Volume 1 – Traffic Impact Analysis

Haskell Avenue Mixed-Use Site
Dallas, Texas

November 16, 2018

Kimley-Horn and Associates, Inc.
Dallas, Texas

Project #061295410
Registered Firm F-928

Kimley»Horn

Traffic Impact Analysis

Haskell Avenue Mixed-Use Site
NEC North Central Expressway
And Haskell Avenue
Dallas, Texas

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EXECUTIVE SUMMARY

The proposed Haskell Avenue Mixed-Use site is located at the northeast corner of the intersection of Haskell Avenue and the US 75 northbound frontage road in Dallas, TX. The site is located adjacent to the Cityplace/Uptown DART Station and the McKinney Avenue Trolley. 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:

- Haskell Avenue at the US 75 Southbound Frontage Road;
- Haskell Avenue at the US 75 Northbound Frontage Road;
- Haskell Avenue at Capitol Avenue;
- Haskell Avenue at Lemmon Avenue;
- Peak Street at Capitol Avenue;
- Carroll Avenue at US 75 Northbound Frontage Road;
- Carroll Avenue at Belmont Avenue; and
- Carroll Avenue at Capitol Avenue.

The analysis also included the following proposed driveways in approximately the same positions as the existing driveways:

- Drive 1, which is a right-in/right-out driveway to Haskell Avenue;
- Drive 2, which is a right-in/right-out driveway to the US 75 northbound frontage road; and
- Drive 3, which is a right-in/right-out driveway to the US 75 northbound frontage road.

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.

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

- TCC Market Station, a development modelled as consisting of 172,950 SF retail, 11,850 SF quality restaurant, and 10,000 SF fast-food restaurant with drive-through, located at the southeast corner of the intersection of Carroll Avenue and the US 75 southbound frontage road. TCC Market Station is planned for the parcel directly north of the Haskell Avenue development site.

The proposed Haskell Avenue Mixed-Use site is expected to generate approximately 1,783 new weekday AM peak hour one-way trips and 2,317 new weekday PM peak hour one-way 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 Haskell Avenue Mixed-Use site can be successfully incorporated into the surrounding roadway network. Signal timing modifications have been identified which would compensate for much of the site's impact to the existing signalized intersections. The proposed site driveways provide the appropriate level of access for the development. After mitigation, the site-generated traffic does not significantly affect the existing traffic operations.

The following improvements are recommended for this site:

At Drive 2, a northbound deceleration lane should be constructed.

At Drive 3, a northbound deceleration lane should be constructed.

The intersection of Carroll Avenue and Capitol Avenue meets traffic signal volume warrants for multiple hours in the background future scenarios. A full traffic signal study should be conducted to determine if a traffic signal is warranted. The intersection should be monitored for signalization if conditions change in the future. Haskell Avenue site-generated traffic represents approximately 20% of the traffic at this intersection during the 2020 scenario.

The intersection of Carroll Avenue and the US 75 northbound frontage road meets the Four-Hour Traffic Volume Warrants with 2017 existing traffic. If the stop-controlled approach is judged necessary to be mitigated, a traffic signal would aid the access to the US 75 northbound frontage road for the development drivers and may be necessary as the background volumes of the city continue to grow. Haskell Avenue site-generated traffic represents less than 15% of the traffic at this intersection during the 2020 scenario.

It is recommended to enhance the pedestrian connections through and around the site to maximize potential not only for walkability within the neighborhood but also for connections to transit options.

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 Haskell Avenue Mixed-Use site located at the northeast corner of the intersection of Haskell Avenue and the US 75 northbound frontage road. 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.

- 2017 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*™ software package and its associated *Intersection* reports for signalized intersections and *Highway Capacity Manual* reports for unsignalized intersections.

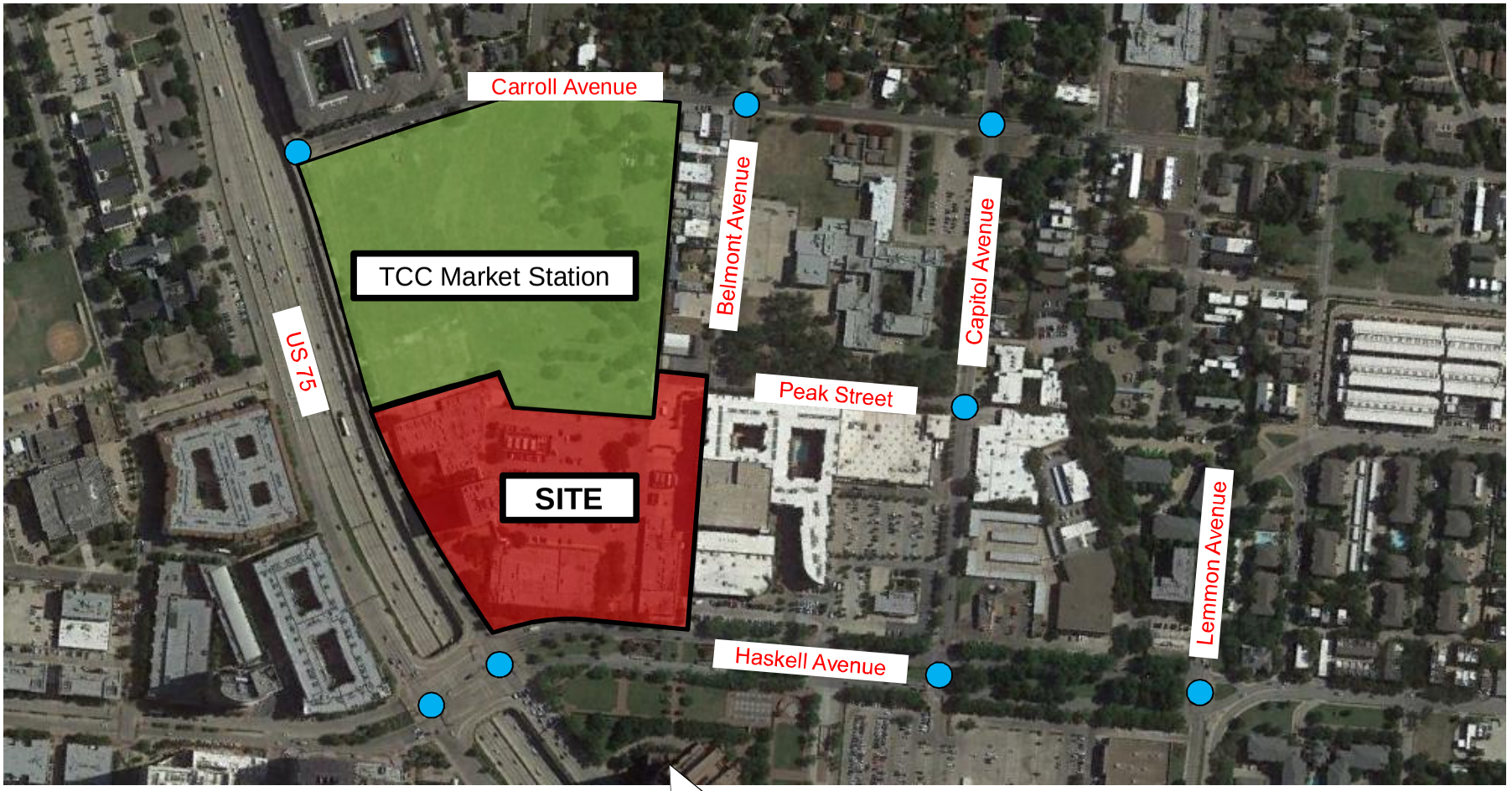

EXHIBIT 1

Vicinity Map

Haskell Street Development - Dallas, Texas

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LEGEND:
= Study Intersection

North

Not To Scale

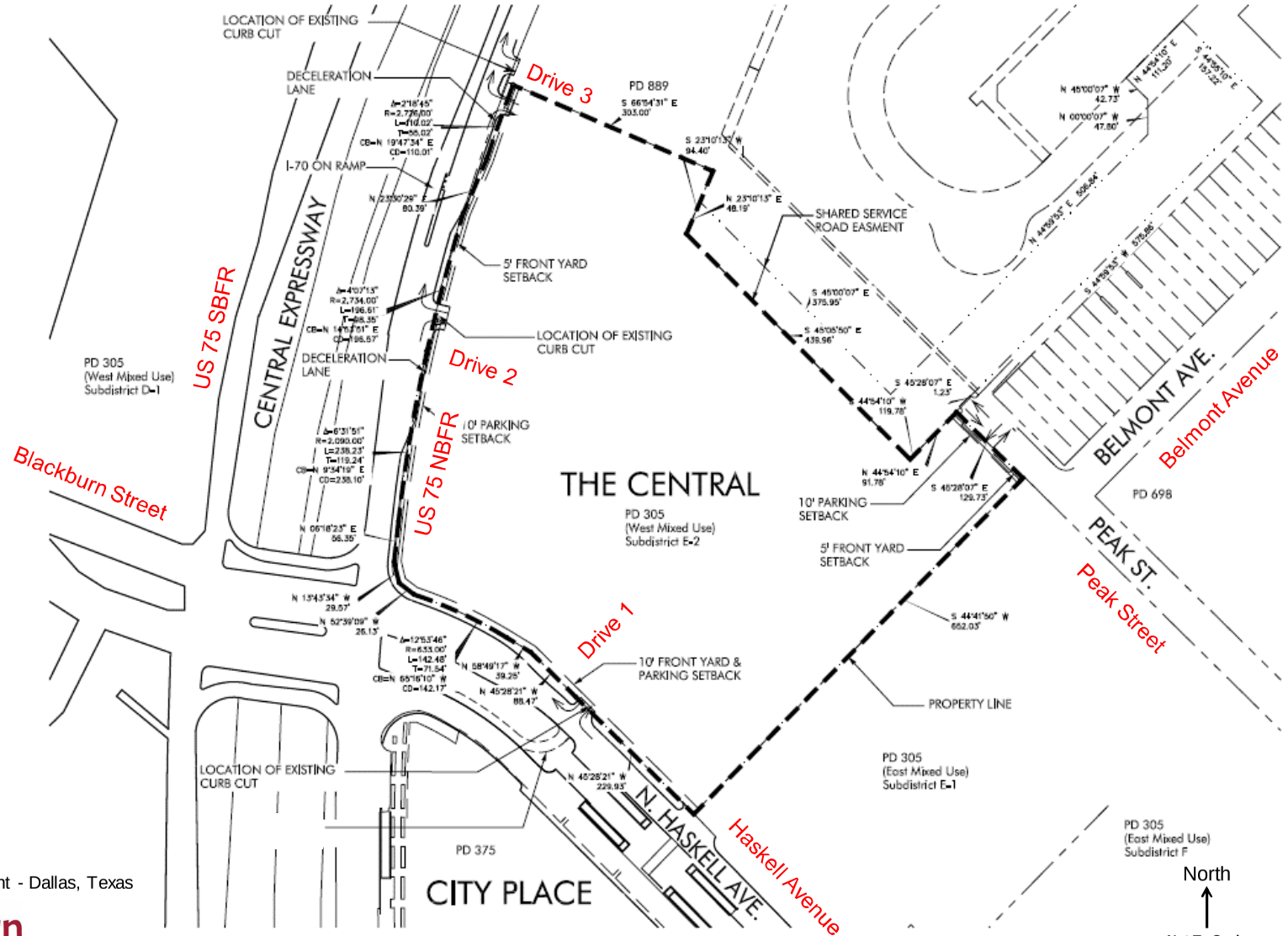

EXHIBIT 2

Conceptual Site Plan

Haskell Street Development - Dallas, Texas

Kimley»Horn

II. EXISTING AND FUTURE AREA CONDITIONS

A. Roadway Characteristics

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

- Haskell Avenue at the US 75 Southbound Frontage Road
- Haskell Avenue at the US 75 Northbound Frontage Road
- Haskell Avenue at Capitol Avenue
- Haskell Avenue at Lemmon Avenue
- Peak Street at Capitol Avenue

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

- Carroll Avenue at the US 75 Northbound Frontage Road
- Carroll Avenue at Belmont Avenue
- Carroll Avenue at Capitol Avenue

The major study area roadways are described below.

