



TRAFFIC IMPACT STUDY

LOVELAND HOUSING AUTHORITY

Loveland, CO

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Loveland Housing Authority

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Executive Summary

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 52.45 acres in size and is identified as Larimer County Parcel Numbers 9635225901 and 9635218902. It is located east of Taft Avenue (CR-17) and south of 57th Street in Loveland, CO. It is zoned Planned Unit Development P-73 Crossroads Addition and is currently vacant.

The study area is generally bounded by Taft Avenue to the west, 57th Street to the north, and property lines to the east and south. The study area for the project includes intersections that could be affected by the proposed development:

- 57th Street/Taft Avenue
- 57th Street/Duffield Avenue
- 50th Street/Duffield Avenue

Description of Proposed Development

The Applicant, Loveland Housing Authority, seeks to develop the property with affordable residential housing uses. Site access is proposed via a proposed $\frac{3}{4}$ access at 57th Street/Duffield Avenue, a new right-in/right out (RIRO) access along 57th Street, and an additional full movement access south of the site with the extension of Duffield Avenue.

Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the intersections within the study area currently operate at overall acceptable levels of service (LOS) "C" or better during the weekday AM and PM peak hours with the exception of the 57th Street/Taft Avenue intersection which operates at LOS "D" during the PM peak hour. All queues remain within their respective storage lengths.
- Under background future 2028 and 2043 traffic conditions, without the development of the subject site, the intersections within the study area would operate at overall acceptable levels of service (LOS) "C" or better during the weekday AM and PM peak hours with the exception of the 57th Street/Taft Avenue intersection which operates at LOS "D" during the PM peak hour. Proposed intersection improvements are applied for study year 2043. All queues are expected to remain within their respective storage lengths with the exception of the northbound left queue at 57th Street/Taft Avenue which would exceed its length in the 2043 PM peak hour.
- The proposed site development would generate, upon completion and full occupancy, 202 new weekday AM and 263 new weekday PM peak hour vehicle trips as well as 2,962 new weekday daily trips.
- Under total future 2028 and 2043 traffic conditions with development of the site, the intersections within the study area would operate consistent with background conditions.

- The ACF failures at 57th Street/Taft Avenue that occur in the Total Future 2028 scenarios include the westbound left movement, westbound approach, and overall intersection delay/LOS. The proposed site development would not contribute any trips to the westbound left movement and westbound approach, therefore a mitigation strategy is not required for these ACF failures. The overall intersection delay would increase by less than 2% compared to Background 2028 conditions, therefore a mitigation strategy is not required for the ACF failure.
- Safe routes to school are provided via non-auto infrastructure for all Elementary and Middle schools in a 1.5-mile radius of the development with the exception of Laurene Edmonson Elementary. There is a bus stop at W 50th Street/Apricot Drive for the Laurene Edmondson Elementary School which will provide transportation to and from the school.

Recommendations

- It is recommended that the Applicant provide an additional northbound through lane at 57th Street/Taft Avenue by creating a new northbound right turn lane along the site's frontage. The final configuration of this northbound approach would have one left lane, two through lanes, and a dedicated right turn lane at the 57th Street/Taft Avenue intersection.
- It is recommended that the northbound and southbound approaches be restricted at 57th Street/Duffield Avenue to $\frac{3}{4}$ movements due to the ACF failures for the northbound and southbound left movements. Ultimately a roundabout will be provided for this intersection depending on certain triggers and funding.
- It is recommended that pedestrian crossings over 57th Street occur at the existing pedestrian crossing facilities at 57th Street/Taft Avenue. This safe crossing allows for pedestrians to continue on the trail to the north of 57th Street. Multiple options for crossing 57th Street were considered and the existing signalized intersection crosswalk was deemed the safest. The ultimate roundabout improvement at 57th Street/Duffield Avenue will provide an additional safe crossing.
- It is recommended that the Applicant coordinate with the city and neighborhood to provide traffic calming at the north end of the existing Duffield Avenue (south end of the property) where the road will extend to 57th Street.
- It is recommended that the Applicant provides access consistent with the recommendations herein.

I. Introduction

Overview

This report presents the results of a Traffic Impact Study (TIS) conducted in support of a site plan to develop residential affordable housing in Loveland, CO. Currently the site is vacant.

Per the requirements of the City of Loveland and the Larimer County Urban Area Street Standards (LCUASS), a Transportation Impact Study is required to support the proposed development.

Site Location and Study Area

The property that comprises the application area for the proposed development is approximately 52.45 acres in size and is identified as Larimer County Parcel Numbers 9635225901 and 9635218902. It is located east of Taft Avenue (CR-17) and south of 57th Street in Loveland, CO, as shown in Figure 1-1. It is zoned Planned Unit Development (PUD) P-73 Crossroads Addition and is currently vacant. The PUD grants certain access to the site and the project is consistent with the PUD providing access via the existing full movement access at 57th Street/Duffield Avenue, a right-in/right out (RIRO) access along 57th Street, and an additional full movement access to the south of the site with the extension of Duffield Avenue.

The Applicant, Loveland Housing Authority, seeks to develop the property with residential affordable housing use. A reduction of the Applicant's proposed conceptual site plan is provided in Figure 1-2. A full-size copy of the plan is provided in Appendix A.

The study area is generally bounded by Taft Avenue to the west, 57th Street to the north, and property lines to the east and south.

Tasks undertaken in the course of this study included the following:

1. Reviewed the Applicant's proposed development plans and other background data.
2. Conducted a virtual field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.
3. Collected weekday AM/PM peak hour turning movement counts at the key intersections.
4. Analyzed existing levels of service at each of the key study intersections based on the methodologies set forth in the Highway Capacity Guidelines (HCM) 6th Edition and reports generated by Synchro as reported by Synchro version 11.
5. Forecasted background future traffic volumes based on baseline traffic counts, pipeline projects, and regional traffic growth for 2028 (build-out) and 2043 (long-range) conditions.
6. Calculated background levels of service at each of the key study intersections for the projected build-out year based on background future traffic forecasts and the existing/background lane use and traffic controls.

7. Estimated the number of AM and PM peak hour trips that would be generated by the proposed use based on the Institute of Transportation Engineers (ITE) Trip Generation 11th Edition rates/equations and methodologies.
8. Prepared AM and PM peak hour total future traffic forecasts based on background traffic forecasts plus site traffic assignments for the 2028 (build-out), as well as 2043 (long-range) conditions.
9. Calculated total future levels of service for each of the key study intersections based on projected total future traffic forecasts, existing traffic controls, and existing/future intersection geometries.
10. Identified roadway improvements required to accommodate future traffic volumes as necessary.

Sources of data for this analysis included the Institute of Transportation Engineers (ITE), Trip Generation, 11th edition, the Highway Capacity Guidelines HCM 6th, Synchro 11, Loveland Housing Authority, City of Loveland, Colorado, LCUASS, and the files/library of Galloway.

Site Description and Access

Site Conditions

The terrain proximate to and surrounding the site is generally classified as “level”.

Hazardous Conditions

Based on the field reconnaissance in the vicinity of the subject site, no hazardous features or constraints were identified.

Proposed Site Access

Access to the site is being proposed via a proposed $\frac{3}{4}$ access at 57th Street/Duffield Avenue, a new right-in/right out (RIRO) access along 57th Street, and an additional full movement access south of the site with the extension of Duffield Avenue. These accesses locations are consistent with the approved PUD.

Existing Zoning

The subject site is currently zoned Planned Unit Development P-73 Crossroads Addition and is currently vacant. Figure 1-3 depicts the existing zoning associated with the subject property, as well as neighboring properties as shown on the City of Loveland zoning map.

Nearby Uses

The properties surrounding the subject site are generally developed with residential uses.

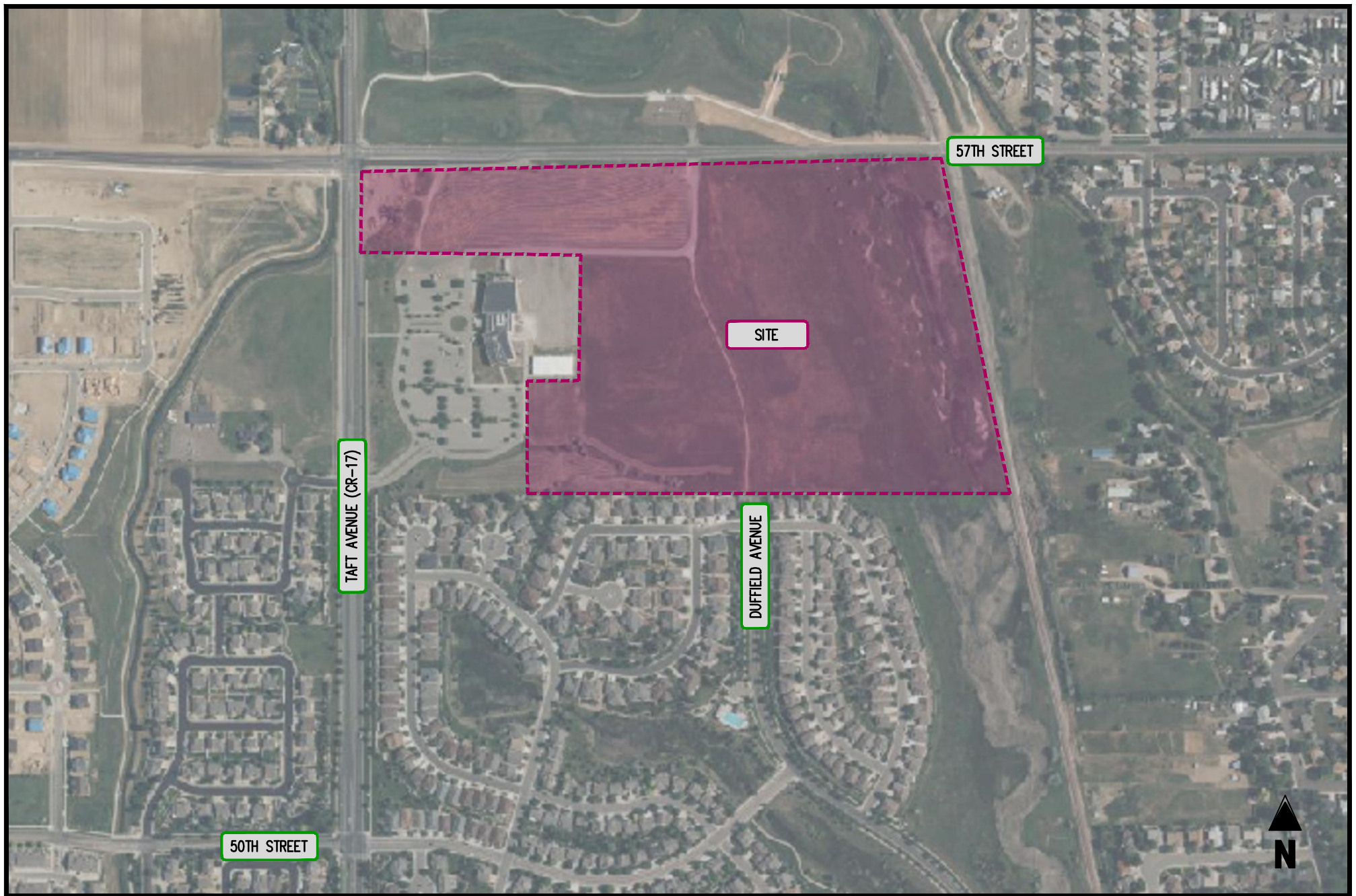


FIGURE 1-1
SITE LOCATION



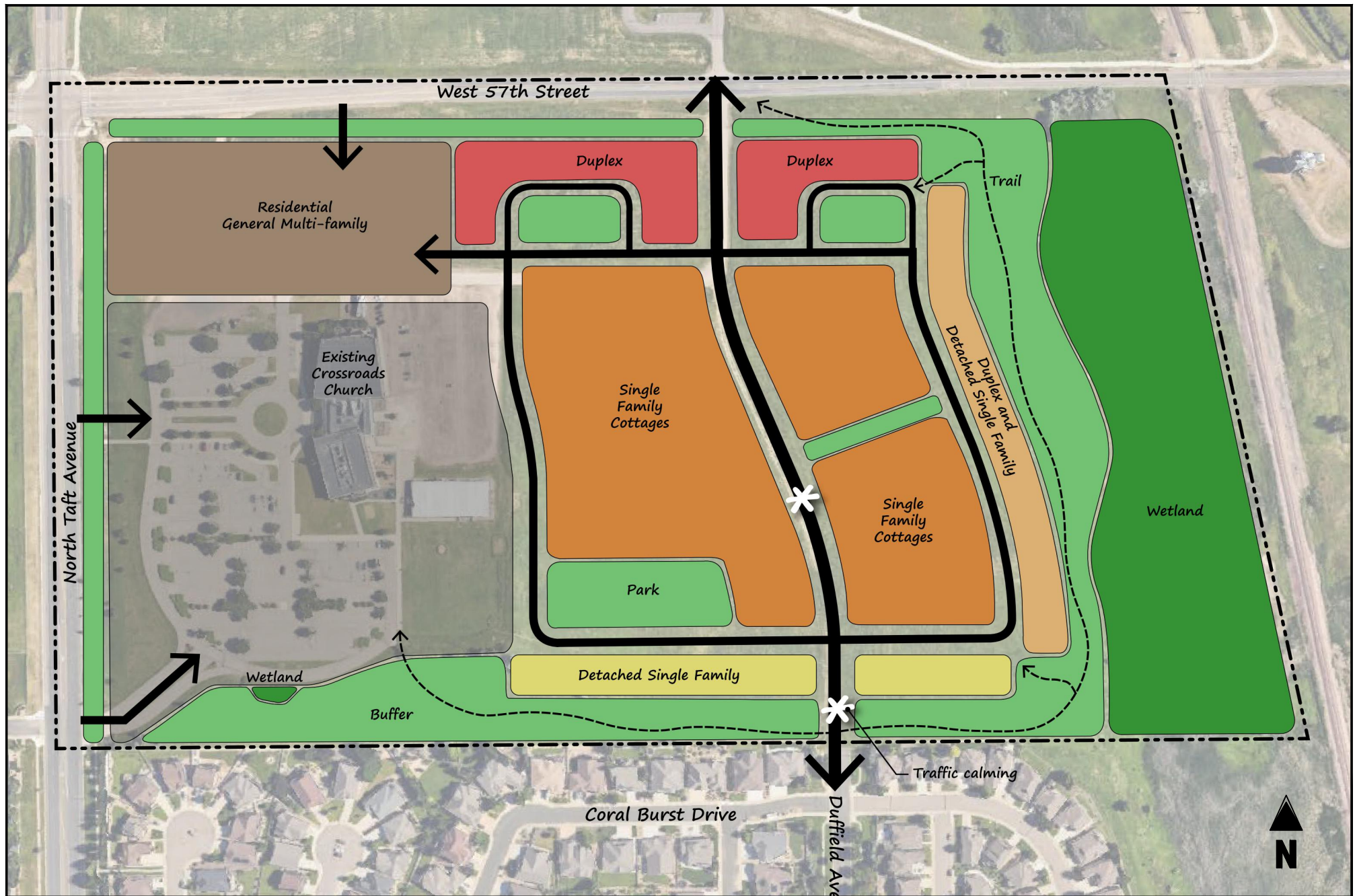


FIGURE 1-2
CONCEPTUAL PLAN



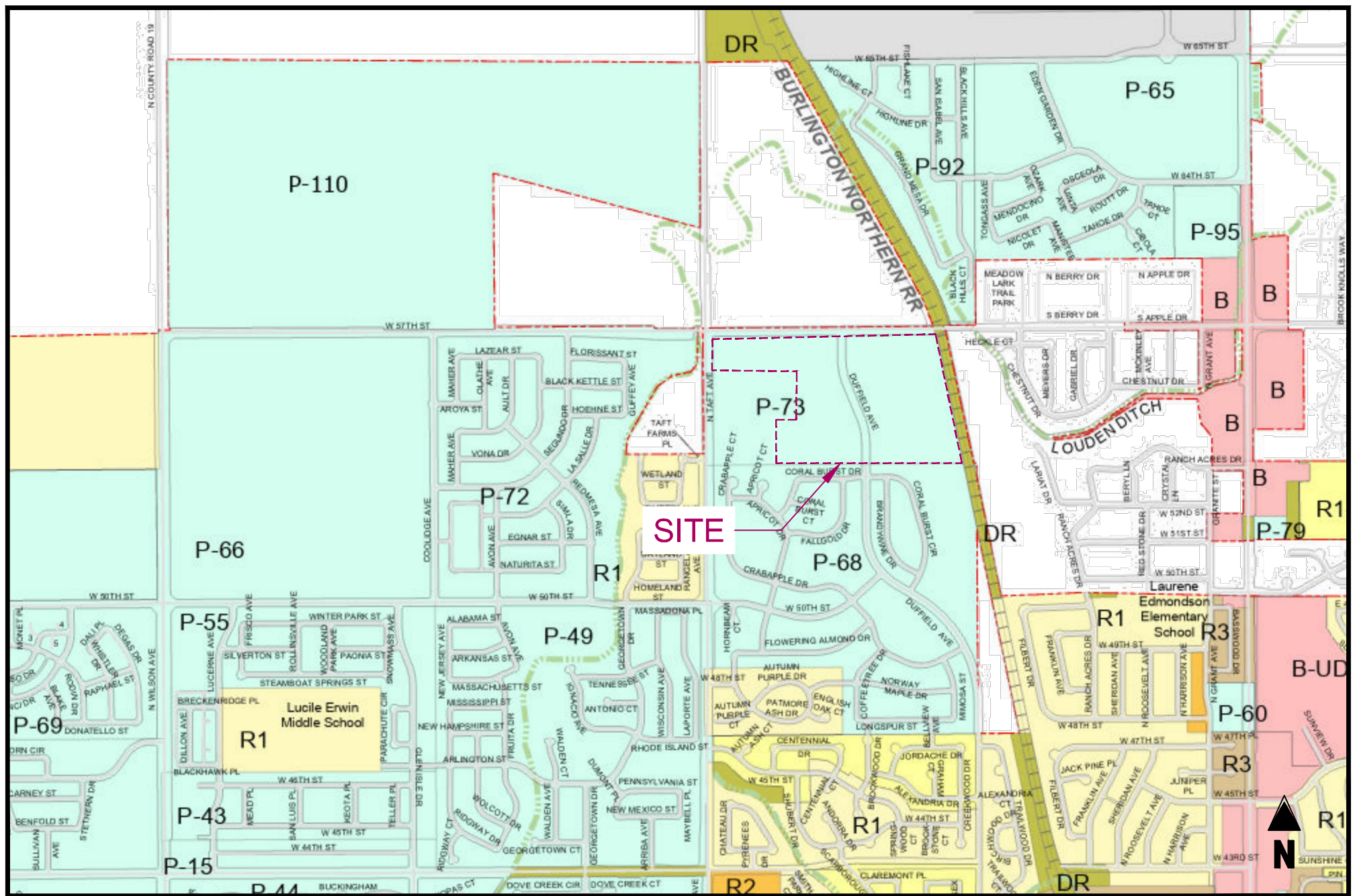


FIGURE 1-3
EXISTING ZONING



II. Background Information

Study Area

The study area was determined by a review of intersections that would experience a significant portion of turning movement volumes generated by the site. As such, the traffic study focuses primarily on the following intersections:

Study Intersections

- 57th Street/Taft Avenue
- 57th Street/Duffield Avenue
- 50th Street/Duffield Avenue

The study intersections, as well as additional study assumptions, were confirmed via a base assumptions form and subsequent conversations with Staff. The approved base assumptions form is provided as Appendix B.

Study Assumptions

For purposes of this analysis only, the proposed use was assumed to be built and occupied in one distinct phase. It was assumed that the use would be built and operational in study year 2028. A long-term analysis of 2043 is also provided.

Study Methodology

Synchro software version 11 was used to evaluate levels of service at each of the study intersections during the weekday AM and PM peak hours. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized and unsignalized intersections analyzed herein were taken from the Highway Capacity Manual (HCM) 6th and reports generated by Synchro. Level of service descriptions are included in Appendix C.

A default percent heavy vehicle (%HV) factor of 2% was used for all movements in the study area.

Existing Roadway Network

Regional access to the subject site is provided by Taft Avenue, and local access is provided via 57th Street and Duffield Avenue. Figure 2-1 depicts existing lane use and traffic controls in the vicinity of the subject site. The following provides a description of each of the roadways within the study network.

Taft Avenue

Taft Avenue is constructed as a four-lane section with turn lanes at major intersections south of 57th Street and a two-lane section north of 57th Street. The posted speed limit is 45 mph in the vicinity of the subject site. The City of Loveland classifies the roadway as a Major Arterial south of 57th Street and as a Minor Arterial north of 57th Street. The intersection with 57th Street operates under signalized control.

57th Street

57th Street is constructed as a two-lane roadway with turn lanes at major intersections. The posted speed limit is 40 mph in the vicinity of the subject site. The City of Loveland classifies the roadway as a Major Arterial east of Taft Avenue and as a Minor Arterial west of Taft Avenue. The intersection with Taft Avenue operates under signalized control.

Duffield Avenue

Duffield Avenue is constructed as a two-lane roadway with a posted speed limit of 35 mph in the vicinity of the subject site. The City of Loveland classifies the roadway as a Major Collector. The intersections along the roadway operate under unsignalized control.

50th Street

50th Street is constructed as a two-lane roadway with a posted speed limit of 25 mph in the vicinity of the subject site. The City of Loveland classifies the roadway as a Minor Collector. The intersection with Duffield Avenue operates under unsignalized control.

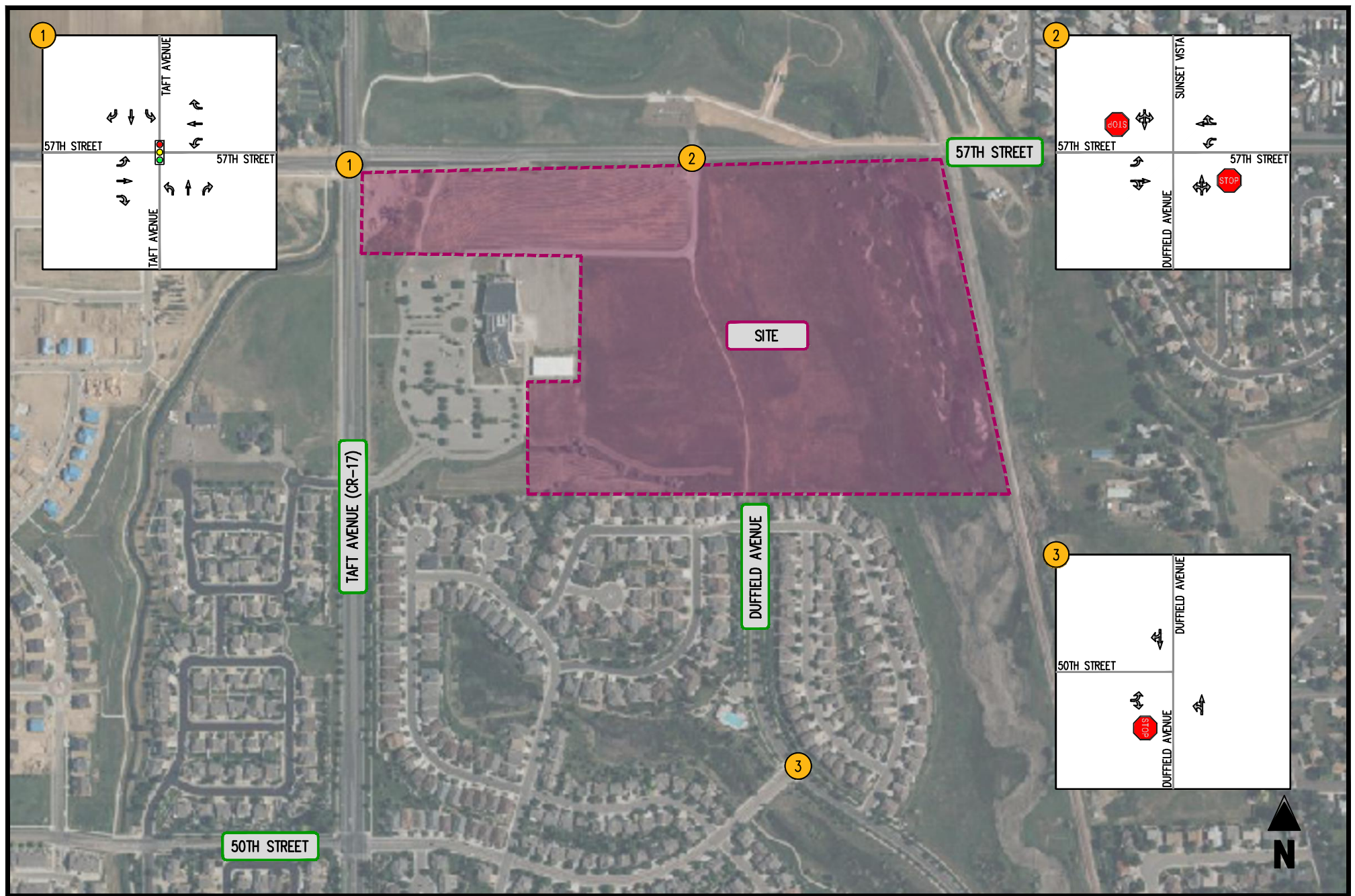


FIGURE 2-1
EXISTING LANE USE AND TRAFFIC CONTROL



III. Analysis of Existing Conditions

Traffic Volumes

Weekday AM and PM peak hour traffic volumes counts were conducted on Wednesday October 4, 2023, from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM at the study intersections by IDAX Data Solutions.

The existing turning movement volumes along with the calculated average daily traffic (ADT) are summarized in Figure 3-1. Copies of traffic counts are included in Appendix D. Existing peak hour factors (PHF) were also computed by approach from the traffic counts and applied to the analysis with a minimum of 0.85 and a maximum of 0.92.

Operational Analysis

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown in Figure 2-1 and existing baseline vehicular traffic volumes shown in Figure 3-1. The capacity analysis results are presented in Appendix E and summarized in Table 3-1 along with the ACF compliance for the movements, approaches, and intersections. The levels of service are also depicted graphically in Figure 3-2.

As shown in Table 3-1, the intersections in the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday peak hours with the exception of the 57th Street/Taft Avenue intersection which operates at LOS “D” during the PM peak hour.

Existing Intersection Queues

An analysis of intersection 95th-percentile queues was performed at key locations. The results of the queuing analysis, as reported by Synchro, are summarized in Table 3-2. As shown in the table, all queues are contained within their effective storage.

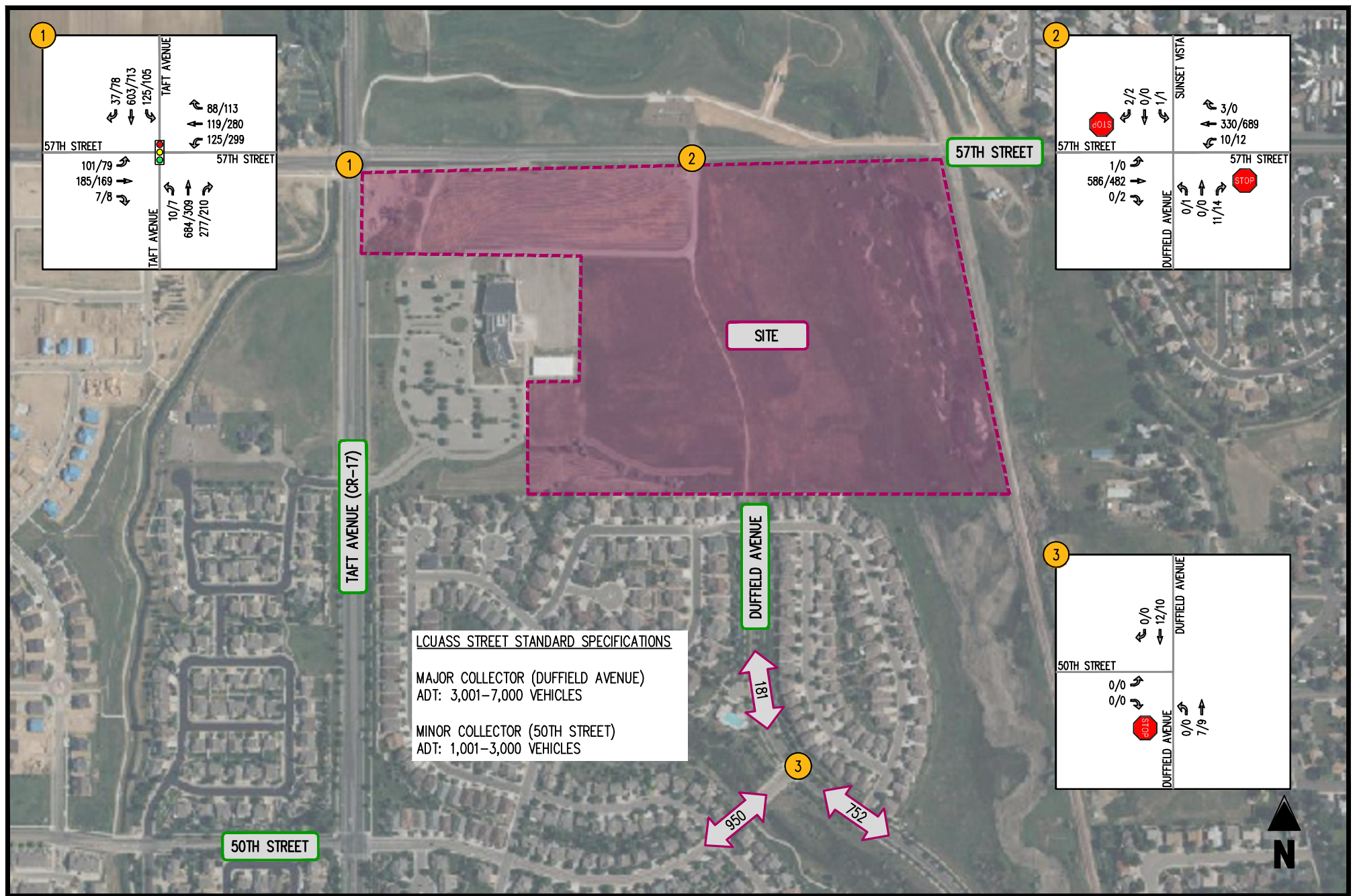
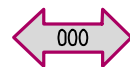


FIGURE 3-1
EXISTING VOLUMES



ADT (VEHICLES)



INTERSECTION LOS

0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

MOVEMENT



SIGNALIZED INTERSECTION



STOP SIGN



YIELD SIGN



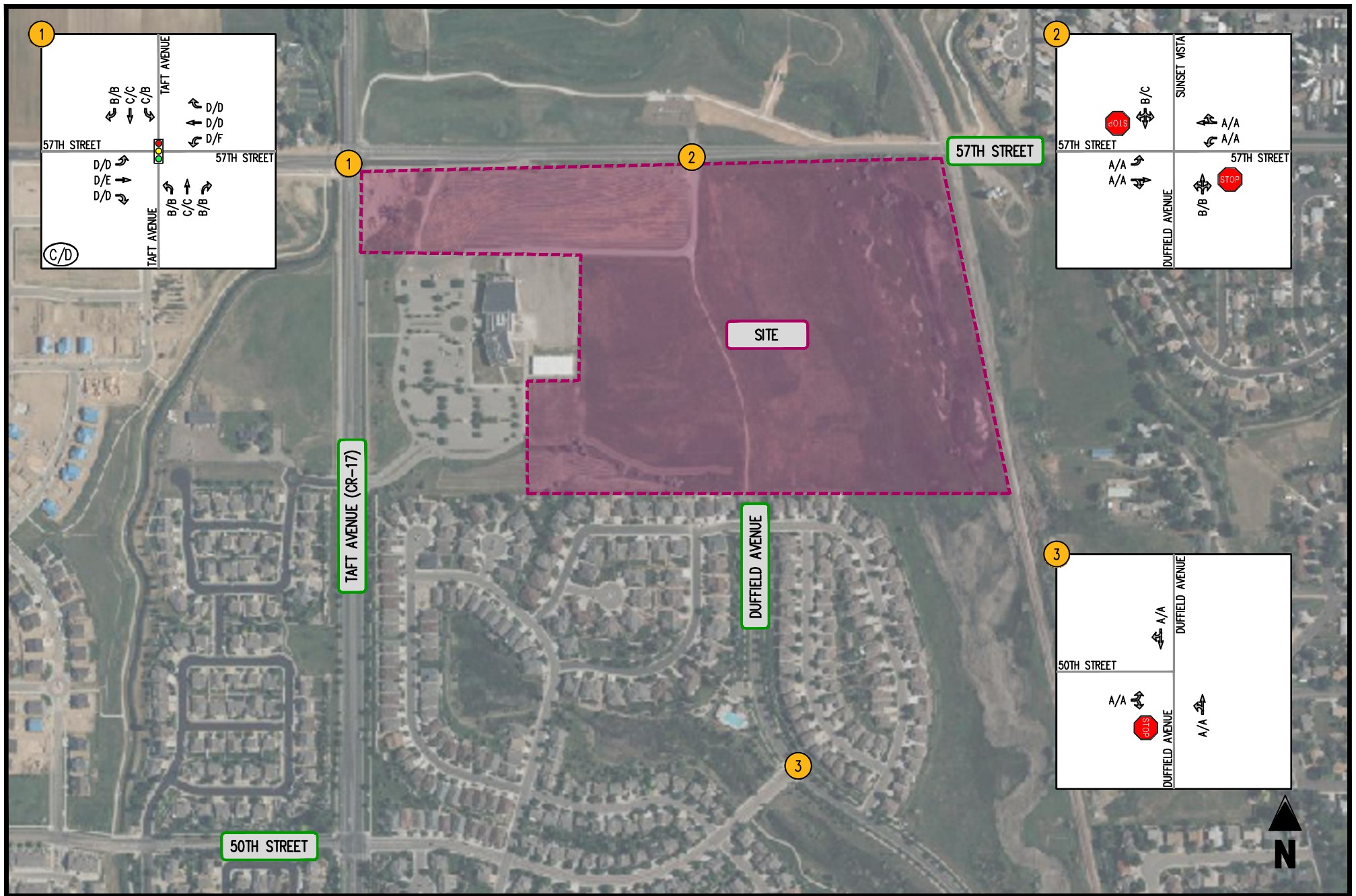


FIGURE 3-2
EXISTING LOS

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



Table 3-1
 Loveland Housing Authority - Loveland, CO
 Existing Intersection Level of Service Summary ^{(1) (2)}

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023		ACF Compliant? (Yes/No)
				AM Peak Hour	PM Peak Hour	
1 57th Street/Taft Avenue	SIGNAL	Overall		C (28.8)	D (40.1)	NO
			EB	D (44.9)	D (53.3)	YES
			EBL	D (36.5)	D (42.3)	YES
			EBT	D (49.8)	E (58.9)	YES
			EBR	D (37.2)	D (42.3)	YES
			WB	D (36.5)	E (77.4)	NO
			WBL	D (35.1)	F (116.2)	NO
			WBT	D (37.5)	D (51.3)	YES
			WBR	D (37.2)	D (39.0)	YES
			NB	C (27.7)	C (22.5)	YES
			NBL	B (14.5)	B (17.8)	YES
			NBT	C (32.1)	C (24.6)	YES
			NBR	B (17.3)	B (16.3)	YES
			SB	C (20.6)	C (23.4)	YES
			SBL	C (25.1)	B (17.3)	YES
			SBT	C (20.3)	C (25.5)	YES
			SBR	B (10.8)	B (12.3)	YES
2 57th Street/Duffield Avenue	STOP	57th Street	EB	A [0.0]	A [0.0]	YES
			EBL	A [8.0]	A [0.0]	YES
			EBTR	A [0.0]	A [0.0]	YES
			WB	A [0.3]	A [0.2]	YES
			WBL	A [8.9]	A [8.5]	YES
			WBTR	A [0.0]	A [0.0]	YES
		Duffield Avenue	NB	B [13.0]	B [13.2]	YES
			NBLTR	B [13.0]	B [13.2]	YES
		Sunset Vista	SB	B [14.6]	C [20.1]	YES
			SBLTR	B [14.6]	C [20.1]	YES
3 50th Street/Duffield Avenue	STOP	50th Street	EB	A [0.0]	A [0.0]	YES
			EBLR	A [0.0]	A [0.0]	YES
		Duffield Avenue	NB	A [0.0]	A [0.0]	YES
			NBLT	A [0.0]	A [0.0]	YES
		Duffield Avenue	SB	A [0.0]	A [0.0]	YES
			SBTR	A [0.0]	A [0.0]	YES

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.

