APPENDIX C

Traffic Operations Analysis Technical Memorandum

CAMPO
CAPITAL AREA METROPOLITAN PLANNING ORGANIZATION
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GEORGETOWN
TEXAS
more than welcome

Austin Avenue Corridor Study

Traffic Operations Analysis Report

Final Submittal

March 2024

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TRAFFIC OPERATIONS SUMMARY

LEVEL OF SERVICE SUMMARY

Signalized Intersections

- Existing and No-Build scenarios include four stop-controlled intersections that are recommended to be signalized in Build Scenarios 1 and 2.
- Four signalized intersections will operate at failing LOS E/F in Build Scenario 1 and/or Build Scenario 2 during the AM and/or PM peak hour:
  - Austin Avenue and Weir Road/Northwest Boulevard
  - Austin Avenue and San Gabriel Village Boulevard (Signal)
  - Austin Avenue and 2nd Street
  - Austin Avenue and SE Inner Loop

		2023		NO-BUILD		SCENARIO 1		SCENARIO 2	
	SIGNALIZED INTERSECTIONS	AM	PM	AM	PM	AM	PM	AM	PM
1	Lakeway Dr/NE Inner Loop	C (22.5)	C (30.1)	C (32.9)	E (59.3)	C (33.8)	D (47.4)		
2	I-35 NB FR/Apt Dwy			F (392.6)	F (308.8)	B (18.5)	C (31.2)		
3	Old Airport Rd/Stadium Dr			F (1,657.5)	F (1,393.9)	B (13.6)	B (19.2)		
4	Georgetown HS Dwy	B (11.1)	B (13.1)	B (15.8)	C (20.5)	B (15.7)	C (20.5)	No change from Scenario 1	
5	Weir Rd/Northwest Blvd.	C (25.5)	C (30.3)	F (96.5)	F (85.7)	F (80.7)	F (85.1)		
6	Austin Ave and Williams Dr	C (30.2)	C (34.2)	D (35.5)	D (52.0)	D (35.5)	D (52.0)		
7	Austin Ave and Morrow St	A (5.3)	A (8.1)	A (6.7)	B (12.9)	B (14.5)	C (20.9)		
8	San Gabriel Village Blvd	A (4.3)	A (5.3)	A (6.7)	B (17.7)	F (94.6)	B (14.2)		
9	Austin Ave and 2nd St	A (8.0)	A (8.5)	B (15.5)	E (61.6)	B (13.3)	B (19.5)	C (30.6)	F (83.7)
10	Austin Ave and 6th St			E (44.7)	F (800.1)	B (18.7)	B (15.2)	A (6.7)	C (23.8)
11	Austin Ave and 7th St	B (15.9)	B (14.6)	B (19.4)	B (19.1)	A (2.8)	A (8.0)	A (4.9)	B (15.7)
12	Austin Ave and 8th St	A (4.3)	A (7.4)	A (5.0)	A (8.3)	A (3.0)	B (10.1)	A (5.0)	A (8.2)
13	Austin Ave and 9th St			D (27.4)	E (43.8)	C (20.7)	A (7.8)	A (7.0)	A (9.4)
14	SH 29/University Ave	E (56.1)	F (86.2)	F (215.4)	F (171.3)	C (27.5)	C (27.5)	D (52.2)	D (46.4)
15	SH 29/University Ave at Main St	D (37.4)	F (101.4)	F (89.1)	F (118.1)	A (9.4)	B (19.1)	No change from Scenario 1	
16	Leander Rd/FM 1460	C (30.4)	D (46.3)	F (100.2)	F (146.7)	C (28.5)	D (42.8)		
17	Austin Ave and SE Inner Loop	C (32.0)	D (35.1)	F (91.2)	F (96.7)	D (38.1)	E (69.6)		
	San Gabriel Village Roundabout					A (7.2)	B (13.1)	No change from S1	

Stop controlled in Existing Conditions and No-Build Scenario. Critical Approach LOS reported for No-Build Scenario.

Unsignalized Intersections

Build Scenario 1 and 2 generally show improved or similar critical approach LOS results at unsignalized intersections compared to No-Build. Minor-street vehicles on the east and west approaches will experience long delays in the future while waiting for adequate gaps in the Austin

Avenue traffic stream to execute their desired maneuvers unless a traffic signal is installed. Installation of traffic signals is recommended at the following four intersections in Build Scenarios 1 and 2:

- Austin Avenue and IH 35 NBFR Slip Ramp/Apartment Driveway
- Austin Avenue and Old Airport Road/Stadium Drive
- Austin Avenue and 6th Street (Georgetown Downtown Master Plan Recommendation)
- Austin Avenue and 9th Street (Georgetown Downtown Master Plan Recommendation)

	2023		NO-BUILD		SCENARIO 1		SCENARIO 2	
UNSIGNALIZED	AM	PM	AM	PM	AM	PM	AM	PM
1 I-35 NBFR/Apartment Dwy	E (41.7)	D (33.0)	F (392.6)	F (308.8)				
2 Old Airport Rd/ Stadium Dr	F (86.1)	F (59.8)	F (1657.5)	F (1393.9)				
3 Austin Ave and 3rd St	D (29.6)	D (27.8)	F (266.6)	F (183.6)	F (232.5)	F (161.3)	F (117.6)	F (143.2)
4 Austin Ave and 4th St	C (22.7)	D (28.2)	F (74.6)	F (134.5)	F (73.4)	F (126.8)	E (48.7)	F (96.0)
5 Austin Ave and 5th St	C (20.0)	D (26.2)	F (54.2)	F (235.3)	F (51.1)	F (161.8)	E (39.0)	F (147.9)
6 Austin Ave and 6th St	C (18.1)	D (31.2)	E (44.7)	F (800.1)				
7 Austin Ave and 9th St	B (14.9)	C (17.1)	D (27.4)	E (43.8)				
8 Austin Ave and 10th St ◇	C (15.4)	C (16.3)	D (31.0)	E (39.1)	D (30.1)	E (37.0)	D (26.1)	D (31.7)
9 Austin Ave and 11th St	C (16.0)	C (17.0)	D (33.5)	E (40.3)	D (32.2)	E (37.7)	D (30.9)	E (35.5)
10 Austin Ave and 16th St ◇	C (17.7)	C (17.3)	E (42.2)	E (45.3)	E (42.2)	E (45.3)	E (41.8)	E (39.8)
11 Austin Ave and 17th St	C (15.9)	C (16.3)	D (31.9)	E (36.9)	D (31.9)	E (36.9)	D (26.3)	D (31.4)
12 Austin Ave and W 18th St	B (12.1)	B (11.1)	C (16.5)	B (14.3)	C (16.5)	B (14.3)	C (16.7)	C (16.5)
13 Austin Ave and E 18th St	B (13.1)	B (12.5)	C (20.5)	C (17.3)	C (20.5)	C (17.3)	C (22.3)	C (18.7)

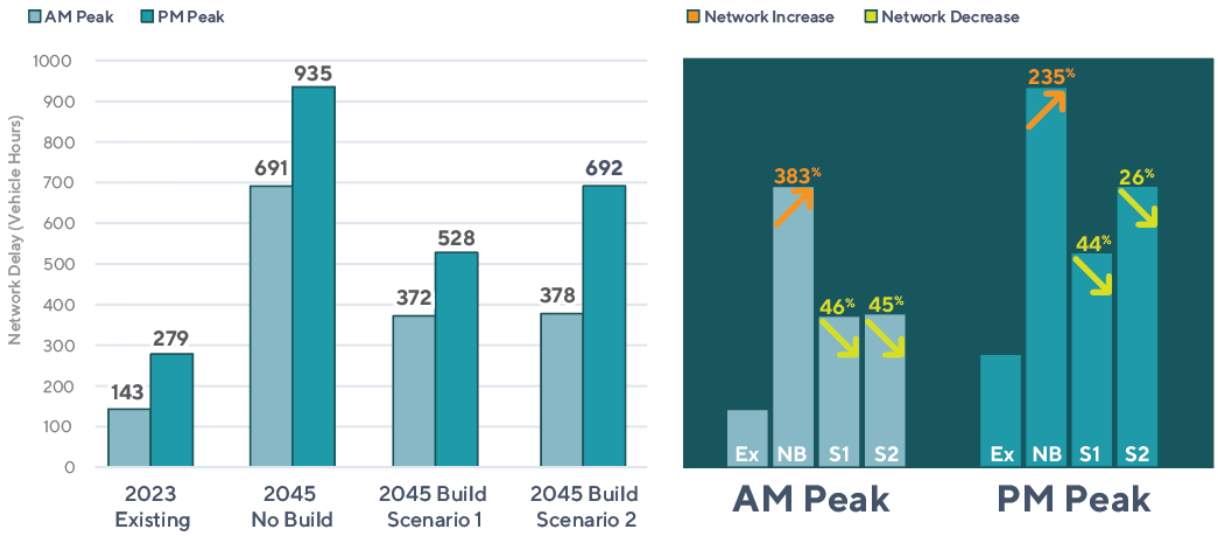
All unsignalized intersections are two-way stop controlled (Right-of-way given to Austin Avenue).
◇ Rectangular Rapid Flashing Beacons present at 10th Street and 16th Street.
Signalized in Build Scenarios 1 and 2

Network Delay Summary

Both Build scenarios significantly improve upon No-Build total network delay. Build Scenario 2 is expected to have more total network delay than Build Scenario 1 due to the proposed lane reduction.

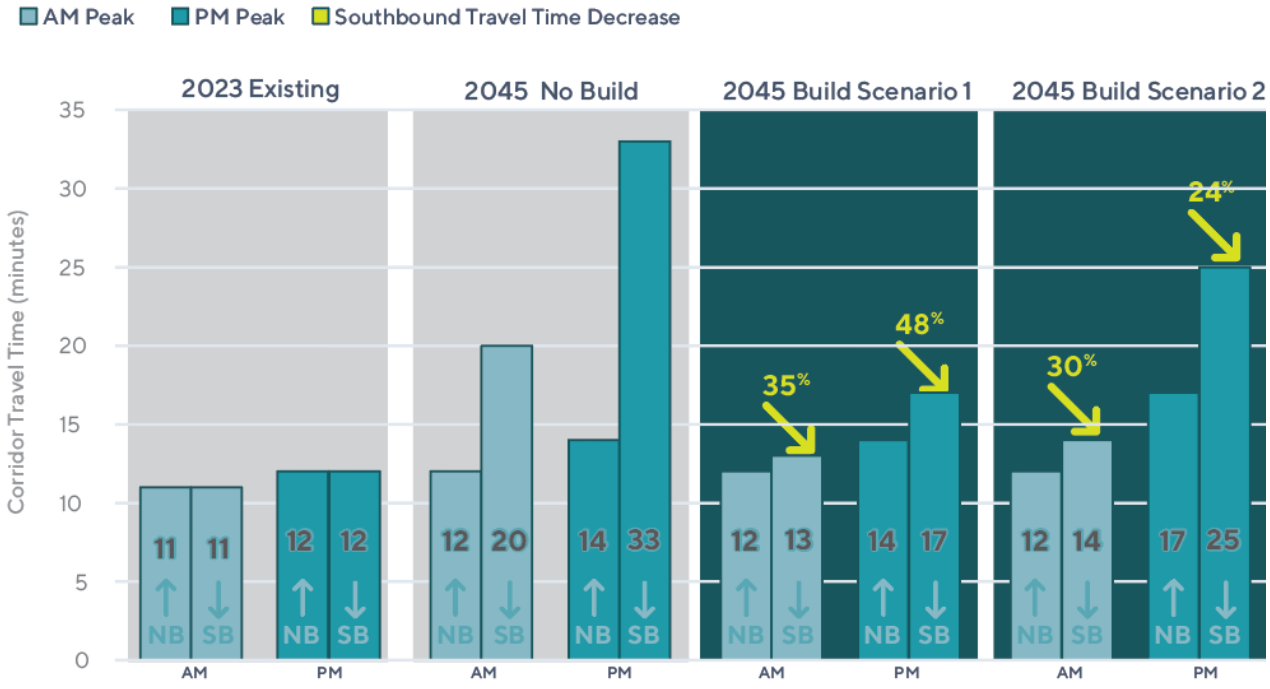
Total Network Delay Comparisons:

No-Build vs. Existing	Build Scenario 1 vs. No-Build	Build Scenario 2 vs. No-Build
• 383% increase (AM peak) • 235% increase (PM peak)	• 46% decrease (AM peak) • 44% decrease (PM peak)	• 45% decrease (AM peak) • 26% decrease (PM peak)



Corridor Travel Time Summary

- Both Build scenarios significantly improve upon No-Build corridor travel time in the southbound direction.
- Northbound travel times for both Build scenarios generally maintain the same travel time as the No-Build scenario except for Build Scenario 2 Northbound PM Peak travel time:
    - Travel time increases by 3 minutes compared to No-Build due to four newly signalized intersections (cross-street delay improves but Austin Avenue traffic slows).
- Build Scenario 2 travel times are slightly higher than those in Build Scenario 1 due to the proposed lane reduction, which results in slower speeds.



