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August 21, 2023

Mr. Jonathan Hake, P.E.  
Cross Engineering Consultants, Inc.  
1720 W. Virginia Street  
McKinney, Texas 75069

RE: *Coppell Senior Living Development Traffic Study*

Dear Mr. Hake:

This memo presents our traffic assessment of the proposed Senior Living Development to be located east of South Belt Line Road and north of Sanders Loop in Coppell, Texas. This memo includes existing traffic volume data provided by the City of Coppell near the site, site trip distributions and assignments, and access management analysis at the proposed Access Point locations.

### **Project Description**

The proposed senior living development located east of South Belt Line Road between Southwestern Boulevard in the north and Airline Drive in the south is currently undeveloped. **Figure 1** shows a vicinity map of the location.

The proposed site will include 120 dwelling units with build-out planned to occur in 2025. The proposed Site Plan for this development is provided in **Figure 2**. Two (2) driveways will provide access for this development:

- One (1) full-access driveway (Access Point 1) on South Belt Line Road
- One (1) full access driveway (Access Point 2) on Sanders Loop

The existing and proposed lane configurations for the site access driveways are provided in **Figure 3** and **Figure 4**, respectively.

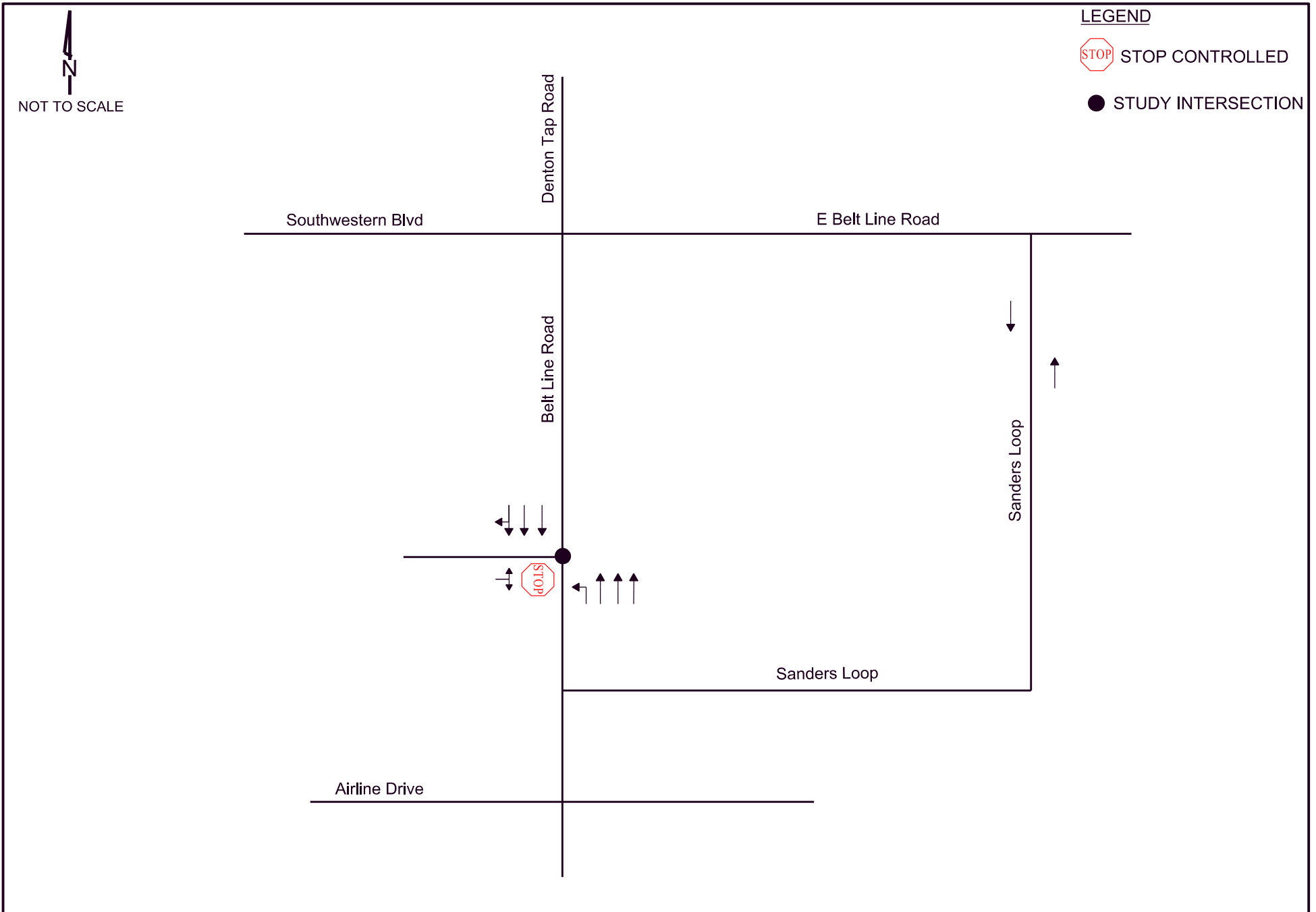
### **Existing & Proposed Roadway Conditions on South Belt Line Road**

