

 **Volume 1 – Traffic Impact Analysis**  
**Z189-153**

**Manderville Lane Development**  
Dallas, Texas

November 7, 2019

Kimley-Horn and Associates, Inc.  
Dallas, Texas

Project #064537400  
Registered Firm F-928

**Kimley»»Horn**

**Traffic Impact Analysis**

**Manderville Lane Development  
Dallas, Texas**

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## EXECUTIVE SUMMARY

The proposed Manderville Lane Development is located at 7777 Manderville Lane between Meadow Road and Walnut Hill Lane in Dallas, Texas. The site is located only 750 feet north of the Walnut Hill DART Station. As studied in the November 16, 2018 TIA by Kimley-Horn, the site was originally proposed to be built with 466 multifamily residences. In accordance with City of Dallas requests, this report will examine the densest traffic scenario using a maximum allowable 1.6 FAR under the proposed PD conditions. This calculates to 445,776 SF of office uses on the 6.396-acre site. 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 development will be referred to as simply the Manderville Lane Development.

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

- Greenville Avenue at Meadow Road
- Rambler Road at Meadow Road
- Manderville Lane at Meadow Road
- Glen Lakes Drive at Walnut Hill Lane
- Manderville Lane at Blair Road
- Manderville Lane at Walnut Hill Lane

The analysis also included the following driveways having access in and out of the site. More driveways may indeed be included in the final site plan, but the addition of more driveways will only further distribute site traffic and reduce the traffic at any particular driveway, leading to lower delays.

- Drive 1, which represents a full-access driveway to Manderville Lane for the northern portion of the site.
- Drive 2, which represents a full-access driveway to Manderville Lane for the southern portion of the site.
- Drive 3, which is a full-access driveway to the alley named Meadow Park Drive. For a conservative analysis, no traffic was assigned to Drive 3.

Traffic operations were analyzed at the study intersections for existing volumes, 2020 and 2025 background traffic volumes, and 2020 and 2025 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.

After a limited reduction for transit usage, the maximum allowable zoning of the Manderville Lane Development is expected to generate approximately 401 new weekday AM peak hour one-way vehicle trips and 424 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 maximum allowable zoning of the proposed Manderville Lane 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 for the maximum allowable zoning does not have a disproportionate effect on the existing vehicle traffic operations, or any effect on the operations of McShan Elementary. 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 Manderville Lane Development located at 7777 Manderville Lane between Meadow Road and Walnut Hill Lane in Dallas, Texas. 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.

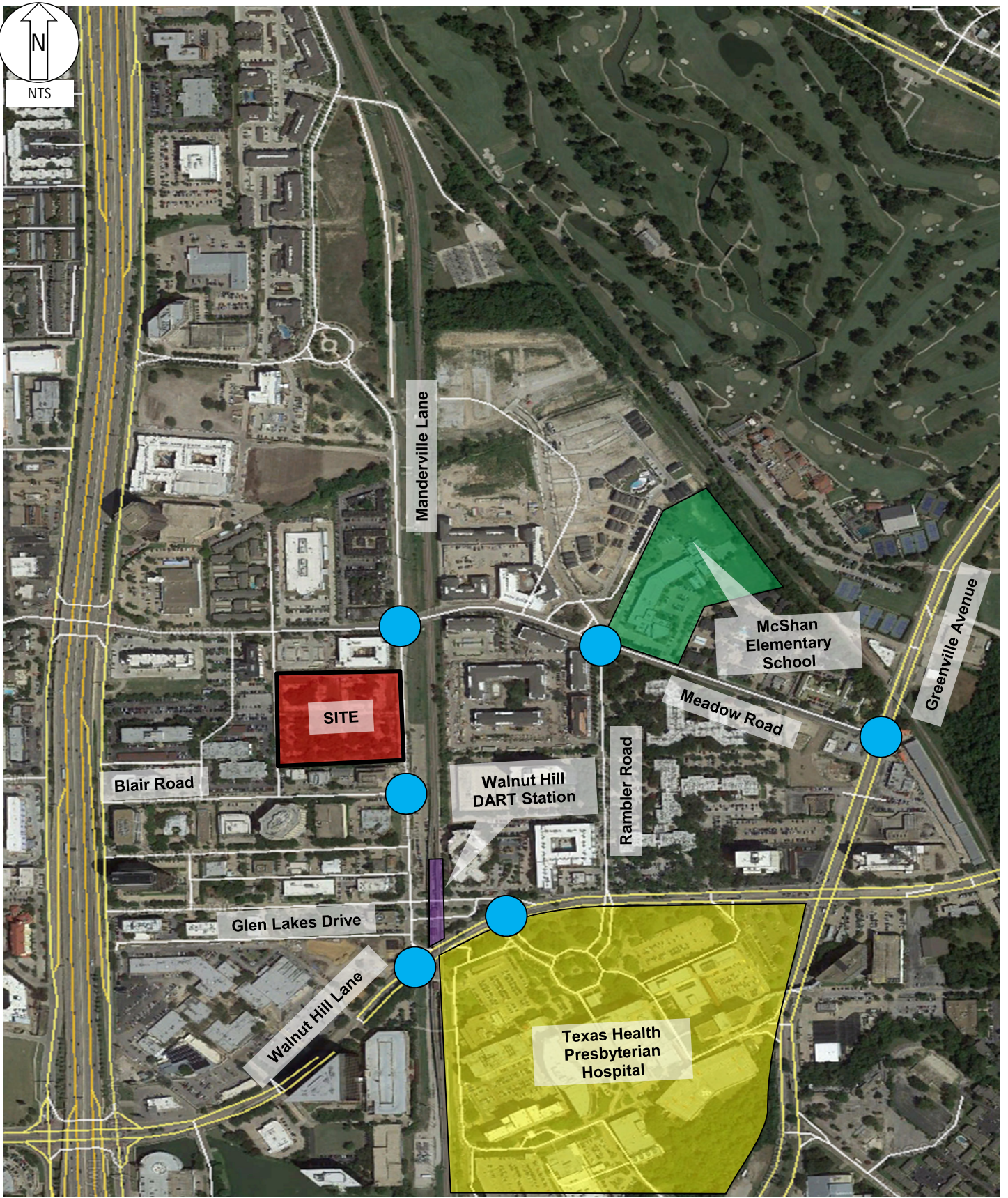
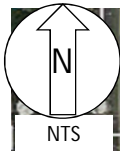
### B. Methodology

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

- 2018 existing traffic
- 2020 background traffic
- 2020 background plus site traffic
- 2025 background traffic
- 2025 background plus site traffic

