Transportation Impact Study

13064 Fish Road Mixed Use Development in Dallas, Texas

Prepared for:
DFW Projects, LLC

Submitted to:
City of Dallas, Texas

June 2018

Second Submittal

BIG RED DOG
ENGINEERING | CONSULTING

0844.80.001

Case No. Z178-215(SM)

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CERTIFICATION

I hereby certify that this report complies with the Ordinance requirements and applicable technical requirements of the City of Dallas, and that it is complete and accurate to the best of my knowledge.

	June 7, 2018
Signature of Responsible Engineer/Submitter	Date of Submittal
Dan Hennessey, TX 124270 Director of Transportation/Traffic Services	BIG RED DOG Engineering F-11201
Printed Name of Responsible Engineer/Submitter, P.E. #	Firm Name

EXECUTIVE SUMMARY

This report presents the results of the transportation impact analysis (TIA) for a new mixed use development project (Project) located at 13064 Fish Road in the City of Dallas, Texas. This analysis was conducted to identify potentially significant adverse impacts of the proposed Project on the surrounding transportation system and to recommend measures to mitigate impacts. This study addresses the Project's impacts on the roadway system and the adjacent bicycle, pedestrian, and transit network. Project impacts were evaluated following the guidelines of the City of Dallas.

The proposed development would consist of 70 single-family homes and up to 160,000 square feet of retail. The Project is in the parcel south of South Beltline Road and east/south of Fish Road. Access to the retail would be from a new driveway on South Beltline Road just east of Fish Road. Access to the single-family homes would be from the existing termini of Sarah Lane and Greengrove Lane. Access to both portions of the project would be available from the other access points, but would generally be inconvenient. The parcel is currently unoccupied.

The Project is anticipated to be constructed and open for use in 2020. This analysis includes buildout of the Project and a future analysis considering additional growth five years into the future.

Pedestrian, bicycle, and transit facilities were also evaluated.

PROJECT TRAFFIC ESTIMATES AND IMPACTS

The Project is estimated to generate 205 AM peak hour vehicle trips and 841 trips during the PM peak hour. Of those trips, 175 would be net new vehicle trips during the AM peak hour and 580 would be new trips during the PM peak hour.

This analysis identifies potentially significant adverse impacts of the proposed Project on the surrounding transportation system and recommends measures to mitigate significant impacts. No roadway segments were identified as significantly impacted by the Project. The following intersections are potentially impacted by the Project:

- (#1) South Beltline Road / Ravenview Road – PM peak hour
- (#3) South Beltline Road / Lawson Road – AM and PM peak hours
- (#7) South Beltline Road / Project Access Driveway – PM peak hour

(#1) South Beltline Road / Ravenview Road

During the PM peak hour, the eastbound approach is degraded from LOS D to LOS E; the Project adds two right-turn trips to this approach, but more than 200 vehicles on South Beltline Road. The intersection does not peak hour signal warrants, and it would be unlikely to meet other peak hour volume warrants as well. With the Project, there are no more than 30 vehicles on the eastbound approach during the PM peak hour; given the minor nature of the impact, **no changes are recommended** as a result of the Project.

(#3) South Beltline Road / Lawson Road

Without the Project, the side-street stop-controlled approach operates at LOS E during the AM peak hour and LOS F during the PM peak hour. With the Project, the approach degrades to LOS F during the AM peak hour; a signal is planned at this location but is not funded.

The Project should contribute its fair share of the cost to the signal installation. To evaluate the fair share cost, we have calculated the share of growth at the intersection attributed to the Project. The Project trip assignment total volume at the intersection was divided by the Build volumes subtracted by the Existing volumes. In the AM peak hour, that share is 26.8 percent; in the PM peak hour, it is 46.3 percent. As a result, the Project applicant **should contribute 46.3 percent to the cost of the signal installation**. With these improvements, the intersection would operate at LOS B in both the AM and PM peak hours.

(#7) South Beltline Road / Project Access Driveway

The Project driveway is anticipated to operate acceptably in the AM peak hour, though it would operate at LOS F in the PM peak hour. Due to the significant retail development, a signal would be required to mitigate the impact, and the intersection would meet certain signal warrants.

To mitigate the impact, the Project applicant should pay 100 percent for the following improvements:

- Install a traffic signal at the proposed driveway
- Install a 125-foot northbound left-turn pocket
- Install a southbound right-turn pocket with at least 50 feet of storage length
- Have two outbound lanes on the driveway for at least 150 feet
- Close the existing median opening near the proposed driveway location

With these improvements, the intersection would operate at LOS A in the AM peak hour and LOS B in the PM peak hour.

Table ES-1 shows a summary of the intersection level of service analysis for all scenarios, and **Table ES-2** shows a summary of the roadway segment level of service analysis for all scenarios.

TABLE ES-1: INTERSECTION LEVELS OF SERVICE ANALYSIS SUMMARY

	Intersection	Peak Hour[1]	Existing Conditions		Buildout Conditions		Buildout Plus Project Conditions		Regional Conditions		Regional Plus Project Conditions	
			Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]
1	South Beltline Road / Ravenview Road	AM	1.9 (24.4)	A (C)	1.9 (32.0)	A (D)	1.9 (34.2)	A (D)	2.0 (34.9)	A (D)	2.1 **(37.6)**	A **(E)**
		PM	2.4 (22.2)	A (C)	2.4 (31.4)	A (D)	2.5 **(39.6)**	A **(E)**	2.5 (34.7)	A (D)	2.7 **(44.4)**	A **(E)**
2	South Beltline Road / Fish Road	AM	2.5 (13.3)	A (B)	2.2 (15.1)	A (C)	2.3 (15.7)	A (C)	2.3 (15.5)	A (C)	2.4 (16.1)	A (C)
		PM	1.9 (13.6)	A (B)	1.5 (16.6)	A (C)	1.6 (19.1)	A (C)	1.6 (17.1)	A (C)	1.6 (19.8)	A (C)
3	South Beltline Road / Lawson Road	AM	9.5 (22.0)	A (C)	15.2 **(42.7)**	C **(E)**	19.1 **(57.3)**	C **(F)**	19.0 **(53.5)**	C **(F)**	24.2 **(73.2)**	C **(F)**
		PM	7.2 (22.8)	A (C)	15.3 **(61.6)**	C **(F)**	32.7 **(>100)**	D **(F)**	19.6 **(79.8)**	C **(F)**	**41.3 (>100)**	**E (F)**
4	South Beltline Road / Sarah Lane	AM	0.3 (11.1)	A (B)	0.3 (12.1)	A (B)	0.5 (12.8)	A (B)	0.3 (12.5)	A (B)	0.6 (13.0)	A (B)
		PM	0.3 (11.1)	A (B)	0.2 (12.8)	A (B)	0.4 (15.2)	A (C)	0.2 (12.9)	A (B)	0.4 (15.4)	A (C)
5	South Beltline Road / Greengrove Lane	AM	0.1 (10.2)	A (B)	0.1 (10.8)	A (B)	0.4 (12.0)	A (B)	0.1 (11.0)	A (B)	0.4 (12.1)	A (B)
		PM	0.1 (11.0)	A (B)	0.1 (12.5)	A (B)	0.3 (14.6)	A (B)	0.0 (12.7)	A (B)	0.3 (14.8)	A (B)
6	South Beltline Road / Seagoville Road	AM	18.9 (22.7)	C (C)	23.5	C	23.5	C	23.5	C	24.1	C
		PM	20.9 (23.3)	C (C)	24.7	C	26.1	C	25.4	C	26.9	C
7	South Beltline Road / Project Access Driveway	AM	-	-	-	-	1.3 (15.2)	A (C)	-	-	1.3 (15.6)	A (C)
		PM	-	-	-	-	**>100 (>100)**	**F (F)**	-	-	**>100 (>100)**	**F (F)**

Notes:
1. AM = morning peak hour, PM = evening peak hour
2. Entire intersection weighted average control delay expressed in second per vehicle for signalized intersections and all-way stop-controlled intersections. Total control delay for the worst approach is also presented in parentheses for side-street stop controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the Synchro level of service analysis software package, which applies the method described in the Highway Capacity Manual.

Bold text indicates intersection operates at a deficient Level of Service. **Bold and red** indicates a potentially significant impact.
AWSC = All-Way Stop Control; SSSC = Side-Street Stop Control
Source: BIG RED DOG Engineering, 2018.

TABLE ES-2: ROADWAY SEGMENT LEVELS OF SERVICE ANALYSIS SUMMARY

	Intersection	Direction	Peak Hour[1]	Existing Conditions		Buildout Conditions		Buildout Plus Project Conditions		Regional Conditions		Regional Plus Project Conditions	
				v/c[2]	LOS[3]	v/c[2]	LOS[3]	v/c[2]	LOS[3]	v/c[2]	LOS[3]	v/c[2]	LOS[3]
A	South Beltline Road between Ravenview Road and Fish Road	NB	AM (PM)	0.32 (0.21)	B (A)	0.37 (0.28)	B (B)	0.39 (0.34)	B (B)	0.38 (0.29)	B (B)	0.40 (0.35)	B (B)
		SB	AM (PM)	0.18 (0.27)	A (B)	0.25 (0.35)	B (B)	0.26 (0.40)	B (B)	0.26 (0.36)	B (B)	0.27 (0.42)	B (B)
B	South Beltline Road between Lawson Road and Sarah Lane	NB	AM (PM)	0.17 (0.24)	A (A)	0.31 (0.27)	B (B)	0.33 (0.33)	B (B)	0.32 (0.27)	B (B)	0.34 (0.34)	B (B)
		SB	AM (PM)	0.20 (0.21)	A (A)	0.23 (0.29)	A (B)	0.25 (0.39)	B (B)	0.24 (0.30)	A (B)	0.25 (0.40)	B (B)
C	South Beltline Road between Seagoville Road and Greengrove Lane	NB	AM (PM)	0.18 (0.25)	A (A)	0.25 (0.34)	B (B)	0.27 (0.42)	B (B)	0.26 (0.35)	B (B)	0.28 (0.43)	B (B)
		SB	AM (PM)	0.20 (0.22)	A (A)	0.25 (0.31)	B (B)	0.28 (0.39)	B (B)	0.26 (0.32)	B (B)	0.29 (0.40)	B (B)
D	Sarah Lane west of South Beltline Road	NB	AM (PM)	0.03 (0.03)	A (A)	0.03 (0.03)	A (A)	0.07 (0.05)	A (A)	0.04 (0.03)	A (A)	0.07 (0.06)	A (A)
		SB	AM (PM)	0.03 (0.03)	A (A)	0.03 (0.03)	A (A)	0.04 (0.07)	A (A)	0.03 (0.03)	A (A)	0.04 (0.07)	A (A)
E	Greengrove Lane west of South Beltline Road	NB	AM (PM)	0.01 (0.01)	A (A)	0.01 (0.01)	A (A)	0.05 (0.03)	A (A)	0.01 (0.01)	A (A)	0.05 (0.03)	A (A)
		SB	AM (PM)	0.01 (0.01)	A (A)	0.01 (0.01)	A (A)	0.02 (0.05)	A (A)	0.01 (0.01)	A (A)	0.02 (0.05)	A (A)

Notes:
1. AM = morning peak hour, PM = evening peak hour
2. Volumes divided by capacities as defined in the City of Dallas Master Thoroughfare Plan.
3. LOS = Level of Service. LOS calculations per City of Dallas standards.

Bold text indicates intersection operates at a deficient Level of Service. **Bold and red** indicates a potentially significant impact.
Source: BIG RED DOG Engineering, 2018.

1. INTRODUCTION

PURPOSE AND PROJECT DESCRIPTION

This report presents the results of the transportation impact analysis (TIA) for a new mixed use development project (Project) located at 13064 Fish Road in the City of Dallas, Texas. This analysis was conducted to identify potentially significant adverse impacts of the proposed Project on the surrounding transportation system and to recommend measures to mitigate impacts. This study addresses the Project's impacts on the roadway system and the adjacent bicycle, pedestrian, and transit network. Project impacts were evaluated following the guidelines of the City of Dallas.

The proposed development would consist of 70 single-family homes and up to 160,000 square feet of retail. The Project is in the parcel south of South Beltline Road and east/south of Fish Road. Access to the retail would be from a new driveway on South Beltline Road just east of Fish Road. Access to the single-family homes would be from the existing termini of Sarah Lane and Greengrove Lane. Access to both portions of the project would be available from the other access points, but would generally be inconvenient. The parcel is currently unoccupied.

The Project is anticipated to be constructed and open for use in 2020. This analysis includes buildout of the Project and a future analysis considering additional growth five years into the future.

Figure 1 shows the location of the Project site, the surrounding transportation network, and study intersections. **Figure 2** shows the Project site plan.

Key: (X) Study Intersection

Figure 1
Study Area and Intersections

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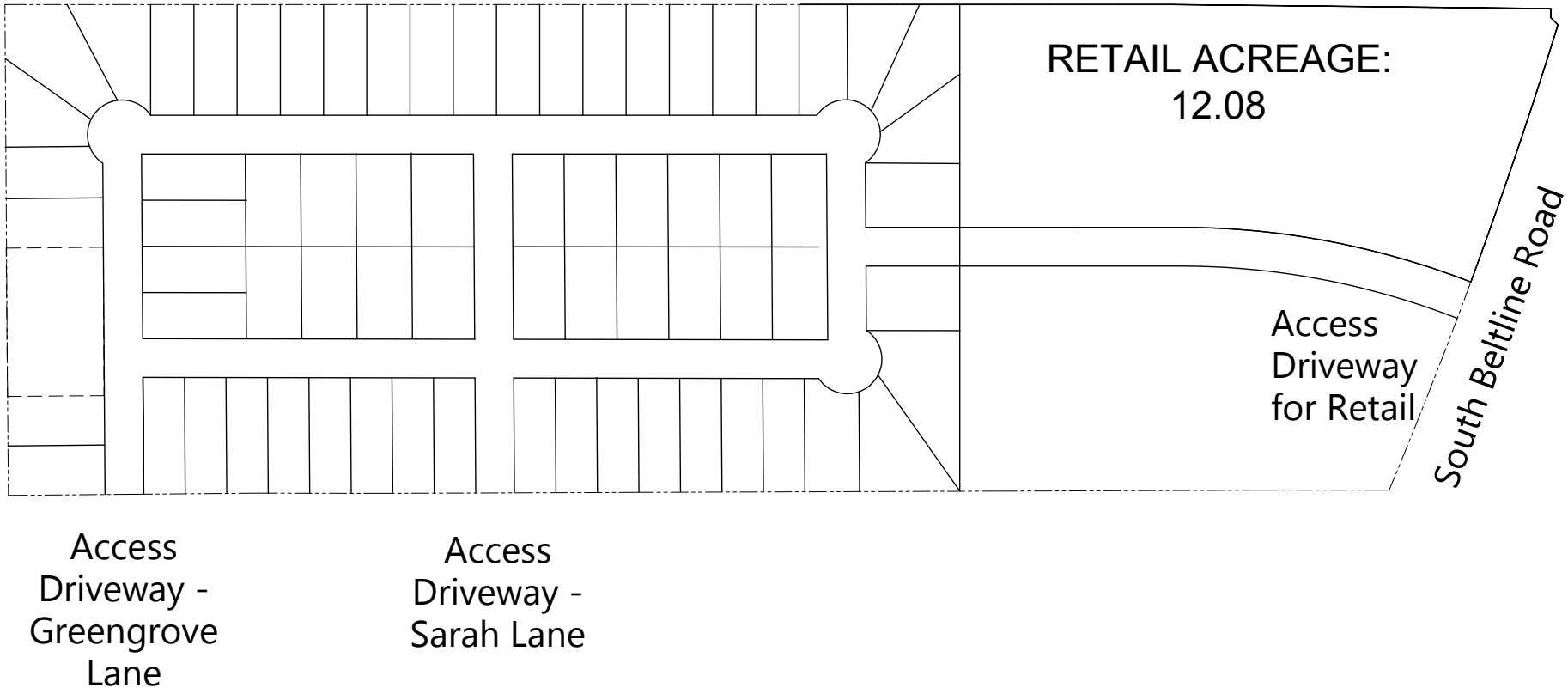


Figure 2
Project Site Plan

PROJECT STUDY AREA

STUDY INTERSECTIONS AND ROADWAY SEGMENTS

Project impacts on the study area roadway facilities were determined by measuring the effect Project traffic would have on intersection operations during the morning (7:00 to 9:00 AM) and late afternoon (4:00 to 6:00 PM) peak periods, when traffic volumes on the surrounding roadways are highest.