Haskell Avenue – is a six-lane, divided road that runs northwest-southeast through Uptown and into East Dallas. On the west side of US 75, Haskell Avenue is known as Blackburn Street. In the project vicinity, Haskell Avenue has intersections with both the US 75 north- and southbound frontage roads, Capitol Avenue, Lemmon Avenue, and other commercial driveways. On the City of Dallas Thoroughfare Plan, Haskell Avenue is designated as a Community Collector (SPCL CPLT). The speed limit near the site is 30 mph.

CityPlace Tower, just south of the project site across Haskell Avenue, has a parking garage that has four ramps that have access to Haskell Avenue between the US 75 northbound frontage road and Capitol Avenue. There are two entrance ramps and two exit ramps, one pair for the north side of Haskell Avenue and one for the south side. The ramps have access to the inside of the street and are controlled by a police officer during peak hours.

Pedestrians can cross Haskell Avenue with the pedestrian signals at its intersections with the US 75 northbound frontage road and with Capitol Avenue. Pedestrians can also cross Haskell Avenue at the unsignalized crosswalk at Weldon Street and at the midblock crossing between US 75 and Weldon Street.

US 75 – is an eight-lane, divided highway that runs north-south from Downtown Dallas and I-45 through the northeastern portion of Dallas. US 75 has three-lane frontage roads in the project area. US 75 is also known as the North Central Expressway. In the project vicinity, the US 75 northbound frontage road has intersections with Haskell Avenue and

Carroll Avenue, and the southbound frontage road intersects Haskell Avenue. The frontage road speed limit near the site is 35 mph.

Carroll Avenue – is a two-lane, undivided road that runs southeast-northwest from the US 75 northbound frontage road through east Dallas. In the project vicinity, Carroll Avenue has intersections with the US 75 northbound frontage road, Belmont Avenue, Capitol Avenue and numerous other residential and commercial driveways. On the City of Dallas Thoroughfare Plan, Capitol Avenue is not classified. The speed limit near the site is not demarcated, but is assumed to be 30 mph.

Lemmon Avenue – is a six-lane, divided road that generally runs southeast-northwest from Uptown to East Dallas. Near the site, Lemmon Avenue curves to run northeast-southwest. In the project vicinity, Lemmon Avenue intersects Haskell Avenue. On the City of Dallas Thoroughfare Plan, Lemmon Avenue is classified as a Principal Arterial (M-6-D(A) south of Haskell Avenue and EXST CPLT north of Haskell Avenue). The speed limit near the site is 30 mph.

Peak Street – is a two-lane, undivided road that runs southeast-northwest from the project site to its terminus on the east side of Capitol Avenue. In the project vicinity, Peak Street has intersections with Capitol Avenue and several commercial driveways. (Note: on the north side of Haskell Avenue, Lemmon Avenue is named Peak Street. This roadway is disconnected from the Peak Street in this analysis and is a distinct one-way couplet with Haskell Avenue east of Lemmon Avenue.) On the City of Dallas Thoroughfare Plan, Peak Street is not specified. The speed limit near the site is assumed to be 30 mph.

Belmont Avenue – is a two-lane, undivided road that runs northeast-southwest. Belmont Avenue has intersections with Carroll Avenue, among other local streets and residential driveways and several commercial driveways. On the City of Dallas Thoroughfare Plan, Belmont Avenue is not classified. The speed limit near the site is assumed to be 30 mph.

Capitol Avenue – is a two-lane, undivided road that runs northeast-southwest. Capitol Avenue has intersections with Haskell Avenue, Peak Street, and Carroll Avenue among other commercial and residential driveways. On the City of Dallas Thoroughfare Plan, Capitol Avenue is not classified. The speed limit near the site is 30 mph.

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

B. Existing Study Area

The existing 454,000 SF office site was largely closed at the time traffic counts were taken. The site is within PD 305 (East Mixed-Use), Subdistrict E-2 and is currently zoned Commercial. It is immediately surrounded by primarily commercial and mixed-use areas,

but there are single family neighborhoods just outside of the mixed-use areas to the north and east. South across Haskell Avenue is the CityPlace Tower and DART light rail station.

C. Proposed Site Improvements

The site as proposed will replace the existing office buildings with 1,400,000 SF office, a 600-key hotel, 1,000 multifamily units, 66,700 SF retail, a 30,000 SF movie theater, a 33,000 SF health club, and 48,000 SF of quality restaurant.

The site would have access via a total of three driveways, Belmont Avenue, and Peak Street. The driveways to be modeled in this analysis are as follows:

Drive 1 – is a right-in/right-out driveway to Haskell Avenue approximately 250 feet east of the intersection of Haskell Avenue and the US 75 northbound frontage road. One lane will remain for the inbound movement, and one lane for the outbound movement. In previous analyses, a new eastbound left-turn lane from Haskell Avenue to Drive 1 was studied. This additional access is not included in the current analysis.

Drive 2 – is a right-in/right-out driveway to the US 75 northbound frontage road approximately 450 feet north of the intersection of Haskell Avenue and the US 75 northbound frontage road. One lane will remain for the inbound movement, and one lane for the outbound movement.

Drive 3 – is be a right-in/right-out driveway to the US 75 northbound frontage road approximately 300 feet north of the intersection of Drive 2 and the US 75 northbound frontage road. One lane will remain for the inbound movement, and one lane will remain for the outbound movement.

The driveways to Peak Street and Belmont Avenue on the east corner of the site were not modeled.

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

D. Existing Traffic Volumes

24-hour machine counts were collected adjacent to the site on Haskell Avenue, the US 75 northbound frontage road and entrance ramp, and Carroll Avenue. **Exhibit 4** shows the existing weekday AM and PM peak hour traffic volumes. The raw count sheets are provided in the **Appendix**, as well as a comparison between the 24-hour volumes collected and previous 24-hour counts.

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

- Haskell Avenue: 25,896 vehicles per day (vpd)
- US 75 northbound frontage road past on-ramp: 12,302 vpd
- US 75 northbound entrance ramp after Haskell Avenue: 19,108 vpd
- Carroll Avenue: 3,775 vpd

