

 **Volume 1 – Traffic Impact Analysis**

2999 Turtle Creek Boulevard
Dallas, Texas

November 20, 2018

Kimley-Horn and Associates, Inc.
Dallas, Texas

Project #063319089
Registered Firm F-928

Kimley»»Horn

Traffic Impact Analysis

**2999 Turtle Creek Boulevard
Dallas, Texas**

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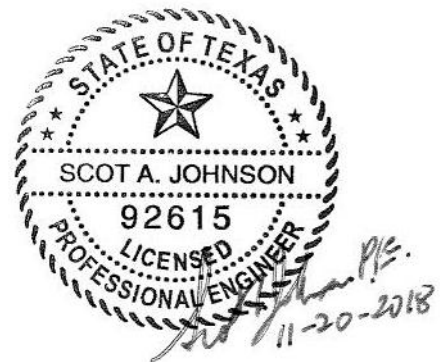


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EXECUTIVE SUMMARY

The proposed 2999 Turtle Creek mixed-use development is located northwest of Turtle Creek Boulevard between Gillespie Street and Dickason Avenue in Dallas, Texas. The site is proposed to be built with 85 branded residential condominium units and 180 hotel rooms. This study is intended to identify traffic generation characteristics, identify potential traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts.

The following existing intersections were selected to be part of this study:

- Turtle Creek Boulevard at Cedar Springs Road
- Turtle Creek Boulevard at Cedar Springs Road / Bowen Street
- Sale Street at Gillespie Street
- Turtle Creek Boulevard at Gillespie Street
- Sale Street at Dickason Avenue
- Turtle Creek Boulevard at Dickason Avenue
- Sale Street at Cedar Springs Road

The analysis also included the following driveways having access in and out of the site:

- Drive 1, which is a full-access driveway to Dickason Avenue and will be the primary access point for the hotel; and
- Drive 2, which is a full-access driveway to Dickason Avenue and will be the primary access point for the residential units; and
- Drive 3, which is a full-access driveway to Gillespie Street and will be the secondary access point for the residential units.

Traffic operations were analyzed at the study intersections for existing volumes, 2021 and 2026 background traffic volumes, and 2021 and 2026 background plus site-generated traffic volumes. The future years correspond to the expected buildout year of the site and a key future study year. Conditions were analyzed for the weekday AM and PM peak hours.

The background traffic conditions included existing traffic with compound growth rates, plus explicit modelling of the following developments in the vicinity:

- 2727 Turtle Creek site, a development consisting of 310 multifamily units, 40 condominium units, a 250-key hotel, and 300,000 SF office, located at 2727 Turtle Creek Boulevard in Dallas, Texas, which is between Fairmount Street and Gillespie Street.
- 3000 Turtle Creek site, a development consisting of 170,000 SF office located on the southern corner of the intersection of Turtle Creek Boulevard and Bowen Street.
- Lincoln Katy Trail site, a development consisting of 329 multifamily units located on the west side of Carlisle Street between Hall Street and Bowen Street.

The 2999 Turtle Creek mixed-use development is expected to generate approximately 122 new weekday AM peak hour one-way vehicle trips and 145 new weekday PM peak hour one-way

vehicle trips at buildout. The distribution of the site-generated traffic volumes onto the street system was based on the surrounding roadway network, existing traffic patterns, and the project's proposed access locations.

Based on the analysis presented in this report, the proposed 2999 Turtle Creek Boulevard mixed-use development can be successfully incorporated into the surrounding roadway network. The proposed site driveways provide the appropriate level of access for the development. The site-generated traffic does not have a disproportionate effect on the existing vehicle traffic operations. No improvements to the external roadway network are required for the site.

I. INTRODUCTION

A. Purpose

Kimley-Horn was retained to conduct a Traffic Impact Analysis (TIA) of future traffic conditions associated with the development of the 2999 Turtle Creek mixed-use development located at 2999 Turtle Creek Boulevard. A site vicinity map is provided as **Exhibit 1**. **Exhibit 2** shows the proposed conceptual site plan. This study is intended to identify traffic generation characteristics, identify potential traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts.

B. Methodology

Traffic operations were analyzed at the study intersections for AM and PM peak hours for the following scenarios:

- 2018 existing traffic
- 2021 background traffic
- 2021 background plus site traffic
- 2026 background traffic
- 2026 background plus site traffic

The capacity analyses were conducted using the *Synchro*[™] software package and its associated *Intersection* reports for signalized intersections and *Highway Capacity Manual* reports for unsignalized intersections.

