

## MEMORANDUM

To: David Nevarez  
 Transportation Engineer, City of Dallas

From: Scot Johnson, P.E., PTOE  
 Jake Halter, EIT

Date: January 26, 2021

Subject: Traffic Impact Analysis Addendum  
 Z189-141 Project McKinney  
 NEC McKinney Avenue and Lemmon Avenue



### Introduction

A Traffic Impact Analysis (TIA) was completed by Kimley-Horn for the Project McKinney (Z189-141) development on November 26, 2018. Since 2018, the Project McKinney development plan has evolved, so this TIA Addendum Memo will serve to document the slight change in the trip generation and to update the conclusions of the original TIA for the current submission.

### Trip Generation Comparison

The original TIA offered four development scenarios for the Project McKinney development. Of these four, the Hotel + Multifamily Scenario was considered to be the main scenario. The trip generation for this scenario is found in **Table 1**.

**Table 1 – Trip Generation for Previously Proposed Hotel + MF Scenario**

Land Uses	Amount	Units	ITE Code	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (High-Rise)	270	Units	222	1,276	21	67	88	61	39	100
Hotel	220	Rooms	310	2,057	62	43	105	71	68	139
General Office Building	450,000	SF	710	4,564	386	63	449	76	399	475
Supermarket	95,000	SF	850	10,144	330	304	634	375	347	722
Supermarket Administration (Office)	20,000	SF	710	223	39	6	45	4	21	25
Retail/Shopping Center	25,000	SF	820	944	15	9	24	46	49	95
Quality Restaurant	10,000	SF	931	838	6	1	7	52	26	78
<b>Development Totals</b>										
Raw Trip Generation Total:				20,046	859	493	1,352	685	949	1,634
Internal Capture Total:				4,334	62	62	124	156	156	312
External Trips:				15,712	797	431	1,228	529	793	1,322
10% Multimodal Reduction:				1,571	80	43	123	53	79	132
Total Net New External Vehicle Trips:				14,141	717	388	1,105	476	714	1,190

For the updated proposal, the hotel, retail, and restaurant uses were removed, the office space was reduced, the supermarket area was increased, and the number of multifamily units was increased. The trip generation for the currently proposed development plan can be seen in **Table 2**.

Z201-178

**Table 2 – Trip Generation for Currently Proposed MF Scenario**

Land Uses	Amount	Units	ITE Code	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (High-Rise)	800	Units	222	3,364	57	180	237	171	110	281
General Office Building	60,000	SF	710	646	71	12	83	11	59	70
Supermarket	120,000	SF	850	12,814	416	384	800	474	438	912
Supermarket Administration (Office)	20,000	SF	710	223	39	6	45	4	21	25
<b>Development Totals</b>										
Raw Trip Generation Total:				17,047	583	582	1,165	660	628	1,288
Internal Capture Total:				2,006	15	15	30	152	153	305
External Trips:				15,041	568	567	1,135	508	475	983
10% Multimodal Reduction				1,504	57	57	114	51	48	98
<b>Total Net New External Vehicle Trips:</b>				<b>13,537</b>	<b>511</b>	<b>510</b>	<b>1,022</b>	<b>457</b>	<b>428</b>	<b>885</b>

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

**Table 3** shows a comparison between the previous and current trip generation. The current trip generation is lower in each peak hour and in the overall daily trips. During the crucial PM peak hour, the currently proposed site generates over 25% fewer trips than the previously proposed plan. Furthermore, the current trip generation is better balanced when comparing inbound versus outbound trips in each peak hour. This leads to a more efficient use of infrastructure and fewer concentrated, high delay movements.

**Table 3 – Trip Generation Comparison**

Scenario	Daily One-Way Trips	AM Peak Hour One-Way Trips			PM Peak Hour One-Way Trips		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Previous Hotel + Multifamily Scenario	14,141	717	388	1,105	476	714	1,190
Current Multifamily Scenario	13,537	511	510	1,022	457	428	885
<b>Difference between previous Hotel + MF and current proposed trip gen scenarios:</b>							
	-604	-206	122	-84	-19	-286	-305
<b>Percent Difference between scenarios:</b>							
	-4%	-29%	32%	-8%	-4%	-40%	-26%

**Area Development Since 2018**

Since the finalization of the TIA, there have been some infrastructure improvements in the area of the site. A traffic signal has been constructed at the intersection of Oak Grove Avenue with Lemmon Avenue and is functional as of the writing of this memo. There are plans to build a traffic signal at the intersection of Oak Grove Avenue and Lemmon Avenue East, so this intersection is modeled as signalized as well. These signals were recommended in the TIA.

**Traffic Operations Analysis**

In light of the changes outlined above, traffic was regenerated for the site. The trip assignment from the TIA will be used again here since the driveway access is not changing. The updated exhibits, showing the current site traffic distribution, are attached to the end of this memo. The updated traffic operations analysis results are summarized in **Table 4**. As in the original TIA, the 2026 scenario uses the two-way configuration of McKinney Avenue and Cole Avenue.

Z201-178

Generally, the external intersections operate approximately the same as they did in the 2018 TIA. See the 2018 TIA for a full discussion of the external intersections. The intersections including the site driveways and the intersections of Oak Grove Avenue with Lemmon Avenue and Lemmon Avenue East are affected more specifically by the update and will be discussed here.

Since the traffic signal at the intersection of Oak Grove Avenue with Lemmon Avenue is already functional, this update removed any reference to the intersection being unsignalized. Likewise, the intersection of Oak Grove Avenue with Lemmon Avenue East will be signalized when the Project McKinney site is operational, so it will be analyzed as signalized as well.

The traffic operations analysis shows that the North and South Drives operate at LOS D or better during the AM peak hour in both study year scenarios. The South Drive operates at LOS E during the PM peak. The North Drive, which had an LOS E approach in the original TIA, operates at LOS D or better during both peak hours. When analyzing a minor street or driveway approach to a major arterial like Lemmon Avenue or Lemmon Avenue East, LOS E does not indicate approach failure and is typically expected by drivers. No mitigations are recommended to lower this delay any further.

The approaches to the intersection of the East Drive with Oak Grove Avenue operates at LOS B or better during both scenarios. The site driveways function well and provide appropriate access to the local street network for the Project McKinney site.

The signalized intersections of Oak Grove Avenue with Lemmon Avenue and with Lemmon Avenue East function excellently during all scenarios, operating at LOS B or better overall. This is expected due to the low volumes along Oak Grove Avenue.

Z201-178

Table 4 – Traffic Operations Analysis Results

INTERSECTION	APPROACH	2021 Background plus Site Traffic		2026 Background plus Site Traffic		2021 Background plus Site Traffic		2026 Background plus Site Traffic	
		AM Peak Hour		AM Peak Hour		PM Peak Hour		PM Peak Hour	
		DELAY (SEC/VB)	LOS	DELAY (SEC/VB)	LOS	DELAY (SEC/VB)	LOS	DELAY (SEC/VB)	LOS
Lemmon Avenue East @ Cole Avenue	WB	8.6	A	52.0	D	3.1	A	12.8	B
	NB	-	-	54.9	D	-	-	34.6	C
	SB	46.4	D	81.7	F	46.4	D	17.4	B
	Overall	22.8	C	60.7	E	17.7	B	16.7	B
Lemmon Avenue @ Cole Avenue/ Carlisle Street	EB	28.6	C	34.0	C	20.8	C	51.6	D
	NB	-	-	9.8	A	-	-	24.1	C
	SB	5.8	A	34.7	C	14.3	B	25.5	C
	Overall	18.1	B	32.6	C	18.8	B	44.0	D
Lemmon Avenue East @ McKinney Avenue	WB	8.3	A	19.8	B	20.7	C	35.7	D
	NB	22.9	C	55.9	E	19.5	B	27.0	C
	SB	-	-	45.5	D	-	-	19.0	B
	Overall	12.6	B	31.1	C	20.1	C	31.0	C
Lemmon Avenue @ McKinney Avenue	EB	0.9	A	3.6	A	10.1	B	25.8	C
	NB	46.8	D	39.5	D	45.4	D	63.9	E
	SB	-	-	81.0	F	-	-	39.9	D
	Overall	13.7	B	24.0	C	20.9	C	36.3	D
Lemmon Avenue @ US 75 SBFR	EB	36.6	D	39.5	D	55.4	E	68.5	E
	WB	8.3	A	11.4	B	3.4	A	3.6	A
	SB	62.1	E	72.4	E	57.2	E	57.7	E
	Overall	32.3	C	37.4	D	42.8	D	49.4	D
Lemmon Avenue @ US 75 NBRF	EB	4.3	A	4.2	A	3.8	A	3.0	A
	WB	99.8	F	99.3	F	54.6	D	54.5	D
	NB	27.3	C	32.9	C	40.9	D	88.7	F
	Overall	46.0	D	47.8	D	26.5	C	42.9	D
McKinney Avenue @ Blackburn Street	EB	13.7	B	49.9	D	23.1	C	30.9	C
	WB	28.1	C	50.5	D	34.5	C	76.6	E
	NB	3.5	A	35.4	D	4.1	A	66.8	E
	SB	-	-	24.2	C	-	-	32.7	C
Overall	17.5	B	45.3	D	17.7	B	54.0	D	
McKinney Avenue @ Hall Street	EB	8.2	A	7.9	A	18.7	B	15.1	B
	WB	8.7	A	9.3	A	13.0	B	19.5	B
	NB	14.5	B	12.3	B	15.8	B	14.3	B
	SB	-	-	21.6	C	-	-	28.7	C
Overall	11.4	B	12.2	B	15.7	B	18.9	B	
Lemmon Avenue East @ North Drive	NBL1*	28.5	D	30.1	D	22.4	C	23.6	C
	NBL2*	21.7	C	22.5	C	18.8	C	19.6	C
Lemmon Avenue @ South Drive	SBL1*	24.5	C	25.8	D	42.7	E	47.5	E
	SBL2*	18.1	C	18.7	C	26.6	D	28.3	D
Lemmon Avenue East @ Oak Grove Avenue (Signalized)	WB	10.0	A	10.5	B	9.6	A	10.1	B
	NB	32.9	C	34.5	C	34.0	C	36.9	D
	SB	2.9	A	3.1	A	8.3	A	9.5	A
	Overall	10.6	B	11.1	B	11.1	B	11.8	B
Lemmon Avenue @ Oak Grove Avenue	EB	5.5	A	5.2	A	12.1	B	13.4	B
	NB	12.4	B	12.9	B	27.5	C	28.0	C
	SB	26.0	C	26.7	C	44.8	D	35.1	D
	Overall	9.3	A	9.1	A	14.5	B	15.2	B
Oak Grove Avenue @ East Drive	NBL	7.9	A	8.1	A	7.6	A	7.8	A
	EB*	11.0	B	11.4	B	9.7	A	10.4	B

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

201-178

**Conclusions**

The Project McKinney site updates from the 2018 TIA do not change the recommendations therein and do not degrade the traffic operations of the local street network. The site can be incorporated into the area without any additional changes to the external street network.

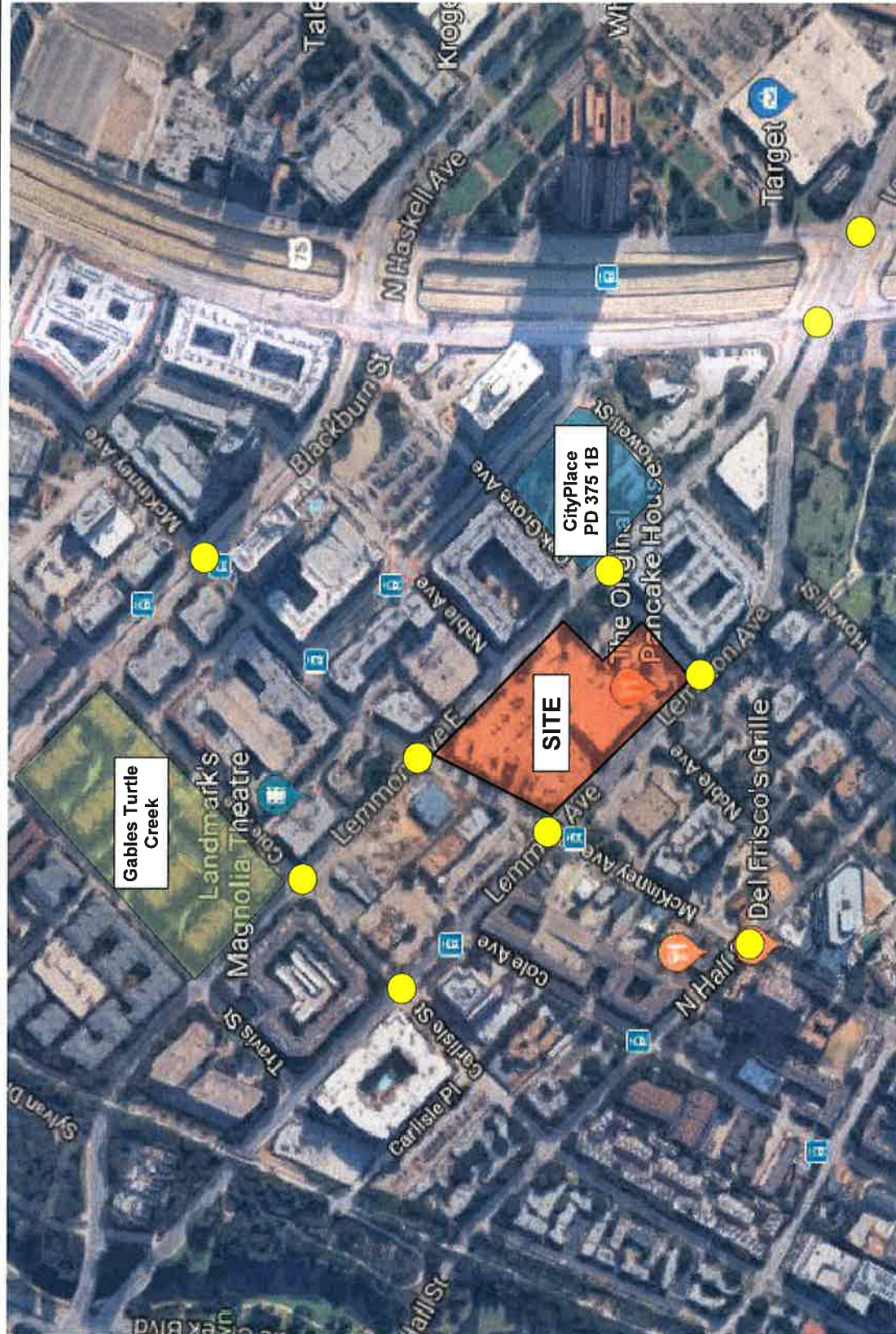
**END**

Attachments: Exhibits 1-14 and A1-A8, updated to account for the new site plan  
Synchro™ Results for TIA Addendum Traffic Operations Analysis