A total of six external intersections and five roadway segments were selected as study locations. These intersections and roadway segments represent the locations most likely to experience traffic impacts associated with the Project. Driveway access intersections are also included in the study. The study intersections are:

1. South Beltline Road / Ravenview Road
2. South Beltline Road / Fish Road
3. South Beltline Road / Lawson Road
4. South Beltline Road / Sarah Lane ***– also provides access to single-family***
5. South Beltline Road / Greengrove Lane ***– also provides access to single-family***
6. South Beltline Road / Seagoville Road
7. ***South Beltline Road / Project Access Driveway 1 (future) – access to retail***

The study roadway segments are:

A. South Beltline Road between Ravenview Road and Fish Road
B. South Beltline Road between Lawson Road and Sarah Lane
C. South Beltline Road between Seagoville Road and Greengrove Lane
D. Sarah Lane west of South Beltline Road
E. Greengrove Lane west of South Beltline Road

ANALYSIS SCENARIOS

The operations of the study intersections were evaluated during the weekday morning (AM) and weekday evening (PM) peak hours for the following five scenarios:

Scenario 1: *Existing Conditions* – Existing volumes obtained from counts collected in February of 2018.

Scenario 2: *Existing Plus Background Conditions* – Existing volumes plus traffic from other growth for the year 2020, when the Project is projected to be completed.

Scenario 3: *Existing Plus Background Plus Project Conditions* – Scenario 2 volumes plus traffic generated by buildout of the proposed Project.

Scenario 4: *Regional Conditions* – Existing volumes plus traffic from other growth for the year 2025.

Scenario 5: *Regional Plus Project Conditions* – Scenario 4 volumes plus traffic generated by buildout of the proposed Project.

TRAFFIC ANALYSIS METHODS

Operational traffic analyses focus on intersections rather than roadway segments, due to the capacity constraints typically occurring at the intersections. The operational performance of a roadway network is commonly described with the term level of service or LOS. LOS is a qualitative description of operating conditions, ranging from LOS A (free flow traffic conditions with little or no delay) to LOS F (oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays). The LOS analysis methods outlined in the Highway Capacity Manual (Transportation Research Board, 2010) were used in this study. The HCM methods for calculating LOS for signalized intersections and unsignalized intersections are described below.

SIGNALIZED INTERSECTIONS

Traffic operations at signalized intersections were evaluated using the LOS method described in Chapter 18 of the 2010 Highway Capacity Manual. The Synchro software package (version 9) was used to model traffic conditions throughout the Project study area. Synchro is a macrosimulation tool that uses deterministic equations to evaluate operations at an intersection.

A signalized intersection's LOS is based on the weighted average control delay measured in seconds per vehicle. Control delay includes initial deceleration delay, queue move-up time (if multiple cycles are needed to clear the intersection), stopped delay, and final acceleration. **Table 1** summarizes the relationship between the control delay and LOS for signalized intersections.

TABLE 1: SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay (seconds)
A	Operations with very low delay occurring with good traffic signal progression and/or short cycle lengths.	< 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10.0 to 20.0
C	Operations with average delays resulting from fair progression. Individual cycle failures begin to appear.	> 20.0 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55.0 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation.	> 80.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2010.

UNSIGNALIZED INTERSECTIONS

In Chapters 19 and 20 of the Transportation Research Board's 2010 Highway Capacity Manual, the LOS for unsignalized intersections (side-street or all-way stop controlled intersections) is also defined by the average control delay per vehicle (measured in seconds). The control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side-street stop-controlled intersections, delay is calculated for each stop-controlled movement and for the uncontrolled left turns, if any, from the main street. The delay and LOS for the intersection as a whole and for the worst movement are reported for side-street stop intersections. The intersection average delay is reported for all-way stop intersections. **Table 2** summarizes the relationship between delay and LOS for unsignalized intersections. The delay ranges for unsignalized intersections are lower than for signalized intersections as drivers expect less delay at unsignalized intersections.

TABLE 2: UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay.	≤ 10.0
B	Short traffic delays.	10.1 to 15.0
C	Average traffic delays.	15.1 to 25.0
D	Long traffic delays.	25.1 to 35.0
E	Very long traffic delays.	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2010.

ROADWAY SEGMENTS

The City of Dallas has defined hourly service volumes per lane for eight functional classes of roadways in five different area types on both divided and undivided roads. For the purposes of this analysis, South Beltline Road is a Principal Arterial, per the City of Dallas Thoroughfare Plan. It is considered two-way, four-lane divided roadway in a suburban residential area. Sarah Lane and Greengrove Lane are both unidentified in the City of Dallas Thoroughfare Plan; both are considered local streets. The hourly service volume for South Beltline Road is 925 vehicles per hour per lane and for the local streets is 525 vehicles per hour. The LOS is based on the ratio of volume to the service volumes per lane listed (capacity). **Table 3** summarizes the relationship between roadway volumes per lane and LOS for roadway segments, though has recently been found to be outdated; as such, comparisons to Table 3 are provided for information only.

TABLE 3: ROADWAY SEGMENT LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Volume to Service Volume Ratio
A	No delay.	≤ 0.25
B	Little delay.	0.25 to 0.45
C	Short traffic delays.	0.45 to 0.65
D	Average traffic delays.	0.65 to 0.80
E	Nearing or at capacity.	0.80 to 1.00
F	Over capacity and over-saturation.	> 1.00

Source: *City of Dallas, 2016.*

SIGNIFICANT IMPACT CRITERIA

The impacts of the Project were evaluated by comparing the results of the level of service calculations under Buildout Plus Project Conditions to the results under Buildout Conditions, as well as Regional Plus Project Conditions to Regional Conditions. LOS D shall be the minimum acceptable standard. If an intersection operates at LOS E or LOS F without the Proposed Project, the standard is to maintain the level of service with addition of traffic resulting from the Proposed Project.

Additionally, the Project has been reviewed with respect to non-auto modes, including:

- Potential conflicts for pedestrians and bicyclists;
- Exacerbation of a current unsafe pedestrian or bicycle condition;
- Potential internal circulation conflicts for pedestrians or motorists;
- Potential transit demand and ability of local providers to accommodate that demand; or
- Project parking demand and ability proposed parking supply to accommodate that demand.

REPORT ORGANIZATION

This report is divided into chapters as described below:

- **Chapter 2 – Existing Conditions** describes the transportation system near the Project site, including the surrounding roadway network, existing bicycle, pedestrian, and transit facilities, morning and evening peak period intersection turning movement volumes, and intersection levels of service.
- **Chapter 3 – Project Transportation Characteristics** describes the land use components of the Project and the method used to estimate the amount of traffic generated by it. The distribution and assignment of vehicle traffic on the roadway system is also discussed in this chapter.
- **Chapter 4 – Buildout Conditions** addresses the conditions with background growth by 2020, when construction of the Project is planned to be completed. The chapter discusses these conditions, both without and with the Project.
- **Chapter 5 – Regional Conditions** addresses the conditions with background growth by 2025. The chapter discusses these conditions, both without and with the Project.
- **Chapter 6 – Site Access, Circulation and Parking** describes Project access and internal circulation for all travel modes, and discusses Project vehicular, pedestrian, bicycle, and transit impacts.

2. EXISTING CONDITIONS

This chapter describes the Existing Conditions of the roadway facilities, pedestrian, and bicycle facilities, and transit service near the Project site. It also presents existing traffic volumes and operations for the study intersections and roadway segments with the results of level of service calculations.

EXISTING STREET SYSTEM

Regional vehicular access to the Project area is likely to be provided by I-20, I-635, and US-176. Local access is provided by South Beltline Road and Seagoville Road. The local access roadway and other significant roadways in the study area are described as follows.

South Beltline Road is a four-lane, divided Principal Arterial in the City of Dallas Thoroughfare Plan. The grass median is more than 30 feet wide. Beltline Road extends from I-30 in the north and east in Garland (where it continues as Broadway Boulevard) to Joe Pool Lake in the south and west. It extends for roughly 40 miles. Lanes are roughly twelve feet wide and curbs and roadway lighting exist in the study area; no sidewalks or bicycle facilities exist. The posted speed limit is 40 miles per hour (mph).

Ravenview Road extends from South Beltline Road in the north to the US-175 Westbound Frontage Road in the south. It is approximately 2.75 miles long. Ravenview Road has two lanes and no posted speed limit, sidewalks, or bicycle facilities. Ravenview Road is 20 to 22 feet wide and has no shoulders or curbs. Full access is provided at South Beltline Road, and left-turn lanes are provided in both directions.

Fish Road is a 3,800-foot local road providing access to residential homes. Fish Road has two lanes and no posted speed limit, sidewalks, or bicycle facilities. South of South Beltline Road, Fish Road terminates at Ravenview Road. North of South Beltline Road, Fish Road has two branches; one that terminates just to the north and another that turns east and connects to Lawson Road. Fish Road has two lanes and no posted speed limit, sidewalks, or bicycle facilities. Fish Road is 20 to 22 feet wide and has no shoulders or curbs. Full access is provided at South Beltline Road, and left-turn lanes are provided in both directions. Full access is provided at Lawson Road, though no turn lanes are provided.

Lawson Road extends from South Beltline Road in the south to US-80 in the north in Sunnyvale. The posted speed limit is 40 mph near South Beltline Road (and 30 mph farther to the north). Lawson Road has two lanes, but no sidewalks or bicycle facilities. Lawson Road is roughly 24 feet wide and has no shoulders or curbs. Full access is provided at South Beltline Road, and a southbound left-turn lane is provided.

Sarah Lane is a 1,700-foot local road providing access to residential homes. Sarah Lane has two lanes and no posted speed limit, sidewalks, or bicycle facilities. Sarah Lane is roughly 20 feet wide and has no shoulders or curbs. Full access is provided at South Beltline Road, and a northbound left-turn lane is provided. The western terminus of the road will be an access point to the single-family portion of the development.

Greengrove Lane is a 1,250-foot local road providing access to residential homes. Greengrove Lane has two lanes and no posted speed limit, sidewalks, or bicycle facilities. Greengrove Lane is less than 20 feet wide and has no shoulders or curbs. Full access is provided at South Beltline Road, and a northbound left-turn lane is provided. The western terminus of the road will be an access point to the single-family portion of the development.

Seagoville Road extends from I-20 in the west (where it continues as Pioneer Road) to US-175 in the east. Seagoville Road is a four-lane divided Minor Arterial in the City of Dallas Thoroughfare Plan. The grass median is approximately 15 to 18 feet wide. Lanes are roughly twelve feet wide and curbs and roadway lighting exist in the study area; no sidewalks or bicycle facilities exist. The posted speed limit is 40 miles per hour (mph).

No construction was observed during data collection and only one roadway change has been assumed within this analysis. The City of Dallas has previously identified both (#3) South Beltline Road / Lawson Road and (#6) South Beltline Road / Seagoville Road as meeting signal warrants; the signal at Seagoville Road is part of the 2017 bond program and is scheduled for installation. This signal is not assumed in the existing conditions analysis, but is assumed in all future scenarios. The signal at Lawson Road does not yet have funds allocated; as such, it is not assumed in any scenario.

EXISTING PEDESTRIAN FACILITIES AND OBSERVATIONS

Pedestrian facilities include sidewalks, crosswalks, pedestrian signals and off-street pedestrian paths.

As mentioned, no sidewalks exist in the study area. No marked crosswalks are provided at any of the intersections or across any other roadway segments in the study area.

During data collection, the highest concentration of pedestrians were observed at the (#5) South Beltline Road / Greengrove Road during the AM peak hour and at the (#1) South Beltline Road / Ravenview Road intersection during the PM peak hour. No more than ten pedestrians were observed at any intersection. Thirty-one total pedestrians were observed across the four hours of data collection, seventeen of which cross South Beltline Road. Because of the complete lack of pedestrian infrastructure in the study area, no

particular conflicts for pedestrians were noted, though any person trying to walk in the area has not been safely accommodated.

EXISTING BICYCLE FACILITIES AND OBSERVATIONS

Bikeway planning and design in Texas typically relies on guidelines and design standards established by the Texas Department of Transportation (TXDOT) in the Texas Manual on Uniform Traffic Control Devices (2011). Bicycle facilities comprise paths (Class I), lanes (Class II), and routes (Class III) as described below.

- *Class I Bikeway (Bicycle Path)* provides a completely separate right-of-way and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. Class I paths are typically eight to ten feet wide excluding shoulders and are generally paved.

- *Class II Bikeway (Bicycle Lane)* provides a restricted right-of-way and is designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally four to six feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.

- *Class III Bikeway (Bicycle Route)* provides for a right-of-way designated by signs or pavement markings (sharrows) for shared use with pedestrians or motor vehicles. Sharrows are a type of pavement marking (bike and arrow stencil) placed to guide bicyclists to the best place to ride on the road, avoid car doors, and remind drivers to share the road with cyclists.

Currently, no bicycle facilities exist in the study area. At the study intersections, no bicyclists were observed in the AM or PM peak periods. No bicycle improvements have been assumed as part of this analysis. In the *City of Dallas Bicycle Plan*, on-street bicycle facilities are planned on Seagoville Road, Lawson Road, and South Beltline Road (south of Lawson Road) in the study area.

EXISTING TRANSIT SERVICE

DALLAS AREA RAPID TRANSIT (DART)

DART is the City of Dallas's regional public transportation provider. DART provides service to Dallas and twelve surrounding cities and provides more than 220,000 passengers per day across a 700-square mile service area. DART provides commuter rail service, light rail service, bus routes, and paratransit services.

The only DART route within four miles of the Project is **DART Bus Route 842 – Buckner Station FLEX**. The route provides bus service between Buckner Station in the west and Seagoville Middle School in the east.

The route serves an area bounded roughly by Buckner Boulevard to the west, Elam Road and Ravenview Road to the north, Seagoville Road to the east, and Teagarden Road to the south.