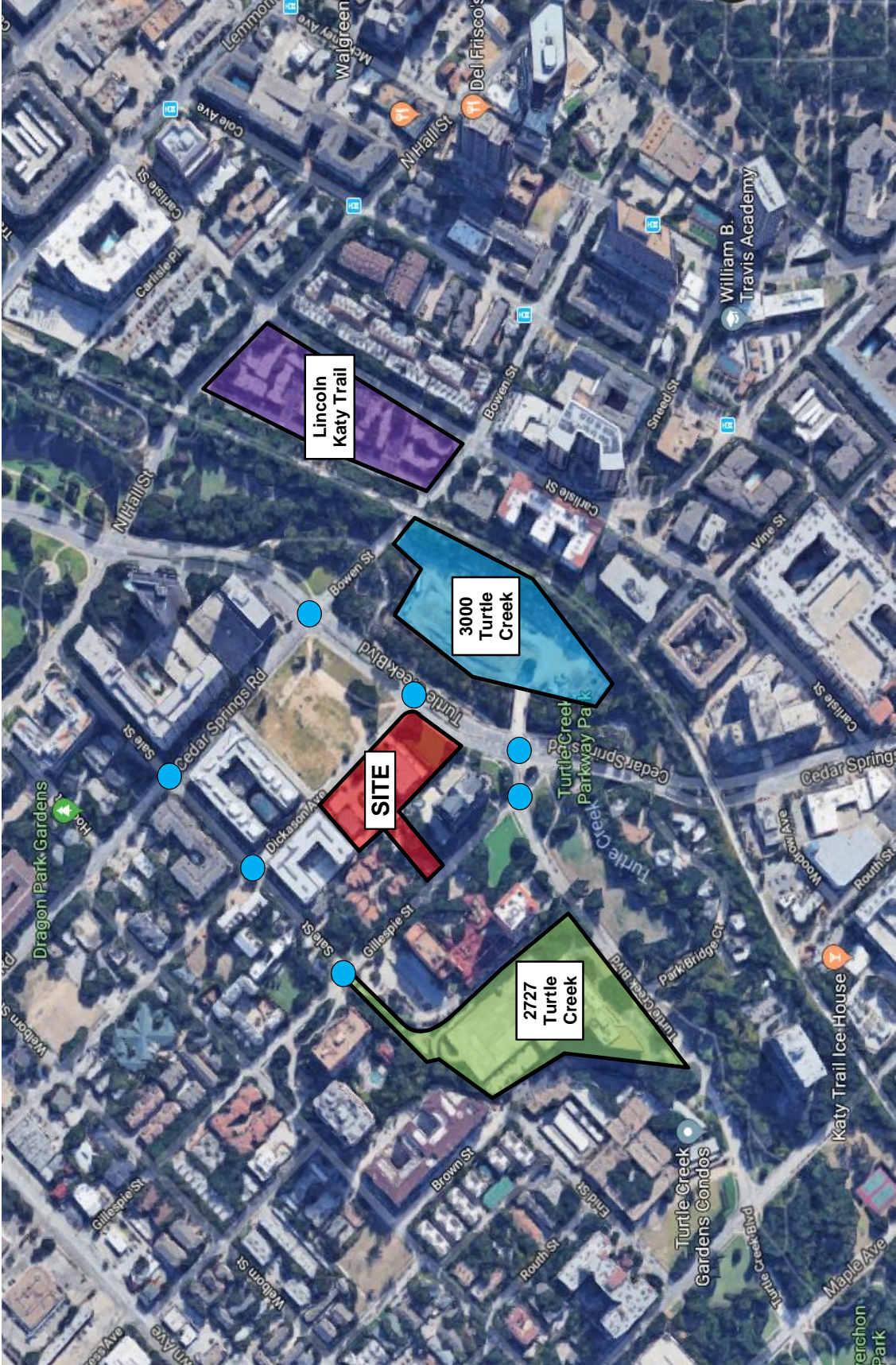



EXHIBIT 1

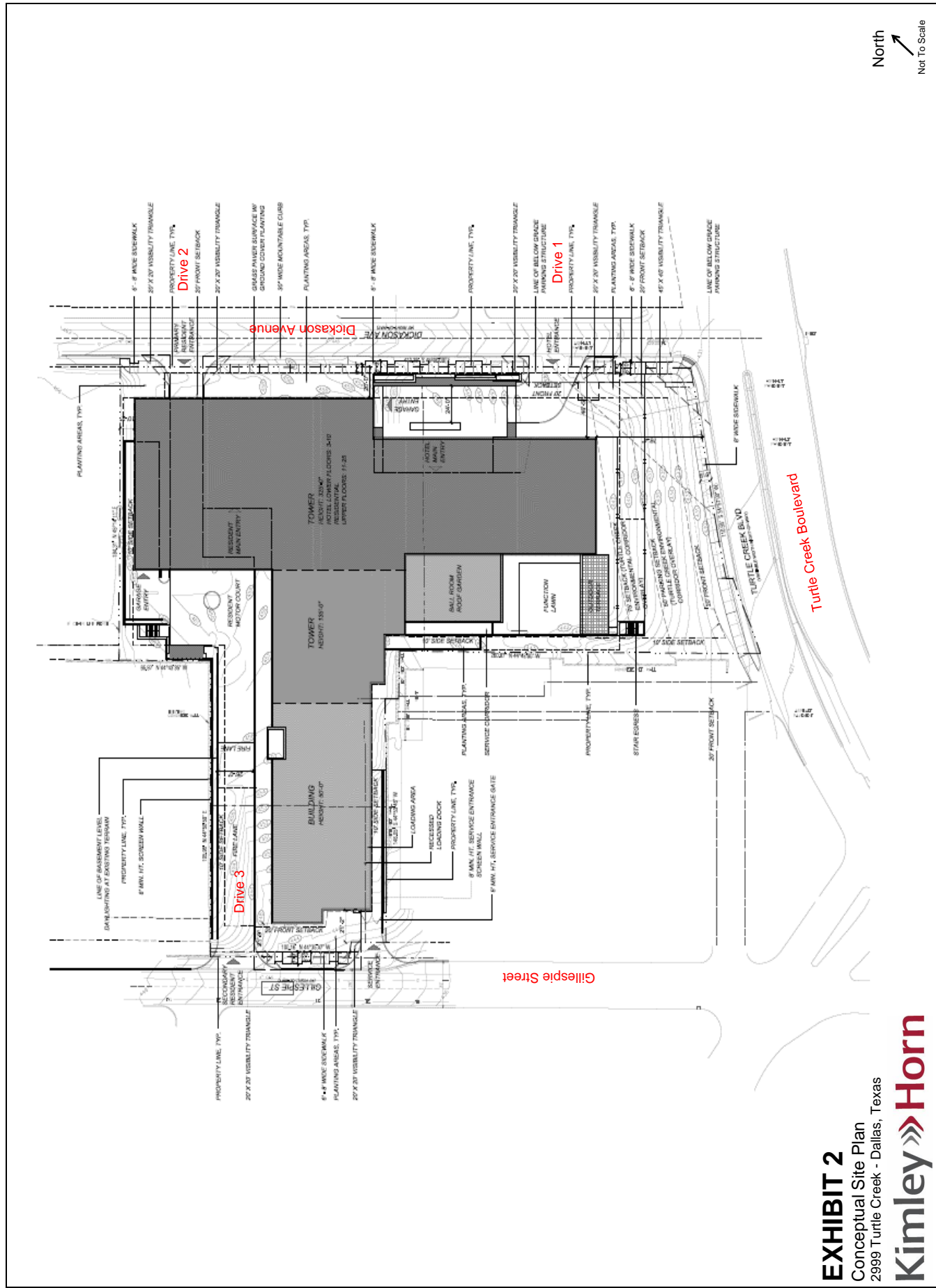
Vicinity Map
 2999 Turtle Creek - Dallas, Texas



LEGEND:
 = Study Intersection

North

 Not To Scale



II. EXISTING AND FUTURE AREA CONDITIONS

A. Roadway Characteristics

The following signalized intersections were evaluated as part of this study:

- Turtle Creek Boulevard at Cedar Springs Road
- Turtle Creek Boulevard at Cedar Springs Road / Bowen Street

The following unsignalized intersections were evaluated as part of this study:

- Sale Street at Gillespie Street
- Turtle Creek Boulevard at Gillespie Street
- Sale Street at Dickason Avenue
- Turtle Creek Boulevard at Dickason Avenue
- Sale Street at Cedar Springs Road

The major study area roadways are described in **Appendix A**.

Exhibit 3 illustrates the existing intersection geometry used for the traffic analysis.

B. Existing Study Area

The property is located within PD 193 and is zoned O-2. The property currently contains an office building site and parking structure.

C. Proposed Site Improvements

The development as proposed includes 85 branded residential condominium units and 180 hotel rooms.

As shown in **Exhibit 3**, the site has three proposed driveways. The driveways to be modelled in this analysis are as follows:

Drive 1 – would modify the southern existing full-access driveway to Dickason Avenue located between Turtle Creek Boulevard and Sale Street. The driveway was modelled with one inbound and one outbound lane. Drive 1 was considered the primary driveway for hotel traffic.

Drive 2 – would modify the northern existing full-access driveway to Dickason Avenue located between Turtle Creek Boulevard and Sale Street, which is approximately 175' north of Drive 1. The driveway was modelled with one inbound and one outbound lane. Drive 2 was considered the primary driveway for residential traffic.

Drive 3 – would modify the existing full-access driveway to Gillespie Street located approximately 375' south of Sale Street. The driveway was modelled with one inbound and one outbound lane. Drive 3 was considered the secondary driveway for residential traffic.

Intersection sight distance at the proposed driveways is acceptable, with each on relatively straight segments of their respective roadway. The driveways are far from the crest of the hills along Dickason Avenue and Gillespie Street. Therefore, the driveways are positioned at level, albeit inclined, sections of their roadways.

D. Existing Traffic Volumes

24-hour machine counts were collected near the site on Turtle Creek Boulevard, Gillespie Street, Sale Street, and Dickason Avenue. **Exhibit 4** shows the existing weekday AM and PM peak hour traffic volumes. The raw count sheets, as well as a comparison between the 24-hour volumes collected and previous 24-hour counts, are provided in **Volume 2** of this report.

The 24-hour count showed the daily volume on the roadway link as follows:

- Turtle Creek Boulevard: 17,631 vehicles per day (vpd)
- Gillespie Street: 2,120 vpd
- Sale Street: 721 vpd
- Dickason Avenue: 1,193 vpd