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





**Kimley»Horn**

Manderville Lane  
Apartments TIA  
Dallas, Texas  
11/16/2018

**Vicinity Map**

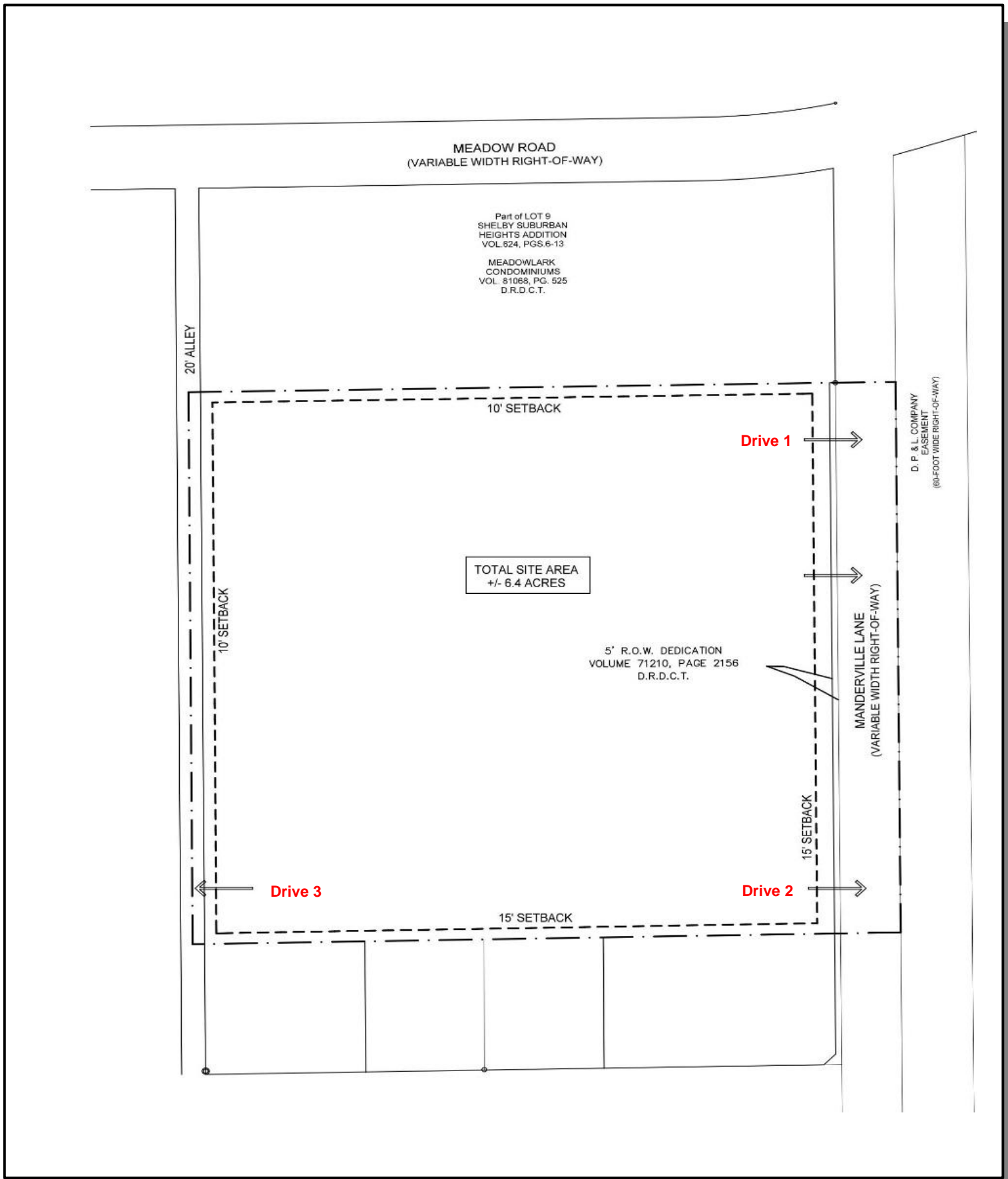
Legend



= Study Intersection

**Exhibit  
1**





Manderville Lane  
Apartments TIA  
Dallas, Texas  
11/16/2018

**Conceptual Site Plan**

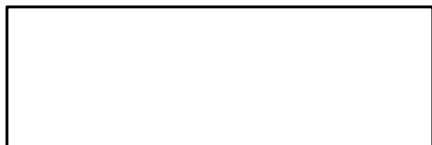


Exhibit  
**2**



## II. EXISTING AND FUTURE AREA CONDITIONS

### A. Roadway Characteristics

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

- Greenville Avenue at Meadow Road
- Rambler Road at Meadow Road
- Manderville Lane at Meadow Road
- Glen Lakes Drive at Walnut Hill Lane

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

- Manderville Lane at Blair Road
- Manderville Lane at Walnut Hill Lane

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 zoned MF-2(A). The property is currently undeveloped.

### C. Proposed Site Improvements

The development as proposed includes 466 multifamily housing units. However, per City of Dallas requests, this report will use the maximum allowable zoning. With a 1.6 FAR for the 6.396-acre site, this calculates to 445,776 SF office.

The site has three proposed driveways, two of which are shown in **Exhibit 3**. More driveways may indeed be included in the final site plan, but the addition of more driveways will only further distribute site traffic and reduce the traffic at any particular driveway, leading to lower delays. The driveways to be modeled in this analysis are as follows:

**Drive 1** – represents a full-access driveway to Manderville Lane for the northern portion of the site. The driveway was modeled with one inbound and one outbound lane.

**Drive 2** – represents a full-access driveway to Manderville Lane for the southern portion of the site. The driveway was modeled with one inbound and one outbound lane.

**Drive 3** – would be a full-access driveway to Meadow Park Drive located approximately 150 feet north of Blair Road. Meadow Park Drive is a narrow alleyway west of Manderville Lane, between Meadow Road and Blair Road. The alleyway is not wide enough to efficiently handle two-way traffic, it is shared with other developments, and using the alleyway does not provide a significant advantage over Manderville Lane. Therefore, no

site traffic was assigned via Drive 3, and it was not modeled. This causes Drives 1 and 2 to handle more of the site traffic, which is a conservative assumption and will lead to more conservative recommendations for these driveways.

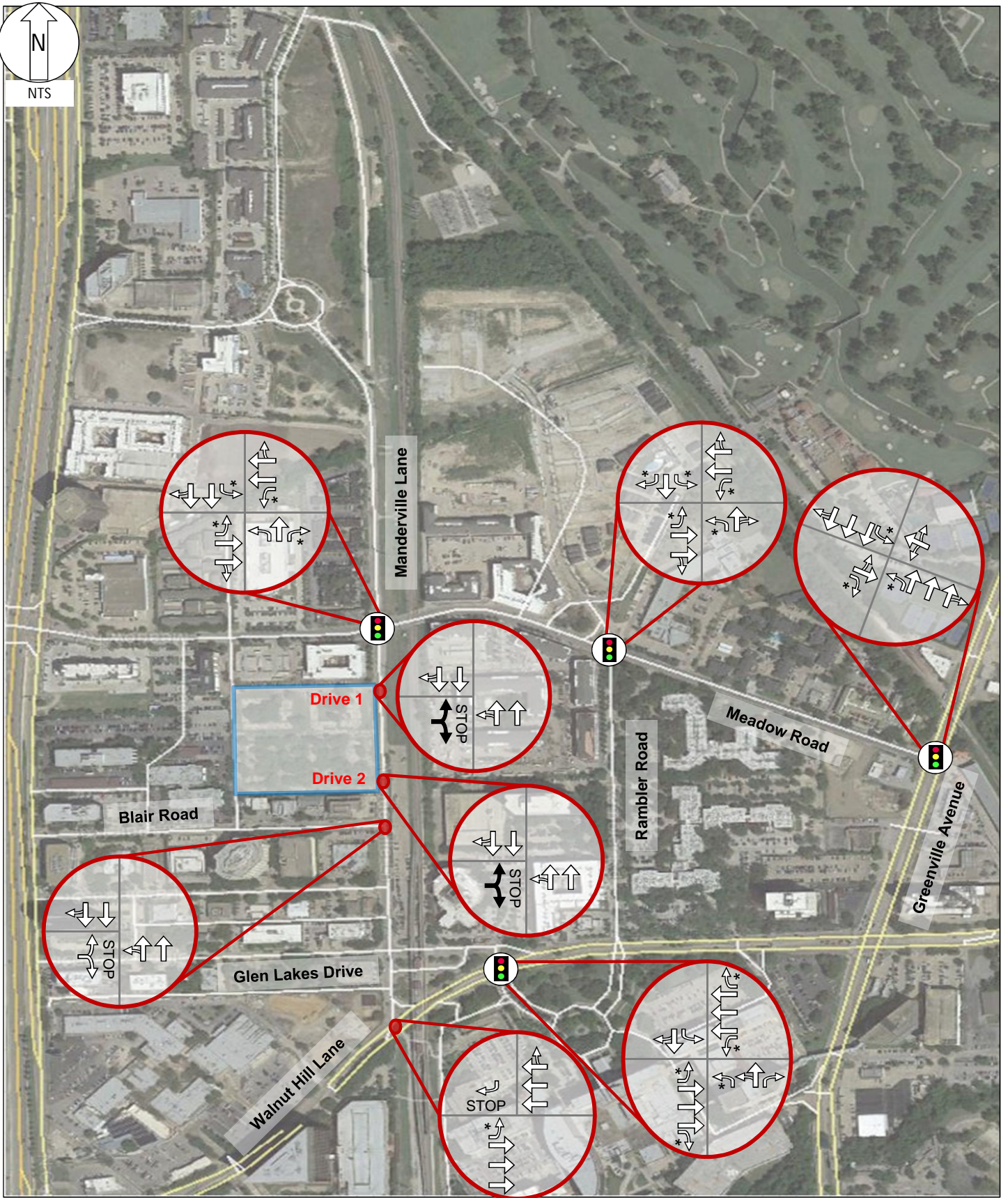
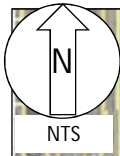
Intersection sight distance at the proposed driveways is acceptable, with each on relatively flat and straight segments of their respective roadway.