Z201-178

**TIA Addendum Exhibits**

*Z201-178*



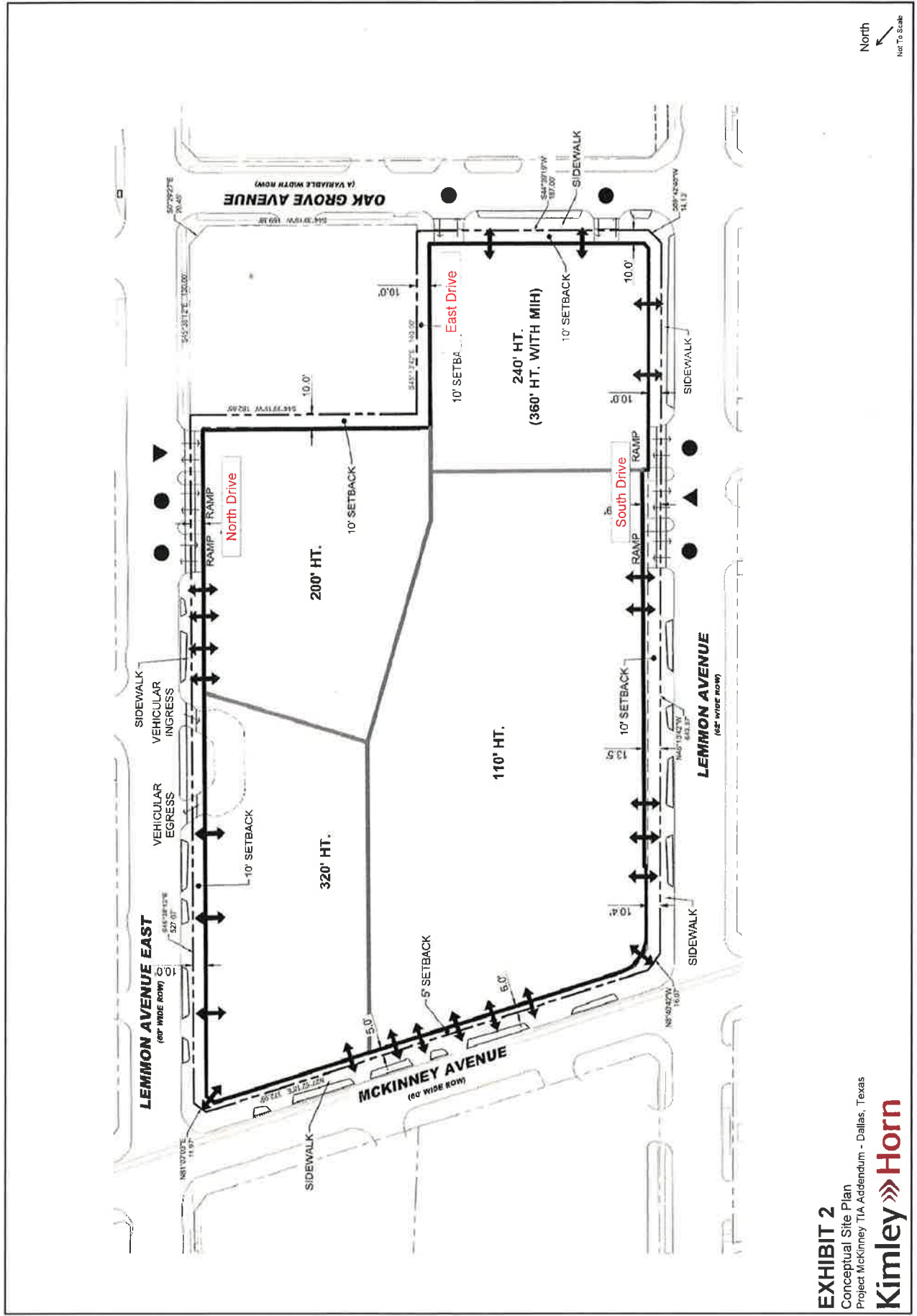
LEGEND:  
 ● Study Intersection

North  
 ↑  
 Not To Scale

**EXHIBIT 1**  
 Vicinity Map  
 Project McKinney TIA Addendum - Dallas, Texas

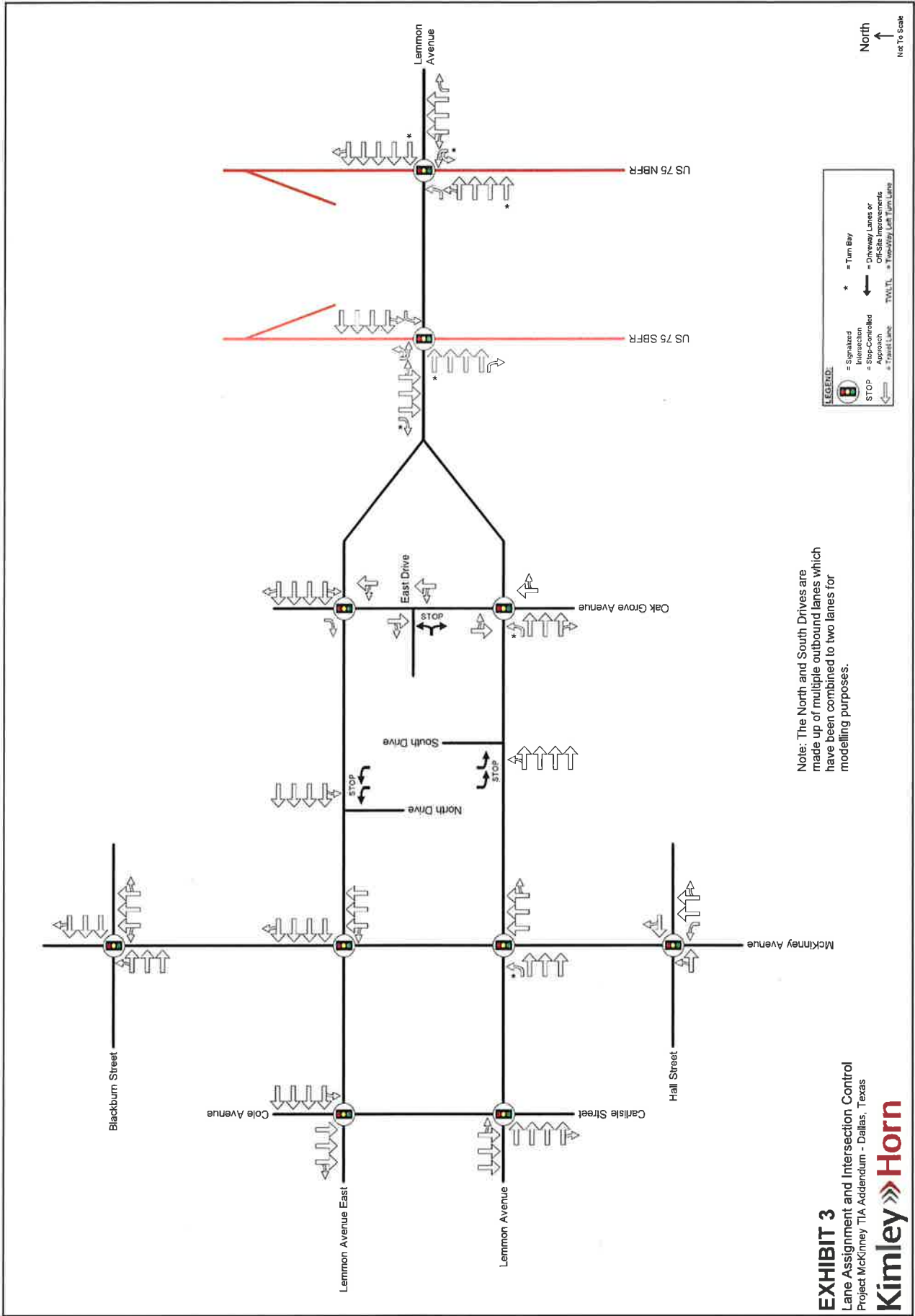


Z201-178



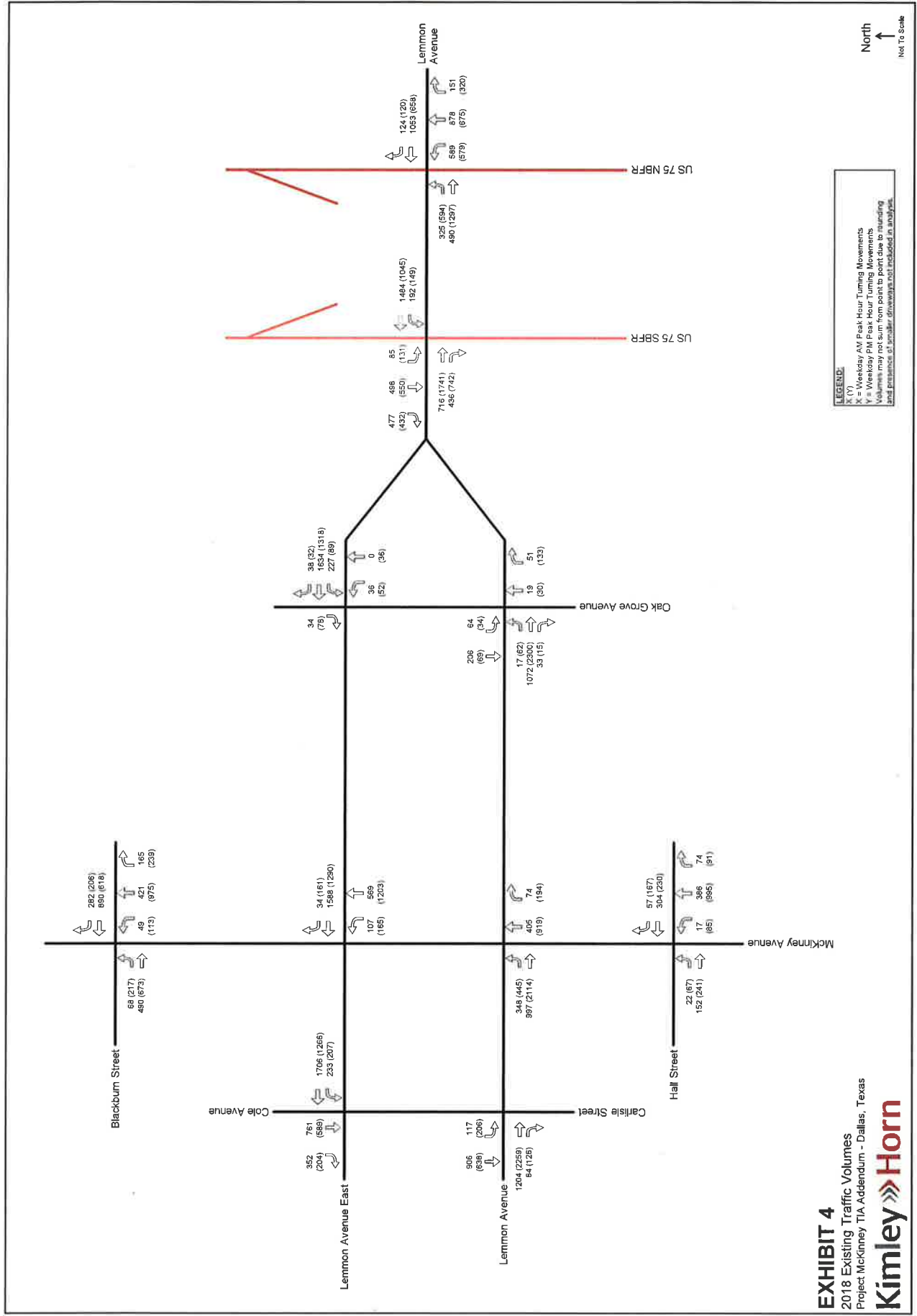
Z 201-178