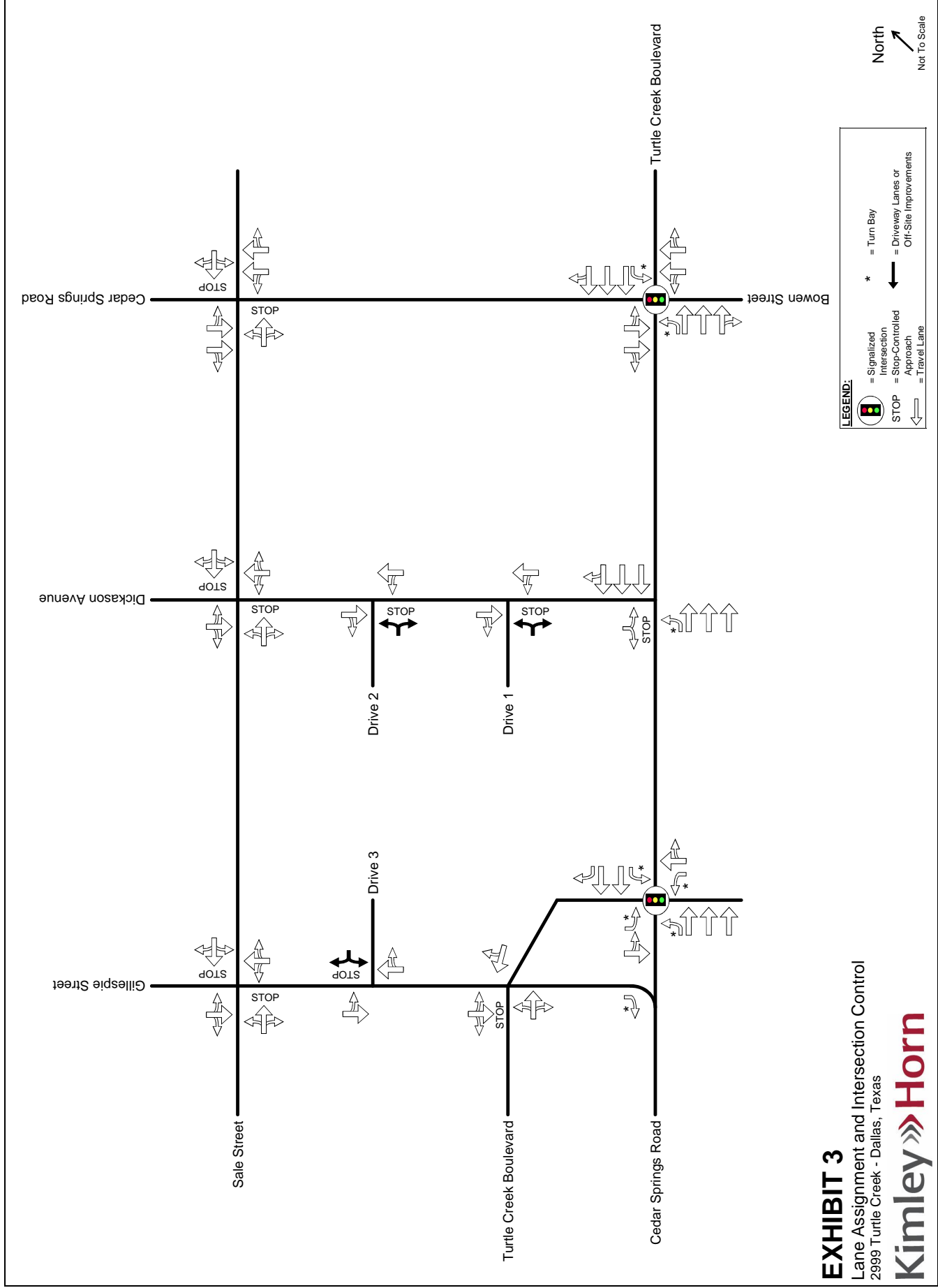


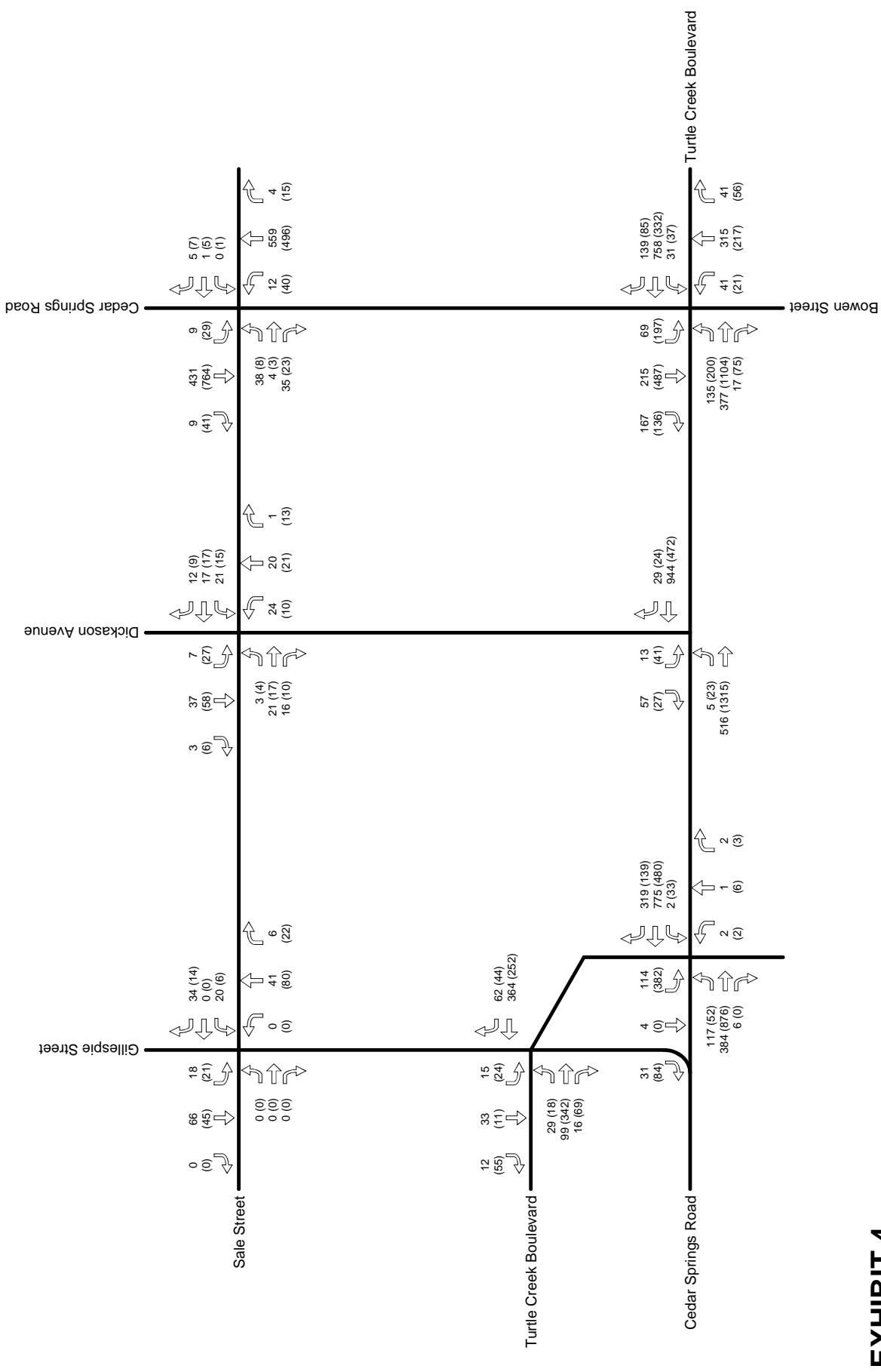
EXHIBIT 3
 Lane Assignment and Intersection Control
 2999 Turtle Creek - Dallas, Texas



LEGEND:
 X (Y)
 X = Weekday AM Peak Hour Turning Movements
 Y = Weekday PM Peak Hour Turning Movements
 Volumes may not sum from point to point due to rounding
 and presence of smaller driveways not included in analysis.

North

 Not To Scale



III. PROJECT TRAFFIC CHARACTERISTICS

A. Site-Generated Traffic

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the 10th edition of *Trip Generation Manual* published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. The trips indicated are actually one-way trips or *trip ends*, where one vehicle entering and exiting the site is counted as one inbound trip and one outbound trip.

No reductions were taken for internal capture, pass-by trips, or multimodal use.

Table 1 shows the resulting daily and weekday AM and PM peak hour trip generation for the proposed development, showing new external trips.

Table 1 – Trip Generation

Land Uses	Amount	Units	ITE Code	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
Branded Residential (Condominium)	85	Units	222	547	9	28	37	23	14	37
Hotel	180	Rooms	310	1,505	50	35	85	55	53	108
Development Totals										
Total Net New External Vehicle Trips:				2,052	59	63	122	78	67	145

Trip Generation rates based on ITE's *Trip Generation Manual*, 10th Edition.

B. Trip Generation Comparison

By right, with no zoning change, the 2999 Turtle Creek Development can be built out in a few different scenarios. Comparisons between the desired scenario and the simplest As-of-Right scenario is analyzed below.

1. Office As-of-Right Scenario

By right, 430,440 SF office can be built on the development site for a maximum FAR of 4.0. The trip generation is shown below, with a comparison between the desired land use plan and the as-of-right scenario to follow.

Table 2 – Trip Generation for the Office As-of-Right Scenario

Land Uses	Amount	Units	ITE Code	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
General Office Building	430,440	SF	710	4,372	371	60	431	73	383	456
Development Totals										
Total Net New External Trips:				4,372	371	60	431	73	383	456

Trip Generation rates based on ITE's *Trip Generation Manual*, 10th Edition.

Table 3 – Comparison between Proposed Zoning and the Office Scenario

Land Uses	-	-	ITE Code	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
Proposed Development	-	-	Varies	2,052	59	63	122	78	67	145
Office - As of Right	-	-	710	4,372	371	60	431	73	383	456
Development Totals										
Difference in External Trips:				2,320	312	-3	309	-5	316	311
Percent Change from Mixed-Use Plan to Office - As of Right:				113%	529%	-5%	253%	-6%	472%	214%

When compared to the desired proposed development, the Office As-of-Right scenario produces many more vehicle trips. The peak hour trips for both peak hours range from 3 to 6 times higher in the office scenario. This comparison just shows the magnitude of the proposed site's traffic as compared to the existing development potential. An office development actually using the as-of-right office potential would need to perform other traffic studies during the site plan approval process.

C. Trip Distribution and Assignment

The distribution of the site-generated traffic volumes into and out of the site driveways and onto the street system was based on the area street system characteristics, existing traffic patterns, relative land use density, and the locations of the proposed driveway access to/from the site.

The corresponding inbound and outbound traffic assignment, where the directional distribution is applied using the most probable paths to and from the site, can be found in

Exhibit 5. Exhibit 6 shows the resulting site-generated weekday AM and weekday PM peak hour turning movements after multiplying the new external trip generation by the respective traffic assignment percentages.

D. Other Development Traffic Modelling

Using the same procedure as was used to develop the 2999 Turtle Creek site-generated traffic and distribute that traffic on the roadway network, traffic was developed and distributed for both the following background sites. The 2727 Turtle Creek site TIA was performed by Kimley-Horn and Associates, Inc. in a report dated May 2018. The 3000 Turtle Creek site traffic was developed in the same report. The Lincoln Katy Trail site TIA was performed by the DeShazo Group, Inc. in a report dated April 2018. Extrapolations to the traffic recorded in these TIAs were made where necessary. The distribution and volumes for each of these developments can be found in **Volume 2** of this report.

E. Development of 2021 Background Traffic

In order to obtain 2021 background traffic, the existing traffic counts and historic counts near the site were compared to find expected growth trends within the study area. Based on the recent growth in the area, an annual growth rate of 1% was assumed for the background traffic through 2021. To calculate the 2021 background traffic, the existing 2018 traffic counts were grown by 1% annually for three years. The resulting 2021 background weekday AM and PM peak hour traffic volumes are shown in **Exhibit 7**.

F. Development of 2021 Total Traffic

Site traffic volumes were added to the background volumes to represent the estimated total (background plus site-generated) traffic conditions for the 2021 study year after completion of the proposed development. **Exhibit 8** shows the resulting 2021 weekday AM and PM peak hour total traffic volumes.