(2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

Table 3-2
 Loveland Housing Authority - Loveland, CO
 Existing Intersection Queueing Summary ⁽¹⁾

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023	
					AM Peak Hour	PM Peak Hour
1 57th Street/Taft Avenue	SIGNAL	57th Street	EBL	450	84	77
			EBT	-	185	194
			EBR	430	0	0
			WBL	550	101	361
		57th Street	WBT	-	114	292
			WBR	200	15	43
			NBL	200	12	10
			NBT	-	733	542
		Taft Avenue	NBR	-	68	43
			SBL	450	147	66
			SBT	-	596	777
			SBR	325	0	0
2 57th Street/Duffield Avenue	STOP	57th Street	EBL	400	0	0
			EBTR	-	0	0
		57th Street	WBL	200	0	0
			WBTR	-	0	0
		Duffield Avenue	NBLTR	-	2.5	2.5
		Sunset Vista	SBLTR	-	0	0
3 50th Street/Duffield Avenue	STOP	50th Street	EBLR	-	0	0
		Duffield Avenue	NBLT	-	0	0
		Duffield Avenue	SBTR	-	0	0

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

IV. Analysis of Future Conditions without Site Development

Methodology

The future traffic forecasts, without the proposed new use, were developed for 2028 and 2043 conditions based on a composite of existing baseline traffic volumes and regional traffic. A 2.0% growth factor per year was applied to existing through traffic on Taft Avenue.

Regional Growth

Increases in traffic associated with regional growth were estimated at 2.0 percent per year compounded for through movements along Taft Avenue up to 2028 as well as to 2043. This growth accounts for increases in traffic resulting from influences outside of the immediate study area. The resulting increases in volumes within the study area are reflected in Figure 4-1 for 2028 conditions and Figure 4-2 for 2043 conditions.

Pipeline Developments

Approved but unbuilt/unoccupied (i.e., “pipeline”) developments were identified for consideration within the study. The following pipeline developments and development programs were included in the background and total future analysis for 2043 conditions:

Green Valley Ranch & Elkader

957	DU	Single Family Detached
23,000	SF	Shopping Center
5,000	SF	Fast Casual Restaurant
3,500	SF	Fast-food Restaurant with Drive-Through

Taft Ridge

675	DU	Single Family Detached
310	DU	Single Family Attached
10	FP	Gas Station/C-Store
17.424	KSF	Strip Retail Plaza (<40k)

Eagle Brook

36	DU	Single Family Detached Housing
48	DU	Multifamily Housing (Low-Rise)

The location of the pipeline developments in relation to the Applicant’s property are shown in Figure 4-3. Improvements for the intersection of 57th Street/Taft Avenue were identified by pipeline developments and assumed built for 2043 (long-range) conditions.

Pipeline development impacts have been proposed to be mitigated by the following improvements to the 57th Street/Taft Avenue intersection by 2040:

- Receiving lane for the second northbound through lane
- Converting the southbound right turn lane to a through/right lane
- Dual westbound left turn lanes

The Background future lane use and traffic control for 2028 would be consistent with the Existing lane use and traffic control shown in Figure 2-1. The proposed Background future lane use and traffic control for 2043 is shown in Figure 4-4.

Pipeline development site trips were obtained from the Green Valley Ranch & Elkader TIS, Taft Ridge TIS, and Eagle Brook TIS, and are shown in Figure 4-5. Relevant excerpts from the pipeline development TIS's are included in Appendix F.

Background Traffic Forecasts

The existing traffic forecasts depicted in Figure 3-1 and the regional growth shown in Figure 4-1 (2028) were added together to yield the background future traffic forecasts shown in Figure 4-6 for 2028 conditions. The existing traffic forecasts depicted in Figure 3-1, the regional growth shown in Figure 4-2 (2043), and the pipeline development site trips shown in Figure 4-5 were added together to yield the background future traffic forecasts shown in Figure 4-7 for 2043 conditions.

Background Future Levels of Service

Capacity analyses of 2028 and 2043 future traffic conditions without the proposed development are provided in Appendix G and summarized in Table 4-1 along with the ACF compliance for the movements, approaches, and intersections. The forecasted levels of service are also depicted graphically in Figure 4-8 for 2028 conditions and Figure 4-9 for 2043 conditions.

As shown on Table 4-1, all intersections in the study area for background 2028 conditions are forecasted to operate consistent with the existing scenario. The signalized intersection of 57th Street/Taft Avenue is forecasted approach capacity due to growth and pipeline developments in 2043. With assumed intersection improvements from the pipeline TIS's, the signalized intersection is expected to operate at LOS "D" during 2043 weekday AM peak hour conditions and LOS "E" during 2043 weekday PM peak hour conditions.

Unsignalized intersection approaches in the study area are expected to operate at overall acceptable LOS "D" or better during background 2043 future conditions with the exception of the southbound approach at the 57th Street/Duffield Avenue intersection which is expected to operate at LOS "E" in 2043 PM conditions due to growth from pipeline developments on 57th Street. The approach is forecasted to have a Volume-to-Capacity ratio of less than 1.0, suggesting additional capacity available for this movement.

Background Future Queueing

An analysis of intersection queues was performed at key locations under background future traffic conditions. The results of the queuing analysis are summarized in Table 4-2.

As shown in the table, queues within the study network will increase due to regional traffic growth. All queues are expected to be contained in their effective storage with the exception of the NBL movement at the 57th Street/Taft Avenue intersection during the 2043 PM peak hour under future traffic conditions.

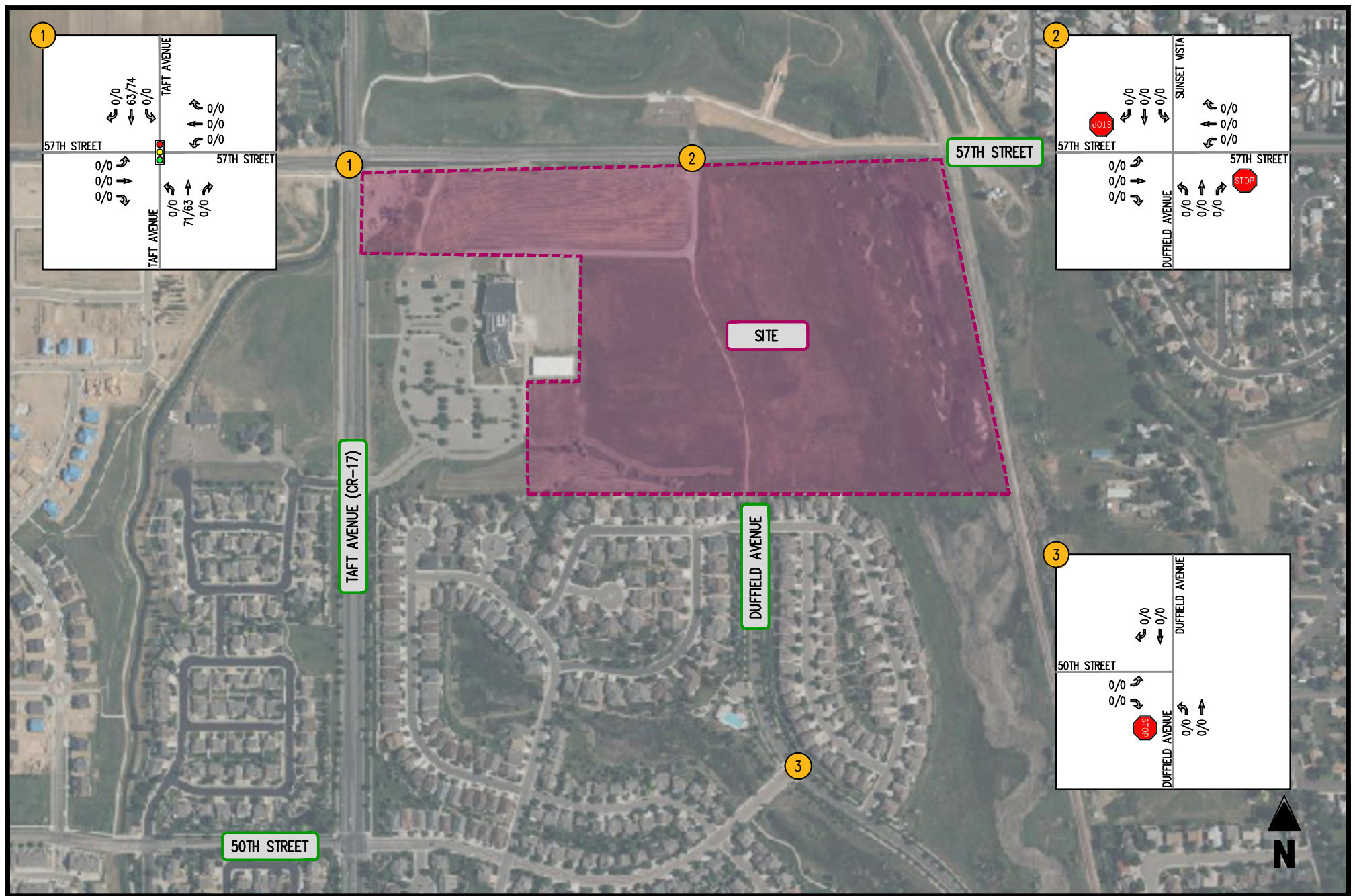


FIGURE 4-1
BACKGROUND 2028 REGIONAL GROWTH

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



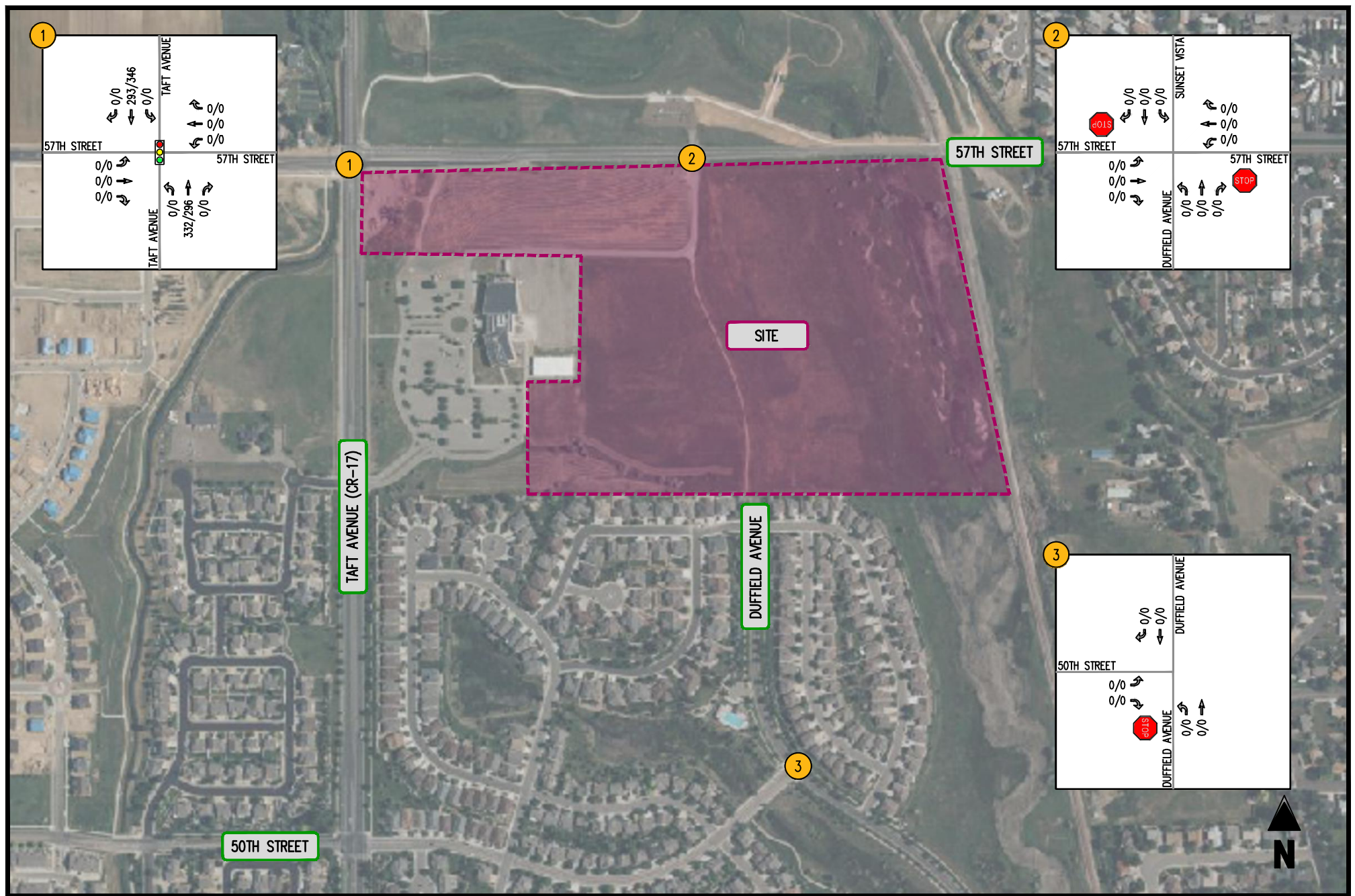


FIGURE 4-2
BACKGROUND 2043 REGIONAL GROWTH

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



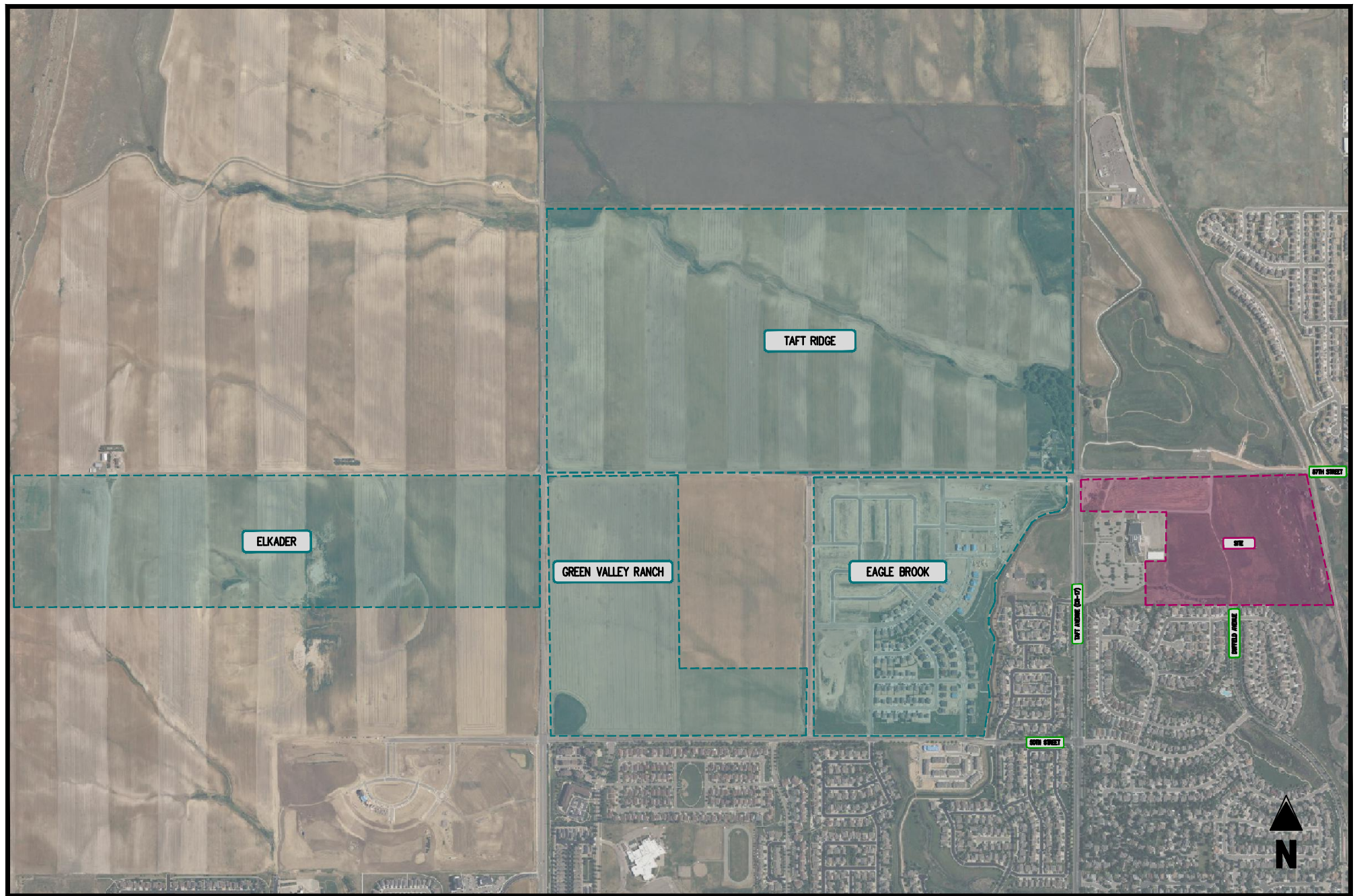


FIGURE 4-3
2043 PIPELINE LOCATIONS



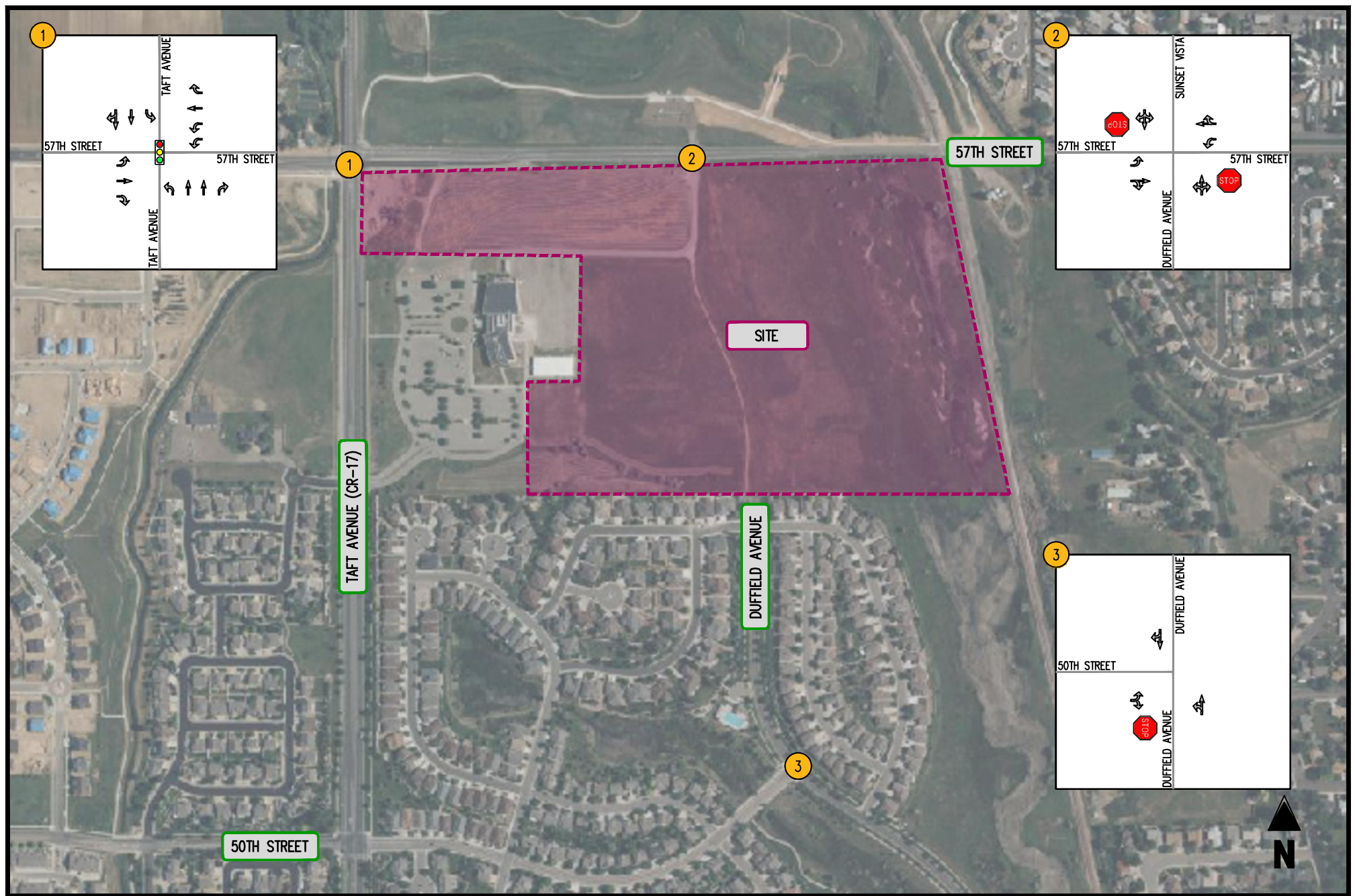
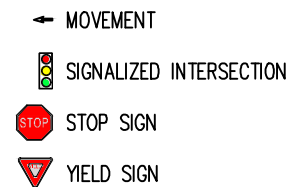


FIGURE 4-4
BACKGROUND 2043 LANE USE AND TRAFFIC CONTROL

LOVELAND HOUSING AUTHORITY
LOVELAND, CO



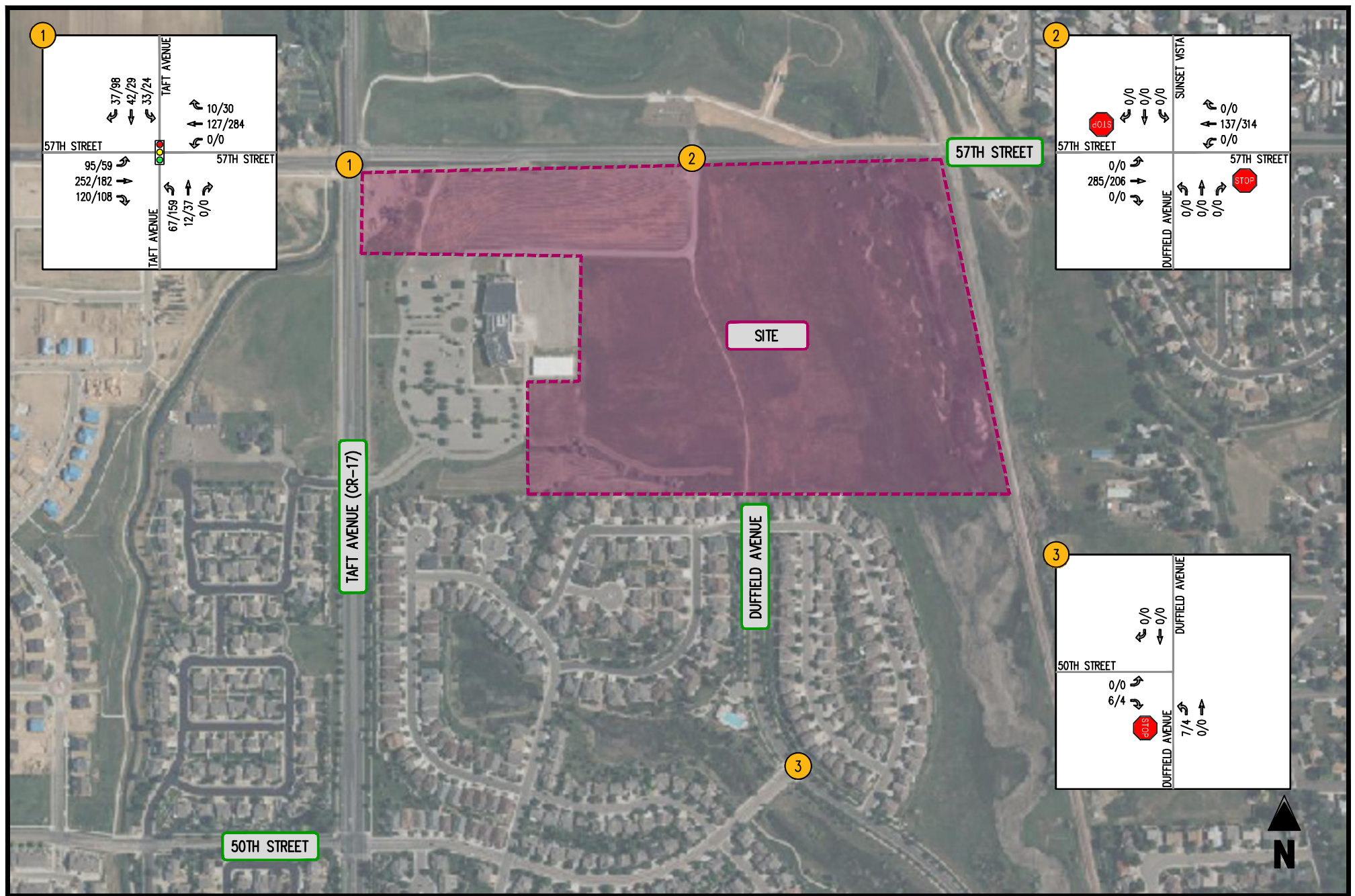


FIGURE 4-5
2043 PIPELINE SITE TRIPS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



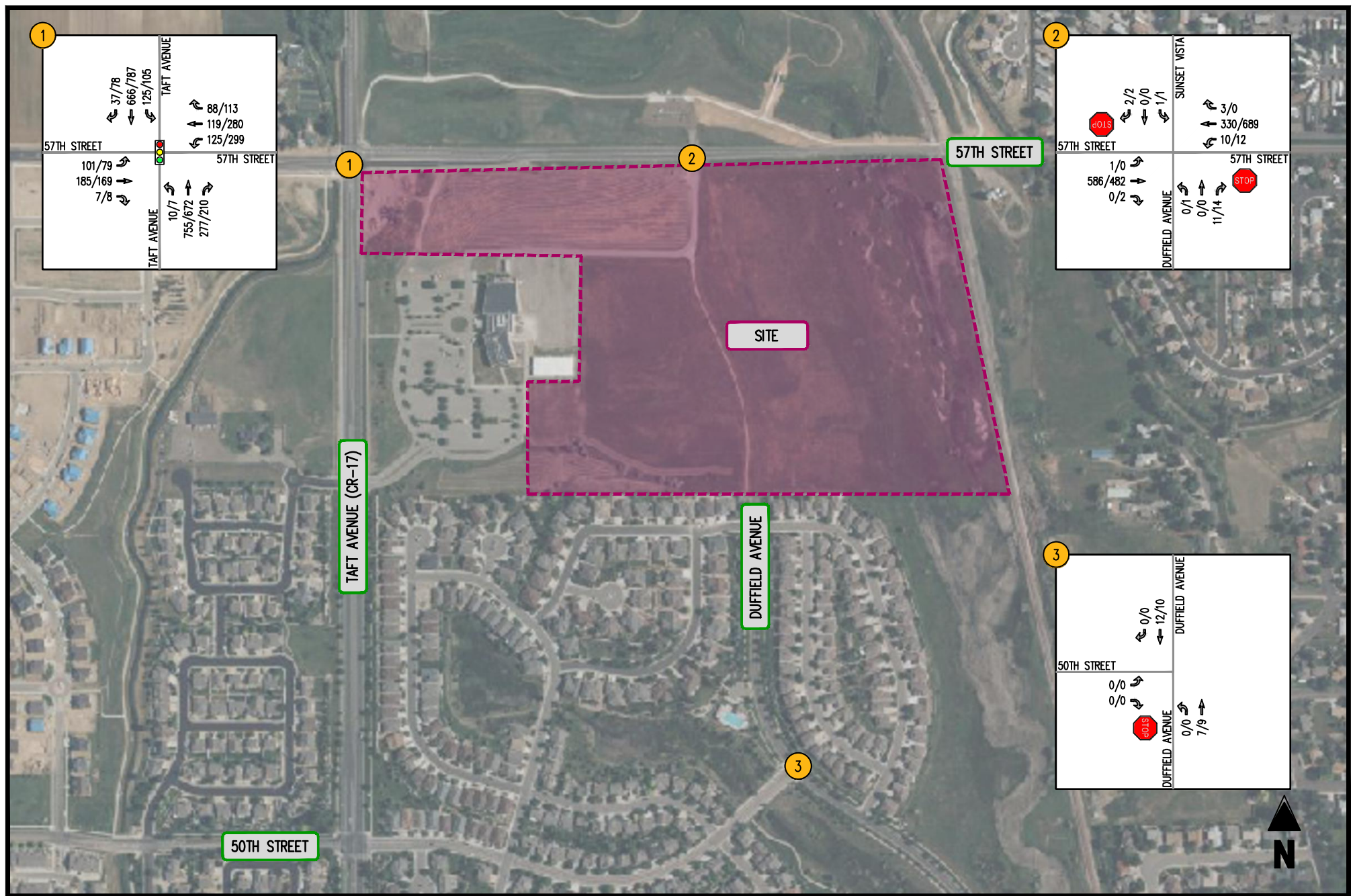


FIGURE 4-6
BACKGROUND 2028 FORECASTS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