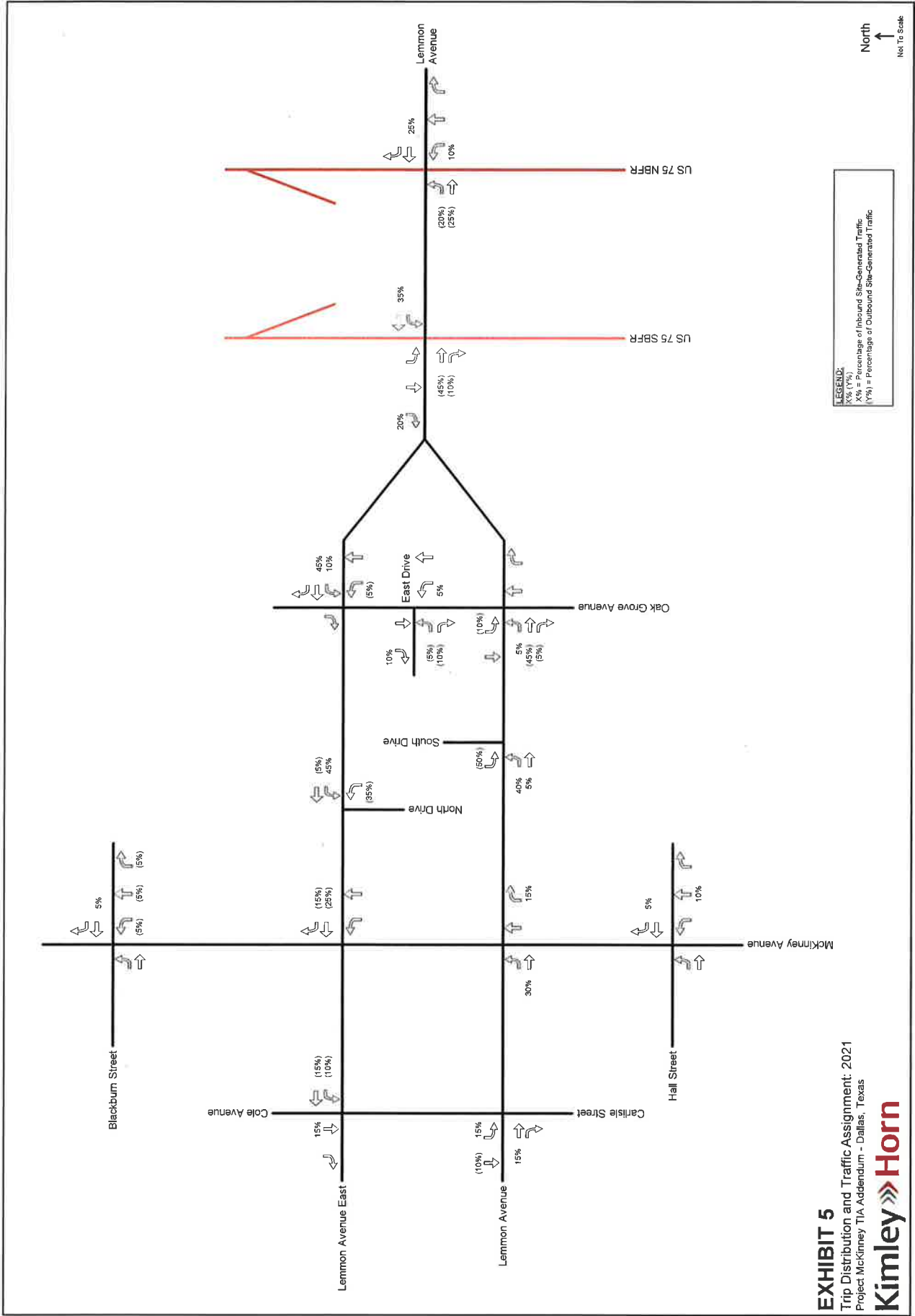


Z201-178

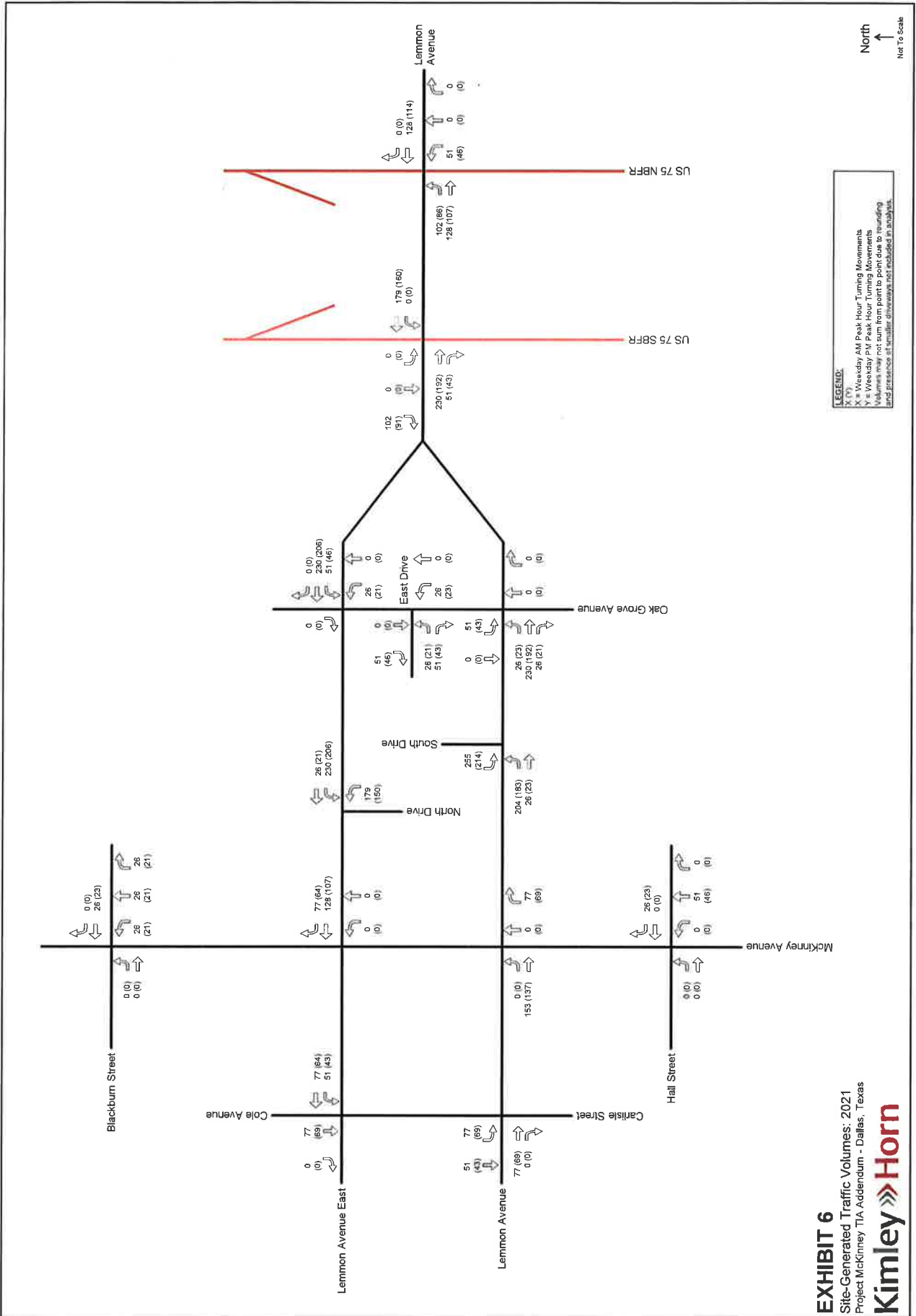
Z201-178



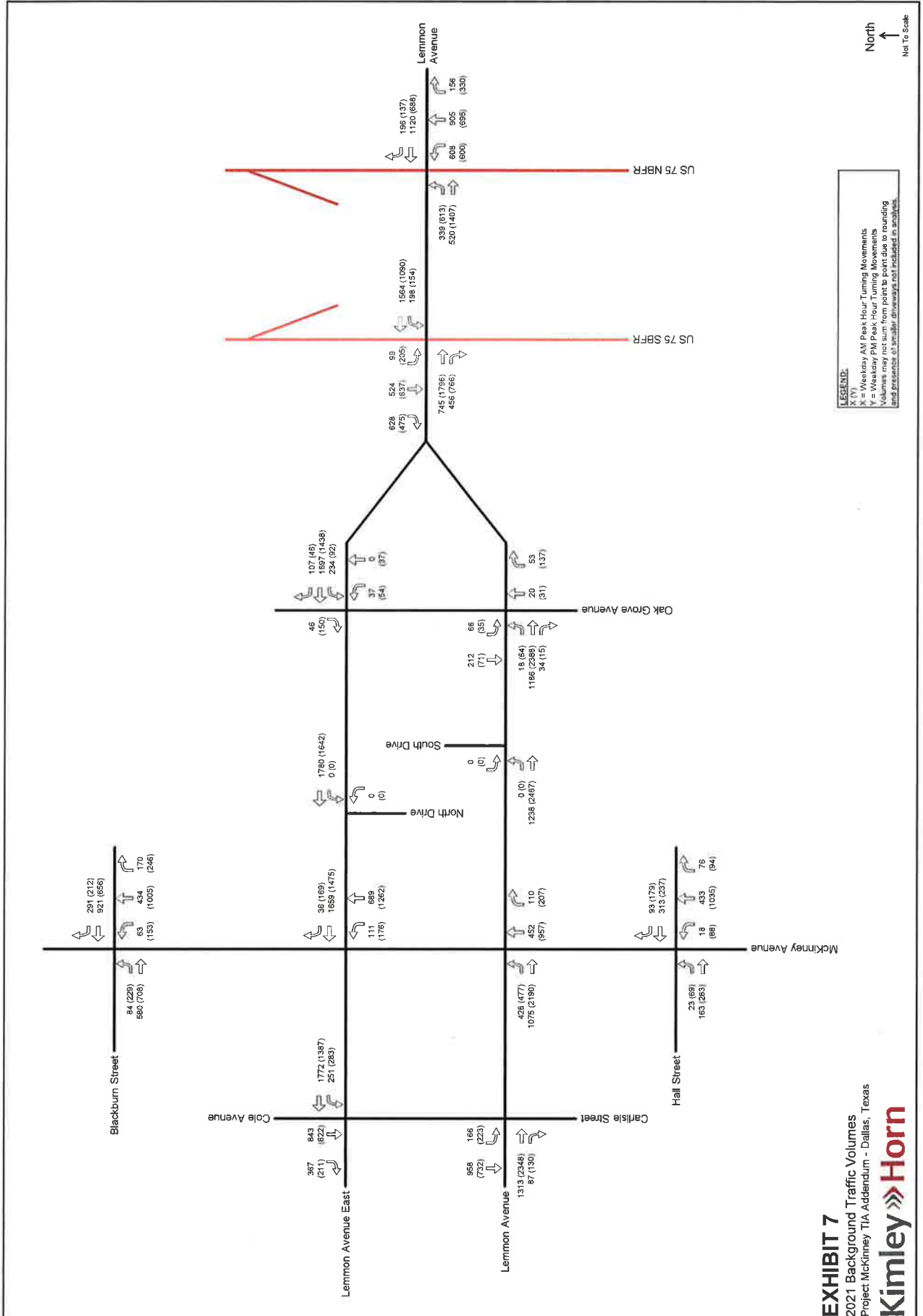
Z201-178

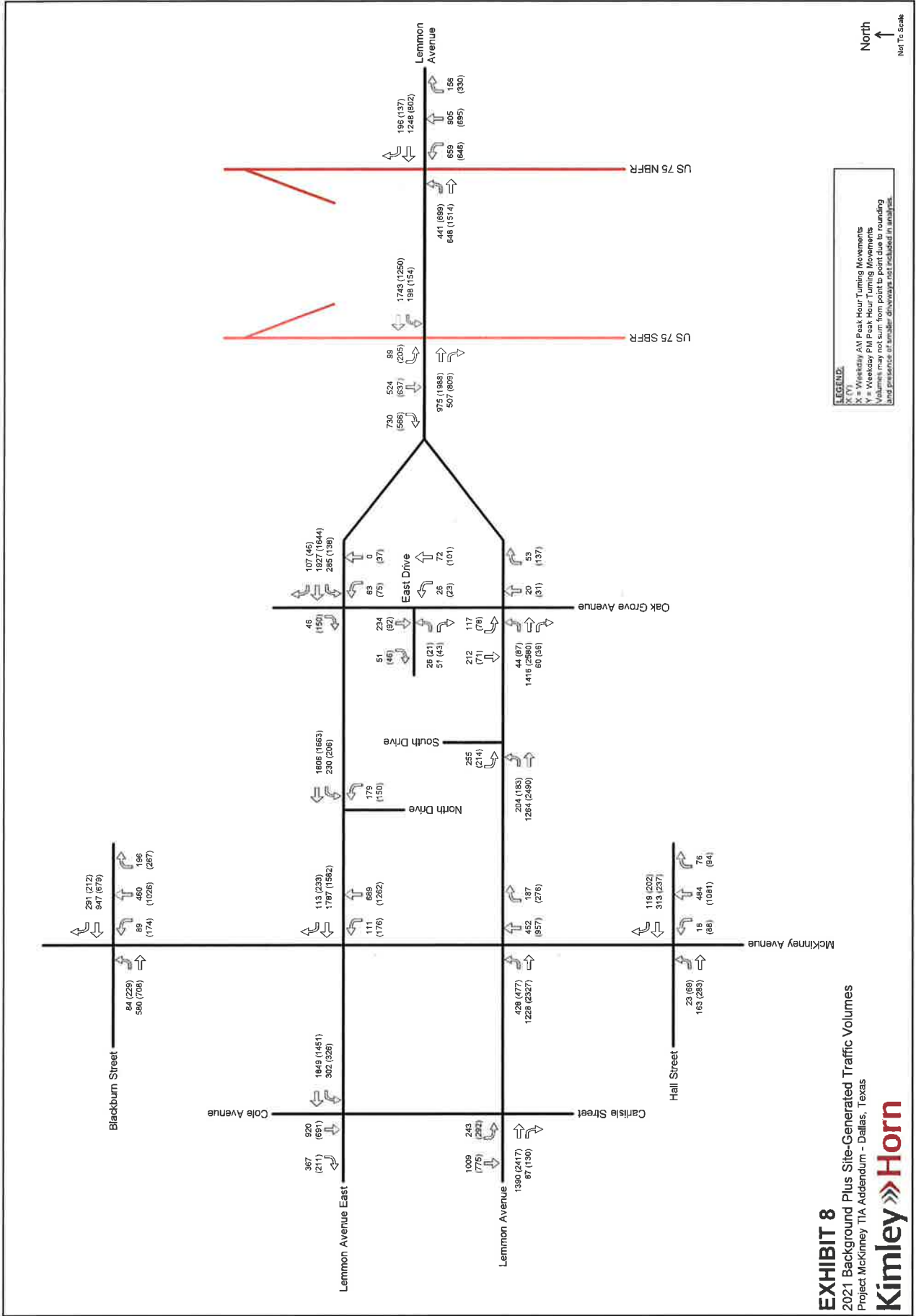


Z 201-178



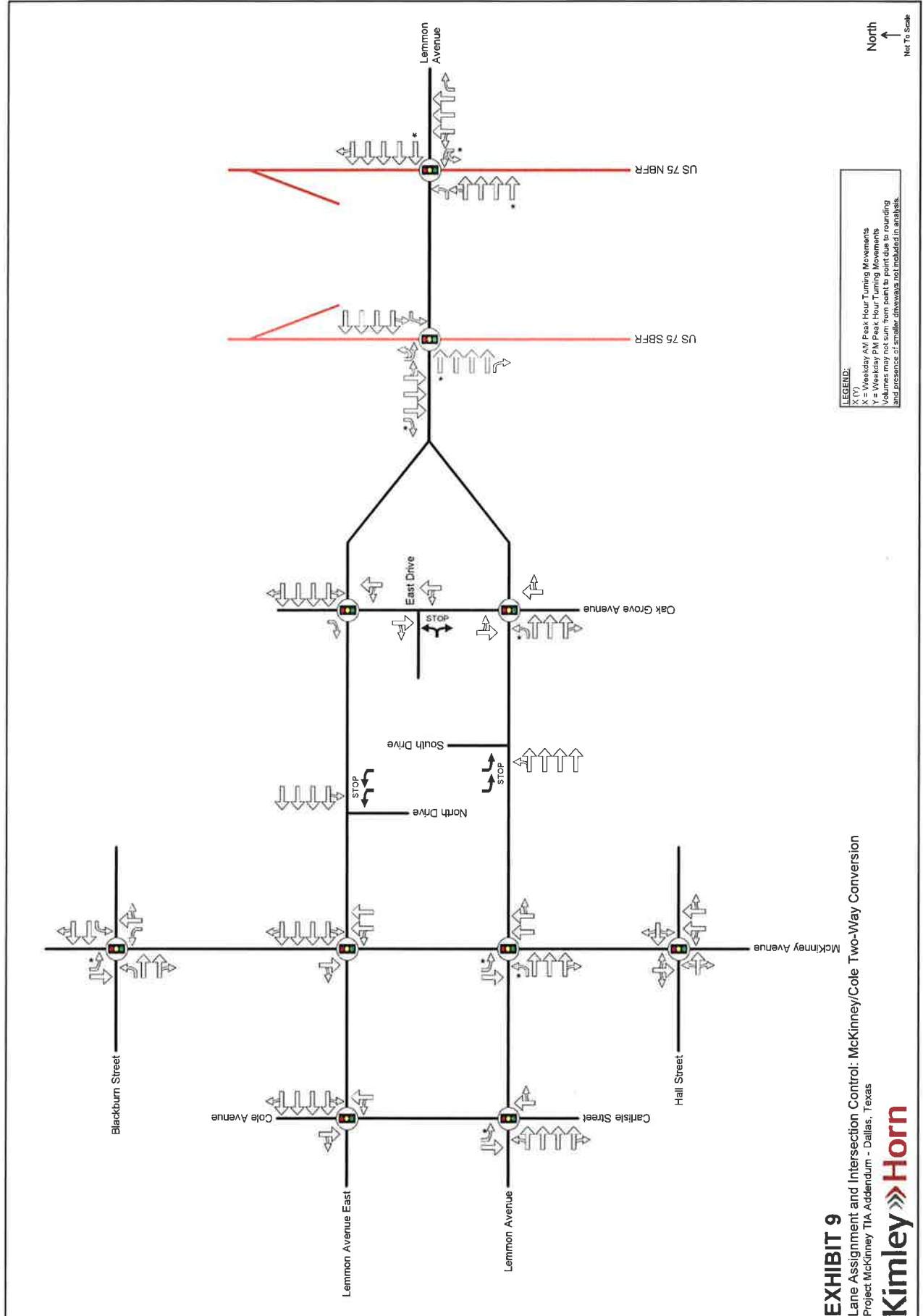
Z201-178





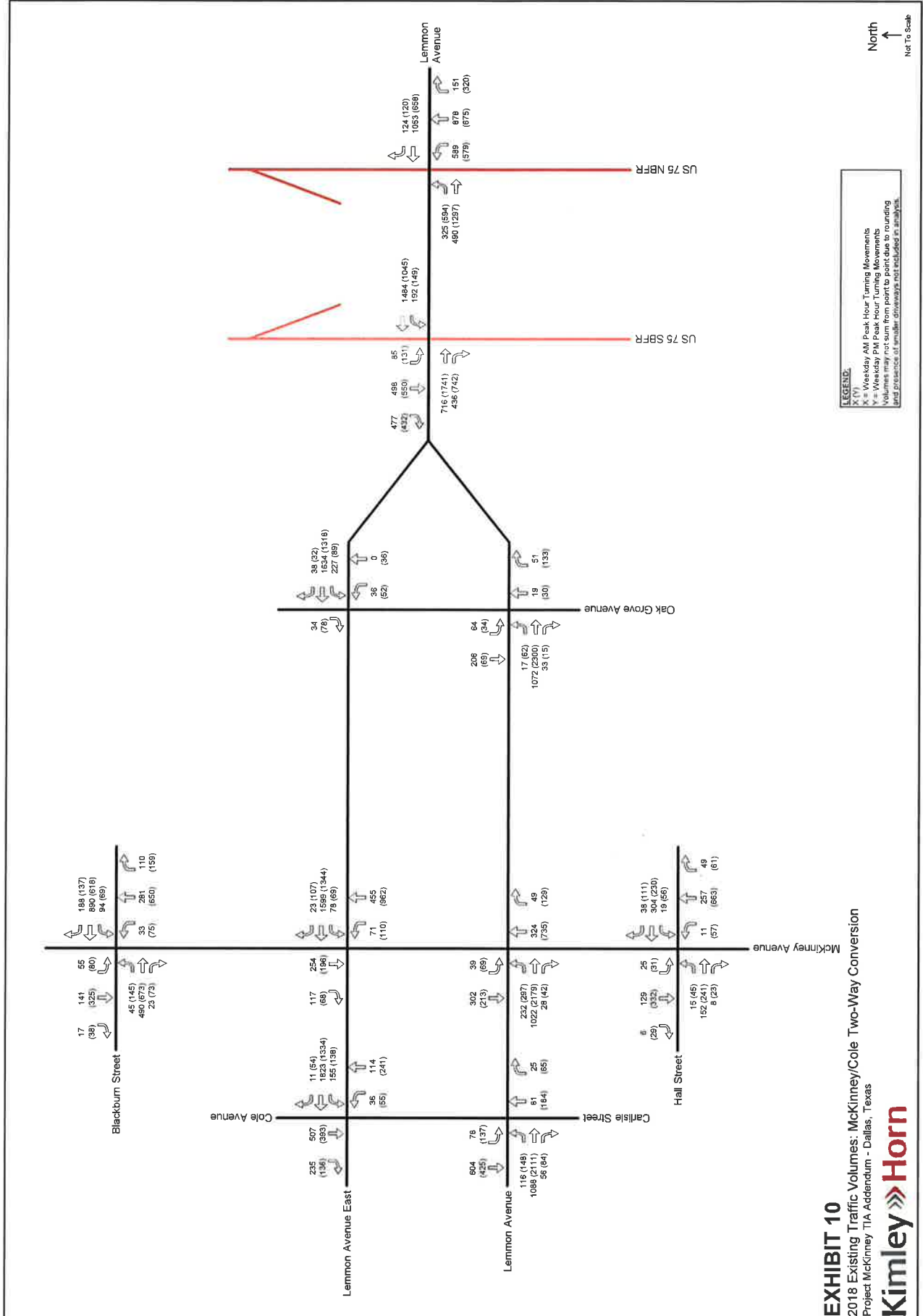
Z201-178

Z 201-178