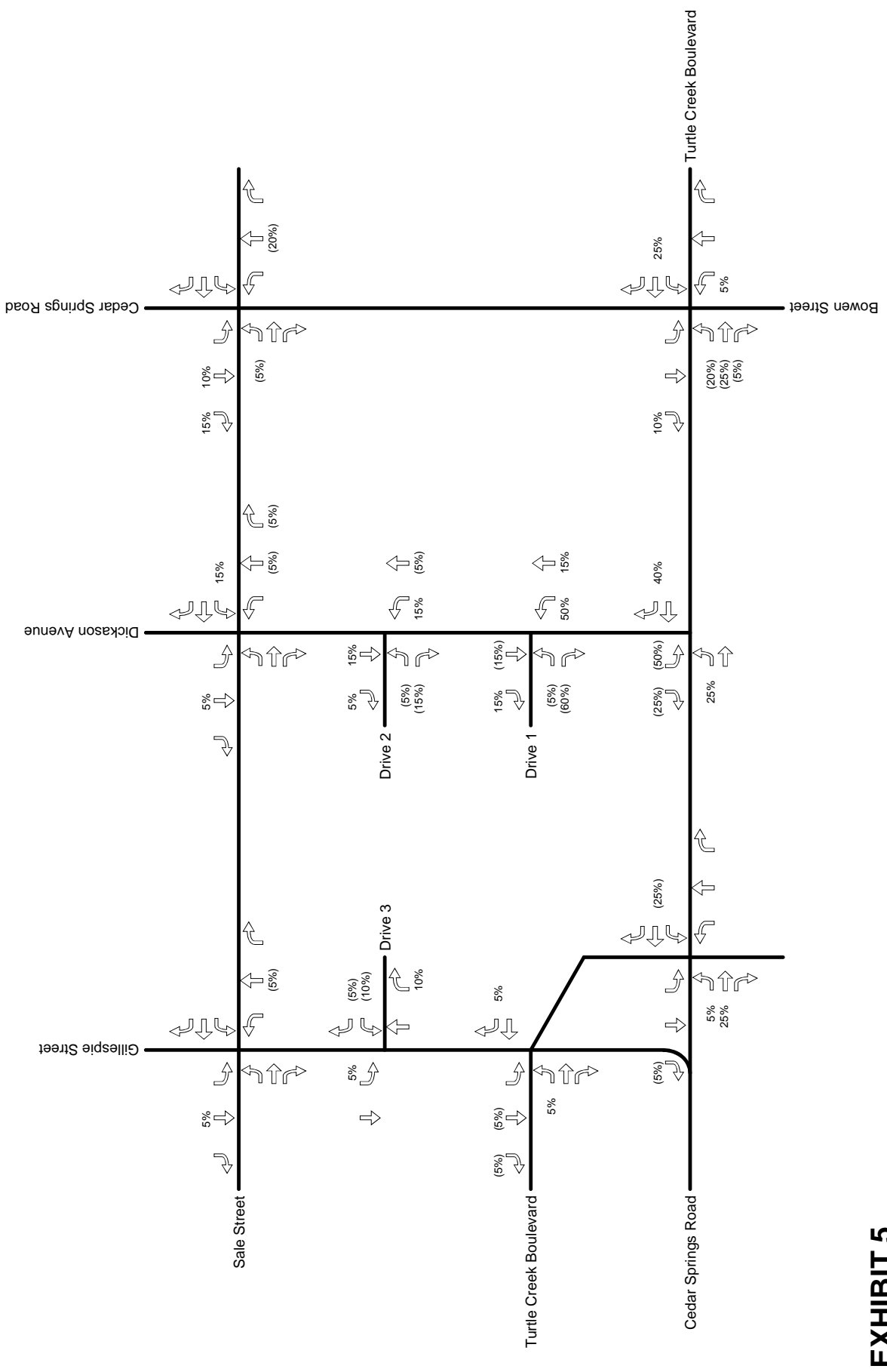
G. Development of 2026 Background and Total Traffic

The background and total traffic volumes in the 2026 study year were calculated in a similar manner to the 2021 traffic volumes by adding five years of 1% growth over the 2021 background volumes. The background development traffic was then added into the traffic volumes. **Exhibit 9** shows the resulting 2026 weekday AM and PM peak hour background traffic volumes, and **Exhibit 10** shows the resulting 2026 weekday AM and PM peak hour total traffic volumes after the addition of the site-generated traffic.

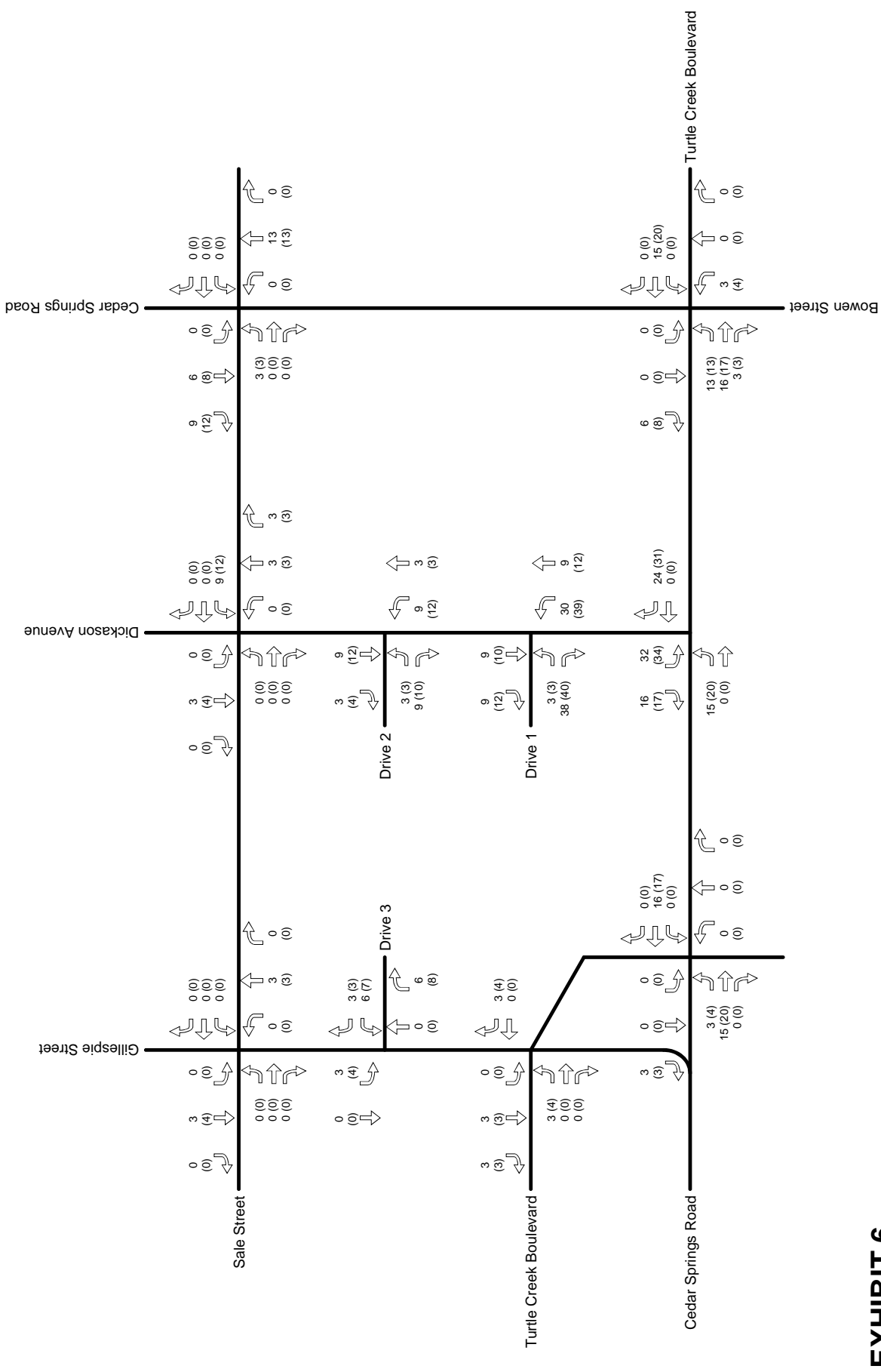
EXHIBIT 5
 Trip Distribution and Traffic Assignment
 2999 Turtle Creek - Dallas, Texas