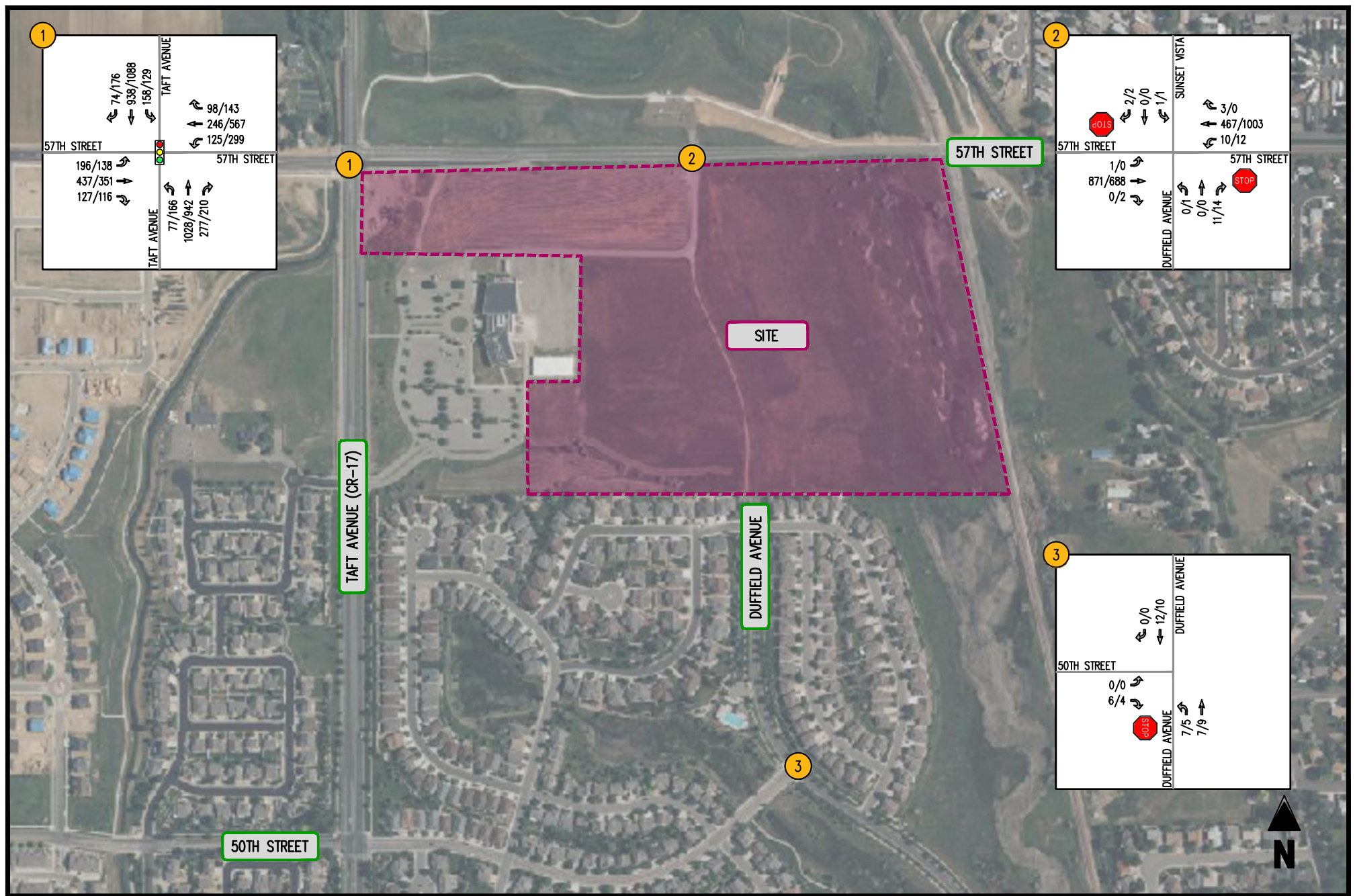


FIGURE 4-7
BACKGROUND 2043 FORECASTS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



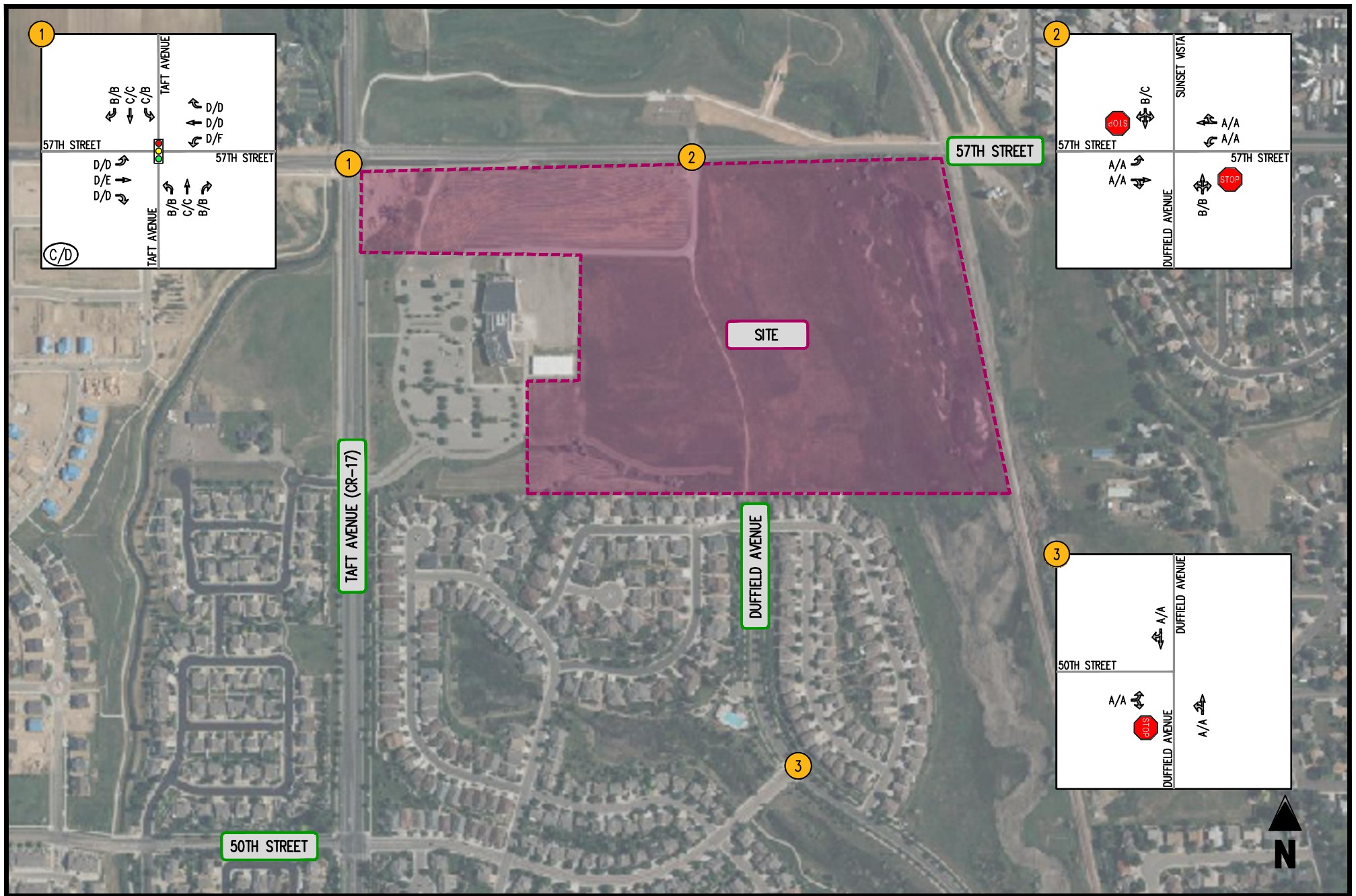


FIGURE 4-8
BACKGROUND 2028 LOS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



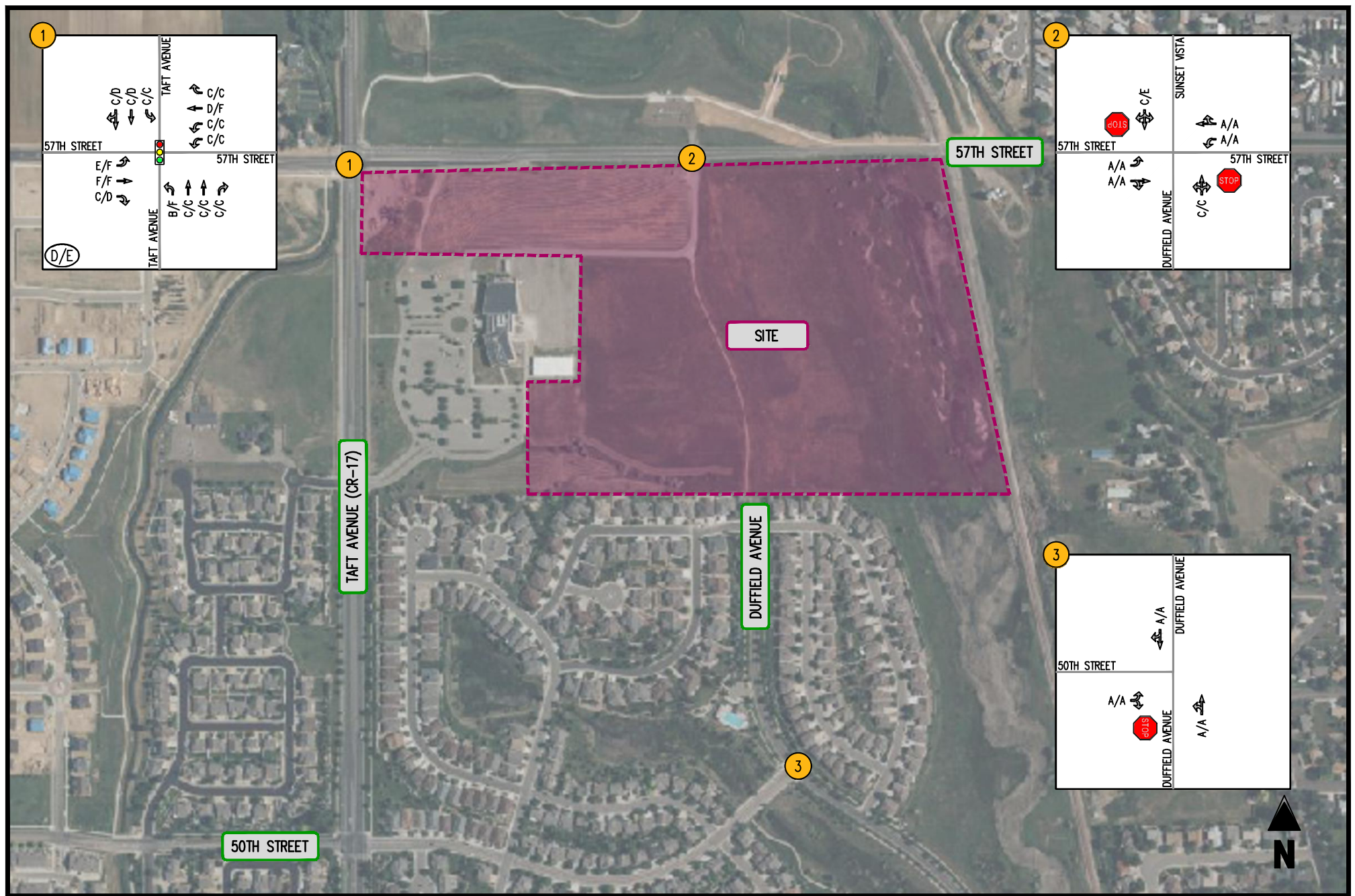


FIGURE 4-9
BACKGROUND 2043 LOS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



Table 4-1
 Loveland Housing Authority - Loveland, CO
 Background Future Intersection Level of Service Summary ⁽¹⁾⁽²⁾

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2023		ACF Compliant? (Yes/No)	Background 2028		ACF Compliant? (Yes/No)	Background 2043		ACF Compliant? (Yes/No)
				AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour	
1 57th Street/Taft Avenue	SIGNAL	Overall		C (28.8)	D (40.1)	NO	C (28.2)	D (40.0)	NO	D (40.2)	E (60.6)	NO
			EB	D (44.9)	D (53.3)	YES	D (44.5)	D (52.2)	YES	F (97.5)	F (84.1)	NO
			EBL	D (36.5)	D (42.3)	YES	D (36.9)	D (42.8)	YES	E (60.1)	F (122.0)	NO
			EBT	D (49.8)	E (58.9)	YES	D (48.9)	E (57.1)	YES	F (132.7)	F (84.4)	NO
			EBR	D (37.2)	D (42.3)	YES	D (38.0)	D (43.1)	YES	C (34.0)	D (38.2)	YES
			WB	D (36.5)	E (77.4)	NO	D (37.3)	E (76.7)	NO	C (34.9)	F (119.2)	NO
			WBL *	D (35.1)	F (116.2)	NO	D (35.6)	F (112.3)	NO	C (31.1)	C (34.5)	NO
			WBT	D (37.5)	D (51.3)	YES	D (38.4)	D (53.5)	YES	D (37.5)	F (185.6)	NO
			WBR	D (37.2)	D (39.0)	YES	D (38.0)	D (39.8)	YES	C (33.1)	C (34.5)	YES
			NB	C (27.7)	C (22.5)	YES	C (26.9)	C (23.9)	YES	C (23.4)	C (31.2)	NO
			NBL	B (14.5)	B (17.8)	YES	B (14.4)	B (18.9)	YES	B (17.0)	F (80.8)	NO
			NBT *	C (32.1)	C (24.6)	YES	C (31.1)	C (26.4)	YES	C (24.6)	C (24.9)	NO
			NBR	B (17.3)	B (16.3)	YES	B (16.0)	B (15.8)	YES	C (20.5)	C (20.3)	YES
			SB	C (20.6)	C (23.4)	YES	C (20.3)	C (25.5)	YES	C (24.9)	D (36.0)	NO
			SBL	C (25.1)	B (17.3)	YES	C (23.5)	B (18.7)	YES	C (26.2)	C (21.6)	NO
			SBT	C (20.3)	C (25.5)	YES	C (20.3)	C (27.8)	YES	C (24.7)	D (37.2)	NO
			SBR *	B (10.8)	B (12.3)	YES	B (10.4)	B (11.8)	YES	C (24.6)	D (37.8)	YES
2 57th Street/Duffield Avenue	STOP	Overall	EB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
			EBL	A [8.0]	A [0.0]	YES	A [8.0]	A [0.0]	YES	A [8.4]	A [0.0]	YES
			EBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
			WB	A [0.3]	A [0.2]	YES	A [0.3]	A [0.2]	YES	A [0.2]	A [0.1]	YES
			WBL	A [8.9]	A [8.5]	YES	A [8.8]	A [8.5]	YES	A [10.0]	A [9.3]	YES
			WBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
			NB	B [13.0]	B [13.2]	YES	B [12.7]	B [13.1]	YES	C [16.8]	C [18.3]	YES
			NBLTR	B [13.0]	B [13.2]	YES	B [12.7]	B [13.1]	YES	C [16.8]	C [18.3]	YES
			SB	B [14.6]	C [20.1]	YES	B [14.4]	C [20.2]	YES	C [21.7]	E [37.8]	NO
			SBLTR	B [14.6]	C [20.1]	YES	B [14.4]	C [20.2]	YES	C [21.7]	E [37.8]	YES
3 50th Street/Duffield Avenue	STOP	Overall	EB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [8.4]	A [8.4]	YES
			EBLR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [8.4]	A [8.4]	YES
			NB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [3.6]	A [2.6]	YES
			NBLT	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [7.3]	A [7.2]	YES
			SB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
			SBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.

(2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.

* Two northbound through lanes, dual westbound left lanes, and a southbound through/right lane in 2043 conditions

Table 4-2
 Loveland Housing Authority - Loveland, CO
 Background Future Intersection Queueing Summary ⁽¹⁾

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Existing 2023		Background 2028		Background 2043	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 57th Street/Taft Avenue	SIGNAL	57th Street	EBL	450	84	77	85	77	171	197
			EBT	-	185	194	185	193	553	500
			EBR	430	0	0	0	0	46	18
		57th Street	WBL *	550	101	361	102	344	48	119
			WBT	-	114	292	115	287	226	772
			WBR	200	15	43	15	42	22	66
		Taft Avenue	NBL	200	12	10	12	10	50	243
			NBT *	-	733	542	829	681	407	355
			NBR	-	68	43	80	52	86	42
		Taft Avenue	SBL	450	147	66	141	71	187	81
			SBT	-	596	777	679	874	390	545
			SBR *	325	0	0	0	0	390	545
2 57th Street/Duffield Avenue	STOP	57th Street	EBL	400	0	0	0	0	0	0
			EBTR	-	0	0	0	0	0	0
		57th Street	WBL	200	0	0	0	0	0	0
			WBTR	-	0	0	0	0	0	0
		Duffield Avenue	NBLTR	-	2.5	2.5	2.5	2.5	2.5	5
		Sunset Vista	SBLTR	-	0	0	0	0	0	2.5
3 50th Street/Duffield Avenue	STOP	50th Street	EBLR	-	0	0	0	0	0	0
		Duffield Avenue	NBLT	-	0	0	0	0	0	0
		Duffield Avenue	SBTR	-	0	0	0	0	0	0

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

* Two northbound through lanes, dual westbound left lanes, and a southbound through/right lane in 2043 conditions

V. Site Analysis

Overview

The Applicant is proposing to develop the approximately 52.45-acre site with residential use. For purposes of this study, the site is assumed to be complete and occupied in 2028. The following use and development programs were analyzed:

Build-Out 2028:

143	DU	Single Family Detached Housing
50	DU	Single Family Attached Housing
180	DU	Multifamily Housing (Low-Rise)

Proposed Site Access

As shown on the Applicant's conceptual plan (Figure 1-2), access to the development is proposed via a 3/4 movement access at 57th Street/Duffield Avenue, a new right-in/right out (RIRO) access along 57th Street, and an additional full movement access to the south of the site with the extension of Duffield Avenue. The total future scenarios show $\frac{3}{4}$ northbound and southbound movements at the 57th Street/Duffield Avenue intersection. Ultimately a roundabout will be provided for this intersection depending on certain triggers and funding.

The total future 2043 scenarios also include the modifications at the 57th Street/Taft Avenue intersection which include an additional northbound through lane, a repurpose of the southbound right lane to a southbound through/right lane, and an additional westbound left lane consistent with the background conditions that were provided with the pipeline development TIS reports. Proposed lane use and traffic control for the total future scenarios are shown in Figure 5-1 (2028) and Figure 5-2 (2043).

Trip Generation

Overview

Trip generation estimates for the weekday AM and PM peak hours, as well as the weekday average daily traffic (ADT), were derived from the standard Institute of Transportation Engineers (ITE) Trip Generation Manual rates/equations, as published in the 11th edition. The trip generation analysis is presented in Table 5-1.

Site Trips

The vehicle trips that would be generated by the proposed development plan are summarized in Table 5-1. As shown in Table 5-1, the site would generate upon completion and full occupancy 202 new weekday AM and 263 new weekday PM peak hour vehicle trips, as well as 2,962 new weekday daily trips.

Site Trip Distributions

The distribution of the anticipated trips generated by the completion of the proposed development was based on an examination of existing traffic counts and local knowledge. Existing travel patterns indicate the following distribution is appropriate in the forecasting of future site traffic and consistent with the agreed upon scope:

- To/from the east on 57th Street: 55%
- To/from the south on Taft Avenue: 25%
- To/from the north on Taft Avenue: 5%
- To/from the west on 57th Street: 5%
- To/from the south on Duffield Avenue: 10%

Site Trip Assignments

The assignment of the new vehicle trips generated upon the future build-out of the development project was based on the above distribution. The trips assignments are depicted in Figure 5-3.

Non-Auto Infrastructure & Safe Routes to School

During the scoping process, the City of Loveland requested that the study review safe routes to school (SRTS) for schools within a mile and a half of the subject site. SRTS is a comprehensive approach to providing and encouraging walking and biking routes to schools to facilitate safe options for children. Schools within 1.5 miles exist to the southeast and southwest of subject site, and as such, non-auto infrastructure to/from these areas was reviewed.

Figure 5-4 provides the non-auto infrastructure that would serve these areas. As can be seen in Figure 5-4, the subject project would be serviced with multiple walking and biking routes to nearby schools. Schools to the east of the subject site are currently challenged by a rail crossing as well as several gaps in the infrastructure. All schools within a mile and a half of the proposed site would have uninterrupted pedestrian and bicycle routes once the proposed sidewalks and bike lanes are constructed. There are adequate pedestrian crossing markings at major intersections along these routes. Additionally, there is a bus stop at W 50th Street/Apricot Drive for the Laurene Edmondson Elementary School which will provide transportation to and from the school without the need for young children to cross the railroad tracks. The District has informed the project that if there is a need along N Duffield Avenue that additional stops can be provided as there are additional stops along the same route in the neighborhoods on the northside of 57th St. The designated walk boundary for Laurene Edmonson does not cross the tracks to the west. This project will connect to the existing infrastructure to the extent possible as the applicant is currently coordinating those alternatives with the City.

For points northeast of the proposed developed the safe pedestrian route was identified as the crosswalk at 57th Street/Taft Avenue. This crosswalk connects directly into the pedestrian infrastructure north of 57th Street and eventually connects to the Walmart Supercenter. Although this would create some out of direction travel, it is the safest way to cross and travel along the trail to the north of 57th Street. In ultimate conditions it is expected that 57th Street/Duffield Avenue will have a roundabout, and at that time a safe pedestrian crossing could be provided at that location.

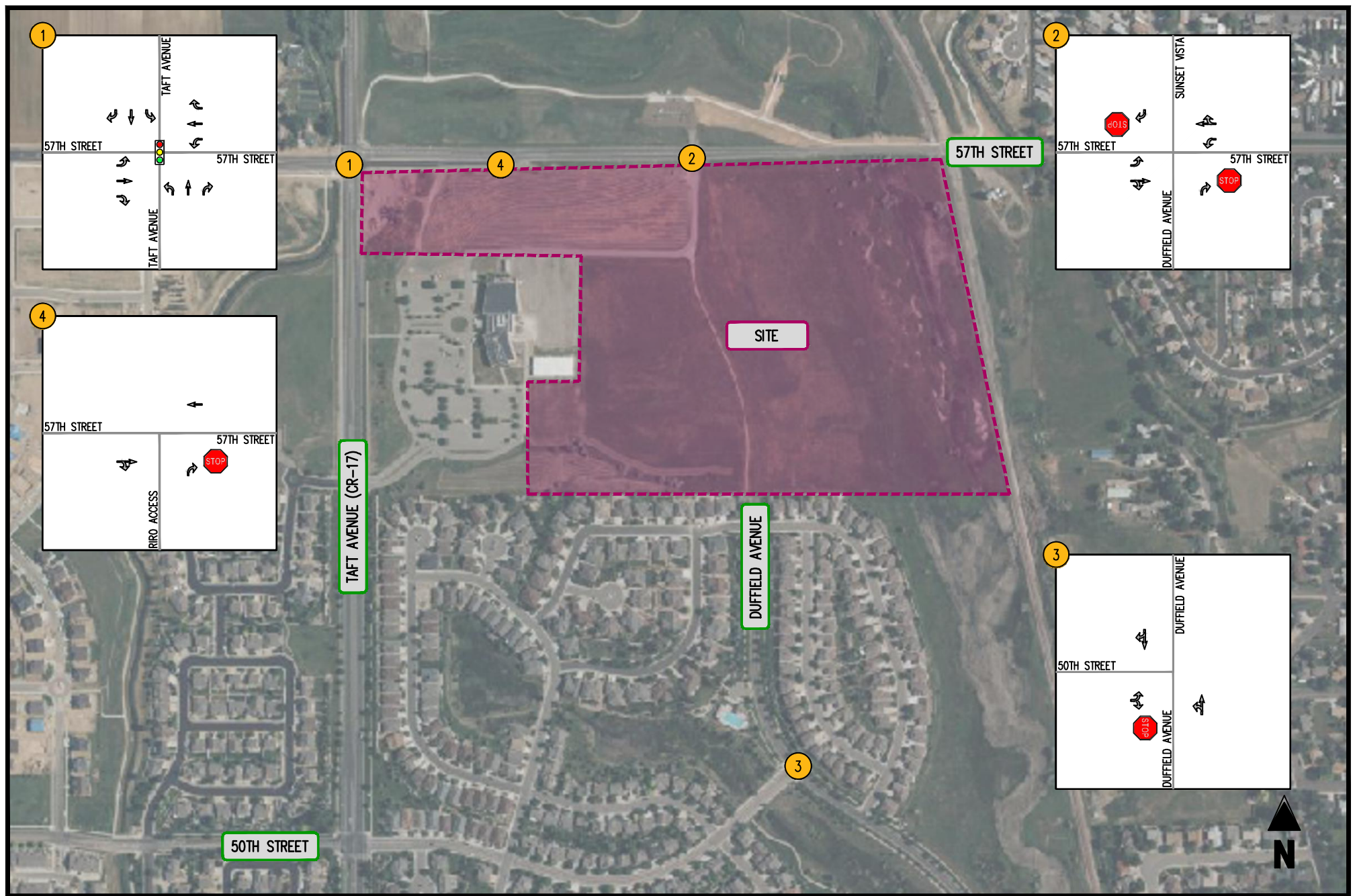


FIGURE 5-1
TOTAL FUTURE 2028 LANE USE AND TRAFFIC CONTROL



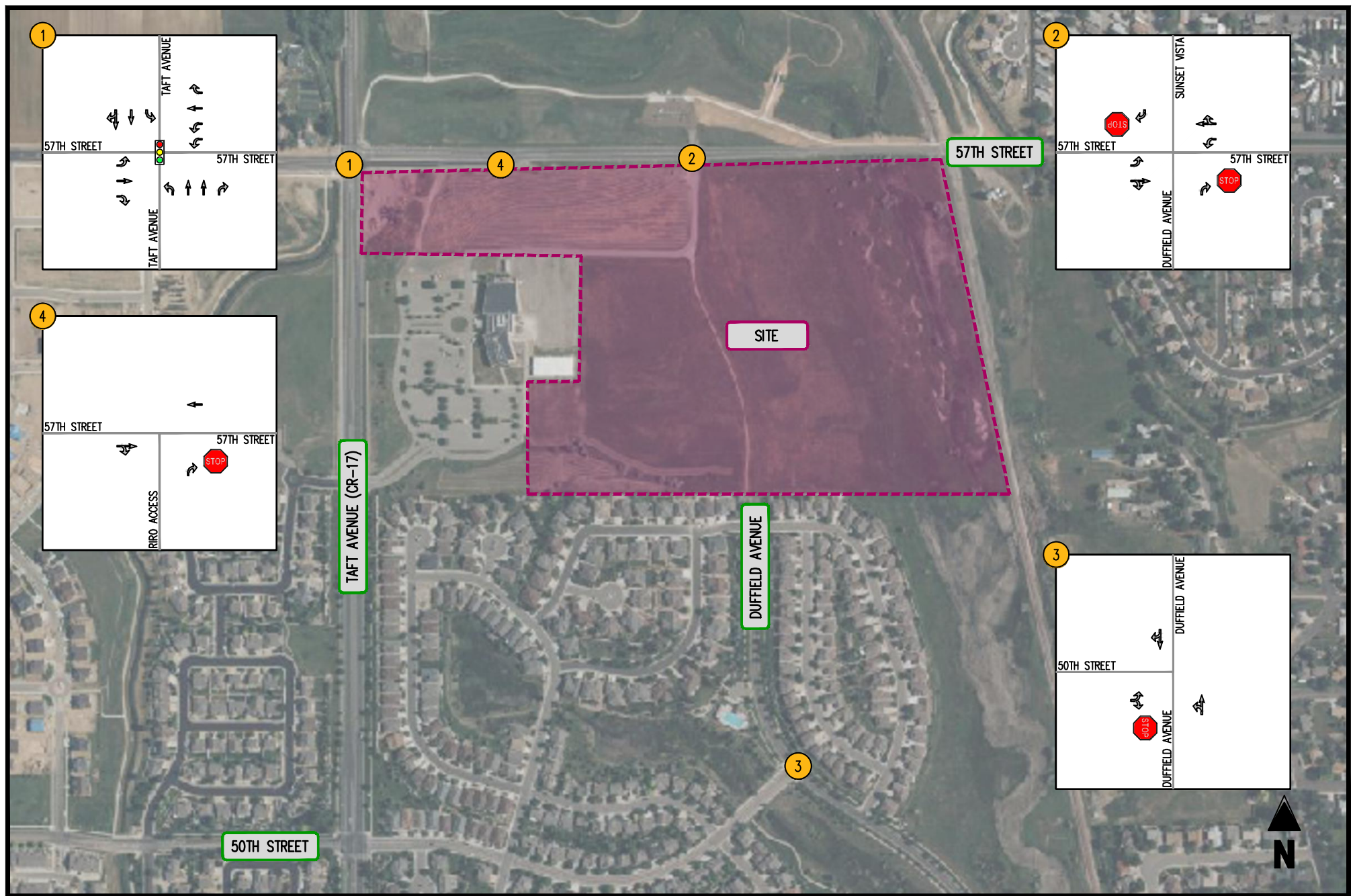


FIGURE 5-2
TOTAL FUTURE 2043 LANE USE AND TRAFFIC CONTROL



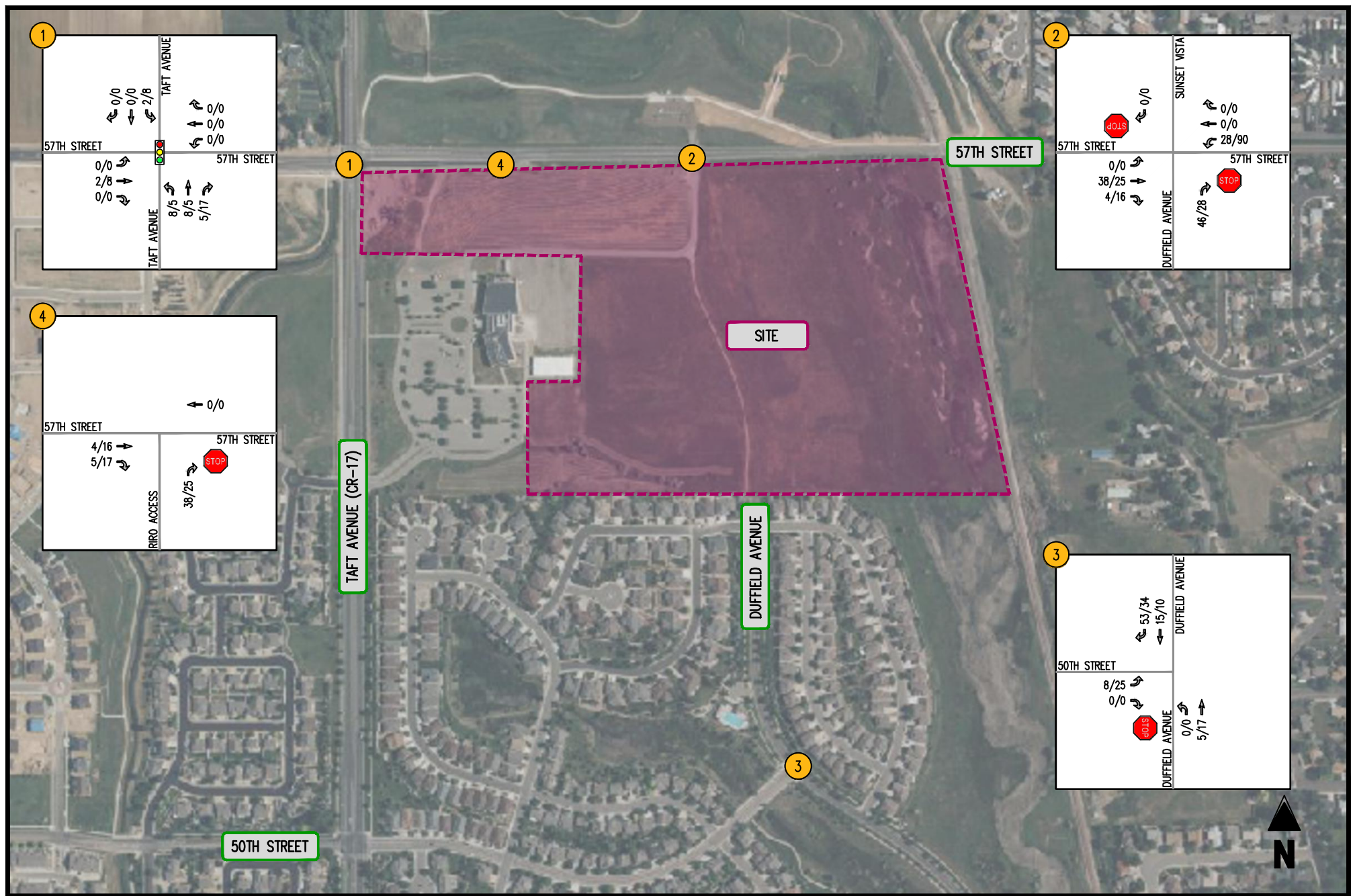


FIGURE 5-3
SITE TRIPS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
SIGNALIZED INTERSECTION
STOP SIGN
YIELD SIGN

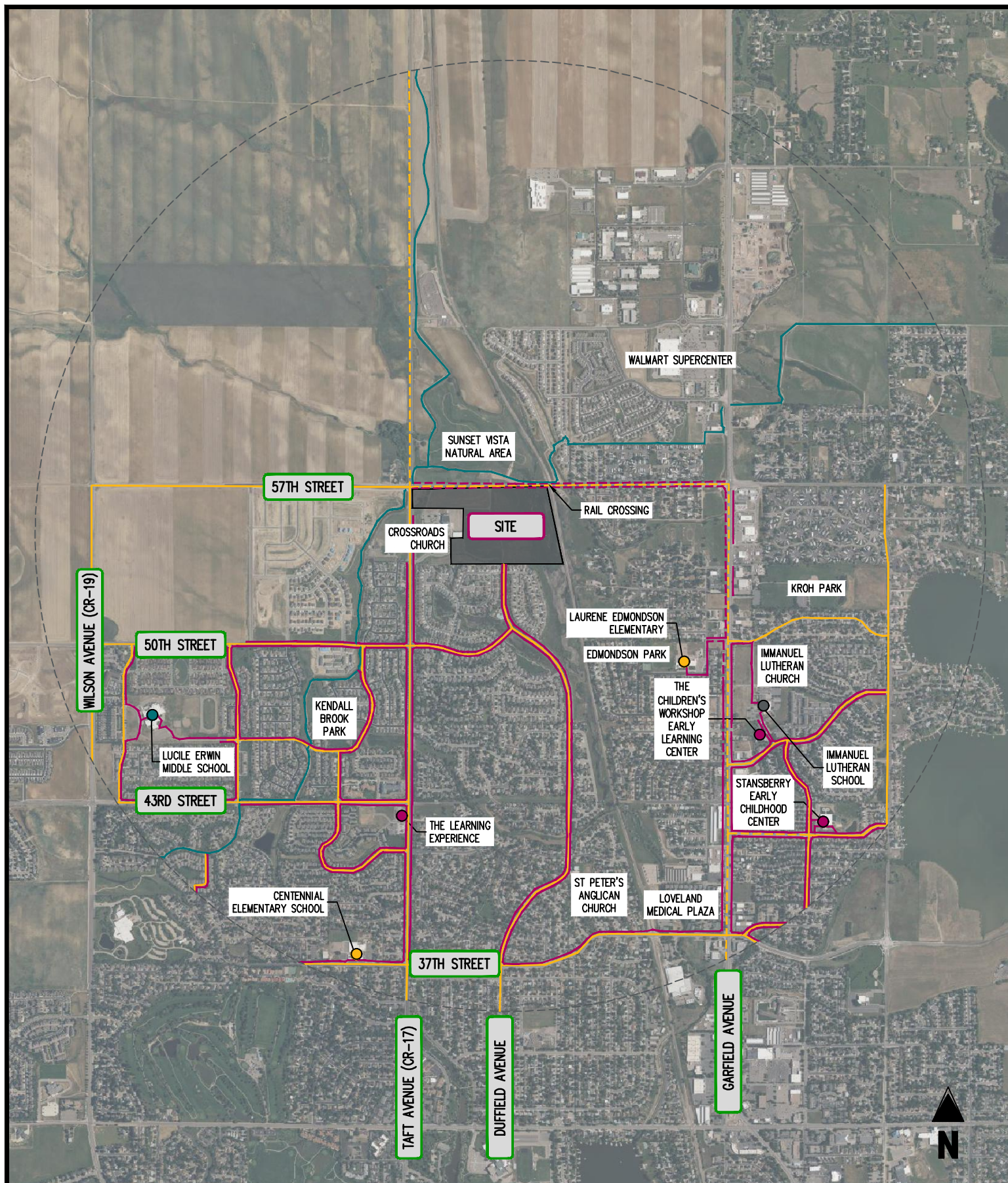


FIGURE 5-4
NON-AUTO INFRASTRUCTURE

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

- PRESCHOOL/DAYCARE
- ELEMENTARY SCHOOL
- MIDDLE SCHOOL
- RELIGIOUS SCHOOL

- EXISTING SIDEWALK
- - - PROPOSED SIDEWALK
- EXISTING ON-STREET BIKE FACILITIES
- - - PROPOSED ON-STREET BIKE FACILITIES
- EXISTING TRAIL



Table 5-1

Loveland Housing Authority - Loveland, CO

Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
<u>Proposed</u> ⁽¹⁾										
Single-Family Detached Housing	210	143	DU	26	77	103	88	51	139	1,402
Single-Family Attached Housing	215	50	DU	5	15	20	15	11	26	331
Multifamily Housing (Low-Rise)	220	180	DU	19	60	79	62	36	98	1,229
Total Site Trips				50	152	202	165	98	263	2,962

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition

VI. Analysis of Future Conditions with Site Development

Total Future Traffic Forecasts

The 2028 and 2043 total future traffic forecasts associated with the proposed development were developed by combining the background future forecasts shown in Figure 4-6 (2028) and Figure 4-7 (2043), and the site trip assignments shown in Figure 5-3. The existing traffic volumes for the southbound left movement at 57th Street/Duffield Avenue were rerouted to turn right and make a U-turn at the 57th Street/Taft Avenue intersection to accommodate the $\frac{3}{4}$ access at 57th Street/Duffield Avenue. The resulting total future turning movement forecasts along with the assumed average daily traffic (ADT) are provided in Figure 6-1 for 2028 conditions and Figure 6-2 for 2043 conditions.