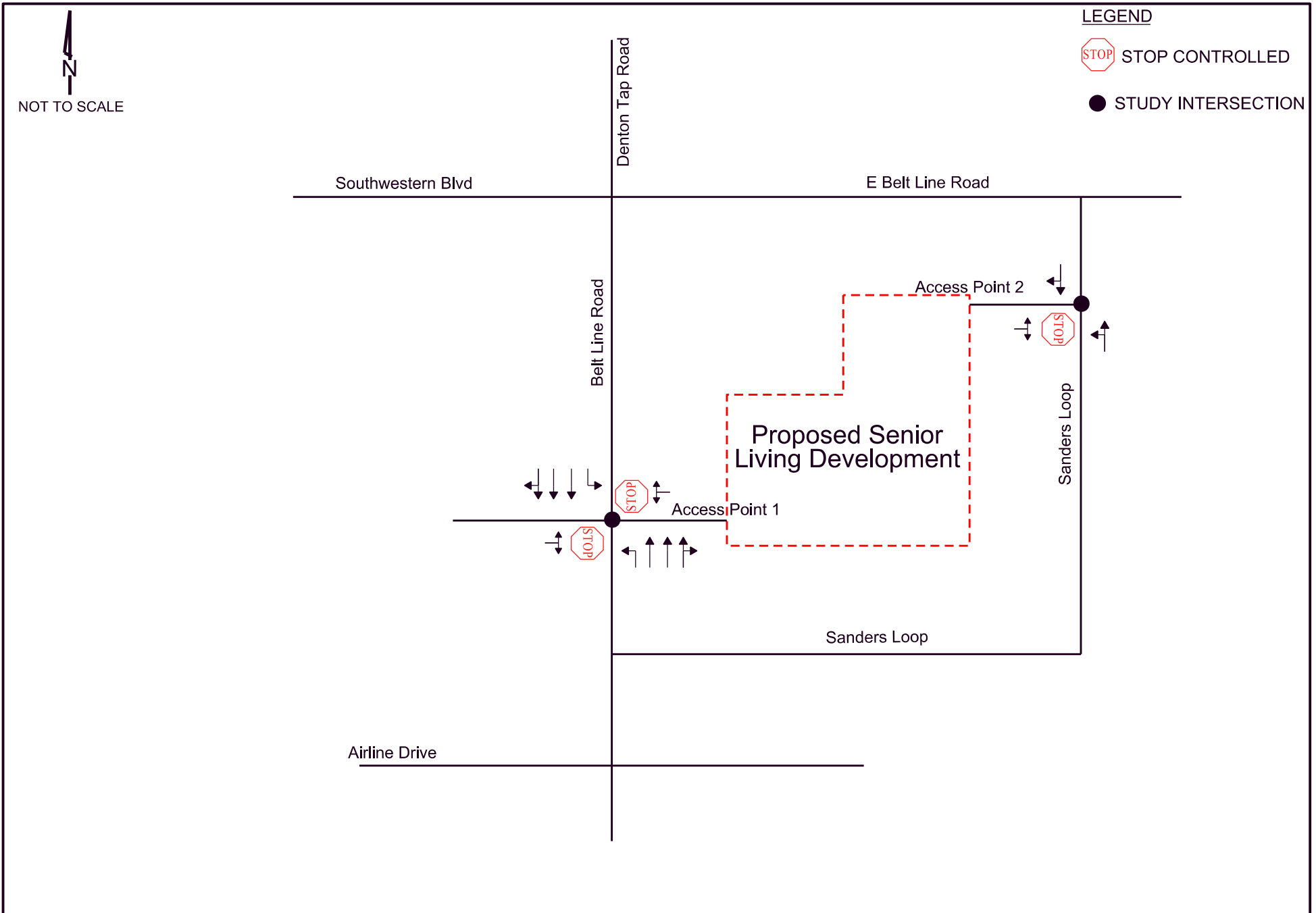
Based on the observations in the field, South Belt Line Road is currently being reconstructed as a six-lane divided roadway in the study area with completion anticipated this year. In the vicinity of the proposed Senior Living Development, all six lanes and the median opening at the proposed Access Point 1 are constructed, as represented in Figure 3. Additionally, the driveway that will serve the proposed Senior Living development was constructed as part of the Belt Line Road improvement project.

Figure 1: Vicinity Map









## Adjusted Existing Traffic Volumes

Existing AM (7:00 - 8:30 AM) and PM (4:30 - 6:00 PM) peak period turning movement volumes collected on Tuesday, March 6, 2018 were provided by the City of Coppell for the following two (2) intersections:

- Southwestern Boulevard and Denton Tap Road
- Airline Drive and South Belt Line Road

**Figure 5** presents the 2018 peak hour traffic volumes at these two (2) intersections and the estimated traffic volumes near the median opening on South Belt Line Road in the vicinity of the site. To represent existing traffic volumes, the 2018 traffic volumes were grown at 3% annually, as discussed in the next section, and are shown in **Figure 6**.