1 INTRODUCTION

1.1 BACKGROUND

This Austin Avenue Corridor Study Traffic Operations Analysis Report presents the results of a traffic operations assessment for the Austin Avenue Corridor Study. This report summarizes existing and future conditions of intersection traffic operations on the Austin Avenue Corridor (Corridor). The Corridor is a five-mile, north-south roadway which runs between NE Inner Loop and SE Inner Loop within the City of Georgetown (City). The Corridor is a primary access route for through travel, travel to downtown, and access to significant activity centers. Current operations are influenced by its proximity to other major regional corridors, demands of local commercial and residential interests, and the impacts of multiple modes of transportation.

This report analyzes traffic operations for Existing (2023) traffic conditions, Future No-Build (2045) conditions, and Future Build (2045) scenarios that include proposed transportation improvements for the Austin Avenue Corridor. The traffic analysis includes 25 signalized and unsignalized intersections on Austin Avenue from NE Inner Loop to SE Inner Loop, as well as the signalized intersection of SH 29/University Avenue and Main Street (26 total study intersections).

Several operational performance measures were developed for the traffic operations assessment to compare the scenarios, including Level of Service (LOS)/delay, corridor travel time, and total network delay. These performance measures were used to assess the ability of proposed multimodal improvements in several Build scenarios to accommodate projected traffic volumes and improve safety throughout the corridor.

1.2 STUDY AREA

The Study Area encompasses the full corridor but is also evaluated on a subarea basis due to the variations in the character of the corridor.

The Study Area comprises a half-mile buffer from the corridor and includes the area surrounding I-35 to the west. Six subareas have been identified within the Study Area, and are shown in **Figure 1**:

- **Northern Gateway:** NE Inner Loop to Weir Road/FM 971
- **San Gabriel:** Weir Road/FM 971 to South Fork San Gabriel River
- **Downtown:** South Fork San Gabriel River to SH 29/University Avenue
- **Old Town:** SH 29/University Avenue to W 18th Street
- **Southern Gateway:** W 18th Street to Leander Road/FM 1460
- **Industrial and Institutional:** Leander Road/FM 1460 to SE Inner Loop

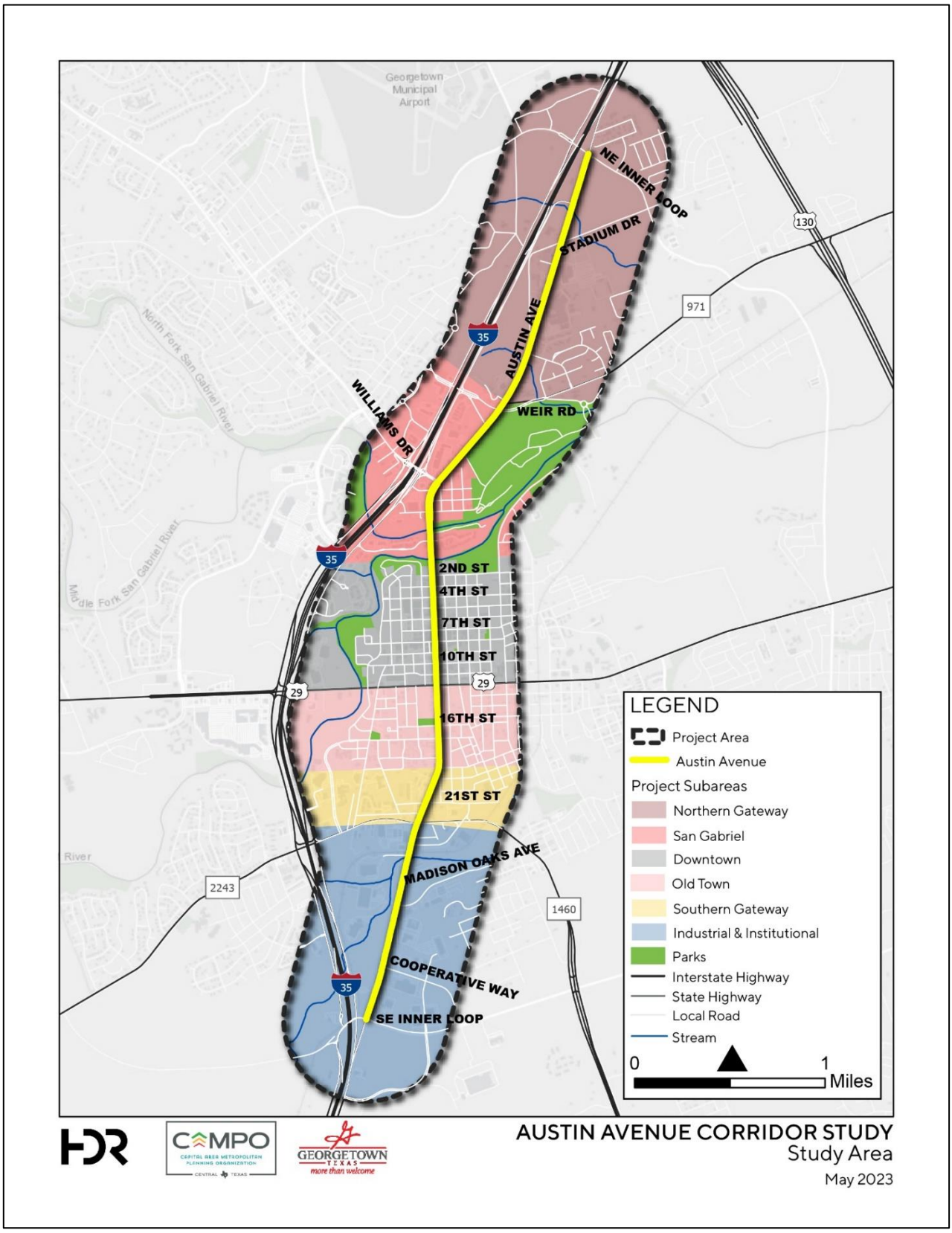


Figure 1: Austin Avenue Corridor Study Area Map

2 EXISTING CONDITIONS (2023)

2.1 EXISTING SCENARIO

The Existing Scenario considers traffic operations along the corridor using existing (2023) vehicle turning movement volumes for the AM and PM peak hours. Existing conditions (2023) geometry was modeled along the corridor from NE Inner Loop to SE Inner Loop with no additional roadway improvements or modifications assumed.

2.2 EXISTING TRAFFIC VOLUMES

Existing traffic conditions were analyzed to identify and evaluate transportation operations along the corridor. This included a review of traffic data and analysis of congestion and total vehicles traveling the corridor. Sources used to obtain the latest vehicle traffic volumes included counts previously collected by the City, Texas Department of Transportation (TxDOT) annual traffic counts; counts collected by the project team on Thursday April 13, 2023; and a site visit conducted on Thursday May 18, 2023. Collected traffic volume counts included peak hour turning movement counts, 24-hour volume counts, and 24-hour classification counts.

2.2.1 Corridor Daily Traffic Volumes

Table 1 and **Figure 2** provide an overview of the daily volumes on Austin Avenue. The Corridor averages 12,000 vehicles per day (VPD) across all six subareas. Volumes are highest north of Downtown near 2nd Street and north of Williams Drive, with approximately 18,000 VPD at both locations. Volumes taper at the corridor limits, decreasing to approximately 10,000 VPD in the Northern Gateway subarea to the north, and approximately 8,000 VPD in the Industrial and Institutional subarea to the south.

Table 1: Existing Austin Avenue Corridor Daily Traffic Volumes

Subarea	Limits	Existing Austin Avenue Daily Traffic Volumes				
		Count Location	Source	Year	Total VPD (Rounded)	Subarea Average Total VPD (Rounded)
Northern Gateway	NE Inner Loop to Weir Rd/FM 971	S of Lakeway Dr	TxDOT	2021	10,000	10,000
		N of GHS Dwy	GRAM	2023	11,000 (300 HVs*)	
		N of Weir Rd/FM 971	TxDOT	2021	10,000	
San Gabriel	Weir Rd/FM 971 to South Fork San Gabriel River	N of Williams Dr	TxDOT	2021	18,000	14,000
		N of San Gabriel River	TxDOT	2020	7,000**	
		Austin Ave Bridge (San Gabriel Village)	City	2022	17,000	
Downtown	South Fork San Gabriel River to SH 29/University Ave	Austin Ave Bridge (El Monumento)	City	2022	18,000	16,000
		Between SH 29/ University Ave and 8th St	GRAM	2023	13,000	
Old Town	SH 29/University Ave to W 18th Street	S of SH 29/ University Ave	GRAM	2023	11,000 (400 HVs*)	12,000
		N of W 18th St	GRAM	2023	12,000	
Southern Gateway	W 18th Street to Leander Rd	Between W 18th St and Leander Rd/FM 1460	Kimley-Horn	2022	13,000***	13,000***
Industrial and Institutional	Leander Rd/FM 1460 to SE Inner Loop	S of Madison Oaks Ave	TxDOT	2021	8,000	8,000
		N of Georgetown Medical Clinic	City (Kimley-Horn)	2022	8,000 (1,300 HVs*)	

**Number of Heavy Vehicles in the Total VPD Volume*

***Number is potentially lower than current conditions due to COVID-19 traffic impacts*

****Approximated based on peak hour turning movement counts provided by the City (from Kimley-Horn)*

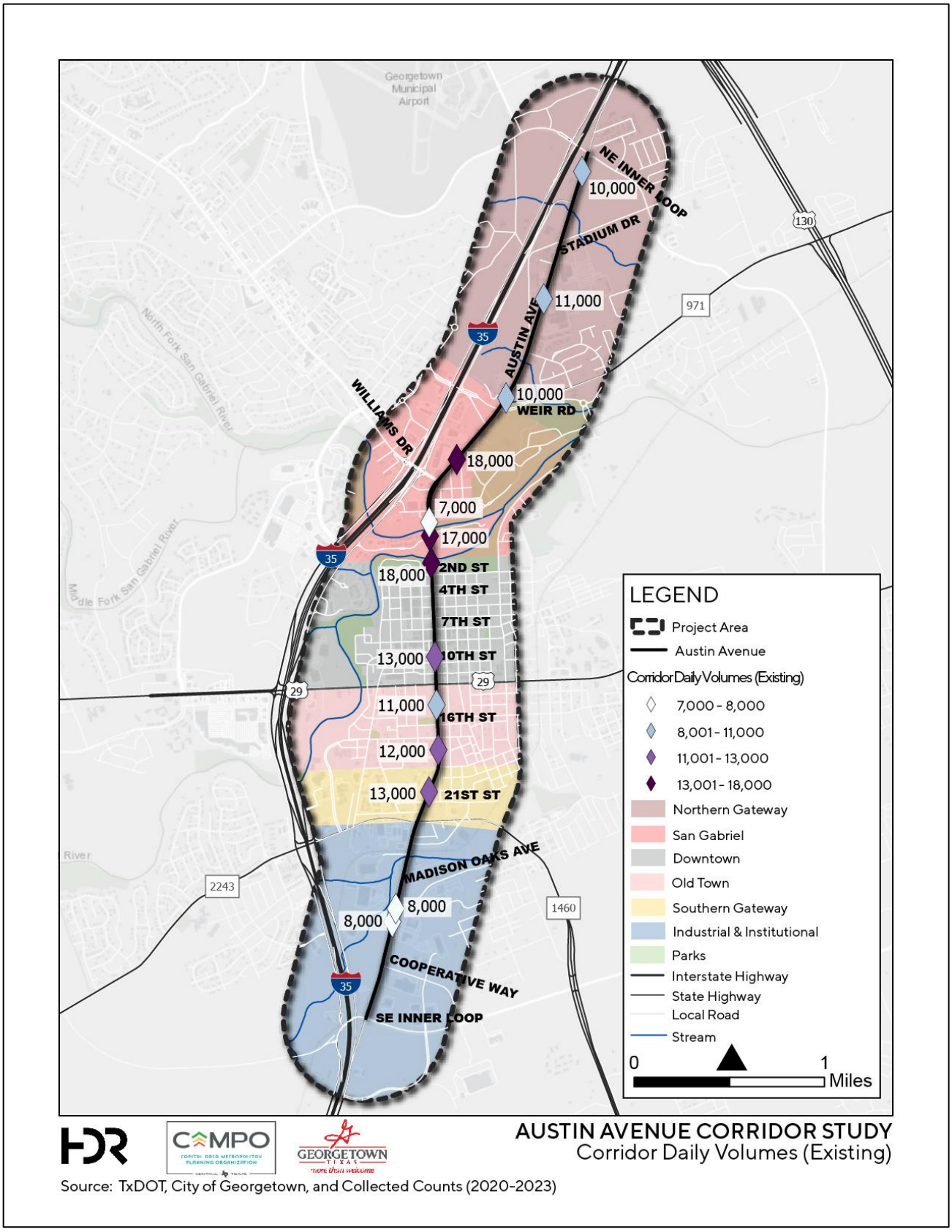


Figure 2: Existing Austin Avenue Corridor Daily Traffic Volumes Map

2.2.2 Intersection Turning Movement Volumes

Peak hour turning movements at 25 intersections along Austin Avenue and at the intersection of SH 29/University Avenue and Main Street were analyzed to evaluate traffic operations, determine opportunities to improve intersection operations, and improve overall corridor performance.