Total Future Levels of Service with Proposed Development

Future levels of service with the proposed development plan were estimated at key study intersections based on the future traffic volumes shown in Figure 6-1 (2028) and Figure 6-2 (2043), the total future lane use in Figure 5-1 (2028) and Figure 5-2 (2043), and the HCM 7th methodologies for signalized and unsignalized intersections. The results of these analyses are provided in Appendix H and presented in Table 6-1 along with the Adequate Community Facilities (ACF) compliance for the movements, approaches, and intersections. Total future levels of service are also presented graphically in Figure 6-3 (2028) and Figure 6-4 (2043).

As shown in Table 6-1, levels of service under future site development conditions would remain generally consistent with future background conditions (i.e., without site development). Overall delays would experience minor changes due to site trips and lane modifications. All intersection within the study area would operate consistent with background conditions. No ACF failures are attributed to the proposed development requiring additional mitigation.

Total Future Queuing

Total future queues were forecasted using Synchro. The results of the queuing analysis are summarized in Table 6-2. The forecasted queues are expected to remain consistent with background conditions

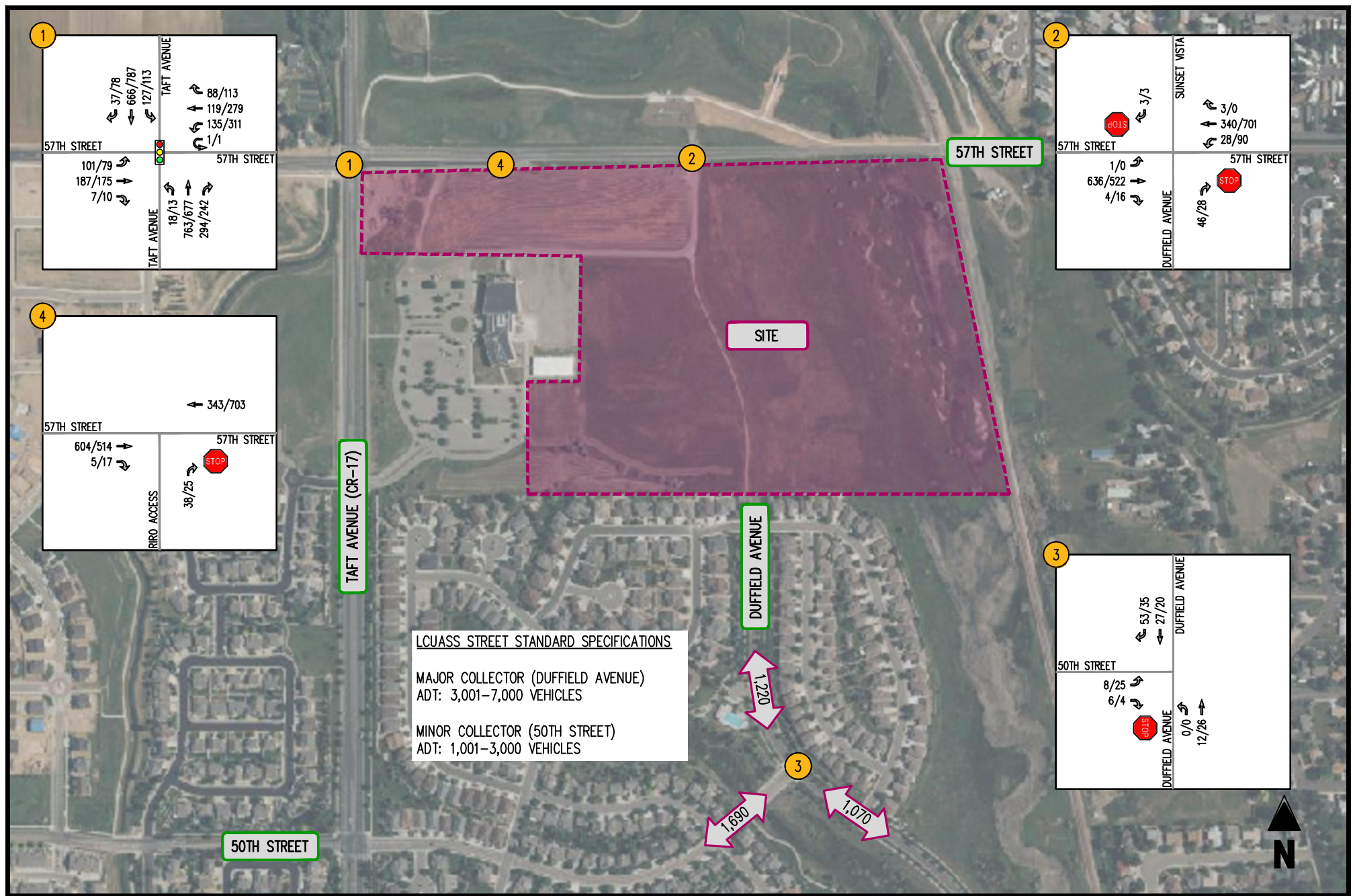


FIGURE 6-1
TOTAL FUTURE 2028 FORECASTS

000 ADT (VEHICLES)

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
SIGNALIZED INTERSECTION
STOP SIGN
YIELD SIGN



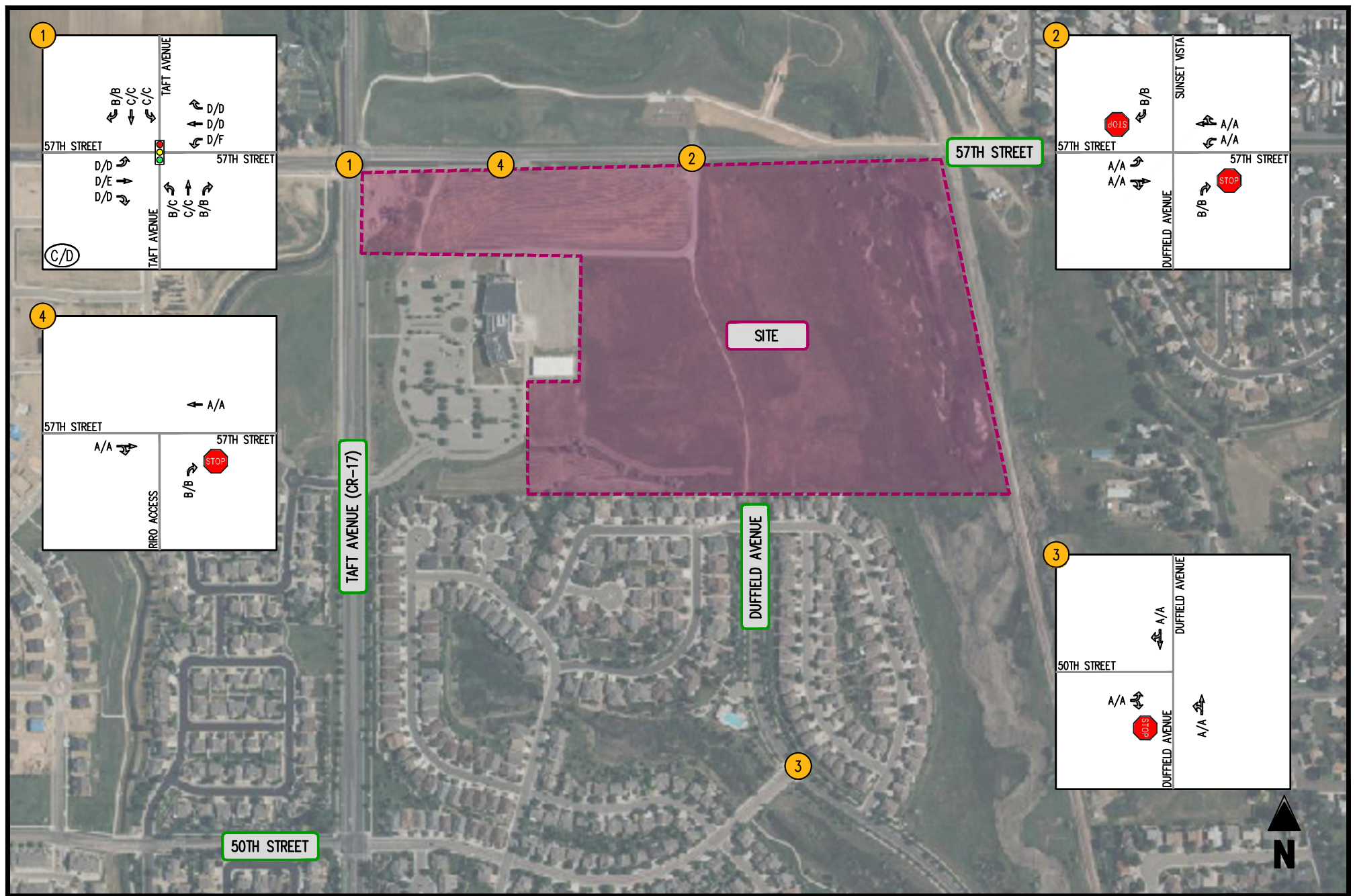


FIGURE 6-3
TOTAL FUTURE 2028 LOS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

← MOVEMENT
 SIGNALIZED INTERSECTION
 STOP SIGN
 YIELD SIGN



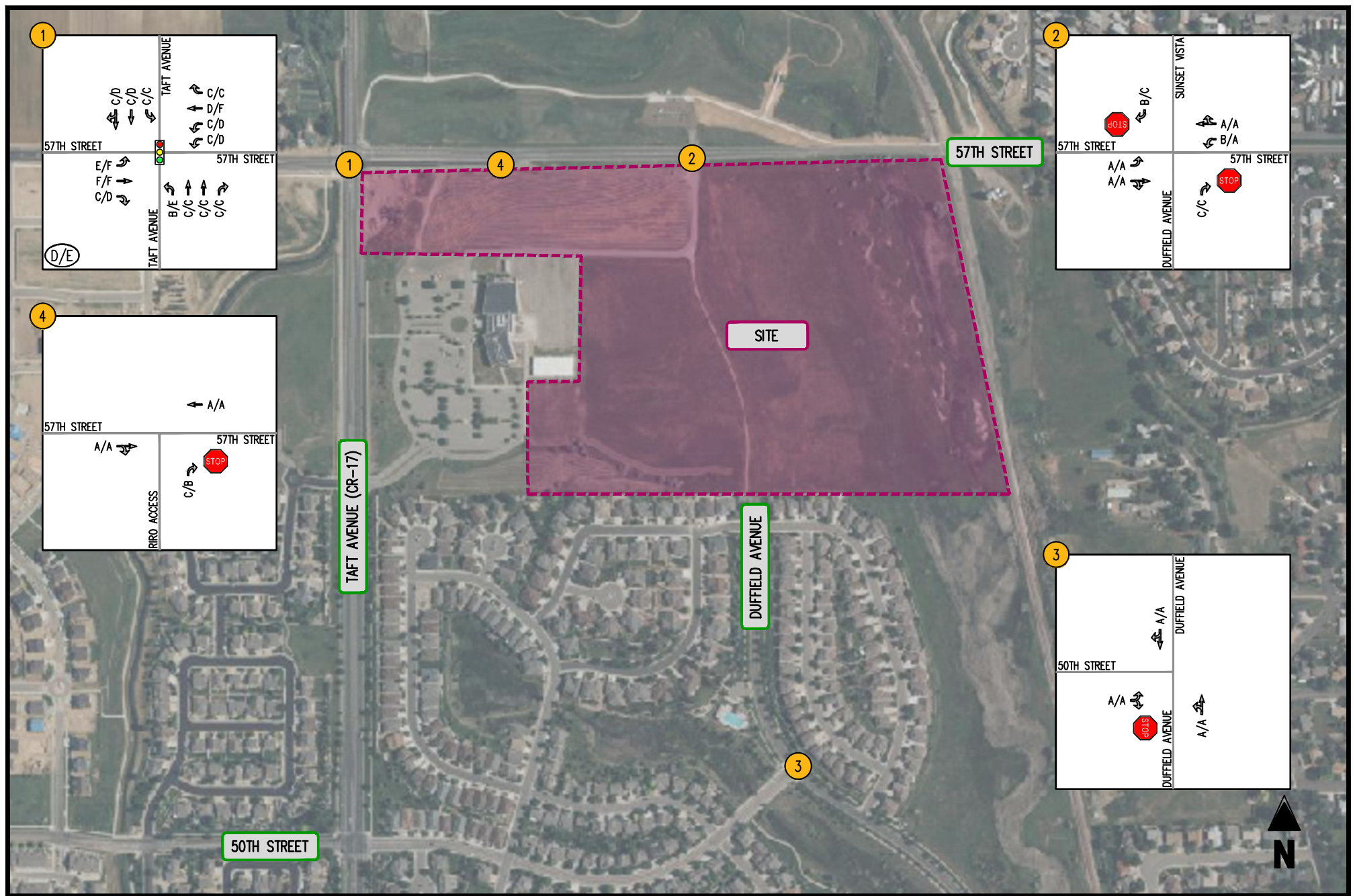


FIGURE 6-4
TOTAL FUTURE 2043 LOS

LOVELAND HOUSING AUTHORITY
LOVELAND, CO

(A/A) INTERSECTION LOS
0000/0000 (AM PEAK HOUR/PM PEAK HOUR)

- ← MOVEMENT
- 🚦 SIGNALIZED INTERSECTION
- STOP STOP SIGN
- 🚧 YIELD SIGN



Table 6-1
 Loveland Housing Authority - Loveland, CO
 Total Future Intersection Level of Service Summary ^{(1) (2)}

Intersection	Operating Condition	Street Name	Approach/ Movement	Background 2028		ACF Compliant? (Yes/No)	Background 2043		ACF Compliant? (Yes/No)	Total Future 2028		ACF Compliant? (Yes/No)	Total Future 2043		ACF Compliant? (Yes/No)		
				AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour		AM Peak Hour	PM Peak Hour			
1 57th Street/Taft Avenue	SIGNAL	Overall		C (28.2)	D (40.0)	NO	D (40.2)	E (60.6)	NO	C (29.4)	D (40.6)	NO ***	D (40.5)	E (60.5)	NO ***		
				D (44.5)	D (52.2)	YES	F (97.5)	F (84.1)	NO	D (44.4)	D (53.6)	YES	F (98.1)	F (81.4)	NO ***		
			57th Street	EBL	D (36.9)	D (42.8)	YES	E (60.1)	F (122.0)	NO	D (36.7)	D (42.0)	YES	E (58.2)	F (121.6)	NO **	
				EBT	D (48.9)	E (57.1)	YES	F (132.7)	F (84.4)	NO	D (48.9)	E (59.5)	YES	F (134.5)	F (80.2)	NO***	
				EBR	D (38.0)	D (43.1)	YES	C (34.0)	D (38.2)	YES	D (37.9)	D (42.9)	YES	C (34.0)	D (37.7)	YES	
			57th Street	WB	D (37.3)	F (76.7)	NO	C (34.9)	F (119.2)	NO	D (36.7)	F (72.8)	NO **	C (34.5)	F (119.1)	NO **	
				WBL *	D (35.6)	F (112.3)	NO	C (31.1)	C (34.5)	NO	D (35.4)	F (106.5)	NO **	C (31.0)	D (39.2)	YES	
				WBT	D (38.4)	D (53.5)	YES	D (37.5)	F (185.6)	NO	D (37.8)	D (49.0)	YES	D (37.2)	F (184.7)	NO **	
				WBR	D (38.0)	D (39.8)	YES	C (33.1)	C (34.5)	YES	D (37.4)	D (38.6)	YES	C (32.8)	C (34.5)	YES	
			Taft Avenue	NB	C (26.9)	C (23.9)	YES	C (23.4)	C (31.2)	NO	C (28.7)	C (25.4)	YES	C (23.8)	C (30.3)	YES	
				NBL	B (14.4)	B (18.9)	YES	B (17.0)	F (80.8)	NO	B (14.9)	C (20.2)	YES	B (17.3)	E (72.6)	YES	
				NBT *	C (31.1)	C (26.4)	YES	C (24.6)	C (24.9)	NO	C (33.6)	C (28.4)	YES	C (25.1)	C (25.0)	YES	
				NBR	B (16.0)	B (15.8)	YES	C (20.5)	C (20.3)	YES	B (16.9)	B (17.2)	YES	C (21.2)	C (21.0)	YES	
			Taft Avenue	SB	C (20.3)	C (25.5)	YES	C (24.9)	D (36.0)	NO	C (21.9)	C (28.4)	YES	C (25.5)	D (38.3)	YES	
				SBL	C (23.5)	B (18.7)	YES	C (26.2)	C (21.6)	NO	C (25.7)	C (20.6)	YES	C (27.9)	C (24.0)	YES	
				SBT	C (20.3)	C (27.8)	YES	C (24.7)	D (37.2)	NO	C (21.8)	C (31.1)	YES	C (25.1)	D (39.5)	YES	
				SBR *	B (10.4)	B (11.8)	YES	C (24.6)	D (37.8)	YES	B (11.0)	B (12.8)	YES	C (25.0)	D (40.2)	YES	
2 57th Street/Duffield Avenue	STOP	57th Street	EB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	-	-	-	-	-	-		
			EBL	A [8.0]	A [0.0]	YES	A [8.4]	A [0.0]	YES	-	-	-	-	-	-		
			EBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	-	-	-	-	-	-		
			WB	A [0.3]	A [0.2]	YES	A [0.2]	A [0.1]	YES	-	-	-	-	-	-		
			WBL	A [8.8]	A [8.5]	YES	A [10.0]	A [9.3]	YES	-	-	-	-	-	-		
			WBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	-	-	-	-	-	-		
		Duffield Avenue	NB	B [12.7]	B [13.1]	YES	C [16.8]	C [18.3]	YES	-	-	-	-	-	-		
			NBLTR	B [12.7]	B [13.1]	YES	C [16.8]	C [18.3]	YES	-	-	-	-	-	-		
		Sunset Vista	SB	B [14.4]	C [20.2]	YES	C [21.7]	E [37.8]	NO	-	-	-	-	-	-		
			SBLTR	B [14.4]	C [20.2]	YES	C [21.7]	E [37.8]	YES	-	-	-	-	-	-		
	3/4 Movements NB/SB	STOP	EB	-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
			EBL	-	-	-	-	-	-	A [8.0]	A [0.0]	YES	A [8.4]	A [0.0]	YES		
			EBTR	-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
			WB	-	-	-	-	-	-	A [0.7]	A [1.0]	YES	A [0.6]	A [0.8]	YES		
			WBL	-	-	-	-	-	-	A [9.1]	A [9.0]	YES	B [10.5]	A [10.0]	YES		
			WBTR	-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
		Duffield Avenue	NB	-	-	-	-	-	-	B [14.2]	B [12.4]	YES	C [19.8]	C [15.2]	YES		
			NBR	-	-	-	-	-	-	B [14.2]	B [12.4]	YES	C [19.8]	C [15.2]	YES		
		Sunset Vista	SB	-	-	-	-	-	-	B [10.4]	B [11.0]	YES	B [11.5]	C [19.2]	YES		
			SBR	-	-	-	-	-	-	B [10.4]	B [14.0]	YES	B [11.5]	C [19.2]	YES		
3 50th Street/Duffield Avenue	STOP	50th Street	EB	A [0.0]	A [0.0]	YES	A [8.4]	A [8.4]	YES	A [8.9]	A [9.0]	YES	A [8.9]	A [9.0]	YES		
			EBLR	A [0.0]	A [0.0]	YES	A [8.4]	A [8.4]	YES	A [8.9]	A [9.0]	YES	A [8.9]	A [9.0]	YES		
		Duffield Avenue	NB	A [0.0]	A [0.0]	YES	A [3.6]	A [2.6]	YES	A [0.0]	A [0.0]	YES	A [2.7]	A [1.2]	YES		
			NBLT	A [0.0]	A [0.0]	YES	A [7.3]	A [7.2]	YES	A [0.0]	A [0.0]	YES	A [7.4]	A [7.3]	YES		
		Duffield Avenue	SB	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
			SBTR	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
		4 57th Street/RIRO Access	STOP	57th Street	EB	-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
					EBTR	-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES
57th Street	WB			-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
	WBT			-	-	-	-	-	-	A [0.0]	A [0.0]	YES	A [0.0]	A [0.0]	YES		
RIRO Access	NB			-	-	-	-	-	-	B [13.5]	B [12.3]	YES	C [18.5]	B [14.9]	YES		
	NBR			-	-	-	-	-	-	B [13.5]	B [12.3]	YES	C [18.5]	B [14.9]	YES		

Notes : (1) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
 (2) Numbers in parenthesis () represent delay at signalized intersections in seconds per vehicle.
 * Two northbound through lanes, dual westbound left lanes, and a southbound through/right lane in 2043 conditions
 ** No new site trips contributed to these approaches/movements
 *** Delays for these intersections/approaches/movements increased by 2% or less

Table 6-2
 Loveland Housing Authority - Loveland, CO
 Total Future Intersection Queueing Summary ⁽¹⁾

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage	Background 2028		Background 2043		Total Future 2028		Total Future 2043	
					AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1 57th Street/Taft Avenue	SIGNAL	57th Street	EBL	450	85	77	171	197	85	77	171	196
			EBT	-	185	193	553	500	187	201	559	504
			EBR	430	0	0	46	18	0	0	46	19
			WBL *	550	102	344	48	119	109	367	52	124
		57th Street	WBT	-	115	287	226	772	115	286	226	772
			WBR	200	15	42	22	66	15	42	22	66
			NBL	200	12	10	50	243	17	14	54	255
			NBT *	-	829	681	407	355	840	690	411	357
		Taft Avenue	NBR	-	80	52	86	42	86	57	101	45
			SBL	450	141	71	187	81	148	91	191	97
			SBT	-	679	874	390	545	679	874	390	545
			SBR *	325	0	0	390	545	0	0	390	545
2 57th Street/Duffield Avenue 3/4 Movement NB/SB	STOP	57th Street	EBL	400	0	0	0	0	-	-	-	-
			EBTR	-	0	0	0	0	-	-	-	-
		57th Street	WBL	200	0	0	0	0	-	-	-	-
			WBTR	-	0	0	0	0	-	-	-	-
		Duffield Avenue	NBLTR	-	2.5	2.5	2.5	5	-	-	-	-
		Sunset Vista	SBLTR	-	0	0	0	2.5	-	-	-	-
	STOP	57th Street	EBL	400	-	-	-	-	0	0	0	0
			EBTR	-	-	-	-	-	0	0	0	0
		57th Street	WBL	200	-	-	-	-	2.5	7.5	2.5	10
			WBTR	-	-	-	-	-	0	0	0	0
		Duffield Avenue	NBR	-	-	-	-	-	10	5	15	7.5
		Sunset Vista	SBR	-	-	-	-	-	0	0	0	0
3 50th Street/Duffield Avenue	STOP	50th Street	EBLR	-	0	0	0	0	0	2.5	0	2.5
		Duffield Avenue	NBLT	-	0	0	0	0	0	0	0	0
		Duffield Avenue	SBTR	-	0	0	0	0	0	0	0	0
4 57th Street/RIRO Access	STOP	57th Street	EBTR	-	-	-	-	-	0	0	0	0
		57th Street	WBT	-	-	-	-	-	0	0	0	0
		RIRO Access	NBR	-	-	-	-	-	7.5	5	12.5	5

Notes : (1) Queue length, in feet, is based on the 95th percentile queue as reported by Synchro, Version 12.

* Two northbound through lanes, dual westbound left lanes, and a southbound through/right lane in 2043 conditions

VII. Conclusions and Recommendations

Conclusions

Based on the results of this traffic impact study, the following may be concluded:

- Under existing traffic conditions, the intersections within the study area currently operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours with the exception of the 57th Street/Taft Avenue intersection which operates at LOS “D” during the PM peak hour. All queues remain within their respective storage lengths.
- Under background future 2028 and 2043 traffic conditions, without the development of the subject site, the intersections within the study area would operate at overall acceptable levels of service (LOS) “C” or better during the weekday AM and PM peak hours with the exception of the 57th Street/Taft Avenue intersection which operates at LOS “D” during the PM peak hour. Proposed intersection improvements are applied for study year 2043. All queues are expected to remain within their respective storage lengths with the exception of the northbound left queue at 57th Street/Taft Avenue which would exceed its length in the 2043 PM peak hour.
- The proposed site development would generate, upon completion and full occupancy, 202 new weekday AM and 263 new weekday PM peak hour vehicle trips as well as 2,962 new weekday daily trips.
- Under total future 2028 and 2043 traffic conditions with development of the site, the intersections within the study area would operate consistent with background conditions.
- The ACF failures at 57th Street/Taft Avenue that occur in the Total Future 2028 scenarios include the westbound left movement, westbound approach, and overall intersection delay/LOS. The proposed site development would not contribute any trips to the westbound left movement and westbound approach, therefore a mitigation strategy is not required for these ACF failures. The overall intersection delay would increase by less than 2% compared to Background 2028 conditions, therefore a mitigation strategy is not required for the ACF failure.
- Safe routes to school are provided via non-auto infrastructure for all Elementary and Middle schools in a 1.5-mile radius of the development with the exception of Laurene Edmonson Elementary. There is a bus stop at W 50th Street/Apricot Drive for the Laurene Edmondson Elementary School which will provide transportation to and from the school.

Recommendations

- It is recommended that the Applicant provide an additional northbound through lane at 57th Street/Taft Avenue by creating a new northbound right turn lane along the site’s frontage. The final configuration of this northbound approach would have one left lane, two through lanes, and a dedicated right turn lane at the 57th Street/Taft Avenue intersection.
- It is recommended that the northbound and southbound approaches be restricted at 57th Street/Duffield Avenue to ¾ movements due to the ACF failures for the northbound and southbound

left movements. Ultimately a roundabout will be provided for this intersection depending on certain triggers and funding.

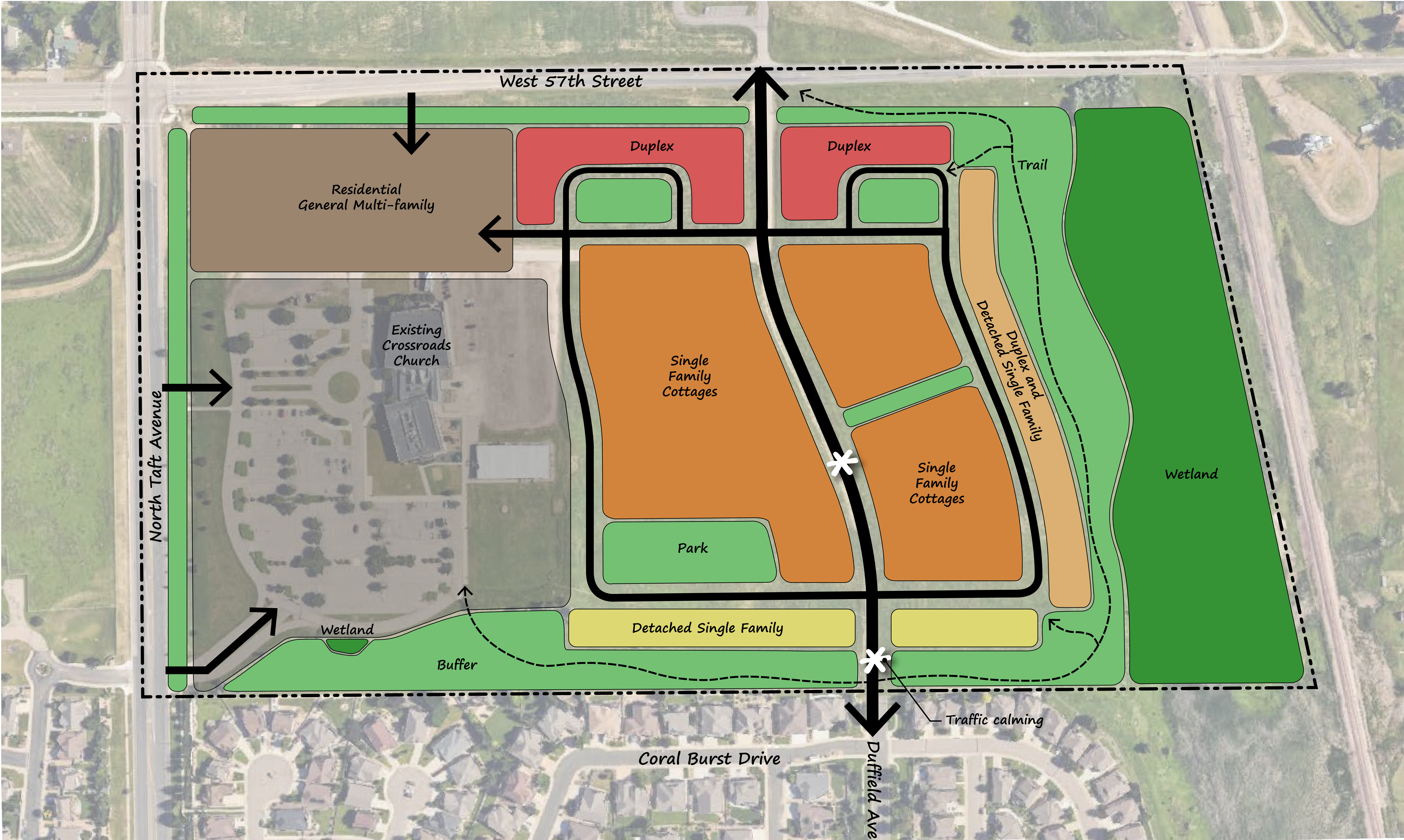
- It is recommended that pedestrian crossings over 57th Street occur at the existing pedestrian crossing facilities at 57th Street/Taft Avenue. This safe crossing allows for pedestrians to continue on the trail to the north of 57th Street. Multiple options for crossing 57th Street were considered and the existing signalized intersection crosswalk was deemed the safest. The ultimate roundabout improvement at 57th Street/Duffield Avenue will provide an additional safe crossing.
- It is recommended that the Applicant coordinate with the city and neighborhood to provide traffic calming at the north end of the existing Duffield Avenue (south end of the property) where the road will extend to 57th Street.
- It is recommended that the Applicant provides access consistent with the recommendations herein.