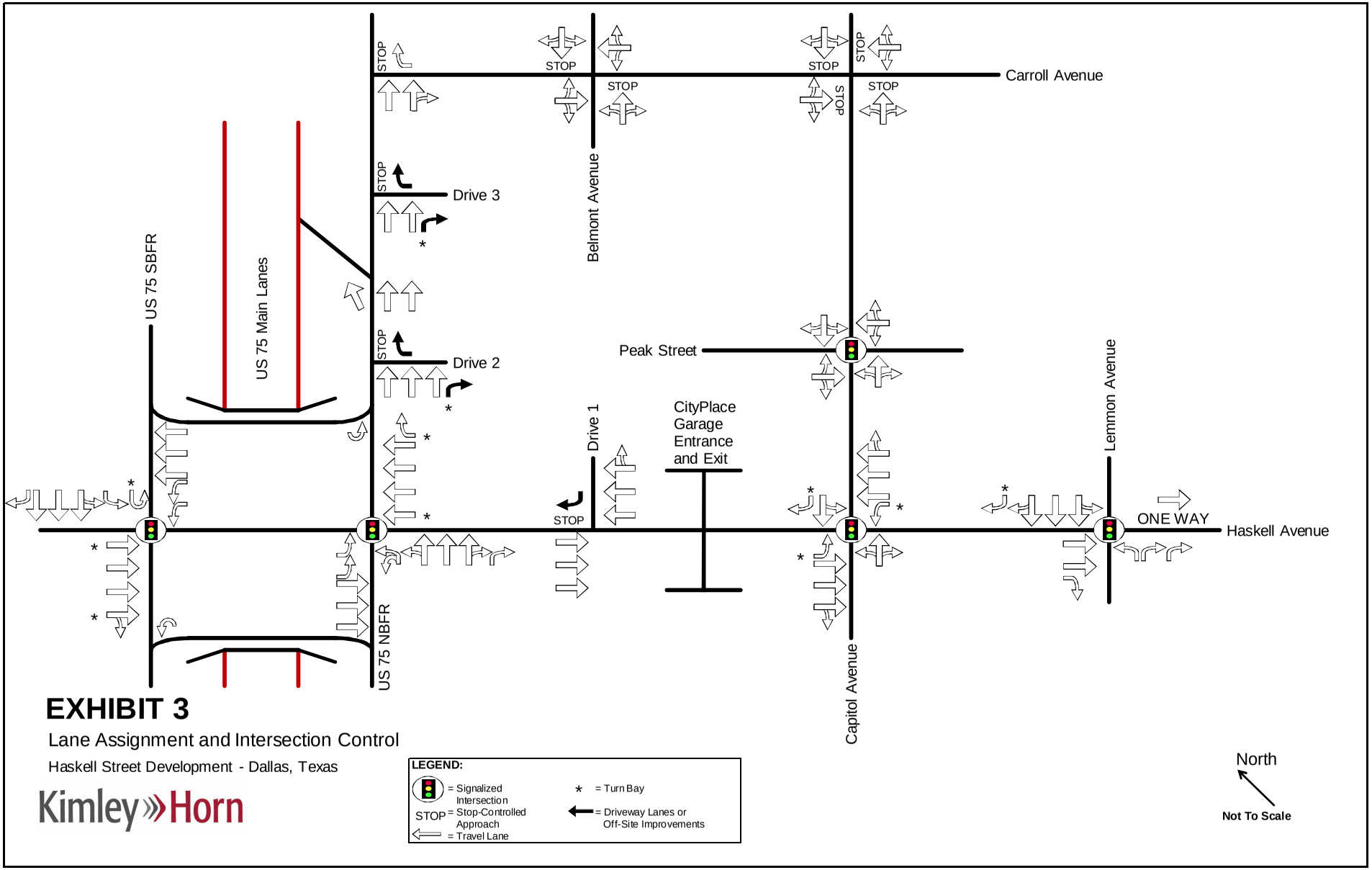

EXHIBIT 3

Lane Assignment and Intersection Control

Haskell Street Development - Dallas, Texas

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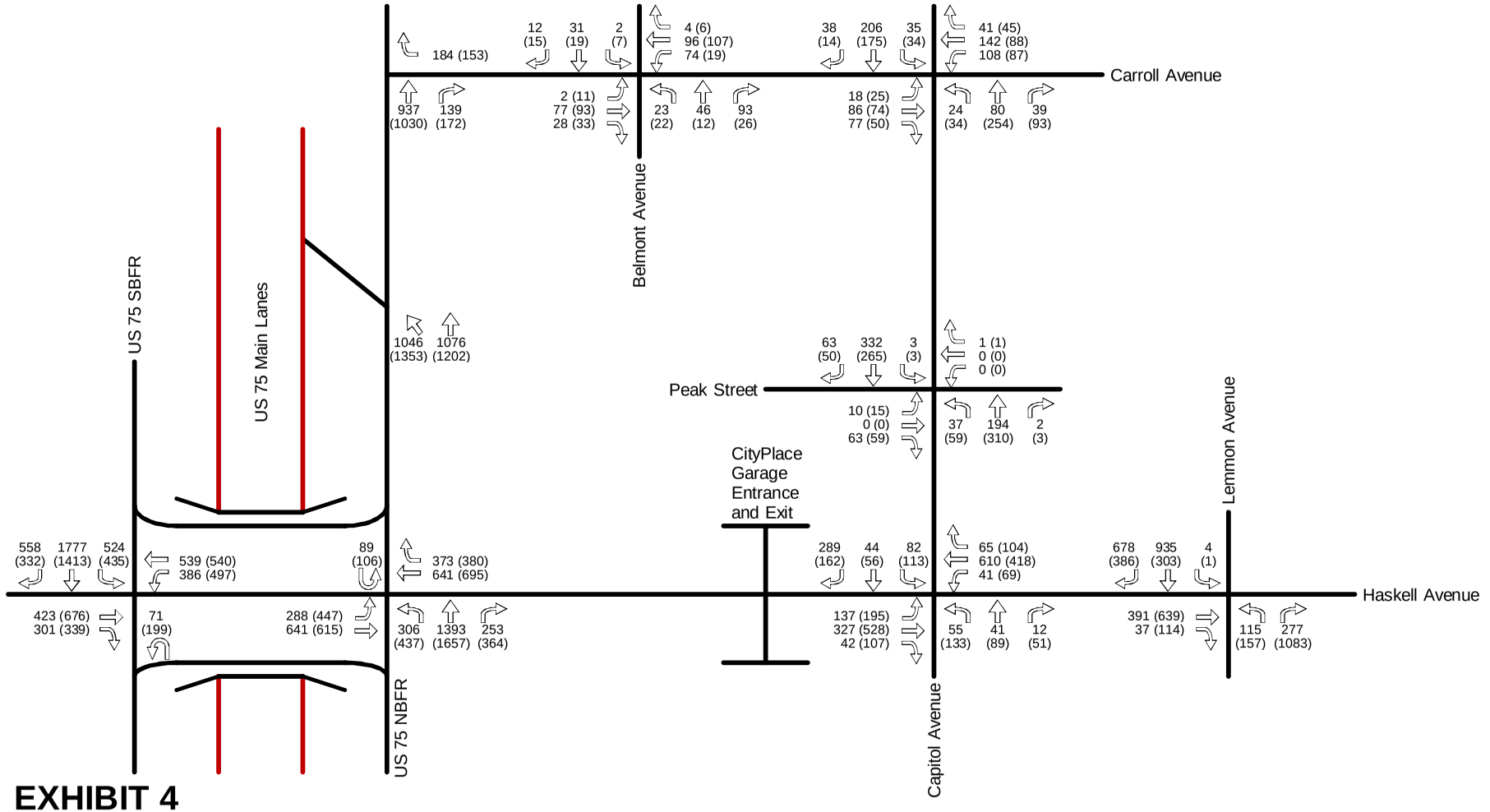

EXHIBIT 4

2017 Existing Traffic Volumes

Haskell Street Development - Dallas, Texas

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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 pass-by trips.

Reductions to the base trip generation estimates are sometimes applied due to internal capture. Internal capture is the tendency for customers or tenants to visit several parts of the mixed-use development in one trip but be counted twice in the trip generation since the formulae assume the residential, retail, office, and restaurant developments are isolated. Internal capture reductions are applied based on the procedures in the 2017 3rd edition of the *Trip Generation Handbook*, a companion manual to *Trip Generation Manual* also published by ITE. The internal capture worksheets are included in the **Appendix**. Internal capture reduces the number of trips leaving the site, and results in a projection of internal trips and external trips.

Due to the site's proximity to the Cityplace Station for the DART Red and Blue Lines, a 10% multimodal reduction was applied to the generated site traffic volumes. The true reduction may be much higher since the development site is essentially next door to the train station, but 10% was chosen to maintain a conservative assumption.

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
General Office Building	1,400,000	SF	710	13,724	1,154	188	1,342	224	1,173	1,397
Hotel	600	Rooms	310	5,016	166	116	282	184	176	360
Multifamily Housing (High-Rise)	1,200	Units	222	4,940	84	265	349	254	163	417
Retail/Shopping Center	66,700	SF	820	2,518	39	24	63	122	132	254
Supermarket	27,000	SF	850	2,883	94	86	180	107	98	205
Multiplex Movie Theater	30,000	SF	445	N/A	0	0	0	91	56	147
Health/Fitness Club	33,000	SF	492	1,153	22	21	43	65	49	114
Quality Restaurant	60,000	SF	931	5,030	35	9	44	314	154	468
Quality Restaurant (Inside Gourmet Marketplace)	18,000	SF	931	1,509	10	3	13	94	46	140
Development Totals										
Raw Trip Generation Total:				36,773	1,604	712	2,316	1,455	2,047	3,502
Internal Capture Total:				11,398	167	167	334	464	464	928
External Trips:				25,375	1,437	545	1,982	991	1,583	2,574
10% Multimodal Reduction				2,538	144	55	199	99	158	257
Total Net New External Vehicle Trips:				**22,837**	**1,293**	**490**	**1,783**	**892**	**1,425**	**2,317**

Trip Generation rates based on *ITE's Trip Generation Manual*, 10th Edition.
Internal Capture procedure from *ITE Trip Generation Handbook*, 3rd Edition (2017).

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 residential density, and the locations of the proposed driveway access to/from the site. **Table 2** displays the general directional distribution percentages assumed for the site.

Table 2 – General Directional Distribution

Direction (To/From)	Percent of Site Traffic
North	40%
South	25%
East	20%
West	15%

The corresponding inbound and outbound traffic assignment, where the directional distribution in **Table 2** 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 for each phase by the respective traffic assignment percentages.

C. Other Development Traffic Modelling

Using the same procedure as was used to develop Haskell Avenue site traffic and distribute that traffic on the roadway network, traffic was developed and distributed for the TCC Market Station site as well. The distribution and volumes for these developments can be found in the **Appendix** of this report. The TCC Market Station development traffic was added into the 2021 and 2026 background traffic volumes.

D. Development of 2020 Background Traffic

In order 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 2.5% was assumed for the background traffic through 2020. To calculate the 2020 background traffic, the existing 2017 traffic counts were grown by 2.5% annually for three years. The traffic from the TCC Market Station background site was then added to the grown background volumes. The resulting 2020 background weekday AM and PM peak hour traffic volumes are shown in **Exhibit 7**.

E. 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.

F. 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 2.5% growth over the 2020 background 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.