Turning movement volumes were developed for two weekday peak hours (AM and PM) from existing turning movement counts previously collected by the City of Georgetown and counts collected in April 2023 by the project team. The AM and PM peak hours were based on the hour of highest traffic demand at each intersection along Austin Avenue during the morning and afternoon, respectively. A common AM and PM peak hour was determined for the intersections of University Avenue at Austin Avenue and at Main Street based on their proximity. 2020 and 2022 peak hour turning movement counts were grown by an annual 2% exponential growth rate (between NE Inner Loop and Leander Road) and an annual 3.2% exponential growth rate (between Leander Road and SE Inner Loop) based on TxDOT historical count data in the area to approximate Existing (2023) turning movement volumes. These Existing (2023) turning movement volumes were balanced along the corridor and used to develop Existing traffic models.

Line diagrams were developed to show turning movement volumes, heavy vehicle percentages, and peak hour factors used in the Existing (2023) traffic models at every study intersection for both the AM and PM peak hours. Line diagrams are included in **Appendix A1**.

3 FUTURE CONDITIONS (2045)

Future traffic conditions (2045) were analyzed for a No-Build scenario and three Build scenarios with proposed transportation improvements.

3.1 No-Build Scenario

The No-Build Scenario considers traffic operations along the corridor under Future conditions (2045) using turning movement volume projections for the AM and PM peak hours that are discussed in Section 3.5.2. The No-Build scenario assumes completion of funded transportation projects proposed to be completed prior to 2045. The Austin Avenue Corridor Study included TxDOT's planned roadway widening project on South Austin Avenue from Leander Road/FM 1460 to SE Inner Loop (CSJ: 0015-17-029) shown in **Appendix A2**. The future roadway project includes the addition of a two-way left-turn lane from Leander Road/FM 1460 to SE Inner Loop as well as a dedicated northbound left-turn lane at the intersection of Austin Avenue and Leander Road/FM 1460.

3.2 Build Scenario 1

Build Scenario 1 includes mitigations to improve intersection operations to LOS D or better along Austin Avenue where feasible. This scenario models traffic operations along the corridor under Future (2045) AM and PM peak hour traffic conditions.

Table 2 provides an overview of the proposed mitigations recommended at each intersection under Build Scenario 1. It should be noted that the proposed mitigations recommended in **Table 2** focus solely on improving traffic operations. Additional improvements will be recommended in other deliverables to achieve other goals (e.g. safety, placemaking, etc.). Recommended storage lengths for turn lane improvements are based on 95th percentile queue lengths in both peak hours. It should be noted that some improvements, such as turn lanes at the intersections of Austin Avenue and University Avenue, and Austin Avenue and Leander Road/FM 1460 will require procurement of additional right-of-way. At the intersection of Austin Avenue and San Gabriel Village Boulevard, improvements to the existing signalized intersection as well as a roundabout installation were analyzed as options to improve intersection operations and are both shown in **Table 2.** Physical constraints associated with construction of a two-lane roundabout at this intersection due to the adjacent bridge structure to the north and steep grades to the east will need to be further evaluated.

Table 2: Build Scenario 1 Mitigation Summary

Intersection	Build Scenario 1 Mitigations
Austin Ave and Lakeway Dr/NE Inner Loop	Signal timing optimization
	Construct an additional northbound left-turn lane on Austin Ave to create dual northbound left-turn lanes with 800 feet of storage and 100 feet of taper
Austin Ave and IH 35 NBFR Slip Ramp/ Apartment Dwy	Install a traffic signal when warrants are met
	Construct a southbound left-turn lane with 100 feet of storage and 100 feet of taper
	Modify the eastbound right-turn lane to provide a through/right-turn shared lane
	Modify the westbound right-turn lane to provide a left-turn/right-turn shared lane
Austin Ave and Old Airport Rd/ Stadium Dr	Install a traffic signal when warrants are met
	Convert the two-way left-turn lane to a northbound left-turn lane with 100 feet of storage and 100 feet of taper
	Convert the two-way left-turn lane to a southbound left-turn lane with 200 feet of storage and 100 feet of taper
	Construct an eastbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a westbound left-turn lane with 150 feet of storage and 50 feet of taper
Austin Ave and Georgetown HS Dwy	None
Austin Ave and Weir Rd/Northwest Blvd	Signal timing optimization
	Extend the northbound left-turn lane to provide 200 feet of storage and 100 feet of taper
	Extend the northbound right-turn lane to provide 700 feet of storage and 100 feet of taper
Austin Ave and Williams Dr	None
Austin Ave and Morrow St	Signal timing optimization
	Install flashing yellow arrow signal heads and update signal phasing on all approaches
	Extend the northbound left-turn lane to provide 150 feet of storage and 50 feet of taper
	Construct an eastbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a westbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and San Gabriel Village Blvd	**Signalized Intersection Mitigations:**
	Install flashing yellow arrow signal heads and update signal phasing on all approaches
	Signal timing optimization
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Modify the eastbound approach to provide a left-turn lane with 100 feet of storage and 50 feet of taper and a through/right-turn shared lane
	Remove the eastbound free channelized right-turn and the acceleration lane on Austin Avenue
	Modify the westbound approach to provide a left-turn lane and a through/right-turn shared lane
	Roundabout Intersection Mitigations:
	Construct a two-lane roundabout with:
	NB/SB Approaches: One shared left-turn/through shared lane, and one shared through/right-turn lane
	EB Approach: One shared left-turn/through shared lane, and one right-turn slip lane
	WB Approach: One shared left-turn/through/right-turn shared lane
Austin Ave and 2nd St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization

Intersection	Build Scenario 1 Mitigations
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 200 feet of storage and 50 feet of taper
Austin Ave and 3rd St	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 4th St	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 5th St	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 6th St	Install a traffic signal when warrants are met
	Implement signal phasing to provide leading pedestrian intervals
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 7th St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 8th St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 9th St	Install a traffic signal when warrants are met
	Implement signal phasing to provide leading pedestrian intervals
	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 10th St	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 11th St	Construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and University Ave	Install flashing yellow arrow signal heads and update signal phasing on all approaches
	Signal timing optimization
	Construct a northbound left-turn lane with 150 feet of storage and 50 feet of taper
	Construct a southbound left-turn lane with 150 feet of storage and 50 feet of taper
	Construct an eastbound left-turn lane with 150 feet of storage and 50 feet of taper
	Construct a westbound left-turn lane with 100 feet of storage and 50 feet of taper
University Ave and Main St	Install flashing yellow arrow signal heads and update signal phasing for the eastbound and westbound left-turn
	Signal timing optimization
	Construct an eastbound left-turn lane with 100 feet of storage and 50 feet of taper
	Construct a westbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 16th St	None
Austin Ave and 17th St	None
Austin Ave and W 18th St	None
Austin Ave and E 18th St	None

Intersection	Build Scenario 1 Mitigations
Austin Ave and Leander Rd/FM 1460	Install flashing yellow arrow signal heads and update signal phasing for the northbound left-turn
	Signal modification to provide protected only southbound left-turn phasing
	Signal timing optimization
	Construct a northbound left-turn lane with 350 feet of storage and 100 feet of taper (TxDOT Project)
	Construct two southbound left-turn lanes to create dual southbound left-turn lanes with 400 feet of storage and 50 feet of taper
	Extend the eastbound left-turn lane to provide 250 feet of storage and 50 feet of taper
	Construct a westbound right-turn lane with 300 feet of storage and 50 feet of taper
Austin Ave and SE Inner Loop	Signal modification to provide a southbound right-turn overlap
	Signal timing optimization
	Construct an additional eastbound through lane
	Extend the westbound through lane to provide 600 feet of storage and 100 feet of taper

3.3 Build Scenario 2

Build Scenario 2 includes a lane reduction on Austin Avenue from four lanes to two lanes between 2nd Street and 18th Street as well as mitigations to improve intersection operations to LOS D or better along Austin Avenue where feasible. This scenario models traffic operations along the corridor under Future (2045) AM and PM peak hour traffic conditions. **Table 3** provides an overview of the proposed mitigations recommended at each intersection under Build Scenario 2. It should be noted that the proposed mitigations recommended in **Table 3** focus solely on improving traffic operations. Additional improvements will be recommended in other deliverables to achieve other goals (e.g. safety, placemaking, etc.). Recommended storage lengths for turn lane improvements are based on 95th percentile queue lengths in both peak hours. It should be noted that some improvements, such as turn lanes at the intersections of Austin Avenue and University Avenue, and Austin Avenue and Leander Road/FM 1460 will require procurement of additional ROW. At the intersection of Austin Avenue and San Gabriel Village Boulevard, improvements to the existing signalized intersection as well as roundabout installation were analyzed as options to improve intersection operations and are both shown in **Table 3**. Physical constraints associated with construction of a two-lane roundabout at this intersection due to the adjacent bridge structure to the north and steep grades to the east will need to be further evaluated.

Table 3: Build Scenario 2 Mitigation Summary

Intersection	Build Scenario 2 Mitigations
Austin Ave and Lakeway Dr/NE Inner Loop	Same Mitigations as in Build Scenario 1
Austin Ave and IH 35 NBFR Slip Ramp/Apartment Dwy	Same Mitigations as in Build Scenario 1
Austin Ave and Old Airport Rd/Stadium Dr	Same Mitigations as in Build Scenario 1
Austin Ave and Georgetown HS Dwy	None
Austin Ave and Weir Rd/Northwest Blvd	Same Mitigations as in Build Scenario 1
Austin Ave and Williams Dr	None
Austin Ave and Morrow St	Same Mitigations as in Build Scenario 1
Austin Ave and San Gabriel Village Blvd	**Signalized Intersection Mitigations:** Same Mitigations as in Build Scenario 1 **Roundabout Intersection Mitigations:** Same Mitigations as in Build Scenario 1
Austin Ave and 2nd St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Drop the southbound through/left-turn shared lane into a left-turn lane through restriping
Austin Ave and 3rd St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 4th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 5th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 6th St	Install a traffic signal when warrants are met
	Implement signal phasing to provide leading pedestrian intervals
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper

Intersection	Build Scenario 2 Mitigations
Austin Ave and 7th St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 8th St	Install flashing yellow arrow signal heads and update signal phasing for the northbound and southbound left-turn
	Update signal phasing to provide leading pedestrian intervals
	Signal timing optimization
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 9th St	Install a traffic signal when warrants are met
	Implement signal phasing to provide leading pedestrian intervals
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 10th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 11th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and University Ave	Install flashing yellow arrow signal heads and update signal phasing on all approaches
	Signal timing optimization
	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 150 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 150 feet of storage and 50 feet of taper
	Construct an eastbound left-turn lane with 200 feet of storage and 50 feet of taper
	Construct a westbound left-turn lane with 150 feet of storage and 50 feet of taper
University Ave and Main St	Same Mitigations as in Build Scenario 1
Austin Ave and 16th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and 17th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and W 18th St	Remove the northbound through/left-turn shared lane and construct a northbound left-turn lane with 100 feet of storage and 50 feet of taper

Intersection	Build Scenario 2 Mitigations
	Remove the southbound through lane
Austin Ave and E 18th St	Drop the northbound through/right-turn shared lane into a right-turn lane through restriping
	Remove the southbound through/left-turn shared lane and construct a southbound left-turn lane with 100 feet of storage and 50 feet of taper
Austin Ave and Leander Rd/FM 1460	Same Mitigations as in Build Scenario 1
Austin Ave and SE Inner Loop	Same Mitigations as in Build Scenario 1

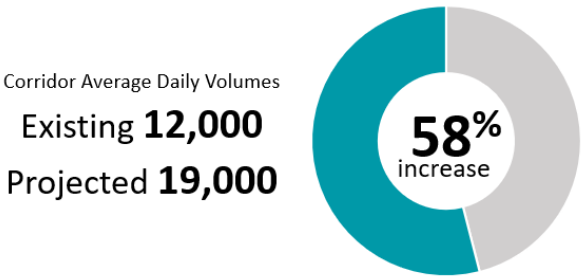
3.4 Build Scenario 3

Build Scenario 3 includes a lane reduction on Austin Avenue from four lanes to two lanes between 2nd Street and 18th Street and conversion of both Austin Avenue and Main Street from two-way to one-way operations between 2nd Street and University Avenue. Traffic will be rerouted through the one-way roadway pairs with Austin Avenue operating as a southbound roadway and Main Street operating as a northbound roadway. A "proof-of-concept" Synchro analysis determined that under this scenario, queuing on both roadways is projected to be significant through downtown due to a bottleneck created at University Avenue. The eastbound left-turn lane queue at the intersection of University Avenue and Main Street extended beyond the intersection of Austin Avenue and University Avenue, effectively reducing University Avenue to one eastbound lane. This extensive queuing was considered to be a fatal flaw and a detailed Synchro analysis of Build Scenario 3 was not conducted. Queuing diagrams of 95th percentile queue lengths at the intersection of University Avenue and Main Street and the intersection of Austin Avenue and University Avenue for all scenarios are presented in **Appendix A3**.