FLEX is a service offering the advantages of a fixed route plus the convenience of curbside service. This service charges a DART local fare for boardings at bus stops and for trips that begin or end away from the local or fixed route. FLEX requests are limited to the designated FLEX zone. Reservation requests are accepted 24 hours prior to the desired trip and may be made seven days in advance. Walk-up requests are not accepted. Approval of requests are based on ridership, traffic, and timing of other requests.

The closest stop is at the intersection of (#6) South Beltline Road / Seagoville Road, between one-half and three-quarters of a mile from the Project. The route operates on weekdays only, running from 5:30 AM to 7:00 PM with roughly thirty-minute headways in the westbound direction and one-hour headways in the eastbound direction.

In the AM peak period, six buses run in the westbound, though only three travel the entire route (including the Project area). In the eastbound direction, four buses run, though only two travel the entire route (including the Project area). In the PM peak period, four buses run in the westbound, though only two travel the entire route (including the Project area). In the eastbound direction, six buses run, though only three travel the entire route (including the Project area).

No transit improvements have been assumed as part of this analysis.

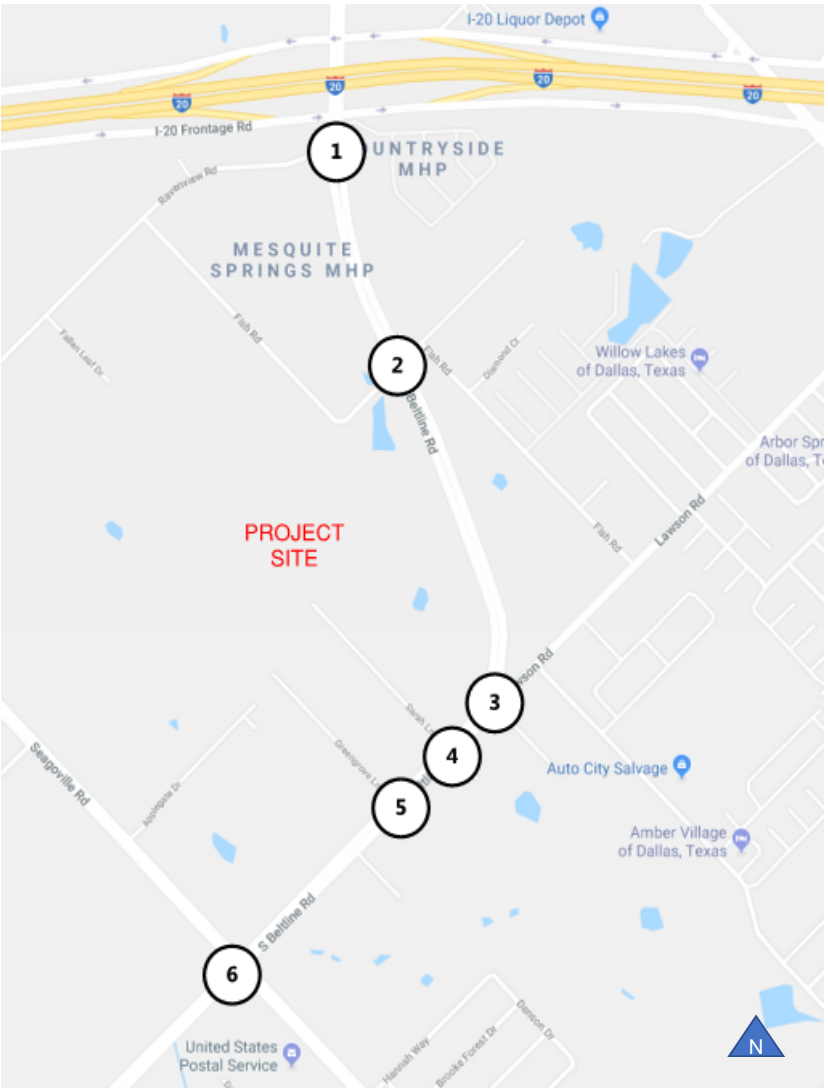
EXISTING VOLUMES AND LANE CONFIGURATIONS

Weekday morning (7:00 to 9:00 AM) and late afternoon (3:00 to 5:00 PM) peak period intersection turning movement counts were conducted at the study locations in February of 2018 with area schools in session. The single hour with the highest traffic volumes during each count period was identified as the peak hour. Existing lane configurations and signal controls were obtained through field observations. The peak hour volumes are presented on **Figure 3** along with the existing lane configurations and traffic control devices (stops signs or traffic signals). Detailed count data are contained in **Appendix A**. Existing intersection lane and roadway segment configurations and peak hour turning movement volumes were used to calculate the levels of service for the key intersections and roadway segments during each peak hour. All study intersections are unsignalized.

EXISTING LEVELS OF SERVICE

Field observations conducted during the peak periods were used to validate the results of the AM and PM peak hour Synchro analysis. Each Synchro model was calibrated and validated to the field observations. Typically, queues did not affect other intersections.

The results of the LOS analysis for Existing Conditions are presented in **Table 4**. **Appendix B** contains the corresponding LOS calculation sheets, which show the delay (and corresponding level of service), volume-to-capacity (v/c) ratio, and 95th percentile queue length for each movement. The results of the LOS calculations indicate that all study intersections and roadway segments operate acceptably. **Appendix C** includes an evaluation of peak hour signal warrants for each intersection; the intersection of (#6) South Beltline Road / Seagoville Road currently meets peak hour signal warrants. It operates at LOS C during both peak hours as an all-way stop-controlled intersection; all approaches operate at LOS C or better during both peak hours.



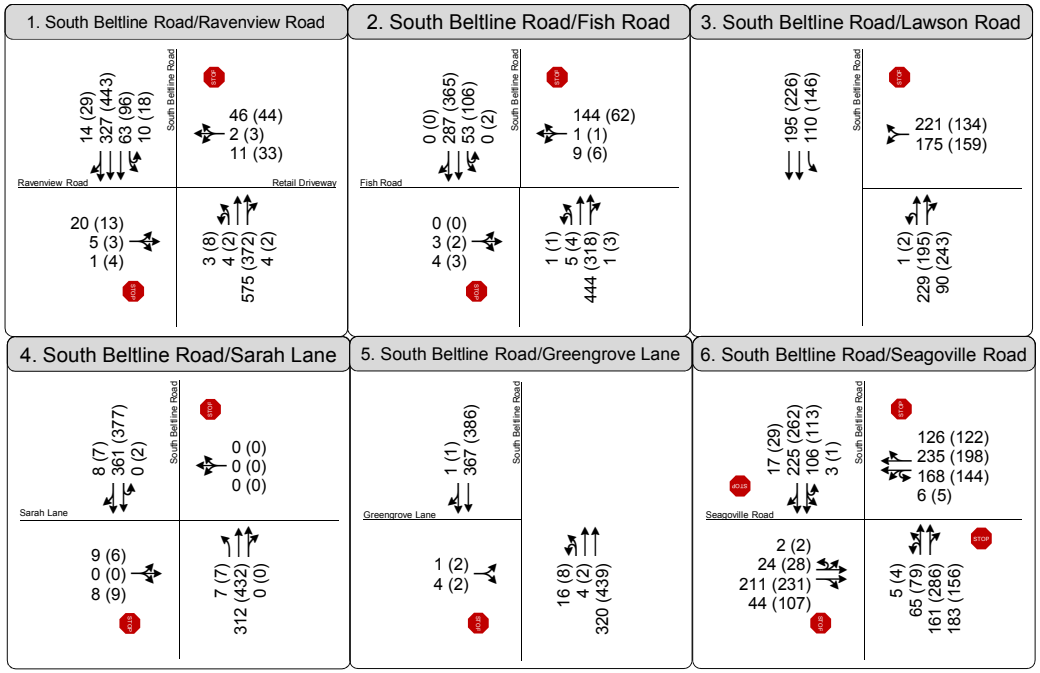


Figure 3
Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes
Existing Conditions

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TABLE 4: EXISTING INTERSECTION AND ROADWAY SEGMENT LEVELS OF SERVICE

	Intersection / Roadway Segment	Control/ Direction	Peak Hour[1]	Delay or v/c[2]	LOS[3]
1	South Beltline Road / Ravenview Road	SSSC	AM PM	1.9 (24.4) 2.4 (22.2)	A (C) A (C)
2	South Beltline Road / Fish Road	SSSC	AM PM	2.5 (13.3) 1.9 (13.6)	A (B) A (B)
3	South Beltline Road / Lawson Road	SSSC	AM PM	9.5 (22.0) 7.2 (22.8)	A (C) A (C)
4	South Beltline Road / Sarah Lane	SSSC	AM PM	0.3 (11.1) 0.3 (11.1)	A (B) A (B)
5	South Beltline Road / Greengrove Lane	SSSC	AM PM	0.1 (10.2) 0.1 (11.0)	A (B) A (B)
6	South Beltline Road / Seagoville Road	AWSC	AM PM	18.9 (22.7) 20.9 (23.3)	C (C) C (C)
A	South Beltline Road between Ravenview Road and Fish Road	NB SB	AM (PM) AM (PM)	0.32 (0.21) 0.18 (0.27)	B (A) A (B)
B	South Beltline Road between Lawson Road and Sarah Lane	NB SB	AM (PM) AM (PM)	0.17 (0.24) 0.20 (0.21)	A (A) A (A)
C	South Beltline Road between Seagoville Road and Greengrove Lane	NB SB	AM (PM) AM (PM)	0.18 (0.25) 0.20 (0.22)	A (A) A (A)
D	Sarah Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.03 (0.03) 0.03 (0.03)	A (A) A (A)
E	Greengrove Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.01 (0.01) 0.01 (0.01)	A (A) A (A)

Notes:
1. AM = morning peak hour, PM = evening peak hour
2. Entire intersection weighted average control delay expressed in second per vehicle for signalized intersections and all-way stop-controlled intersections. Total control delay for the worst approach is also presented in parentheses for side-street stop controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the Synchro level of service analysis software package, which applies the method described in the Highway Capacity Manual.

Bold text indicates intersection operates at a deficient Level of Service.
AWSC = All-Way Stop Control; SSSC = Side-Street Stop Control
Source: BIG RED DOG Engineering, 2018.

3. PROJECT TRANSPORTATION CHARACTERISTICS

This chapter presents the method used to estimate the amount of traffic generated by the proposed development and how it will be distributed to the roadway system. The amount of traffic added to the roadway system is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of traffic added to the roadway network. The second step estimates the directions of travel to and from the Project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. The results of the process are described in the following sections.

TRIP GENERATION

The purpose of the vehicular trip generation estimate is to approximate the number of new vehicle trips entering and exiting the site for various purposes (e.g., resident, employee, and visitor trips) during a selected time period. The proposed development would consist of up to 100 single-family homes and 160,000 square feet of retail.

Despite providing a mix of uses, no estimate for internalization of vehicle trips has been included within this analysis. The transportation network in this area of Dallas also does not provide potential for substantial pedestrian, bicycle, or transit travel to and from the Proposed Project, and no reduction has been included to account for use of transit and active modes. The Institute of Transportation Engineers (ITE) *Trip Generation (10th Edition)* was used for trip generation rates for the residential uses; no adjustment to the standard ITE rates has been made.

Pass-by trip reductions have been included for the retail portion of the Project. Pass-by trips are those which make an additional stop on their ultimate trip, but do not deviate from the vehicle's intended route, i.e., trips generated as a stop-off on the way to the vehicle's intended destination. Retail is a primary example of development that attracts a significant proportion of pass-by trips, given that many who use the facility have a secondary destination planned.

The *ITE Trip Generation Handbook* contains peak period pass-by ratios for retail land uses. According to the *Handbook*, 34 percent of PM peak trips to the retail will be pass-by trips. No AM peak data is provided, but a mid-day percentage of 26 percent pass-by trips is provided. For this analysis, a 20 percent pass-by rate for AM peak hour trips to the retail has been used. For daily trips, the average of the AM and PM ratios was used. Pass-by trips still occur at driveways entering and exiting the Project, but are re-routed from existing trips.

Table 5 summarizes the estimated trip generation for the Project for a typical weekday. As shown in Table 5, the Project is estimated to generate 205 AM peak hour vehicle trips and 841 trips during the PM peak hour. Of those trips, 175 would be net new vehicle trips during the AM peak hour and 580 would be new trips during the PM peak hour.

TABLE 5: DEVELOPMENT NET NEW EXTERNAL VEHICLE TRIPS

Description	Land Use	ITE Code	Units	Daily	Weekday AM Peak			Weekday PM Peak		
				Total	In	Out	Total	In	Out	Total
Residential	Single-Family	210[1]	70 DU	749	14	41	55	45	27	72
Retail	Shopping Center	820[2]	160,000 SF	8,276	93	57	150	369	400	769
Pass-by Trips				*(2,235)*	*(19)*	*(11)*	*(30)*	*(125)*	*(136)*	*(261)*
Net New Vehicle Trips Total				***6,790***	***88***	***87***	***175***	***289***	***291***	***580***

Notes:
1. Daily: LN (T) = 0.92 * LN (X) + 2.71
   AM: T = 0.71 * X + 4.80; 25% in, 75% out
   PM: LN (T) = 0.96 * LN (X) + 0.20; 63% in, 37% out
   Where T= number of vehicle trips, X = number of dwelling units
2. Daily: LN (T) = 0.68 * LN (X) + 5.57
   AM: T = 0.94 * X; 62% in, 38% out
   PM: LN (T) = 0.74 * LN (X) + 2.89; 48% in, 52% out
   Where T= number of vehicle trips, X = gross square footage

Source: ITE *Trip Generation Manual* (10th Edition), BIG RED DOG Engineering, 2018.