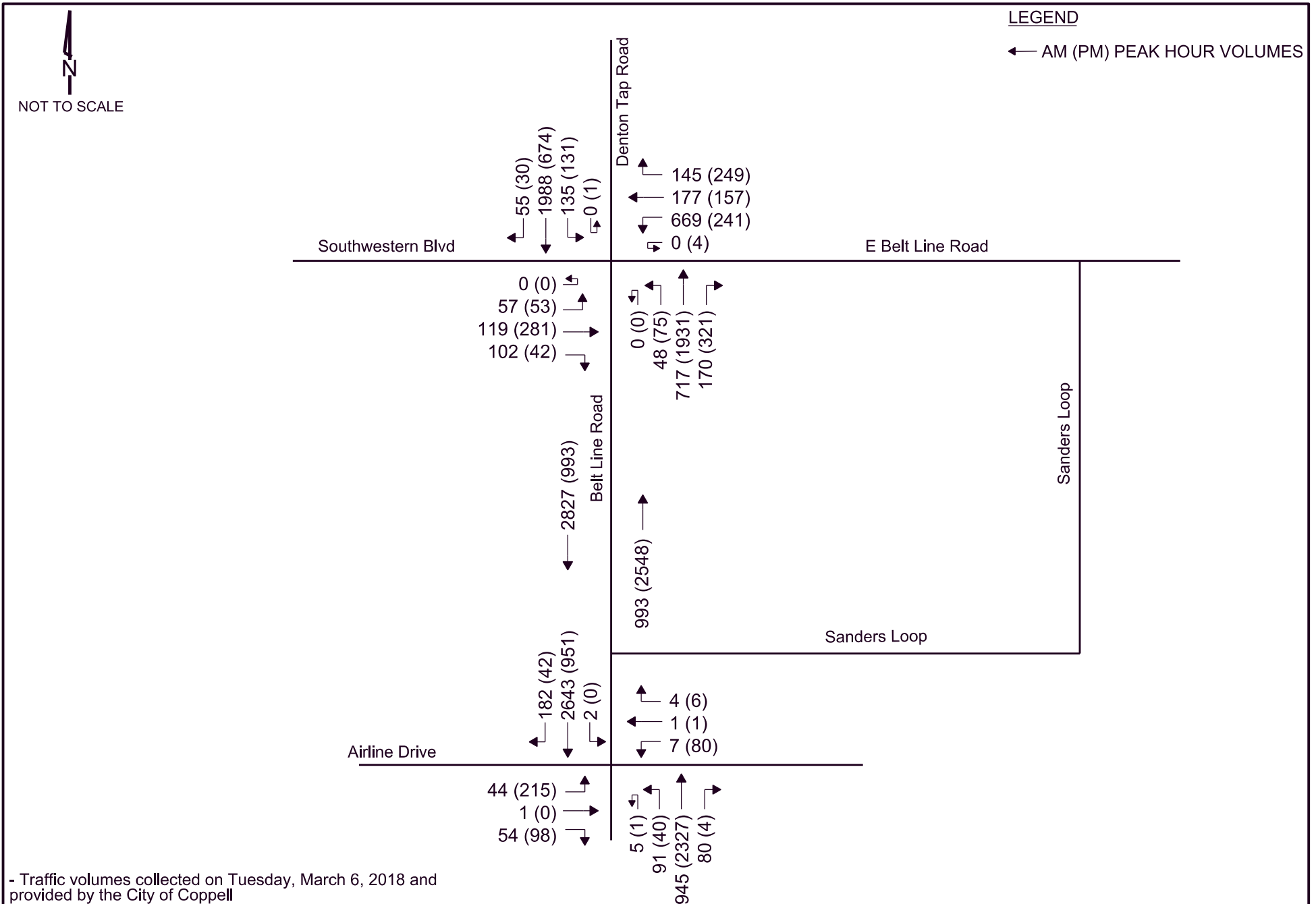
## Background Traffic Volumes

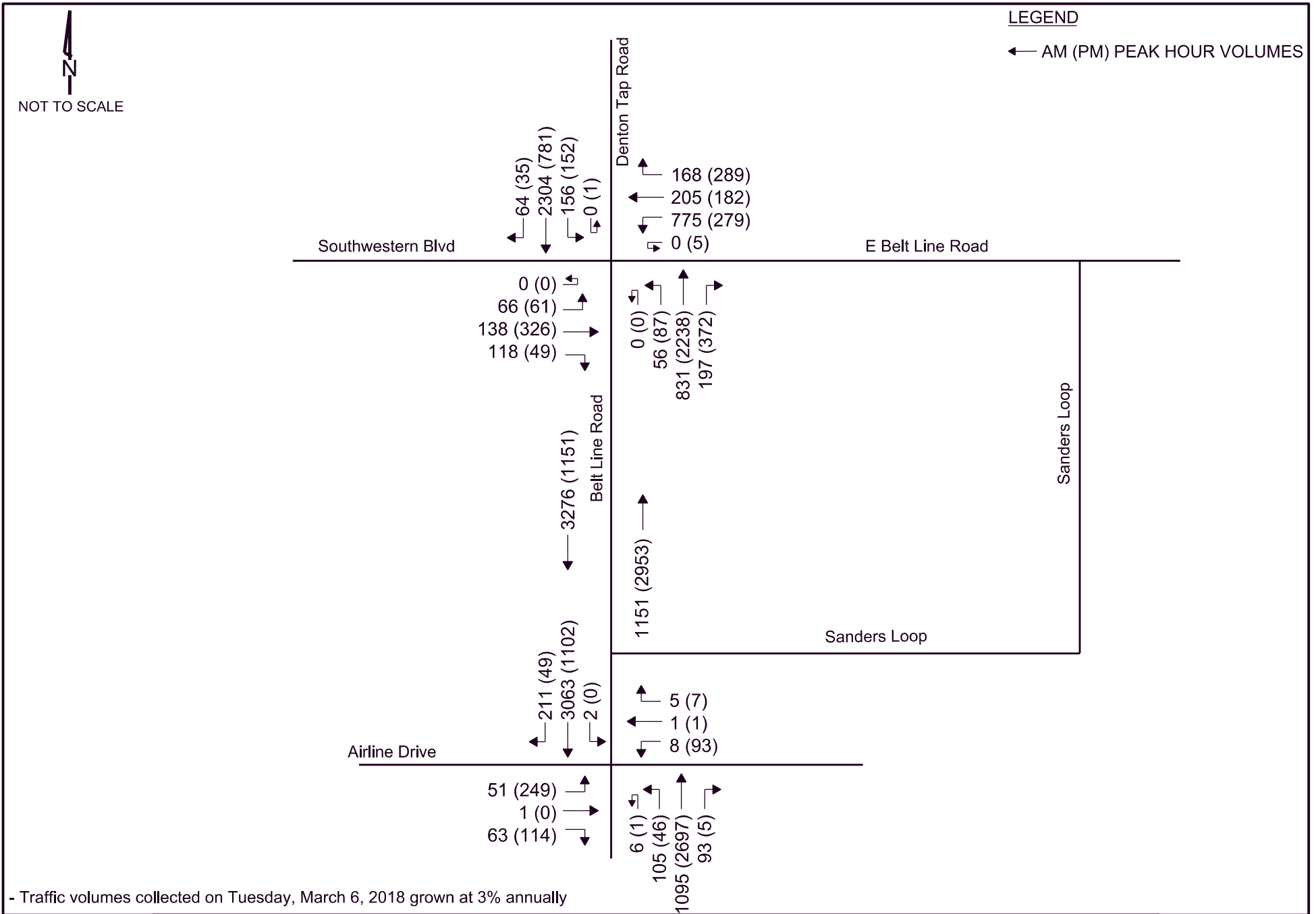
Historical 24-hour traffic volumes in the vicinity of the proposed development were obtained from TxDOT's online Traffic Count Database System and are presented in **Table 1**. These volumes were used in estimating the annual growth percentage necessary to grow the historical and adjusted existing traffic volumes to future years. While the historical traffic volume data in Table 1 reflect traffic volumes in the area have generally decreased over the previous five and 10-year periods, a growth rate of 3% was used based on the growth rate assumed for a previous traffic study approximately one (1) mile to the south. **Figure 7** shows the resulting Build-out Year (2025) Background traffic volumes.