3.5 Future Traffic Volumes

3.5.1 Corridor Daily Traffic Volumes

Table 4 and **Figure 3** provide an overview of the Future (2045) daily traffic volumes estimated for Austin Avenue. These Future daily volumes were developed by applying an annual 2% exponential growth rate to existing daily volumes to approximate future demand along Austin Avenue. The annual 2% exponential growth rate was based on an analysis of growth patterns along the corridor in Capital Area Metropolitan Planning Organization's (CAMPO) Travel Demand Model between the calibrated base year (2015) and future year 2045. Details of this future growth rate analysis are provided in **Appendix A4**.



The corridor is projected to average approximately 19,000 VPD across all six subareas in 2045. This represents an increase of approximately 58% in the average corridor daily volume from Existing, which had an average corridor daily volume of 12,000 VPD.

Similar to Existing Conditions, **Table 4** shows that future volumes on Austin Avenue are projected to be the highest in the Downtown and San Gabriel subareas, with subarea average volumes of 25,000 VPD and 22,000 VPD, respectively.

Table 4: Future (2045) Austin Avenue Corridor Daily Traffic Volumes

Subarea	Limits	Future (2045) Austin Avenue Daily Traffic Volumes		
		Location	Total VPD (Rounded)	Subarea Average Total VPD (Rounded)
Northern Gateway	NE Inner Loop to Weir Road/FM 971	S of Lakeway Dr	16,000	16,000
		N of Georgetown HS Dwy	17,000 (1,000 HVs*)	
		N of Weir Rd/ FM 971	16,000	
San Gabriel	Weir Road/FM 971 to South Fork San Gabriel River	N of Williams Dr	28,000	22,000
		N of San Gabriel River	11,000**	
		Austin Ave Bridge (San Gabriel Village)	27,000	
Downtown	South Fork San Gabriel River to University Ave/SH 29	Austin Ave Bridge (El Monumento)	28,000	25,000
		Between University Ave/SH 29 and 8th St	21,000	
Old Town	University Ave/SH29 to W 18th St	S of University Ave/SH 29	17,000 (1,000 HVs*)	18,000
		N of 18th St	19,000	
Southern Gateway	W 18th Street to Leander Rd/FM 1460	Between W 18th St and Leander Rd/ FM 1460	20,000	20,000
Industrial and Institutional	Leander Rd/FM1460 to SE Inner Loop	S of Madison Oaks Ave Dr	12,000	12,000
		N of Georgetown Medical Clinic	12,000 (2,000 HVs*)	

**Number of Heavy Vehicles in the Total VPD Volume*
***Possible COVID-19 Impact*

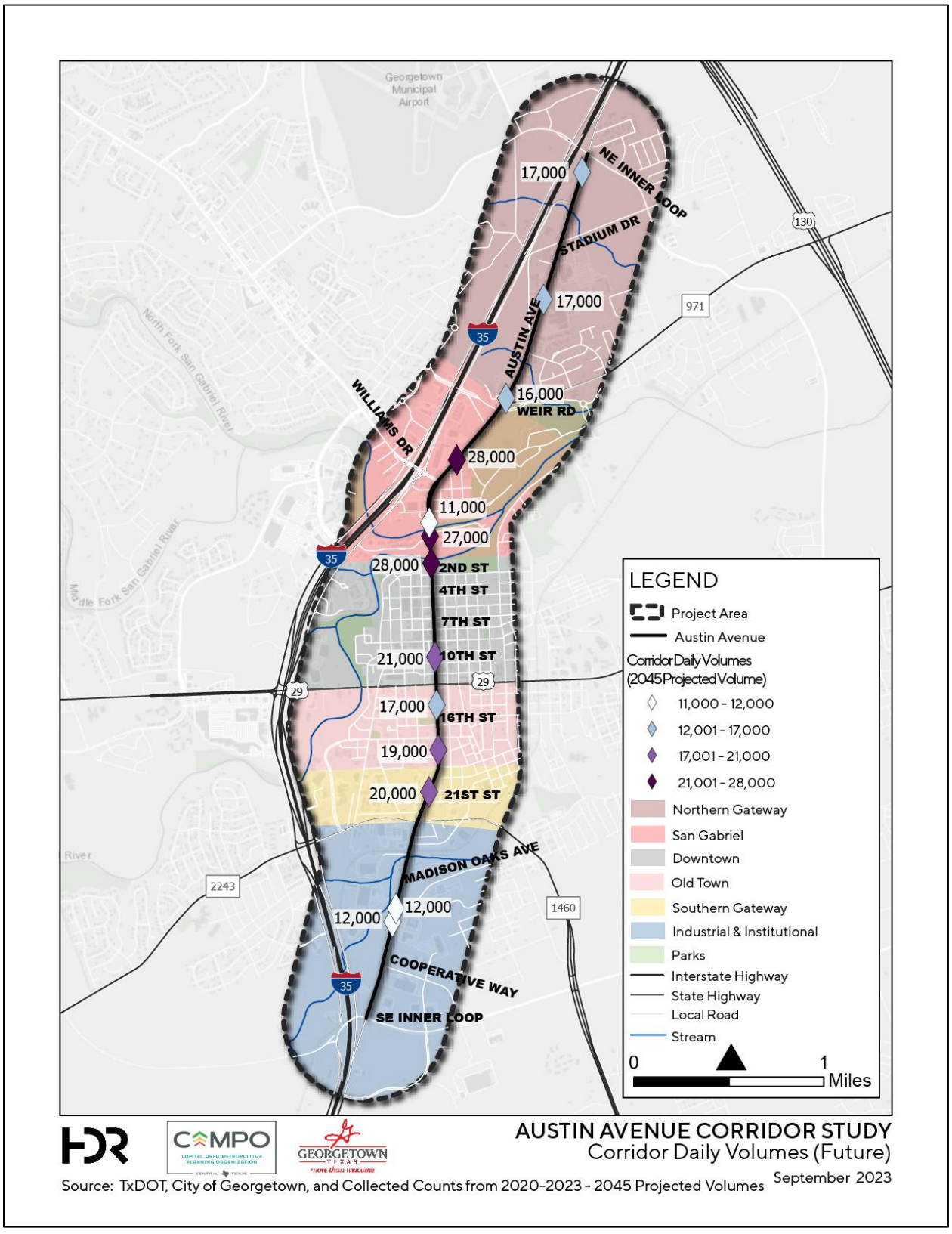


Figure 3: Future (2045) Austin Avenue Corridor Daily Traffic Volumes Map

3.5.2 Intersection Turning Movement Volumes

Peak hour turning movement volumes for Future conditions were developed by applying an annual 2% growth rate (growth factor of 1.55) to Existing (2023) turning movement volumes to approximate Future (2045) demand at 25 intersections along Austin Avenue and at the intersection of SH 29/University Avenue and Main Street (26 total study intersections). Details of the future growth rate analysis are provided in **Appendix A4**. These Future conditions (2045) turning movement volumes were used to develop Synchro 11 models for the No-Build Scenario, Build Scenario 1, and Build Scenario 2. In Build Scenario 2, a 20% volume reduction on top of the 2% growth rate (resultant growth factor of 1.24) was applied to northbound and southbound through volumes on Austin Avenue from 2nd Street to 18th Street to account for the expected future traffic diversion from Austin Avenue due its proposed lane reduction. This volume reduction is discussed further in Section 3.5.3.

Line diagrams that show the turning movement volumes used in the Future (2045) traffic models at every study intersection for both the AM and PM peak hours are included in **Appendix A1**.

3.5.3 Build Scenario 2 Lane Reduction Traffic Diversion

A future collector road parallel to Austin Avenue is planned to connect SH 29/University Avenue to FM 971 east of Southwestern University, beginning at the intersection of Smith Creek Road and SH 29/University Avenue, and ending at the intersection of Parkview Drive and FM 971. This future collector will provide an additional north/south route that will serve as an alternative to Austin Avenue. Traffic is expected to divert from Austin Avenue to this future collector in Build Scenario 2 due to the proposed lane reduction on Austin Avenue between 2nd Street and 18th Street.

CAMPO's 2045 Travel Demand Model (TDM) was used to estimate the traffic diversion from Austin Avenue to this future collector in Build Scenario 2. Two modelling scenarios were compared – one with the 2045 No-Build assumptions and one with Build Scenario 2 roadway network changes, including the lane reduction and parallel route construction. **Figure 4** shows the centroid connector and roadway links that were added to the CAMPO 2045 TDM to incorporate the future collector. Traffic assignment was rerun for the modified CAMPO 2045 TDM, and the Austin Avenue reduced lane section showed an expected volume reduction ranging between 20% and 35% compared to the original CAMPO 2045 TDM (2045 No-Build). A conservative estimate of 20% was selected to model the expected reduction in through volumes on Austin Avenue between 2nd Street to 18th Street in Build Scenario 2. A comparison of volumes from the original CAMPO 2045 TDM and the modified model with the future parallel facility is presented in **Appendix A5**.

Figure 4: CAMPO 2045 TDM Future Parallel Facility Roadway Modification

4 INTERSECTION LEVEL OF SERVICE ANALYSIS

The standard used to evaluate traffic conditions at intersections is Level of Service (LOS), which is a measure of the average delay experienced by drivers traversing a given intersection during the peak period of travel. LOS is quantified by letter grades ranging from A to F, with A representing free-flow conditions and F indicating severe congestion and delay. The City of Georgetown's policy aims to maintain a LOS D or better at intersections throughout the City.

Two types of intersections to be evaluated are signalized and unsignalized, which use different criteria for assessment of operating levels.

Signalized intersection LOS is defined in terms of delay, which is a direct and/or indirect measure of driver discomfort, frustration, fuel consumption, and lost travel time. The levels of service have been established based on driver acceptability of various delays. The delay for each approach lane group is calculated based on several factors including lane geometrics, percentage of trucks, peak hour factor, number of lanes, signal progression, volume, signal green time to total cycle time ratio, roadway grades, parking conditions, and pedestrian flows.

Unsignalized intersection LOS is defined in terms of average control delay and, in some cases, volume to capacity (v/c) ratio. Control delay is that portion of total delay attributed to traffic control measures, either traffic signals or stop signs. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

For two-way stop-controlled (TWSC) intersections, the analysis method assumes that major street through traffic is not affected by minor street flows. Major street left-turning traffic and the traffic on the minor approaches will be affected by opposing movements. Stop or yield signs are used to assign the right-of-way (ROW) to the major street. This designation forces drivers on the controlled street to judgmentally select gaps in the major street flow through which to execute crossing or turning maneuvers. Thus, the capacity of the controlled legs is based upon two factors:

- The distribution of gaps in the major street traffic stream.
- Driver judgment in selecting gaps through which to execute their desired maneuvers.