#### **D. Existing Traffic Volumes**

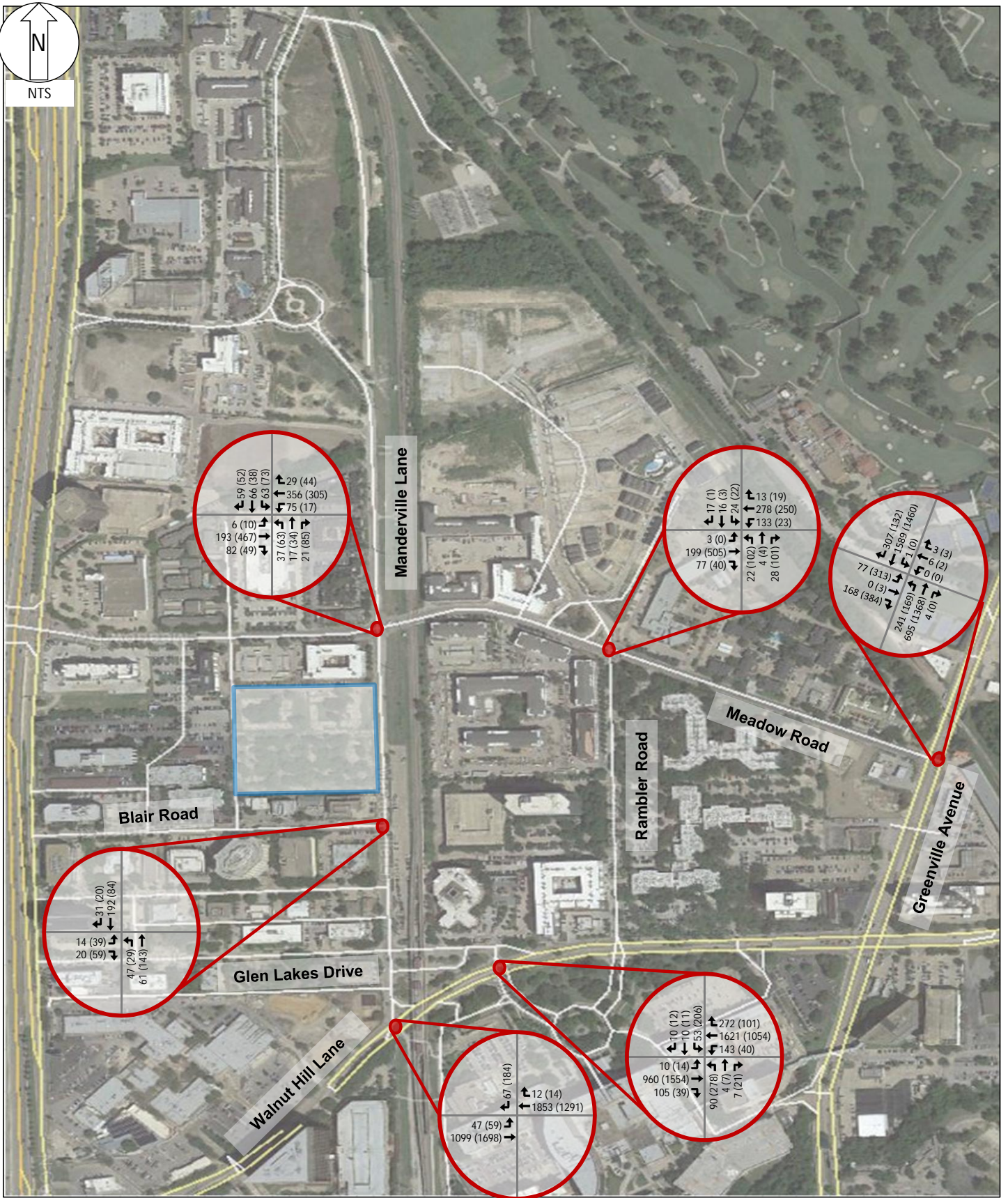
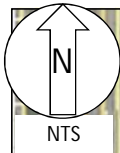
24-hour machine counts were collected near the site on Manderville Lane, Meadow Road, and Blair Road. **Exhibit 4** shows the existing weekday AM and PM peak hour traffic volumes. The raw count sheets, as well as a comparison between the 24-hour volumes collected and previous 24-hour counts, are provided in **Volume 2** of this report.

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

- Manderville Lane: 2,964 vehicles per day (vpd)
- Meadow Road: 8,381 vpd
- Blair Road: 1,141 vpd







### 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 10<sup>th</sup> 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.

The Walnut Hill DART station is located only 750 feet south of the development. The station includes access to DART busses and to the Red and Orange DART rail lines. Therefore, a 10% multimodal trip reduction was applied to the external trips. A greater reduction would still be considered reasonable, but 10% was chosen to be conservative.

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

**Table 1** shows the resulting daily and weekday AM and PM peak hour trip generation for the maximum allowable zoning 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
<b>General Office Building</b>	445,776	SF	710	4,523	384	62	446	75	396	471
<b>Development Totals</b>										
<b>Raw Trip Generation Total:</b>				4,523	384	62	446	75	396	471
<b>10% Multimodal Reduction</b>				452	38	6	45	8	40	47
<b>Total Net New External Vehicle Trips:</b>				<b>4,071</b>	<b>346</b>	<b>56</b>	<b>401</b>	<b>68</b>	<b>356</b>	<b>424</b>

Trip Generation rates based on ITE's *Trip Generation Manual*, 10<sup>th</sup> Edition.



