	-	-	-	738	
HCM Lane V/C Ratio	0.036	-	-	-	0.038	
HCM Control Delay (s)	7.9	-	-	-	10.1	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	

HCM 6th TWSC
3: Proposed Collector & Site Drive C

P.M. Peak Hour
Future Conditions

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	5	28	23	5	5	49	185	41	5	107	5
Future Vol, veh/h	5	5	28	23	5	5	49	185	41	5	107	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	5	30	25	5	5	53	201	45	5	116	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	464	481	119	476	461	224	121	0	0	246	0	0
Stage 1	129	129	-	330	330	-	-	-	-	-	-	-
Stage 2	335	352	-	146	131	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	508	485	933	499	497	815	1467	-	-	1320	-	-
Stage 1	875	789	-	683	646	-	-	-	-	-	-	-
Stage 2	679	632	-	857	788	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	483	463	933	462	474	815	1467	-	-	1320	-	-
Mov Cap-2 Maneuver	483	463	-	462	474	-	-	-	-	-	-	-
Stage 1	838	786	-	654	619	-	-	-	-	-	-	-
Stage 2	640	605	-	820	785	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.1		12.8		1.3		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1467	-	-	743	496	1320	-
HCM Lane V/C Ratio	0.036	-	-	0.056	0.072	0.004	-
HCM Control Delay (s)	7.5	0	-	10.1	12.8	7.7	0
HCM Lane LOS	A	A	-	B	B	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.2	0	-