Table 5 shows the relationship between the average control delay and LOS for signalized and unsignalized intersections, as well as a qualitative description for each. The LOS range for unsignalized intersections is different than that for signalized intersections because drivers expect different levels of performance from different kinds of transportation facilities. Unsignalized intersections carry less traffic volume than signalized intersections and delays at unsignalized intersections are variable. For these reasons, the acceptable control delay would be less for an unsignalized intersection than for a signalized intersection. The overall approach LOS is computed as a weighted average of the vehicle delay for each movement; therefore, an approach may have an overall LOS C or D and have individual movements, which are LOS E or F.

Table 5: Intersection Level of Service Measurements and Qualitative Descriptions

LOS	Control Delay (sec/veh)		Qualitative Description
	Signalized	Unsignalized	
A	0-10	0-10	Good progression and short cycle lengths
B	>10-20	>10-15	Good progression or short cycle lengths, more vehicle stops
C	>20-35	>15-25	Fair progression and/or longer cycle lengths, some cycle
D	>35-55	>25-35	Congestion becomes noticeable, high v/c ratio
E	>55-80	>35-50	Limit of acceptable delay, poor progression, long cycles, and/or high volume
F	>80	>50	Unacceptable to drivers, volume greater than capacity

Source: 2016 Highway Capacity Manual (HCM 6)

Analysis of signalized and stop-controlled intersections was performed using Synchro 11 software, which is based on the procedures contained in the 2016 Highway Capacity Manual (HCM 6). In cases where textbook HCM 6 methodology could not be used to analyze an intersection, (due to NEMA phasing constraints, speed limit constraints, etc.) Synchro "Lanes, Volumes, and Timings" analysis results were presented instead. Synchro 11 models were created using existing signal timing cards provided by TxDOT and the City of Georgetown and turning movement volumes including heavy vehicle percentages and peak hour factors. Signal timing cards are provided in **Appendix A6.**

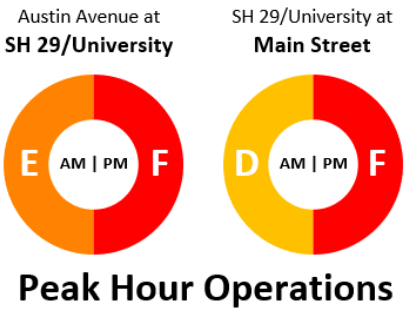
4.1 Existing Scenario Analysis

Table 6 provides a breakdown of existing peak hour overall intersection LOS and delay results for the signalized study intersections from north to south. Most intersections along the corridor operate at LOS of D or better. Of the 13 total signalized intersections evaluated, two operate at LOS E or F during the AM and/or PM peak hour.

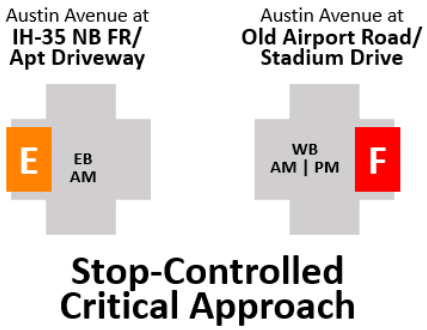
Table 6: Existing Peak Hour Overall Intersection LOS and Delay for Signalized Intersections

Signalized Intersections	Overall Intersection LOS (Delay) (sec/veh)	
	AM	PM
Austin Ave and NE Inner Loop	C (22.5)	C (30.1)
Austin Ave and Georgetown HS Dwy	B (11.1)	B (13.1)
Austin Ave and Weir Rd/FM 971	C (25.5)	C (30.3)
Austin Ave and Williams Dr	C (30.2)	C (34.2)
Austin Ave and Morrow St	A (5.3)	A (8.1)
Austin Ave and San Gabriel Village Blvd	A (4.3)	A (5.3)
Austin Ave and 2nd St	A (8.0)	A (8.5)
Austin Ave and 7th St	B (15.9)	B (14.6)
Austin Ave and 8th St	A (4.3)	A (7.4)
Austin Ave and SH 29/University Ave	E (56.1)	F (86.2)
SH 29/University Ave and Main St	D (37.4)	F (101.4)
Austin Ave and Leander Rd/FM 1460	C (30.4)	D (46.3)
Austin Ave and SE Inner Loop	C (32.0)	D (35.1)

Source: Trafficware Synchro Studio 11



A breakdown of the highest (critical) approach delay and LOS for unsignalized intersections is provided in **Table 7**. Of the 13 unsignalized intersections evaluated, two have critical approaches that operate at LOS E or F during the AM and/or PM peak hour. These failing critical approach LOS results can be attributed to vehicles on the minor-street approaches experiencing long delays while waiting for adequate gaps in the Austin Avenue traffic stream to execute their desired maneuvers.



Detailed intersection analysis results that show delay, LOS, and additional performance measures such as 95th percentile queue length and v/c ratio for individual movements at every intersection are provided in **Appendix A7**. Synchro reports for every intersection in all analysis scenarios are provided in **Appendix A8.**

Table 7: Existing Peak Hour Critical Approach LOS and Delay for Unsignalized Intersections

Unsignalized Intersections	Traffic Control Type	Critical Approach LOS (Delay) (sec/veh)		
		Critical Approach	AM	PM
Austin Ave and IH 35 NBFR Slip Ramp/Apartment Dwy	TWSC	EB	E (41.7)	D (33.0)
Austin Ave and Old Airport Rd/ Stadium Dr	TWSC	WB	F (86.1)	F (59.8)
Austin Ave and 3rd St	TWSC	EB	D (29.6)	D (27.8)
Austin Ave and 4th St	TWSC	EB	C (22.7)	D (28.2)
Austin Ave and 5th St	TWSC	EB	C (20.0)	D (26.2)
Austin Ave and 6th St	TWSC	EB	C (18.1)	D (31.2)
Austin Ave and 9th St	TWSC	EB	B (14.9)	C (17.1)
Austin Ave and 10th St	TWSC/RRFB	EB	C (15.4)	C (16.3)
Austin Ave and 11th St	TWSC	EB	C (16.0)	C (17.0)
Austin Ave and 16th St	TWSC/RRFB	WB	C (17.7)	C (17.3)
Austin Ave and 17th St	TWSC	EB (AM) WB (PM)	C (15.9)	C (16.3)
Austin Ave and W 18th St	TWSC	EB	B (12.1)	B (11.1)
Austin Ave and E 18th St	TWSC	WB	B (13.1)	B (12.5)

RRFB: Rectangular Rapid Flashing Beacon
Source: Trafficware Synchro Studio 11

Figure 5 illustrates the Existing LOS for the AM and PM peak hours at the 26 study intersections on a map. Overall intersection LOS is shown for signalized intersections, and critical approach LOS is shown for unsignalized intersections.

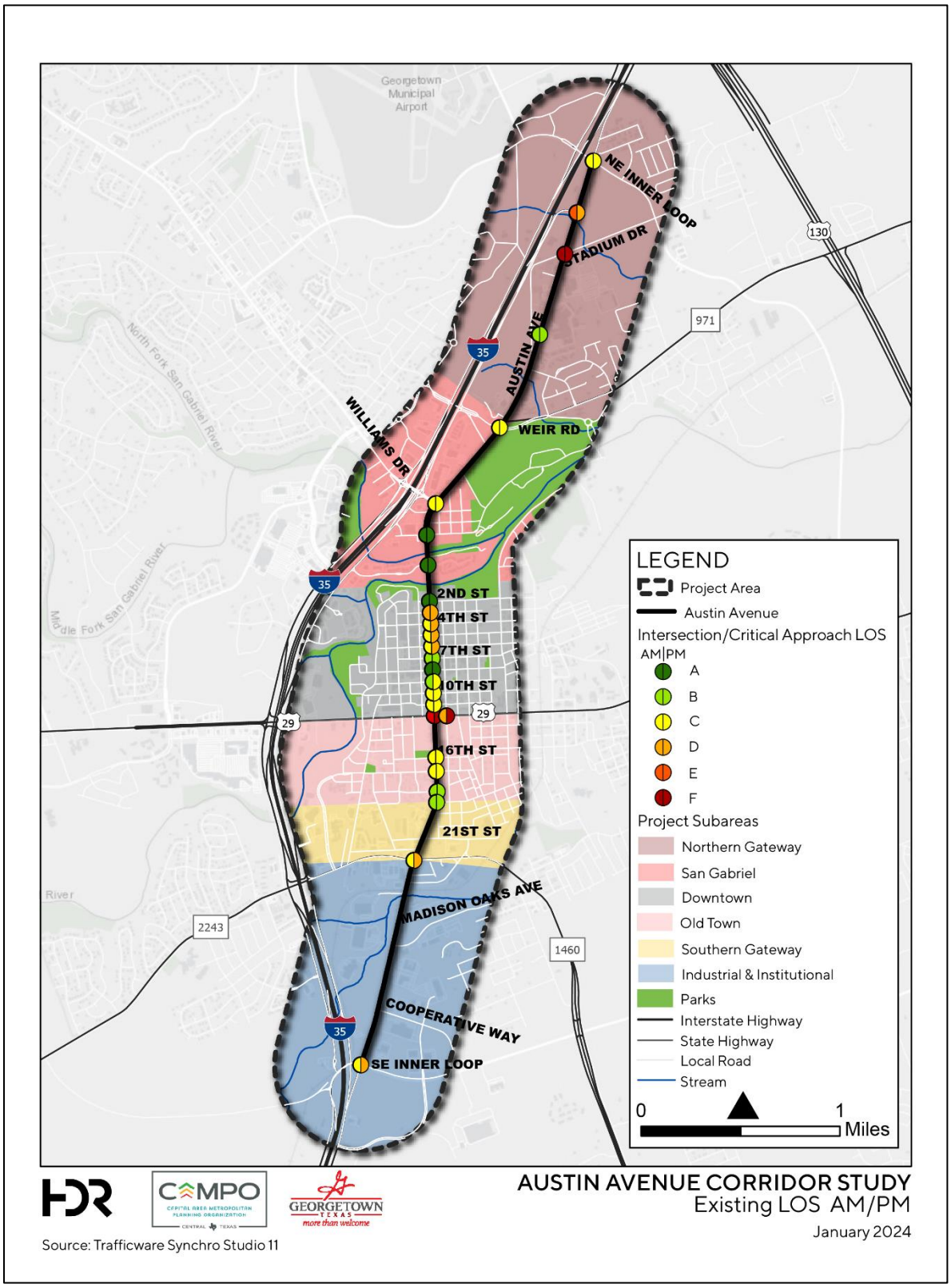


Figure 5: Existing Intersection/Critical Approach LOS AM/PM

4.2 No-Build Scenario Analysis

Table 8 provides a breakdown of overall intersection LOS results in the No-Build scenario for signalized intersections from north to south. All signalized intersections show worsened delays and/or LOS compared to Existing conditions due to projected growth. In particular, Table 8the following intersections worsen from LOS A-D in Existing Conditions to LOS E or F in No-Build conditions:

- Austin Avenue and NE Inner Loop
- Austin Avenue and Weir Road/RM 971
- Austin Avenue and 2nd Street
- SH 29/University Avenue and Main Street
- Austin Avenue and Leander Road/FM 1460
- Austin Avenue and SE Inner Loop

Of the 13 total signalized intersections evaluated, seven are projected to operate at LOS E or F during the AM and/or PM peak hour.

Table 8: No-Build (2045) Peak Hour Overall Intersection LOS and Delay for Signalized Intersections

Signalized Intersection	Overall Intersection LOS (Delay) (sec/veh)	
	AM	PM
Austin Ave and NE Inner Loop	C (32.9)	E (59.3)*
Austin Ave and Georgetown HS Dwy	B (15.8)	C (20.5)
Austin Ave and Weir Rd/FM 971	F (96.5)*	F (85.7)*
Austin Ave and Williams Dr	D (35.5)	D (52.0)
Austin Ave and Morrow St	A (6.7)	B (12.9)
Austin Ave and San Gabriel Village Blvd	A (6.7)	B (17.7)
Austin Ave and 2nd St	B (15.5)	E (61.6)*
Austin Ave and 7th St	B (19.4)	B (19.1)
Austin Ave and 8th St	A (5.0)	A (8.3)
Austin Ave and SH 29/University Ave	F (215.4)	F (171.3)
SH 29/University Ave and Main St	F (89.1)*	F (118.1)
Austin Ave and Leander Rd/FM 1460	F (100.2)*	F (146.7)*
Austin Ave and SE Inner Loop	F (91.2)*	F (96.7)*

*Indicates LOS has worsened from LOS A-D in Existing conditions to LOS E or F in No-Build conditions
Source: Trafficware Synchro Studio 11

Table 9 provides a breakdown of critical approach delay and LOS results in the No-Build scenario for unsignalized intersections. Of the 13 unsignalized intersections evaluated, 11 have critical approaches that are projected to operate at LOS E or F during the AM and/or PM peak hour due to vehicles on the minor-street approaches experiencing long delays while waiting for adequate gaps in the Austin Avenue traffic stream to execute their desired maneuvers. In particular, the following unsignalized intersections worsen from LOS A-D in Existing Conditions to LOS E or F in No-Build conditions:

- Austin Avenue and IH 35 NBFR Slip Ramp/Apartment Driveway
- Austin Avenue and 3rd Street
- Austin Avenue and 4th Street
- Austin Avenue and 5th Street
- Austin Avenue and 6th Street
- Austin Avenue and 9th Street
- Austin Avenue and 10th Street
- Austin Avenue and 11th Street
- Austin Avenue and 16th Street
- Austin Avenue and 17th Street

These long delays are due to projected increased future demand on the minor-street approaches as well as projected increased volumes along Austin Avenue creating fewer gaps in the traffic stream compared to Existing conditions. These No-Build results for both signalized and unsignalized intersections indicate a need for future improvements along the corridor to accommodate the anticipated impacts of projected growth.