**B. 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.

**C. Development of 2020 Background Traffic**

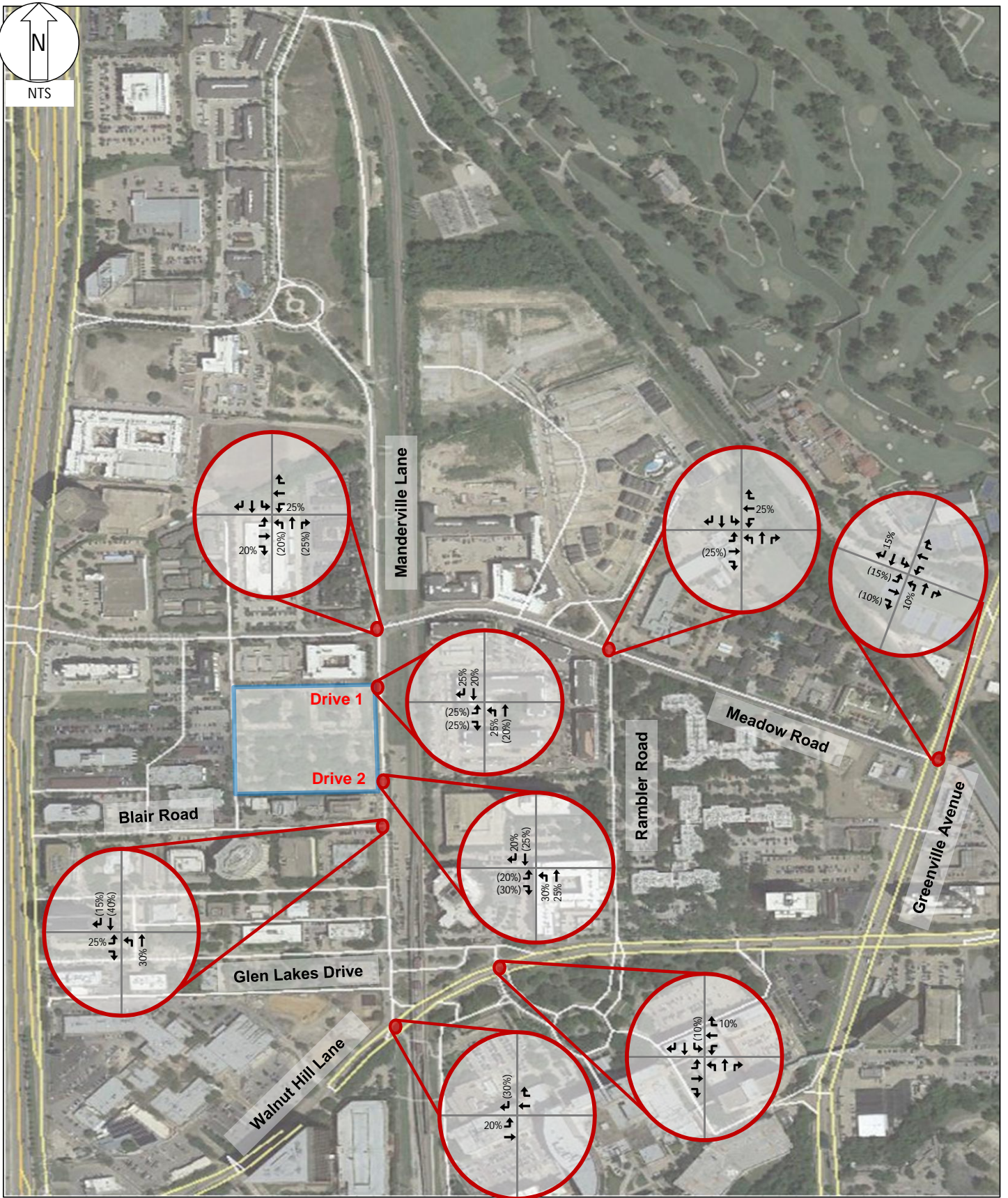
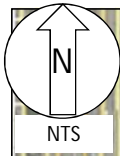
To obtain 2020 background traffic, the existing traffic counts and historic counts near the site were compared to find expected growth trends within the study area. Based on the recent growth in the area, an annual growth rate of 1% was assumed for the background traffic through 2020. To calculate the 2020 background traffic, the existing 2018 traffic counts were grown by 1% annually for two years. The resulting 2020 background weekday AM and PM peak hour traffic volumes are shown in **Exhibit 7**.

**D. Development of 2020 Total Traffic**

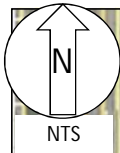
Site traffic volumes were added to the background volumes to represent the estimated total (background plus site-generated) traffic conditions for the 2020 study year after completion of the proposed development. **Exhibit 8** shows the resulting 2020 weekday AM and PM peak hour total traffic volumes.

**E. Development of 2025 Background and Total Traffic**

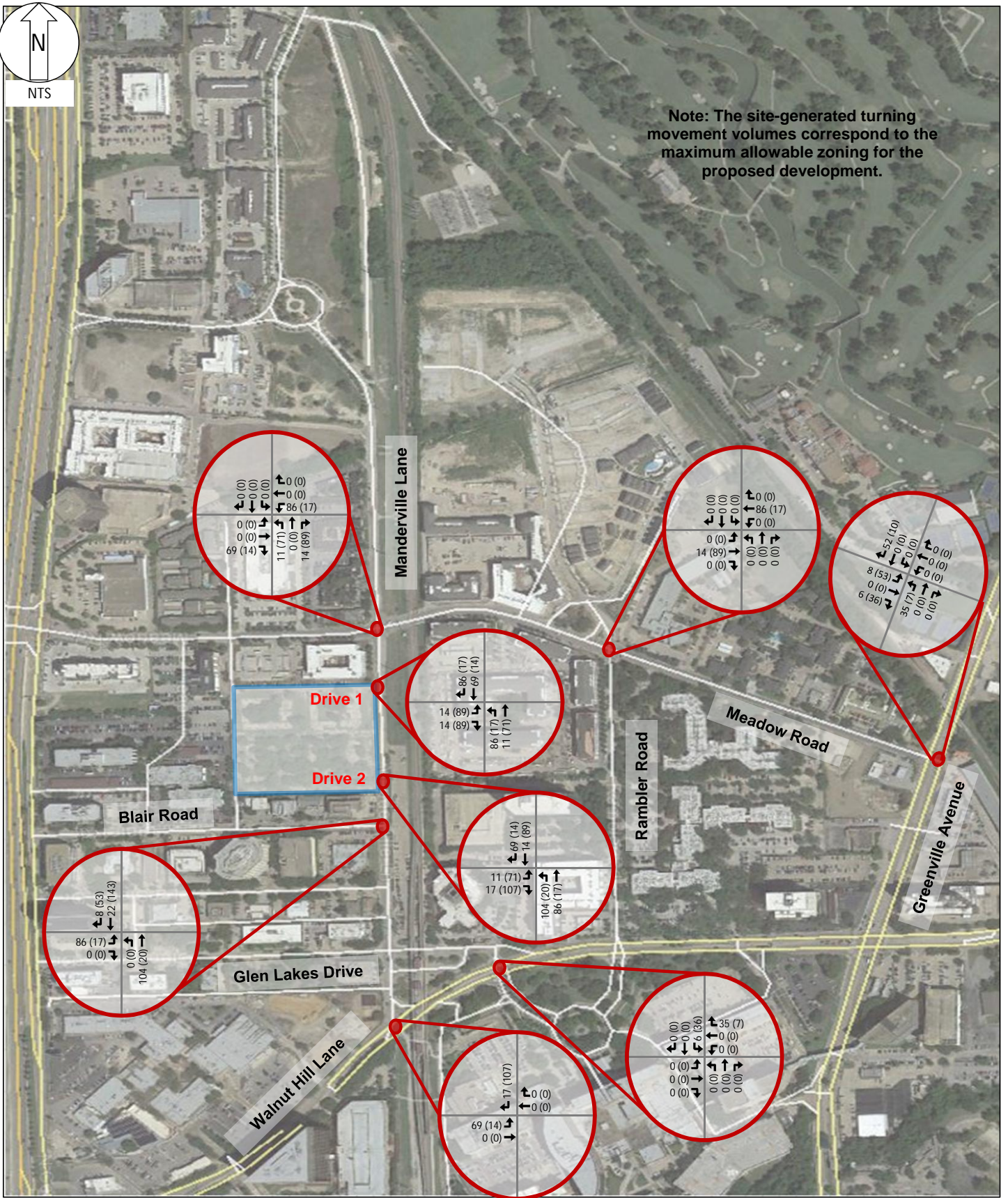
The background and total traffic volumes in the 2025 study year were calculated in a similar manner to the 2020 traffic volumes by adding five years of 1% growth over the 2020 background volumes. The background development traffic was then added into the traffic volumes. **Exhibit 9** shows the resulting 2025 weekday AM and PM peak hour background traffic volumes, and **Exhibit 10** shows the resulting 2025 weekday AM and PM peak hour total traffic volumes after the addition of the site-generated traffic.