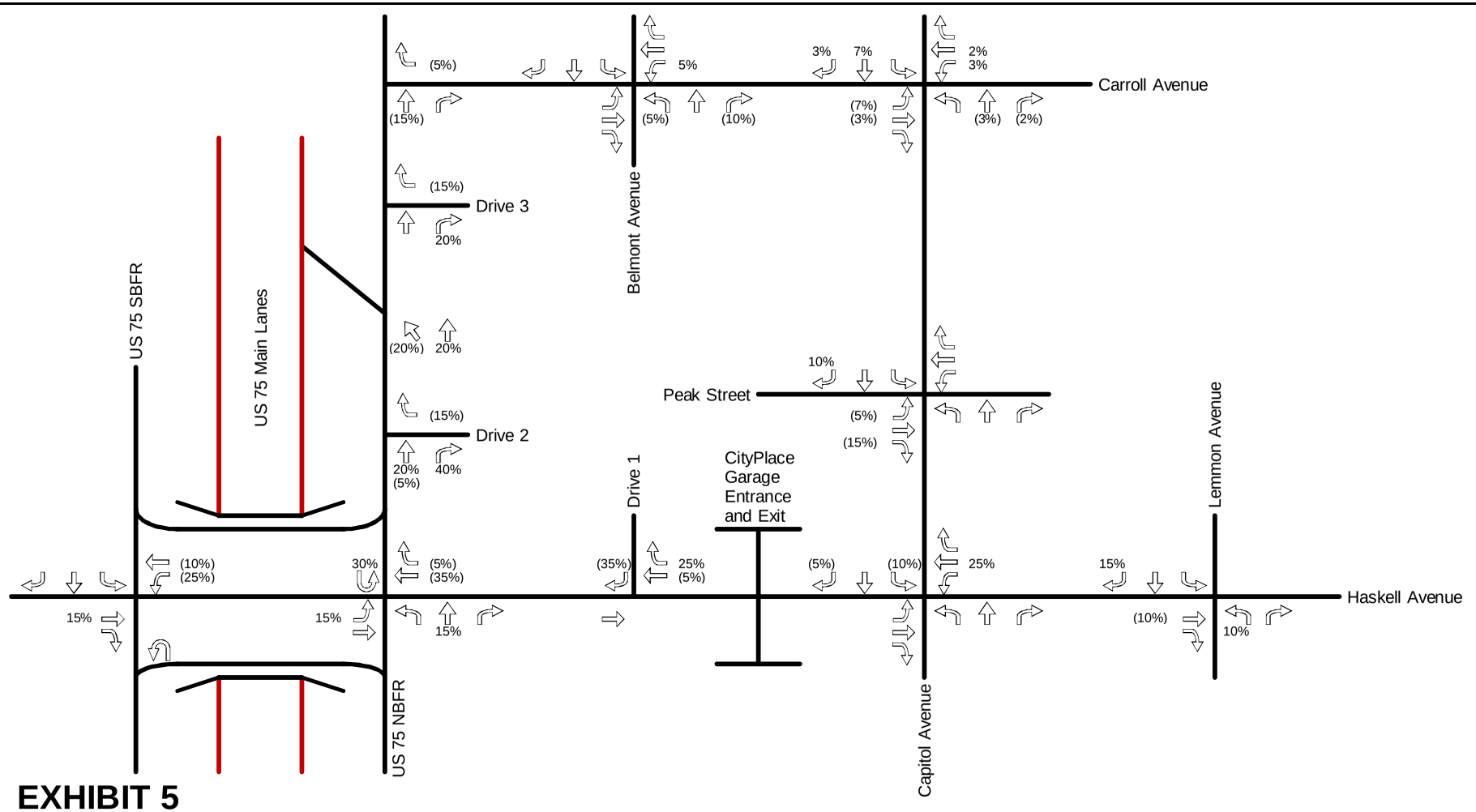

EXHIBIT 5

Trip Distribution and Traffic Assignment

Haskell Street Development - Dallas, Texas

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

North

Not To Scale

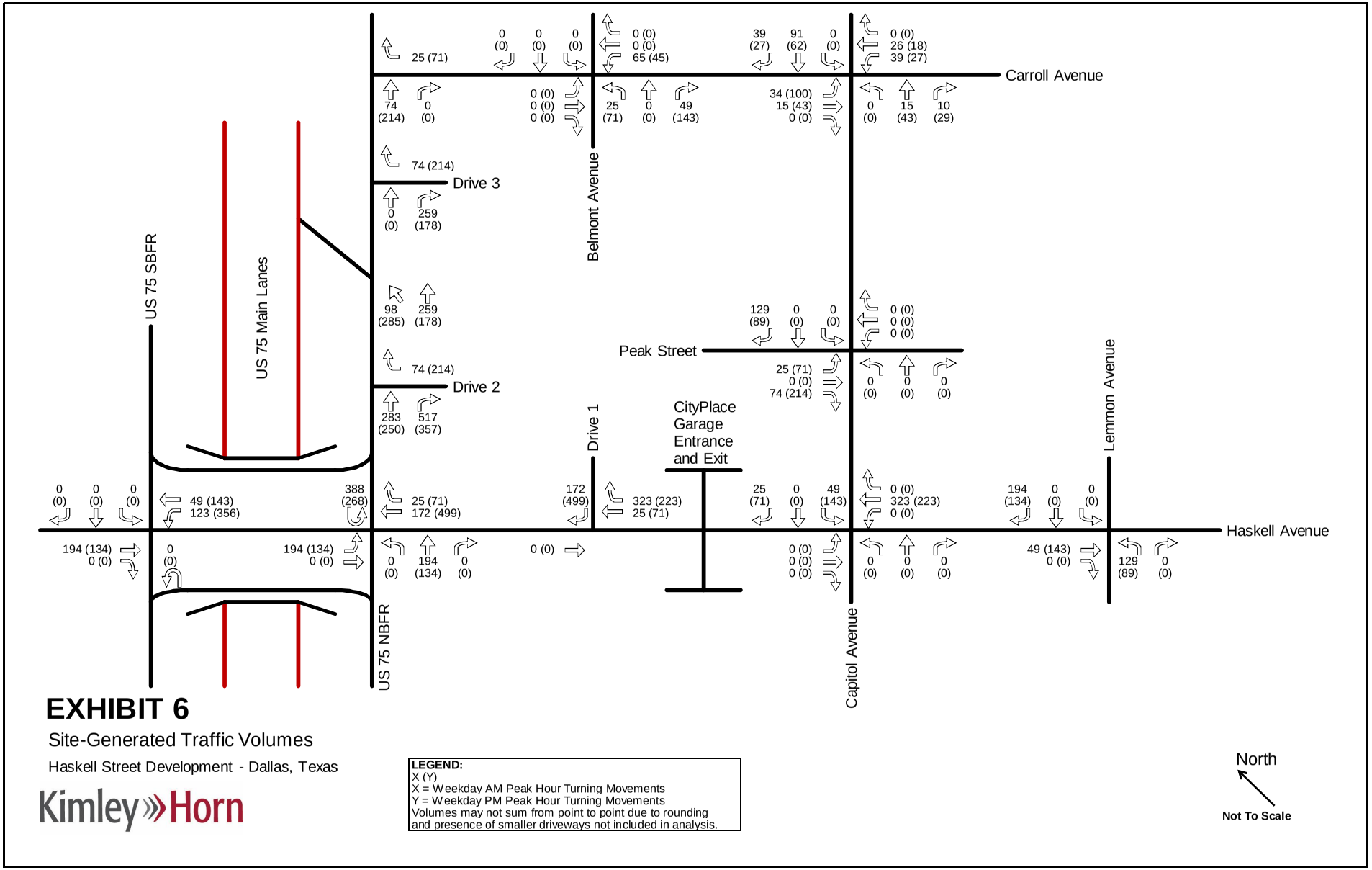

EXHIBIT 6

Site-Generated Traffic Volumes

Haskell Street Development - Dallas, Texas

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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

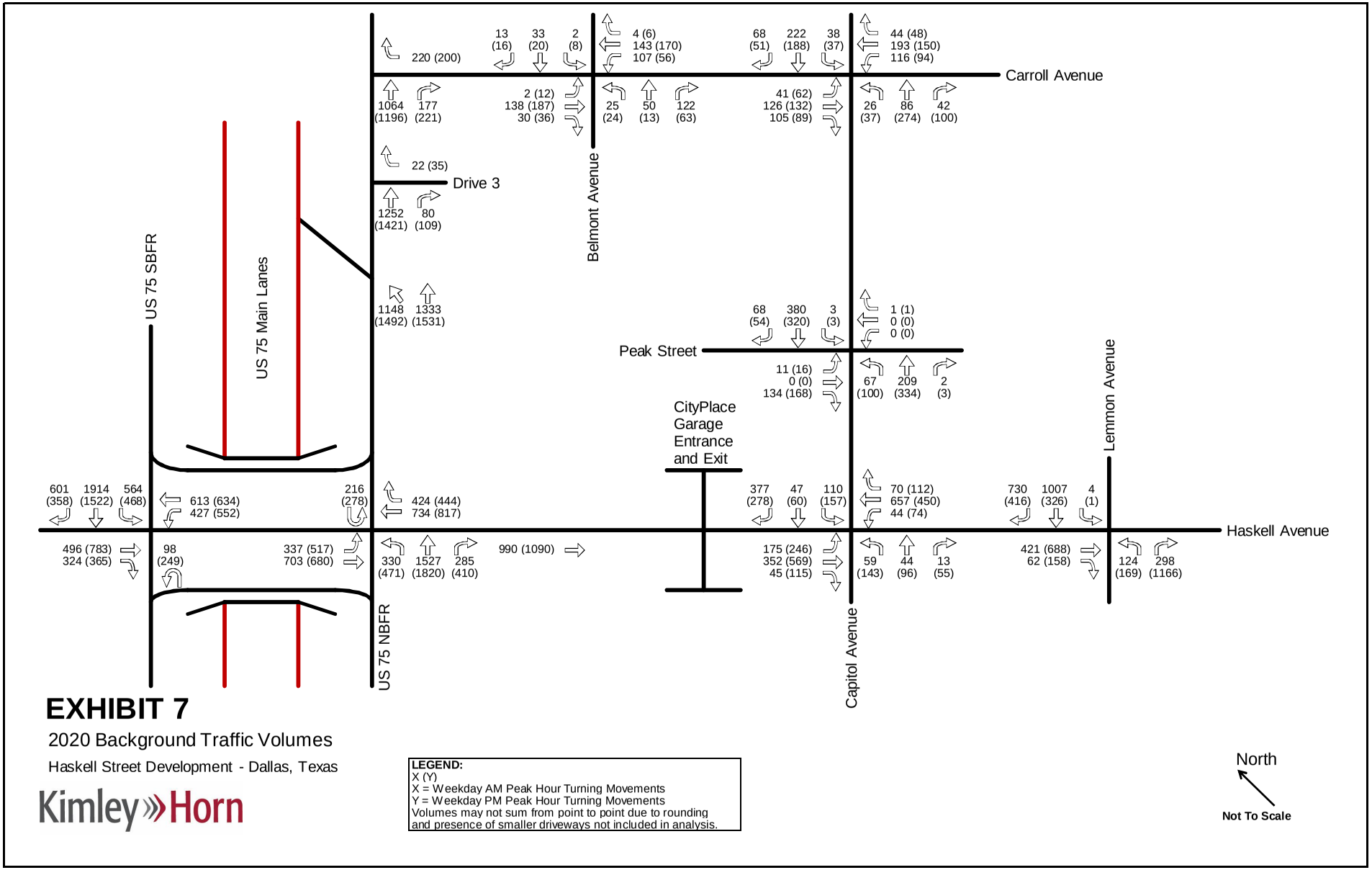

EXHIBIT 7

2020 Background Traffic Volumes

Haskell Street Development - Dallas, Texas

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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