TRIP DISTRIBUTION

Trip distribution is defined as the directions of approach and departure that vehicles would use to arrive at and depart from the site. Trip distribution for Project trips was based on existing travel patterns in the area. Given that the Project is mixed use but heavily commercial, destinations were generally tied to other residential areas. Given its location within the greater Dallas area, as well as the study area, the destinations are specifically tied to the surrounding freeways. The general directions of approach and departure for the AM and PM peak hours, based on existing counts and additional engineering judgment regarding potential origins and destinations, as well as comments from the City of Dallas, are summarized below in **Table 6.**

TABLE 6: TRIP DISTRIBUTION

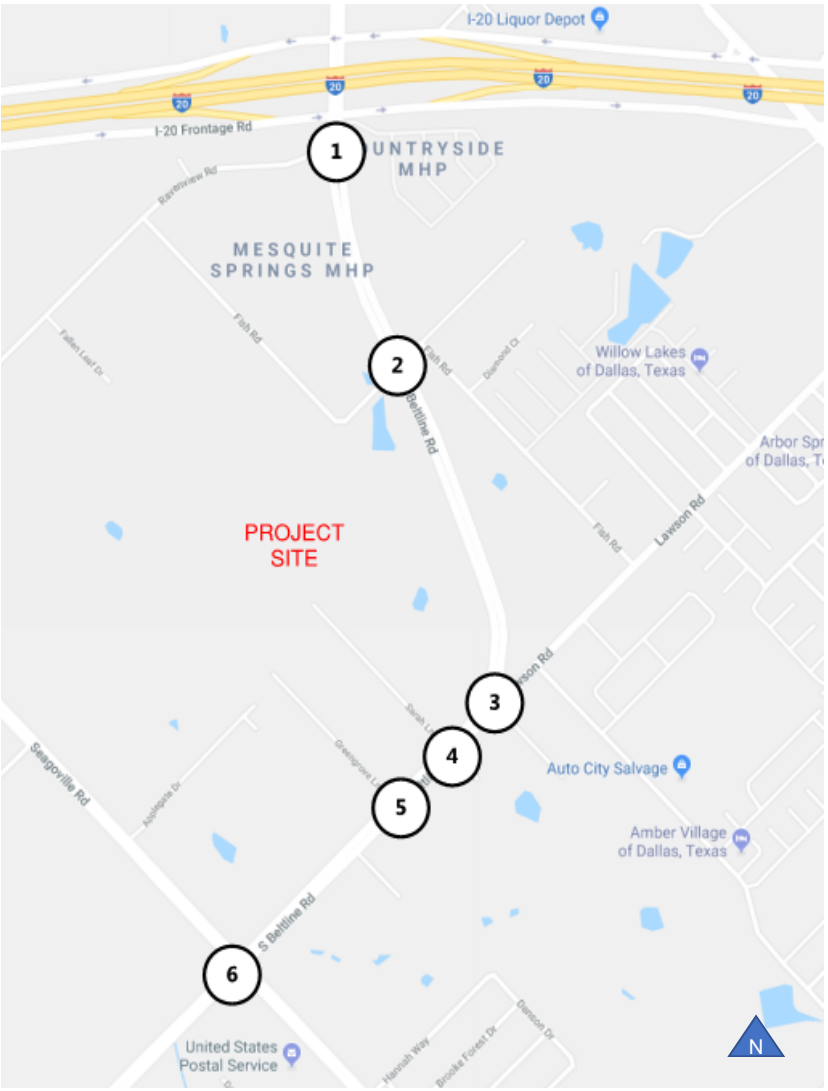
Location	Trip Distribution
South Beltline Road (north)	35%
South Beltline Road (south)	27%
Seagoville Road (west)	10%
Seagoville Road (east)	15%
Fish Road (east)	4%
Ravenview Road (west)	1%
Lawson Road (east)	8%

Source: BIG RED DOG Engineering, 2018.

TRIP ASSIGNMENT

The Project trips were assigned to the roadway system based on the directions of approach and departure discussed above. **Figure 4** shows the number of net new Project trips assigned to each turning movement at each study intersection for the Project.

Trips to the single-family portion of the Project would access via Sarah Lane and Greengrove Lane (assumed to be split evenly). The retail portion of the Project would have its own access driveway on South Beltline Road just north of Lawson Road. For the purposes of this analysis, it has been assumed that all movements will be available at the Project driveway; further design details will be discussed in the following chapter.



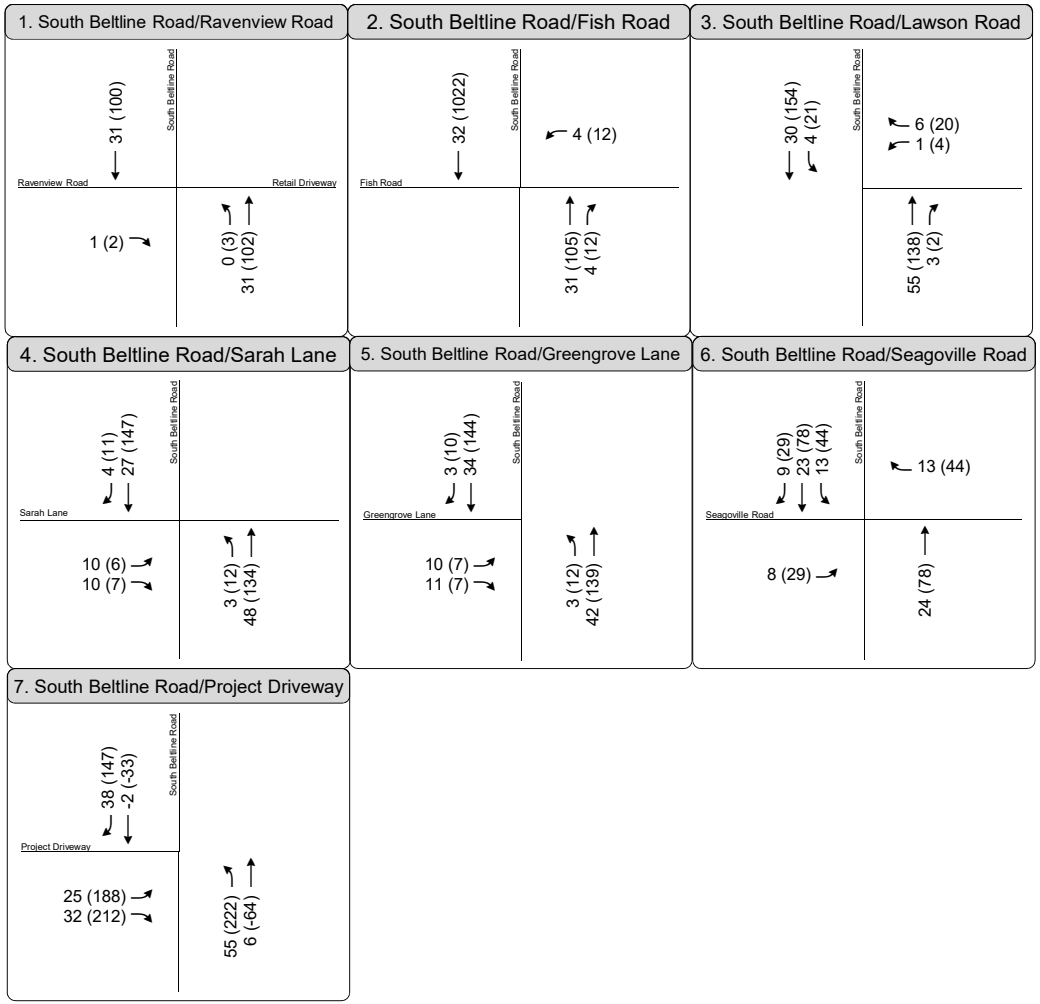


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Figure 4
Project Trip Assignment

4. BUILDOUT CONDITIONS (2020)

This chapter presents the results of the level of service calculations under Buildout Conditions (2020) with and without the Project. Buildout Conditions are defined as conditions prior to completion and occupancy of the proposed development. Traffic volumes for Buildout Conditions comprise existing volumes plus traffic generated by approved but not yet constructed and occupied developments in the area, as well as other background growth. Buildout Plus Project Conditions are defined as Buildout Conditions plus net new traffic generated by the proposed Project.

BUILDOUT CONDITIONS TRAFFIC VOLUMES

Projections of added traffic for Buildout Conditions were based on approved and not occupied development projects in the vicinity of the site, as well as typical growth rates.

Three specific developments were considered for inclusion in this analysis:

- A mixed-use development in the parcels bounded by Beltline Road, Garden Grove Drive, Edd Road, and Seagoville Road would include approximately 142 single-family homes, 102 apartments, and 50,000 square feet of commercial space.
- A retail development at 100-300 West Lawson Road would include 28,600 square feet of retail space, 325 units of self-storage, and an automated car wash
- A farmer's market is planned at the northeast corner of Beltline Road and Lawson Road; the expectation is that trip generation for this use would be minimal during the peak hours, and no adjustments have been made to the analysis to account for this development.

Trip generation estimates were developed for the first two projects and are included in the Buildout Conditions volumes.

Additionally, average daily traffic (ADT) data from the North Central Texas Council of Governments (NCTCOG) were used to identify a general growth rate over the last few years. A count on South Beltline Road just north of Seagoville Road is available in 1999, 2004, and 2009. In both directions, there is a total of three percent growth in the ten years. The 2004 counts showed a two percent decrease from 1999.

As a result, and to present a conservative analysis, a one percent annual increase was applied per year throughout the study area. Volumes were adjusted for two years of growth (2018 to 2020) in this scenario

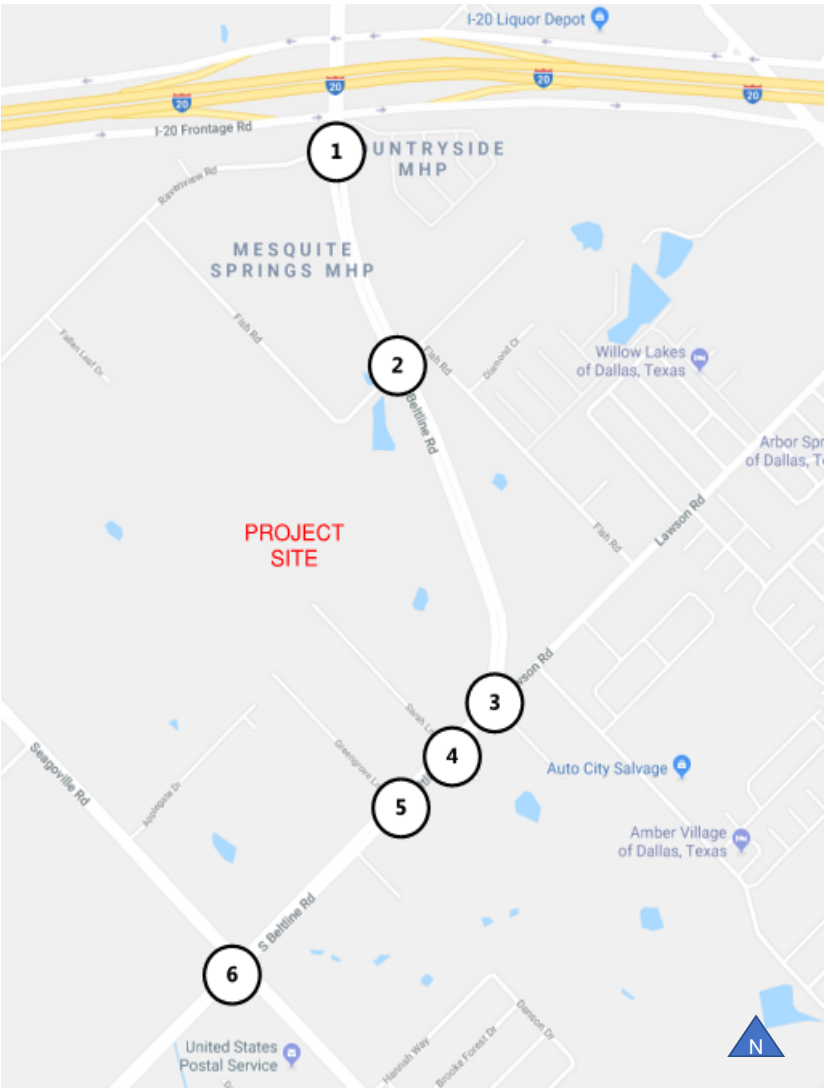
at all locations. Volumes increased two percent as compared to the 2018 counts. The resulting volumes are shown on **Figure 5.**

BUILDOUT PLUS PROJECT INTERSECTION VOLUMES

Net new trips from the Project presented in Chapter 3 were added to the Buildout Conditions volumes to develop traffic volumes for Buildout Plus Project Conditions. The resulting volumes are shown on **Figure 6.**

BUILDOUT INTERSECTION LEVELS OF SERVICE

Table 7 presents the level of service calculation results for the study intersections under Existing Plus Background Conditions and Existing Plus Background Plus Project Conditions. Appendix B contains the corresponding calculation sheets. More detailed results, showing the delay, LOS, and 95th percentile queue length for each movement, are shown in **Table 8A** (for the AM peak hour) and **Table 8B** (for the PM peak hour).



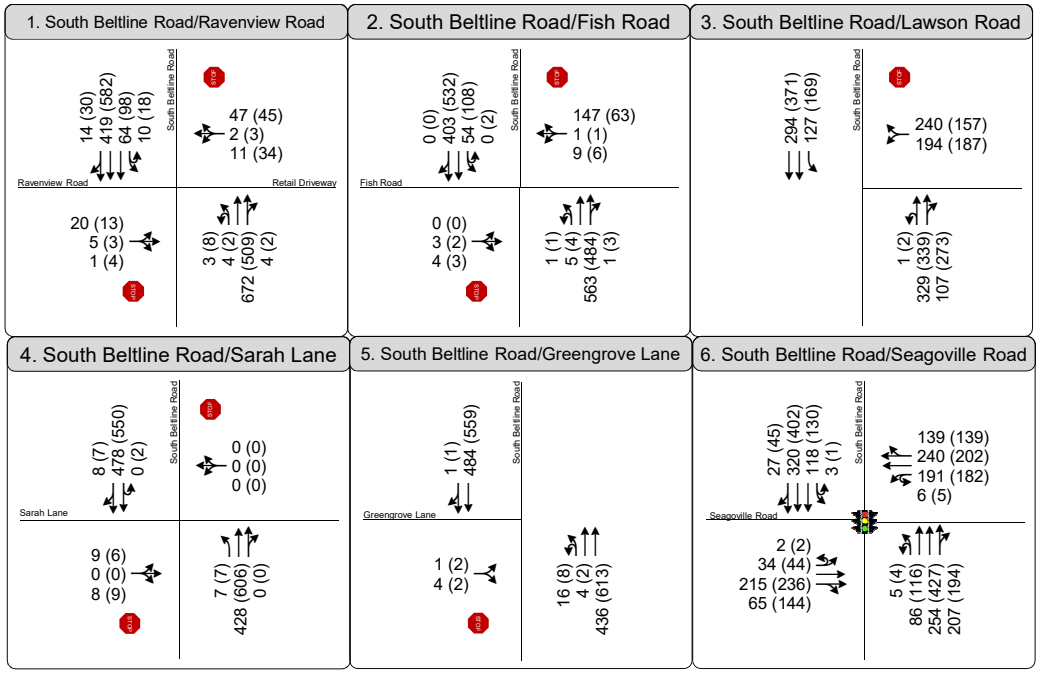


Figure 5
Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes
Buildout Conditions (2020)