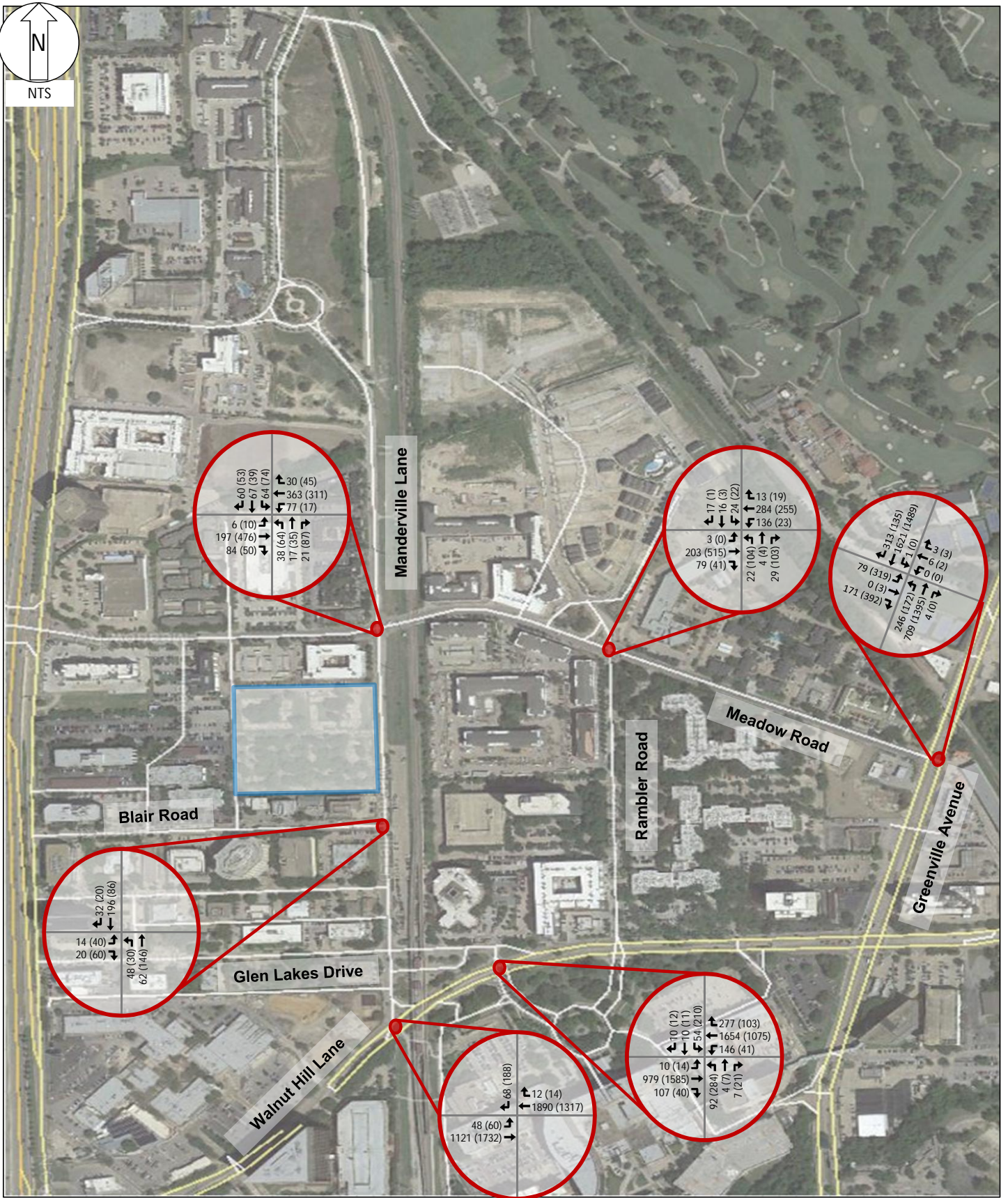
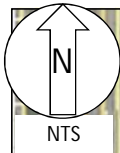




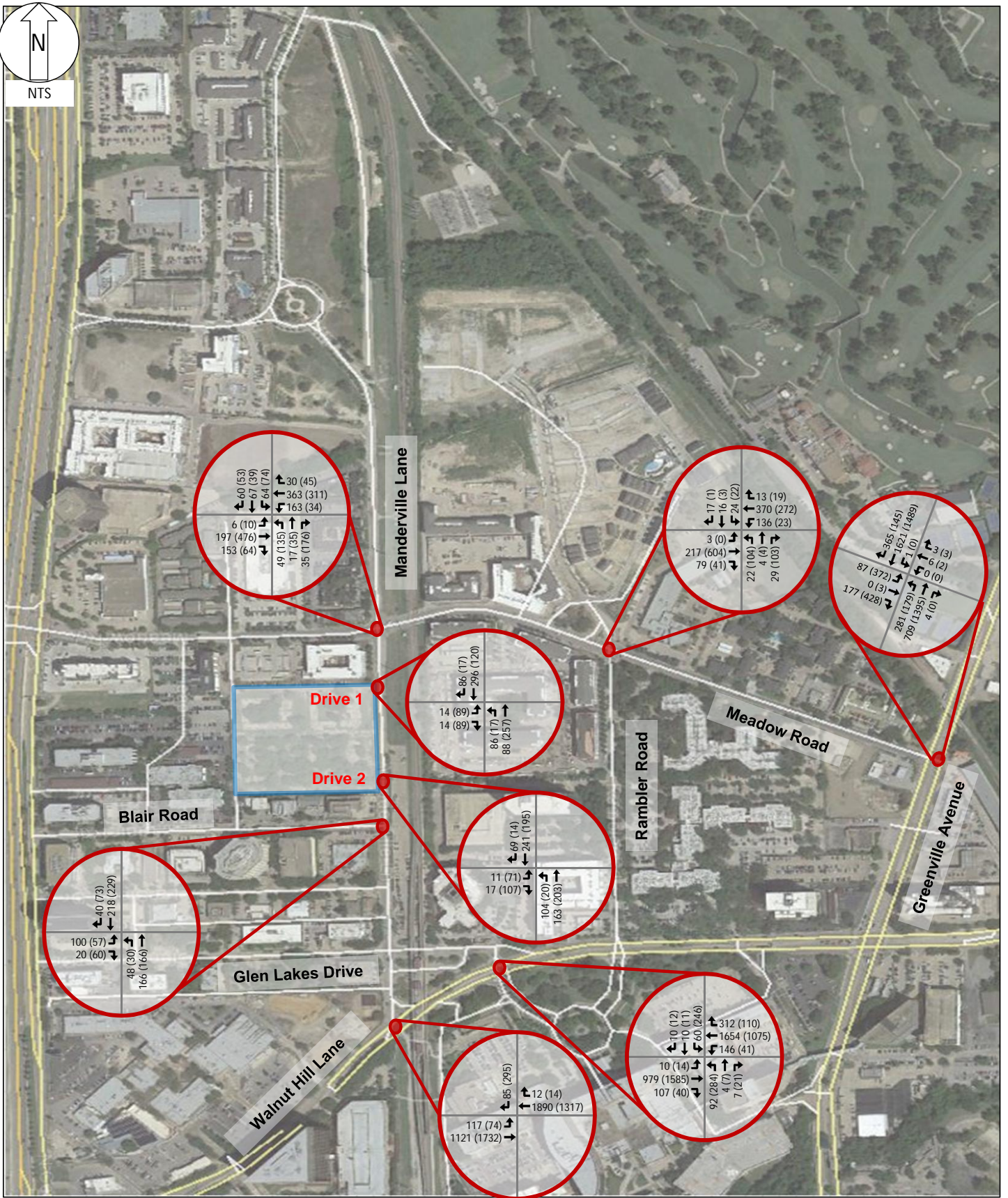
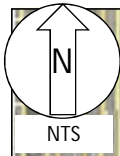
Note: The site-generated turning movement volumes correspond to the maximum allowable zoning for the proposed development.