Detailed intersection analysis results that show delay/LOS as well as additional performance measures such as 95th percentile queue length and v/c ratio for individual movements at every intersection are provided in **Appendix A7**. Synchro reports for every intersection are provided in **Appendix A8.**

Table 9: No-Build (2045) Peak Hour Critical Approach LOS and Delay for Unsignalized Intersections

Unsignalized Intersection	Traffic Control Type	Critical Approach LOS (Delay) (sec/veh)		
		Critical Approach	AM	PM
Austin Ave and IH 35 NBFR Slip Ramp/Apartment Dwy	TWSC	EB	F (392.6)	F (308.8)*
Austin Ave and Old Airport Rd/Stadium Dr	TWSC	WB	F (1,657.5)	F (1,393.9)
Austin Ave and 3rd St	TWSC	EB	F (266.6)*	F (183.6)*
Austin Ave and 4th St	TWSC	EB	F (74.6)*	F (134.5)*
Austin Ave and 5th St	TWSC	EB	F (54.2)*	F (235.3)*
Austin Ave and 6th St	TWSC	EB	E (44.7)*	F (800.1)*
Austin Ave and 9th St	TWSC	EB (AM) WB (PM)	D (27.4)	E (43.8)*
Austin Ave and 10th St	TWSC/RRFB	EB	D (31.0)	E (39.1)*
Austin Ave and 11th St	TWSC	WB (AM) EB (PM)	D (33.5)	E (40.3)*
Austin Ave and 16th St	TWSC/RRFB	WB	E (42.2)*	E (45.3)*
Austin Ave and 17th St	TWSC	EB	D (31.9)	E (36.9)*
Austin Ave and W 18th St	TWSC	EB	C (16.5)	B (14.3)
Austin Ave and E 18th St	TWSC	WB	C (20.5)	C (17.3)

*Indicates LOS has worsened from LOS A-D in Existing conditions to LOS E or F in No-Build conditions
RRFB: Rectangular Rapid Flashing Beacon
Source: Trafficware Synchro Studio 11

Figure 6 illustrates the No-Build LOS for the AM and PM peak hours at the 26 study intersections. Overall intersection LOS is shown for signalized intersections, and critical approach LOS is shown for unsignalized intersections.

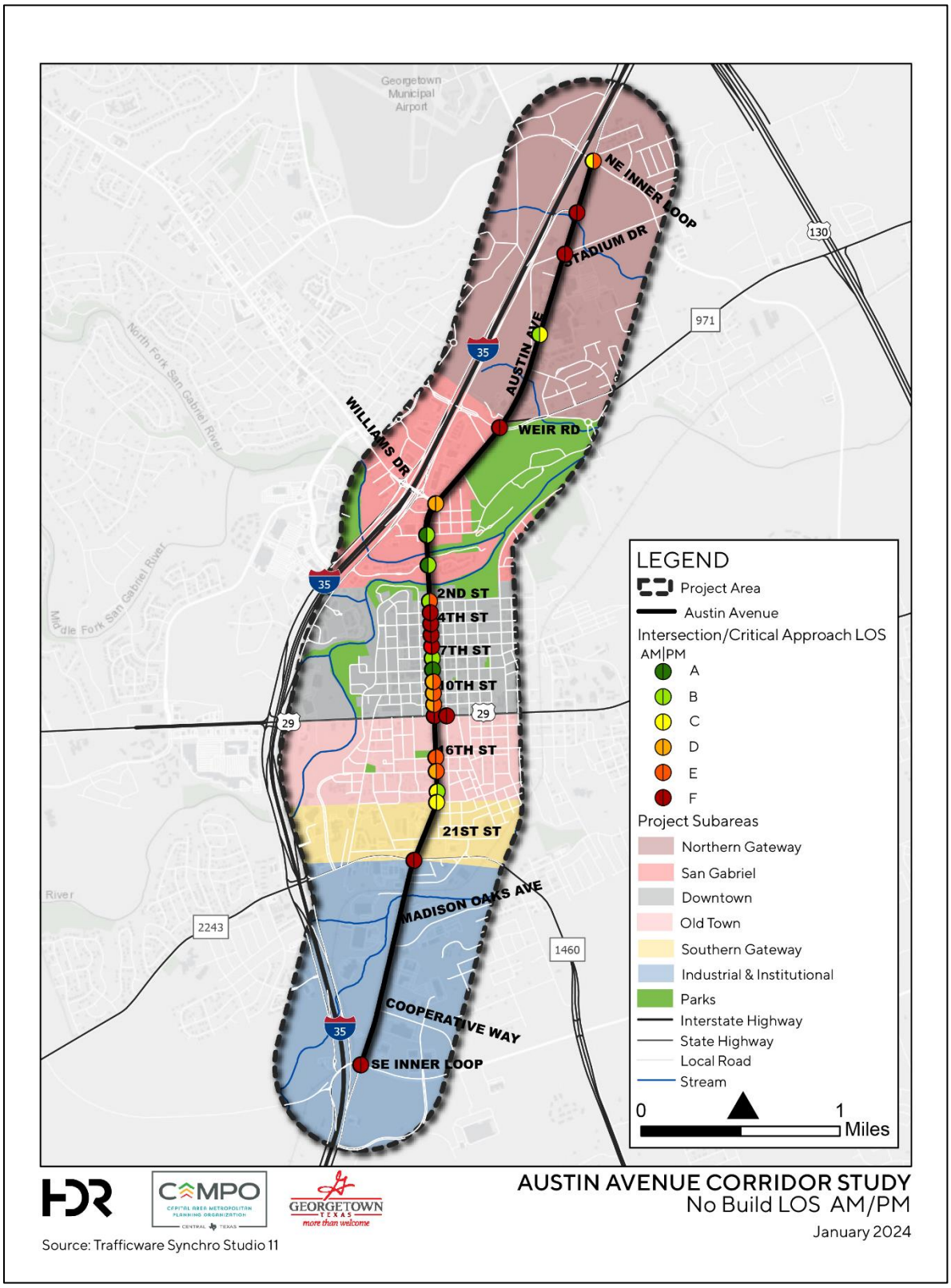


Figure 6: No-Build Intersection/Critical Approach LOS AM/PM

4.3 Build Scenarios Analysis

Table 10 provides a breakdown of overall signalized (and roundabout) intersection LOS results for Build Scenario 1 and Build Scenario 2 from north to south compared to No-Build conditions for reference. Intersection delay and LOS results for the roundabout analysis at Austin Avenue and San Gabriel Village Boulevard are reported from the software program SIDRA Intersection 9, which provides a more comprehensive model for analyzing roundabouts than Synchro.

Table 10 shows that most signalized intersections are expected to perform at acceptable LOS A through D under Build Scenario 1 and Build Scenario 2. Four signalized intersections will operate at failing LOS E or F in Build Scenario 1 and/or Build Scenario 2 during the AM and/or PM peak hour:

- Austin Avenue and Weir Road/Northwest Boulevard
- Austin Avenue and San Gabriel Village Boulevard (Signal)
- Austin Avenue and 2nd Street
- Austin Avenue and SE Inner Loop

Austin Avenue and Weir Road/Northwest Boulevard – The intersection of Austin Avenue and Weir Road/Northwest Boulevard operates at LOS F in the No-Build scenario, Build Scenario 1, and Build Scenario 2, with slightly improved overall intersection delays in the Build scenarios compared to No-Build. An additional westbound left-turn lane on Northwest Boulevard to create dual westbound left-turn lanes is needed to mitigate operations for the westbound left-turn movement and to improve intersection operations to acceptable LOS D or better. This mitigation was not assumed, however, due to ROW constraints, geometric feasibility, and the recent completion of construction at this intersection.

Austin Avenue and San Gabriel Village Boulevard – The intersection of Austin Avenue and San Gabriel Village Boulevard worsens from LOS A in No-Build to LOS F in both Build scenarios during the AM peak hour. HCM methodology could not be used to analyze Austin Avenue and San Gabriel Village Boulevard under No-Build conditions due to NEMA phasing constraints caused by the current east-west split-phased signal operations at the intersection. The signal phasing is recommended to be modified in the Build scenarios. Thus, No-Build results at this intersection are reported from Synchro's "Lanes, Volumes, and Timings", while Build Scenario 1 and 2 results at this intersection are reported from HCM 6. It should be noted that under Synchro's "Lanes, Volumes, and Timings" this intersection is reported to perform at LOS B during both peak hours in both Build Scenario 1 and 2. In addition, a SIDRA analysis was performed to assess the effectiveness of a roundabout at this intersection. A single-lane roundabout would operate at an unacceptable overall intersection LOS of F during both the AM and PM peak hours. A two-lane roundabout would operate at an acceptable overall intersection LOS A (AM) and LOS B (PM) in both Build Scenario 1 and 2, as shown in **Table 10.** The eastbound San Gabriel Village Boulevard approach requires a two-lane approach (ideally an eastbound right-turn slip lane) for the eastbound approach to operate at an acceptable LOS during the AM and PM peak hours. Detailed SIDRA analysis results for the analyzed roundabout configurations (one-lane, two-lane, and two-lane with eastbound right-turn slip lane) are provided in **Appendix A9**.

Austin Avenue and 2nd Street – The intersection of Austin Avenue and 2nd Street worsens from LOS E in No-Build to LOS F in Build Scenario 2 during the PM peak hour. Austin Avenue and 2nd Street is

the most constrained intersection in the lane reduction section of Build Scenario 2. During the PM peak hour, when volumes on Austin Avenue are highest, the northbound and southbound approaches are expected to perform at LOS E and F, respectively, in Build Scenario 2, due to the proposed lane reduction. Alternate driving routes are available for access both to and from Austin Avenue within the Downtown street network. Thus, an LOS E or F at the intersection of Austin Avenue and 2nd Street may not be as significant of an issue as an LOS E or F at a more isolated intersection without alternate driving routes. An additional analysis is also recommended at Austin Avenue and 2nd Street to evaluate the geometric feasibility of carrying four lanes through the intersection on Austin Avenue before transitioning to the lane reduction south of 2nd Street to improve intersection operations.

Austin Avenue and SE Inner Loop – The intersection of Austin Avenue and SE Inner Loop operates at LOS E in both Build scenarios during the PM peak hour. Conversion of the northbound right-turn lane on Austin Avenue to a free-flowing, channelized right-turn lane with construction of an acceleration lane on SE Inner Loop would improve overall intersection LOS E to an acceptable LOS. This mitigation was not recommended, however, due to safety concerns regarding potential pedestrian / bicycle and vehicular conflicts.

Table 11 provides a breakdown of unsignalized intersection critical approach LOS results for Build Scenario 1 and 2 compared to No-Build conditions for reference. In general, Build Scenario 1 and 2 show improved or similar critical approach LOS results at unsignalized intersections compared to No-Build. Minor-street vehicles on the east and west approaches will experience long delays in the future while waiting for adequate gaps in the Austin Avenue traffic stream to execute their desired maneuvers unless a traffic signal is installed. Installation of traffic signals is recommended at the following four intersections in Build Scenarios 1 and 2:

- Austin Avenue and IH 35 NBFR Slip Ramp/Apartment Driveway
- Austin Avenue and Old Airport Road/Stadium Drive
- Austin Avenue and 6th Street (Georgetown Downtown Master Plan Recommendation)
- Austin Avenue and 9th Street (Georgetown Downtown Master Plan Recommendation)

Traffic conditions at these and other unsignalized intersections should be monitored and signal warrant studies based on observed vehicular and/or pedestrian volumes should be conducted to determine if and when a traffic signal is installed.