**EXHIBIT 9**  
 Lane Assignment and Intersection Control: McKinney/Cole Two-Way Conversion  
 Project McKinney TIA Addendum - Dallas, Texas  
**Kimley»Horn**

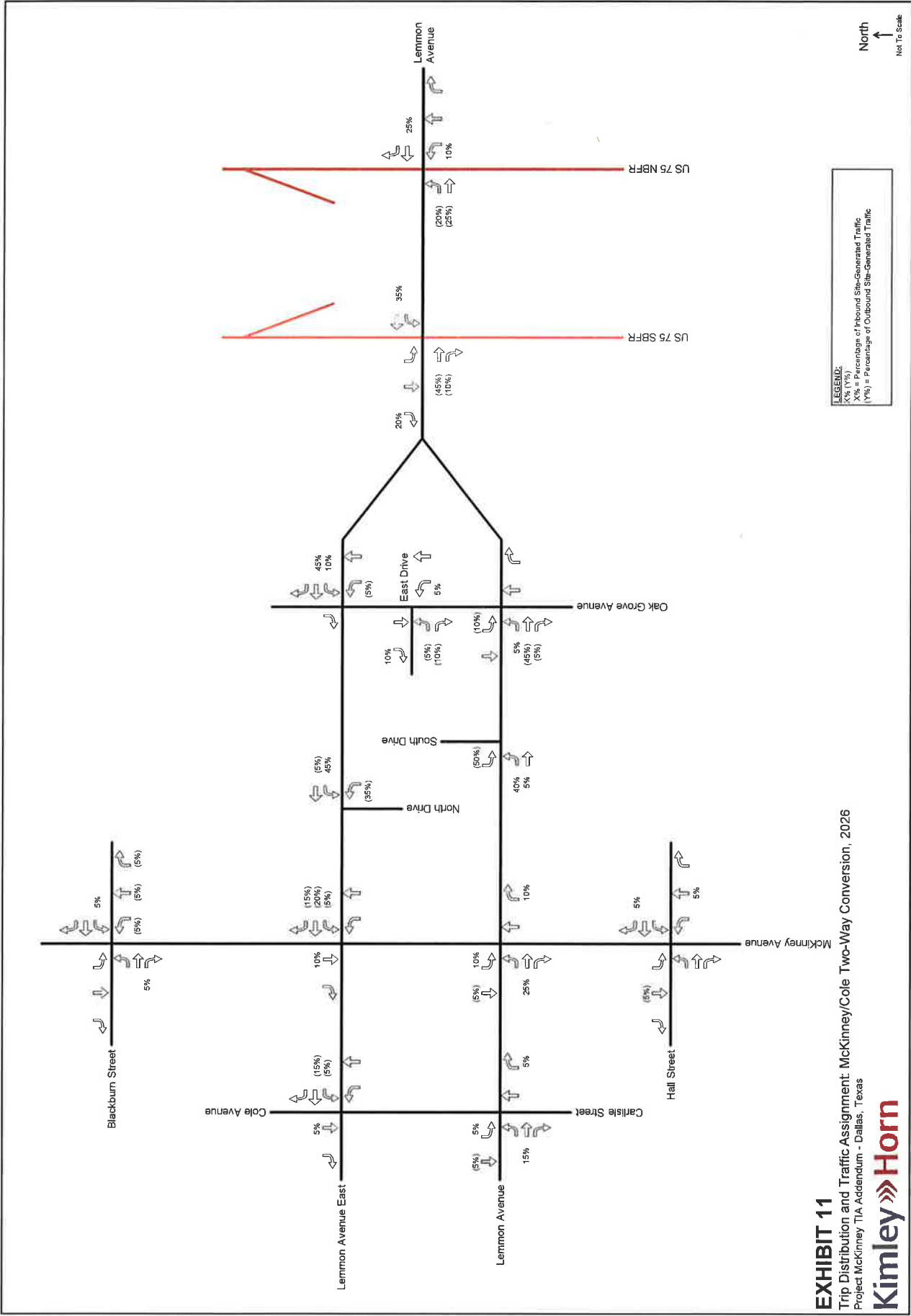
201-178



**EXHIBIT 10**  
 2018 Existing Traffic Volumes: McKinney/Cole Two-Way Conversion  
 Project McKinney TIA Addendum - Dallas, Texas