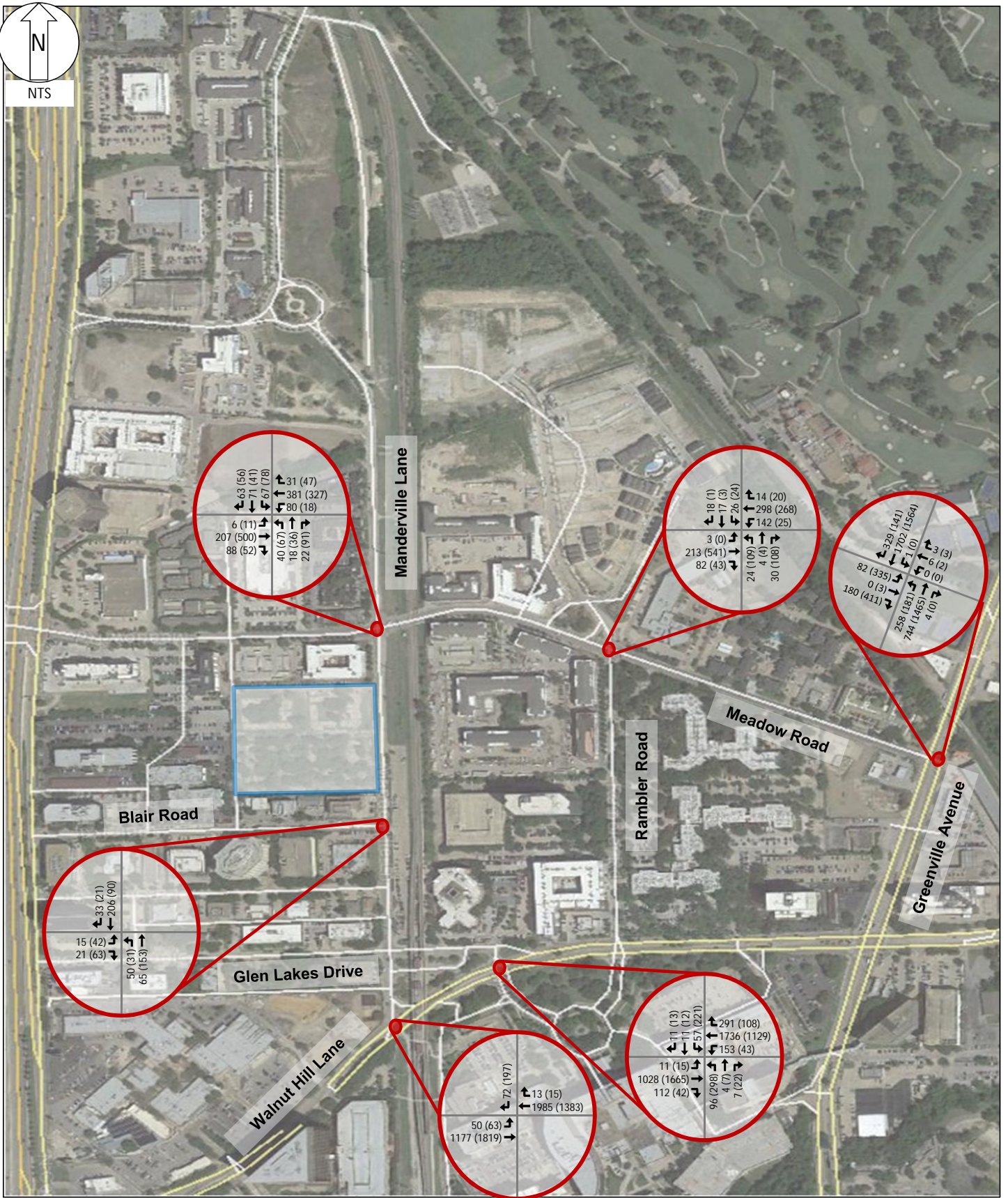
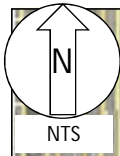




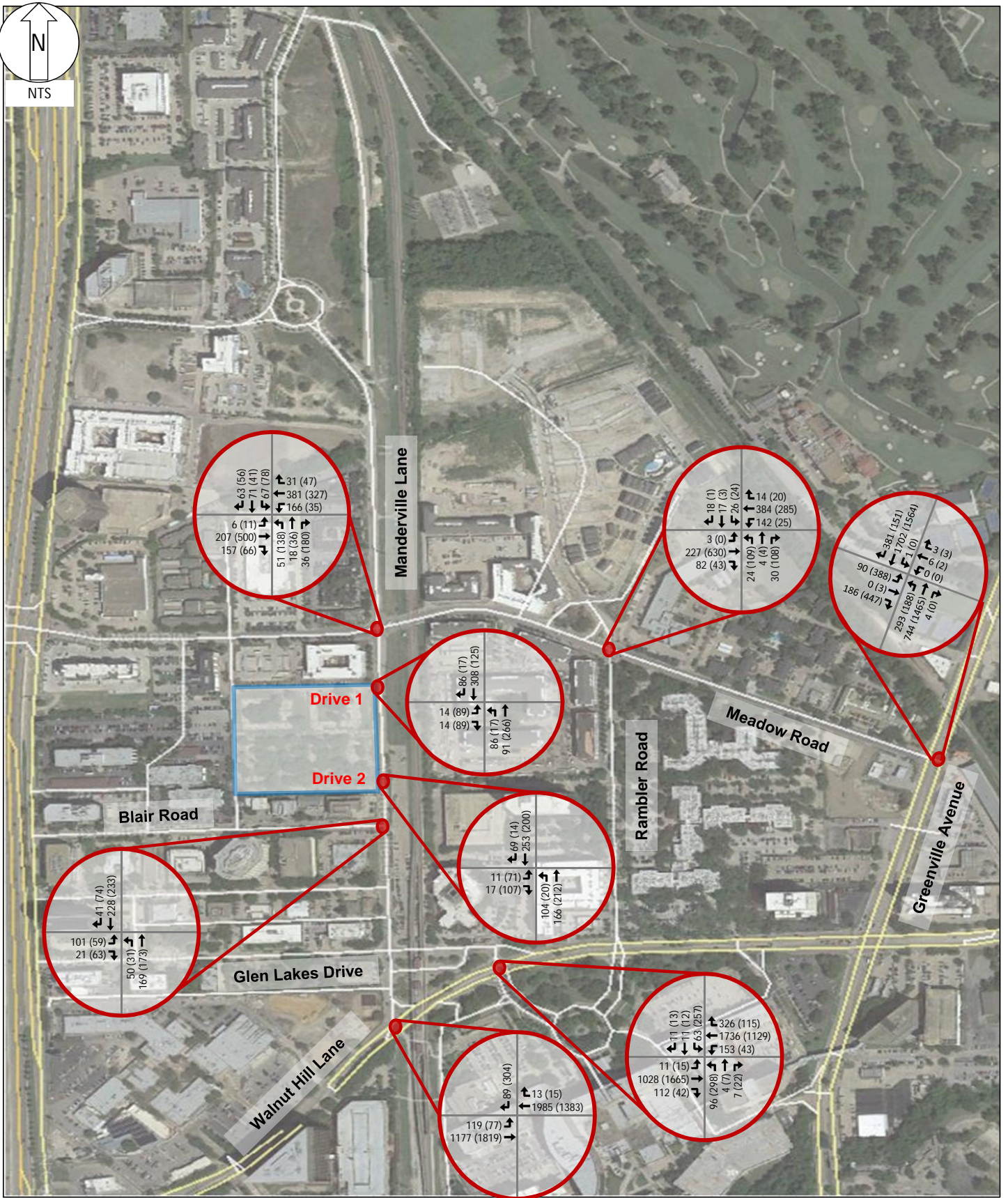
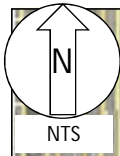












## IV. TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn conducted a traffic operations analysis to determine potential capacity deficiencies in the 2018, 2020 and 2025 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 taken from Dallas signal timing 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 2** and **Table 3** show the intersection operational results for the weekday AM and PM peak hours, respectively.