**Table 1: Historical TxDOT 24-Hour Traffic Volumes**

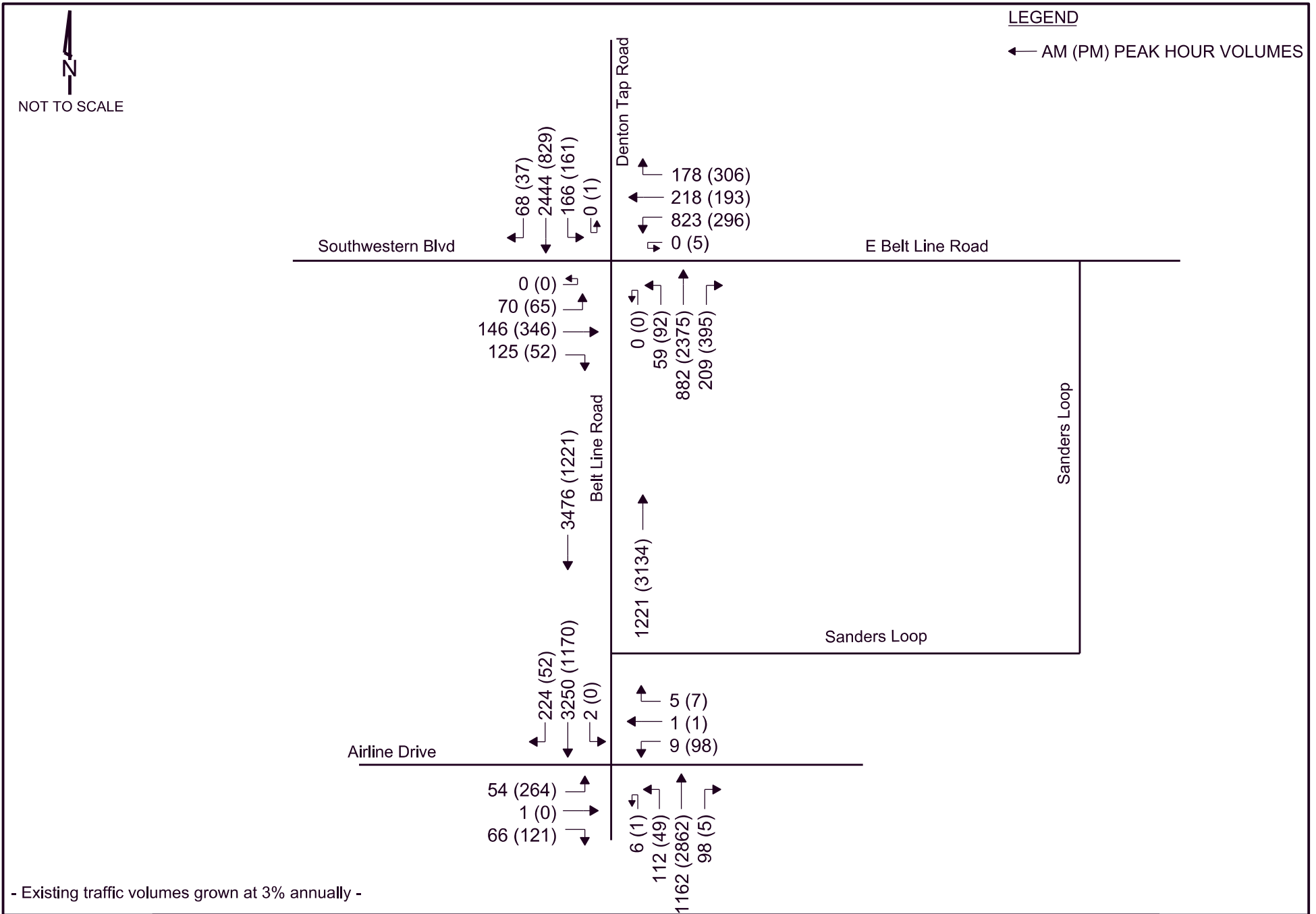
Year	S Belt Line Road (S of Southwestern Blvd)	Denton Tap Road (N of Southwestern Blvd)	E Belt Line Road (E of S Belt Line Rd)
2009	33,900	30,720	13,390
2010	---	---	---
2011	---	---	---
2012	---	---	---
2013	---	---	---
2014	37,290	33,285	---
2015	---	---	---
2016	---	---	---
2017	---	---	---
2018	---	---	---
2019	32,331	27,881	11,815
Average Annual Growth Rate <sup>1</sup>	-2.8% (-0.5%)	-3.5% (-0.1%)	N/A (-1.2%)