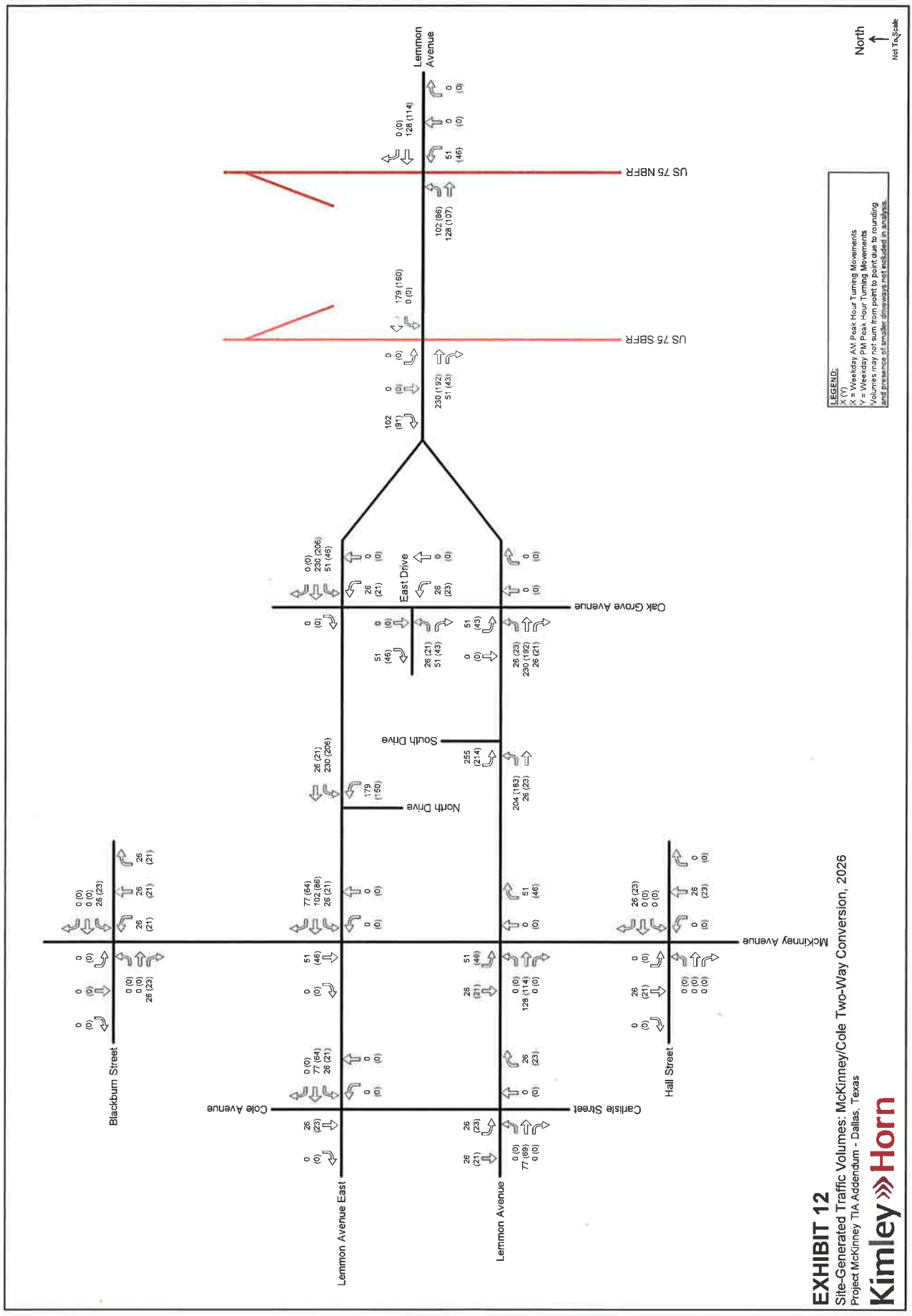


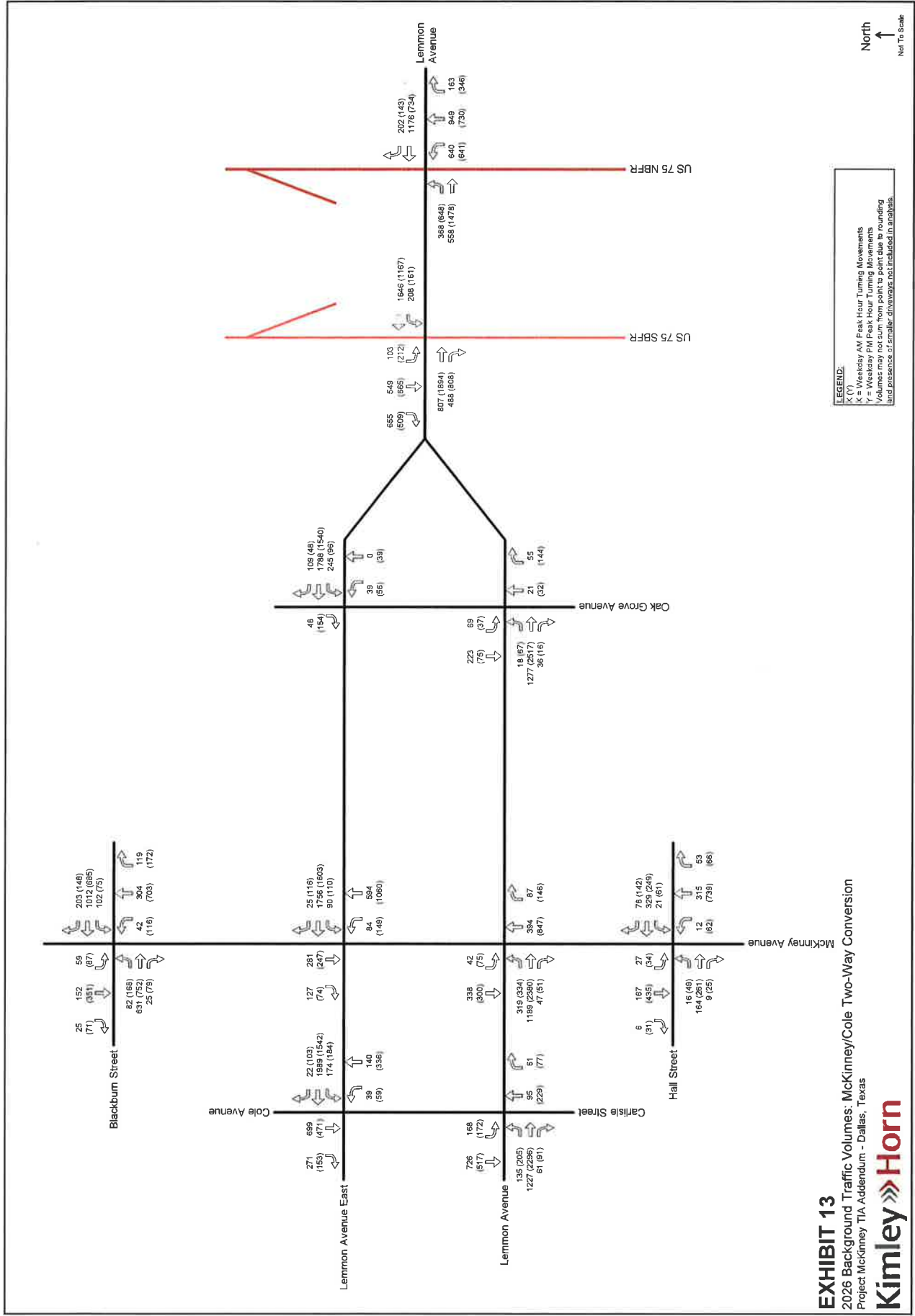
201-178

**EXHIBIT 11**  
 Trip Distribution and Traffic Assignment: McKinney/Cole Two-Way Conversion, 2026  
 Project McKinney TIA Addendum - Dallas, Texas