**Table 2 – Traffic Operational Results – Weekday AM Peak Hour**

INTERSECTION	APPROACH	2018 Background Traffic		2020 Background Traffic		2020 Background plus Site Traffic		2025 Background Traffic		2025 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
Greenville Avenue @ Meadow Road	EB	33.2	C	33.4	C	34.9	C	34.1	C	36.5	D
	WB	40.3	D	40.2	D	39.9	D	40.1	D	39.8	D
	NB	19.4	B	20.9	C	33.2	C	26.4	C	39.6	D
	SB	13.6	B	13.9	B	14.5	B	14.7	B	15.3	B
	<b>Overall</b>	<b>17.0</b>	<b>B</b>	<b>17.7</b>	<b>B</b>	<b>21.9</b>	<b>C</b>	<b>19.9</b>	<b>B</b>	<b>24.5</b>	<b>C</b>
Rambler Road @ Meadow Road	EB	2.8	A	2.8	A	2.8	A	2.8	A	2.9	A
	WB	4.0	A	4.1	A	4.1	A	4.2	A	4.2	A
	NB	26.3	C	25.8	C	25.8	C	26.0	C	26.0	C
	SB	22.3	C	22.3	C	22.3	C	21.9	C	21.9	C
	<b>Overall</b>	<b>6.3</b>	<b>A</b>	<b>6.3</b>	<b>A</b>	<b>6.1</b>	<b>A</b>	<b>6.4</b>	<b>A</b>	<b>6.2</b>	<b>A</b>
Manderville Lane @ Meadow Road	EB	15.2	B	15.4	B	12.8	B	15.7	B	13.0	B
	WB	20.8	C	20.9	C	20.1	C	21.2	C	20.4	C
	NB	12.4	B	12.5	B	11.2	B	12.7	B	11.4	B
	SB	14.3	B	14.3	B	14.3	B	14.3	B	14.3	B
	<b>Overall</b>	<b>17.4</b>	<b>B</b>	<b>17.5</b>	<b>B</b>	<b>16.3</b>	<b>B</b>	<b>17.8</b>	<b>B</b>	<b>16.5</b>	<b>B</b>
Glen Lakes Drive @ Walnut Hill Lane	EB	28.2	C	27.6	C	27.7	C	26.2	C	26.4	C
	WB	4.6	A	4.7	A	4.7	A	5.5	A	5.5	A
	NB	56.1	E	56.4	E	55.6	E	57.0	E	56.1	E
	SB	52.6	D	52.9	D	54.3	D	53.2	D	54.5	D
	<b>Overall</b>	<b>15.0</b>	<b>B</b>	<b>14.9</b>	<b>B</b>	<b>14.9</b>	<b>B</b>	<b>14.9</b>	<b>B</b>	<b>15.0</b>	<b>B</b>
Manderville Lane @ Drive 1	NBL	-	-	-	-	8.4	A	-	-	8.5	A
	EB*	-	-	-	-	12.2	B	-	-	12.4	B
Manderville Lane @ Drive 2	NBL	-	-	-	-	8.3	A	-	-	8.3	A
	EB*	-	-	-	-	11.7	B	-	-	11.8	B
Manderville Lane @ Blair Road	NBL	7.8	A	7.9	A	7.9	A	7.9	A	8.0	A
	EB*	10.1	B	10.2	B	13.6	B	10.3	B	13.9	B
Walnut Hill Lane @ Manderville Lane	EBL	11.6	B	11.6	B	12.6	B	11.9	B	13.1	B
	SB*	13.9	B	13.9	B	14.4	B	14.5	B	15.0	B

\* Stop-Controlled Approach  
 - No movements in Time Period

Signalized	Unsignalized
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**Table 3 – Traffic Operational Results – Weekday PM Peak Hour**

INTERSECTION	APPROACH	2018 Background Traffic		2020 Background Traffic		2020 Background plus Site Traffic		2025 Background Traffic		2025 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
Greenville Avenue @ Meadow Road	EB	38.8	D	38.9	D	42.9	D	39.8	D	46.6	D
	WB	24.0	C	23.8	C	23.4	C	23.6	C	23.4	C
	NB	6.0	A	6.1	A	6.6	A	6.4	A	7.9	A
	SB	41.9	D	43.5	D	51.4	D	48.8	D	52.1	D
	<b>Overall</b>	<b>26.9</b>	<b>C</b>	<b>27.6</b>	<b>C</b>	<b>32.1</b>	<b>C</b>	<b>30.1</b>	<b>C</b>	<b>33.4</b>	<b>C</b>
Rambler Road @ Meadow Road	EB	6.1	A	6.2	A	6.4	A	6.4	A	6.7	A
	WB	5.8	A	5.9	A	6.0	A	6.1	A	6.1	A
	NB	27.9	C	27.8	C	27.8	C	27.9	C	27.9	C
	SB	24.8	C	24.7	C	24.7	C	24.8	C	24.8	C
	<b>Overall</b>	<b>10.7</b>	<b>B</b>	<b>10.7</b>	<b>B</b>	<b>10.5</b>	<b>B</b>	<b>10.9</b>	<b>B</b>	<b>10.7</b>	<b>B</b>
Manderville Lane @ Meadow Road	EB	24.6	C	24.8	C	24.9	C	25.3	C	25.5	C
	WB	21.0	C	21.1	C	20.7	C	21.4	C	21.0	C
	NB	10.2	B	10.3	B	12.6	B	10.5	B	12.6	B
	SB	13.7	B	13.7	B	13.7	B	13.7	B	13.7	B
	<b>Overall</b>	<b>20.0</b>	<b>B</b>	<b>20.1</b>	<b>C</b>	<b>19.5</b>	<b>B</b>	<b>20.5</b>	<b>C</b>	<b>19.9</b>	<b>B</b>
Glen Lakes Drive @ Walnut Hill Lane	EB	21.0	C	20.9	C	22.0	C	21.0	C	21.2	C
	WB	18.1	B	18.1	B	18.6	B	18.3	B	18.4	B
	NB	74.0	E	74.9	E	78.4	E	76.5	E	76.5	E
	SB	49.1	D	51.6	D	54.1	D	58.0	E	69.6	E
	<b>Overall</b>	<b>26.8</b>	<b>C</b>	<b>26.9</b>	<b>C</b>	<b>28.4</b>	<b>C</b>	<b>27.7</b>	<b>C</b>	<b>29.0</b>	<b>C</b>
Manderville Lane @ Drive 1	NBL	-	-	-	-	7.6	A	-	-	7.6	A
	EB*	-	-	-	-	9.7	A	-	-	11.3	B
Manderville Lane @ Drive 2	NBL	-	-	-	-	7.6	A	-	-	7.7	A
	EB*	-	-	-	-	9.9	A	-	-	11.5	B
Manderville Lane @ Blair Road	NBL	7.5	A	7.5	A	7.6	A	7.5	A	8.0	A
	EB*	9.8	A	9.8	A	11.0	B	9.9	A	12.0	B
Walnut Hill Lane @ Manderville Lane	EBL	10.0	B	10.2	B	10.3	B	10.2	B	10.3	B
	SB*	13.5	B	14.0	B	14.8	B	14.2	B	17.9	C

\* 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. Each signalized intersection operates at LOS C or better during both peak hours, functioning very favorably from a vehicular perspective. There is coordination along Walnut Hill Lane and Greenville Avenue, so the major street approaches for the intersections along those roads operate with lower delay than if they were uncoordinated.

The Glen Lakes Drive approaches to its intersection with Walnut Hill Lane operate at LOS D and E during both peak hours. These delays are not due to a lack of capacity but rather to the coordination along Walnut Hill Lane. Coordination through an area typically adds delay to the side streets to remove delay to the prioritized main street. Furthermore, Walnut Hill Lane has a series of closely spaced signalized intersections near Glen Lakes Drive, which make the coordination more difficult and add some additional delay to Glen Lakes Drive. Glen Lakes Drive can make its movements every cycle and is not over capacity.

Of the unsignalized study intersection approaches, all the approaches operate at LOS B or better during both the AM and PM peaks, which is very favorable.

**D. 2020 Background Traffic Operations**

The signalized study intersections generally experience more delay with three years of background growth added to the network. The only change in level of service occurs during the PM peak hour when the intersection of Manderville Lane with Meadow Road changes from LOS B to C. After the background growth, all the signalized intersections continue to operate favorably at LOS C or better.

The unsignalized intersections experience additional delays at the study approaches. All approaches operate favorably at LOS B or better after the background traffic growth is added to the street network.

**E. 2020 Background Plus Site-Generated Traffic Operations**

The addition of the site-generated traffic to the 2020 background traffic results in some additional delay 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 semi-urban setting near a major US highway.

The intersection of Meadow Road and Rambler Road, which provides access to McShan Elementary School, does not experience any increases in level of service due to the Manderville Lane Development traffic in either peak hour. Each approach continues to operate with similar levels of delay experienced currently.