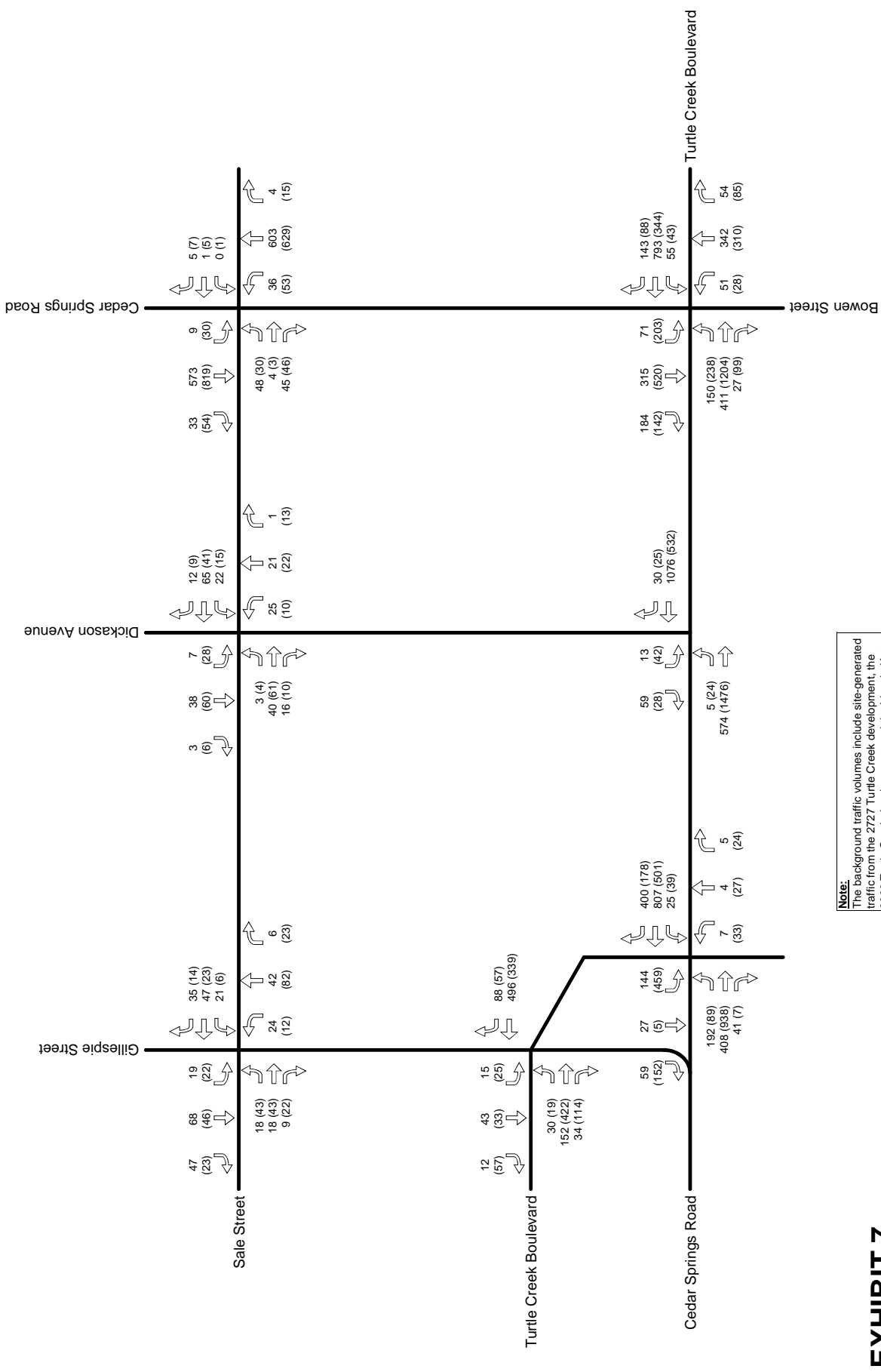


LEGEND:
 X% (Y%)
 X% = Percentage of Inbound Site-Generated Traffic
 (Y%) = Percentage of Outbound Site-Generated Traffic



LEGEND:
 X (Y)
 X = Weekday AM Peak Hour Turning Movements
 Y = Weekday PM Peak Hour Turning Movements
 Volumes may not sum from point to point due to rounding
 and presence of smaller driveways not included in analysis.





Note:
 The background traffic volumes include site-generated traffic from the 2727 Turtle Creek development, the 3000 Turtle Creek development, and the Lincoln Katy Trail development.

LEGEND:
 X (Y)
 X = Weekday AM Peak Hour Turning Movements
 Y = Weekday PM Peak Hour Turning Movements
 Volumes may not sum from point to point due to rounding and presence of smaller driveways not included in analysis.

North
 ↗
 Not To Scale

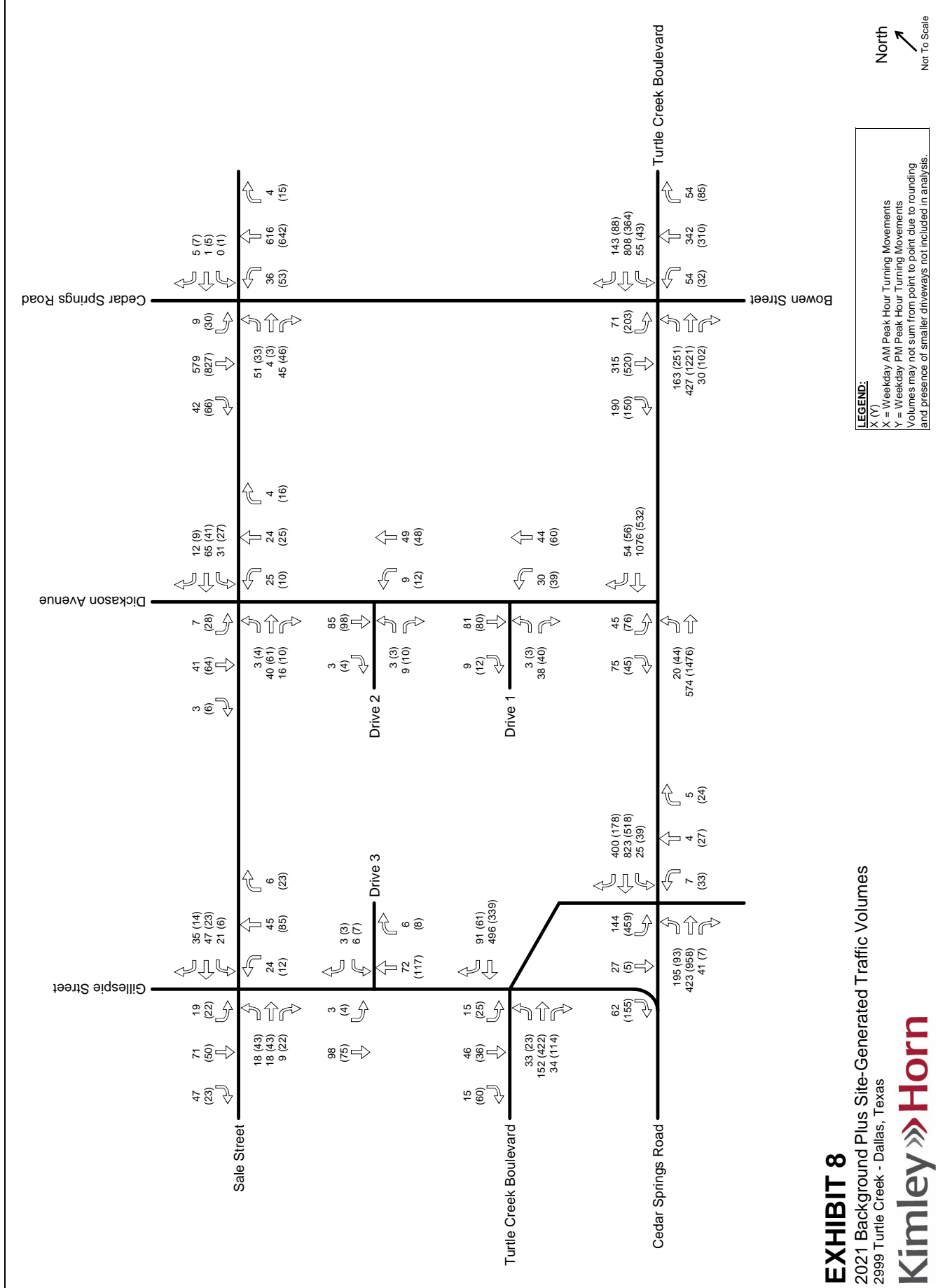
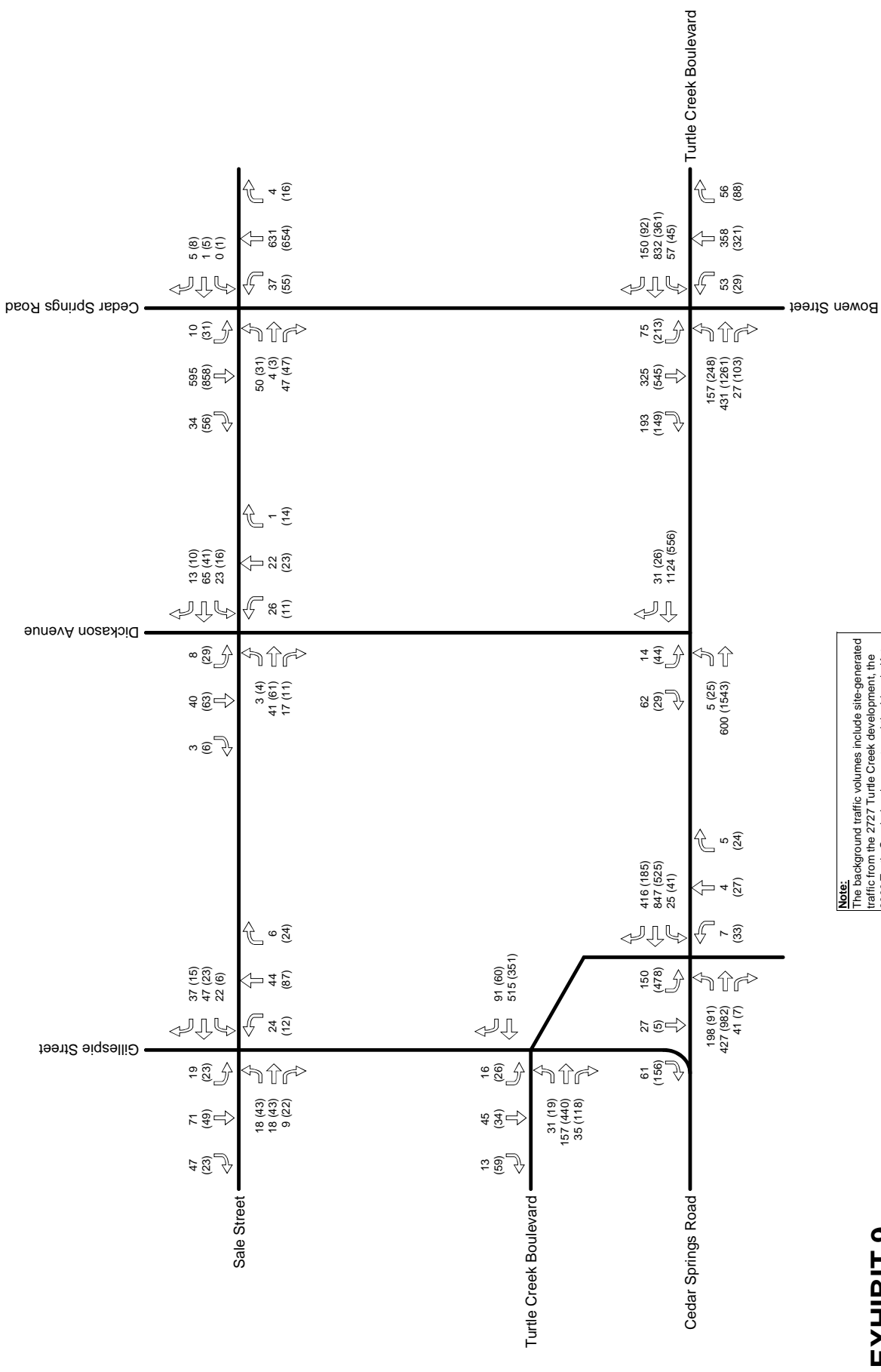