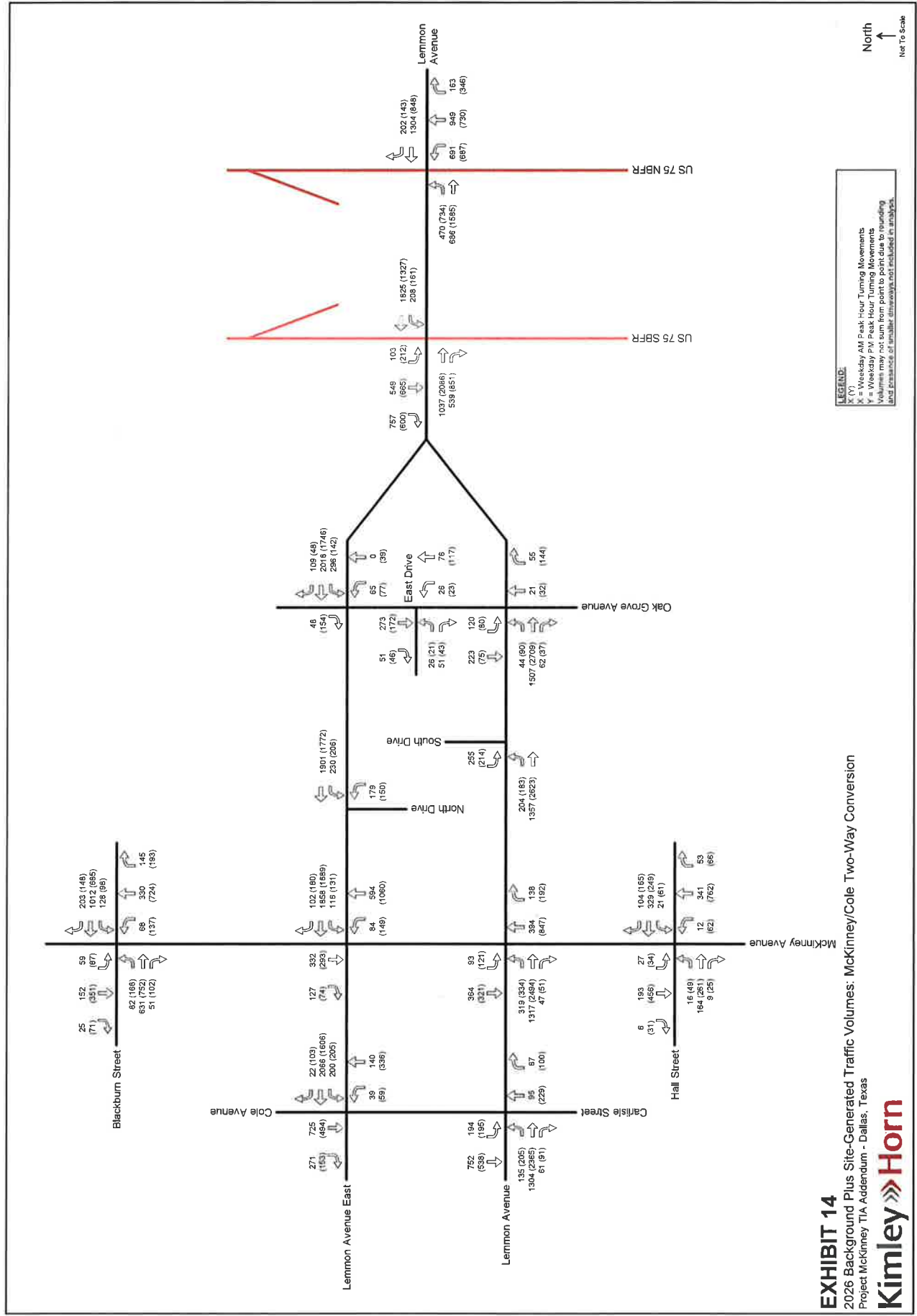
Z 201-178



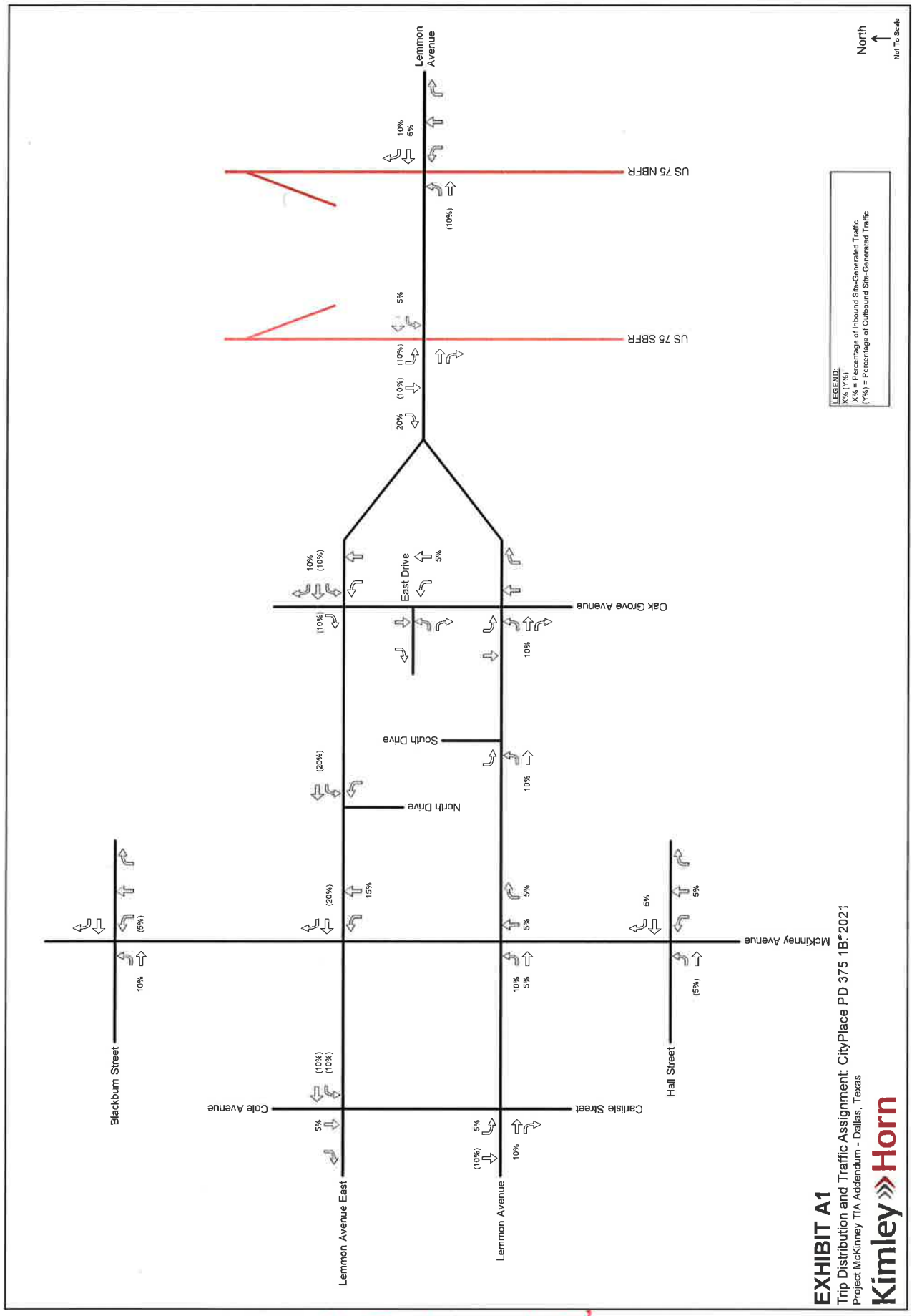


Z201-178

Z201-178

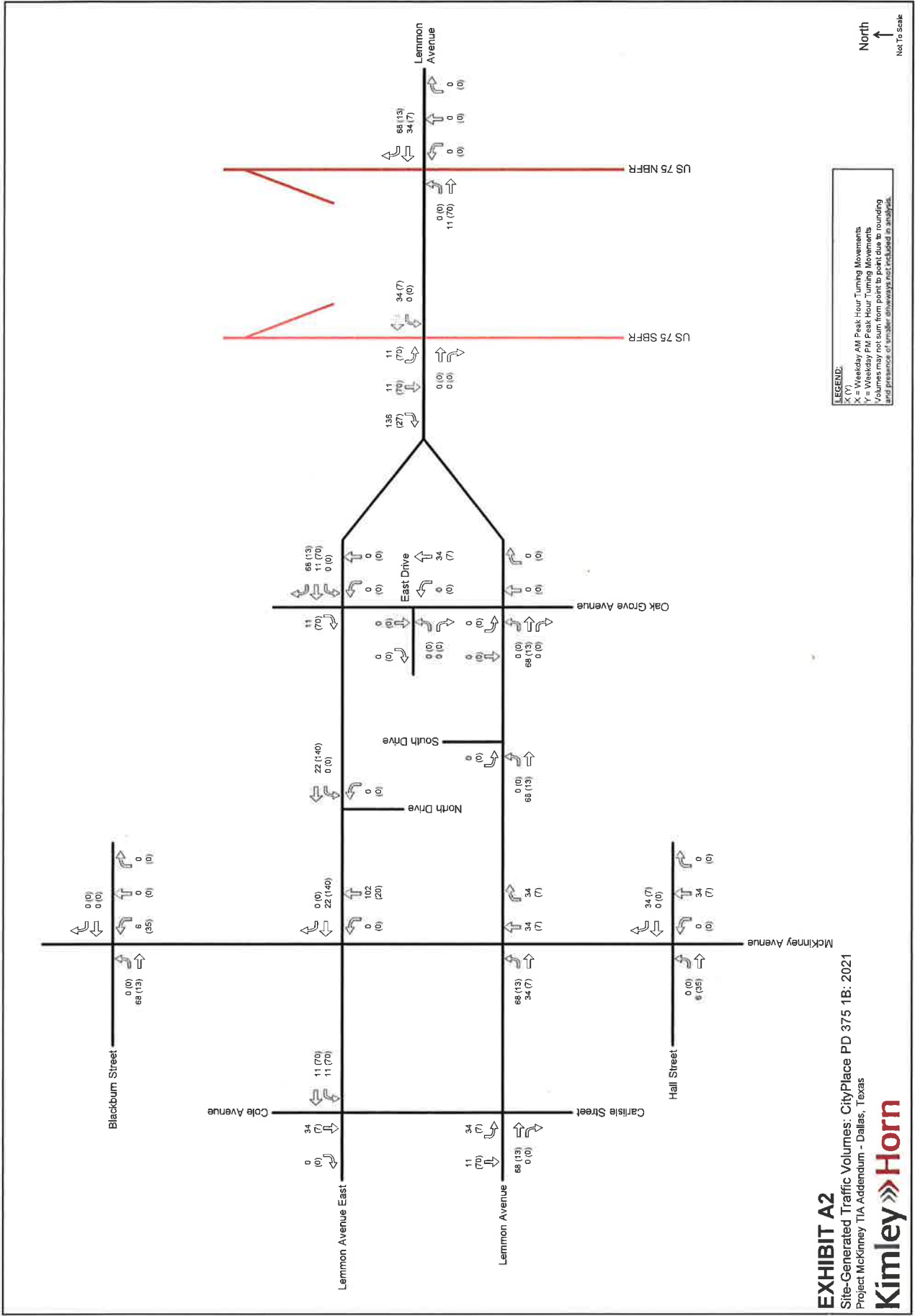


201-178

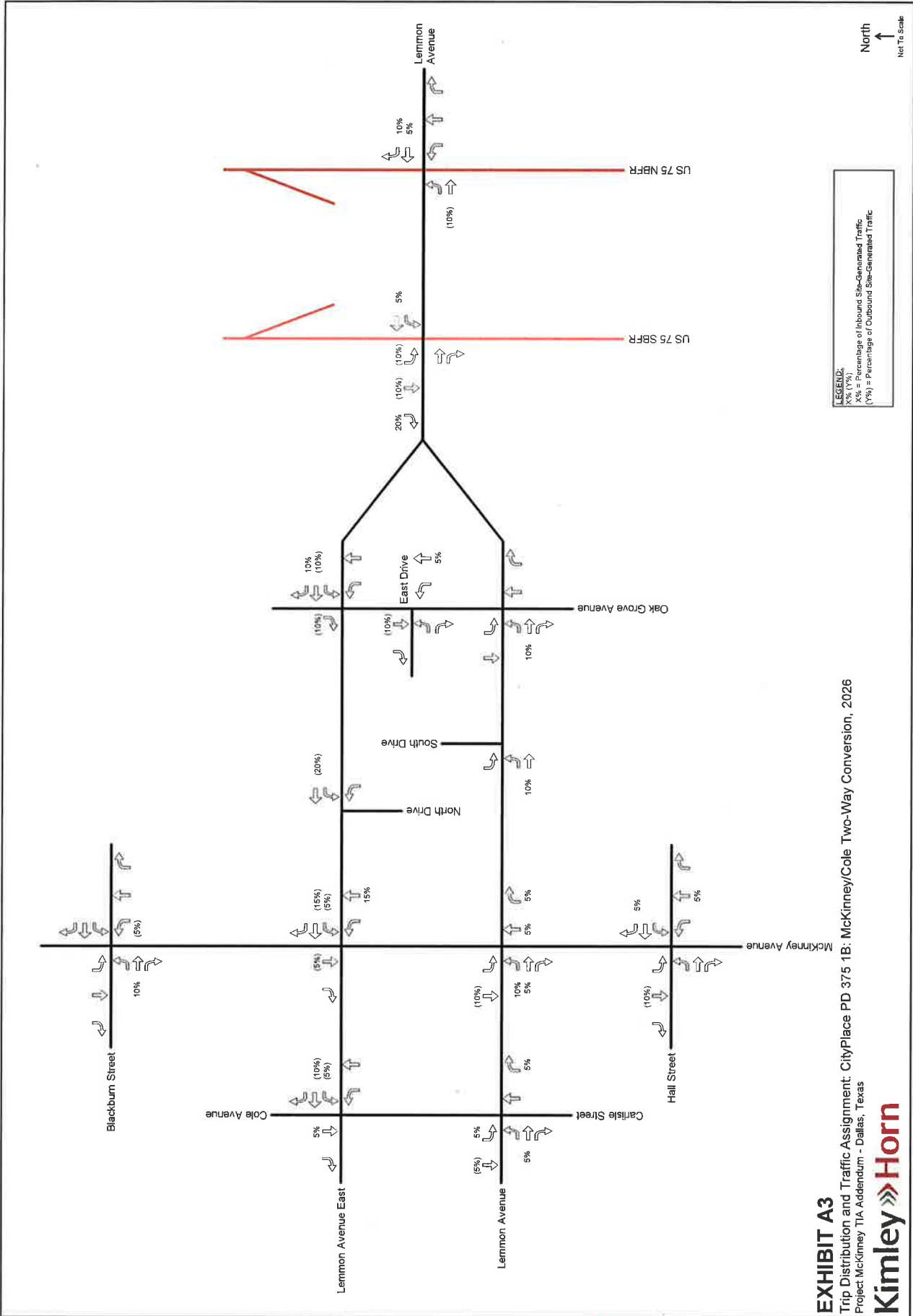


**EXHIBIT A1**  
 Trip Distribution and Traffic Assignment: CityPlace PD 375 1B 2021  
 Project McKinney TIA Addendum - Dallas, Texas  
**Kimley»Horn**