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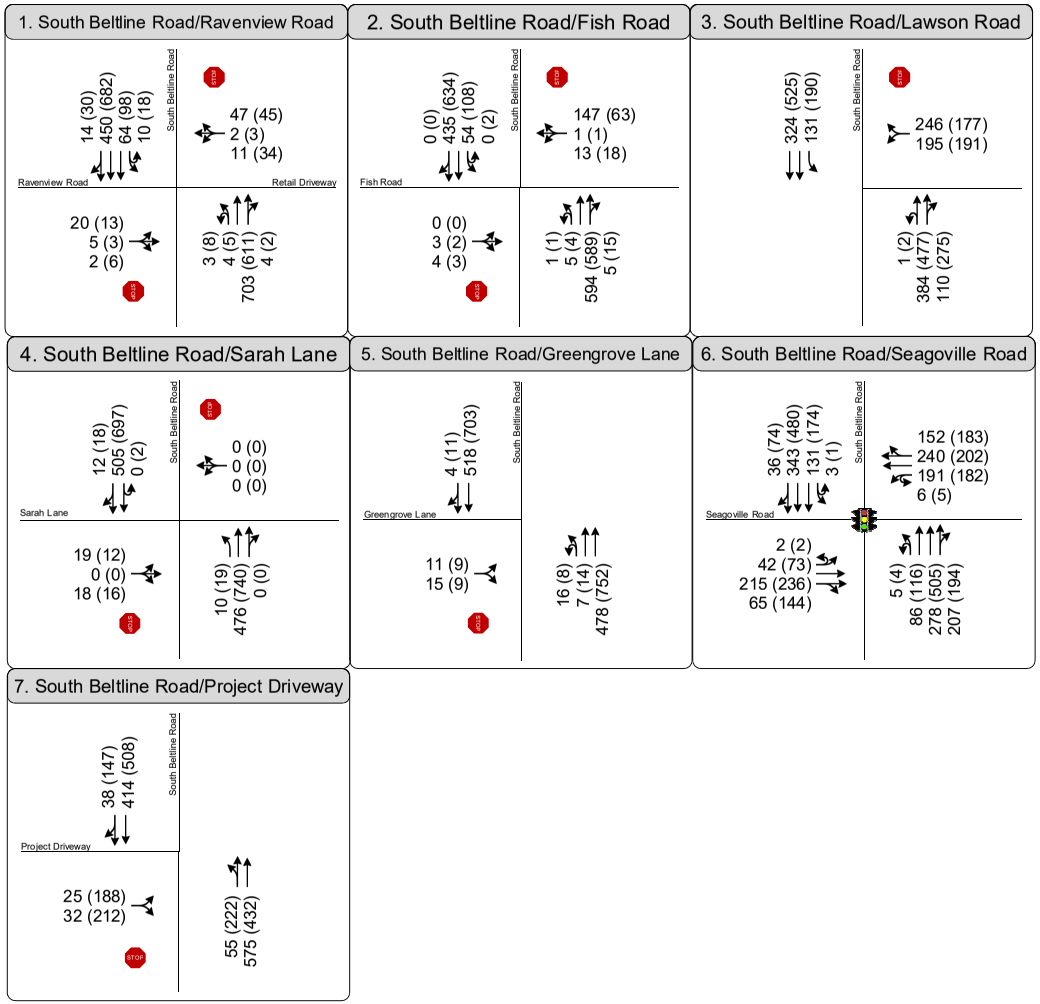

Figure 6
Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes
Buildout Plus Project Conditions (2020)

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TABLE 7: BUILDOUT (2020) INTERSECTION AND ROADWAY SEGMENT LEVELS OF SERVICE

	Intersection / Roadway Segment	Control/ Direction	Peak Hour[1]	Buildout Conditions		Buildout Plus Project Conditions	
				Delay or v/c[2]	LOS[3]	Delay or v/c[2]	LOS[3]
1	South Beltline Road / Ravenview Road	SSSC	AM PM	1.9 (32.0) 2.4 (31.4)	A (D) A (D)	1.9 (34.2) 2.5 **(39.6)**	A (D) A **(E)**
2	South Beltline Road / Fish Road	SSSC	AM PM	2.2 (15.1) 1.5 (16.6)	A (C) A (C)	2.3 (15.7) 1.6 (19.1)	A (C) A (C)
3	South Beltline Road / Lawson Road	SSSC	AM PM	15.2 **(42.7)** 15.3 **(61.6)**	C **(E)** C **(F)**	19.1 **(57.3)** 32.7 **(>100)**	C **(F)** D **(F)**
4	South Beltline Road / Sarah Lane	SSSC	AM PM	0.3 (12.1) 0.2 (12.8)	A (B) A (B)	0.5 (12.8) 0.4 (15.2)	A (B) A (C)
5	South Beltline Road / Greengrove Lane	SSSC	AM PM	0.1 (10.8) 0.1 (12.5)	A (B) A (B)	0.4 (12.0) 0.3 (14.6)	A (B) A (B)
6	South Beltline Road / Seagoville Road	Signal	AM PM	23.5 24.7	C C	23.5 26.1	C C
7	South Beltline Road / Project Access Driveway	SSSC	AM PM	- -	- -	1.3 (15.2) **>100 (>100)**	A (C) **F (F)**
A	South Beltline Road between Ravenview Road and Fish Road	NB SB	AM (PM) AM (PM)	0.37 (0.28) 0.25 (0.35)	B (B) B (B)	0.39 (0.34) 0.26 (0.40)	B (B) B (B)
B	South Beltline Road between Lawson Road and Sarah Lane	NB SB	AM (PM) AM (PM)	0.31 (0.27) 0.23 (0.29)	B (B) A (B)	0.33 (0.33) 0.25 (0.39)	B (B) B (B)
C	South Beltline Road between Seagoville Road and Greengrove Lane	NB SB	AM (PM) AM (PM)	0.25 (0.34) 0.25 (0.31)	B (B) B (B)	0.27 (0.42) 0.28 (0.39)	B (B) B (B)
D	Sarah Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.03 (0.03) 0.03 (0.03)	A (A) A (A)	0.07 (0.05) 0.04 (0.07)	A (A) A (A)
E	Greengrove Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.01 (0.01) 0.01 (0.01)	A (A) A (A)	0.05 (0.03) 0.02 (0.05)	A (A) A (A)

Notes:
1. AM = morning peak hour, PM = evening peak hour
2. Entire intersection weighted average control delay expressed in second per vehicle for signalized intersections and all-way stop-controlled intersections. Total control delay for the worst approach is also presented in parentheses for side-street stop controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the Synchro level of service analysis software package, which applies the method described in the Highway Capacity Manual.

Bold text indicates intersection operates at a deficient Level of Service. **Bold and red** indicates a potentially significant impact.
AWSC = All-Way Stop Control; SSSC = Side-Street Stop Control
Source: BIG RED DOG Engineering, 2018.

Table 8A: Buildout (2020) Detailed Intersection LOS Table - AM Peak Hour																
Intersection/Movement	Existing Conditions				No Build Conditions				Build Conditions				Mitigations			
	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)
#1 South Beltline Road / Ravenview Road / Retail Driveway	1.9	A	-	-	1.9	A	-	-	1.9	A	-	-	No Change			
EBL/T/R	24.4	C	0.13	11	32.0	D	0.17	15	34.2	D	0.19	17				
WBL/T/R	13.9	B	0.13	12	15.7	C	0.16	14	16.5	C	0.17	15				
NBU/L	8.0	A	0.00	0	8.3	A	0.00	0	8.4	A	0.00	0				
NBT/R	0.0	A	0.24	0	0.0	A	0.28	0	0.0	A	0.30	0				
SBL/U	9.0	A	0.07	6	9.4	A	0.08	6	9.5	A	0.08	7				
SBT/R	0.0	A	0.08	0	0.0	A	0.11	0	0.0	A	0.11	0				
#2 South Beltline Road / Fish Road	2.5	A	-	-	2.2	A	-	-	2.3	A	-	-	No Change			
EBL/T/R	13.3	B	0.02	1	15.1	C	0.02	1	15.7	C	0.02	2				
WBL/T/R	11.9	B	0.25	24	13.1	B	0.28	29	13.9	B	0.31	32				
NBU/L	7.9	A	0.00	0	8.2	A	0.01	0	8.3	A	0.01	0				
NBT/R	0.0	A	0.19	0	0.0	A	0.25	0	0.0	A	0.26	0				
SBL/U	8.6	A	0.06	4	9.0	A	0.12	5	9.2	A	0.07	5				
SBT/R	0.0	A	0.13	0	0.0	A	0.18	0	0.0	A	0.19	0				
#3 South Beltline Road / Lawson Road	9.5	A	-	-	15.2	C	-	-	19.1	C	-	-	15.0	B	0.60	-
WBL/R	22.0	C	0.68	131	**42.7**	**E**	0.88	244	**57.3**	**F**	0.95	296	19.1	B	0.71	252
NBT/R	0.0	A	0.11	0	0.0	A	0.14	0	0.0	A	0.16	0	17.3	B	0.55	141
SBL	8.4	A	0.10	8	9.0	A	0.13	11	9.2	A	0.14	12	9.1	A	0.37	62
SBT	0.0	A	0.06	0	0.0	A	0.09	0	0.0	A	0.10	0	8.1	A	0.20	65
#4 South Beltline Road / Sarah Lane	0.3	A	-	-	0.3	A	-	-	0.5	A	-	-	No Change			
EBL/T/R	11.1	B	0.03	2	12.1	B	0.03	3	12.8	B	0.08	6				
WBL/T/R	0.0	A	0.00	0	0.0	A	0.00	0	0.0	A	0.00	0				
NBU/L	8.1	A	0.01	0	8.4	A	0.01	0	8.5	A	0.01	1				
NBT/R	0.0	A	0.13	0	0.0	A	0.18	0	0.0	A	0.20	0				
SBL/U	0.0	A	0.15	0	0.0	A	0.20	0	0.0	A	0.21	0				
SBT/R	0.0	A	0.08	0	0.0	A	0.10	0	0.0	A	0.11	0				
#5 South Beltline Road / Greenglove Lane	0.1	A	-	-	0.1	A	-	-	0.4	A	-	-	No Change			
EBL/T/R	10.2	B	0.01	1	10.8	B	0.01	1	12.0	B	0.05	4				
NBU/L	8.5	A	0.00	0	9.0	A	0.00	0	9.1	A	0.01	1				
NBT	0.0	A	0.10	0	0.0	A	0.13	0	0.0	A	0.15	0				
SBT/R	0.0	A	0.15	0	0.0	A	0.20	0	0.0	A	0.21	0				
#6 South Beltline Road / Seagoville Road	18.9	C	-	-	23.5	C	0.48	-	23.5	C	0.50	-	No Change			
EBL/T/R	14.3	B	0.37	-	-	-	-	-	-	-	-	-				
EBU/L	-	-	-	-	54.0	D	0.65	45	35.3	D	0.51	52				
EBT/R	-	-	-	-	26.1	C	0.51	94	26.3	C	0.51	94				
WBL/T/R	22.7	C	0.70	-	-	-	-	-	-	-	-	-				
WBU/L	-	-	-	-	22.2	C	0.50	154	23.6	C	0.53	157				
WBT/R	-	-	-	-	14.5	B	0.27	83	16.1	B	0.29	82				
NBL/T/R	18.2	C	0.60	-	-	-	-	-	-	-	-	-				
NBU/L	-	-	-	-	32.9	C	0.58	89	33.6	C	0.58	90				
NBT/R	-	-	-	-	26.0	C	0.47	73	25.7	C	0.49	82				
SBL/T/R	17.5	C	0.55	-	-	-	-	-	-	-	-	-				
SBU/L	-	-	-	-	26.2	C	0.46	109	26.5	C	0.49	121				
SBT/R	-	-	-	-	22.1	C	0.33	78	21.5	C	0.34	84				
#7 South Beltline Road / Access Driveway	-	-	-	-	-	-	-	-	1.3	A	-	-	4.0	A	0.29	-
EBL/R	-	-	-	-	-	-	-	-	15.2	C	0.15	13	-	-	-	-
EBL	-	-	-	-	-	-	-	-	-	-	-	-	18.9	B	0.27	20
EBR	-	-	-	-	-	-	-	-	-	-	-	-	17.3	B	0.02	17
NBL	-	-	-	-	-	-	-	-	2.3	A	0.06	4	2.0	A	0.10	13
NBT	-	-	-	-	-	-	-	-	0.0	A	0.25	0	2.0	A	0.25	45
SBT/R	-	-	-	-	-	-	-	-	0.0	0	0.18	0	-	-	-	-
SBT	-	-	-	-	-	-	-	-	-	-	-	-	5.0	A	0.24	72
SBR	-	-	-	-	-	-	-	-	-	-	-	-	4.4	A	0.03	14

Table 8B: Buildout (2020) Detailed Intersection LOS Table - PM Peak Hour																
Intersection/Movement	Existing Conditions				No Build Conditions				Build Conditions				Mitigations			
	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)
#1 South Beltline Road / Ravenview Road / Retail Driveway	2.4	A	-	-	2.4	A	-	-	2.5	A	-	-	**No Change**			
EBL/T/R	22.2	C	0.09	7	31.4	D	0.13	11	**39.6**	**E**	0.17	15				
WBL/T/R	15.3	C	0.19	17	19.9	C	0.26	25	25.5	D	0.33	34				
NBU/L	9.5	A	0.00	0	10.3	B	0.00	0	10.9	B	0.01	1				
NBT/R	0.0	A	0.15	0	0.0	A	0.21	0	0.0	A	0.25	0				
SBL/U	8.3	A	0.08	7	8.8	A	0.10	8	9.2	A	0.11	9				
SBT/R	0.0	A	0.11	0	0.0	A	0.14	0	0.0	A	0.17	0				
#2 South Beltline Road / Fish Road	1.9	A	-	-	1.5	A	-	-	1.6	A	-	-	**No Change**			
EBL/T/R	13.6	B	0.01	1	16.6	C	0.02	1	19.1	C	0.02	1				
WBL/T/R	10.3	B	0.10	8	11.3	B	0.12	10	14.1	B	0.18	16				
NBU/L	8.1	A	0.00	0	8.6	A	0.00	0	8.9	A	0.00	0				
NBT/R	0.0	A	0.13	0	0.0	A	0.20	0	0.0	A	0.25	0				
SBL/U	8.2	A	0.09	8	8.8	A	0.11	9	9.3	A	0.12	10				
SBT/R	0.0	A	0.15	0	0.0	A	0.22	0	0.0	A	0.26	0				
#3 South Beltline Road / Lawson Road	7.2	A	-	-	15.3	C	-	-	32.7	D	-	-	15.4	B	0.65	-
WBL/R	22.8	C	0.62	103	**61.6**	**F**	0.93	254	**157.9**	**F**	1.22	435	23.5	C	0.71	231
NBT/R	0.0	A	0.19	0	0.0	A	0.24	0	0.0	A	0.27	0	18.8	B	0.66	203
SBL	8.8	A	0.14	13	9.8	A	0.20	18	10.8	B	0.25	25	9.7	A	0.52	87
SBT	0.0	A	0.07	0	0.0	A	0.12	0	0.0	A	0.17	0	7.1	A	0.28	104
#4 South Beltline Road / Sarah Lane	0.3	A	-	-	0.2	A	-	-	0.4	A	-	-	**No Change**			
EBL/T/R	11.1	B	0.03	2	12.8	B	0.04	3	15.2	B	0.08	7				
WBL/T/R	0.0	A	0.00	0	0.0	A	0.00	0	0.0	A	0.00	0				
NBU/L	8.2	A	0.01	1	8.7	A	0.01	1	9.4	A	0.03	2				
NBT/R	0.0	A	0.19	0	0.0	A	0.26	0	0.0	A	0.32	0				
SBL/U	0.0	A	0.16	0	0.0	A	0.24	0	0.0	A	0.30	0				
SBT/R	0.0	A	0.09	0	0.0	A	0.12	0	0.0	A	0.16	0				
#5 South Beltline Road / Greenglove Lane	0.1	A	-	-	0.1	A	-	-	0.3	A	-	-	**No Change**			
EBL/T/R	11.0	B	0.01	1	12.5	B	0.01	1	14.6	B	0.05	4				
NBU/L	8.2	A	0.00	0	8.7	A	0.00	0	9.4	A	0.02	1				
NBT	0.0	A	0.14	0	0.0	A	0.20	0	0.0	A	0.25	0				
SBT/R	0.0	A	0.17	0	0.0	A	0.25	0	0.0	A	0.31	0				
#6 South Beltline Road / Seagoville Road	20.9	C	-	-	24.7	C	0.54	-	26.1	C	0.59	-	**No Change**			
EBL/T/R	17.7	B	0.54	-	-	-	-	-	-	-	-	-				
EBU/L	-	-	-	-	38.1	D	0.54	59	44.7	D	0.66	104				
EBT/R	-	-	-	-	27.2	C	0.53	109	28.6	C	0.54	114				
WBL/T/R	21.0	C	0.62	-	-	-	-	-	-	-	-	-				
WBU/L	-	-	-	-	24.9	C	0.52	161	28.3	C	0.57	169				
WBT/R	-	-	-	-	16.7	B	0.24	73	19.7	B	0.28	80				
NBL/T/R	23.3	C	0.70	-	-	-	-	-	-	-	-	-				
NBU/L	-	-	-	-	30.9	C	0.55	138	33.1	C	0.57	145				
NBT/R	-	-	-	-	25.3	C	0.57	125	25.6	C	0.60	147				
SBL/T/R	20.4	C	0.62	-	-	-	-	-	-	-	-	-				
SBU/L	-	-	-	-	29.6	C	0.53	126	33.9	C	0.66	208				
SBT/R	-	-	-	-	23.2	C	0.41	98	22.3	C	0.44	121				
#7 South Beltline Road / Access Driveway	-	-	-	-	-	-	-	-	**155.4**	**F**	-	-	11.0	B	0.51	-
EBL/R	-	-	-	-	-	-	-	-	**657.7**	**F**	2.34	890	-	-	-	-
EBL	-	-	-	-	-	-	-	-	-	-	-	-	16.5	B	0.49	109
EBR	-	-	-	-	-	-	-	-	-	-	-	-	14.4	B	0.15	42
NBL	-	-	-	-	-	-	-	-	7.7	A	0.27	28	6.2	A	0.45	71
NBT	-	-	-	-	-	-	-	-	0.0	A	0.18	0	5.0	A	0.23	61
SBT/R	-	-	-	-	-	-	-	-	0.0	A	0.22	0	-	-	-	-
SBT	-	-	-	-	-	-	-	-	-	-	-	-	14.3	B	0.52	118
SBR	-	-	-	-	-	-	-	-	-	-	-	-	12.1	B	0.10	33