APPENDIX A – Full Sized Conceptual Plan

Legacy Crossing Concept Land Use Exhibit

Loveland, Colorado
Not a part of PUD Submittal

October, 2024



APPENDIX B – Base Assumptions Form

Reviewed By:
Randy Maizland
TDPP
9.21.23

Attachment A
Transportation Impact Study Base Assumptions

Project Information			
Project Name Loveland Housing Authority			
Project Location Loveland, CO			
TIS Assumptions			
Type of Study	Full: 	Intermediate:	
	MTIS:	Memo:	
Study Area Boundaries	North: 57th St	South: Site Boundary	
	East: Site Boundary	West: CR-17	
Study Years	Short Range: 2025	Long Range: 2043	
Future Traffic Growth Rate	2% per year		
Study Intersections	1. All access drives	5.	Add Duffield/50th
	2. CR-17 & 57th St	6.	Add Taft/57th
	3. 57th St & Duffield Ave	7.	
	4.	8.	
Time Period for Study	AM: 7:00-9:00	PM: 4:00-6:00	Sat Noon:
Trip Generation Rates	Trip generation calculations are attached		
Trip Adjustment Factors	Passby: N/A	Captive Market: N/A	
Overall Trip Distribution	SEE ATTACHED SKETCH		
Mode Split Assumptions			
Design Vehicle Information	SU-30 (Single Unit Truck)		
Committed Roadway Improvements	There are no committed roadway improvements at this time. The required roadway improvements will be based on the results of the traffic analysis.		
Other Traffic Studies	Several - Taft Ridge, Elkader, portions of Eagle Brook Meadows not built out, Green Valley Ranch		
Areas Requiring Special Study	Traffic Calming on Duffield at southern boundary connection to existing Safe pedestrian crossing at Duffield southern boundary/trail Roundabout at Duffield/57th intersection Safe routes to school analysis		

Date: 8/23/2023

Traffic Engineer: Max Rusch

Local Entity Engineer: _____

Table 1

Crossroads Church Development

Site Trip Generation

Land Use	Land Use Code	Amount	Units	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
Single-Family Detached Housing	210	114	Homes	21	63	84	71	41	112	1138
Single-Family Attached Housing	215	68	Units	7	22	30	22	15	37	468
Multifamily Housing (Low-Rise)	220	171	Units	18	58	76	59	35	94	1170
Total Site Trips				47	143	189	152	91	243	2,775

Note(s):

(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 11th Edition



5%

5%

57th St

57th St

65%

Site

Make sure to include the access on Taft in the list of "all accesses" to be included.

Please add 5% distribution going south on Duffield and add Duffield/50th intersection to the list of intersections to be analyzed. Adjust east-west distribution accordingly (60% east on 57th)

25%

Taft Ave

Crossroads Church Development Concept 1

Loveland, Colorado

June, 2023



- Mission Homes
95' x 26.5' Lots
Count: 65
- Mission Ranch Home
95' x 43' Lots
Count: 16
- IDF Duplexes (Habitat)
100' x 77' Lots
Count: 68
- Detached Single Family
100' x 43.5' Lots
Count: 33
- Loveland Housing Authority
Appx Area: 6.3 Acres
- Open Space / Landscape
Buffering, 4 Acres
- Wetland and wetland
Setback, 13 Acres



APPENDIX C – LOS Descriptions

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Table 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

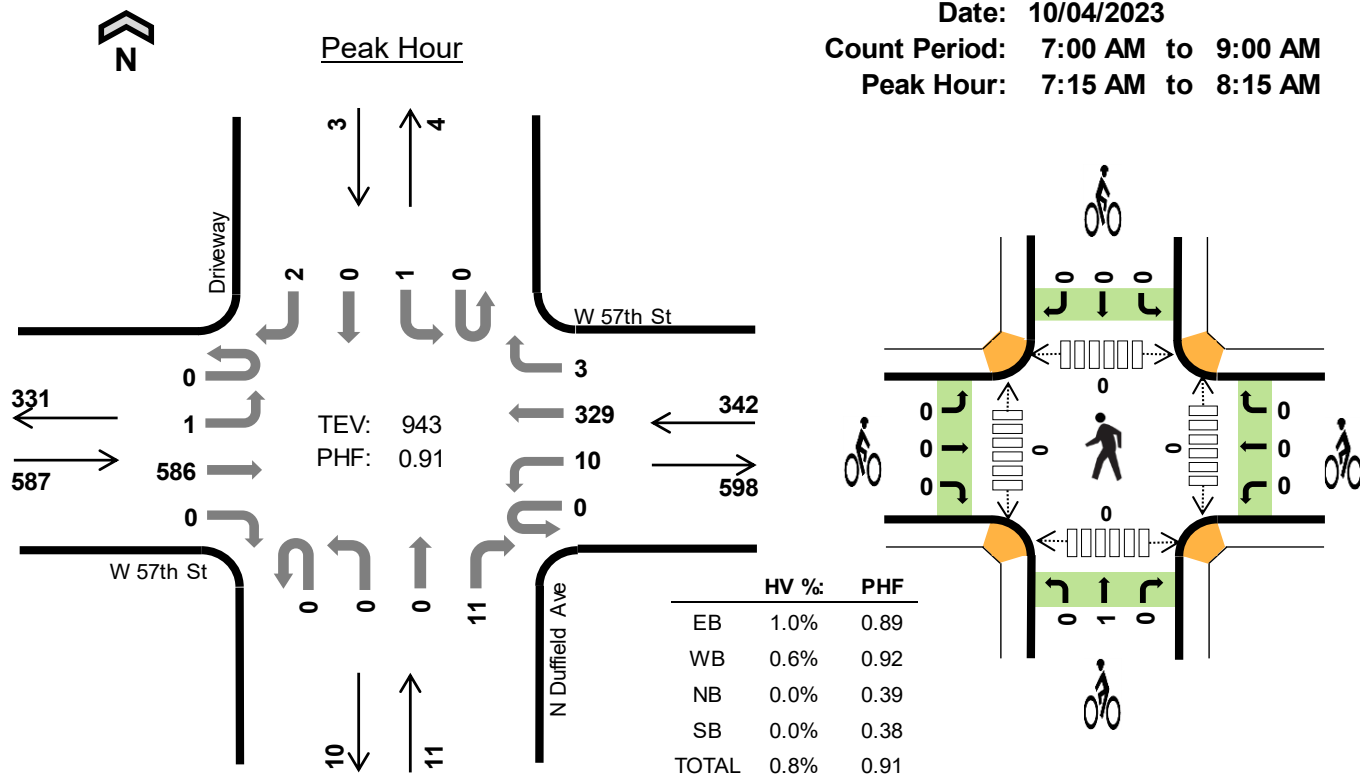
The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

APPENDIX D – Traffic Counts

N Duffield Ave W 57th St



Count Summaries

Interval Start		W 57th St				W 57th St				N Duffield Ave				Driveway				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	101	0	0	0	58	0	0	0	0	0	0	0	0	0	159	0
7:15 AM		0	0	141	0	0	3	74	1	0	0	0	1	0	0	0	1	221	0
7:30 AM		0	0	160	0	0	5	87	1	0	0	0	7	0	0	0	0	260	0
7:45 AM		0	1	163	0	0	0	83	1	0	0	0	1	0	1	0	1	251	891
8:00 AM		0	0	122	0	0	2	85	0	0	0	0	2	0	0	0	0	211	943
8:15 AM		0	1	117	0	0	3	76	1	0	2	0	3	0	0	0	2	205	927
8:30 AM		0	1	129	0	0	1	98	2	0	0	0	1	0	2	0	1	235	902
8:45 AM		0	1	120	1	0	0	84	1	0	0	0	2	0	0	0	2	211	862
Count Total		0	4	1,053	1	0	14	645	7	0	2	0	17	0	3	0	7	1,753	0
Peak Hour	All	0	1	586	0	0	10	329	3	0	0	0	11	0	1	0	2	943	0
	HV	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	8	0
	HV%	-	0%	1%	-	-	0%	1%	0%	-	-	-	0%	-	0%	-	0%	1%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
7:15 AM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
7:45 AM	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	1	0	0	2	0	0	1	0	1	0	0	0	0	0
8:15 AM	3	2	0	0	5	0	0	0	0	0	0	2	0	0	2
8:30 AM	3	2	0	0	5	0	0	0	0	0	0	0	0	0	0
8:45 AM	4	1	0	0	5	0	0	0	0	0	0	2	0	0	2
Count Total	16	7	0	0	23	0	0	2	0	2	0	4	0	0	4
Peak Hour	6	2	0	0	8	0	0	1	0	1	0	0	0	0	0

Count Summaries - Heavy Vehicles

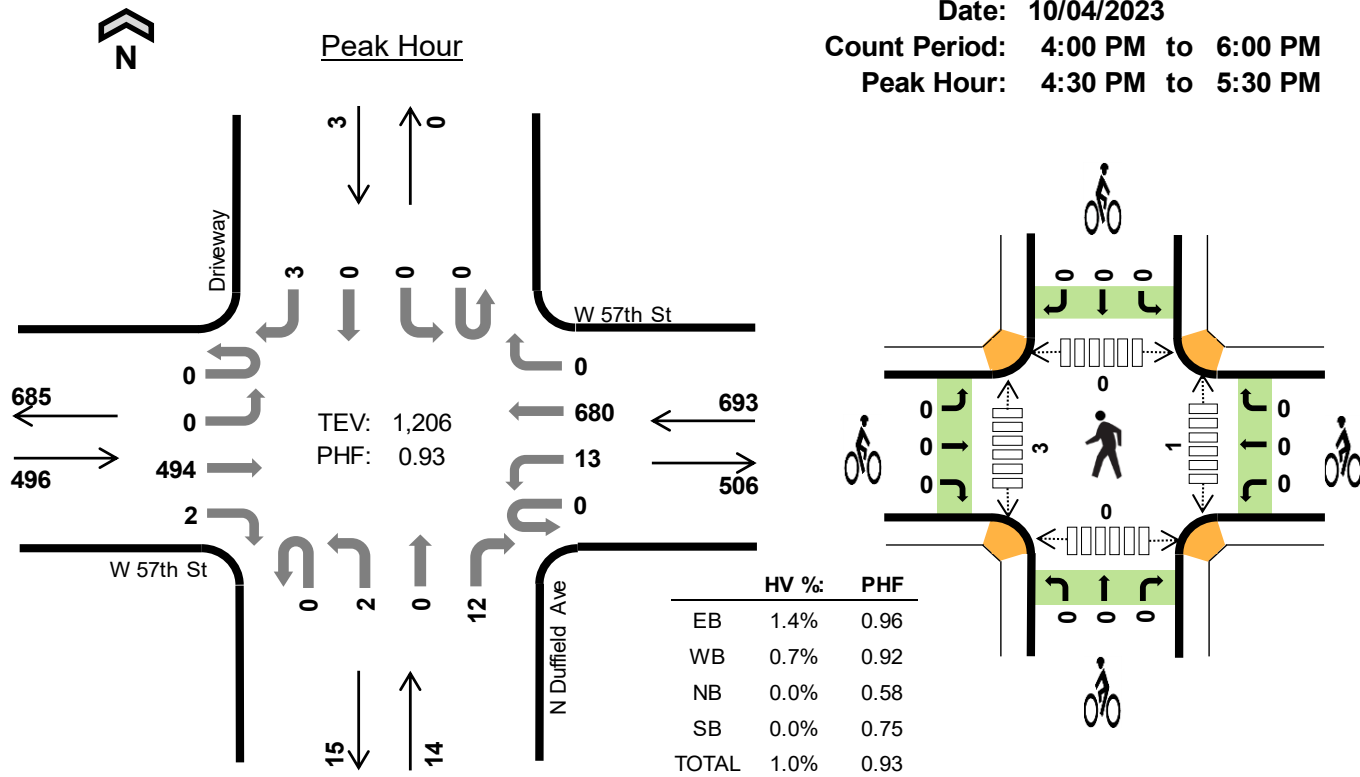
Interval Start	W 57th St				W 57th St				N Duffield Ave				Driveway				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
7:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
7:45 AM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6
8:00 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	8
8:15 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	5	11
8:30 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	5	15
8:45 AM	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	5	17
Count Total	0	0	16	0	0	0	7	0	0	0	0	0	0	0	0	0	23	0
Peak Hour	0	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	8	0

Count Summaries - Bikes

Interval Start	W 57th St			W 57th St			N Duffield Ave			Driveway			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	0	0	0	0	0	2	0	0	0	0	2	0
Peak Hour	0	0	0	0	0	0	0	1	0	0	0	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Duffield Ave W 57th St



Count Summaries

Interval Start		W 57th St				W 57th St				N Duffield Ave				Driveway				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	1	118	0	0	1	151	0	0	0	0	1	0	0	0	0	272	0
4:15 PM		0	1	161	1	0	2	134	1	0	0	0	1	0	0	0	2	303	0
4:30 PM		0	0	126	1	0	1	149	0	0	1	0	2	0	0	0	1	281	0
4:45 PM		0	0	114	0	0	2	183	0	0	1	0	1	0	0	0	0	301	1,157
5:00 PM		0	0	126	0	0	3	167	0	0	0	0	3	0	0	0	1	300	1,185
5:15 PM		0	0	128	1	0	7	181	0	0	0	0	6	0	0	0	1	324	1,206
5:30 PM		0	0	114	1	0	0	158	0	0	0	0	4	0	1	0	0	278	1,203
5:45 PM		0	0	96	3	0	7	139	2	0	0	0	2	0	1	0	2	252	1,154
Count Total		0	2	983	7	0	23	1,262	3	0	2	0	20	0	2	0	7	2,311	0
Peak Hour	All	0	0	494	2	0	13	680	0	0	2	0	12	0	0	0	3	1,206	0
	HV	0	0	7	0	0	0	5	0	0	0	0	0	0	0	0	0	12	0
	HV%	-	-	1%	0%	-	0%	1%	-	-	0%	-	0%	-	-	-	0%	1%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0
4:15 PM	8	2	0	0	10	0	0	0	0	0	0	0	0	0	0
4:30 PM	2	0	0	0	2	0	0	0	0	0	1	0	0	0	1
4:45 PM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2
5:00 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0
5:15 PM	3	2	0	0	5	0	0	0	0	0	0	1	0	0	1
5:30 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0
5:45 PM	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Count Total	21	11	0	0	32	0	0	0	0	0	1	3	0	0	4
Peak Hour	7	5	0	0	12	0	0	0	0	0	1	3	0	0	4

Count Summaries - Heavy Vehicles

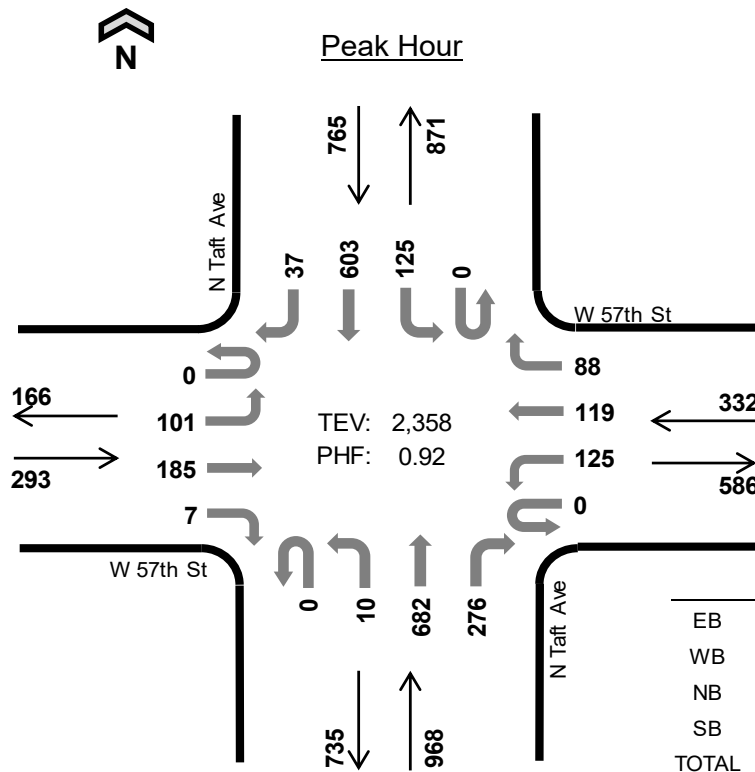
Interval Start	W 57th St				W 57th St				N Duffield Ave				Driveway				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	4	0
4:15 PM	0	0	8	0	0	0	2	0	0	0	0	0	0	0	0	0	10	0
4:30 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
4:45 PM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	3	19
5:00 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	17
5:15 PM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	5	12
5:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	12
5:45 PM	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	13
Count Total	0	0	21	0	0	0	11	0	0	0	0	0	0	0	0	0	32	0
Peak Hour	0	0	7	0	0	0	5	0	0	0	0	0	0	0	0	0	12	0

Count Summaries - Bikes

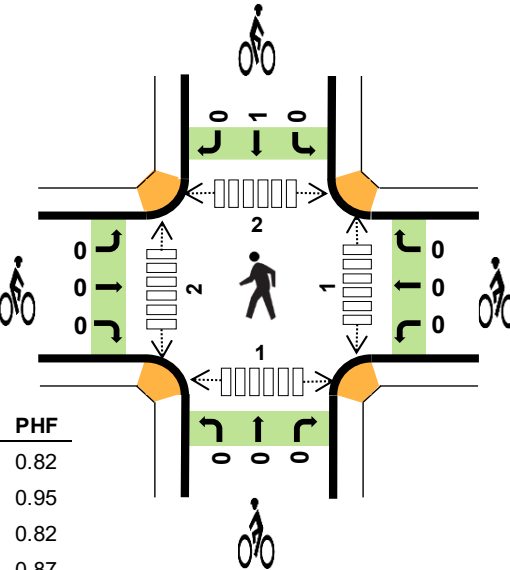
Interval Start	W 57th St			W 57th St			N Duffield Ave			Driveway			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Taft Ave W 57th St



Date: 10/04/2023
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM



	HV %:	PHF
EB	1.7%	0.82
WB	0.6%	0.95
NB	1.1%	0.82
SB	1.6%	0.87
TOTAL	1.3%	0.92

Count Summaries

Interval Start		W 57th St				W 57th St				N Taft Ave				N Taft Ave				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	16	45	4	0	20	20	15	0	1	128	46	0	10	116	6	427	0
7:15 AM		0	22	43	0	0	26	26	23	0	2	183	73	0	24	163	4	589	0
7:30 AM		0	38	50	1	0	33	25	29	0	3	207	84	0	27	141	6	644	0
7:45 AM		0	18	55	3	0	32	40	15	0	3	155	71	0	42	166	12	612	2,272
8:00 AM		0	23	37	3	0	34	28	21	0	2	137	48	0	32	133	15	513	2,358
8:15 AM		0	29	36	1	0	33	26	22	0	0	144	51	0	33	147	10	532	2,301
8:30 AM		0	23	48	5	0	32	38	28	0	2	181	60	0	21	135	9	582	2,239
8:45 AM		0	11	38	4	0	34	32	21	0	2	136	48	0	38	129	16	509	2,136
Count Total		0	180	352	21	0	244	235	174	0	15	1,271	481	0	227	1,130	78	4,408	0
Peak Hour	All	0	101	185	7	0	125	119	88	0	10	682	276	0	125	603	37	2,358	0
	HV	0	2	2	1	0	1	0	1	0	0	7	4	0	0	12	0	30	0
	HV%	-	2%	1%	14%	-	1%	0%	1%	-	0%	1%	1%	-	0%	2%	0%	1%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	0	3	3	0	0	0	0	0	0	1	0	0	1
7:15 AM	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0
7:30 AM	1	1	1	4	7	0	0	0	0	0	0	1	1	0	2
7:45 AM	2	0	4	4	10	0	0	0	1	1	0	1	0	0	1
8:00 AM	2	1	3	2	8	0	0	0	0	0	1	0	1	1	3
8:15 AM	0	2	7	1	10	0	0	0	1	1	1	1	1	1	4
8:30 AM	1	2	2	6	11	0	0	0	1	1	1	0	0	1	2
8:45 AM	2	1	2	4	9	0	0	0	0	0	1	0	0	1	2
Count Total	8	7	22	26	63	0	0	0	3	3	4	4	3	4	15
Peak Hour	5	2	11	12	30	0	0	0	1	1	1	2	2	1	6

Count Summaries - Heavy Vehicles

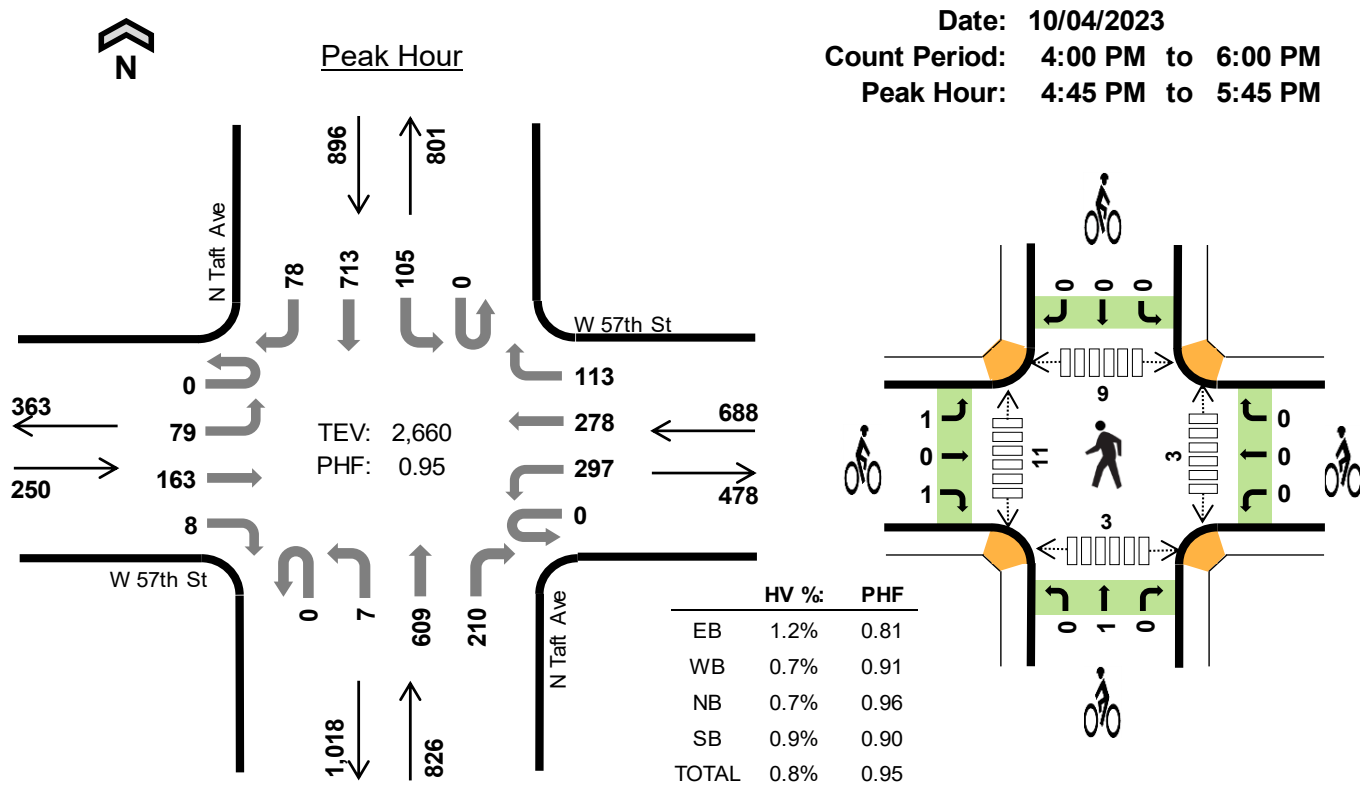
Interval Start	W 57th St				W 57th St				N Taft Ave				N Taft Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	1	2	0	0	2	0	5	0
7:30 AM	0	1	0	0	0	1	0	0	0	0	1	0	0	0	4	0	7	0
7:45 AM	0	0	1	1	0	0	0	0	0	0	2	2	0	0	4	0	10	25
8:00 AM	0	1	1	0	0	0	0	1	0	0	3	0	0	0	2	0	8	30
8:15 AM	0	0	0	0	0	0	1	1	0	0	3	4	0	0	1	0	10	35
8:30 AM	0	0	1	0	0	0	1	1	0	0	2	0	0	1	4	1	11	39
8:45 AM	0	0	2	0	0	0	1	0	0	0	1	1	0	1	3	0	9	38
Count Total	0	2	5	1	0	1	3	3	0	0	13	9	0	2	22	2	63	0
Peak Hour	0	2	2	1	0	1	0	1	0	0	7	4	0	0	12	0	30	0

Count Summaries - Bikes

Interval Start	W 57th St			W 57th St			N Taft Ave			N Taft Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	2
8:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	3
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	0	0	3	0	3	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	1	0	1	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Taft Ave W 57th St



Count Summaries

Interval Start		W 57th St				W 57th St				N Taft Ave				N Taft Ave				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	9	36	0	0	74	58	19	0	5	144	54	0	31	171	19	620	0
4:15 PM		0	16	51	2	0	57	55	22	0	6	129	79	0	35	160	18	630	0
4:30 PM		0	15	43	4	0	64	71	18	0	5	159	63	0	24	182	14	662	0
4:45 PM		0	13	33	3	0	82	63	30	0	2	156	46	0	30	170	9	637	2,549
5:00 PM		0	26	47	1	0	62	70	25	0	1	146	57	0	25	182	11	653	2,582
5:15 PM		0	23	52	2	0	74	80	34	0	3	158	55	0	15	178	26	700	2,652
5:30 PM		0	17	31	2	0	79	65	24	0	1	149	52	0	35	183	32	670	2,660
5:45 PM		0	7	26	2	0	55	64	24	0	2	148	46	0	27	160	20	581	2,604
Count Total		0	126	319	16	0	547	526	196	0	25	1,189	452	0	222	1,386	149	5,153	0
Peak Hour	All	0	79	163	8	0	297	278	113	0	7	609	210	0	105	713	78	2,660	0
	HV	0	0	3	0	0	2	3	0	0	0	3	3	0	0	7	1	22	0
	HV%	-	0%	2%	0%	-	1%	1%	0%	-	0%	0%	1%	-	0%	1%	1%	1%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	3	2	3	9	0	0	0	0	0	0	0	0	0	0
4:15 PM	4	1	8	2	15	0	0	0	0	0	0	0	3	3	6
4:30 PM	1	2	2	5	10	0	0	1	0	1	0	1	2	0	3
4:45 PM	1	1	1	2	5	0	0	0	0	0	0	4	1	0	5
5:00 PM	0	1	2	2	5	0	0	1	0	1	0	1	2	2	5
5:15 PM	2	2	2	3	9	2	0	0	0	2	1	1	1	1	4
5:30 PM	0	1	1	1	3	0	0	0	0	0	2	5	5	0	12
5:45 PM	1	0	3	3	7	0	0	0	0	0	0	0	0	0	0
Count Total	10	11	21	21	63	2	0	2	0	4	3	12	14	6	35
Peak Hour	3	5	6	8	22	2	0	1	0	3	3	11	9	3	26

Count Summaries - Heavy Vehicles

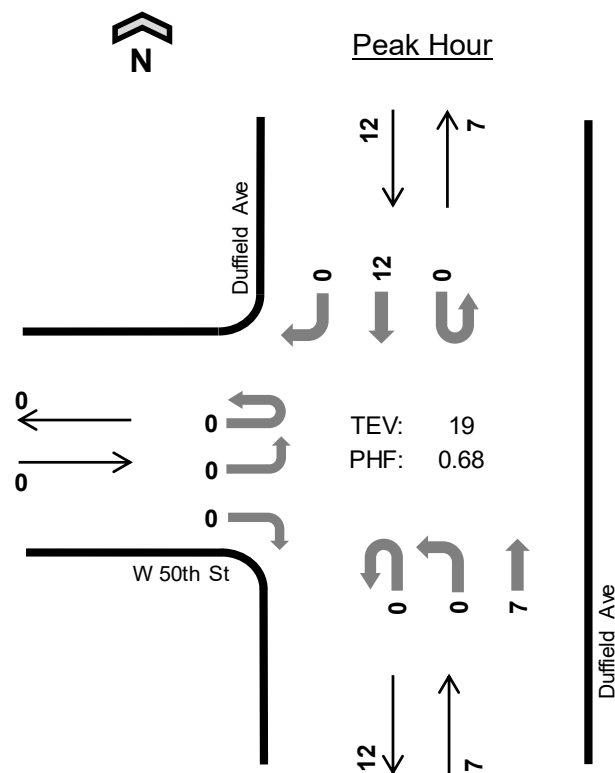
Interval Start	W 57th St				W 57th St				N Taft Ave				N Taft Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	1	0	0	1	2	0	0	0	2	0	0	0	2	1	9	0
4:15 PM	0	2	2	0	0	1	0	0	0	0	2	6	0	0	2	0	15	0
4:30 PM	0	0	1	0	0	0	1	1	0	0	2	0	0	1	4	0	10	0
4:45 PM	0	0	1	0	0	0	1	0	0	0	1	0	0	0	2	0	5	39
5:00 PM	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	1	5	35
5:15 PM	0	0	2	0	0	1	1	0	0	0	1	1	0	0	3	0	9	29
5:30 PM	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	3	22
5:45 PM	0	0	1	0	0	0	0	0	0	0	1	2	0	1	2	0	7	24
Count Total	0	2	8	0	0	4	6	1	0	0	10	11	0	2	17	2	63	0
Peak Hour	0	0	3	0	0	2	3	0	0	0	3	3	0	0	7	1	22	0

Count Summaries - Bikes

Interval Start	W 57th St			W 57th St			N Taft Ave			N Taft Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	2
5:15 PM	1	0	1	0	0	0	0	0	0	0	0	0	2	4
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Count Total	1	0	1	0	0	0	0	2	0	0	0	0	4	0
Peak Hour	1	0	1	0	0	0	0	1	0	0	0	0	3	0

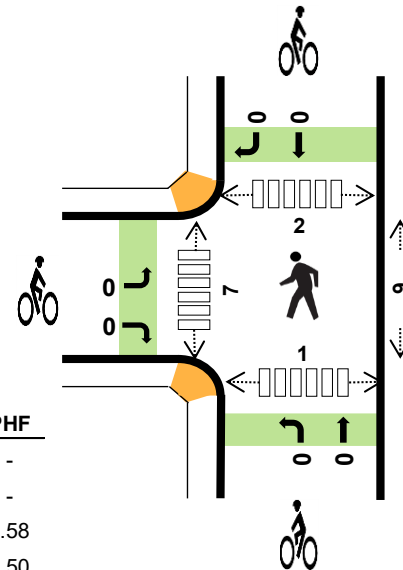
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Duffield Ave W 50th St



Date: 10/04/2023
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM

	HV %	PHF
EB	-	-
WB	-	-
NB	0.0%	0.58
SB	0.0%	0.50
TOTAL	0.0%	0.68



Count Summaries

Interval Start		W 50th St				N/A				Duffield Ave				Duffield Ave				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
7:15 AM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
7:30 AM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
7:45 AM		0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	9
8:00 AM		0	0	0	0	0	0	0	0	0	0	1	0	0	0	6	0	7	15
8:15 AM		0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	4	17
8:30 AM		0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	19
8:45 AM		0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	4	19
Count Total		0	0	0	0	0	0	0	0	0	0	10	0	0	0	18	0	28	0
Peak Hour	All	0	0	0	0	0	0	0	0	0	0	7	0	0	0	12	0	19	0
	HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HV%	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	0%	-	0%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	0	0	0	0	0	1	0	1	1	4	0	0	5
7:15 AM	0	0	0	0	0	0	0	0	0	0	4	1	0	0	5
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	2	0	0	4
7:45 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
8:00 AM	0	0	0	0	0	0	0	0	0	0	2	2	1	0	5
8:15 AM	0	0	0	0	0	0	0	0	0	0	3	1	0	0	4
8:30 AM	0	0	0	0	0	0	0	0	0	0	3	3	1	1	8
8:45 AM	0	0	0	0	0	0	0	0	0	0	5	4	0	0	9
Count Total	0	0	0	0	0	0	0	1	0	1	21	18	2	1	42
Peak Hr	0	0	0	0	0	0	0	0	0	0	9	7	2	1	19