Detailed intersection analysis results that show delay/LOS as well as additional performance measures such as 95th percentile queue length and v/c ratio for individual movements at every intersection are provided in **Appendix A7**. Synchro reports for every intersection are provided in **Appendix A8.**

Figure 7 and **Figure 8** illustrate the Build Scenario 1 and Build Scenario 2 LOS, respectively, for the AM and PM peak hours at the 26 study intersections. Overall intersection LOS is shown for signalized intersections, and critical approach LOS is shown for unsignalized intersections.

Table 10: Future (2045) Comparison of Peak Hour Overall Intersection LOS and Delay for Signalized Intersections

Signalized Intersection	Overall Intersection LOS (Delay) (sec/veh)					
	No-Build		Build Scenario 1		Build Scenario 2	
	AM	PM	AM	PM	AM	PM
Austin Ave and Lakeway Dr/NE Inner Loop	C (32.9)	E (59.3)	C (33.8)	D (47.4)	C (33.8)	D (47.4)
Austin Ave and IH 35 NBFR Slip Ramp/Apartment Dwy*	F (392.6)	F (308.8)	B (18.5)	C (31.2)	B (18.5)	C (31.2)
Austin Ave and Old Airport Rd/Stadium Dr*	F (1,657.5)	F (1,393.9)	B (13.6)	B (19.2)	B (13.6)	B (19.2)
Austin Ave and Georgetown HS Dwy	B (15.8)	C (20.5)	B (15.7)	C (20.5)	B (15.7)	C (20.5)
Austin Ave and Weir Rd/Northwest Blvd	F (96.5)	F (85.7)	F (80.7)	F (85.1)	F (80.7)	F (85.1)
Austin Ave and Williams Dr	D (35.5)	D (52.0)	D (35.5)	D (52.0)	D (35.5)	D (52.0)
Austin Ave and Morrow St	A (6.7)	B (12.9)	B (14.5)	C (20.9)	B (14.3)	C (20.9)
Austin Ave and San Gabriel Village Blvd	A (6.7)	B (17.7)	F (94.6)	B (14.2)	F (94.6)	B (14.2)
Austin Ave and 2nd St	B (15.5)	E (61.6)	B (13.3)	B (19.5)	C (30.6)	F (83.7)
Austin Ave and 6th St*	E (44.7)*	F (800.1)*	B (18.7)	B (15.2)	A (6.7)	C (23.8)
Austin Ave and 7th St	B (19.4)	B (19.1)	A (2.8)	A (8.0)	A (4.9)	B (15.7)
Austin Ave and 8th St	A (5.0)	A (8.3)	A (3.0)	B (10.1)	A (5.0)	A (8.2)
Austin Ave and 9th St*	D (27.4)	E (43.8)*	C (20.7)	A (7.8)	A (7.0)	A (9.4)
Austin Ave and SH 29/University Ave	F (215.4)	F (171.3)	C (27.5)	C (27.5)	D (52.2)	D (46.4)
SH 29/University Ave and Main St	F (89.1)	F (118.1)	A (9.4)	B (19.1)	A (9.3)	B (19.0)
Austin Ave and Leander Rd/FM 1460	F (100.2)	F (146.7)	C (28.5)	D (42.8)	C (28.5)	D (42.8)
Austin Ave and SE Inner Loop	F (91.2)	F (96.7)	D (38.1)	E (69.6)	D (38.1)	E (69.6)
Roundabout Intersection	**Overall Intersection LOS (Delay) (sec/veh)**					
	No-Build		**Build Scenario 1**		**Build Scenario 2**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
Austin Ave and San Gabriel Village Blvd**	-	-	A (7.2)	B (13.1)	A (7.2)	B (13.1)

*Unsignalized Intersection in No-Build. Critical Approach LOS (Delay) instead of overall intersection LOS (Delay) reported for No-Build.
**2-lane Roundabout Improvement for Build Scenario 1 & 2. SIDRA results reported.
Source: Trafficware Synchro Studio 11

Table 11: Future (2045) Comparison of Peak Hour Critical Approach LOS and Delay for Unsignalized Intersections

Unsignalized Intersection	Traffic Control Type	Critical Approach LOS (Delay) (sec/veh)								
		No-Build			Build Scenario 1			Build Scenario 2		
		Critical Approach	AM	PM	Critical Approach	AM	PM	Critical Approach	AM	PM
Austin Ave and 3rd St	TWSC	EB	F (266.6)	F (183.6)	EB	F (232.5)	F (161.3)	EB	F (117.6)	F (143.2)
Austin Ave and 4th St	TWSC	EB	F (74.6)	F (134.5)	EB	F (73.4)	F (126.8)	EB	E (48.7)	F (96.0)
Austin Ave and 5th St	TWSC	EB	F (54.2)	F (235.3)	EB	F (51.1)	F (161.8)	EB	E (39.0)	F (147.9)
Austin Ave and 10th St	TWSC/ RRFB	EB	D (31.0)	E (39.1)	EB	D (30.1)	E (37.0)	EB	D (26.1)	D (31.7)
Austin Ave and 11th St	TWSC	WB (AM) EB (PM)	D (33.5)	E (40.3)	WB (AM) EB (PM)	D (32.2)	E (37.7)	WB (AM) EB (PM)	D (30.9)	E (35.5)
Austin Ave and 16th St	TWSC/ RRFB	WB	E (42.2)	E (45.3)	WB	E (42.2)	E (45.3)	WB	E (41.8)	E (39.8)
Austin Ave and 17th St	TWSC	EB	D (31.9)	E (36.9)	EB	D (31.9)	E (36.9)	EB (AM) WB (PM)	D (26.3)	D (31.4)
Austin Ave and W 18th St	TWSC	EB	C (16.5)	B (14.3)	EB	C (16.5)	B (14.3)	EB	C (16.7)	C (16.5)
Austin Ave and E 18th St	TWSC	WB	C (20.5)	C (17.3)	WB	C (20.5)	C (17.3)	WB	C (22.3)	C (18.7)