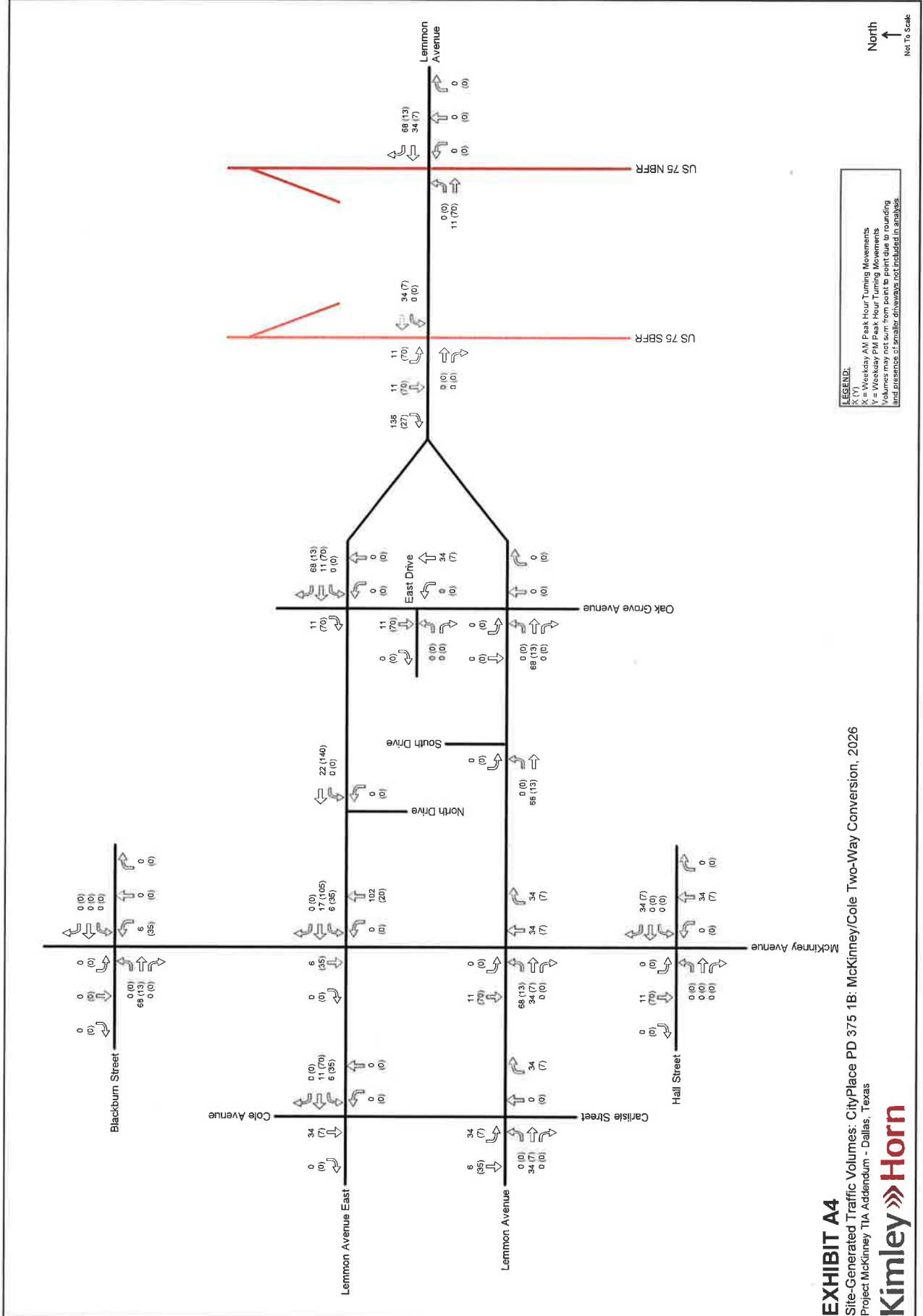
Z201-178



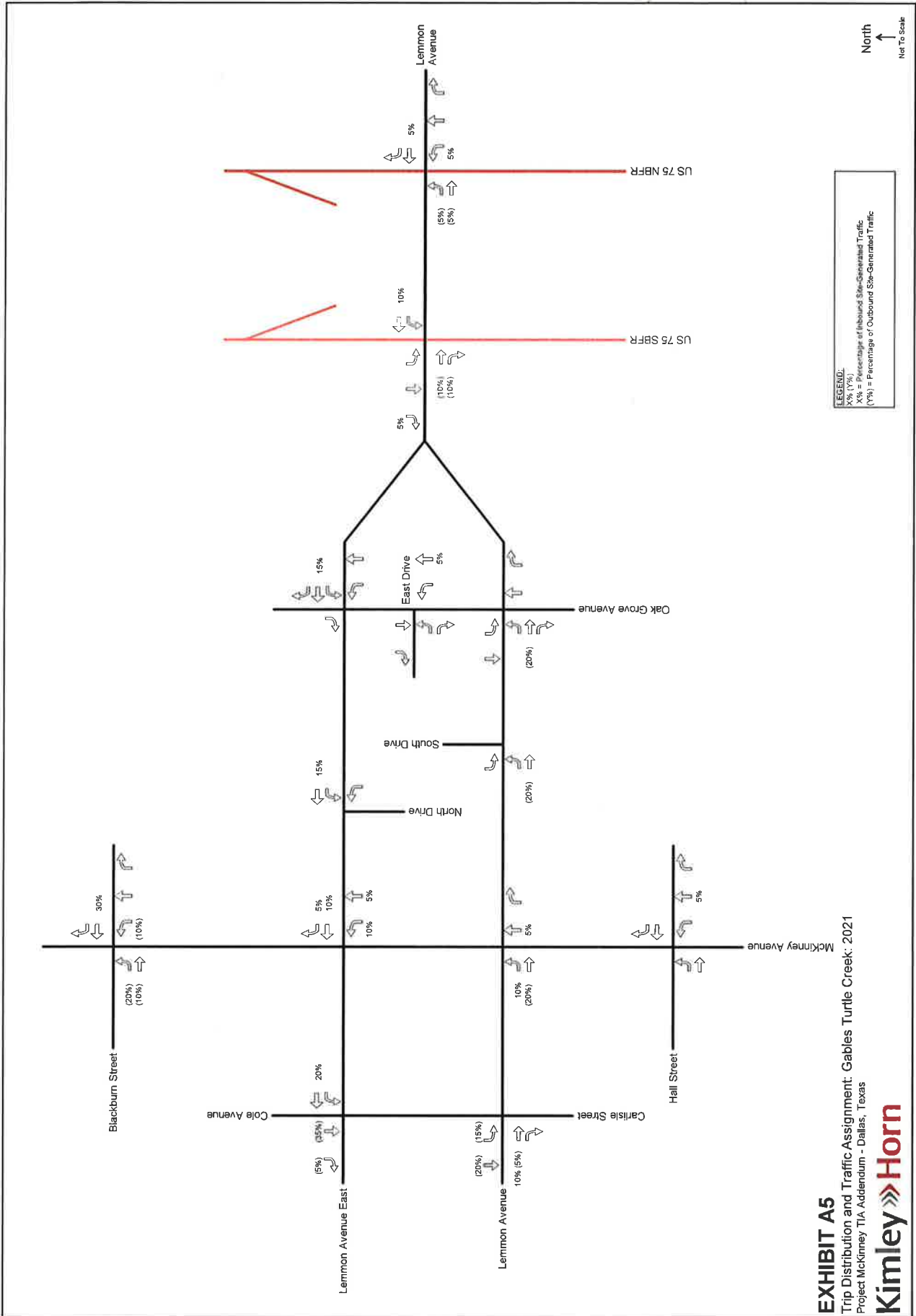
Z201-178



201-178





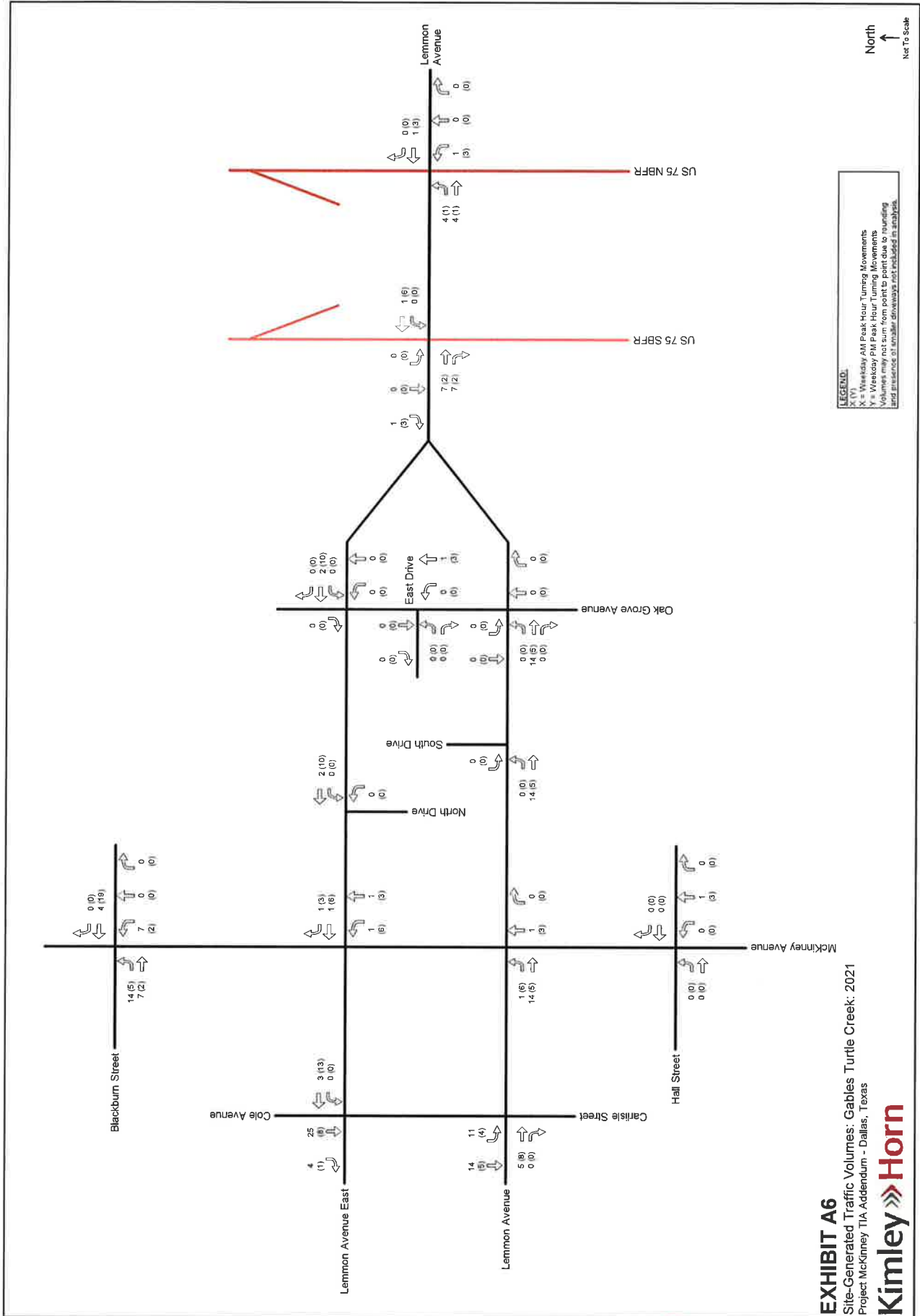


**EXHIBIT A5**  
 Trip Distribution and Traffic Assignment: Gables Turtle Creek: 2021  
 Project McKinney TIA Addendum - Dallas, Texas



Z201-178

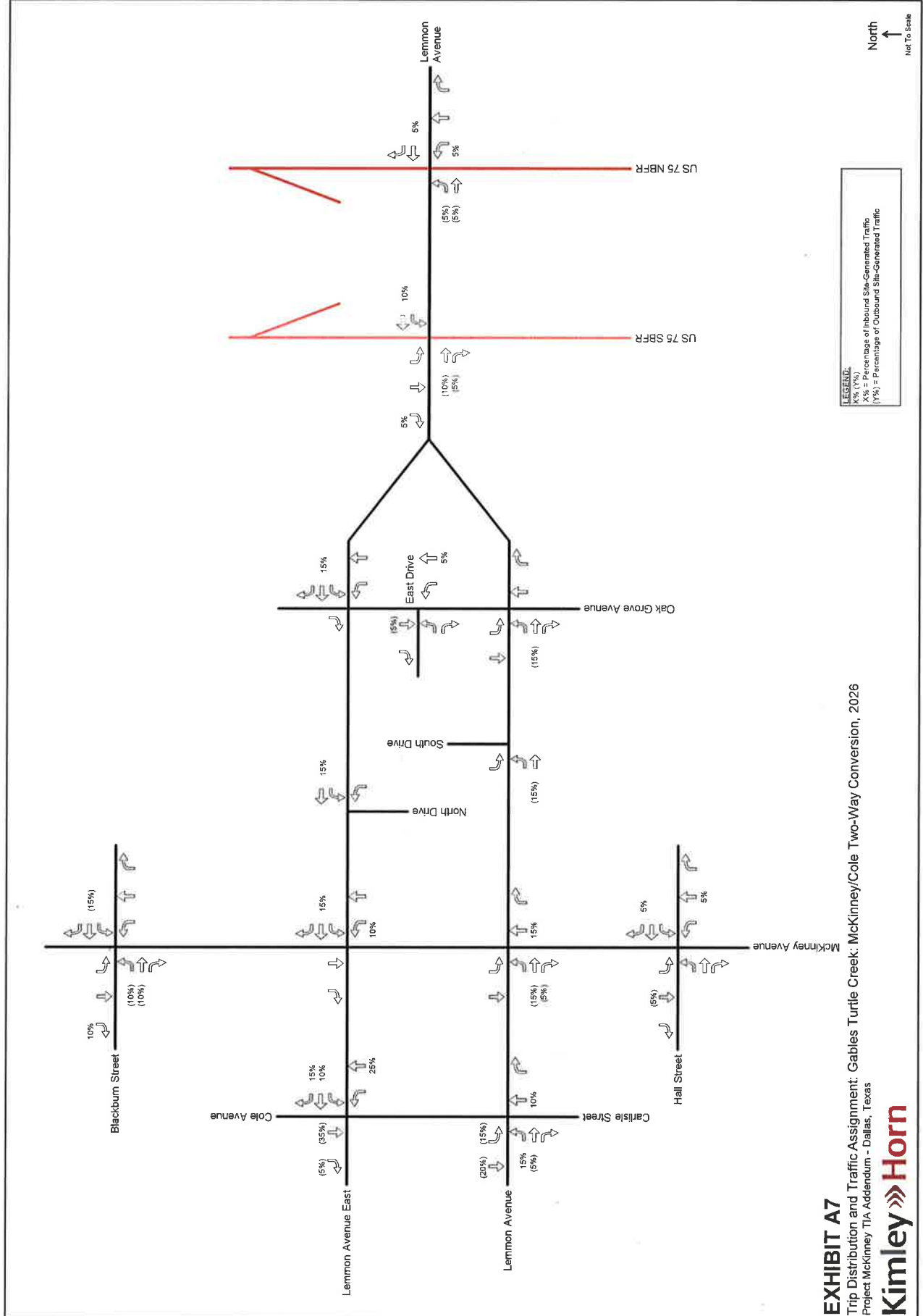
Z201-178



**EXHIBIT A6**  
 Site-Generated Traffic Volumes: Gables Turtle Creek: 2021  
 Project McKinney TIA Addendum - Dallas, Texas



Z201-178



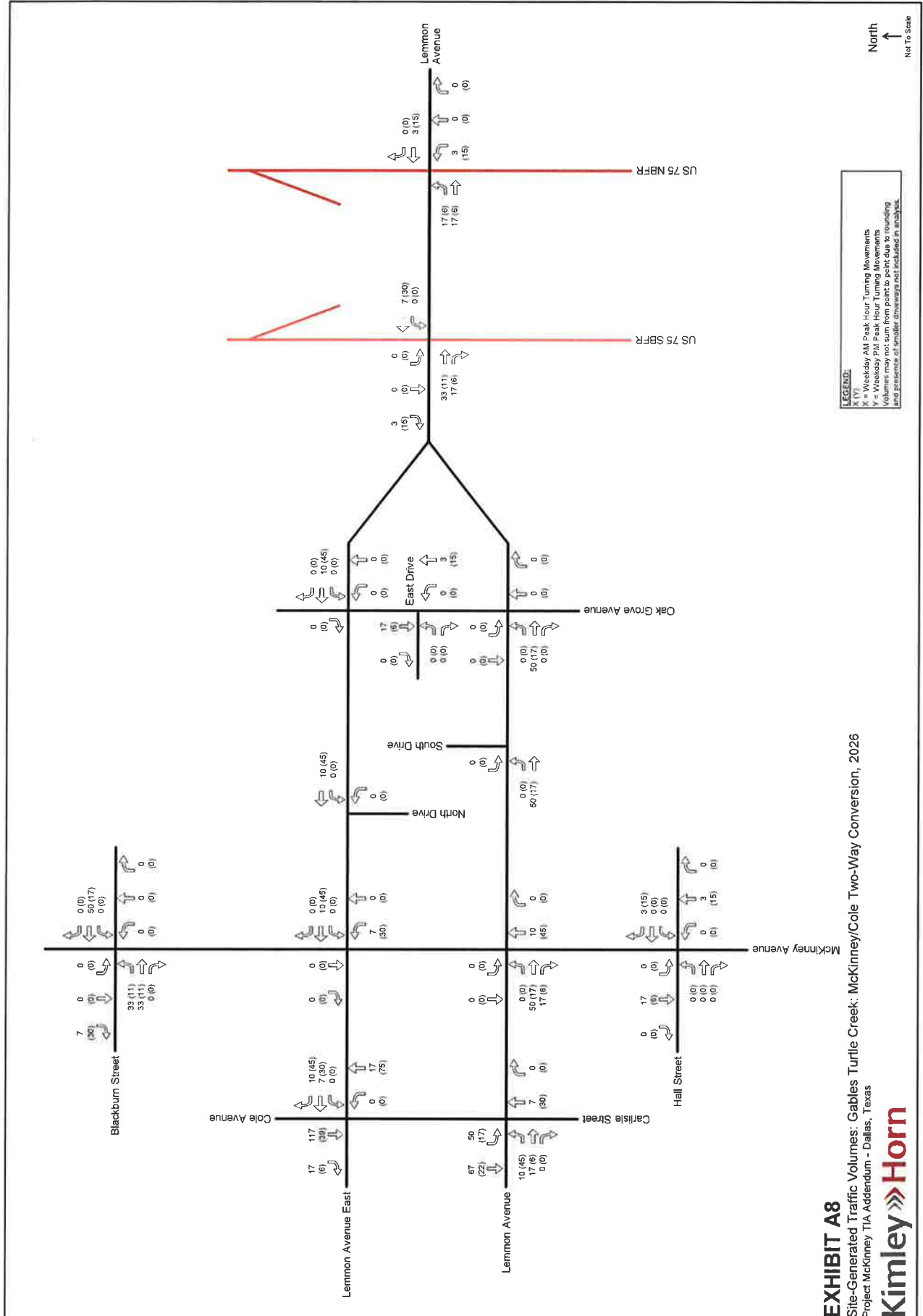
**LEGEND:**  
X% (Y%) = Percentage of Inbound Site-Generated Traffic  
Y% (X%) = Percentage of Outbound Site-Generated Traffic

North  
↑  
Not To Scale

**EXHIBIT A7**  
Trip Distribution and Traffic Assignment: Gables Turtle Creek: McKinney/Cole Two-Way Conversion, 2026  
Project McKinney TIA Addendum - Dallas, Texas



201-178





## TIA Addendum Synchro™ Reports

Z201-178

Intersection	2.7											
Int Delay, s/veh	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SST	SBR
Movement	0	0	0	230	1355	0	179	0	0	0	0	0
Lane Configurations	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4
Traffic Vol, veh/h	0	0	0	230	1355	0	179	0	0	0	0	0
Future Vol, veh/h	0	0	0	230	1355	0	179	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	-	-	-	None	None	None	None	None	None
Storage Length	-	-	-	-	-	-	0	0	0	0	0	0
Veh in Median Storage, #	-	-	-	-	-	-	0	0	0	0	0	0
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	250	1473	0	195	0	0	0	0	0

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	-	1089
Stage 2	-	1089
Critical Hdwy	5.34	5.74
Critical Hdwy Stg 1	-	6.04
Critical Hdwy Stg 2	-	3.82
Follow-up Hdwy	3.12	280
Pot Cap-1 Maneuver	-	0
Stage 1	-	0
Stage 2	-	256
Platoon blocked, %	-	0
Mov Cap-1 Maneuver	-	280
Mov Cap-2 Maneuver	-	280
Stage 1	-	0
Stage 2	-	256

Approach	WB	NB
HCM Control Delay, s	26.2	D
HCM LOS	D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	WBL	WBT
Capacity (veh/h)	280	280	-	-
HCM Lane V/C Ratio	0.463	0.232	-	-
HCM Control Delay (s)	28.5	21.7	-	-
HCM Lane LOS	D	C	-	-
HCM 95th %tile Q(veh)	2.3	0.9	-	-

7201-178

Intersection	4.1											
Int Delay, s/veh	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	0	0	0	204	948	0	0	0	0	0	255	0
Lane Configurations	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4
Traffic Vol, veh/h	0	0	0	204	948	0	0	0	0	0	255	0
Future Vol, veh/h	0	0	0	204	948	0	0	0	0	0	255	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	-	-	-	None	None	None	None	None	None
Storage Length	-	-	-	-	-	-	0	0	0	0	0	0
Veh in Median Storage, #	-	-	-	-	-	-	0	0	0	0	0	0
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	222	1030	0	0	0	0	0	0	0	0	277	0

Major/Minor	Major1	Minor1	Minor2
Conflicting Flow All	0	0	856
Stage 1	-	-	0
Stage 2	-	-	856
Critical Hdwy	5.34	5.74	6.54
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	6.04
Follow-up Hdwy	3.12	3.82	4.02
Pot Cap-1 Maneuver	-	0	386
Stage 1	-	0	0
Stage 2	-	0	341
Platoon blocked, %	-	-	189
Mov Cap-1 Maneuver	-	-	366
Mov Cap-2 Maneuver	-	-	366
Stage 1	-	-	0
Stage 2	-	-	341

Approach	EB	SB
HCM Control Delay, s	22.4	C
HCM LOS	C	C

Minor Lane/Major Mvmt	EBL	EBT	SBLn1	SBLn2
Capacity (veh/h)	-	366	366	-
HCM Lane V/C Ratio	-	0.505	0.252	-
HCM Control Delay (s)	-	24.5	18.1	-
HCM Lane LOS	-	C	C	-
HCM 95th %tile Q(veh)	-	2.7	1	-