Count Summaries - Heavy Vehicles

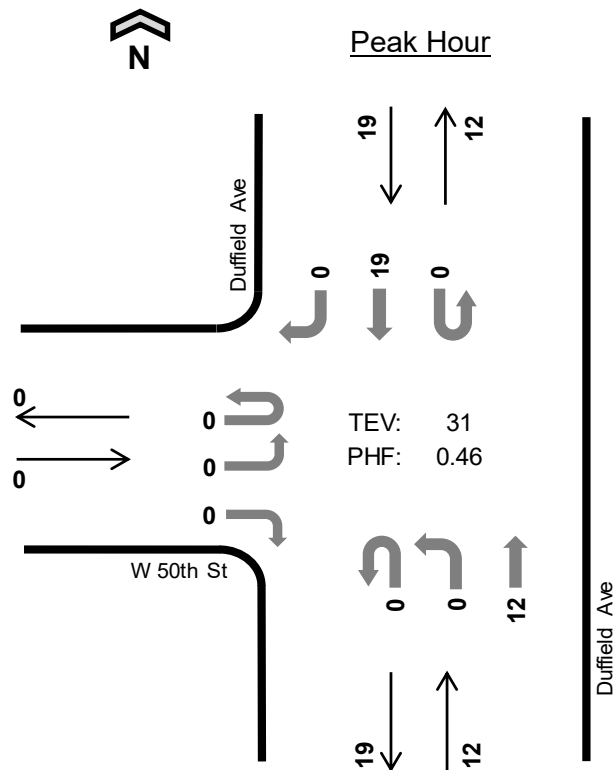
Interval Start	W 50th St				N/A				Duffield Ave				Duffield Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Count Summaries - Bikes

Interval Start	W 50th St			N/A			Duffield Ave			Duffield Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

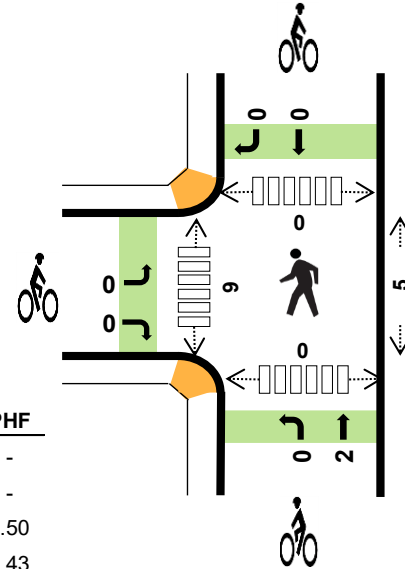
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Duffield Ave W 50th St



Date: 10/04/2023
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM

	HV %:	PHF
EB	-	-
WB	-	-
NB	0.0%	0.50
SB	0.0%	0.43
TOTAL	0.0%	0.46



Count Summaries

Interval Start		W 50th St				N/A				Duffield Ave				Duffield Ave				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	0
4:15 PM		0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	5	0
4:30 PM		0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	10	0
4:45 PM		0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	5	26
5:00 PM		0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	22
5:15 PM		0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	4	21
5:30 PM		0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	8	19
5:45 PM		0	0	0	0	0	0	0	0	0	0	6	0	0	0	11	0	17	31
Count Total		0	0	0	0	0	0	0	0	0	0	28	0	0	0	29	0	57	0
Peak Hour	All	0	0	0	0	0	0	0	0	0	0	12	0	0	0	19	0	31	0
	HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HV%	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	0%	-	0%	0

Note: Count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3
4:30 PM	0	0	0	0	0	0	0	1	0	1	2	0	0	0	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	2	0	2	3	4	0	0	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Count Total	0	0	0	0	0	0	0	3	0	3	10	20	0	0	30
Peak Hr	0	0	0	0	0	0	0	2	0	2	5	9	0	0	14

Count Summaries - Heavy Vehicles

Interval Start	W 50th St				N/A				Duffield Ave				Duffield Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Count Summaries - Bikes

Interval Start	W 50th St			N/A			Duffield Ave			Duffield Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	2	0	0	0	0	2	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	3	0	0	0	0	3	0
Peak Hour	0	0	0	0	0	0	0	2	0	0	0	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

APPENDIX E – Existing Synchro Outputs

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	119	218	8	136	129	96	12	805	326	144	693	43
v/c Ratio	0.38	0.70	0.02	0.45	0.33	0.22	0.04	0.99	0.39	0.65	0.68	0.05
Control Delay (s/veh)	29.0	51.1	0.1	28.6	34.4	2.7	11.4	60.3	6.0	32.1	23.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	29.0	51.1	0.1	28.6	34.4	2.7	11.4	60.3	6.0	32.1	23.0	0.1
Queue Length 50th (ft)	54	132	0	63	70	0	3	~567	23	40	291	0
Queue Length 95th (ft)	84	185	0	101	114	15	12	#733	68	#147	#596	0
Internal Link Dist (ft)		956			1269			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	310	409	459	313	503	531	298	811	840	221	1022	932
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.53	0.02	0.43	0.26	0.18	0.04	0.99	0.39	0.65	0.68	0.05

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	185	7	125	119	88	10	684	277	125	603	37
Future Volume (veh/h)	101	185	7	125	119	88	10	684	277	125	603	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	119	218	8	136	129	96	12	805	326	144	693	43
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.85	0.85	0.85	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	290	262	222	250	323	274	295	936	793	234	1016	861
Arrive On Green	0.05	0.14	0.14	0.08	0.17	0.17	0.01	0.50	0.50	0.06	0.54	0.54
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	119	218	8	136	129	96	12	805	326	144	693	43
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	5.0	11.3	0.4	6.4	6.1	5.3	0.3	37.8	12.9	3.8	26.9	1.3
Cycle Q Clear(g_c), s	5.0	11.3	0.4	6.4	6.1	5.3	0.3	37.8	12.9	3.8	26.9	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	290	262	222	250	323	274	295	936	793	234	1016	861
V/C Ratio(X)	0.41	0.83	0.04	0.54	0.40	0.35	0.04	0.86	0.41	0.61	0.68	0.05
Avail Cap(c_a), veh/h	290	411	349	281	505	428	359	936	793	240	1016	861
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.6	41.8	37.1	33.2	36.7	36.4	14.5	21.9	15.7	20.6	16.6	10.7
Incr Delay (d2), s/veh	0.9	8.0	0.1	1.8	0.8	0.8	0.1	10.2	1.6	4.5	3.7	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	5.6	0.2	2.8	2.8	2.1	0.1	17.3	4.7	1.8	11.1	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.5	49.8	37.2	35.1	37.5	37.2	14.5	32.1	17.3	25.1	20.3	10.8
LnGrp LOS	D	D	D	D	D	D	B	C	B	C	C	B
Approach Vol, veh/h	345			361			1143			880		
Approach Delay, s/veh	44.9			36.5			27.7			20.6		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.7	56.0	13.3	20.0	6.4	60.3	10.0	23.3				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	6.0	40.0	10.0	22.0	5.0	41.0	5.0	27.0				
Max Q Clear Time (g_c+I1), s	5.8	39.8	8.4	13.3	2.3	28.9	7.0	8.1				
Green Ext Time (p_c), s	0.0	0.2	0.0	0.7	0.0	3.5	0.0	0.8				
Intersection Summary												
HCM 7th Control Delay, s/veh	28.8											
HCM 7th LOS	C											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	586	0	10	330	3	0	0	11	1	0	2
Future Vol, veh/h	1	586	0	10	330	3	0	0	11	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	92	92	92	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	658	0	11	359	3	0	0	13	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	362	0	0	658	0	0	1041	1044	658	1043	1043	360
Stage 1	-	-	-	-	-	-	661	661	-	382	382	-
Stage 2	-	-	-	-	-	-	380	384	-	661	661	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1197	-	-	929	-	-	208	229	464	207	229	684
Stage 1	-	-	-	-	-	-	452	460	-	640	613	-
Stage 2	-	-	-	-	-	-	642	612	-	452	460	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1197	-	-	929	-	-	205	226	464	199	227	684
Mov Cap-2 Maneuver	-	-	-	-	-	-	205	226	-	199	227	-
Stage 1	-	-	-	-	-	-	451	459	-	633	605	-
Stage 2	-	-	-	-	-	-	632	604	-	439	459	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.01	0.26	12.98	14.62
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	464	1197	-	-	929	-	-	378
HCM Lane V/C Ratio	0.028	0.001	-	-	0.012	-	-	0.009
HCM Control Delay (s/veh)	13	8	-	-	8.9	-	-	14.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection

Int Delay, s/veh 0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	7	12	0
Future Vol, veh/h	0	0	0	7	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	8	14	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	22	14	14
Stage 1	14	-	-
Stage 2	8	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	994	1066	1604
Stage 1	1009	-	-
Stage 2	1015	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	994	1066	1604
Mov Cap-2 Maneuver	994	-	-
Stage 1	1009	-	-
Stage 2	1015	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1604	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	93	199	9	329	308	124	8	662	228	117	792	87
v/c Ratio	0.36	0.72	0.02	0.89	0.65	0.25	0.04	0.79	0.27	0.48	0.79	0.09
Control Delay (s/veh)	31.2	59.2	0.1	58.0	44.6	6.6	11.3	33.8	3.2	19.0	28.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.2	59.2	0.1	58.0	44.6	6.6	11.3	33.8	3.2	19.0	28.5	0.2
Queue Length 50th (ft)	46	135	0	191	203	0	2	385	0	35	391	0
Queue Length 95th (ft)	77	194	0	#361	292	43	10	542	43	66	#777	0
Internal Link Dist (ft)		956			1269			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	259	338	434	370	489	511	196	860	853	244	1007	938
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.59	0.02	0.89	0.63	0.24	0.04	0.77	0.27	0.48	0.79	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	169	8	299	280	113	7	609	210	105	713	78
Future Volume (veh/h)	79	169	8	299	280	113	7	609	210	105	713	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	93	199	9	329	308	124	8	662	228	117	792	87
Peak Hour Factor	0.85	0.85	0.85	0.91	0.91	0.91	0.92	0.92	0.92	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	237	201	303	373	316	216	953	808	297	1020	864
Arrive On Green	0.05	0.13	0.13	0.12	0.20	0.20	0.01	0.51	0.51	0.05	0.55	0.55
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	93	199	9	329	308	124	8	662	228	117	792	87
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	5.0	11.4	0.5	13.0	17.4	7.5	0.2	29.6	9.1	3.4	36.7	2.9
Cycle Q Clear(g_c), s	5.0	11.4	0.5	13.0	17.4	7.5	0.2	29.6	9.1	3.4	36.7	2.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	186	237	201	303	373	316	216	953	808	297	1020	864
V/C Ratio(X)	0.50	0.84	0.04	1.09	0.83	0.39	0.04	0.69	0.28	0.39	0.78	0.10
Avail Cap(c_a), veh/h	186	340	288	303	476	403	280	953	808	297	1020	864
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	46.9	42.2	39.3	42.2	38.2	17.7	20.5	15.4	16.4	19.7	12.0
Incr Delay (d2), s/veh	2.1	11.9	0.1	77.0	9.1	0.8	0.1	4.2	0.9	0.8	5.8	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	6.0	0.2	8.3	8.7	2.9	0.1	12.8	3.3	1.3	15.8	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.3	58.9	42.3	116.2	51.3	39.0	17.8	24.6	16.3	17.3	25.5	12.3
LnGrp LOS	D	E	D	F	D	D	B	C	B	B	C	B
Approach Vol, veh/h	301			761			898			996		
Approach Delay, s/veh	53.3			77.4			22.5			23.4		
Approach LOS	D			E			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	62.1	18.0	19.9	6.1	66.0	10.0	27.9				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	5.0	50.0	13.0	20.0	5.0	50.0	5.0	28.0				
Max Q Clear Time (g_c+I1), s	5.4	31.6	15.0	13.4	2.2	38.7	7.0	19.4				
Green Ext Time (p_c), s	0.0	4.7	0.0	0.5	0.0	4.1	0.0	1.4				
Intersection Summary												
HCM 7th Control Delay, s/veh	40.1											
HCM 7th LOS	D											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	482	2	12	689	0	1	0	14	1	0	2
Future Vol, veh/h	0	482	2	12	689	0	1	0	14	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	524	2	13	749	0	1	0	16	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	749	0	0	526	0	0	1300	1300	525	1299	1301	749
Stage 1	-	-	-	-	-	-	525	525	-	775	775	-
Stage 2	-	-	-	-	-	-	775	775	-	524	526	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	860	-	-	1041	-	-	138	161	552	138	161	412
Stage 1	-	-	-	-	-	-	536	529	-	391	408	-
Stage 2	-	-	-	-	-	-	391	408	-	537	529	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	860	-	-	1041	-	-	136	159	552	133	159	412
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	159	-	133	159	-
Stage 1	-	-	-	-	-	-	536	529	-	386	403	-
Stage 2	-	-	-	-	-	-	384	403	-	521	529	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.15	13.16	20.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	459	860	-	-	1041	-	-	242
HCM Lane V/C Ratio	0.038	-	-	-	0.013	-	-	0.015
HCM Control Delay (s/veh)	13.2	0	-	-	8.5	-	-	20.1
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection

Int Delay, s/veh 0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	9	10	0
Future Vol, veh/h	0	0	0	9	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	11	12	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	22	12	12
Stage 1	12	-	-
Stage 2	11	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	994	1069	1607
Stage 1	1011	-	-
Stage 2	1012	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	994	1069	1607
Mov Cap-2 Maneuver	994	-	-
Stage 1	1011	-	-
Stage 2	1012	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1607	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

APPENDIX F – Pipeline Development Excerpts



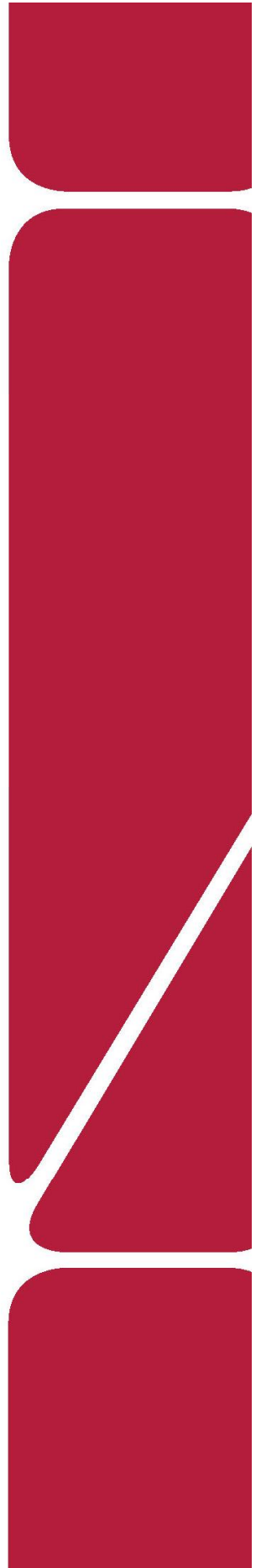
Traffic Impact Study

Green Valley Ranch & Elkader Loveland, Colorado

Prepared for:

LGI Homes, LLC

Kimley»Horn



T R A F F I C I M P A C T S T U D Y

Green Valley Ranch & Elkader

Loveland, Colorado

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August 2021

This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.



GREEN VALLEY RANCH & ELKADER
VICINITY MAP

FIGURE 1

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For the purposes of this study, Kimley-Horn used the ITE Trip Generation equations that apply to Single-Family Detached Housing (ITE Code 210), Shopping Center (ITE 820), Fast Casual Restaurant (ITE 930), and Fast Food with Drive-Thru (ITE 934).

Since the Elkader property is proposed to contain a mix of residential and retail uses, internal capture trips are expected to occur on site as well. These internal capture trips are shared trips from vehicles already within the internal street network. These shared trips reduce the number of total external trips and were calculated directly per the ITE procedure.

Green Valley Ranch and Elkader is expected to generate approximately 10,784 weekday daily external trips, with 912 of these trips occurring during the morning peak hour and 1,000 of these trips occurring during the afternoon peak hour. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10th Edition – Volume 1: User's Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the Green Valley Ranch and Elkader development. The trip generation worksheets are included in **Appendix C**.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

Table 1 – Green Valley Ranch & Elkader Traffic Generation

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached Housing (ITE 210) – 957 Dwelling Units	7,840	165	492	657	518	306	824
Shopping Center (ITE 820) – 23,000 Square Feet	1,456	88	51	139	43	42	85
Fast Casual Restaurant (ITE 930) – 5,000 Square Feet	448	5	3	8	22	13	35
Fast Food with DT (ITE 934) – 3,500 Square Feet	1,040	50	58	108	34	22	56
Total Project Trips after Internal Capture	10,784	308	604	912	617	383	1,000

4.2 Trip Distribution

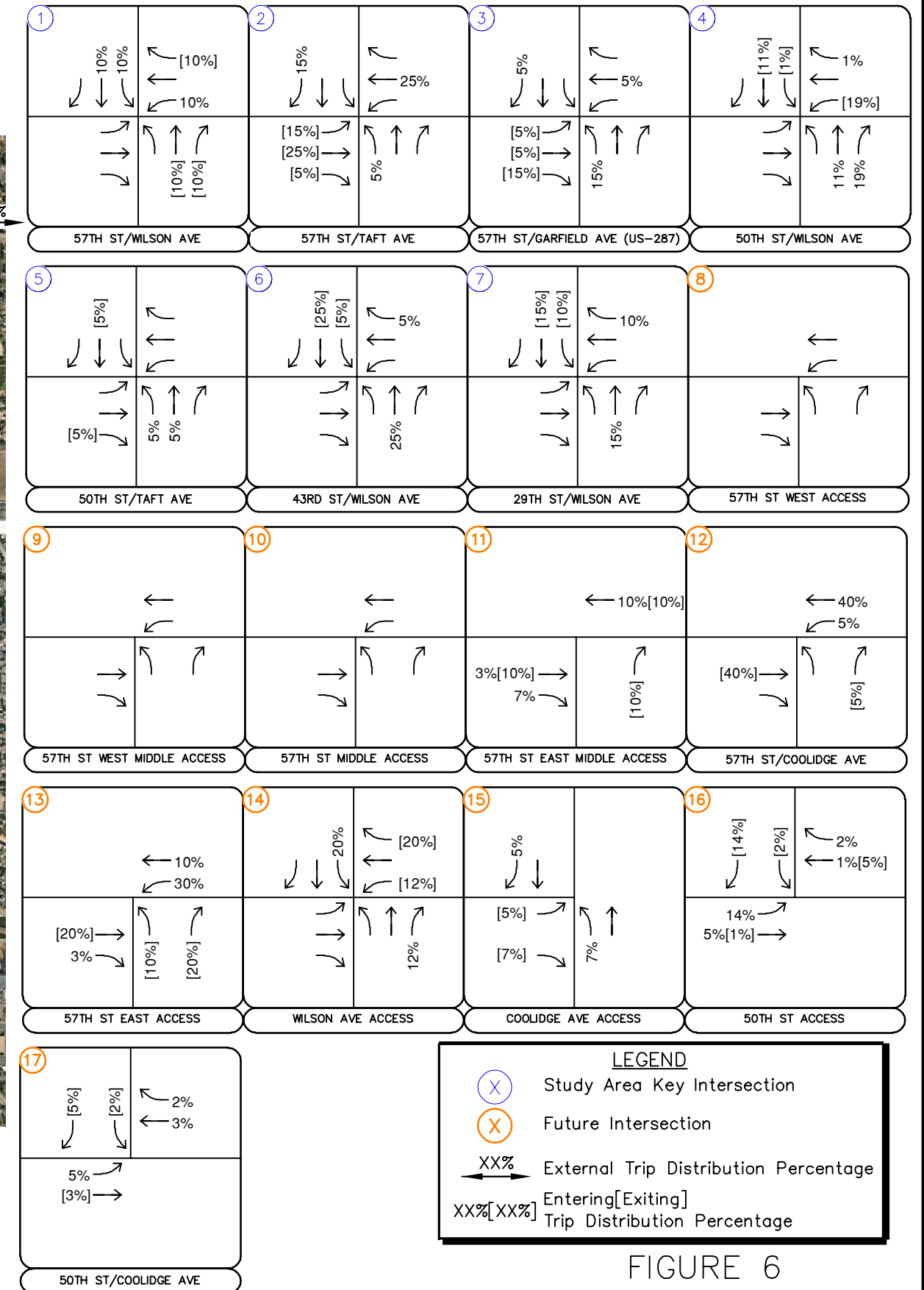
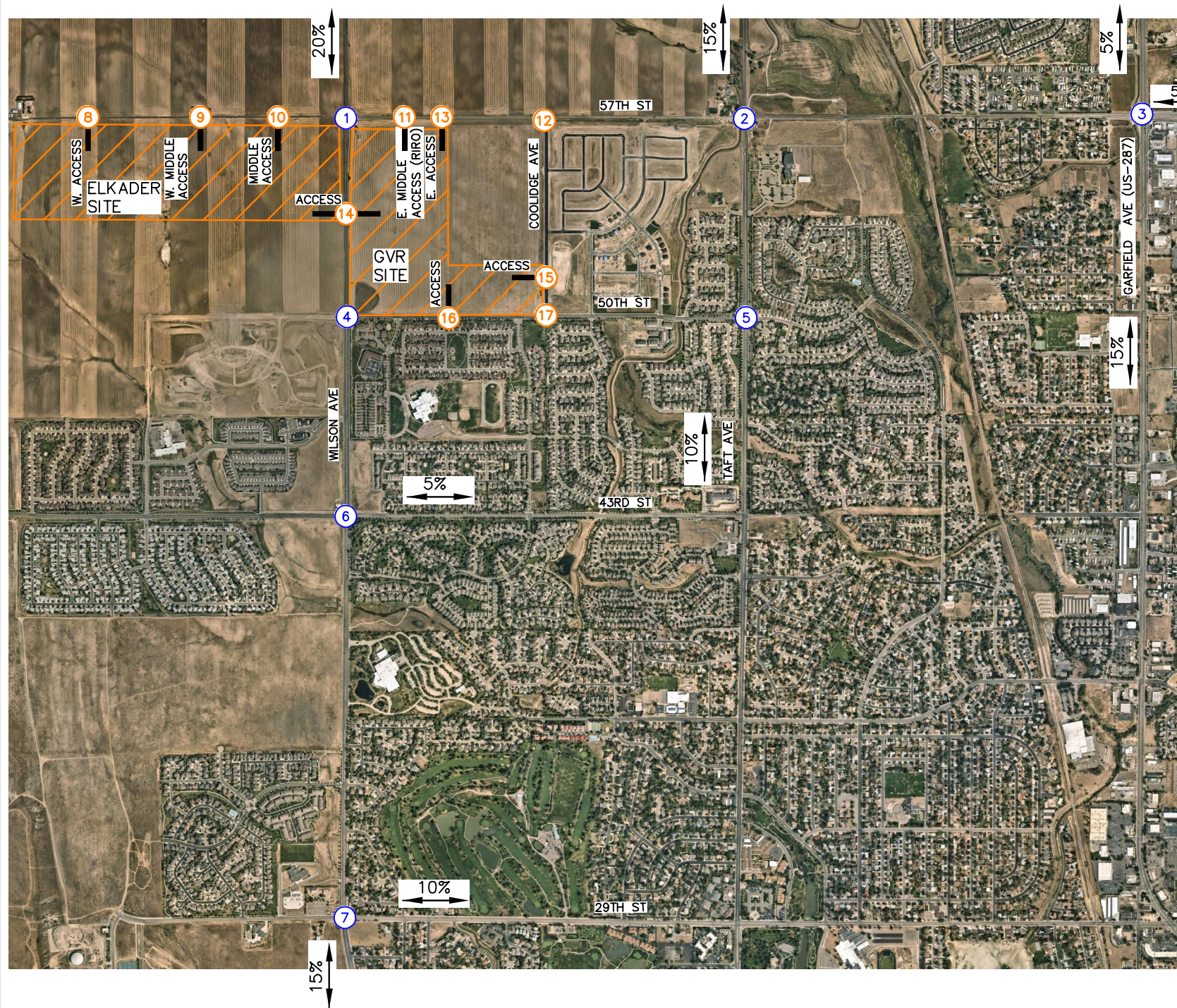
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 6** for the residential portion of Green Valley Ranch, **Figure 7** for the residential portion of Elkader, and **Figure 8** for the commercial portion of Elkader.

4.3 Traffic Assignment

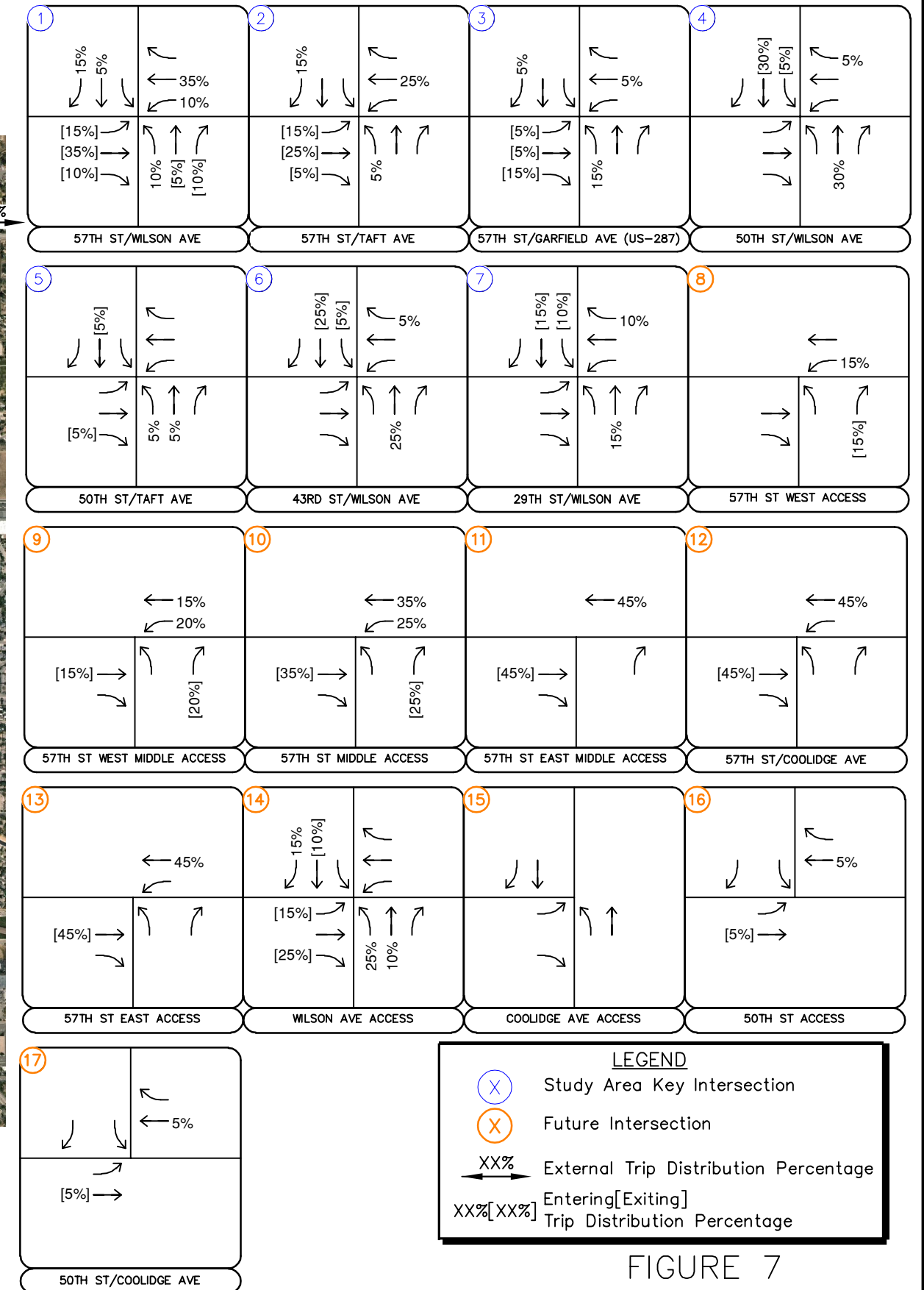
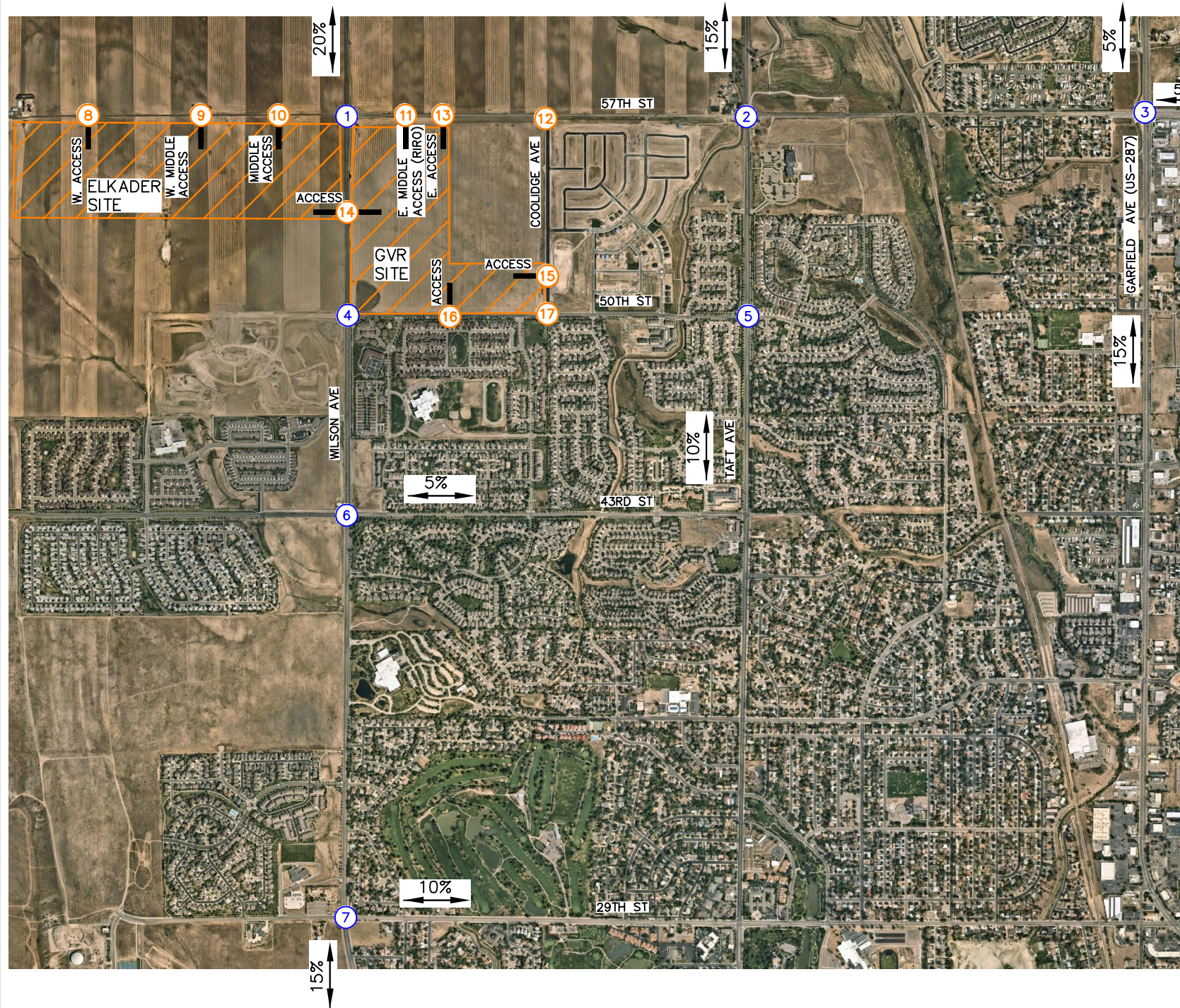
Green Valley Ranch and Elkader traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 9**.

4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the 2025 horizon and long term 2040 horizon. These total traffic volumes for the study area are illustrated for the 2025 and 2040 horizon years in **Figures 9** and **10**, respectively.