<sup>1</sup> Annual growth rates for the past 5 years (10 years)









## Trip Generation

The number of vehicle trips generated by the proposed senior living development was estimated based on the trip generation rates and equations provided in the publication entitled *Trip Generation Manual, 11<sup>th</sup> Edition*, by the Institute of Transportation Engineers (ITE). Estimates of the number of trips generated by the site were made for the AM and PM peak hours, as well as on a daily basis. The trip generation characteristics for the proposed senior living development are shown in **Table 2**. As shown in Table 2, the proposed development is predicted to generate 390 daily trips, 24 AM peak hour trips and 30 PM peak hour trips.

**Table 2: Trip Generation Characteristics of Proposed Senior Living Development**

Land Use (ITE Land Use)	ITE Code	Variable (X)	Average Weekday			AM Peak Hour			PM Peak Hour		
Equation/Rates <sup>1</sup>											
Senior Living (Multifamily)	252	Number of Dwelling Units	T = 3.24(X)			T = 0.19(X) + 0.90			T = 0.25(X) + 0.07		
Directional Splits <sup>2</sup>											
Senior Living (Multifamily)	252	Number of Dwelling Units	50/50			34/66			56/44		
Trips Generated											
Land Use	Amount	Variable (X)	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Senior Living (Multifamily)	120	Number of Dwelling Units	390	195	195	24	8	16	30	17	13
Total Trips			390	195	195	24	8	16	30	17	13
TOTAL NEW TRIPS			390	195	195	24	8	16	30	17	13

<sup>1</sup>T = Trips Ends; X = Dwelling units

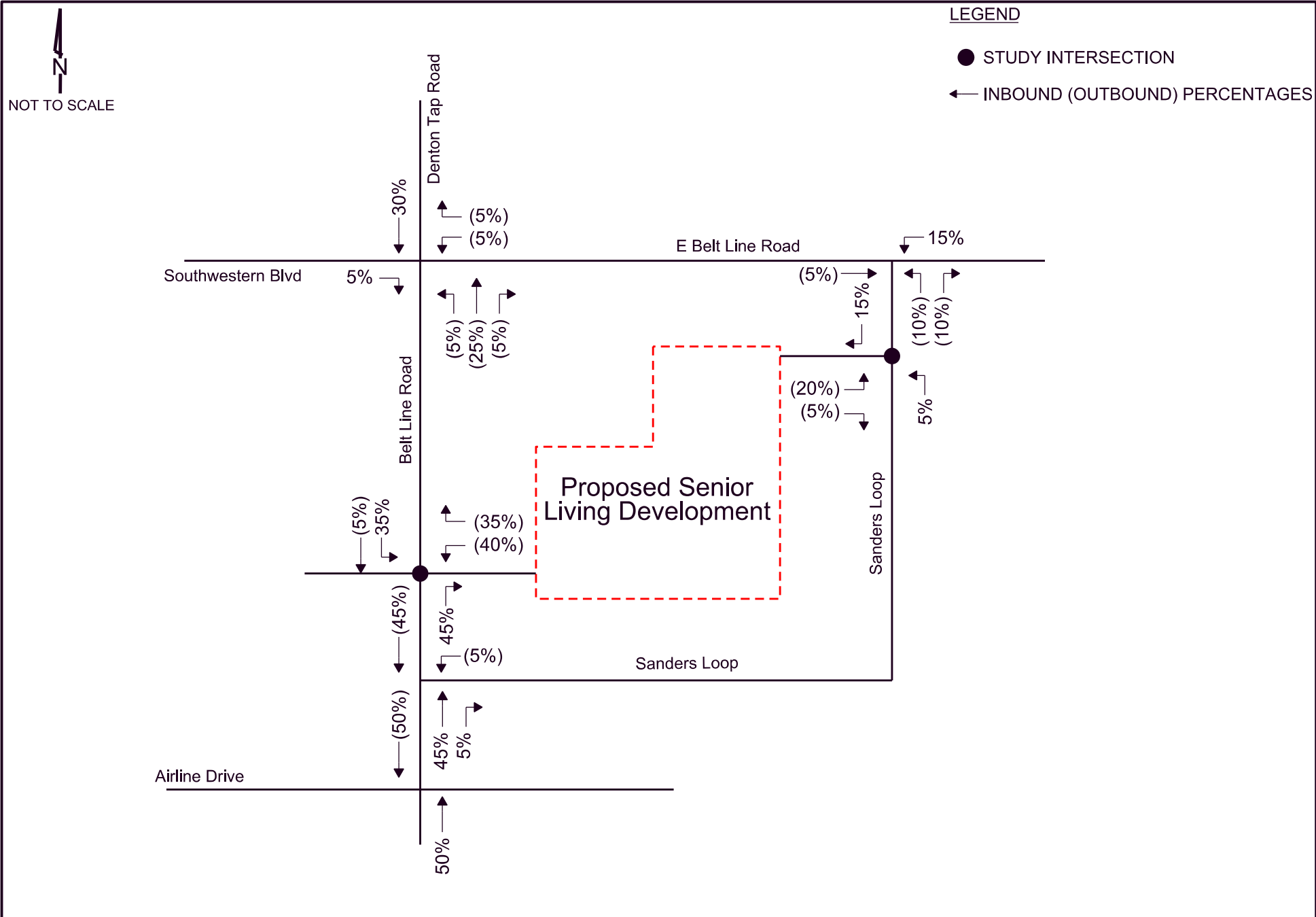
<sup>2</sup> XX / YY = % entering vehicles / % exiting vehicles