IMPACTS AND MITIGATION

Based on the impact criteria listed in Chapter 1, under Buildout Plus Project Conditions without mitigations, the following intersections are potentially impacted by the Project:

- (#1) South Beltline Road / Ravenview Road – PM peak hour
- (#3) South Beltline Road / Lawson Road – AM and PM peak hours
- (#7) South Beltline Road / Project Access Driveway – PM peak hour

All roadway segments are anticipated to operate acceptably.

(#1) South Beltline Road / Ravenview Road

During the PM peak hour, the eastbound approach is degraded from LOS D to LOS E; the Project adds two right-turn trips to this approach, but more than 200 vehicles on South Beltline Road. The intersection does not peak hour signal warrants, and it would be unlikely to meet other peak hour volume warrants as well. With the Project, there are 22 vehicles on the eastbound approach during the PM peak hour; given the minor nature of the impact, **no changes are recommended** as a result of the Project.

(#3) South Beltline Road / Lawson Road

Without the Project, the side-street stop-controlled approach operates at LOS E during the AM peak hour and LOS F during the PM peak hour. With the Project, the approach degrades to LOS F during the AM peak hour; additionally, the intersection meets peak hour signal warrants without the Project during both peak hours. The City of Dallas has previously conducted a full signal warrant study, which indicated that a signal was warranted. As mentioned, a signal is planned at this location but is not funded.

The Project should contribute its fair share of the cost to the signal installation. To evaluate the fair share cost, we have calculated the share of growth at the intersection attributed to the Project. The Project trip assignment total volume at the intersection was divided by the Build volumes subtracted by the Existing volumes. In the AM peak hour, that share is 26.8 percent; in the PM peak hour, it is 46.3 percent. As a result, the Project applicant **should contribute 46.3 percent to the cost of the signal installation**.

With these improvements, the intersection would operate at LOS B in both the AM and PM peak hours, as shown in Tables 9A and 9B.

(#7) South Beltline Road / Project Access Driveway

The Project driveway is anticipated to operate acceptably in the AM peak hour, though it would operate at LOS F in the PM peak hour. Due to the significant retail development, a signal would be required to mitigate the impact. The signal would be approximately 1,600 feet from the planned signal at (#3) South Beltline Road / Lawson Road. The signal would meet certain signal warrants, as shown in **Table 9**. The vehicle volume warrants would likely be met with the Project, though none of the other warrants are met currently. There is unlikely to be enough pedestrian activity to meet Warrant 4. There is no school in the immediate area. No other signals are in the area with which to coordinate, and TxDOT's Crash Records Information System (CRIS) does not show enough crashes from 2010 to 2018 to warrant a signal. Warrant 8 and Warrant 9 are also not met, given the definition of a major route and a lack of railroad crossing in the area.

TABLE 9: TRAFFIC SIGNAL WARRANT ANALYSIS SUMMARY

Warrant	Existing Conditions Result
Signal Warrant 1: Eight-Hour Vehicular Volume	**Likely**
Signal Warrant 2: Four-Hour Vehicular Volume	**Likely**
Signal Warrant 3: Peak Hour	**Met**
Signal Warrant 4: Pedestrian Volume	Not Met
Signal Warrant 5: School Crossing	Not Met
Signal Warrant 6: Coordinated Signal System	Not Met
Signal Warrant 7: Crash Experience	Not Met
Signal Warrant 8: Roadway Network	Not Met
Signal Warrant 9: Intersection Near a Grade Crossing	Not Met

Source: BIG RED DOG Engineering, 2018.

As previously mentioned, it has been assumed that vehicles would be able to turn left into and left out of the site. To do so, a median opening would need to be provided. Per City of Dallas City Code Section 51A-8.607(c), "median openings serving minor streets or driveway approaches along a divided thoroughfare must be at least 300 feet apart, measured between median noses, unless the city traffic engineer determines that the potential vehicular traffic in the area does not require the 300-foot spacing. Median openings and left turn pockets must be constructed at the intersection of all streets and approaches that generate 250 trips in a 12-hour period."

The driveway would generate more than 250 trips in a 12-hour period, and the proposed driveway location is approximately 300-feet from a median opening to the south; that opening does not have any driveway connections; it could be closed for a new opening at the proposed driveway location.

To mitigate the impact, the Project applicant should pay 100 percent for the following improvements:

- Install a traffic signal at the proposed driveway
- Install a 125-foot northbound left-turn pocket
- Install a southbound right-turn pocket with at least 50 feet of storage length
- Have two outbound lanes on the driveway for at least 150 feet
- Close the existing median opening near the proposed driveway location

With these improvements, the intersection would operate at LOS A in the AM peak hour and LOS B in the PM peak hour, as shown in Tables 9A and 9B.

5. FIVE-YEAR HORIZON CONDITIONS (2025)

This chapter presents the results of the level of service calculations under Five-Year Horizon Conditions (2025) with and without the Project. Regional Conditions are defined as conditions five years after completion and occupancy of the proposed development. Traffic volumes for Buildout Conditions comprise existing volumes plus traffic generated by approved but not yet constructed and occupied developments in the area, as well as other background growth. Regional Plus Project Conditions are defined as Regional Conditions plus net new traffic generated by the proposed Project.

REGIONAL CONDITIONS TRAFFIC VOLUMES

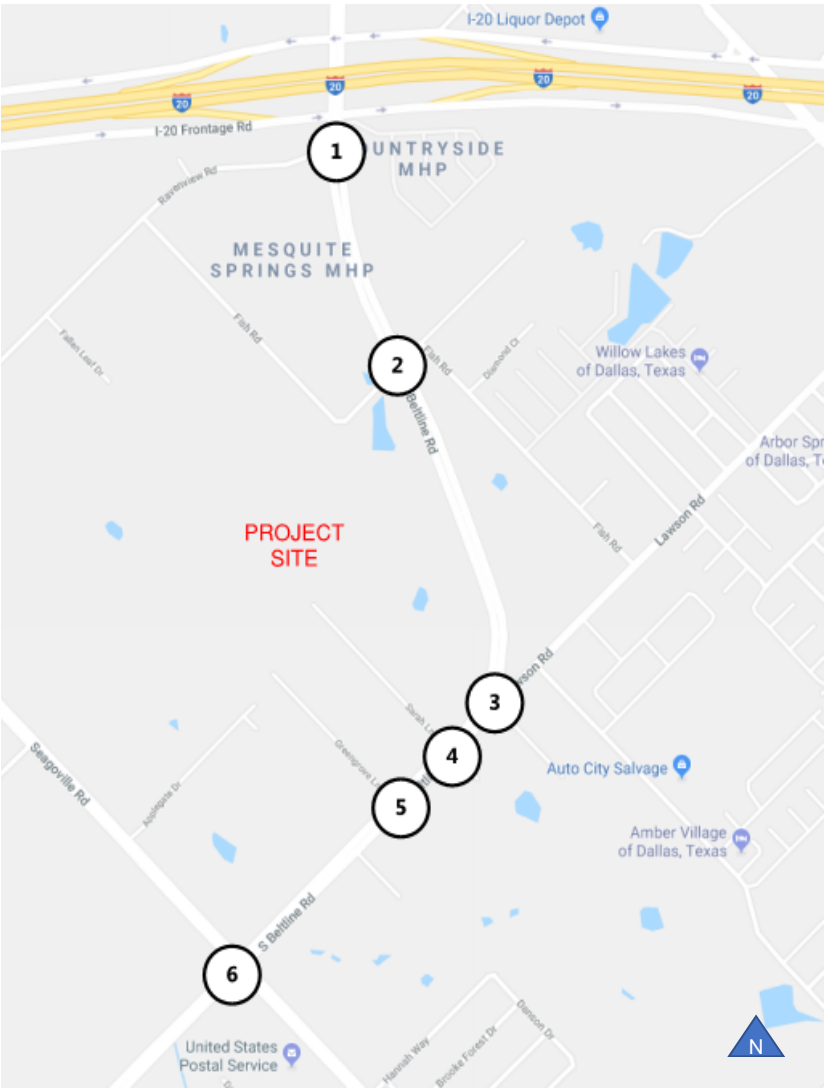
Projections of added traffic for Regional Conditions were based on approved and not occupied development projects in the vicinity of the site, as well as typical growth rates. The same projects were used in this analysis as were analyzed in Chapter 4. Additionally, the one percent annual increase was applied per year throughout the study area. Volumes were adjusted for seven years of growth (2018 to 2025) in this scenario at all locations. Volumes increased seven percent as compared to the 2018 counts. The resulting volumes are shown on **Figure 7.**

REGIONAL PLUS PROJECT INTERSECTION VOLUMES

Net new trips from the Project presented in Chapter 3 were added to the Buildout Conditions volumes to develop traffic volumes for Regional Plus Project Conditions. The resulting volumes are shown on **Figure 8.**

REGIONAL INTERSECTION LEVELS OF SERVICE

Table 10 presents the level of service calculation results for the study intersections under Regional Conditions and Regional Plus Project Conditions. The results shown in Table 10 are without the proposed mitigation measures described in the previous chapter. Appendix B contains the corresponding calculation sheets. More detailed results, showing the delay, LOS, and 95th percentile queue length for each movement, are shown in **Table 11A** (for the AM peak hour) and **Table 11B** (for the PM peak hour).



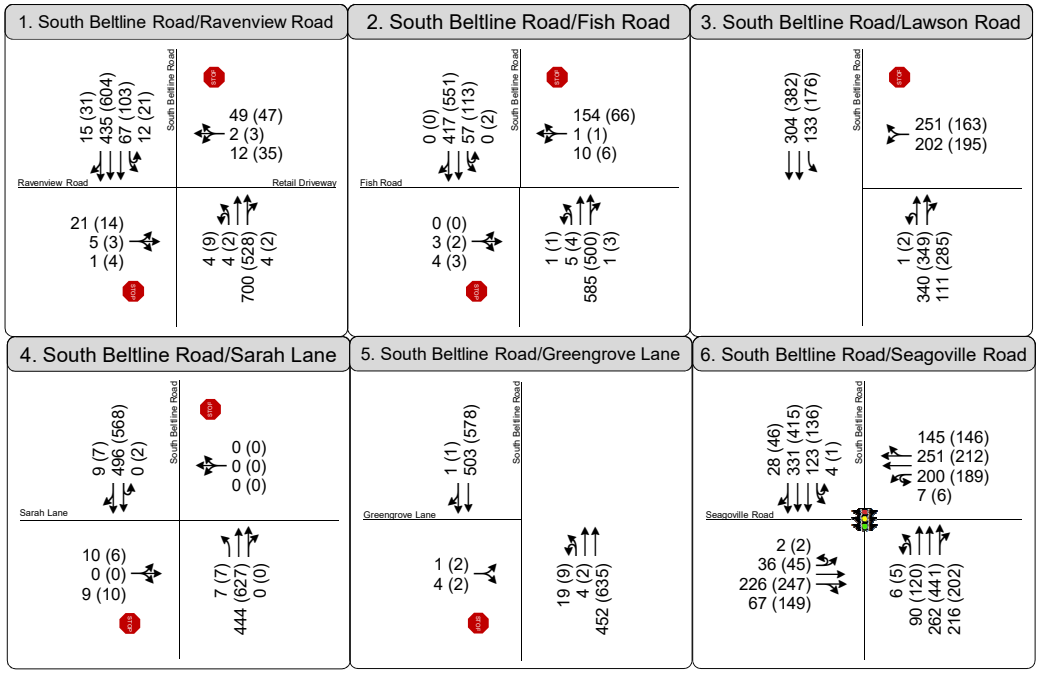


Figure 7
Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes
Five-Year Horizon Conditions (2025)

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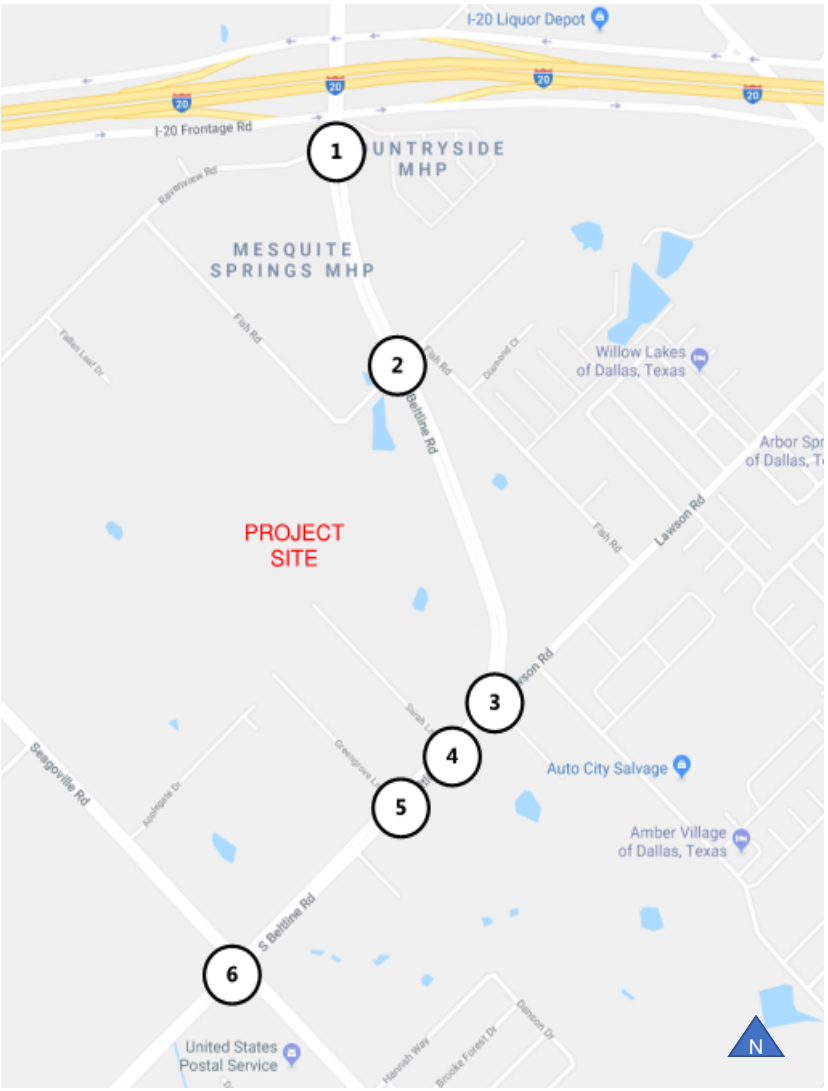