EXHIBIT 8
 2021 Background Plus Site-Generated Traffic Volumes
 2999 Turtle Creek - Dallas, Texas

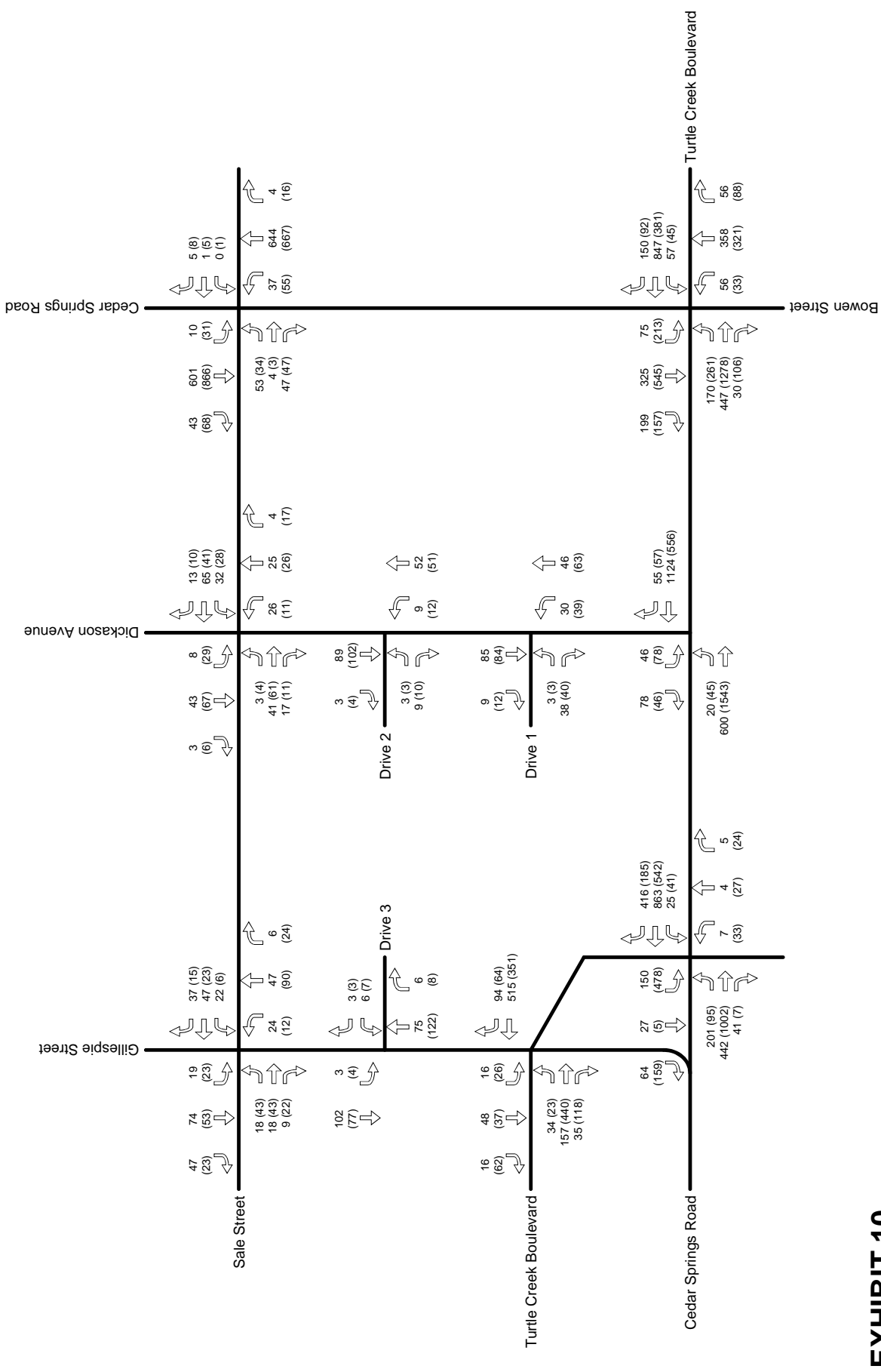




Note:
 The background traffic volumes include site-generated traffic from the 2727 Turtle Creek development, the 3000 Turtle Creek development, and the Lincoln Katy Trail development.

LEGEND:
 X (Y)
 X = Weekday AM Peak Hour Turning Movements
 Y = Weekday PM Peak Hour Turning Movements
 Volumes may not sum from point to point due to rounding and presence of smaller driveways not included in analysis.

North
 ↗
 Not To Scale



LEGEND:
 X (Y)
 X = Weekday AM Peak Hour Turning Movements
 Y = Weekday PM Peak Hour Turning Movements
 Volumes may not sum from point to point due to rounding and presence of smaller driveways not included in analysis.

EXHIBIT 10
 2026 Background Plus Site-Generated Traffic Volumes
 2999 Turtle Creek - Dallas, Texas



IV. TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn conducted a traffic operations analysis to determine potential capacity deficiencies in the 2018, 2021 and 2026 study years at the study intersections. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual*.

A. Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). Level of service and the corresponding analysis methodology are explained in **Appendix B**.

Signal timings for the signalized intersections are based off of Dallas “As Fine-Tuned” Synchro files. Timing adjustments were made in the future scenarios to accommodate changes in traffic volumes due to background growth and site traffic, replicating how City staff will periodically review signal operations in the future.

Calculations for the level of service at the key intersections identified for study are provided in **Volume 2** of this report. The analyses assumed the lane geometry and intersection control shown in **Exhibit 3**.

B. Analysis Results

Table 4 and **Table 5** show the intersection operational results for the weekday AM and PM peak hours, respectively.

Table 4 – Traffic Operational Results – Weekday AM Peak Hour

INTERSECTION	APPROACH	2018 Background Traffic		2021 Background Traffic		2021 Background plus Site Traffic		2026 Background Traffic		2026 Background plus Site Traffic	
		AM Peak Hour		AM Peak Hour		AM Peak Hour		AM Peak Hour		AM Peak Hour	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Cedar Springs Road @ Turtle Creek Boulevard	EB	5.2	A	12.8	B	13.2	B	14.1	B	14.4	B
	WB	5.2	A	8.9	A	8.9	A	9.5	A	9.6	A
	NB	36.8	D	34.7	C	34.7	C	34.7	C	34.7	C
	SB	60.0	E	60.5	E	60.5	E	59.7	E	59.7	E
	Overall	9.8	A	16.6	B	16.6	B	17.1	B	17.2	B
Turtle Creek Boulevard @ Cedar Springs Road (Bowen)	EB	19.1	B	21.6	C	22.7	C	22.8	C	24.1	C
	WB	9.2	A	9.7	A	10.0	B	10.0	A	10.4	B
	NB	33.7	C	41.4	D	42.9	D	45.4	D	48.0	D
	SB	29.5	C	43.2	D	43.2	D	47.9	D	48.2	D
	Overall	19.8	B	25.3	C	25.9	C	27.4	C	28.3	C
Drive 1 @ Dickason Avenue	NBL	-	-	-	-	7.5	A	-	-	7.5	A
	EB*	-	-	-	-	9.0	A	-	-	9.0	A
Drive 2 @ Dickason Avenue	NBL	-	-	-	-	7.4	A	-	-	7.4	A
	EB*	-	-	-	-	9.0	A	-	-	9.0	A
Drive 3 @ Gillespie Street	WB*	-	-	-	-	9.3	A	-	-	9.3	A
	SBL	-	-	-	-	7.4	A	-	-	7.4	A
Turtle Creek Boulevard @ Gillespie Street	EBL	8.4	A	8.9	A	9.0	A	9.0	A	9.0	A
	SB*	13.1	B	16.6	C	16.6	C	17.3	C	17.3	C
Sale Street @ Gillespie Street	NBL	-	-	7.5	A	7.5	A	7.5	A	7.6	A
	EB*	-	-	11.2	B	11.2	B	11.2	B	11.3	B
	WB*	9.3	A	11.1	B	11.2	B	11.1	B	11.2	B
	SBL	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A
Turtle Creek Boulevard @ Dickason Avenue	EBL	9.2	A	9.3	A	9.5	A	9.5	A	9.6	A
	SB*	11.0	B	11.3	B	12.2	B	11.6	B	12.7	B
Sale Street @ Dickason Avenue	NBL	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A
	EB*	9.6	A	10.0	A	10.1	B	10.1	B	10.2	B
	WB*	9.9	A	10.7	B	10.9	B	10.7	B	10.9	B
	SBL	7.3	A	7.3	A	7.3	A	7.3	A	7.3	A
Sale Street @ Cedar Springs Road	NBL	8.4	A	9.1	A	9.2	A	9.2	A	9.3	A
	EB*	18.1	C	30.0	D	32.9	D	34.2	D	37.5	E
	WB*	11.6	B	13.5	B	13.7	B	14.1	B	14.4	B
	SBL	7.8	A	7.9	A	7.9	A	8.0	A	8.0	A