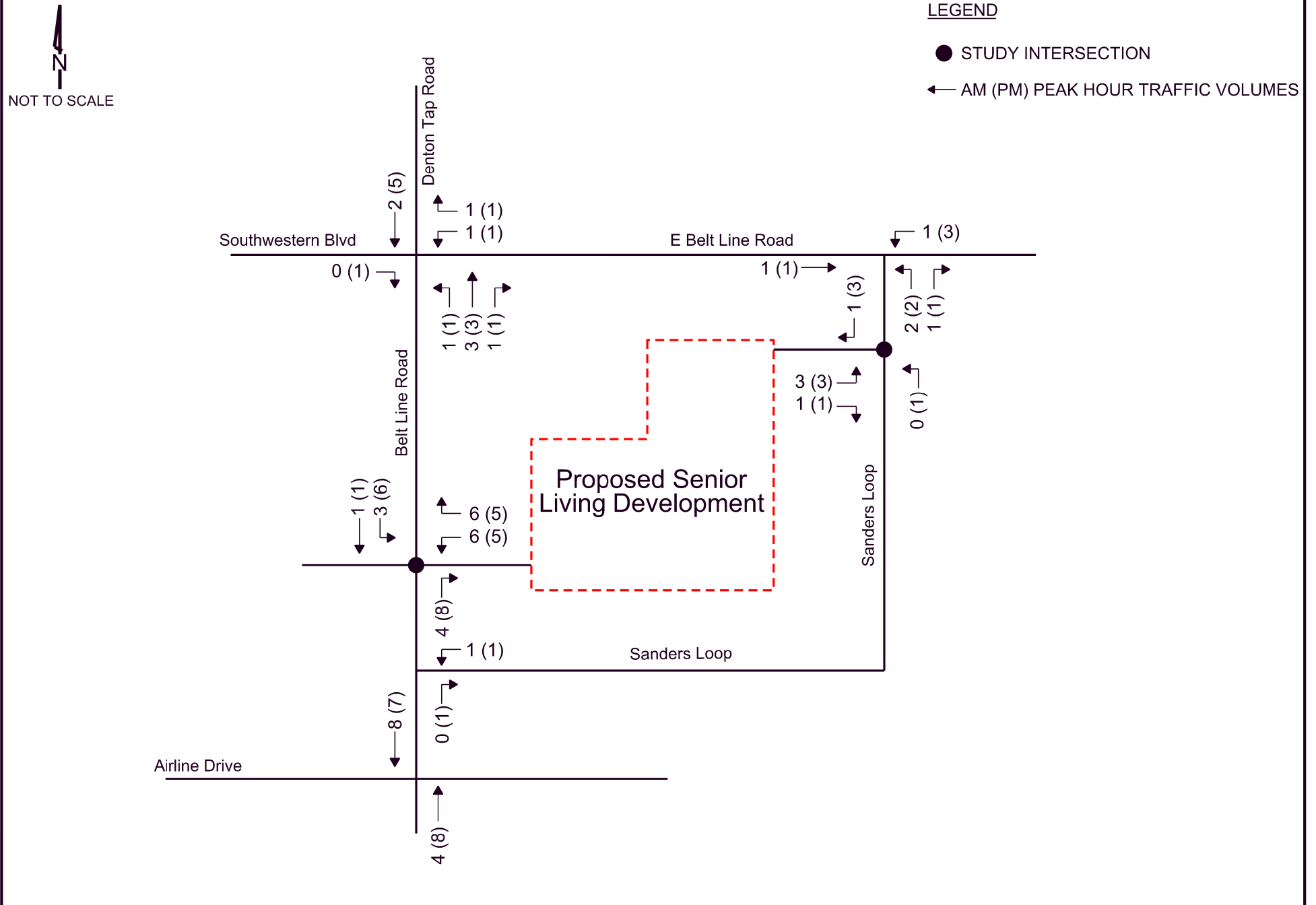
## Site Traffic Distribution and Assignment

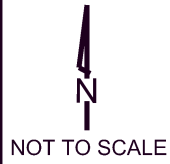
The existing traffic volume data, existing roadways in the area, along with the proposed site layout were used to determine the directions from which traffic would approach and depart the proposed development. The assumed directional distributions for the trips generated by the proposed senior living development are shown in **Figure 8**. The traffic volumes expected to be generated by the proposed development (Table 2) were assigned to the area roadways and site driveways based on the directional distribution identified in Figure 8. The estimated site generated peak hour traffic volumes at the site driveways are shown in **Figure 9**. As shown in Figure 9, site traffic is predicted to add minimal traffic to intersections in the area.

## Total Traffic Volumes

The Build-out Year (2025) Total traffic volumes were obtained by adding the site-generated traffic volumes in Figure 9 to the Build-out Year (2025) Background traffic volumes in Figure 7. The Build-out Year (2025) Total traffic volumes are presented in **Figure 10**. With roadways (Sanders Loop) and driveways between the Airline Drive intersection and the median opening, this figure represents assumed traffic volumes on Belt Line Road at the median opening serving the proposed Senior Living Development.