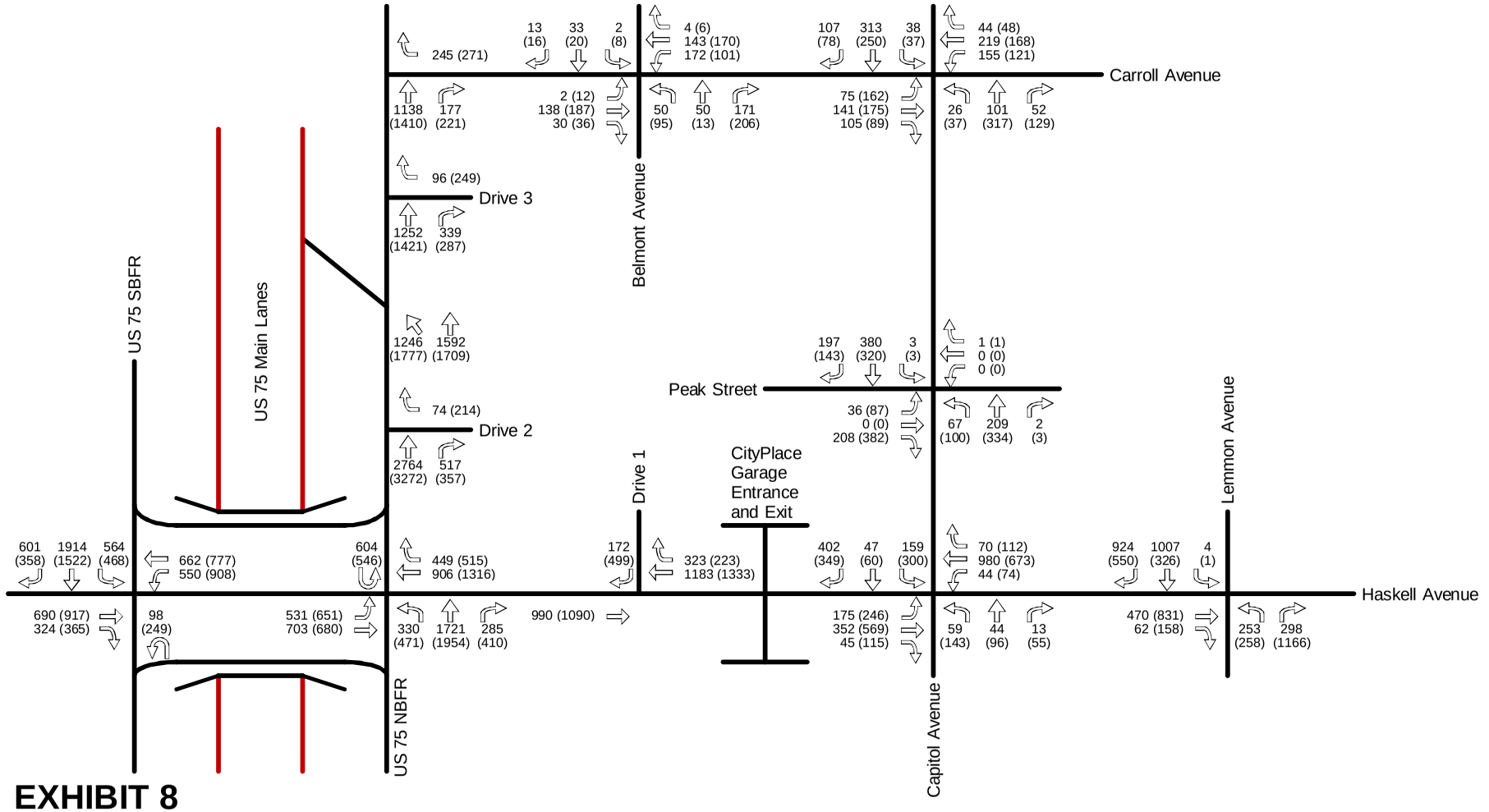

EXHIBIT 8

2020 Background Plus Site-Generated Traffic Volumes

Haskell Street Development - Dallas, Texas

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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

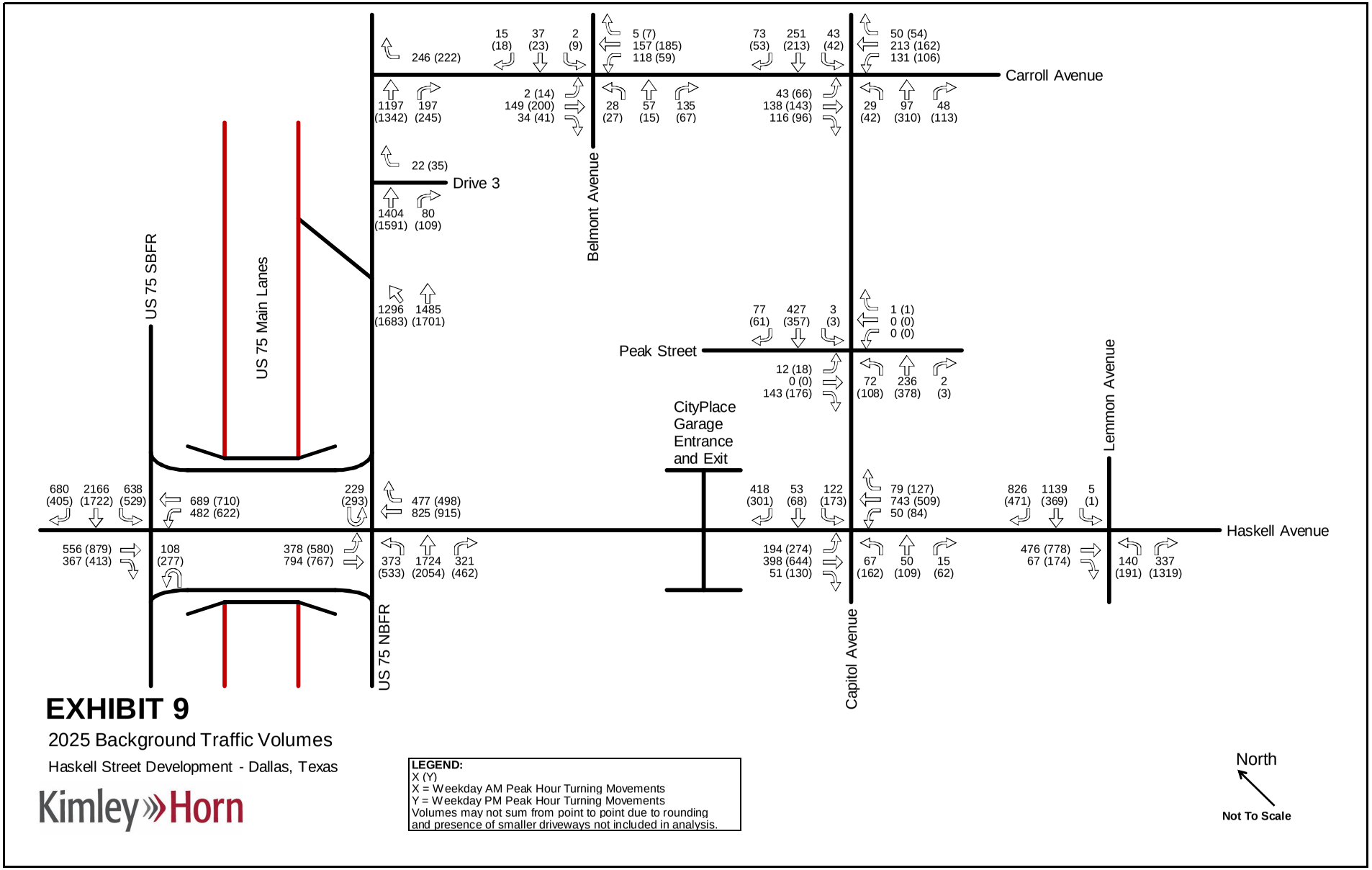

EXHIBIT 9

2025 Background Traffic Volumes

Haskell Street Development - Dallas, Texas

Kimley»Horn

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

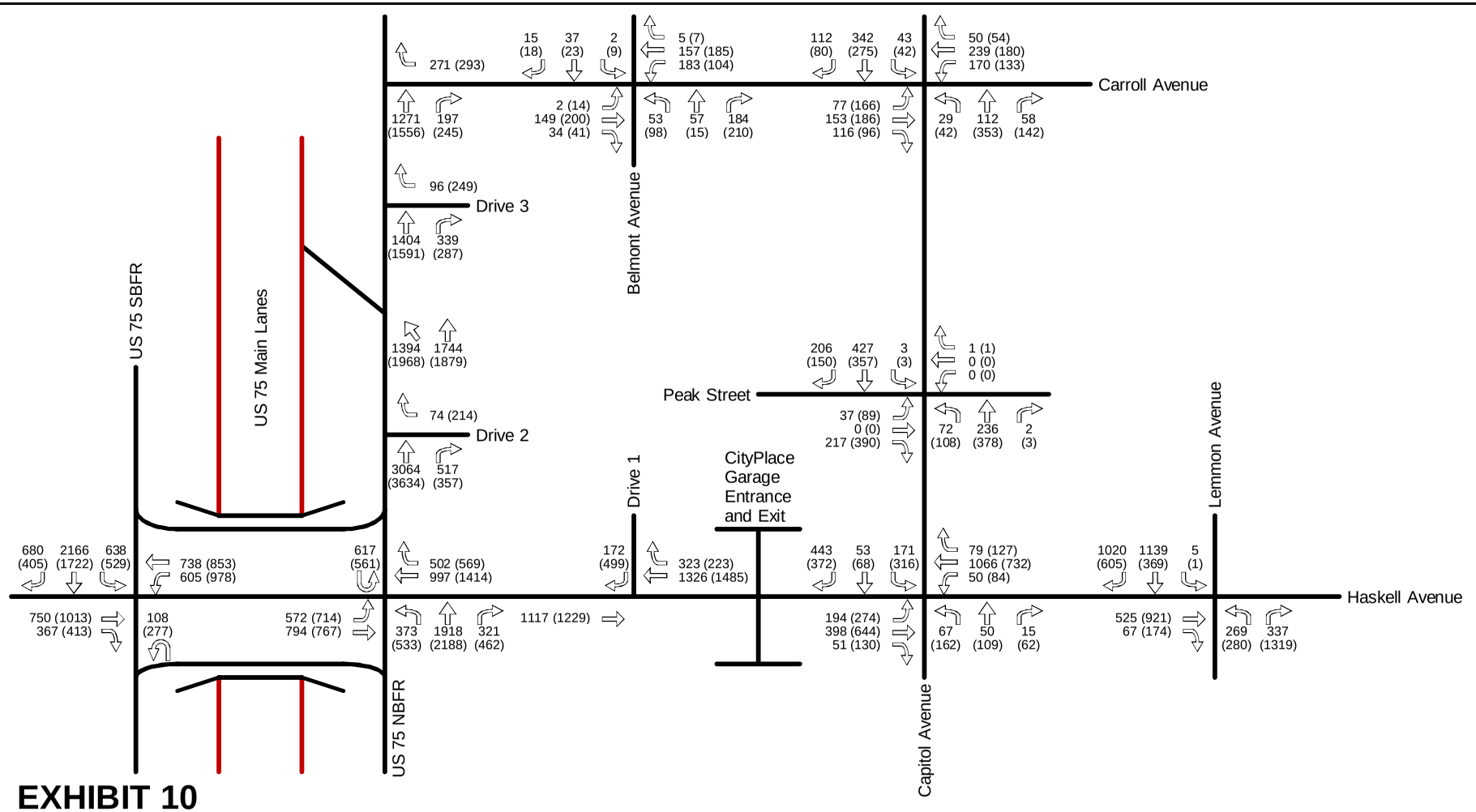

EXHIBIT 10

2025 Background Plus Site-Generated Traffic Volumes

Haskell Street Development - Dallas, Texas

Kimley»Horn

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

IV. TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn conducted a traffic operations analysis to determine potential capacity deficiencies in the 2017, 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). 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 3** shows the definition of level of service for signalized and unsignalized intersections.