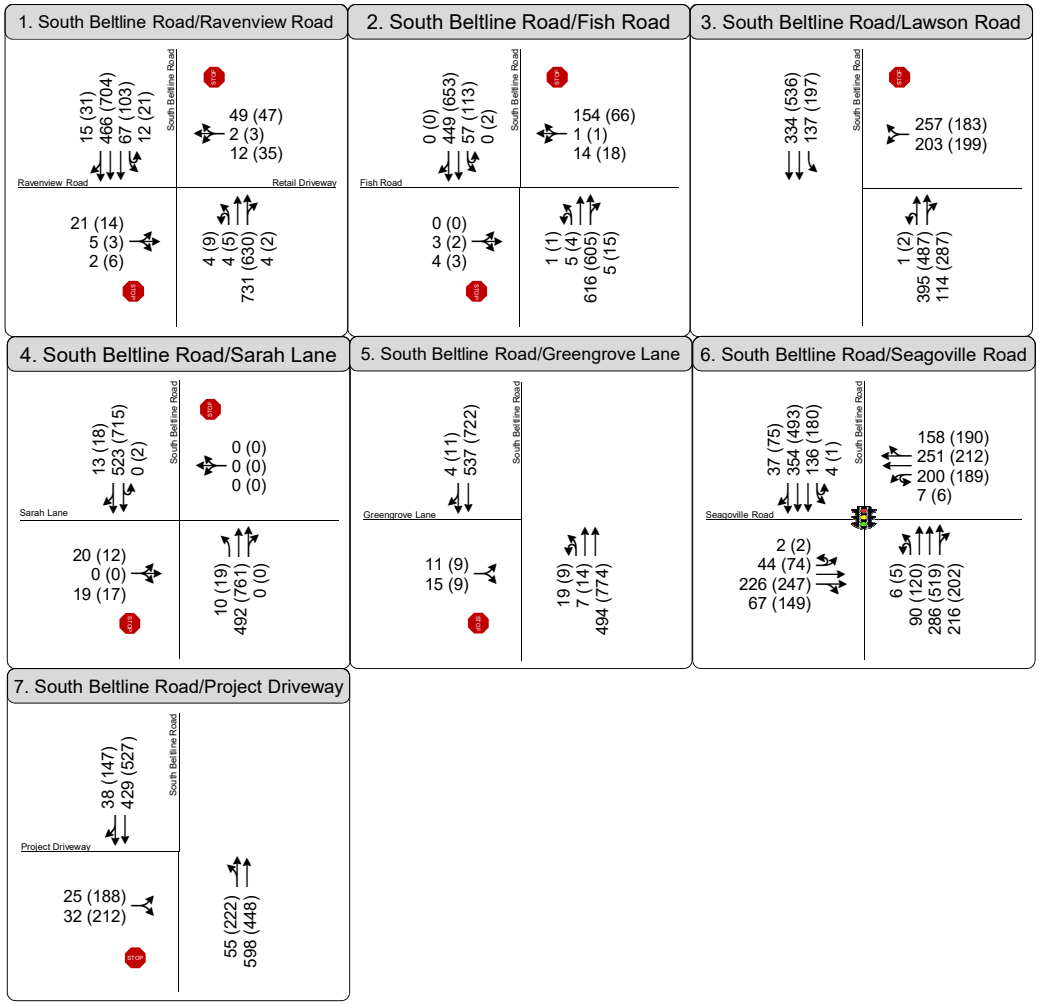

Figure 8
Lane Configurations, Traffic Controls, and Peak Hour Traffic Volumes
Five-Year Horizon Project Conditions (2025)

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TABLE 10: FIVE-YEAR (2025) INTERSECTION AND ROADWAY SEGMENT LEVELS OF SERVICE

	Intersection / Roadway Segment	Control/ Direction	Peak Hour[1]	Buildout Conditions		Buildout Plus Project Conditions	
				Delay or v/c[2]	LOS[3]	Delay or v/c[2]	LOS[3]
1	South Beltline Road / Ravenview Road	SSSC	AM PM	2.0 (34.9) 2.5 (34.7)	A (D) A (D)	2.1 **(37.6)** 2.7 **(44.4)**	A **(E)** A **(E)**
2	South Beltline Road / Fish Road	SSSC	AM PM	2.3 (15.5) 1.6 (17.1)	A (C) A (C)	2.4 (16.1) 1.6 (19.8)	A (C) A (C)
3	South Beltline Road / Lawson Road	SSSC	AM PM	19.0 **(53.5)** 19.6 **(79.8)**	C **(F)** C **(F)**	24.2 **(73.2)** **41.3 (>100)**	C **(F)** **E (F)**
4	South Beltline Road / Sarah Lane	SSSC	AM PM	0.3 (12.5) 0.2 (12.9)	A (B) A (B)	0.6 (13.0) 0.4 (15.4)	A (B) A (C)
5	South Beltline Road / Greengrove Lane	SSSC	AM PM	0.1 (11.0) 0.0 (12.7)	A (B) A (B)	0.4 (12.1) 0.3 (14.8)	A (B) A (B)
6	South Beltline Road / Seagoville Road	Signal	AM PM	23.5 25.4	C C	24.1 26.9	C C
7	South Beltline Road / Project Access Driveway	SSSC	AM PM	- -	- -	1.3 (15.6) **>100 (>100)**	A (C) **F (F)**
A	South Beltline Road between Ravenview Road and Fish Road	NB SB	AM (PM) AM (PM)	0.38 (0.29) 0.26 (0.36)	B (B) B (B)	0.40 (0.35) 0.27 (0.42)	B (B) B (B)
B	South Beltline Road between Lawson Road and Sarah Lane	NB SB	AM (PM) AM (PM)	0.32 (0.27) 0.24 (0.30)	B (B) A (B)	0.34 (0.34) 0.25 (0.40)	B (B) B (B)
C	South Beltline Road between Seagoville Road and Greengrove Lane	NB SB	AM (PM) AM (PM)	0.26 (0.35) 0.26 (0.32)	B (B) B (B)	0.28 (0.43) 0.29 (0.40)	B (B) B (B)
D	Sarah Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.04 (0.03) 0.03 (0.03)	A (A) A (A)	0.07 (0.06) 0.04 (0.07)	A (A) A (A)
E	Greengrove Lane west of South Beltline Road	NB SB	AM (PM) AM (PM)	0.01 (0.01) 0.01 (0.01)	A (A) A (A)	0.05 (0.03) 0.02 (0.05)	A (A) A (A)

Notes:
1. AM = morning peak hour, PM = evening peak hour
2. Entire intersection weighted average control delay expressed in second per vehicle for signalized intersections and all-way stop-controlled intersections. Total control delay for the worst approach is also presented in parentheses for side-street stop controlled intersections.
3. LOS = Level of Service. LOS calculations conducted using the Synchro level of service analysis software package, which applies the method described in the Highway Capacity Manual.

Bold text indicates intersection operates at a deficient Level of Service. **Bold and red** indicates a potentially significant impact.
AWSC = All-Way Stop Control; SSSC = Side-Street Stop Control
Source: BIG RED DOG Engineering, 2018.

Table 11A: Five-Year (2025) Detailed Intersection LOS Table - AM Peak Hour																
Intersection/Movement	Existing Conditions				No Build Conditions				Build Conditions				Mitigations			
	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)
#1 South Beltline Road / Ravenview Road / Retail Driveway	1.9	A	-	-	2.0	A	-	-	2.1	A	-	-	**No Change**			
EBL/T/R	24.4	C	0.13	11	34.9	D	0.19	17	**37.6**	**E**	0.21	19				
WBL/T/R	13.9	B	0.13	12	16.6	C	0.18	16	17.5	C	0.19	17				
NBU/L	8.0	A	0.00	0	8.3	A	0.00	0	8.4	A	0.00	0				
NBT/R	0.0	A	0.24	0	0.0	A	0.30	0	0.0	A	0.31	0				
SBL/U	9.0	A	0.07	6	9.6	A	0.08	7	9.7	A	0.09	7				
SBT/R	0.0	A	0.08	0	0.0	A	0.11	0	0.0	A	0.12	0				
#2 South Beltline Road / Fish Road	2.5	A	-	-	2.3	A	-	-	2.4	A	-	-	**No Change**			
EBL/T/R	13.3	B	0.02	1	15.5	C	0.02	2	16.1	C	0.02	2				
WBL/T/R	11.9	B	0.25	24	13.5	B	0.30	32	14.5	B	0.33	36				
NBU/L	7.9	A	0.00	0	8.3	A	0.01	0	8.4	A	0.01	0				
NBT/R	0.0	A	0.19	0	0.0	A	0.25	0	0.0	A	0.27	0				
SBL/U	8.6	A	0.06	4	9.1	A	0.07	5	9.3	A	0.07	6				
SBT/R	0.0	A	0.13	0	0.0	A	0.18	0	0.0	A	0.20	0				
#3 South Beltline Road / Lawson Road	9.5	A	-	-	19.0	C	-	-	24.2	C	-	-	15.6	B	0.62	-
WBL/R	22.0	C	0.68	131	**53.5**	**F**	0.94	290	**73.2**	**F**	1.01	350	19.6	B	0.72	271
NBT/R	0.0	A	0.11	0	0.0	A	0.14	0	0.0	A	0.17	0	18.1	B	0.57	145
SBL	8.4	A	0.10	8	9.0	A	0.14	12	9.3	A	0.15	13	9.7	A	0.40	64
SBT	0.0	A	0.06	0	0.0	A	0.10	0	0.0	A	0.11	0	8.6	A	0.21	67
#4 South Beltline Road / Sarah Lane	0.3	A	-	-	0.3	A	-	-	0.6	A	-	-	**No Change**			
EBL/T/R	11.1	B	0.03	2	12.5	B	0.04	3	13.0	B	0.08	7				
WBL/T/R	0.0	A	0.00	0	0.0	A	0.00	0	0.0	A	0.00	0				
NBU/L	8.1	A	0.01	0	8.5	A	0.01	1	8.6	A	0.01	1				
NBT/R	0.0	A	0.13	0	0.0	A	0.18	0	0.0	A	0.20	0				
SBL/U	0.0	A	0.15	0	0.0	A	0.20	0	0.0	A	0.22	0				
SBT/R	0.0	A	0.08	0	0.0	A	0.11	0	0.0	A	0.12	0				
#5 South Beltline Road / Greenglove Lane	0.1	A	-	-	0.1	A	-	-	0.4	A	-	-	**No Change**			
EBL/T/R	10.2	B	0.01	1	11.0	B	0.01	1	12.1	B	0.05	4				
NBU/L	8.5	A	0.00	0	9.0	A	0.00	0	9.2	A	0.01	1				
NBT	0.0	A	0.10	0	0.0	A	0.14	0	0.0	A	0.15	0				
SBT/R	0.0	A	0.15	0	0.0	A	0.21	0	0.0	A	0.22	0				
#6 South Beltline Road / Seagoville Road	18.9	C	-	-	23.5	C	0.48	-	24.1	C	0.52	-	**No Change**			
EBL/T/R	14.3	B	0.37	-	-	-	-	-	-	-	-	-				
EBU/L	-	-	-	-	33.8	C	0.44	48	37.9	D	0.54	56				
EBT/R	-	-	-	-	24.0	C	0.44	98	24.8	C	0.44	101				
WBL/T/R	22.7	C	0.70	-	-	-	-	-	-	-	-	-				
WBU/L	-	-	-	-	27.3	C	0.63	165	28.5	C	0.64	169				
WBT/R	-	-	-	-	15.7	B	0.30	90	16.4	B	0.30	90				
NBL/T/R	18.2	C	0.60	-	-	-	-	-	-	-	-	-				
NBU/L	-	-	-	-	34.5	C	0.61	95	36.4	C	0.62	97				
NBT/R	-	-	-	-	24.9	C	0.44	77	25.1	C	0.46	85				
SBL/T/R	17.5	C	0.55	-	-	-	-	-	-	-	-	-				
SBU/L	-	-	-	-	27.9	C	0.53	115	29.7	C	0.57	139				
SBT/R	-	-	-	-	22.0	C	0.34	81	21.7	C	0.35	87				
#7 South Beltline Road / Access Driveway	-	-	-	-	-	-	-	-	1.3	A	-	-	3.9	A	0.30	-
EBL/R	-	-	-	-	-	-	-	-	15.6	C	0.15	14	-	-	-	-
EBL	-	-	-	-	-	-	-	-	-	-	-	-	19.2	B	0.27	21
EBR	-	-	-	-	-	-	-	-	-	-	-	-	17.5	B	0.02	17
NBL	-	-	-	-	-	-	-	-	2.3	A	0.06	5	2.0	A	0.10	13
NBT	-	-	-	-	-	-	-	-	0.0	A	0.25	0	2.0	A	0.26	47
SBT/R	-	-	-	-	-	-	-	-	0.0	0	0.18	0	-	-	-	-
SBT	-	-	-	-	-	-	-	-	-	-	-	-	4.9	A	0.25	74
SBR	-	-	-	-	-	-	-	-	-	-	-	-	4.3	A	0.03	14