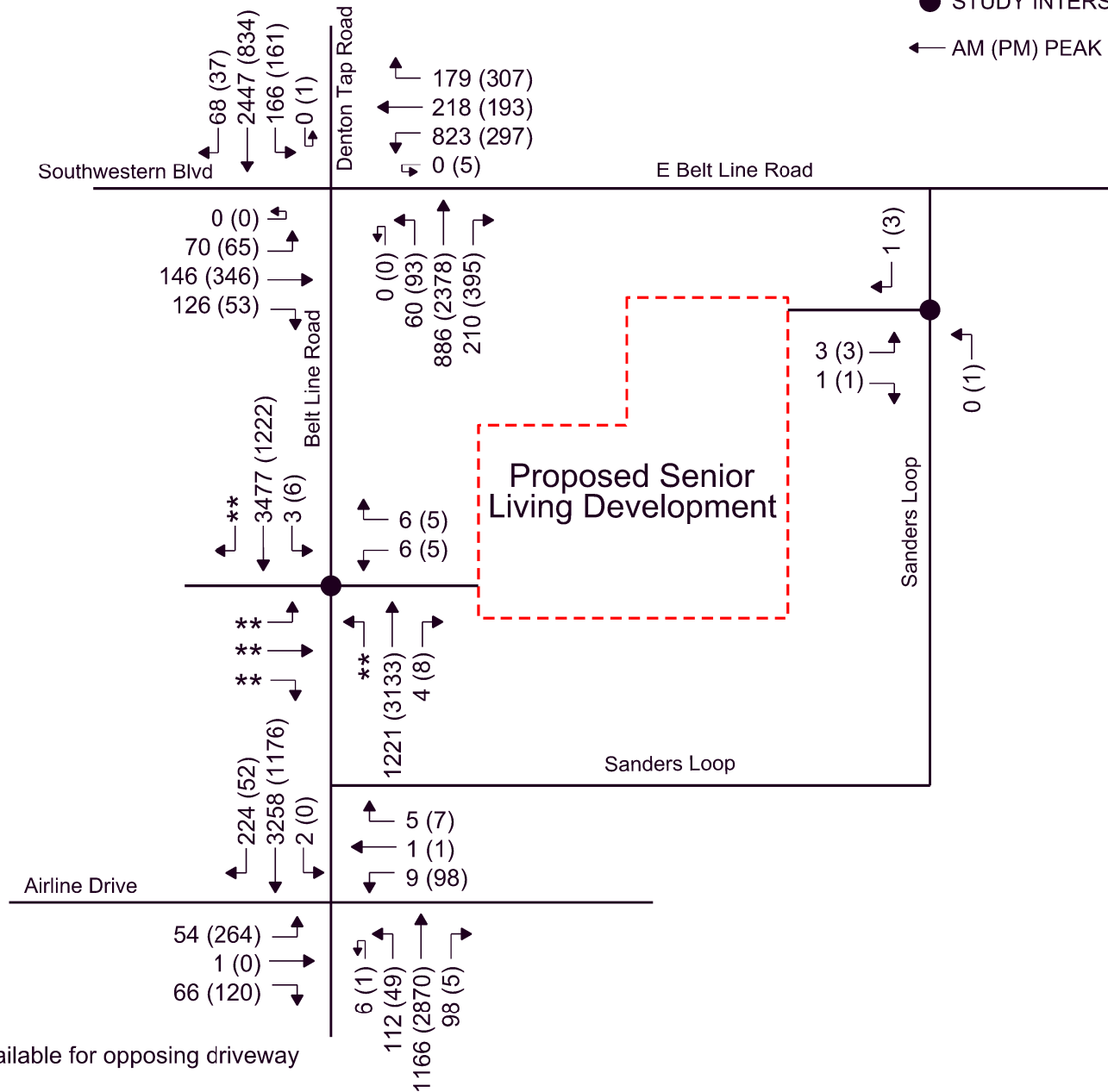






# LEGEND

- STUDY INTERSECTION
- ← AM (PM) PEAK HOUR TRAFFIC VOLUMES



\*\* Traffic volumes unavailable for opposing driveway on Belt Line Road



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DALLAS, TX 75234  
PHONE: 972-248-3006  
TBPE FIRM NO. F-450

Build-Out Year (2025) Total Peak Hour Traffic Volumes

Figure 10

## Site Access Evaluation

### *Right Turn Deceleration Lane Analysis*

The entering right-turn volumes at the two (2) proposed site access points were analyzed to determine the necessity of right-turn deceleration lanes. In the absence of City of Coppell guidelines, guidelines in TxDOT's *Access Management Manual* were used and state that for roadways with a posted speed limit of 45 mph or less, a right turn deceleration lane should be considered when peak right turn volumes are greater than 60 vehicles per hour. **Table 3** summarizes the projected right turn volumes under Build-out Year (2025) Total traffic conditions and the results in this table indicate that the TxDOT's threshold for consideration of a right turn deceleration lane is not exceeded. Therefore, right turn deceleration lanes are not recommended at either site driveway location.

**Table 3: Right Turn Deceleration Lane Analysis Results**

Intersection	Scenario	Approach	Speed Limit (mph)	Right Turn Volume (vph) AM (PM)	Threshold (vph)	Exceeds Threshold?
Access Point 1 @ S Belt Line Road	Build-out Year Total (2025)	NB	45 <sup>1</sup>	4 (8)	60	No
Access Point 2 @ Sanders Loop	Build-out Year Total (2025)	SB	30	1 (3)	60	No

<sup>1</sup>Posted speed limit prior to construction

### *Left Turn Deceleration Lane Analysis*

As part of the Belt Line Road construction project, a median opening has been constructed that serves the existing driveway for the development west of Belt Line Road and the existing (future site) driveway east of Belt Line Road. While a northbound left turn deceleration lane is provided at the median opening for the development west of Belt Line Road, a southbound left turn deceleration lane at the median opening is not provided.