Table 3 – 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 existing signalized intersections are based on existing timing plans. In the future scenarios, the future timing plans, scheduled to be implemented in 2018, were used to analyze the intersections. Timing adjustments were made in the Mitigation 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 the **Appendix**. 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	2017 Existing Traffic AM Peak Hour		2020 Background Traffic AM Peak Hour		2020 Background plus Site Traffic AM Peak Hour		2025 Background Traffic AM Peak Hour		2025 Background plus Site Traffic AM Peak Hour	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Haskell Avenue (Blackburn Street) @ US 75 SBFR	EB	43.3	D	44.7	D	28.1	C	43.4	D	32.7	C
	WB	5.6	A	16.4	B	14.0	B	15.2	B	13.2	B
	SB	187.1	F	31.7	C	73.8	E	69.8	E	104.5	F
	Overall	**125.0**	**F**	**30.7**	**C**	**51.4**	**D**	**53.9**	**D**	**70.4**	**E**
Haskell Avenue @ US 75 NBFR	EB	5.5	A	18.2	B	47.5	D	19.7	B	47.1	D
	WB	31.4	C	39.2	D	43.9	D	41.7	D	51.0	D
	NB	32.7	C	21.9	C	20.3	C	24.3	C	28.2	C
	Overall	**25.9**	**C**	**25.6**	**C**	**33.6**	**C**	**27.8**	**C**	**39.2**	**D**
Haskell Avenue @ Capitol Avenue	EB	23.3	C	23.3	C	24.0	C	26.5	C	27.1	C
	WB	26.8	C	21.9	C	29.7	C	23.9	C	33.0	C
	NB	31.6	C	39.2	D	39.2	D	40.8	D	40.8	D
	SB	17.5	B	25.2	C	21.1	C	26.4	C	35.3	D
	Overall	**23.8**	**C**	**24.2**	**C**	**29.4**	**C**	**26.3**	**C**	**32.5**	**C**
Haskell Avenue @ Lemmon Avenue	EB	13.2	B	16.7	B	25.7	C	17.1	B	27.4	C
	NB	12.6	B	16.2	B	21.9	C	22.8	C	22.4	C
	SB	32.2	C	19.9	B	21.7	C	23.5	C	27.1	C
	Overall	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**
Peak Street @ Capitol Avenue	EB	8.7	A	8.3	A	10.3	B	8.4	A	10.3	B
	NB	3.3	A	3.6	A	4.2	A	3.8	A	4.6	A
	SB	3.8	A	5.0	A	7.2	A	5.5	A	8.1	A
	Overall	**4.1**	**A**	**5.1**	**A**	**7.1**	**A**	**5.4**	**A**	**7.6**	**A**
Haskell Avenue @ Drive 1	SBR*	-	-	-	-	12.9	B	-	-	13.4	B
Drive 2 @ US NBFR	WBR*	-	-	-	-	133.4	F	-	-	200.0+	F
Drive 3 @ US NBFR	WBR*	-	-	-	-	17.4	C	-	-	19.8	C
Carroll Avenue @ Belmont Avenue	NB*	11.8	B	14.6	B	22.2	C	16.6	C	28.9	D
	EBL	7.4	A	7.5	A	7.5	A	7.6	A	7.6	A
	WBL	7.6	A	7.8	A	8.0	A	7.9	A	8.1	A
	SB*	11.8	B	14.1	B	16.9	C	15.1	C	18.4	C
Carroll Avenue @ Capitol Avenue	NB*	10.8	B	13.2	B	20.5	C	16.4	C	24.6	C
	EB*	11.1	B	16.2	C	36.2	E	22.7	C	48.4	E
	WB*	13.9	B	21.7	C	68.1	F	37.0	E	111.4	F
	SB*	13.6	B	20.0	C	94.2	F	31.9	D	136.2	F
	Overall	**12.7**	**B**	**18.7**	**C**	**63.2**	**F**	**29.1**	**D**	**93.6**	**F**
Carroll Avenue @ US NBFR	WBR*	19.0	C	27.0	D	35.4	E	41.9	E	62.8	F

* Stop-Controlled Approach
\- No movements in Time Period
\+ Movement Delay Exceeds 200 seconds

& Approach delay is combined from two different intersection nodes, and the total intersection delay was not calculated.

Table 5 – Traffic Operational Results – Weekday PM Peak Hour

INTERSECTION	APPROACH	2017 Existing Traffic PM Peak Hour		2020 Background Traffic PM Peak Hour		2020 Background plus Site Traffic PM Peak Hour		2025 Background Traffic PM Peak Hour		2025 Background plus Site Traffic PM Peak Hour	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Haskell Avenue @ US 75 SBFR	EB	63.7	E	43.7	D	51.8	D	62.1	E	100.4	F
	WB	6.1	A	22.4	C	16.6	B	21.2	C	24.5	C
	SB	66.6	E	31.3	C	86.2	F	72.8	E	84.1	F
	Overall	**50.8**	**D**	**32.1**	**C**	**55.9**	**E**	**57.1**	**E**	**69.6**	**E**
Haskell Avenue @ US 75 NBFR	EB	7.0	A	29.7	C	55.8	E	45.7	D	72.9	E
	WB	33.4	C	44.5	D	73.0	E	52.1	D	90.6	F
	NB	51.3	D	39.6	D	48.4	D	70.7	E	76.3	E
	Overall	**36.9**	**D**	**38.5**	**D**	**57.6**	**E**	**60.3**	**E**	**79.8**	**E**
Haskell Avenue @ Capitol Avenue	EB	30.3	C	29.1	C	48.1	D	33.0	C	39.9	D
	WB	35.1	D	33.3	C	42.4	D	39.3	D	52.9	D
	NB	36.5	D	53.3	D	62.4	E	56.1	E	63.6	E
	SB	25.7	C	31.8	C	38.8	D	33.6	C	41.1	D
	Overall	**31.9**	**C**	**33.8**	**C**	**45.5**	**D**	**37.8**	**D**	**46.7**	**D**
Haskell Avenue @ Lemmon Avenue	EB	10.5	B	17.0	B	17.3	B	17.6	B	32.1	C
	NB	7.2	A	10.3	B	12.1	B	11.0	B	12.9	B
	SB	14.9	B	16.7	B	15.7	B	18.7	B	18.3	B
	Overall	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**	**&**
Peak Street @ Capitol Avenue	EB	15.4	B	12.3	B	27.4	C	12.6	B	25.8	C
	NB	3.2	A	7.7	A	12.2	B	9.1	A	14.6	B
	SB	2.7	A	3.6	A	10.8	B	3.9	A	12.1	B
	Overall	**4.1**	**A**	**7.0**	**A**	**16.9**	**B**	**7.7**	**A**	**17.3**	**B**
Haskell Avenue @ Drive 1	SBR*	-	-	-	-	42.7	E	-	-	58.7	F
Drive 2 @ US NBFR	WBR*	-	-	-	-	200.0+	F	-	-	200.0+	F
Drive 3 @ US NBFR	WBR*	-	-	-	-	45.7	E	-	-	70.4	F
Carroll Avenue @ Belmont Avenue	NB*	10.6	B	12.6	B	23.2	C	13.5	B	28.0	D
	EBL	7.5	A	7.6	A	7.6	A	7.7	A	7.7	A
	WBL	7.5	A	7.8	A	8.0	A	7.9	A	8.0	A
	SB*	10.7	B	13.3	B	16.0	C	14.1	B	17.3	C
Carroll Avenue @ Capitol Avenue	NB*	17.5	C	47.6	E	200.0+	F	117.5	F	200.0+	F
	EB*	11.6	B	25.1	D	156.4	F	37.2	E	187.5	F
	WB*	13.2	B	26.8	D	80.8	F	42.3	E	109.2	F
	SB*	12.9	B	24.3	C	97.3	F	38.1	E	133.3	F
	Overall	**14.6**	**B**	**32.6**	**D**	**144.3**	**F**	**65.2**	**F**	**188.6**	**F**
Carroll Avenue @ US NBFR	WBR*	19.6	C	32.0	D	99.8	F	53.2	F	193.0	F

* Stop-Controlled Approach
\- No movements in Time Period
\+ Movement Delay Exceeds 200 seconds

& Approach delay is combined from two different intersection nodes, and the total intersection delay was not calculated.

C. 2017 Existing Traffic Operations

The analysis of the 2017 existing traffic operations shows that all of the signalized intersections operate at LOS C or better in both peak hours except for the intersections of Haskell Avenue and the two US 75 frontage roads. Haskell Avenue's intersection with the southbound frontage road operates at LOS F during the AM peak hour and LOS D during the PM peak hour, and its intersection with the northbound frontage road operates at LOS C during the AM peak hour and LOS D during the PM peak hour. The intersection of Haskell Avenue and Lemmon Avenue operates similarly to a diamond interchange in that it has two sets of traffic signals, but the spacing between the signals is so close that it operates as one intersection. It was analyzed as two intersections to more accurately calculate the delay experienced by each user, and because of this the total intersection delay was calculated at each intersection, not for the interchange as a whole. The Synchro™ analysis sheets with the intersection delay for each intersection can be found in the **Appendix**.

The existing office building on the site was nearly closed at the time that counts were performed, so the existing driveways, which are approximately in the same location as the proposed driveways, were not able to be analyzed. All existing unsignalized approaches at the study intersections operate at LOS C or better during both peak hours.

D. 2020 Background Traffic Operations

With three years of background growth added to the network and the implementation of the new City of Dallas timing plan, some of the signalized intersections experience added delay while others experience less delay. The intersection of Haskell Avenue and the US 75 southbound frontage road changes from LOS F to C during the AM peak hour and from LOS D to C during the PM peak hour. No other signalized study intersections experience a change in their level of service.

The unsignalized intersections experience added delays with the additional years of background traffic growth as well. During the PM peak hour at the intersection of Capitol Avenue and Carroll Avenue, the northbound approach changes from LOS C to E, the east- and westbound from LOS B to D, and the overall intersection from LOS B to D. All-way stop-controlled intersections handle low volumes with very little delay, but once the traffic volumes increase, especially if one approach becomes disproportionately greater than the others, the delays increase rapidly. While there is no definite "tipping point" where the intersection increases more rapidly, the intersection of Carroll Avenue and Capitol Avenue is certainly headed in that direction quickly.

The westbound right-turning approach of Carroll Avenue to the US 75 northbound frontage road changes from LOS C to D during both peak hours due to the increase in turning volumes and northbound through volumes from the background growth and the background site itself.

E. 2020 Background Plus Site-Generated Traffic Operations

The addition of the site-generated traffic to the 2020 background traffic results in an addition of delay at the existing signalized intersections, with two increases in level of service. The intersection of Haskell Avenue and the US 75 southbound frontage road changes from LOS C to D during the AM peak hour and from LOS C to E during the PM peak hour. Likewise, the intersection of Haskell Avenue with the US 75 northbound frontage road changes from LOS D to E during the PM peak hour. The intersection of Haskell Avenue and Capitol Avenue changes from LOS C to D during the PM peak hour. With the exception of the frontage road intersections, every signalized intersection operates at LOS D or better during both peak hours of the 2020 background plus site scenario. This is very favorable considering the proximity to a major US highway and the urban environment in which the site is located.