Intersection												
Int Delay, s/veh 2.3												
Movement	EBL	EBR	NBL	NBT	SBT	SBR						
Lane Configurations	W			4	T							
Traffic Vol, veh/h	26	51	26	72	234	51						
Future Vol, veh/h	26	51	26	72	234	51						
Conflicting Pkts, #/hr	0	0	0	0	0	0						
Sign Control	Stop	Stop	Free	Free	Free	Free						
RT Channelized	-	None	-	None	-	None						
Storage Length	0	-	-	-	-	-						
Veh in Median Storage, #	0	-	-	0	0	-						
Grade, %	0	-	-	0	0	-						
Peak Hour Factor	92	92	92	92	92	92						
Heavy Vehicles, %	2	2	2	2	2	2						
Movt Flow	28	55	28	78	254	55						
Major/Minor												
	Minor2	Major1	Major2									
Conflicting Flow All	416	282	309	0	-	0						
Stage 1	282	-	-	-	-	-						
Stage 2	134	-	-	-	-	-						
Critical Hdwy	6.42	6.22	4.12	-	-	-						
Critical Hdwy Sig 1	5.42	-	-	-	-	-						
Critical Hdwy Sig 2	5.42	-	-	-	-	-						
Follow-up Hdwy	3.518	3.318	2.218	-	-	-						
Pot Cap-1 Maneuver	593	757	1252	-	-	-						
Stage 1	766	-	-	-	-	-						
Stage 2	892	-	-	-	-	-						
Platoon blocked, %	-	-	-	-	-	-						
Mov Cap-1 Maneuver	579	757	1252	-	-	-						
Mov Cap-2 Maneuver	579	-	-	-	-	-						
Stage 1	748	-	-	-	-	-						
Stage 2	892	-	-	-	-	-						
Approach												
	EB	EB	EB	SB	SB							
HCM Control Delay, s	11	2.1	2.1	0	0							
HCM LOS	B											
Minor Lane/Major Mount												
	NBL	NBT	EBL	EBT	SBL	SBR						
Capacity (veh/h)	1252	-	686	-	-	-						
HCM Lane V/C Ratio	0.023	-	0.122	-	-	-						
HCM Control Delay (s)	7.9	0	11	-	-	-						
HCM Lane LOS	A	A	B	-	-	-						
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	-						

Z201-178

Intersection	2											
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4+4+4											
Traffic Vol, veh/h	0	0	0	206	1247	0	150	0	0	0	0	0
Future Vol, veh/h	0	0	0	206	1247	0	150	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	None	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	0	0	0	0	0	0	0	0	0	0	0	0
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	224	1355	0	163	0	0	0	0	0

Intersection	3.5											
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4+4+4											
Traffic Vol, veh/h	183	1868	0	0	0	0	0	0	0	0	214	0
Future Vol, veh/h	183	1868	0	0	0	0	0	0	0	0	214	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	None	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	0	0	0	0	0	0	0	0	0	0	0	0
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	199	2030	0	0	0	0	0	0	0	0	233	0

Major/Minor	Major1	Minor1
Conflicting Flow All	0	0
Stage 1	0	990
Stage 2	0	0
Critical Hdwy	5.34	5.74, 6.54
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	3.12	6.04, 5.54
Plat Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Major/Minor	Major2	Minor2
Conflicting Flow All	0	0
Stage 1	0	1210
Stage 2	0	2428
Critical Hdwy	5.34	5.74, 6.54
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	3.12	6.04, 5.54
Plat Cap-1 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	-
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	WB	NB
HCM Control Delay, s	21.2	21.2
HCM LOS	C	C

Approach	EB	SB
HCM Control Delay, s	37.3	37.3
HCM LOS	E	E

Minor Lane/Minor Mvmt	NBLn1	NBLn2	WBL	WBT
Capacity (veh/h)	314	314	-	-
HCM Lane V/C Ratio	0.346	0.173	-	-
HCM Control Delay (s)	22.4	18.8	-	-
HCM Lane LOS	C	C	-	-
HCM 95th %tile Q(veh)	1.5	0.6	-	-

Minor Lane/Minor Mvmt	EBL	EBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	243	243
HCM Lane V/C Ratio	-	-	0.638	0.319
HCM Control Delay (s)	-	-	42.7	26.6
HCM Lane LOS	-	-	E	D
HCM 95th %tile Q(veh)	-	-	3.9	1.3

Z201-178



Intersection	Z4			
In Delay, s/veh	EBL	EBR	NBL	SBR
Movement	W		4	
Lane Configurations				
Traffic Vol, veh/h	21	43	23	101
Future Vol, veh/h	21	43	23	101
Conflicting Peds, #/hr	0	0	0	0
Sign Control	Stop	Free	Free	Free
RT Channelized	-	None	-	None
Storage Length	0	-	-	-
Veh in Median Storage, #	0	-	-	-
Grade, %	0	-	-	-
Peak Hour Factor	92	92	92	92
Heavy Vehicles, %	2	2	2	2
Movmt Flow	23	47	25	110

Minor/Minor	Minor2	Minor1	Major2
Conflicting Flow All	285	125	150
Stage 1	125	-	-
Stage 2	160	-	-
Critical Hwy	5.42	6.22	4.12
Critical Hwy Stg 1	5.42	-	-
Critical Hwy Stg 2	5.42	-	-
Follow-up Hwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	705	926	1431
Stage 1	901	-	-
Stage 2	869	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	692	926	1431
Mov Cap-2 Maneuver	692	-	-
Stage 1	884	-	-
Stage 2	869	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	1.4	0
HCM LOS	A		
Minor Lane/Minor Movmt	NBL	NBL	EB in 1
Capacity (veh/h)	1431	-	834
HCM Lane V/C Ratio	0.017	-	0.083
HCM Control Delay (s)	7.6	0	9.7
HCM Lane LOS	A	A	A
HCM 95th %ile Q(veh)	0.1	-	0.3

Z201-178

Intersection													
Int Delay, s/veh													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	4+4												
Traffic Vol, veh/h	0	0	0	230	1426	0	179	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	230	1426	0	179	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	None	-	None	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	-	-	-	-	-	-	-	-	-
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	250	1550	0	195	0	0	0	0	0	0

Major/Minor	Major2	Minor1
Conflicting Flow All	0	0
Stage 1	-	1120
Stage 2	-	2050
Critical Hdwy	5.34	5.74
Critical Hdwy Stg 1	-	6.04
Critical Hdwy Stg 2	-	3.82
Follow-up Hdwy	3.12	4.02
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	270
Mov Cap-2 Maneuver	-	270
Stage 1	-	246
Stage 2	-	246

Intersection													
Int Delay, s/veh													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	4+4												
Traffic Vol, veh/h	204	1018	0	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	204	1018	0	0	0	0	0	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None	-	None	-	None	-	None	-
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	-	-	-	-	-	-	-	-	-
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	222	1107	0	0	0	0	0	0	0	0	0	0	0

Major/Minor	Major1	Minor2
Conflicting Flow All	0	0
Stage 1	-	887
Stage 2	-	1551
Critical Hdwy	5.34	5.74
Critical Hdwy Stg 1	-	6.04
Critical Hdwy Stg 2	-	3.82
Follow-up Hdwy	3.12	4.02
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	-	354
Mov Cap-2 Maneuver	-	354
Stage 1	-	328
Stage 2	-	173

Approach	EB
HCM Control Delay, s	23.4
HCM LOS	C

Minor Lane	Major	Minor	EBL	EBT	SBL	SBR
Capacity (veh/h)	-	-	354	354	-	-
HCM Lane V/C Ratio	-	-	0.522	0.261	-	-
HCM Control Delay (s)	-	-	25.8	18.7	-	-
HCM Lane LOS	-	-	D	C	-	-
HCM 95th %tile Q(veh)	-	-	2.9	1	-	-

Z201-178

Intersection									
Int Delay, s/veh									
2.2									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations	Y			4					
Traffic Vol, veh/h	26	51	26	76	273	51			
Future Vol, veh/h	26	51	26	76	273	51			
Conflicting Peds. #/hr	0	0	0	0	0	0			
Sign Control	Stop	Stop	Free	Free	Free	Free			
RT Channelized	-	None	-	None	-	None			
Storage Length	0								
Veh in Median Storage, #	0								
Grade, %	0								
Peak Hour Factor	92	92	92	92	92	92			
Heavy Vehicles, %	2	2	2	2	2	2			
Maxmt Flow	28	55	28	83	297	55			
Major/Minor									
Major2 Major1 Major2									
Conflicting Flow All	464	325	352	0	-	0			
Stage 1	325	-	-	-	-	-			
Stage 2	139	-	-	-	-	-			
Critical Hwy	6.42	6.22	4.12	-	-	-			
Critical Hwy Sig 1	5.42	-	-	-	-	-			
Critical Hwy Sig 2	5.42	-	-	-	-	-			
Follow-up Hwy	3.518	3.318	2.218	-	-	-			
Pot Cap-1 Maneuver	556	716	1207	-	-	-			
Stage 1	732	-	-	-	-	-			
Stage 2	888	-	-	-	-	-			
Platoon blocked, %									
Mov Cap-1 Maneuver	543	716	1207	-	-	-			
Mov Cap-2 Maneuver	543	-	-	-	-	-			
Stage 1	714	-	-	-	-	-			
Stage 2	888	-	-	-	-	-			
Approach									
EB NB SB									
HCM Control Delay, s	11.4	2.1	2.1	0	0	0			
HCM LOS	B								
Minor Lane/Major Mvmt									
NBL NBT EBLn1 SBT SBR									
Capacity (veh/h)	1207	-	646	-	-	-			
HCM Lane V/C Ratio	0.023	-	0.13	-	-	-			
HCM Control Delay (s)	8.1	0	11.4	-	-	-			
HCM Lane LOS	A	A	B	-	-	-			
HCM 95th %ile Q(veh)	0.1	-	0.4	-	-	-			

Z201-178

Intersection													
Int Delay, s/veh													
2													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SBR
Lane Configurations													
Traffic Vol, veh/h	0	0	0	206	1329	0	150	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	206	1329	0	150	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	-	-	0	-	-	-	-	-	-
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Max Flow	0	0	0	224	1445	0	163	0	0	0	0	0	0
Major/Minor													
Major2													
Minor1													
Conflicting Flow All	0 0 0 1026 1893												
Stage 1	-												
Stage 2	-												
Critical Hwy	5.34												
Critical Hwy Stg 1	-												
Critical Hwy Stg 2	-												
Follow-up Hwy	3.12												
Pot Cap-1 Maneuver	-												
Stage 1	-												
Stage 2	-												
Platoon blocked, %	-												
Mov Cap-1 Maneuver	-												
Mov Cap-2 Maneuver	-												
Stage 1	-												
Stage 2	-												
Approach													
W6													
NE													
HCM Control Delay, s	22.3												
HCM LOS													
C													
Minor Lane/Major Mount													
NBLn1 NBLn2 WBL WBT													
Capacity (veh/h)	301 301												
HCM Lane V/C Ratio	0.361 0.181												
HCM Control Delay (s)	23.6 19.6												
HCM Lane LOS													
C C													
HCM 95th %tile Q(veh)	1.6 0.6												

201-178

Intersection													
Int Delay, s/veh													
3.7													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SBR
Lane Configurations													
Traffic Vol, veh/h	183	1967	0	0	0	0	0	0	0	0	214	0	0
Future Vol, veh/h	183	1967	0	0	0	0	0	0	0	0	214	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	-	-	-	-	-	-	-	-	-
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Max Flow	199	2138	0	0	0	0	0	0	0	0	233	0	0
Major/Minor													
Major1													
Minor2													
Conflicting Flow All	0 0												
Stage 1	-												
Stage 2	-												
Critical Hwy	5.34												
Critical Hwy Stg 1	-												
Critical Hwy Stg 2	-												
Follow-up Hwy	3.12												
Pot Cap-1 Maneuver	-												
Stage 1	-												
Stage 2	-												
Platoon blocked, %	-												
Mov Cap-1 Maneuver	-												
Mov Cap-2 Maneuver	-												
Stage 1	-												
Stage 2	-												
Approach													
EB													
SB													
HCM Control Delay, s	41.1												
HCM LOS													
E													
Minor Lane/Major Mount													
EBL EBT SBLn1 SBLn2													
Capacity (veh/h)	-												
HCM Lane V/C Ratio	-												
HCM Control Delay (s)	-												
HCM Lane LOS													
E D													
HCM 95th %tile Q(veh)	-												
4.2 1.4													
Notes													
- Volume exceeds capacity \$ Delay exceeds 300s * Computation Not Defined ** All major volume in platoon													

Intersection												
Int Delay, s/veh												
2												
Movement	EBL	EBR	NBL	NBT	SBT	SBR						
Lane Configurations	W						4					
Traffic Vol, veh/h	21	43	23	117	172	46						
Future Vol, veh/h	21	43	23	117	172	46						
Conflicting Peds. #/hr	0	0	0	0	0	0						
Sign Control	Stop	Stop	Free	Free	Free	Free						
RT Channelized	-	None	-	None	-	None						
Storage Length	0											
Veh in Median Storage, #	0											
Grade, %	0											
Peak Hour Factor	92	92	92	92	92	92						
Heavy Vehicles, %	2	2	2	2	2	2						
Mvmt Flow	23	47	25	127	187	50						

Major2												
Minor2												
Major1												
Minor1												
Conflicting Flow All	389	212	237	0	0	0						
Stage 1	212											
Stage 2	177											
Critical Hwy	642	622	412									
Critical Hwy Stg 1	542											
Critical Hwy Stg 2	542											
Follow-up Hwy	3,518	3,318	2,218									
Platoon blocked, %	615	828	1,330									
Platoon blocked, %	823											
Platoon blocked, %	854											
Mov Cap-1 Maneuver	603	828	1,330									
Mov Cap-2 Maneuver	603											
Stage 1	807											
Stage 2	854											

Approach												
EB												
NB												
SB												
HCM Control Delay, s												
10.4												
1.3												
0												
HCM LOS												
B												
Minor Lane/Minor Mvmt	NBL	NBT	EBL	N	SBT	SBR						
Capacity (veh/h)	1330		736									
HCM Lane V/C Ratio	0.019		0.094									
HCM Control Delay (s)	7.8	0	10.4									
HCM Lane LOS	A	A	B									
HCM 95th %ile Q(veh)	0.1		0.3									

7201-178