* Stop-Controlled Approach
 - No movements in Time Period

Signalized	Unsignalized
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Table 5 – Traffic Operational Results – Weekday PM Peak Hour

INTERSECTION	APPROACH	2018 Background Traffic		2021 Background Traffic		2021 Background plus Site Traffic		2026 Background Traffic		2026 Background plus Site Traffic	
		PM Peak Hour		PM Peak Hour		PM Peak Hour		PM Peak Hour		PM Peak Hour	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Cedar Springs Road @ Turtle Creek Boulevard	EB	11.0	B	16.3	B	16.8	B	17.2	B	17.4	B
	WB	9.9	A	13.0	B	12.8	B	13.1	B	13.6	B
	NB	40.6	D	48.1	D	49.9	D	49.9	D	49.9	D
	SB	49.1	D	55.2	E	55.6	E	57.2	E	57.2	E
	Overall	18.3	B	25.0	C	25.2	C	25.8	C	25.9	C
Turtle Creek Boulevard @ Cedar Springs Road (Bowen)	EB	9.5	A	12.4	B	14.0	B	15.3	B	17.9	B
	WB	13.8	B	16.6	B	17.9	B	18.5	B	19.9	B
	NB	20.8	C	21.4	C	21.3	C	20.3	C	20.1	C
	SB	44.9	D	52.6	D	50.1	D	53.2	D	50.6	D
	Overall	21.3	C	24.8	C	25.0	C	26.5	C	27.0	C
Drive 1 @ Dickason Avenue	NBL	-	-	-	-	7.5	A	-	-	7.5	A
	EB*	-	-	-	-	9.0	A	-	-	9.0	A
Drive 2 @ Dickason Avenue	NBL	-	-	-	-	7.5	A	-	-	7.5	A
	EB*	-	-	-	-	9.0	A	-	-	9.1	A
Drive 3 @ Gillespie Street	WB*	-	-	-	-	9.5	A	-	-	9.6	A
	SBL	-	-	-	-	7.5	A	-	-	7.5	A
Turtle Creek Boulevard @ Gillespie Street	EBL	8.0	A	8.2	A	8.3	A	8.3	A	8.3	A
	SB*	12.6	B	15.7	C	16.0	C	16.4	C	16.7	C
Sale Street @ Gillespie Street	NBL	-	-	7.4	A	7.4	A	7.4	A	7.4	A
	EB*	-	-	11.5	B	11.6	B	11.6	B	11.7	B
	WB*	9.2	A	10.6	B	10.6	B	10.6	B	10.7	B
	SBL	7.5	A	7.5	A	7.5	A	7.5	A	7.5	A
Turtle Creek Boulevard @ Dickason Avenue	EBL	9.1	A	8.9	A	9.2	A	9.1	A	9.4	A
	SB*	11.4	B	11.9	B	13.3	B	12.0	B	13.4	B
Sale Street @ Dickason Avenue	NBL	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A
	EB*	10.1	B	11.0	B	11.1	B	11.1	B	11.2	B
	WB*	10.3	B	11.0	B	11.3	B	11.1	B	11.4	B
	SBL	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A
Sale Street @ Cedar Springs Road	NBL	10.0	A	10.5	B	10.6	B	10.8	B	10.9	B
	EB*	23.9	C	61.5	F	75.9	F	82.3	F	101.5	F
	WB*	6.1	A	37.4	E	39.3	E	39.6	E	42.5	E
	SBL	7.8	A	8.0	A	8.1	A	8.1	A	8.2	A

* Stop-Controlled Approach
 - No movements in Time Period

Signalized	Unsignalized
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C. 2018 Existing Traffic Operations

The analysis of the 2018 existing traffic operations shows that the signalized study intersections operate with moderate delay in both peak hours. Both signalized intersections operate at LOS C or better during both peak hours, functioning very favorably from a vehicular perspective.

Of the unsignalized study intersection approaches, all but one of the approaches operate at LOS B or better during both the AM and PM peaks. The eastbound approach to the intersection of Sale Street with Cedar Springs Road operates at LOS C during both peak hours, which is very good considering the urban setting of the intersection.

D. 2021 Background Traffic Operations

The signalized study intersections generally experience more delay with three years of background growth and the 2727 Turtle Creek, 3000 Turtle Creek, and Lincoln Katy Trail background developments added to the network. Both signalized intersections experience a change in level of service. The intersection of Cedar Springs Road and Turtle Creek Boulevard changes from LOS A to B during the AM peak and from LOS B to C during the PM peak. The intersection of Turtle Creek Boulevard and Bowen Street/Cedar Springs Road changes from LOS B to C during the AM peak hour and remains at LOS C during the PM peak. As with the existing traffic volumes, both intersections operate favorably at LOS C or better during both peak hours.

The unsignalized intersections experience additional delays at the study approaches, and, apart from three approaches, all continue to operate at LOS B or better after the background traffic growth and traffic from the background sites were added to the street network. The southbound approach of Gillespie Street to Turtle Creek Boulevard changes from LOS B to C during both peak hours. There are known concerns about this intersection due to its proximity to the intersection of Turtle Creek Boulevard and Cedar Springs Road. It serves as a convenient gateway for not only 2727 Turtle Creek traffic but also for 3000 Turtle Creek traffic. The 2999 Turtle Creek site has only a secondary access point to Gillespie Street. The vast majority (85%) of the traffic for the proposed development, which is analyzed in the following sections, was projected to Dickason Avenue, where its primary access points are located.

The eastbound approach to the intersection of Sale Street with Cedar Springs Road changes from LOS C to D during the AM peak and from LOS C to F during the PM peak. This approach serves as a minor access point for the 2727 Turtle Creek site since Sale Street travels directly to one of their site driveways. Only 10% of the traffic from the 2727 Turtle Creek background site is routed to the eastbound approach. Due to the moderately high volumes on Cedar Springs Road, any increase in eastbound left-turning vehicles will produce a relatively large corresponding increase in delay. Furthermore, as is seen by the westbound approach of the same intersection changing from LOS A to E during the PM peak hour, any increase to the through volumes also leads to a relatively large increase

in delay. The background sites do not add any traffic to the westbound approach, so it's change is due solely to the increase in through volumes due to background growth and the background sites.

If users determine that the delay at the intersection of Sale Street with Cedar Springs Road is too great, they may elect to divert their trip north two blocks and take advantage of the signalized intersection of Welborn Street and Cedar Springs Road.

E. 2021 Background Plus Site-Generated Traffic Operations

The addition of the site-generated traffic to the 2021 background traffic results in minor additional delays at the existing signalized intersections, and there are no increases in level of service. All the signalized intersections operate at LOS C or better, which is very good for their urban setting.

The unsignalized intersections also experience some additional delay after the site-generated traffic is dispersed about the roadway network, yet there are no changes in level of service.

For reasons previously discussed, the delay for the eastbound approach to the intersection of Sale Street with Cedar Springs Road increases after site traffic is added to the model. While only 3 site-generated vehicles, or 5% of the total outbound traffic, are added to the left-turning movement during the PM peak, the delay increases by nearly 20 seconds. The delay experienced is shorter than the cycle length at the adjacent signalized intersections. This means that the vehicles attempting to make unsignalized maneuvers are simply waiting for the available gaps in the traffic flow of Cedar Springs Road created by the upstream signalized intersections. In this context, LOS F is more a descriptor of the delay experienced at a given approach and less a declaration of an unsignalized approach's failure.

This approach is very sensitive to any additional volume. The bulk of the delay is due to the background developments in the area. In order to do a good faith analysis of the neighborhood, 5% of the site outbound traffic was added to the approach, but it may be, due to the delays, that nearly no site-generated traffic chooses to use this approach to access Cedar Springs Road. Users may choose to exclusively use Dickason Avenue to access Turtle Creek Boulevard and then turn left to access Cedar Springs Road as this path has relatively moderate delays and can handle an extra 5% increase of site-generated traffic. The Dickason Avenue approach to Turtle Creek Boulevard also benefits from the sight lines present at the intersection. The curvature of Turtle Creek Boulevard works in the favor of the approach, and the downhill slope of Dickason Avenue toward Turtle Creek Boulevard provides the users an elevated position and helps them to see the traffic more clearly. If they prefer, they may also utilize the signalized intersection of Welborn Street and Cedar Springs Road, or they may choose any number of alternate routes through the neighborhood grid.

The site driveway approaches operate at LOS A during both peak hours. The Dickason Avenue and Gillespie Street existing volumes are very low, and the turning movements are very easy to make out of the site.

F. 2026 Background Traffic Operations

The analysis of the 2026 Background Traffic operations shows that at certain approaches, when compared to the 2021 background traffic operations, but the intersections do not experience any changes in overall delay with the addition of five more years of background traffic growth.

The unsignalized intersections experience some additional delays at the study approaches, and there are no changes in level of service.

G. 2026 Background Plus Site-Generated Traffic Operations

The addition of the site-generated traffic to the 2026 background traffic results in some additional delay at the signalized study intersections yet results in no changes in level of service for the intersections overall. Each signalized intersection operates at LOS C or better overall after the addition of site-generated traffic at buildout, which is favorable given the urban location of the signalized study intersections.

With site traffic, the unsignalized intersections experience additional delays at the study approaches, and there is one change in level of service. The eastbound approach to the intersection of Sale Street and Cedar Springs Road changes from LOS D to E during the AM peak hour. The delays associated with this intersection are discussed earlier in this report. If drivers decide that the delay at this approach is too high, they may choose to alter their path to Turtle Creek Boulevard via Dickason Avenue, which has enough capacity to handle the 3 diverted AM peak hour trips, or to the intersection of Welborn Street and Cedar Springs Road to access Cedar Springs Road directly.