With the addition of site-generated traffic, there are some changes in level of service in both peak hours at the unsignalized intersections. During the AM and PM peak hours, respectively, the approaches of the intersection of Carroll Avenue and Capitol Avenue change from LOS B to C and E to F (northbound), from LOS C to E and D to F (eastbound), from LOS C to F and D to F (westbound), and from LOS C to F and C to F (southbound). The intersection as a whole changes from LOS C to F during the AM peak and changes from LOS D to F during the PM peak. The 95th percentile queue length for the northbound approach of this intersection is 24 vehicles, which corresponds to 480 feet. The queue capacity for the northbound approach of the intersection is 750 feet. The approach has approximately 300 feet of excess queueing capacity and is able to handle the site-generated traffic. The intersection meets traffic volume warrants in the peak hours of the 2020 background scenario, so a signal cannot be recommended as the sole responsibility of the development. The intersection should be monitored for signalization if conditions change in the future.

The westbound approach of Carroll Avenue to the US 75 northbound frontage road changes from LOS D to E during the AM peak and from LOS D to F during the PM peak. During the AM peak hour, Drive 1 operates at LOS B, Drive 2 at LOS F, and Drive 3 at LOS C. During the PM peak hour, Drive 1 operates at LOS E, Drive 2 at LOS F, and Drive 3 at LOS E. If users find the queue lengths or delays at Drive 2 to be excessive, they may select a less straightforward path to their destination and use Drive 3 or Belmont Avenue to exit the site, as each of these access points is under capacity. The high delay experienced at Drive 2 is expected when trying to make a stop-controlled right turn onto high-volume roads such as one of the US 75 frontage roads.

F. 2025 Background Traffic Operations

The analysis of the 2025 Background Traffic operations shows the signalized intersections of Haskell Avenue and the US 75 frontage roads experiencing level of service changes similar to the changes resulting from the addition of site traffic to the 2020 background traffic. The intersection of Haskell Avenue with the southbound

frontage road changes from LOS C to D during the AM peak hour and from LOS C to E during the PM peak hour. The intersection of Haskell Avenue and the northbound frontage road changes from LOS D to E during the PM peak hour, and the intersection of Haskell Avenue with Capitol Avenue changes from LOS C to D.

Likewise, the unsignalized approaches of the study intersections experience similar changes in level of service from 2020 to 2025 as they did with the addition of site-generated traffic to the 2020 background volumes. The westbound approach changes from LOS C to E during the AM peak, and the approaches of the intersection of Carroll Avenue and Capitol Avenue change during the PM peak hour as follows: northbound (LOS E to F), eastbound (LOS D to E), westbound (LOS D to E), and southbound (LOS C to E). The intersection as a whole changes from LOS D to E during the AM peak hour and from LOS D to F during the PM peak hour. As previously mentioned, the all-way stop-control configuration of this intersection is quickly approaching its functional limits. Any increases in traffic volume will produce large increases in experienced delay.

The westbound approach of the intersection of Carroll Avenue and the US 75 NBFR changes from LOS D to E during the AM peak hour and from LOS D to F during the PM peak. No traffic was modelled to travel through the neighborhoods to the north of the site. If drivers do not wish to access the US 75 northbound frontage road via Carroll Avenue, they may choose to divert their route north through the neighborhoods or along the major streets in the area.

G. 2025 Background Plus Site-Generated Traffic Operations

The addition of the site-generated traffic to the 2025 background traffic results in additional delay being added to the signalized intersections. The intersection of Haskell Avenue and the US 75 southbound frontage road changes from LOS D to E and remains at LOS E during the AM and PM peak hours, respectively. The intersection of Haskell Avenue and the US 75 northbound frontage road changes from LOS C to D during the AM peak hour and remains at LOS E during the PM peak. The intersections of Haskell Avenue and the US 75 frontage roads were examined in the **Mitigation Analysis** later in this report.

The approaches of the intersection of Carroll Avenue and Capitol Avenue during the AM and PM peak hours, respectively, change as follows: northbound (LOS C to C and LOS F to F), eastbound (LOS C to E and LOS E to F), westbound (LOS E to F and LOS E to F), and southbound (LOS E to F and LOS E to F). The intersection as a whole changes from LOS E to F during the AM peak hour and remains at LOS F during the PM peak hour. As mentioned previously, this intersection is already operating under all-way stop-control operation. The installation of a traffic signal would certainly decrease delay, and with proper signal timing could easily maintain the atmosphere currently present in the established neighborhood. The intersection meets traffic volume warrants in the peak hours of the 2020 background scenario, so a signal cannot be recommended as

the sole responsibility of the development. The intersection should be monitored for signalization if conditions change in the future.

The westbound approach of the intersection of Carroll Avenue and the US 75 NBFR changes from LOS E to F during the AM peak hour and remains at LOS F during the PM peak. The increase in the northbound through volumes from the background growth greatly increases the delay for the westbound right-turning drivers.

During the AM peak hour, Drive 1 operates at LOS B, Drive 2 at LOS F, and Drive 3 at LOS C. During the PM peak hour, all three Drives operate at LOS F. Even though Drives 1 and 3 operate at LOS F during the PM peak, their volume to capacity (v/c) ratio is less than one, which means that they have not reached their maximum capacity and can handle more traffic volume.

If users find the queue lengths or delays at Drive 2 to be excessive, they may choose to select a less straightforward path to their destination and use Drive 3 or Belmont Avenue to exit the site, as each of these access points is under capacity. The high delay experienced at Drive 2 is expected when trying to make a stop-controlled right turn onto a high-volume road such as one of the US 75 frontage roads.

The approaches operating at LOS E or worse were examined in the **Mitigation Analysis** later in this report.

H. Link Volume Analysis

The link capacity analysis examines the operating conditions of roadway links rather than intersections, using the daily and peak hour 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 2017 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, with a capacity of 850 vehicles per hour per lane (vphpl) for a divided principal arterial, such as Haskell Avenue, and 475 vphpl for an undivided collector, such as Carroll Avenue. While Haskell Avenue is listed as a collector on the City of Dallas Thoroughfare Plan, it functions as an arterial in the project vicinity.

The link analyses, displayed below in **Table 6**, show that Haskell Avenue currently operates at LOS C. With background growth, there is no change in level of service. The addition of site-generated traffic changes the roadway link to LOS D during both the 2020 and 2025 scenarios, well within its roadway capacity.

Carroll Avenue also currently operates at LOS A/B. The addition of background traffic changes the roadway from LOS A/B to D in both 2020 and 2025. With site-generated traffic, the link changes from LOS D to E during both future scenarios. As a two-lane collector, Carroll Avenue is beginning to reach its design capacity in the 2025 scenario, but this capacity is not exceeded.

The addition of the project site leaves the two roadway links with the capacity to handle the future daily roadway volumes.

Table 6 – Link Operational Results

Roadway Link		2017 Existing			2020 Background					2020 Site-Generated		2020 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
Haskell Avenue					TCC Market Station	1,673								
US 75 NBFR	**Capitol Avenue**	25,896	0.51	C	20.0%									
							29,560	0.58	C	20.0%	4,567	34,127	0.67	D
Volume Limit 6 Lanes =	51,000					2.5% growth for 3 years								
Carroll Avenue					TCC Market Station	2,509								
US 75 NBFR	**Capitol Avenue**	3,775	0.40	A/B	30.0%									
							6,574	0.69	D	7.5%	1,713	8,287	0.87	E
Volume Limit 2 Lanes =	9,500					2.5% growth for 3 years								

Roadway Link			2025 Background					2025 Site-Generated		2025 Background+Site		
From	To		Volume	Daily Volume	Volume	V/C Ratio	LOS	Assignment	Daily Volume	Volume	V/C Ratio	LOS
Haskell Avenue			TCC Market Station	1,673								
US 75 NBFR	**Capitol Avenue**		20.0%									
					32,963	0.65	C	20.0%	4,567	37,530	0.74	D
Volume Limit 6 Lanes =	51,000			2.5% growth for 5 additional years								
Carroll Avenue			TCC Market Station	2,509								
US 75 NBFR	**Capitol Avenue**		30.0%									
					7,070	0.74	D	7.5%	1,713	8,783	0.92	E
Volume Limit 2 Lanes =	9,500			2.5% growth for 5 additional years								

Volume Limit Based on NCTCOG DFWRTM Hourly Capacity Per Lane

I. Right-Turn Lane Analysis

Where justified, the addition of right-turn deceleration lanes can help inbound turning vehicles separate from the through traffic, avoiding conflicts and smoothing traffic flow. TxDOT has identified right-turning volume thresholds where right-turn lanes are justified. **Table 7** shows the driveway locations with right-turn driveway access to the site, and how they compare with TxDOT standards. The high inbound volume occurs in the AM peak hour for every driveway in this analysis. With the projected maximum peak hour right-turn volume meeting City of Dallas criterion, a right-turn lane is recommended for the northbound approach of the intersection of the US 75 northbound frontage road and Drive 2 and for the northbound approach of the intersection of the US 75 northbound frontage road and Drive 3.

Table 7 – Right-Turn Lane Analysis

Right-Turn Location	Projected Maximum Peak Hour Right-Turn Volume	TxDOT Threshold (Access Management Manual, Table 2-3)	City of Dallas Threshold (Off-Street Parking and Driveways Handbook, III.A.5)	Right-Turn Lane Recommended?
Drive 1 from Haskell Avenue	323 vph	60 vph	120 vph	No*
Drive 2 from US 75 NBFR	517 vph	60 vph	120 vph	Yes
Drive 3 from US 75 NBFR	339 vph	60 vph	120 vph	Yes

While the right-turning volumes at Drive 1 exceed the thresholds, a right-turn lane is not recommended at that location. By encouraging faster right-turn movements into the site, a right-turn lane at Drive 1 would be negative for the urban nature and the desirable pedestrian environment along Haskell Avenue. Compared to the frontage road, it is more important to limit the vehicle speeds along Haskell Avenue, therefore the right-turning vehicles are not as disruptive to the overall traffic flow. A right-turn lane would also require the destruction of the mature trees in the parkway east of Drive 1.

V. Traffic Operations Analysis – MITIGATION

A mitigation analysis was performed on the following intersections identified for mitigation:

- Haskell Avenue and Drive 1
- Drive 2 and the US 75 northbound frontage road
- Drive 3 and the US 75 northbound frontage road
- Carroll Avenue and the US 75 northbound frontage road
- Carroll Avenue and Capitol Avenue
- Haskell Avenue and the US 75 southbound frontage road
- Haskell Avenue and the US 75 southbound frontage road

The same analysis methodology was used as in Section IV of this report.

A. Mitigation Methodology

In order to mitigate the larger delays predicted in the initial analysis, the first recourse was to use the least expensive mitigation option and work up to the more expensive options. Possible mitigation options include, generally from less expensive to more expensive: signal retiming, signal head modifications and retiming, lane additions, and total intersection reconstruction.