RRFB: Rectangular Rapid Flashing Beacon
Source: Trafficware Synchro Studio 11

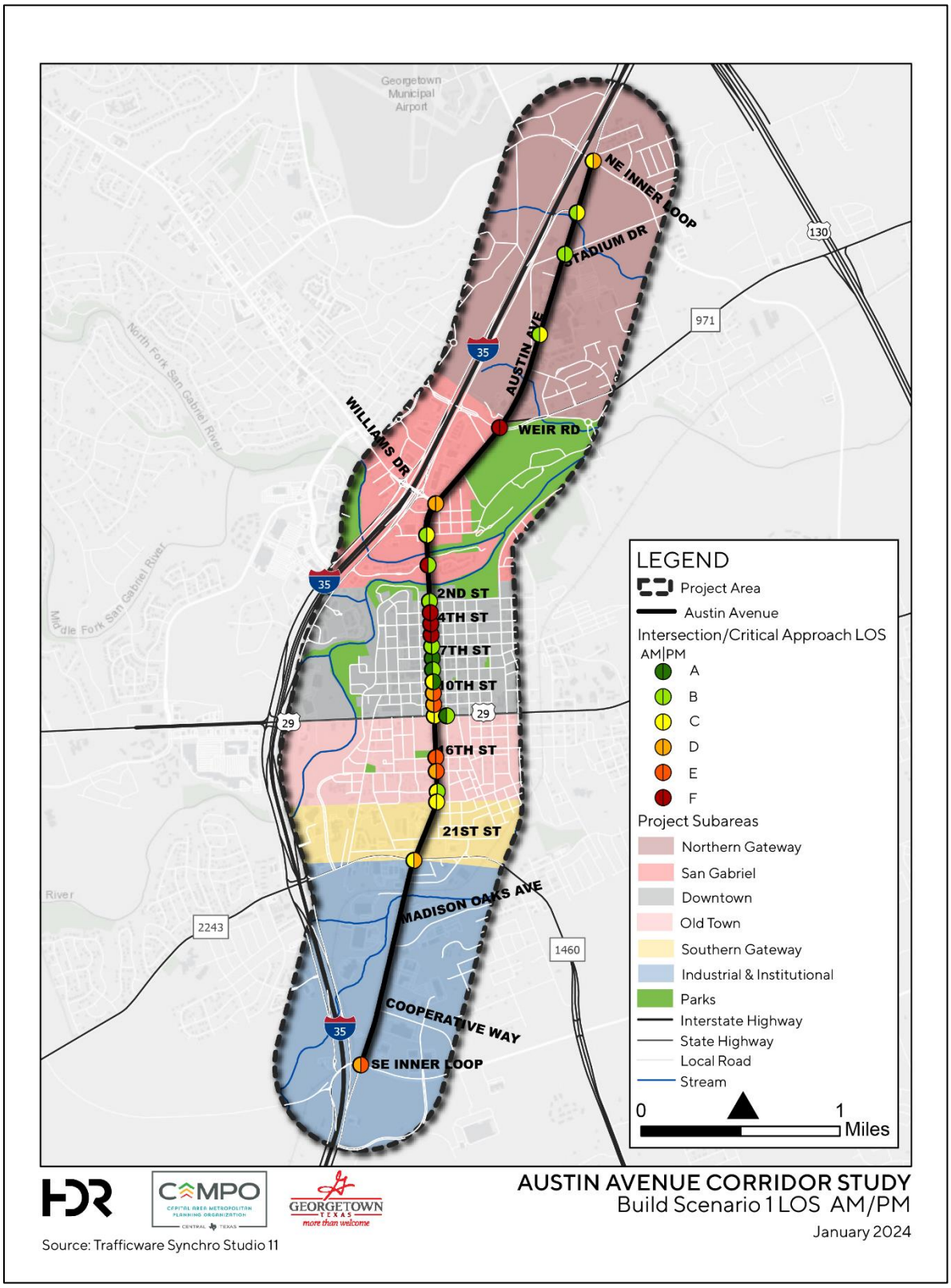


Figure 7: Build Scenario 1 Intersection/Critical Approach LOS AM/PM

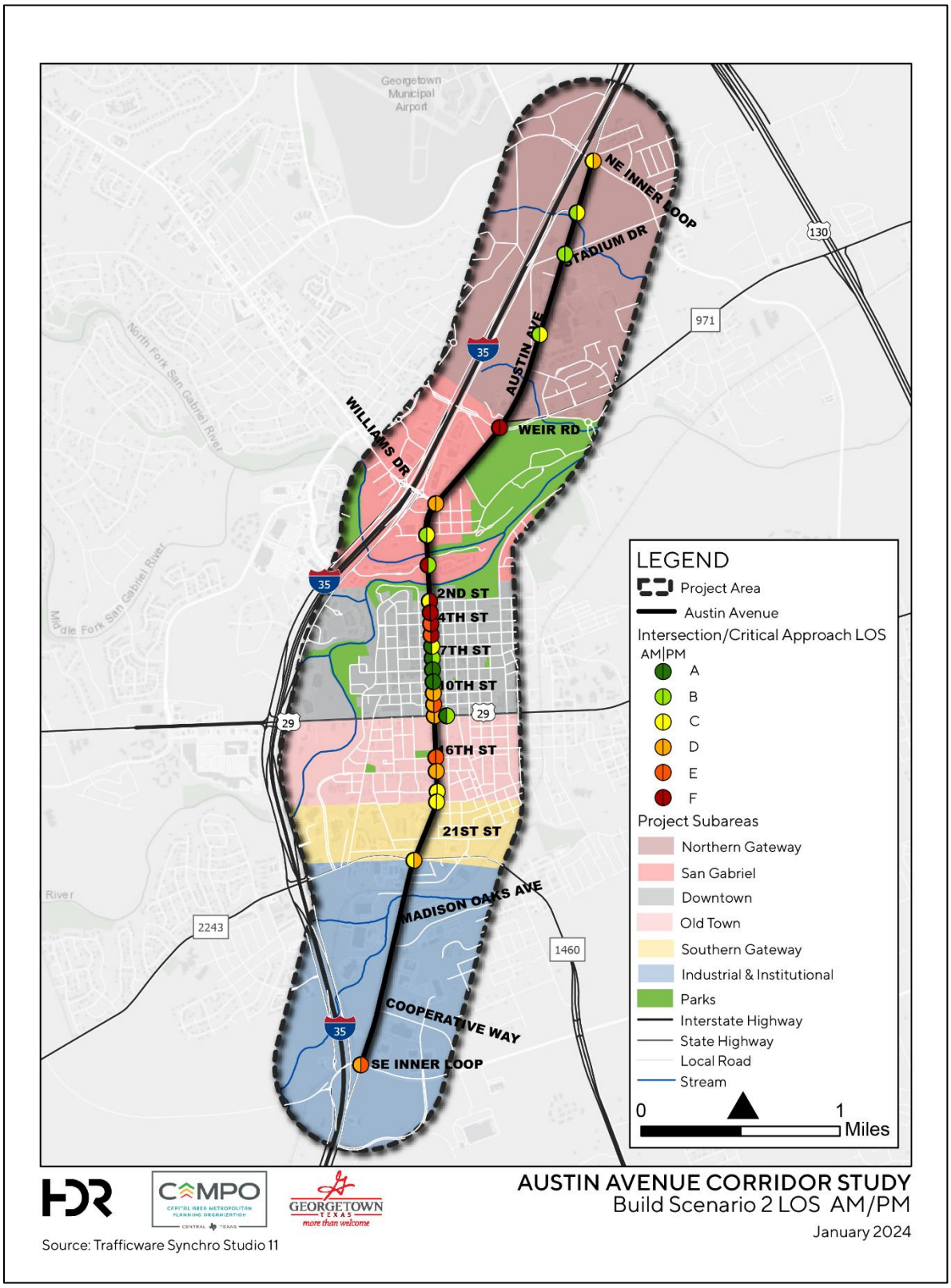


Figure 8: Build Scenario 2 Intersection/Critical Approach LOS AM/PM

5 NETWORK/CORRIDOR PERFORMANCE MEASURES

In addition to LOS, other performance measures were evaluated to provide a comprehensive assessment and comparison between Existing and Future scenarios. SimTraffic 11 by Trafficware was used to perform simulations of vehicular operations using the same inputs as the Synchro model and to generate network and corridor performance metric reports, shown in **Appendix A10**.

5.1 TOTAL NETWORK DELAY

Total network delay captures the amount of total delay in vehicle-hours experienced by vehicles across the Austin Avenue study corridor and all study cross-streets during the peak hour traffic simulation.

Figure 9 shows a comparison of total network delay for the Existing, No-Build, Build Scenario 1, and Build Scenario 2 models. **Figure 9** shows that network delay is expected to increase by 383 percent during the AM peak and by 235 percent during the PM peak in the No-Build scenario compared to Existing conditions. Both Build scenarios significantly improve upon No-Build total network delay. In Build Scenario 1, total network delay is expected to decrease by 46 percent during the AM peak and by 44 percent during the PM peak compared to No-Build conditions. In Build Scenario 2, total network delay is expected to decrease by 45 percent during the AM peak and by 26 percent during the PM peak compared to No-Build conditions. Build Scenario 2 is expected to have more total network delay than Build Scenario 1 due to the proposed reduction in travel lanes.

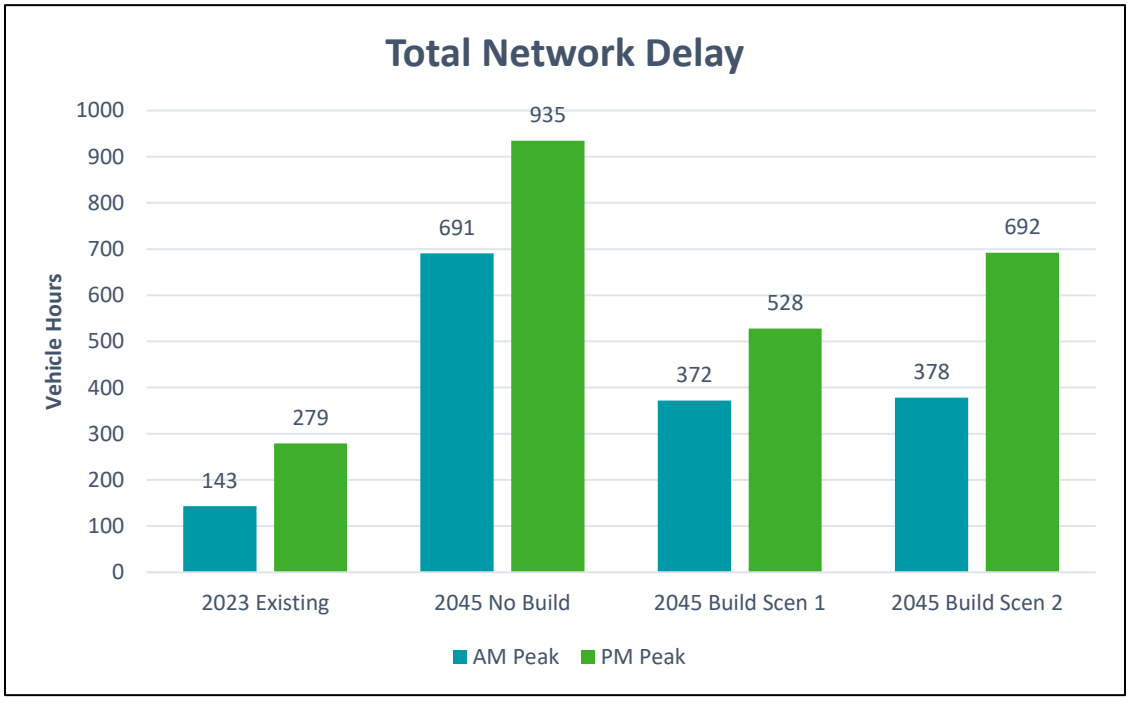


Figure 9: Total Network Delay Comparison

5.2 Corridor Travel Time

Corridor travel time captures the total time taken for vehicles to travel the Austin Avenue corridor between NE Inner Loop and SE Inner Loop during the peak hour traffic simulation.

Figure 10 shows that corridor travel time is expected to increase in the No-Build scenario compared to Existing conditions, particularly in the southbound direction, where travel time increases by 82 percent during the AM peak and by 175 percent during the PM peak.

Corridor travel times in Build Scenario 2 are slightly higher than those of Build Scenario 1 due to the proposed lane reduction on Austin Avenue, which results in slower speeds through the Old Town and Downtown subareas. However, both Build scenarios significantly improve upon No-Build corridor travel time in the southbound direction. In Build Scenario 1, southbound travel time is expected to decrease by 35 percent during the AM peak and by 48 percent during the PM peak compared to No-Build conditions. In Build Scenario 2, southbound travel time is expected to decrease by 30 percent during the AM peak and by 24 percent during the PM peak compared to No-Build conditions.

In the northbound direction, the Build scenarios generally maintain the same corridor travel time as the No-Build scenario, except for Build Scenario 2 during the PM peak, where northbound corridor travel time increases by three minutes compared to No-Build corridor travel time. This was a result of improvements that were made to the cross-streets in both Build scenarios. Four intersections were newly signalized in both Build scenarios, which improved cross-street delay but slowed traffic on Austin Avenue.

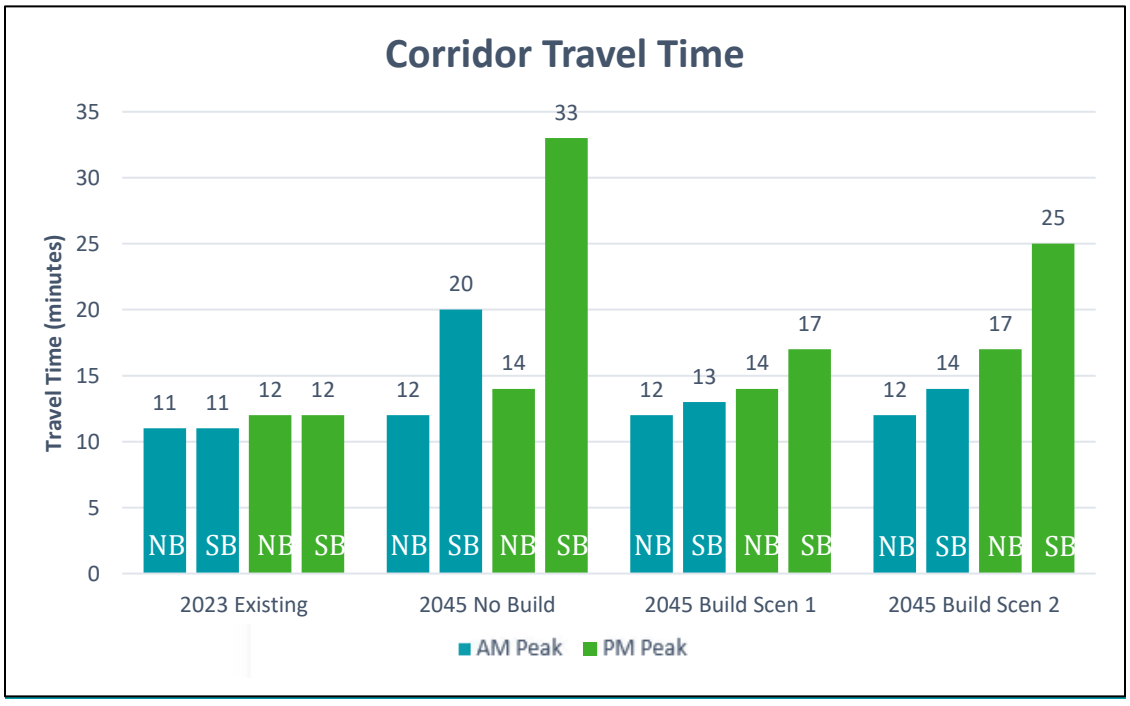


Figure 10: Corridor Travel Time Comparison

6 CONCLUSION AND RECOMMENDATIONS

The No-Build results for both signalized and unsignalized intersections indicate a need for future improvements along the Corridor to accommodate the anticipated impacts of projected growth. Overall, both Build Scenario 1 and 2 offer significant improvements in intersection LOS, total network delay, and corridor travel time compared to the No-Build scenario in Future conditions (2045). Under No-Build conditions, nine signalized intersections are expected to operate at overall intersection LOS E or F during the AM and/or PM peak hour. Only two signalized intersections in Build Scenario 1 and three signalized intersections in Build Scenario 2 are expected to operate at overall intersection LOS E or F during the AM and/or PM peak hour due to proposed mitigations.

In Build Scenario 1, total network delay is expected to decrease by 46 percent during the AM peak and by 44 percent during the PM peak compared to No-Build conditions. In Build Scenario 2, total network delay is expected to decrease by 45 percent during the AM peak and by 26 percent during the PM peak compared to No-Build conditions.

Both Build scenarios also significantly improve upon No-Build corridor travel time in the southbound direction. In Build Scenario 1, southbound travel time is expected to decrease by 35 percent during the AM peak and by 48 percent during the PM peak compared to No-Build conditions. In Build Scenario 2, southbound travel time is expected to decrease by 30 percent during the AM peak and by 24 percent during the PM peak compared to No-Build conditions.

Build Scenario 1 and 2 primarily differ through the subareas of Downtown and Old Town, where a lane reduction is proposed on Austin Avenue between 2nd and 18th Street in Build Scenario 2. Build Scenario 1 provides additional through capacity but results in insufficient right-of-way to provide left-turn lanes for safety at intersections through Old Town and limited flexibility for back-of-curb options (e.g., pedestrian/bicyclist amenities, landscaping, placemaking, parking) in both Downtown and Old Town. The lane reduction in Build Scenario 2 allows for left-turn lanes for safety at all intersections through Downtown and Old Town, as well as sufficient ROW for back-of-curb options. No significant operational differences are expected between Build Scenario 1 and Build Scenario 2 through the Old Town subarea, despite the reduced capacity in Build Scenario 2. In the Downtown subarea, the reduced capacity in Build Scenario 2 results in a minor degradation of LOS, primarily at the intersection of Austin Avenue and 2nd Street during the PM peak.

Build Scenario 2 is recommended as the preferred future Build alternative to improve safety throughout Downtown and Old Town with its addition of left-turn lanes; to provide flexibility for back-of-curb options such as pedestrian/bicyclist amenities, landscaping, placemaking and parking; and to reduce speeds through the pedestrian-heavy and residential areas of Downtown and Old Town, respectively, while still providing significant operational benefits in 2045 compared to No-Build conditions. A two-lane roundabout with an eastbound right-turn slip lane is also recommended over standard intersection improvements at the intersection of Austin Avenue and San Gabriel Avenue (if feasible within the existing physical constraints) to improve traffic operations as well as safety at the intersection by reducing the number of pedestrian and vehicle conflicts compared to those at a traditional intersection.