The site driveways operate at LOS A or better after the 2999 Turtle Creek development projections are fully added to the street network.

H. Link Volume Analysis

The link capacity analysis examines the operating conditions of roadway links rather than intersections, using the daily volumes passing a fixed point. The operating condition is defined by the ratio of link volume to link capacity, or V/C. The V/C of the different roadway links that would be impacted by the proposed development's traffic was calculated for the 2018 existing traffic, 2021 background and background plus site traffic, and 2026 background and background plus site traffic scenarios. The daily link capacity for each roadway is taken from the NCTCOG model capacity volumes assuming the urban residential area type. Turtle Creek Boulevard (also known as Cedar Springs Road), as a minor arterial, has a capacity of 825 vehicles per lane per hour (vphpl). Gillespie Street, Sale Street, and Dickason Avenue, as collector streets, all have a capacity of 475 vphpl.

The link analyses, displayed below in **Table 6**, shows that Turtle Creek Boulevard currently operates with ample capacity at LOS A/B with current traffic volumes. After the traffic from the background growth, background sites, and the project site are added to the network, the roadway continues to operate at LOS A/B through the 2026 background plus site scenario. After the full buildout of the site, the roadway is left with over half of its capacity.

Gillespie Street, Sale Street, and Dickason Avenue also operate at LOS A/B with current traffic and continue to do so during both the 2026 background and background plus site scenarios.

The site as proposed does not have a significant negative impact on the link capacities of the study roadways.

Table 6 – Link Operational Results

Roadway Link		2018 Existing			2021 Background					2021 Site-Generated		2021 Background+Site		
From	To	Volume	V/C Ratio	LOS	Volume	Daily Volume	Volume	V/C Ratio	LOS	Assignment	Daily Volume	Volume	V/C Ratio	LOS
Turtle Creek Boulevard/Cedar Springs Road Bowen Street Routh Street		17,631	0.36	A/B	Lincoln Katy Trail	448	19,778	0.40	A/B	45.0%	923	20,701	0.42	A/B
Volume Limit 6 Lanes = 49,500					2727 Turtle Creek	987								
Gillespie Street Sale Street Turtle Creek Boulevard		2,120	0.22	A/B	Lincoln Katy Trail	0	2,513	0.26	A/B	10.0%	205	2,718	0.29	A/B
Volume Limit 2 Lanes = 9,500					2727 Turtle Creek	329								
Sale Street Dickason Avenue Gillespie Street		721	0.08	A/B	Lincoln Katy Trail	0	1,401	0.15	A/B	10.0%	205	1,606	0.17	A/B
Volume Limit 2 Lanes = 9,500					2727 Turtle Creek	658								
Dickason Avenue Turtle Creek Boulevard Sale Street		1,193	0.13	A/B	Lincoln Katy Trail	0	1,229	0.13	A/B	70.0%	1,436	2,665	0.28	A/B
Volume Limit 2 Lanes = 9,500					2727 Turtle Creek	0								

Roadway Link		2026 Background					2026 Site-Generated		2026 Background+Site				
From	To	Volume	Daily Volume	Volume	V/C Ratio	LOS	Assignment	Daily Volume	Volume	V/C Ratio	LOS		
Turtle Creek Boulevard/Cedar Springs Road Bowen Street Routh Street				Lincoln Katy Trail	448	20,678	0.42	A/B	45.0%	923	21,601	0.44	A/B
Volume Limit 6 Lanes = 49,500				2727 Turtle Creek	987								
Gillespie Street Sale Street Turtle Creek Boulevard				Lincoln Katy Trail	0	2,621	0.28	A/B	10.0%	205	2,826	0.30	A/B
Volume Limit 2 Lanes = 9,500				2727 Turtle Creek	329								
Sale Street Dickason Avenue Gillespie Street				Lincoln Katy Trail	0	1,438	0.15	A/B	10.0%	205	1,643	0.17	A/B
Volume Limit 2 Lanes = 9,500				2727 Turtle Creek	658								
Dickason Avenue Turtle Creek Boulevard Sale Street				Lincoln Katy Trail	0	1,290	0.14	A/B	70.0%	1,436	2,726	0.29	A/B
Volume Limit 2 Lanes = 9,500				2727 Turtle Creek	0								

Volume Limit Based on NCTCOG DFWRM Hourly Capacity Per Lane

V. CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, the proposed 2999 Turtle Creek Boulevard mixed-use development, located northwest of Turtle Creek Boulevard between Gillespie Street and Dickason Avenue in Dallas, Texas, can be successfully incorporated into the surrounding roadway network. The proposed site driveways provide the appropriate level of access for the development. The site-generated traffic does not have a disproportionate effect on the existing vehicle traffic operations. No improvements to the external roadway network are required for the site.

APPENDIX A

A. Roadway Characteristics

The following signalized intersections were evaluated as part of this study:

- Turtle Creek Boulevard at Cedar Springs Road
- Turtle Creek Boulevard at Cedar Springs Road / Bowen Street

The following unsignalized intersections were evaluated as part of this study:

- Sale Street at Gillespie Street
- Turtle Creek Boulevard at Gillespie Street
- Sale Street at Dickason Avenue
- Turtle Creek Boulevard at Dickason Avenue
- Sale Street at Cedar Springs Road

The major study area roadways are described below.

Turtle Creek Boulevard – is generally, west of Cedar Springs Road, a wide two-lane, undivided road that runs northeast-southwest along Turtle Creek in the vicinity of the project. Turtle Creek Boulevard intersects Cedar Springs Road twice, and there is a stretch of approximately 750' where the two roads merge. To the northeast of the merge point, Turtle Creek Boulevard is a six-lane, divided road that runs north-south from the intersection to the Park Cities. In the project vicinity, Turtle Creek Boulevard has intersections with Gillespie Street, Cedar Springs Road, Dickason Avenue, Cedar Springs/Bowen Street, and other commercial driveways. On the City of Dallas Thoroughfare Plan, the segment of Turtle Creek Boulevard west of Cedar Springs Road is not classified, and the northeastern segment is classified as a Minor Arterial. The speed limit near the site is 30 mph.

Cedar Springs Road – is a six-lane, divided road that runs north-south from the uptown area to the intersection at Bowen Street, where it turns to run northwest towards Love Field Airport. In the project vicinity, Cedar Springs Road has an intersection Turtle Creek Boulevard, Dickason Avenue, and Bowen street, and passes under the Katy Trail. On the City of Dallas Thoroughfare Plan, Cedar Springs Road is designated as a minor arterial. The speed limit near the site is be 30 mph.

Gillespie Street – is a two-lane, undivided road that runs southeast-northwest from Turtle Creek Boulevard to Oak Lawn Avenue, where it terminates. In the project vicinity, Gillespie Street has intersections with Turtle Creek Boulevard and Sale Street. On the City of Dallas Thoroughfare Plan, Gillespie Street is not classified. The speed limit near the site is assumed to be 30 mph. Parking is allowed only in specific areas of Gillespie Street, and these areas are widened intentionally for parking.

Sale Street – is a two-lane, undivided road that runs northeast-southwest. Sale Street has intersections with Gillespie Street, Dickason Avenue, and Cedar Springs Road, among other local streets and residential driveways. On the City of Dallas Thoroughfare Plan, Sale Street is not classified. The speed limit near the site is assumed to be 30 mph. Parking is specifically prohibited on the southern side of the roadway. At the intersection of Sale Street and Gillespie Street, parking is prohibited on both sides of Sale Street.

Dickason Avenue – is a two-lane, undivided road that runs northwest-southeast. Dickason Avenue has intersections with Sale Street, and Cedar Springs Road/Turtle Creek Boulevard, among other local streets and residential driveways. On the City of Dallas Thoroughfare Plan, Dickason Avenue is not classified. The speed limit near the site is assumed to be 30 mph. Parking is allowed only in specific areas of Dickason Avenue, and these areas are widened intentionally for parking.

The southbound Dickason Avenue approach to Turtle Creek Boulevard also benefits from the sight lines present at the intersection. The curvature of Turtle Creek Boulevard works in the favor of the approach, and the downhill slope of Dickason Avenue toward Turtle Creek Boulevard provides the users an elevated position and helps them to see the traffic more clearly.

Exhibit 3 illustrates the existing intersection geometry used for the traffic analysis.

APPENDIX B

A. Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). **Table 7** shows the definition of level of service for signalized and unsignalized intersections.

Table 7 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Definitions provided from the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. For the unsignalized analysis, the level of service (LOS) for a two-way stop-controlled intersection is defined for each movement. Unlike signalized intersections which define LOS for each approach and for the intersection as a whole, LOS for two-way stop-controlled intersections is not defined as a whole.

Signal timings for the signalized intersections are based off of Dallas “As Fine-Tuned” Synchro files. Timing adjustments were made in the future scenarios to accommodate changes in traffic volumes due to background growth and site traffic, replicating how City staff will periodically review signal operations in the future.

Calculations for the level of service at the key intersections identified for study are provided in **Volume 2** of this report. The analyses assumed the lane geometry and intersection control shown in **Exhibit 3**.

The peak hour factors (PHF) for the existing traffic is known from the counts collected at the site or for the City’s signal timing efforts. PHF for the future traffic and the site-generated traffic is unknown, so where this occurred the PHF was assumed to be 0.92. The traffic does not grow the most in the peak 15-minute period but rather spreads out to fill the entire peak hour, so as traffic increases, the PHF approaches 1.