B. Mitigation Feasibility

For the intersection of Drive 1 and Haskell Avenue, there is very little that can be done to change the approach from LOS E to D in the 2025 scenario. Drive 1 cannot be signalized because it is less than 300 feet from the signalized intersection of Haskell Avenue and the US 75 northbound frontage road. There is not enough room to add more westbound lanes, and an extra southbound lane would be detrimental to pedestrian access across Drive 1. As evidenced by the LOS D experienced by the southbound approach during the 2020 scenario. The proposed lane configuration can handle the site-generated volumes, and the benefit from the Officer-controlled Cityplace exit was not able to be modeled, which would have further reduced delay. In the fairly dense urban Cityplace area, LOS E will be unavoidable as the background traffic volumes swell.

The westbound right-turning approach of Drive 2 to the US 75 northbound frontage road handles 15% of the site outbound traffic, but the large delays experienced are due to the huge amount of through volume along the US 75 northbound frontage road. If the site were to only generate 1 vehicle to exit the site via Drive 2, that one vehicle would still experience LOS F. Drive 2 is less than 500 feet north of the signalized intersection of Haskell Avenue and the US 75 northbound frontage road, so the intersection cannot be signalized. Adding a second westbound left-turning lane would hurt the pedestrian accessibility across Drive 2 and may encourage unsafe maneuvers.

Exact configuration of Drive 3 and the adjacent TCC Market Center driveway is unknown and will be coordinated through TxDOT. For the most conservative analysis, the site traffic and the TCC Market Center background traffic are both modeled as using Drive 3. In both the 2020 and 2025 scenarios, Drive 3 operates at a volume to capacity ratio (v/c) of less than 1, which means that it is able to serve every vehicle that chooses to utilize the driveway. During the 2025 PM peak, the delay reaches 70.4 seconds. This is considerably lower than the 120 second cycle length at the intersection of Haskell Avenue and the US 75 northbound frontage road. From a functional standpoint, Drive 3 operates well, given the fact that it is accessing a frontage road to a major US highway. Like Drive 2, there is no obvious mitigation available for Drive 3. While it is about 700 feet from the intersection of Haskell Avenue and the US 75 northbound frontage road, it is only 200 feet north of the on-ramp to the US 75 main lanes, which is not an ideal location for a signalized intersection. Therefore, adding a second right-turn lane is the chosen method of mitigation.

The westbound approach of Carroll Avenue to the US 75 northbound frontage road operates with 99.8 seconds of delay during the 2020 PM peak hour and with a v/c ratio of 1.026. Handling the traffic from both sites and the grown background traffic, the approach just barely reaches its capacity. After the background volumes grow for the 2025 scenario, the delay jumps to 193 seconds. The bulk of the delay is quite obviously from the background growth. Nevertheless, if a mid-segment signalized intersection between Haskell Avenue and Fitzhugh Avenue were to be constructed, Carroll Avenue is the ideal location. It is essentially halfway between the two major roads and is accessible by both the Haskell Avenue development and the background development. Therefore, Carroll Avenue will be analyzed in two scenarios. The first will be, like Drive 3, as a double-lane right-turn lane. The second will be as a one-lane, signalized right-turn. In the latter scenario, some of the traffic volume will be reassigned from Drive 3 to Carroll Avenue to model how drivers would divert their path to take advantage of the signalized intersection.

The intersection of Carroll Avenue and Capitol Avenue is currently all-way stop-controlled. 24-hour traffic volume counts were not collected along Capitol Avenue. However, four hours of traffic data were taken from the AM and PM peak hour traffic counts included in this report. For the 2020 background volumes, the Eight-Hour and the Four-Hour Traffic Volume Warrants are met for the two PM peak hours. While a true signal warrant analysis would have to be conducted to justify a traffic signal at the intersection of Carroll Avenue and Capitol Avenue, the fact that the warrants are being met during the peak hours with just the background traffic makes it reasonable to assume that the intersection will fully meet the warrants in the near future. Therefore, the mitigation chosen for the intersection is to signalization without changing the lane configuration.

The intersections of Haskell Avenue with the US 75 frontage roads are built to their realistic extents, so adding lanes at this time is not a feasible solution to reduce delay. Adding lanes would also negatively affect pedestrian crossing conditions. During the 2020 scenario, the site traffic is handled favorably with both of the intersections operating at LOS D or better in the AM peak hour and just barely over the LOS E threshold during the PM peak hour. Therefore, the cause of the change to LOS E during the 2025 scenario is due mainly to background growth. The only mitigation option available is to retime the signals. The interchange currently operates with a three-phase cycle. With many interchanges, simply changing the three-phase cycle to a four-phase cycle can increase capacity. However, the through volumes along the US 75 frontage roads cause a four-phase cycle to be very inefficient and push the intersection to stay with its current three phase operation. LOS E is very common for urban interchanges located in denser parts of a city and should not be considered a failing level of service.

The northbound approach to the intersection of Haskell Avenue with Capitol Avenue operates at LOS E during the PM peak hour of the 2025 scenarios. The wide median and narrow width of Capitol Avenue causes this intersection to be “Split-Phased,” which means the north- and southbound approaches cannot run concurrently. This is a very inefficient traffic signal phasing style, but it is necessary given the intersection geometry. The delay experienced at the northbound approach is multiplied by the split-phasing. Because coordination is desired along Haskell Avenue, more time should not be taken from Haskell Avenue to give to Capitol Avenue, so there is no reasonable way to lower the delay back to LOS D for the northbound approach. Southbound Capitol Avenue already has a right-turn lane and adding other through lanes is not advantageous due to the wide median arrangement. Any widening would also increase the pedestrian crossing distance and hurt walkability along Haskell Avenue.

C. Mitigation Results

Table 8 shows the mitigation results from the addition of second right-turn lanes to the westbound approaches of Drive 3 and Carroll Avenue to the US 75 northbound frontage road. **Table 9** shows the mitigation results from the construction of signalizing the intersection of Carroll Avenue and the US 75 northbound frontage road. **Table 10** shows the mitigation results from signalizing the intersection of Carroll Avenue and Capitol Avenue.

Table 8 – 2025 PM Peak Hour Mitigation Results – Double Right-Turns for Drive 3 and Carroll Avenue

INTERSECTION	APPROACH	2025 Background Plus Site PM			
		AS PROPOSED		MITIGATIONS	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Drive 3 @ US NBFR	WBR1*	70.4	F	22.3	C
	WBR2*	-	-	34.2	D
Carroll Avenue @ US NBFR	WBR1*	193.0	F	29.8	D
	WBR2*	-	-	67.8	F

Table 9 – 2025 PM Peak Hour Mitigation Results – Signalization of Carroll Avenue

INTERSECTION	APPROACH	2025 Background Plus Site PM			
		AS PROPOSED		MITIGATIONS	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Drive 3 @ US NBFR	WBR1*	70.4	F	34.9	D
Carroll Avenue @ US NBFR	WBR1*	193.0	F	-	-
Carroll Avenue @ US NBFR *Signalized*	WB	-	-	52.9	D
	NB	-	-	14.2	B
	Overall	**-**	**-**	**20.8**	**C**

Table 10 – 2025 PM Peak Hour Mitigation Results – Signalization of Carroll at Capitol

INTERSECTION	APPROACH	2025 Background Plus Site PM			
		AS PROPOSED		MITIGATIONS	
		DELAY (SEC/VEH)	LOS	DELAY (SEC/VEH)	LOS
Carroll Avenue @ Capitol Avenue	NB*	200.0+	F	-	-
	EB*	187.5	F	-	-
	WB*	109.2	F	-	-
	SB*	133.3	F	-	-
	Overall	**188.6**	**F**	**-**	**-**
Carroll Avenue @ Capitol Avenue	EB	-	-	33.4	C
	WB	-	-	19.8	B
	NB	-	-	32.8	C
	SB	-	-	17.5	B
	Overall	**-**	**-**	**26.7**	**C**

D. 2025 Mitigation Traffic Operations – Double Right-Turn

After the westbound approaches of Drive 3 and Carroll Avenue to the US 75 northbound frontage road are given an additional right-turn lane, the delays are greatly reduced. Both approaches of Drive 3 to the frontage road operate at LOS D or better afterwards. The approaches of Carroll Avenue experience similar reductions, changing to LOS D and F. While one of the right-turning approaches operates at LOS F, the delay experienced is approximately one third of the original delay, and both Carroll Avenue approaches operate with a v/c of less than one, signifying that they are functioning well.

E. 2025 Mitigation Traffic Operations – Signalization of Carroll Avenue

The signalization of the intersection of Carroll Avenue with the US 75 northbound frontage road, and the subsequent redistribution of westbound right-turning traffic volume from Drive 3 to Carroll Avenue, improves traffic conditions greatly. Both Drive 3 and Carroll Avenue have one approach lane in this scenario. Drive 3 changes from LOS F to D, and the westbound approach of Carroll Avenue also changes from LOS F to D.

The intersection of Carroll Avenue and the US 75 northbound frontage road meets the Four-Hour Traffic Volume Warrants with 2017 existing traffic.

F. 2025 Mitigation Traffic Operations – Signalization of Carroll at Capitol

The signalization of Carroll Avenue at Capitol Avenue, without any lane additions, changes the levels of service to C or better for all approaches, and the intersection as a whole changes to LOS C as well.

The intersection of Carroll Avenue at Capitol Avenue meets the traffic signal warrants for two hours during the PM peak of the 2020 background scenario.

VI. CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, the proposed Haskell Avenue Mixed-Use site, located at the northeast corner of US 75 and Haskell Avenue in Dallas, TX, 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 significantly affect the existing traffic operations.

The following improvements are recommended for this site:

At Drive 2, a northbound deceleration lane should be constructed.

At Drive 3, a northbound deceleration lane should be constructed.

The intersection of Carroll Avenue and Capitol Avenue meets traffic signal volume warrants for multiple hours in the background future scenarios. A full traffic signal study should be conducted to determine if a traffic signal is warranted. The intersection should be monitored for signalization if conditions change in the future. Haskell Avenue site-generated traffic represents approximately 20% of the traffic at this intersection during the 2020 scenario.

The intersection of Carroll Avenue and the US 75 northbound frontage road meets the Four-Hour Traffic Volume Warrants with 2017 existing traffic. If the stop-controlled approach is judged necessary to be mitigated, a traffic signal would aid the access to the US 75 northbound frontage road for the development drivers and may be necessary as the background volumes of the city continue to grow. Haskell Avenue site-generated traffic represents less than 15% of the traffic at this intersection during the 2020 scenario.

It is recommended to enhance the pedestrian connections through and around the site to maximize potential not only for walkability within the neighborhood but also for connections to transit options.