Table 11B: Five-Year (2025) Detailed Intersection LOS Table - PM Peak Hour																
Intersection/Movement	Existing Conditions				No Build Conditions				Build Conditions				Mitigations			
	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)	Delay	LOS	V/C	95th % Queue (feet)
#1 South Beltline Road / Ravenview Road / Retail Driveway	2.4	A	-	-	2.5	A	-	-	2.7	A	-	-	No Change			
EBL/T/R	22.2	C	0.09	7	34.7	D	0.15	13	**44.4**	**E**	0.20	18				
WBL/T/R	15.3	C	0.19	17	21.2	C	0.28	28	27.6	D	0.36	38				
NBU/L	9.5	A	0.00	0	10.4	B	0.00	0	11.1	B	0.01	1				
NBT/R	0.0	A	0.15	0	0.0	A	0.21	0	0.0	A	0.25	0				
SBL/U	8.3	A	0.08	7	8.9	A	0.10	9	9.3	A	0.11	10				
SBT/R	0.0	A	0.11	0	0.0	A	0.15	0	0.0	A	0.17	0				
#2 South Beltline Road / Fish Road	1.9	A	-	-	1.6	A	-	-	1.6	A	-	-	No Change			
EBL/T/R	13.6	B	0.01	1	17.1	C	0.02	1	19.8	C	0.02	2				
WBL/T/R	10.3	B	0.10	8	11.5	B	0.12	10	14.4	B	0.19	17				
NBU/L	8.1	A	0.00	0	8.6	A	0.00	0	9.0	A	0.00	0				
NBT/R	0.0	A	0.13	0	0.0	A	0.21	0	0.0	A	0.25	0				
SBL/U	8.2	A	0.09	8	8.9	A	0.12	10	9.4	A	0.13	11				
SBT/R	0.0	A	0.15	0	0.0	A	0.23	0	0.0	A	0.27	0				
#3 South Beltline Road / Lawson Road	7.2	A	-	-	19.6	C	-	-	**41.3**	**E**	-	-	16.1	B	0.67	-
WBL/R	22.8	C	0.62	103	**79.8**	**F**	1.00	302	**198.5**	**F**	1.32	503	24.5	C	0.73	245
NBT/R	0.0	A	0.19	0	0.0	A	0.25	0	0.0	A	0.28	0	19.4	B	0.68	210
SBL	8.8	A	0.14	13	10.0	A	0.21	19	11.1	B	0.26	27	10.8	A	0.55	98
SBT	0.0	A	0.07	0	0.0	A	0.12	0	0.0	A	0.17	0	7.4	A	0.29	107
#4 South Beltline Road / Sarah Lane	0.3	A	-	-	0.2	A	-	-	0.4	A	-	-	No Change			
EBL/T/R	11.1	B	0.03	2	12.9	B	0.04	3	15.4	B	0.08	7				
WBL/T/R	0.0	A	0.00	0	0.0	A	0.00	0	0.0	A	0.00	0				
NBU/L	8.2	A	0.01	1	8.8	A	0.01	1	9.5	A	0.03	2				
NBT/R	0.0	A	0.19	0	0.0	A	0.27	0	0.0	A	0.33	0				
SBL/U	0.0	A	0.16	0	0.0	A	0.25	0	0.0	A	0.31	0				
SBT/R	0.0	A	0.09	0	0.0	A	0.13	0	0.0	A	0.17	0				
#5 South Beltline Road / Greenglove Lane	0.1	A	-	-	0.0	A	-	-	0.3	A	-	-	No Change			
EBL/T/R	11.0	B	0.01	1	12.7	B	0.01	1	14.8	B	0.05	4				
NBU/L	8.2	A	0.00	0	8.8	A	0.00	0	9.5	A	0.02	1				
NBT	0.0	A	0.14	0	0.0	A	0.21	0	0.0	A	0.26	0				
SBT/R	0.0	A	0.17	0	0.0	A	0.25	0	0.0	A	0.32	0				
#6 South Beltline Road / Seagoville Road	20.9	C	-	-	25.4	C	0.56	-	26.9	C	0.61	-	No Change			
EBL/T/R	17.7	B	0.54	-	-	-	-	-	-	-	-	-				
EBU/L	-	-	-	-	41.2	D	0.57	61	47.5	D	0.68	107				
EBT/R	-	-	-	-	25.5	C	0.47	118	27.8	C	0.52	122				
WBL/T/R	21.0	C	0.62	-	-	-	-	-	-	-	-	-				
WBU/L	-	-	-	-	30.2	C	0.63	173	27.7	C	0.64	179				
WBT/R	-	-	-	-	16.9	B	0.25	78	19.6	B	0.29	83				
NBL/T/R	23.3	C	0.70	-	-	-	-	-	-	-	-	-				
NBU/L	-	-	-	-	33.0	C	0.58	152	35.1	C	0.60	159				
NBT/R	-	-	-	-	26.0	C	0.58	132	26.1	C	0.61	154				
SBL/T/R	20.4	C	0.62	-	-	-	-	-	-	-	-	-				
SBU/L	-	-	-	-	31.1	C	0.56	147	29.5	C	0.70	221				
SBT/R	-	-	-	-	23.6	C	0.42	102	22.6	C	0.45	125				
#7 South Beltline Road / Access Driveway	-	-	-	-	-	-	-	-	**164.0**	**F**	-	-	11.1	B	0.51	-
EBL/R	-	-	-	-	-	-	-	-	**708.8**	**F**	2.45	913	-	-	-	-
EBL	-	-	-	-	-	-	-	-	-	-	-	-	16.8	B	0.49	113
EBR	-	-	-	-	-	-	-	-	-	-	-	-	14.7	B	0.15	43
NBL	-	-	-	-	-	-	-	-	7.7	A	0.28	28	6.3	A	0.46	72
NBT	-	-	-	-	-	-	-	-	0.0	A	0.19	0	5.1	A	0.24	63
SBT/R	-	-	-	-	-	-	-	-	0.0	A	0.22	0	-	-	-	-
SBT	-	-	-	-	-	-	-	-	-	-	-	-	14.4	B	0.53	123
SBR	-	-	-	-	-	-	-	-	-	-	-	-	12.1	B	0.10	32

IMPACTS AND MITIGATION

Based on the impact criteria listed in Chapter 1, under Regional Plus Project Conditions without mitigations, the following intersections are potentially impacted by the Project:

- (#1) South Beltline Road / Ravenview Road – AM and PM peak hours
- (#3) South Beltline Road / Lawson Road – AM and PM peak hours
- (#7) South Beltline Road / Project Access Driveway – PM peak hour

These are the same intersections that were impacted in the previous scenario. The same improvements mitigate the impacts, as shown in Tables 11A and 11B. No additional improvements are necessary. All roadway segments are anticipated to operate acceptably.

6. SITE ACCESS AND CIRCULATION REVIEW

This chapter analyzes site access and internal circulation for vehicles, pedestrians, bicycles, and transit vehicles. The proposed site plan indicates the location of the Project driveways and the internal circulation system that supports auto, pedestrian, and bicycle traffic. Future site access and the internal circulation within the Project site are also discussed below.

SITE ACCESS AND CIRCULATION

As mentioned, the Project provides three access driveways, though two are extensions of existing dead-end streets that would lead into the single-family portion of the Project. Primary access to the retail portion of the Project will be from South Beltline Road. No on-street parking exists or is proposed adjacent to the Project.

Driveway width should be kept to a minimum in order to keep speeds down, though two outbound lanes are recommended near South Beltline Road for operational purposes. Curb return radii should be made as minimal as feasible in order to encourage low speeds. As per the analysis in the previous chapters, there is not likely to be queuing issues as a result of queues extending back to the site driveways and affecting the internal circulation. The driveway operates acceptably with signalization, a median opening, and a left-turn deceleration lane.

The City of Dallas Off-Street Parking and Driveways Handbook (June, 2004) states that "a deceleration lane should be considered on arterials operating at speeds greater than 35 miles per hour or the average inbound right-turn volume into the driveway is expected to exceed 120 vehicles in the peak hour." The speed limit on South Beltline Road is 40 miles per hour and the average peak hour traffic is anticipated to be more than 50 vehicles per hour turning right into the main retail driveway.

Evaluations for right-turn deceleration lanes are included below in **Table 12**. No deceleration lanes currently exist along this segment of South Beltline Road, though one is required per the City of Dallas's criteria.

Access for the single-family portion of the Project is taken from existing locations. The retail driveway will be appropriately spaced from the existing intersections; no driveway cuts currently exist in the 2,500 feet segment of South Beltline Road between Fish Road and Lawson Road. No driveway conflicts exist on the opposite side of South Beltline Road. The median cut just to the south should be removed though to ensure proper spacing between median openings.

TABLE 12: RIGHT-TURN DECELERATION LANE EVALUATION

	Driveway	Peak Hour[1]	Right-Turn Volume	Exceeds 120 vehicles Per Hour?
4	South Beltline Road / Sarah Lane	AM PM	13 18	No No
5	South Beltline Road / Greengrove Lane	AM PM	4 11	No No
7	South Beltline Road / Project Access Driveway	AM PM	38 **147**	No **YES**

Source: BIG RED DOG Engineering, 2018.

Sight distance was also evaluated at the new retail driveway on South Beltline Road. There is very little vertical curvature on South Beltline Road, though there is significant horizontal curvature. There are a few bushes and brush that could constrain sight distance depending on the final location of the driveway, though those shrubs, tree limbs, and possible other obstructions all could be removed. Sight distance should be re-assessed with the final design plan.

More than 500 feet of sight distance should be available at the retail driveway for vehicles attempting to stop and for vehicles exiting the driveway (existing speed limits would require no more than 445 feet of intersection sight distance per the TxDOT *Roadway Design Manual* and AASHTO's *A Policy on Geometric Design for Highways and Streets,* and 485 feet of intersection sight distance per the *City of Dallas Paving Design Manual*). No sight distance issues are anticipated for drivers attempting to enter the site. **Figure 9** shows sight distance at the driveway intersection more clearly. Pictures are included in **Appendix D.**

The pavement was also evaluated on both Sarah Lane and Greengrove Lane (pictures also included in Appendix D). Both streets currently have a "E" grade (or failing) per the City's Public Works pavement condition database. A visit indicated no significant issues on either street. There are no curbs or sidewalks, and the streets are generally 20 to 22 feet wide. Some very minor cracking was observed, but no potholes or missing sections were observed; no changes are recommended as a result of the Project.

PEDESTRIAN, BICYCLE, AND TRANSIT IMPACTS AND MITIGATION

This section of the report address both off-site and on-site facilities that provide pedestrian, bicycle, and transit access and circulation for the Project.

OFF-SITE PEDESTRIAN FACILITY EVALUATION

Pedestrian circulation is facilitated by sidewalks, walking paths, and trails within and around the Project site. Well-designed pedestrian facilities are continuous, accessible to all users, and integrated with the surrounding environment to connect the Project to external destinations. As mentioned in Chapter 2, no sidewalks exist in the study area. No marked crosswalks are provided at any of the intersections or across any other roadway segments in the study area. Most of the trips generated by the Project are likely to arrive by vehicle.

ON-SITE PEDESTRIAN FACILITY EVALUATION

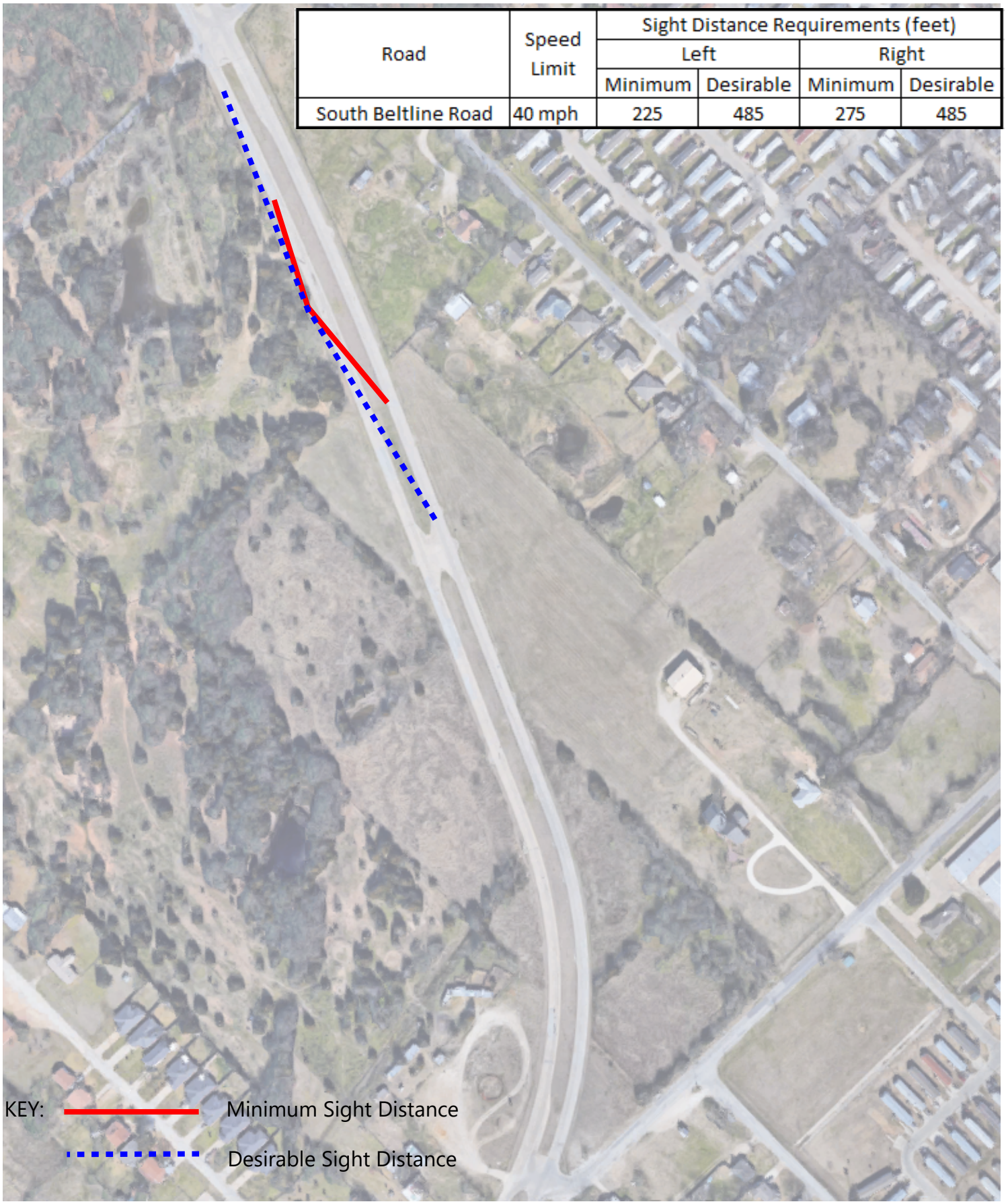
Sidewalks and pedestrian paths should be examined for the retail portion of the Project when those details area available. The single-family portion of the Project should have sidewalks setback from the curb throughout the Project and crosswalks should be provided at locations with potential conflicts. No detailed site plan is currently available for evaluation.

BICYCLE ACCESS EVALUATION

As mentioned in Chapter 2, there are no currently bicycle facilities in the vicinity of the Project, and bicycle ridership in the area is very low. While the Project could attract cyclists, it is unlikely given the width of the roadways and the lack of dedicated facilities in the vicinity of the Project. Most of the trips generated by the Project are likely to arrive by vehicle.

TRANSIT ACCESS AND SERVICE

As mentioned in Chapter 2, only two DART bus routes come near the Project site, and one has very limited service. With incomplete sidewalks in this area, transit riders would have a difficult time accessing the Project from adjacent stops. The Project is not likely to attract much additional transit ridership as a result. Most of the trips generated by the Project are likely to arrive by vehicle.



Road	Speed Limit	Sight Distance Requirements (feet)			
		Left		Right	
		Minimum	Desirable	Minimum	Desirable
South Beltline Road	40 mph	225	485	275	485

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Figure 9
Sight Distance at Retail Driveway