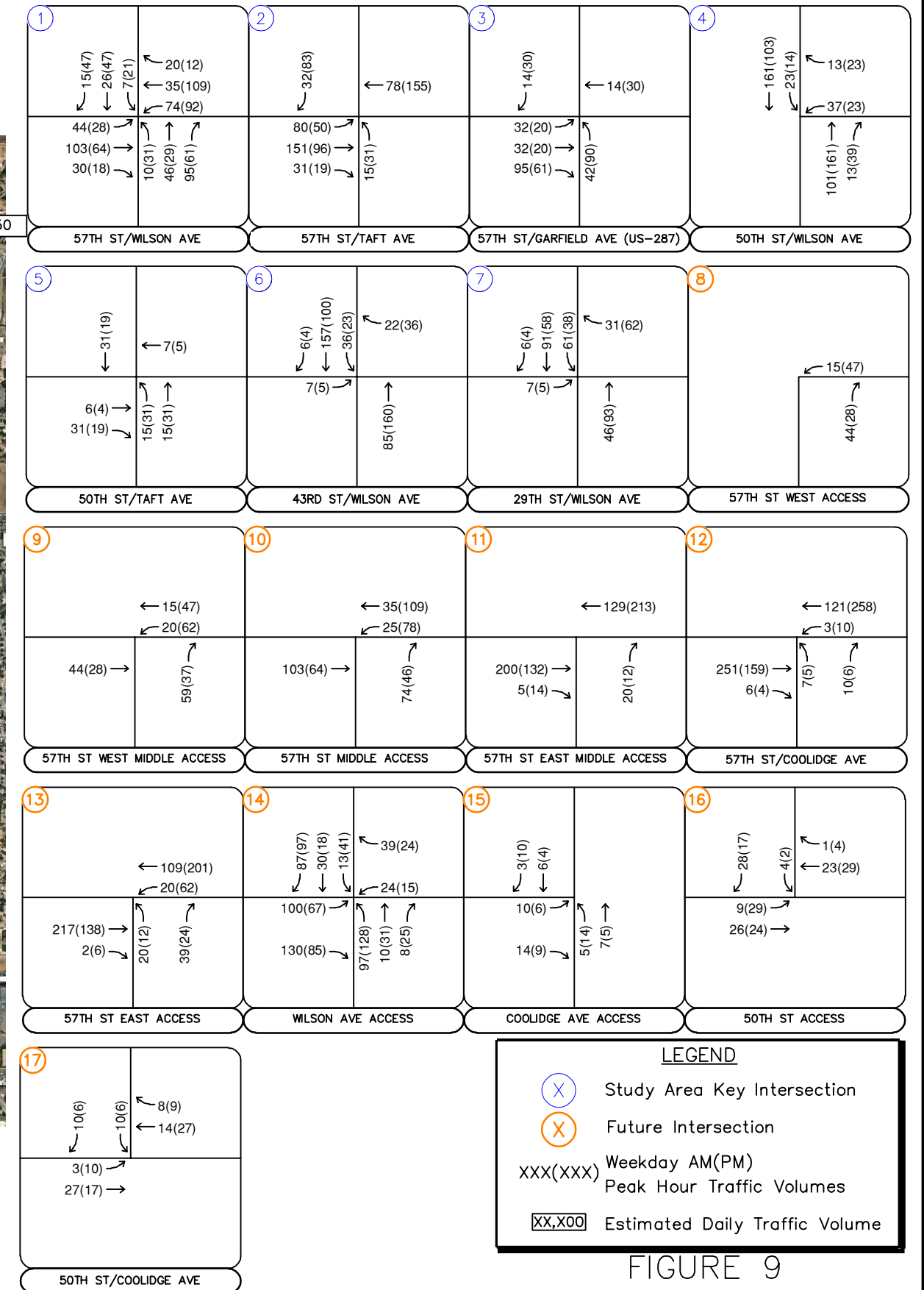
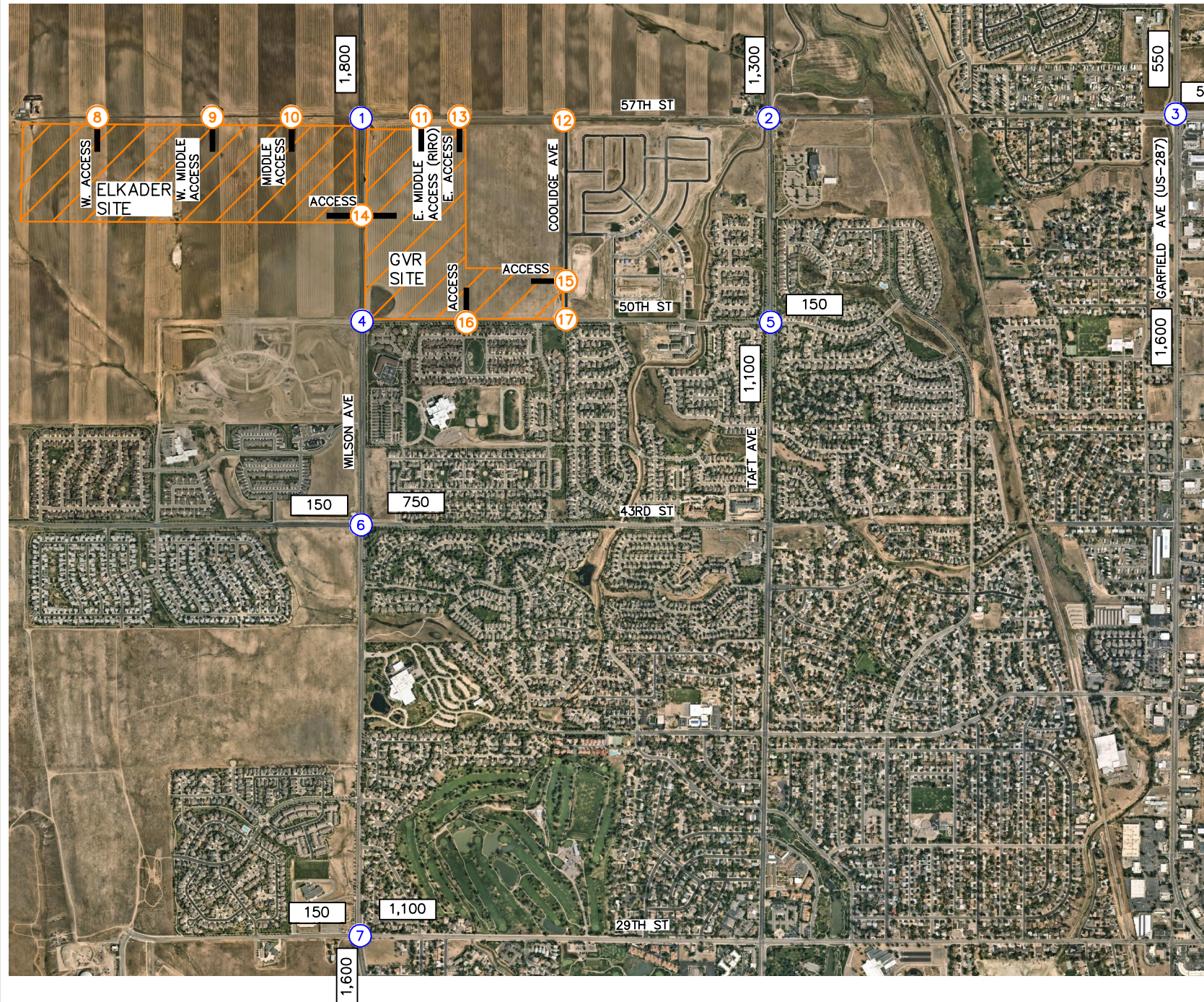


GREEN VALLEY RANCH & ELKADER
GREEN VALLEY RANCH RESIDENTIAL PROJECT TRIP DISTRIBUTION



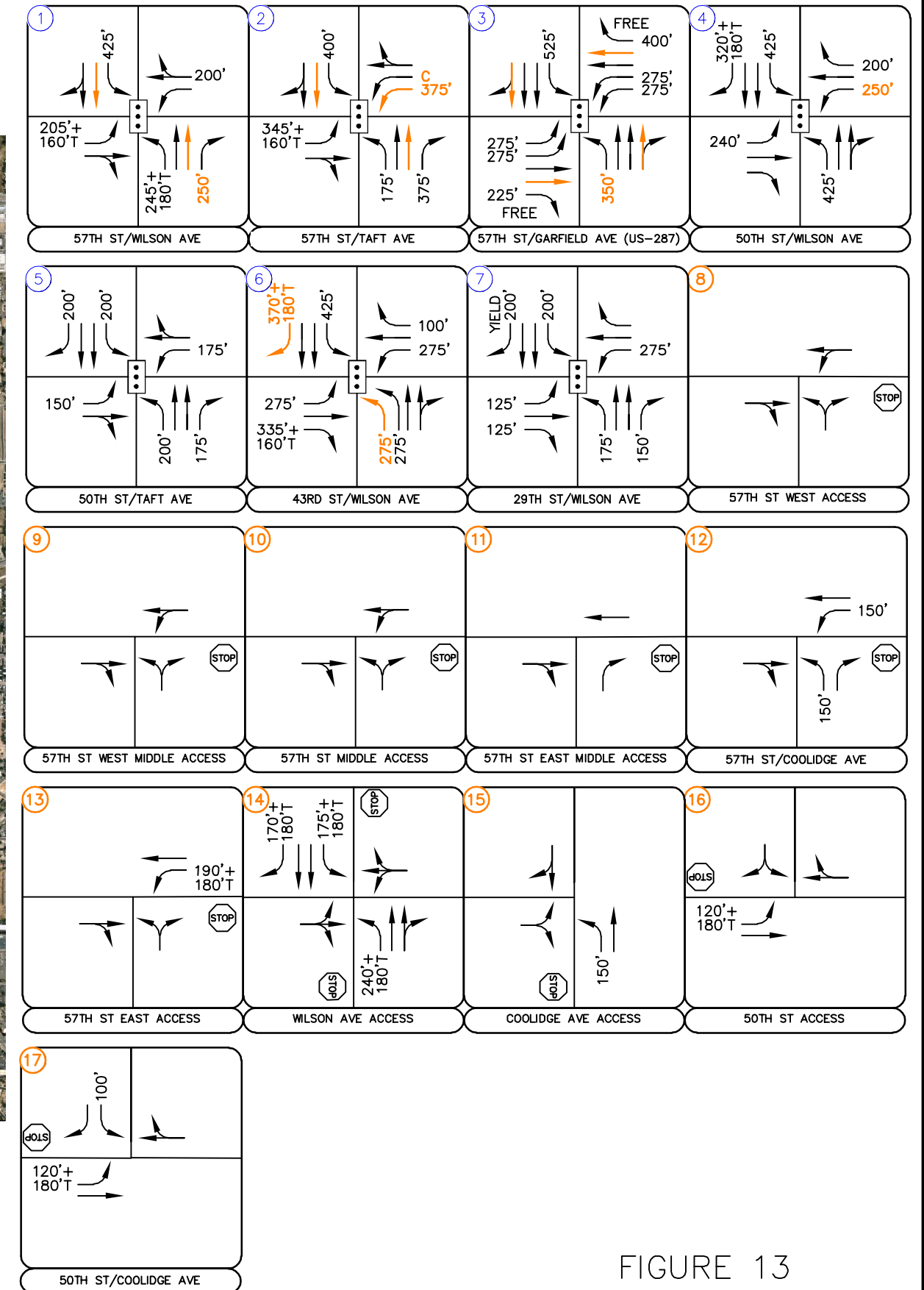
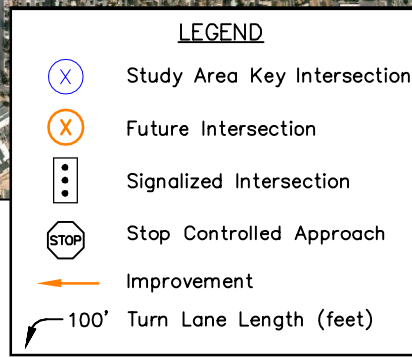
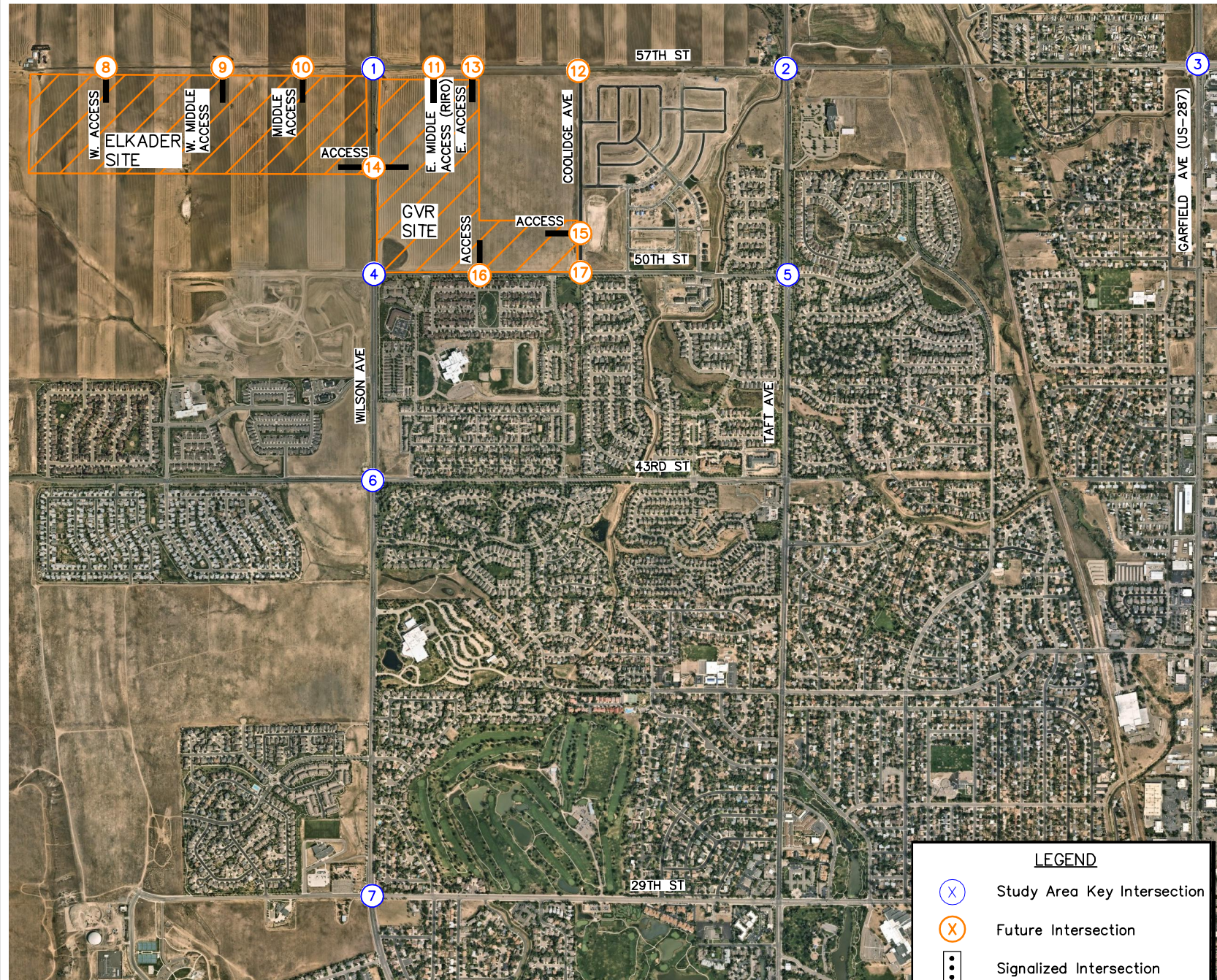
GREEN VALLEY RANCH & ELKADER
ELKADER RESIDENTIAL PROJECT TRIP DISTRIBUTION

FIGURE 7



GREEN VALLEY RANCH & ELKADER
PROJECT TRAFFIC ASSIGNMENT

FIGURE 9



GREEN VALLEY RANCH & ELKADER
2040 RECOMMENDED LANE CONFIGURATION AND GEOMETRY

FIGURE 13

TAFT RIDGE
MASTER TRAFFIC IMPACT STUDY

LOVELAND, COLORADO

MARCH 2022
REVISED JUNE 2022
REVISED SEPTEMBER 2022

Prepared for:

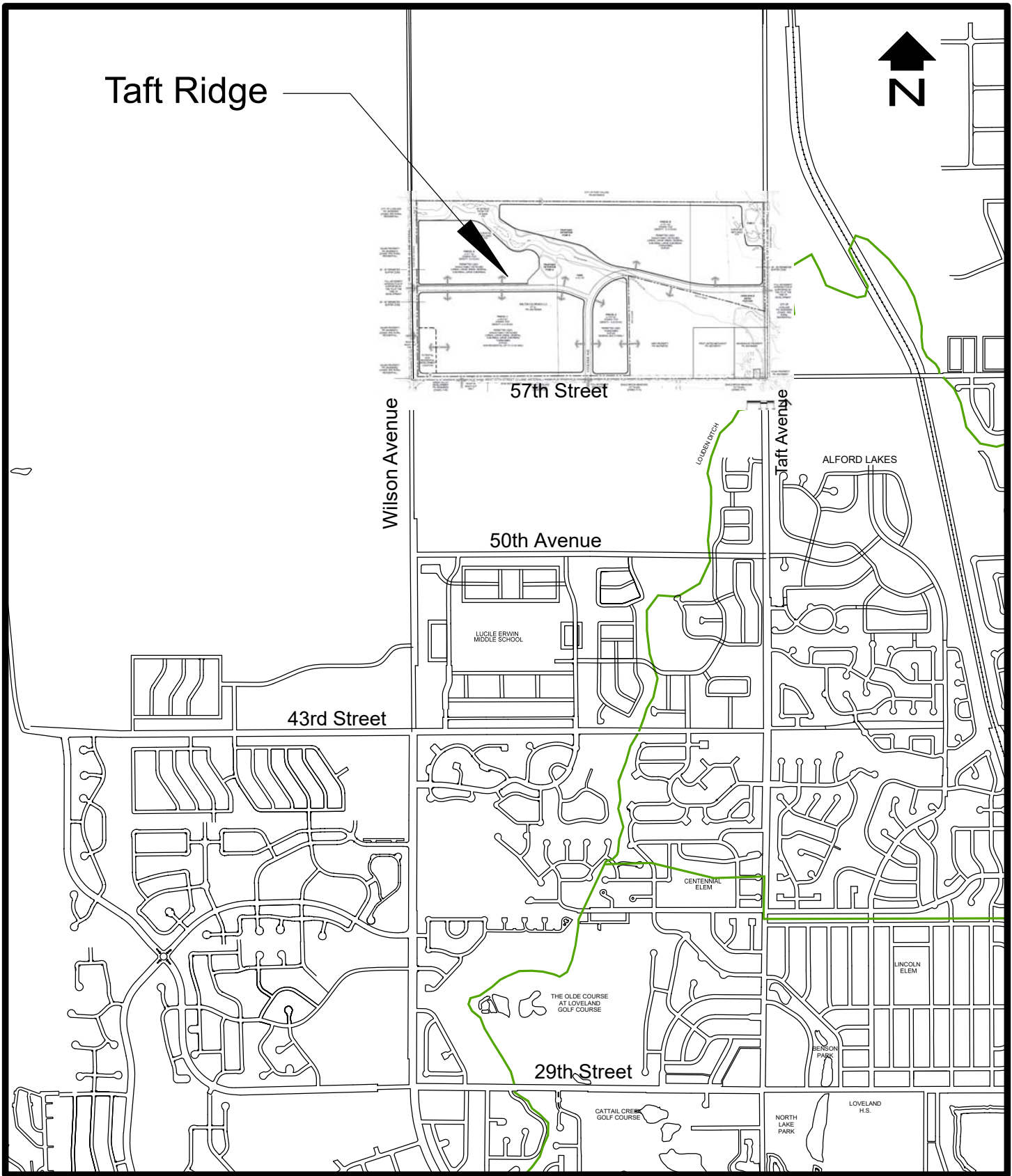
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Project #2126



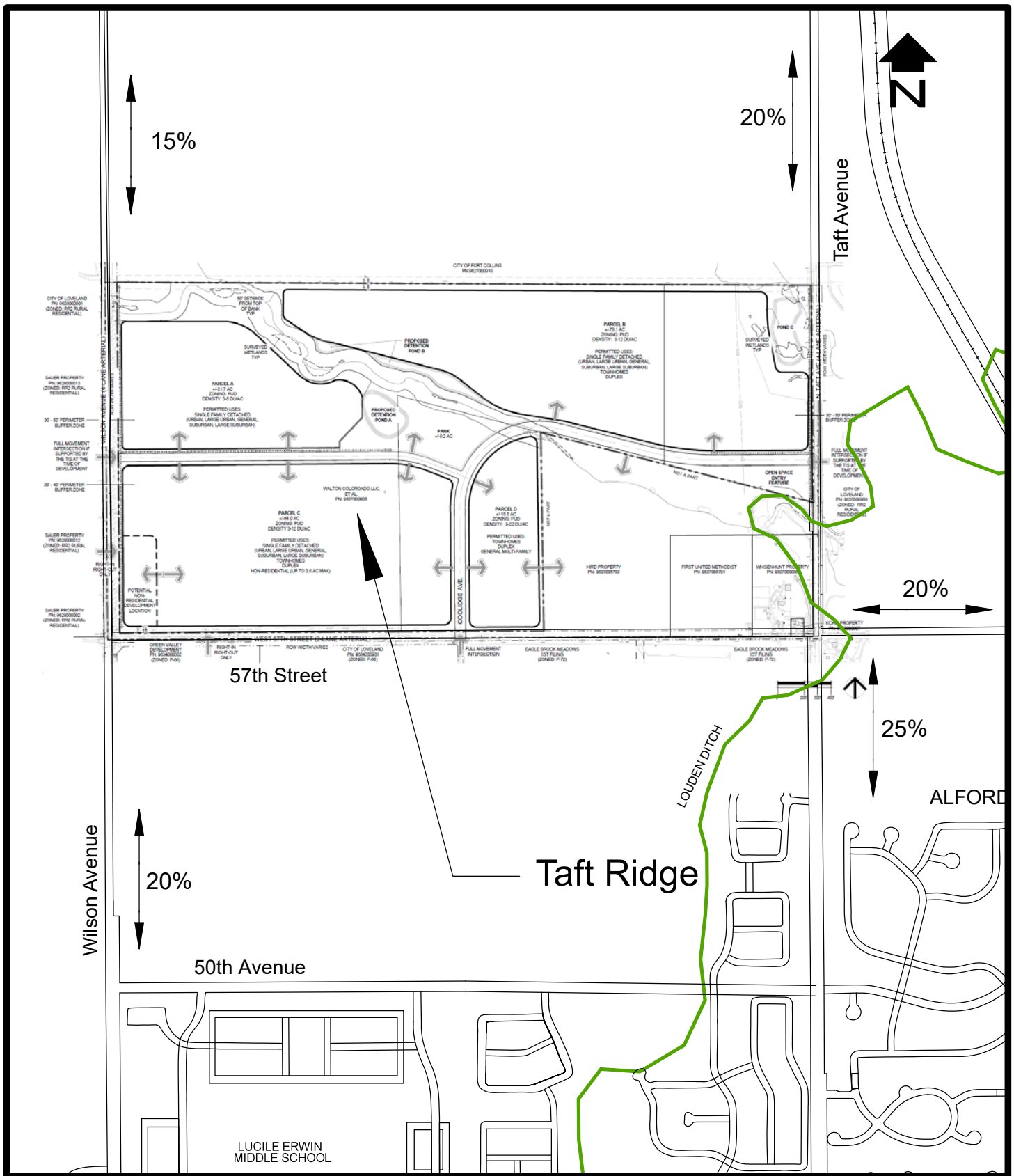
SITE LOCATION



Figure 1

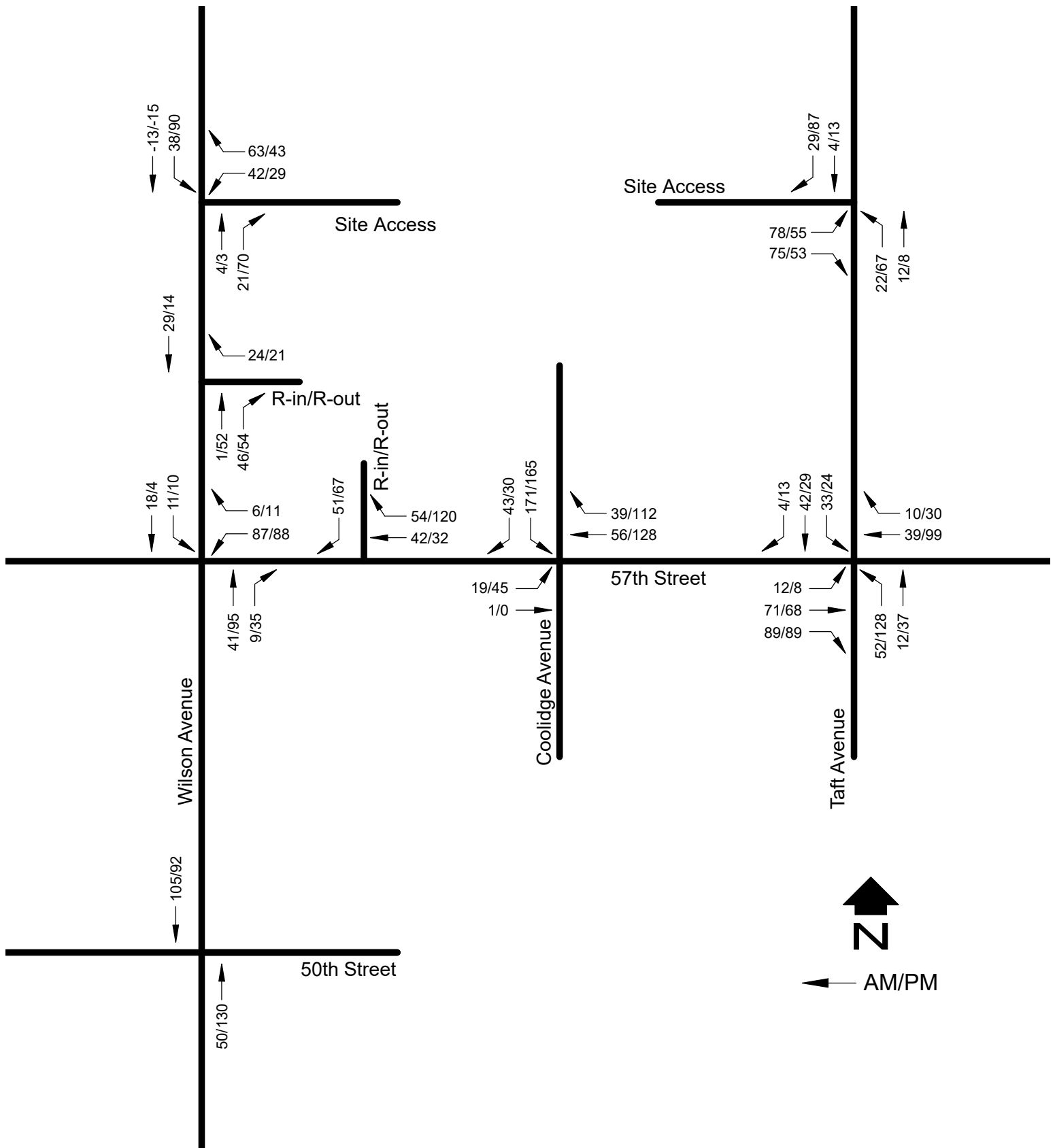
TABLE 2
Trip Generation

Code	Use	Size	AWDTE		AM Peak Hour				PM Peak Hour			
			Rate	Trips	Rate	In	Rate	Out	Rate	In	Rate	Out
210	A – Single Family Detached	140 D.U.	EQ.	1376	EQ.	26	EQ.	75	EQ.	86	EQ.	50
210	B – Single Family Detached	245 D.U.	EQ.	2302	EQ.	43	EQ.	125	EQ.	145	EQ.	86
215	B - Single Family Attached	150 D.U.	EQ.	1092	EQ.	22	EQ.	50	EQ.	49	EQ.	37
210	C - Single Family Detached	290 D.U.	EQ.	2688	EQ.	51	EQ.	145	EQ.	170	EQ.	100
945	C – Gas/C-Store	10 Fueling Positions	EQ.	2434	EQ.	80	EQ.	81	EQ.	92	EQ.	92
822	C – Strip Retail Plaza (<40K)	17,424 KSF	EQ.	964	EQ.	25	EQ.	17	EQ.	57	EQ.	58
215	D – Single Family Attached	160 D.U.	EQ.	1168	EQ.	24	EQ.	54	EQ.	52	EQ.	40
Total				12024		271		547		651		463



TRIP DISTRIBUTION

Figure 5



SITE GENERATED PEAK HOUR TRAFFIC

Figure 6



MEMORANDUM

TO: Russell Baker/Robert Eck, Front Range Investment Holdings LLC
Kristin Turner, TB Group
Randy Maizland, Loveland TDR

FROM: Matt Delich

DATE: November 20, 2019

SUBJECT: Eagle Brook Meadows, Outlot A (Phase 4) – Trip Generation Analysis
(File: 1159ME01)



This memorandum provides trip generation analyses related to the proposed change of use on Outlot A (Phase 4) within Eagle Brook Meadows in Loveland, Colorado. The purpose is to compare the trip generation of the proposed land use with the trip generation of the land use on the same lot, the differences, and any change in the conclusions in the "Eagle Brook Meadows Traffic Impact Study" (TIS), dated June 2012.

The site plan and trip generation table from the cited TIS are provided in Appendix A. The subject lot is in the north of the West 50th Street and east of future Coolidge Avenue in Eagle Brook Meadows. The subject lot is highlighted in red. The land use in the cited TIS was apartments. The trip generation in the cited TIS was calculated using **Trip Generation, 8th Edition**, ITE, as the reference document. Apartments (Code 220) was the designated land use with dwelling units as the trip generation variable. Table 1 shows the calculated trip generation for this lot. The calculated trip generation was: 1034 daily trip ends, 77 morning peak hour trip ends, and 100 afternoon peak hour trip ends.

The site plan of the proposed Outlot A is provided in Appendix B. The land use is a mix of residential housing types. Table 2 shows the calculated trip generation using **Trip Generation, 10th Edition**, ITE, Code 210 (Single Family Detached Housing), with dwelling units as the trip generation variable. The calculated trip generation related to the 84 dwelling units will be: 728 daily trip ends, 54 morning peak hour trip ends, and 69 afternoon peak hour trip ends. The change in the calculated trip generation for the subject lot will be: 306 less daily trip ends, the 23 less morning peak hour trip ends, and 31 less afternoon peak hour trip ends.

The impact on the short range peak hour operation at the key intersections will not be significant. The conclusions in the cited TIS will not change. It is respectfully requested that no further traffic studies be required related to the proposed change of use on Outlot A within Eagle Brook Meadows.

Do not hesitate to contact me if there are questions or if additional information is required.

TABLE 1 Trip Generation for the Subject Outlot A [Phase 4] (TIS)								
Code	Use	Size	AWDTE		AM Peak Hour		PM Peak Hour	
			Rate	Trip Ends	Rate	Trip Ends	Rate	Trip Ends
220	Apartments	150 DU	EQ	1034	EQ	77	EQ	100

TABLE 2 Trip Generation for the Subject Outlot A [Change of Use]									
Code	Use	Size	AWDTE		AM Peak Hour		PM Peak Hour		
			Rate	Trip Ends	Rate	Trip Ends	Rate	Trip Ends	
210	Single Family Detached Housing	36 DU	EQ	406	EQ	30	EQ	38	
220	Townhome	48 DU	EQ	322	EQ	24	EQ	31	
Total				728		54		69	

APPENDIX A



SITE PLAN

Figure 5

III. PROPOSED DEVELOPMENT

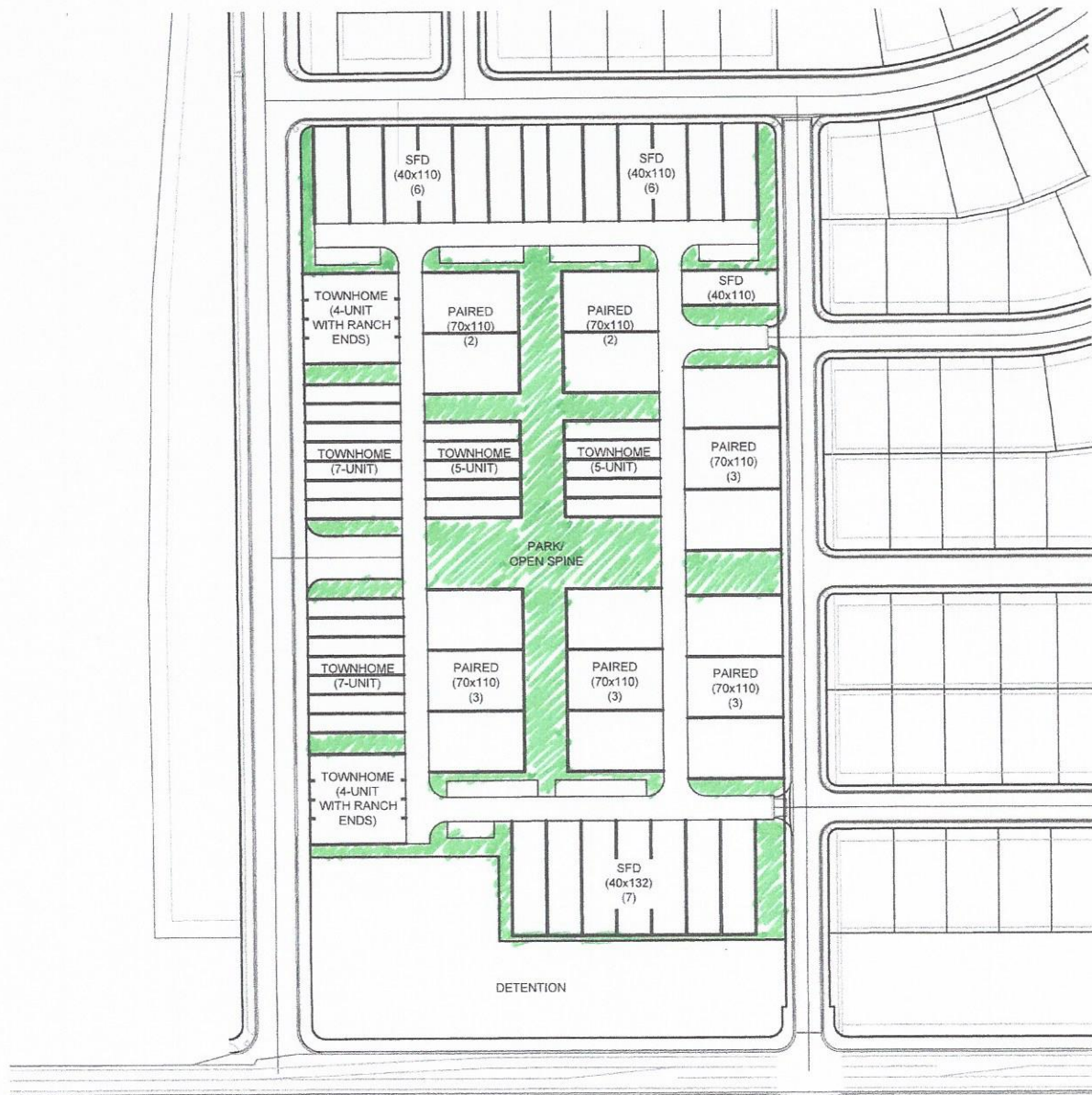
The Eagle Brook Meadows is a proposed 447 unit residential development. Figure 5 shows the site plan for the Eagle Brook Meadows development. The Eagle Brook Meadows development is expected to be built in four phases. Phase 1 is 96 single family residential homes that will access 50th Street at the future 50th/Redmesa and 50th/Avon intersections and is expected to be built in the next 2-3 years, following approval. Phase 1 future was determined to be the year 2015. Phase 2 is 95 single family residential homes that will add an access to 57th Street at the future 57th/Segundo intersection. The Phase 2 future was determined to be the year 2017. Phase 3 is 106 single family residential homes that will add accesses to 50th Street and 57th Street at the future 50th/Coolidge and 57th/Coolidge intersections. The Phase 3 future was determined to be the year 2019. The long range future (year 2030) includes full development and an appropriate increase in background traffic. Phases 2, 3, and full development include the previous phases, later in this report.