The unsignalized intersections also experience some additional delay after the site-generated traffic is dispersed about the roadway network. All the unsignalized approaches operate at LOS B or better during both peak hours, which is excellent.

The site driveway approaches operate at LOS B or better during both peaks. The Manderville Lane existing volumes are moderate, so the turning movements are very easy to make into and out of the site.

#### **F. 2025 Background Traffic Operations**

The analysis of the 2025 Background Traffic operations shows 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 due to the growth in background traffic.

#### **G. 2025 Background Plus Site-Generated Traffic Operations**

The addition of the site-generated traffic to the 2025 background traffic results in some additional delay at the signalized study intersections, with one change in level of service for the intersections overall. The intersection of Greenville Lane with Meadow Road changes from LOS B to C during the AM peak hour. Each signalized intersection operates favorably at LOS C or better overall after the addition of site-generated traffic at buildout.

The intersection of Meadow Road and Rambler Road, which is an access point for McShan Elementary School, experiences no increases in level of service due to the Manderville Lane Development traffic in either peak hour. Each approach continues to operate with similar levels of delay currently experienced.

With site traffic, the unsignalized intersections experience additional delays at the study approaches, and there is one change in level of service. The southbound approach of Manderville Lane to Walnut Hill Lane changes from LOS B to C during the AM peak hour. All unsignalized approaches operate at LOS C or better during both peak hours during the 2025 study year.

The site driveways operate at LOS B or better after the Manderville Lane Development traffic is 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, 2020 background and background plus site traffic, and 2025 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. Meadow Road, Manderville Lane, and Blair Road, as undivided collector or local streets, each has a capacity of 475 vehicles per lane per hour (vphpl).

The link analyses, displayed below in **Table 4**, show that Manderville Lane currently operates with ample capacity at LOS A/B with current traffic volumes and continues to do so in the 2020 and 2025 background scenarios. After the site traffic is added, the road changes from LOS A/B to LOS C during both 2020 and 2025.

Meadow Road currently operates at LOS A/B and does so in the 2020 background scenario also. After site traffic is added to the 2020 scenario, the roadway changes from LOS A/B to C and remains at LOS C through both 2025 scenarios.

Blair Road also operates at LOS A/B with current traffic and continues to do so during both the 2025 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 4 – Link Operational Results**

Roadway Link		2018 Existing			2020 Background			2020 Site-Generated		2020 Background+Site		
From	To	Volume	V/C Ratio	LOS	Volume	V/C Ratio	LOS	Assignment	Daily Volume	Volume	V/C Ratio	LOS
<b>Manderville Road</b> Meadow Road Walnut Hill Road Volume Limit 2 Lanes = 9,500		2,964	0.31	A/B	3,024	0.32	A/B	62.5%	2,827	5,851	0.62	C
<b>Meadow Road</b> US 75 NBFR Manderville Lane Volume Limit 4 Lanes = 19,000		8,381	0.44	A/B	8,549	0.45	A/B	17.5%	792	9,341	0.49	C
<b>Blair Road</b> US 75 NBFR Manderville Lane Volume Limit 2 Lanes = 9,500		1,141	0.06	A/B	1,164	0.12	A/B	17.5%	792	1,956	0.21	A/B
<b>Roadway Link</b>					2025 Background			2025 Site-Generated		2025 Background+Site		
From	To				Volume	V/C Ratio	LOS	Assignment	Daily Volume	Volume	V/C Ratio	LOS
<b>Manderville Road</b> Meadow Road Walnut Hill Road Volume Limit 2 Lanes = 9,500					3,178	0.33	A/B	62.5%	2,827	6,005	0.63	C
<b>Meadow Road</b> US 75 NBFR Manderville Lane Volume Limit 4 Lanes = 19,000					8,985	0.47	C	17.5%	792	9,777	0.51	C
<b>Blair Road</b> US 75 NBFR Manderville Lane Volume Limit 2 Lanes = 9,500					1,223	0.13	A/B	17.5%	792	2,015	0.21	A/B

Volume Limit Based on NCTCOG DFWRM Hourly Capacity Per Lane

**V. CONCLUSIONS AND RECOMMENDATIONS**

Based on the analysis presented in this report, the proposed Manderville Lane Development located at 7777 Manderville Lane between Meadow Road and Walnut Hill Lane 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 for the maximum allowable zoning does not have a disproportionate effect on the existing vehicle traffic operations, or any effect on the operations of McShan Elementary. 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:

- Greenville Avenue at Meadow Road
- Rambler Road at Meadow Road
- Manderville Lane at Meadow Road
- Glen Lakes Drive at Walnut Hill Lane

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

- Manderville Lane at Blair Road
- Manderville Lane at Walnut Hill Lane

The major study area roadways are described below.

**Manderville Lane** – is a four-lane undivided road that runs north-south from Walnut Hill Lane to Royal Lane. In the project vicinity, Manderville Lane has intersections with Meadow Road, Blair Road, Walnut Hill Lane, other local streets, and various commercial driveways. On the City of Dallas Thoroughfare Plan, Manderville Lane is unclassified. The speed limit near the site is posted at 30 mph.

**Meadow Road** – is a four-lane undivided road that runs east-west from Greenville Avenue into the northern area of Dallas. Between Manderville Lane and Rambler Road, Meadow Road has a two-way left-turn lane, making it a five-lane undivided road. In the project vicinity, Meadow Road has intersections with Manderville Lane, Rambler Road, Greenville Avenue, other local streets, and various commercial driveways. McShan Elementary School also has access to Meadow Road via a site driveway and Rambler Road. On the City of Dallas Thoroughfare Plan, Meadow Road is classified as a Community Collector (M-4-U). The speed limit near the site is posted at 30 mph.

**Rambler Road** – is a three-lane undivided road that runs north-south from Texas Health Presbyterian Hospital to the redeveloping area just north of Meadow Road. In the project vicinity, Rambler Road has intersections with Meadow Road, other local streets, and various commercial driveways while serving as an access point for McShan Elementary School. On the City of Dallas Thoroughfare Plan, Rambler Road is unclassified. The speed limit near the site is assumed to be 30 mph.

**Glen Lakes Drive** – is a two-lane undivided road that runs east-west from the US 75 northbound frontage road to Texas Health Presbyterian Hospital. In the project vicinity, Glen Lakes Drive has intersections with Walnut Hill Lane, other local streets, and various commercial driveways. On the City of Dallas Thoroughfare Plan, Glen Lakes Drive is unclassified. The speed limit near the site is assumed to be 30 mph.



**Blair Road** – is a two-lane undivided road that runs east-west from the US 75 northbound frontage road to Manderville Lane. In the project vicinity, Blair Road has intersections with Manderville Lane, other local streets, and various commercial driveways. On the City of Dallas Thoroughfare Plan, Blair Road is unclassified. The speed limit near the site is assumed to be 30 mph.

**Greenville Avenue** – is a six-lane divided road that runs north-south parallel to US-75 throughout the northeastern part of Dallas. In the project vicinity, Greenville Avenue has intersections with Meadow Road, other local streets, and various commercial driveways. On the City of Dallas Thoroughfare Plan, Greenville Avenue is classified as a Principal Arterial (M-6-D(A)). The speed limit near the site is posted at 40 mph.

**Walnut Hill Lane** – is a six-lane divided road that runs east-west throughout north Dallas. In the project vicinity, Walnut Hill Lane has intersections with Manderville Lane, Glen Lakes Drive, Rambler Road, other local streets, and various commercial driveways. On the City of Dallas Thoroughfare Plan, Walnut Hill Lane is classified as a Principal Arterial (M-6-D(A)). The speed limit near the site is posted at 35 mph.

**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 5** shows the definition of level of service for signalized and unsignalized intersections.

**Table 5 – 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 taken from Dallas signal timing 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 this analysis were assumed to be 0.92. The PHF for the existing traffic is known from the counts collected at the site, but the PHF for the future traffic and the site-generated traffic is unknown. 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.