Without a southbound left turn deceleration lane at the median opening, southbound motorists turning left into the Senior Living Development would need to perform this left turn movement from the inside through lane on Belt Line Road, which is not a desirable or safe movement. Even if left turns were prohibited (through the installation of a "No Left Turn" sign), motorists would still likely attempt to make the prohibited left turn movement using the inside through lane. As an alternative, a southbound left turn lane was proposed by the development (**Figure 11**) that initially provided 100 feet of taper and 73 feet of storage (meeting design criteria for a low volume driveway) even with limitations as a result of the northbound left turn bay for the median opening approximately 250 feet to the north. This preliminary design of the southbound left turn left turn lane received preliminary approval by City staff. The proposed southbound left turn deceleration lane will provide a better and safer alternative than not providing one and is expected to provide adequate storage for the estimate southbound left turns at the site driveway during the peak hours (3 during the AM peak hour / 6 during the PM peak hour).

[illegible]

### Intersection Sight Distance

As part of this traffic analysis, the available and recommended intersection sight distance for motorists accessing the adjacent roadway from the proposed site access points on South Belt Line Road and Sanders Loop was analyzed. The sight distance required was estimated using the procedures developed by the American Association of State Highway and Transportation Officials (AASHTO) and published in the 2018 edition of *A Policy on Geometric Design of Highways and Streets*. At this location, the motorist should be able to see if and when adequate gaps exist to perform their desired maneuver. **Table 4** presents the required and predicted available sight distance for vehicles exiting at the proposed Access Point locations.

**Table 4: Intersection Sight Distance Evaluation**

Major Roadway	South Belt Line Road	Sanders Loop
Posted Speed Limit	45 mph <sup>1</sup>	30 mph
Minor Roadway	Access Point 1	Access Point 2
Design Vehicle	Passenger Car	
Intersection Sight Distance (Desirable) Turning from Driveway	600'	335'
Available Intersection Sight Distance (to the right)	>600'	>500'
Available > Desirable?	Yes	Yes
Available Intersection Sight Distance (to the left)	>600'	~500'
Available > Desirable?	Yes	Yes

<sup>1</sup>Posted speed limit prior to construction

Based on conditions in the field at the time of the site visit, the field investigation indicated that adequate sight distance is predicted to be available to the left and right for motorists crossing South Belt Line Road and Sanders Loop from Access Point 1 and Access Point 2, respectively. The available sight distance is also greater than the stopping sight distance, which is 360 feet on a roadway with a speed limit of 45 mph and 200 feet for a roadway with speed limit of 30 mph.

### Driveway Spacing

The City of Coppel's *Subdivision Ordinance* states that "the spacing between driveways shall be dependent upon the speed limit of the thoroughfare." South Belt Line Road and Sanders Loop have a posted speed limit of 45 mph and 30 mph, respectively. Based on Coppel's Driveway Spacing requirements, the minimum driveway spacing is 150 feet on a 45-mph roadway and 90 feet on a 30-mph roadway. The spacing from adjacent driveways at both site driveways will be greater than 150 feet and exceed the City's driveway spacing guidelines, except for the distance between the driveway on Belt Line Road and an existing driveway serving a small auto repair shop to the north that is approximately 140 feet from the site driveway on Belt Line Road (10 feet below the City's threshold). The driveway that is located immediately south of the auto repair shop will not be used for the Senior Living Development. Although the site driveway on Belt Line Road is approximately 10 feet below the City's driveways spacing threshold, the low-volume site driveway is an existing driveway that was reconstructed as part of the Belt Line improvements and is located at an existing median opening.



## Conclusions

Based on the results of this assessment, the following conclusions are made:

- Under Build-out Year (2025) conditions, the proposed senior living development is predicted to generate 390 daily trips, 24 AM peak hour trips, and 30 PM peak hour trips.
- Traffic generated by the proposed development is predicted to add minimal traffic to intersections in the area.
- Access for the proposed development will be provided by a full access driveway on both South Belt Line Road and Sanders Loop.

### Deceleration Lane Analysis

- Right turn deceleration lanes are not recommended at either site access driveway on South Belt Line Road or Sanders Loop.
- While a southbound left turn deceleration lane at the median opening on Belt Line Road serving the site driveway was not constructed as part of the Belt Line Road improvement project, a southbound left turn deceleration is being proposed by the development that will provide a better and safer alternative than not providing a left turn lane at the median opening.

### Sight Distance Analysis

Based on observations of existing conditions in the field, adequate stopping and intersection sight distance is predicted to be provided for the proposed Access Point 1 and Access Point 2 on South Belt Line Road and Sanders Loop, respectively.

### Access Spacing Analysis

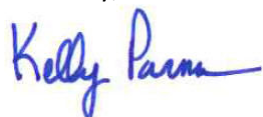
The spacing from adjacent driveways at both site driveways will be greater than 150 feet and exceed the City's driveway spacing guidelines, except for the distance between the driveway on Belt Line Road and an existing driveway serving a small auto repair shop to the north that is approximately 140 feet from the site driveway on Belt Line Road (10 feet below the City's threshold). However, this low-volume site driveway is only approximately 10 feet below the City's driveways spacing threshold and is an existing driveway that aligns with the existing median opening and was reconstructed as part of the Belt Line improvements.

## Recommendations

Based on the results of this analysis, the installation of a southbound left turn deceleration lane on Belt Line Road at the existing median opening serving the Coppell Senior Living Development is recommended.

We appreciate the opportunity to provide these traffic engineering services for you. Feel free to contact me at (972) 248-3006 should you have any questions.

Sincerely,



Kelly Parma, P.E., PTOE  
Senior Project Manager  
Lee Engineering, LLC  
TBPE Firm Registration # F-450