Trip Generation

Trip generation is important in considering the impact of a development, such as this, upon the existing and proposed street system. Trip generation information contained in Trip Generation, 8th Edition, ITE was used to estimate trips that would be generated by the proposed uses at this site. As discussed with City staff, the trip generation was determined using the equations. A trip is defined as a one-way vehicle movement from origin to destination. Table 2 shows the expected trip generation for the Eagle Brook Meadows site. The trip generation of the Eagle Brook Meadows resulted in 4124 daily trip ends, 314 morning peak hour trip ends, and 412 afternoon peak hour trip ends.

TABLE 2 Trip Generation												
Code	Use	Size	AWDTE		AM Peak Hour				PM Peak Hour			
			Rate	Trips	Rate	In	Rate	Out	Rate	In	Rate	Out
Phase 1												
210	Single Family	96 D.U.	EQ.	1000	EQ.	19	EQ.	58	EQ.	64	EQ.	37
Phase 2												
210	Single Family	95 D.U.	EQ.	992	EQ.	19	EQ.	57	EQ.	63	EQ.	37
Phase 2 Subtotal				1992		38		115		127		74
Phase 3												
210	Single Family	106 D.U.	EQ.	1098	EQ.	21	EQ.	63	EQ.	70	EQ.	41
Phase 3 Subtotal				3090		59		178		197		115
Phase 4												
220	Apartments	150 D.U.	EQ.	1034	EQ.	15	EQ.	62	EQ.	65	EQ.	35
Total				4124		74		240		262		150

APPENDIX B



EAGLE BROOK - CONCEPT 10.16.19

38% (32) 16 PAIRED HOMES (70x110)
 38% (32) (2) 4-UNIT TOWNHOMES (22x110 + 30x110 E)
 (2) 5-UNIT TOWNHOMES (22x110)
 (2) 7-UNIT TOWNHOMES (22x110)
 24% (20) SFD (40x110)
 100% = 84 UNITS
 11.25 AC = RESIDENTIAL (~5.5 DU/AC)

APPENDIX G – Background (without site development) Synchro Outputs

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	110	201	8	136	129	96	11	821	301	136	724	40
v/c Ratio	0.37	0.68	0.02	0.44	0.34	0.22	0.04	0.99	0.36	0.62	0.70	0.04
Control Delay (s/veh)	28.9	50.6	0.1	28.9	35.1	2.8	11.1	60.0	6.1	29.6	23.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.9	50.6	0.1	28.9	35.1	2.8	11.1	60.0	6.1	29.6	23.4	0.1
Queue Length 50th (ft)	51	122	0	63	70	0	3	~568	22	37	304	0
Queue Length 95th (ft)	85	185	0	102	115	15	12	#829	80	#141	#679	0
Internal Link Dist (ft)		956			1269			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	301	409	459	317	503	531	283	826	837	220	1033	941
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.49	0.02	0.43	0.26	0.18	0.04	0.99	0.36	0.62	0.70	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	185	7	125	119	88	10	755	277	125	666	37
Future Volume (veh/h)	101	185	7	125	119	88	10	755	277	125	666	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	110	201	8	136	129	96	11	821	301	136	724	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	279	245	208	251	307	261	285	957	811	233	1033	876
Arrive On Green	0.05	0.13	0.13	0.08	0.16	0.16	0.01	0.51	0.51	0.05	0.55	0.55
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	110	201	8	136	129	96	11	821	301	136	724	40
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	5.0	10.5	0.4	6.5	6.2	5.4	0.3	38.2	11.4	3.5	28.3	1.2
Cycle Q Clear(g_c), s	5.0	10.5	0.4	6.5	6.2	5.4	0.3	38.2	11.4	3.5	28.3	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	279	245	208	251	307	261	285	957	811	233	1033	876
V/C Ratio(X)	0.39	0.82	0.04	0.54	0.42	0.37	0.04	0.86	0.37	0.58	0.70	0.05
Avail Cap(c_a), veh/h	279	411	349	281	505	428	351	957	811	244	1033	876
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	42.3	37.9	33.8	37.5	37.2	14.3	21.2	14.7	20.3	16.3	10.3
Incr Delay (d2), s/veh	0.9	6.6	0.1	1.8	0.9	0.9	0.1	9.8	1.3	3.3	4.0	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	5.1	0.2	2.8	2.8	2.1	0.1	17.3	4.1	1.6	11.6	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.9	48.9	38.0	35.6	38.4	38.0	14.4	31.1	16.0	23.5	20.3	10.4
LnGrp LOS	D	D	D	D	D	D	B	C	B	C	C	B
Approach Vol, veh/h	319			361			1133			900		
Approach Delay, s/veh	44.5			37.3			26.9			20.3		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.4	57.2	13.3	19.1	6.3	61.2	10.0	22.4				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	6.0	40.0	10.0	22.0	5.0	41.0	5.0	27.0				
Max Q Clear Time (g_c+l1), s	5.5	40.2	8.5	12.5	2.3	30.3	7.0	8.2				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7	0.0	3.5	0.0	0.8				
Intersection Summary												
HCM 7th Control Delay, s/veh	28.2											
HCM 7th LOS	C											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	586	0	10	330	3	0	0	11	1	0	2
Future Vol, veh/h	1	586	0	10	330	3	0	0	11	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	637	0	11	359	3	0	0	12	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	362	0	0	637	0	0	1020	1023	637	1021	1021	360
Stage 1	-	-	-	-	-	-	639	639	-	382	382	-
Stage 2	-	-	-	-	-	-	380	384	-	639	639	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1197	-	-	947	-	-	215	236	477	215	236	684
Stage 1	-	-	-	-	-	-	464	470	-	640	613	-
Stage 2	-	-	-	-	-	-	642	612	-	464	470	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1197	-	-	947	-	-	212	233	477	207	233	684
Mov Cap-2 Maneuver	-	-	-	-	-	-	212	233	-	207	233	-
Stage 1	-	-	-	-	-	-	464	470	-	633	606	-
Stage 2	-	-	-	-	-	-	632	605	-	452	470	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.01	0.26	12.74	14.39
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	477	1197	-	-	947	-	-	386
HCM Lane V/C Ratio	0.025	0.001	-	-	0.011	-	-	0.008
HCM Control Delay (s/veh)	12.7	8	-	-	8.8	-	-	14.4
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	7	12	0
Future Vol, veh/h	0	0	0	7	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	8	13	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	21	13	13	0	-	0
Stage 1	13	-	-	-	-	-
Stage 2	8	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	996	1067	1605	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	996	1067	1605	-	-	-
Mov Cap-2 Maneuver	996	-	-	-	-	-
Stage 1	1010	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	0	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1605	-	-	-	-	
HCM Lane V/C Ratio	-	-	-	-	-	
HCM Control Delay (s/veh)	0	-	0	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	86	184	9	325	304	123	8	730	228	114	855	85
v/c Ratio	0.39	0.69	0.02	0.96	0.70	0.26	0.04	0.82	0.26	0.50	0.81	0.09
Control Delay (s/veh)	33.1	58.1	0.1	72.7	48.2	6.7	11.1	35.0	4.2	19.9	28.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.1	58.1	0.1	72.7	48.2	6.7	11.1	35.0	4.2	19.9	28.5	0.2
Queue Length 50th (ft)	43	125	0	191	202	0	2	449	8	33	441	0
Queue Length 95th (ft)	77	193	0	#344	287	42	10	#681	52	#71	#874	0
Internal Link Dist (ft)		956			1269			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	222	338	434	340	475	500	183	887	861	227	1054	974
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.54	0.02	0.96	0.64	0.25	0.04	0.82	0.26	0.50	0.81	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	169	8	299	280	113	7	672	210	105	787	78
Future Volume (veh/h)	79	169	8	299	280	113	7	672	210	105	787	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	86	184	9	325	304	123	8	730	228	114	855	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	222	188	303	358	304	188	968	820	269	1035	877
Arrive On Green	0.05	0.12	0.12	0.12	0.19	0.19	0.01	0.52	0.52	0.05	0.55	0.55
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	86	184	9	325	304	123	8	730	228	114	855	85
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	4.7	10.6	0.6	13.0	17.3	7.5	0.2	34.0	8.9	3.2	41.4	2.8
Cycle Q Clear(g_c), s	4.7	10.6	0.6	13.0	17.3	7.5	0.2	34.0	8.9	3.2	41.4	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	222	188	303	358	304	188	968	820	269	1035	877
V/C Ratio(X)	0.48	0.83	0.05	1.07	0.85	0.41	0.04	0.75	0.28	0.42	0.83	0.10
Avail Cap(c_a), veh/h	180	340	288	303	476	403	252	968	820	269	1035	877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	47.4	42.9	39.9	42.9	39.0	18.8	21.0	15.0	17.7	20.2	11.6
Incr Delay (d2), s/veh	2.0	9.7	0.1	72.4	10.6	0.9	0.1	5.4	0.8	1.1	7.6	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	5.4	0.2	7.9	8.8	2.9	0.1	14.8	3.2	1.2	18.1	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.8	57.1	43.1	112.3	53.5	39.8	18.9	26.4	15.8	18.7	27.8	11.8
LnGrp LOS	D	E	D	F	D	D	B	C	B	B	C	B
Approach Vol, veh/h	279			752			966			1054		
Approach Delay, s/veh	52.2			76.7			23.9			25.5		
Approach LOS	D			E			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	62.9	18.0	19.1	6.1	66.8	10.0	27.1				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	5.0	50.0	13.0	20.0	5.0	50.0	5.0	28.0				
Max Q Clear Time (g_c+I1), s	5.2	36.0	15.0	12.6	2.2	43.4	6.7	19.3				
Green Ext Time (p_c), s	0.0	4.7	0.0	0.5	0.0	3.2	0.0	1.4				
Intersection Summary												
HCM 7th Control Delay, s/veh	40.0											
HCM 7th LOS	D											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	482	2	12	689	0	1	0	14	1	0	2
Future Vol, veh/h	0	482	2	12	689	0	1	0	14	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	524	2	13	749	0	1	0	15	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	749	0	0	526	0	0	1300	1300	525	1299	1301	749
Stage 1	-	-	-	-	-	-	525	525	-	775	775	-
Stage 2	-	-	-	-	-	-	775	775	-	524	526	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	860	-	-	1041	-	-	138	161	552	138	161	412
Stage 1	-	-	-	-	-	-	536	529	-	391	408	-
Stage 2	-	-	-	-	-	-	391	408	-	537	529	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	860	-	-	1041	-	-	136	159	552	133	159	412
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	159	-	133	159	-
Stage 1	-	-	-	-	-	-	536	529	-	386	403	-
Stage 2	-	-	-	-	-	-	384	403	-	522	529	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.15	13.14	20.06
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	459	860	-	-	1041	-	-	242
HCM Lane V/C Ratio	0.036	-	-	-	0.013	-	-	0.013
HCM Control Delay (s/veh)	13.1	0	-	-	8.5	-	-	20.1
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	9	10	0
Future Vol, veh/h	0	0	0	9	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	10	11	0

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	21	11	11	0	-	0
Stage 1	11	-	-	-	-	-
Stage 2	10	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	996	1070	1608	-	-	-
Stage 1	1012	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	996	1070	1608	-	-	-
Mov Cap-2 Maneuver	996	-	-	-	-	-
Stage 1	1012	-	-	-	-	-
Stage 2	1013	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1608	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	213	475	138	136	267	107	84	1117	301	172	1100
v/c Ratio	0.60	0.98	0.27	0.32	0.52	0.20	0.48	0.83	0.41	0.95	0.77
Control Delay (s/veh)	34.1	74.8	6.7	21.7	35.0	3.1	22.2	34.4	7.2	75.7	29.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	34.1	74.8	6.7	21.7	35.0	3.1	22.2	34.4	7.2	75.7	29.6
Queue Length 50th (ft)	94	~335	0	28	145	0	26	322	28	56	307
Queue Length 95th (ft)	#171	#553	46	48	226	22	50	407	86	#187	390
Internal Link Dist (ft)		956			1269			1182			652
Turn Bay Length (ft)	450		430	550		200	200			450	
Base Capacity (vph)	356	486	518	492	518	542	174	1415	771	182	1455
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.98	0.27	0.28	0.52	0.20	0.48	0.79	0.39	0.95	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	437	127	125	246	98	77	1028	277	158	938	74
Future Volume (veh/h)	196	437	127	125	246	98	77	1028	277	158	938	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	213	475	138	136	267	107	84	1117	301	172	1020	80
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	252	411	349	318	412	349	270	1598	713	254	1551	122
Arrive On Green	0.05	0.22	0.22	0.05	0.22	0.22	0.05	0.45	0.45	0.06	0.46	0.46
Sat Flow, veh/h	1781	1870	1585	3456	1870	1585	1781	3554	1585	1781	3338	262
Grp Volume(v), veh/h	213	475	138	136	267	107	84	1117	301	172	543	557
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1728	1870	1585	1781	1777	1585	1781	1777	1823
Q Serve(g_s), s	5.0	22.0	7.4	3.0	13.0	5.6	2.5	25.2	12.9	5.2	23.5	23.6
Cycle Q Clear(g_c), s	5.0	22.0	7.4	3.0	13.0	5.6	2.5	25.2	12.9	5.2	23.5	23.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	252	411	349	318	412	349	270	1598	713	254	826	847
V/C Ratio(X)	0.84	1.15	0.40	0.43	0.65	0.31	0.31	0.70	0.42	0.68	0.66	0.66
Avail Cap(c_a), veh/h	252	411	349	490	505	428	278	1598	713	254	826	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	39.0	33.3	30.1	35.5	32.6	16.3	22.1	18.7	19.1	20.6	20.6
Incr Delay (d2), s/veh	22.2	93.7	0.7	0.9	2.1	0.5	0.7	2.6	1.8	7.1	4.1	4.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	20.4	2.8	1.2	5.9	2.1	1.0	10.1	4.8	2.4	9.8	10.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.1	132.7	34.0	31.1	37.5	33.1	17.0	24.6	20.5	26.2	24.7	24.6
LnGrp LOS	E	F	C	C	D	C	B	C	C	C	C	C
Approach Vol, veh/h	826			510			1502			1272		
Approach Delay, s/veh	97.5			34.9			23.4			24.9		
Approach LOS	F			C			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	51.0	10.0	28.0	9.5	52.5	10.0	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	6.0	40.0	10.0	22.0	5.0	41.0	5.0	27.0				
Max Q Clear Time (g_c+l1), s	7.2	27.2	5.0	24.0	4.5	25.6	7.0	15.0				
Green Ext Time (p_c), s	0.0	6.7	0.2	0.0	0.0	5.9	0.0	1.4				
Intersection Summary												
HCM 7th Control Delay, s/veh	40.2											
HCM 7th LOS	D											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	871	0	10	467	3	0	0	11	1	0	2
Future Vol, veh/h	1	871	0	10	467	3	0	0	11	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	947	0	11	508	3	0	0	12	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	511	0	0	947	0	0	1478	1482	947	1480	1480	509
Stage 1	-	-	-	-	-	-	949	949	-	531	531	-
Stage 2	-	-	-	-	-	-	529	533	-	949	949	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1054	-	-	725	-	-	104	125	317	104	126	564
Stage 1	-	-	-	-	-	-	313	339	-	532	526	-
Stage 2	-	-	-	-	-	-	533	525	-	313	339	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1054	-	-	725	-	-	102	123	317	98	123	564
Mov Cap-2 Maneuver	-	-	-	-	-	-	102	123	-	98	123	-
Stage 1	-	-	-	-	-	-	313	339	-	524	518	-
Stage 2	-	-	-	-	-	-	523	517	-	301	339	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.01	0.21	16.81	21.73
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	317	1054	-	-	725	-	-	218
HCM Lane V/C Ratio	0.038	0.001	-	-	0.015	-	-	0.015
HCM Control Delay (s/veh)	16.8	8.4	-	-	10	-	-	21.7
HCM Lane LOS	C	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection

Int Delay, s/veh 3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	7	7	12	0
Future Vol, veh/h	0	6	7	7	12	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	7	8	8	13	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	36	13	13
Stage 1	13	-	-
Stage 2	23	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	977	1067	1605
Stage 1	1010	-	-
Stage 2	1000	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	972	1067	1605
Mov Cap-2 Maneuver	972	-	-
Stage 1	1005	-	-
Stage 2	1000	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.39	3.63	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	900	-	1067	-	-
HCM Lane V/C Ratio	0.005	-	0.006	-	-
HCM Control Delay (s/veh)	7.3	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	150	382	126	325	613	155	180	1024	228	140	1374
v/c Ratio	0.85	1.00	0.27	0.65	1.29	0.31	1.21	0.66	0.28	0.65	0.89
Control Delay (s/veh)	72.1	91.3	3.1	31.3	182.1	10.3	163.2	26.4	3.2	28.6	36.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	72.1	91.3	3.1	31.3	182.1	10.3	163.2	26.4	3.2	28.6	36.4
Queue Length 50th (ft)	~79	~312	0	83	~554	14	~100	284	0	45	441
Queue Length 95th (ft)	#197	#500	18	119	#772	66	#243	355	42	#81	545
Internal Link Dist (ft)		956			1269			1182			652
Turn Bay Length (ft)	450		430	550		200	200			450	
Base Capacity (vph)	176	382	467	533	474	499	149	1608	843	217	1587
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.00	0.27	0.61	1.29	0.31	1.21	0.64	0.27	0.65	0.87

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	351	116	299	564	143	166	942	210	129	1088	176
Future Volume (veh/h)	138	351	116	299	564	143	166	942	210	129	1088	176
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	150	382	126	325	613	155	180	1024	228	140	1183	191
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	146	389	329	457	476	403	190	1615	720	250	1394	224
Arrive On Green	0.05	0.21	0.21	0.09	0.25	0.25	0.05	0.45	0.45	0.05	0.45	0.45
Sat Flow, veh/h	1781	1870	1585	3456	1870	1585	1781	3554	1585	1781	3066	493
Grp Volume(v), veh/h	150	382	126	325	613	155	180	1024	228	140	683	691
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1728	1870	1585	1781	1777	1585	1781	1777	1782
Q Serve(g_s), s	5.0	22.4	7.5	7.8	28.0	8.9	5.0	24.3	10.1	4.7	37.5	38.0
Cycle Q Clear(g_c), s	5.0	22.4	7.5	7.8	28.0	8.9	5.0	24.3	10.1	4.7	37.5	38.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	146	389	329	457	476	403	190	1615	720	250	808	810
V/C Ratio(X)	1.02	0.98	0.38	0.71	1.29	0.38	0.95	0.63	0.32	0.56	0.85	0.85
Avail Cap(c_a), veh/h	146	389	329	547	476	403	190	1615	720	250	808	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	43.4	37.5	31.0	41.0	33.9	29.9	23.0	19.1	18.8	26.6	26.7
Incr Delay (d2), s/veh	81.0	41.0	0.7	3.4	144.6	0.6	50.8	1.9	1.2	2.8	10.6	11.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	14.5	2.9	3.4	31.5	3.4	5.1	9.8	3.8	2.0	16.9	17.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	122.0	84.4	38.2	34.5	185.6	34.5	80.8	24.9	20.3	21.6	37.2	37.8
LnGrp LOS	F	F	D	C	F	C	F	C	C	C	D	D
Approach Vol, veh/h	658		1093			1432			1514			
Approach Delay, s/veh	84.1		119.2			31.2			36.0			
Approach LOS	F		F			C			D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	56.0	15.1	28.9	10.0	56.0	10.0	34.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	5.0	50.0	13.0	20.0	5.0	50.0	5.0	28.0				
Max Q Clear Time (g_c+I1), s	6.7	26.3	9.8	24.4	7.0	40.0	7.0	30.0				
Green Ext Time (p_c), s	0.0	8.1	0.4	0.0	0.0	5.8	0.0	0.0				
Intersection Summary												
HCM 7th Control Delay, s/veh	60.6											
HCM 7th LOS	E											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	688	2	12	1003	0	1	0	14	1	0	2
Future Vol, veh/h	0	688	2	12	1003	0	1	0	14	1	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	748	2	13	1090	0	1	0	15	1	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1090	0	0	750	0	0	1865	1865	749	1864	1866	1090
Stage 1	-	-	-	-	-	-	749	749	-	1116	1116	-
Stage 2	-	-	-	-	-	-	1116	1116	-	748	750	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	640	-	-	859	-	-	56	73	412	56	73	261
Stage 1	-	-	-	-	-	-	404	419	-	252	283	-
Stage 2	-	-	-	-	-	-	252	283	-	405	419	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	640	-	-	859	-	-	54	72	412	53	71	261
Mov Cap-2 Maneuver	-	-	-	-	-	-	54	72	-	53	71	-
Stage 1	-	-	-	-	-	-	404	419	-	248	279	-
Stage 2	-	-	-	-	-	-	246	279	-	390	419	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.11	18.34	37.84
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	286	640	-	-	859	-	-	113
HCM Lane V/C Ratio	0.057	-	-	-	0.015	-	-	0.029
HCM Control Delay (s/veh)	18.3	0	-	-	9.3	-	-	37.8
HCM Lane LOS	C	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	5	9	10	0
Future Vol, veh/h	0	4	5	9	10	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	4	5	10	11	0

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	32	11	11	0	0
Stage 1	11	-	-	-	-
Stage 2	21	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	982	1070	1608	-	-
Stage 1	1012	-	-	-	-
Stage 2	1002	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	979	1070	1608	-	-
Mov Cap-2 Maneuver	979	-	-	-	-
Stage 1	1009	-	-	-	-
Stage 2	1002	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.38	2.59	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	643	-	1070	-	-
HCM Lane V/C Ratio	0.003	-	0.004	-	-
HCM Control Delay (s/veh)	7.2	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

APPENDIX H – Future (with site development) Synchro Outputs

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	110	203	8	148	129	96	20	829	320	138	724	40
v/c Ratio	0.36	0.68	0.02	0.48	0.34	0.22	0.07	1.01	0.38	0.63	0.73	0.04
Control Delay (s/veh)	28.7	50.5	0.1	29.6	34.9	2.8	11.4	64.2	6.3	30.7	26.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.7	50.5	0.1	29.6	34.9	2.8	11.4	64.2	6.3	30.7	26.7	0.1
Queue Length 50th (ft)	50	123	0	69	70	0	5	~583	24	38	305	0
Queue Length 95th (ft)	85	187	0	109	115	15	17	#840	86	#148	#679	0
Internal Link Dist (ft)		956			642			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	303	409	459	317	503	531	267	821	840	219	987	905
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.50	0.02	0.47	0.26	0.18	0.07	1.01	0.38	0.63	0.73	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	101	187	7	1	135	119	88	18	763	294	127	666
Future Volume (veh/h)	101	187	7	1	135	119	88	18	763	294	127	666
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	110	203	8		147	129	96	20	829	320	138	724
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2	2	2	2	2	2
Cap, veh/h	287	247	210		260	319	270	283	943	799	224	1007
Arrive On Green	0.05	0.13	0.13		0.09	0.17	0.17	0.02	0.50	0.50	0.06	0.54
Sat Flow, veh/h	1781	1870	1585		1781	1870	1585	1781	1870	1585	1781	1870
Grp Volume(v), veh/h	110	203	8		147	129	96	20	829	320	138	724
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1781	1870	1585	1781	1870	1585	1781	1870
Q Serve(g_s), s	5.0	10.6	0.4		6.9	6.1	5.3	0.5	39.5	12.5	3.7	29.2
Cycle Q Clear(g_c), s	5.0	10.6	0.4		6.9	6.1	5.3	0.5	39.5	12.5	3.7	29.2
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	287	247	210		260	319	270	283	943	799	224	1007
V/C Ratio(X)	0.38	0.82	0.04		0.56	0.40	0.36	0.07	0.88	0.40	0.62	0.72
Avail Cap(c_a), veh/h	287	411	349		281	505	428	334	943	799	232	1007
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	42.2	37.8		33.2	37.0	36.6	14.8	22.1	15.4	21.1	17.4
Incr Delay (d2), s/veh	0.8	6.6	0.1		2.2	0.8	0.8	0.1	11.5	1.5	4.5	4.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	5.2	0.2		3.1	2.8	2.1	0.2	18.2	4.5	1.7	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	36.7	48.9	37.9		35.4	37.8	37.4	14.9	33.6	16.9	25.7	21.8
LnGrp LOS	D	D	D		D	D	D	B	C	B	C	C
Approach Vol, veh/h		321				372			1169			902
Approach Delay, s/veh		44.4				36.7			28.7			21.9
Approach LOS		D				D			C			C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.6	56.4	13.8	19.2	7.1	59.8	10.0	23.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	6.0	40.0	10.0	22.0	5.0	41.0	5.0	27.0				
Max Q Clear Time (g_c+I1), s	5.7	41.5	8.9	12.6	2.5	31.2	7.0	8.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7	0.0	3.3	0.0	0.8				

Intersection Summary

HCM 7th Control Delay, s/veh	29.4
HCM 7th LOS	C

Notes

User approved ignoring U-Turning movement.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	37
Future Volume (veh/h)	37
Initial Q (Qb), veh	0
Lane Width Adj.	1.00
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	40
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	853
Arrive On Green	0.54
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	40
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	1.2
Cycle Q Clear(g_c), s	1.2
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	853
V/C Ratio(X)	0.05
Avail Cap(c_a), veh/h	853
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	10.9
Incr Delay (d2), s/veh	0.1
Initial Q Delay(d3), s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.4
Unsig. Movement Delay, s/veh	
LnGrp Delay(d), s/veh	11.0
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	637	4	28	340	3	0	0	46	0	0	3
Future Vol, veh/h	1	637	4	28	340	3	0	0	46	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	692	4	30	370	3	0	0	50	0	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	373	0	0	697	0	0	-	-	695	-	-	371
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	-	-	6.22	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	-	-	3.318	-	-	3.318
Pot Cap-1 Maneuver	1186	-	-	899	-	-	0	0	442	0	0	675
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1186	-	-	899	-	-	-	-	442	-	-	675
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.01			0.69			14.17			10.36		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	442	1186	-	-	899	-	-	675
HCM Lane V/C Ratio	0.113	0.001	-	-	0.034	-	-	0.005
HCM Control Delay (s/veh)	14.2	8	-	-	9.1	-	-	10.4
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	0	0	12	27	53
Future Vol, veh/h	8	0	0	12	27	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	0	0	13	29	58

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	71	58	87
Stage 1	58	-	-
Stage 2	13	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	933	1008	1509
Stage 1	964	-	-
Stage 2	1010	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	933	1008	1509
Mov Cap-2 Maneuver	933	-	-
Stage 1	964	-	-
Stage 2	1010	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.89	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1509	-	933	-	-
HCM Lane V/C Ratio	-	-	0.009	-	-
HCM Control Delay (s/veh)	0	-	8.9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 7th TWSC 4: RIRO ACCESS & 57TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↑
Traffic Vol, veh/h	604	5	0	343	0	38
Future Vol, veh/h	604	5	0	343	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	657	5	0	373	0	41

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	-	-	659
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	-	463
Stage 1	-	-	0	-	-
Stage 2	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	463
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	13.53
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	463	-	-	-
HCM Lane V/C Ratio	0.089	-	-	-
HCM Control Delay (s/veh)	13.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	86	190	11	339	303	123	14	736	262	123	855	85
v/c Ratio	0.37	0.71	0.03	0.97	0.67	0.26	0.09	0.84	0.30	0.59	0.85	0.09
Control Delay (s/veh)	32.0	59.7	0.1	73.2	46.0	6.6	12.1	36.8	4.3	25.5	33.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.0	59.7	0.1	73.2	46.0	6.6	12.1	36.8	4.3	25.5	33.9	0.2
Queue Length 50th (ft)	42	129	0	197	198	0	4	456	10	37	455	0
Queue Length 95th (ft)	77	201	0	#367	286	42	14	#690	57	#91	#874	0
Internal Link Dist (ft)		956			662			1182			652	
Turn Bay Length (ft)	450		430	550		200	200			450		325
Base Capacity (vph)	235	321	421	351	479	503	157	874	867	209	1002	934
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.59	0.03	0.97	0.63	0.24	0.09	0.84	0.30	0.59	0.85	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	79	175	10	1	311	279	113	13	677	241	113	787
Future Volume (veh/h)	79	175	10	1	311	279	113	13	677	241	113	787
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	86	190	11		338	303	123	14	736	262	123	855
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2	2	2	2	2	2
Cap, veh/h	194	227	193		318	380	322	179	946	802	251	1001
Arrive On Green	0.05	0.12	0.12		0.13	0.20	0.20	0.02	0.51	0.51	0.05	0.54
Sat Flow, veh/h	1781	1870	1585		1781	1870	1585	1781	1870	1585	1781	1870
Grp Volume(v), veh/h	86	190	11		338	303	123	14	736	262	123	855
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1781	1870	1585	1781	1870	1585	1781	1870
Q Serve(g_s), s	4.6	10.9	0.7		14.0	16.9	7.4	0.4	35.3	10.8	3.6	43.0
Cycle Q Clear(g_c), s	4.6	10.9	0.7		14.0	16.9	7.4	0.4	35.3	10.8	3.6	43.0
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	194	227	193		318	380	322	179	946	802	251	1001
V/C Ratio(X)	0.44	0.84	0.06		1.06	0.80	0.38	0.08	0.78	0.33	0.49	0.85
Avail Cap(c_a), veh/h	194	323	274		318	476	403	232	946	802	251	1001
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.4	47.2	42.7		39.0	41.6	37.8	20.1	22.2	16.1	19.1	21.9
Incr Delay (d2), s/veh	1.6	12.2	0.1		67.6	7.4	0.7	0.2	6.3	1.1	1.5	9.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	5.7	0.3		7.7	8.4	2.9	0.2	15.7	3.9	1.4	19.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	42.0	59.5	42.9		106.5	49.0	38.6	20.2	28.4	17.2	20.6	31.1
LnGrp LOS	D	E	D		F	D	D	C	C	B	C	C
Approach Vol, veh/h		287				764			1012			1063
Approach Delay, s/veh		53.6				72.8			25.4			28.4
Approach LOS		D				E			C			C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	61.6	19.0	19.4	6.7	64.9	10.0	28.4				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	5.0	50.0	14.0	19.0	5.0	50.0	5.0	28.0				
Max Q Clear Time (g_c+I1), s	5.6	37.3	16.0	12.9	2.4	45.0	6.6	18.9				
Green Ext Time (p_c), s	0.0	4.6	0.0	0.4	0.0	2.5	0.0	1.4				

Intersection Summary

HCM 7th Control Delay, s/veh	40.6
HCM 7th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.
User approved ignoring U-Turning movement.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	78
Future Volume (veh/h)	78
Initial Q (Qb), veh	0
Lane Width Adj.	1.00
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	85
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	849
Arrive On Green	0.54
Sat Flow, veh/h	1585
Grp Volume(v), veh/h	85
Grp Sat Flow(s),veh/h/ln	1585
Q Serve(g_s), s	2.9
Cycle Q Clear(g_c), s	2.9
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	849
V/C Ratio(X)	0.10
Avail Cap(c_a), veh/h	849
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	12.5
Incr Delay (d2), s/veh	0.2
Initial Q Delay(d3), s/veh	0.0
%ile BackOfQ(50%),veh/ln	1.0
Unsig. Movement Delay, s/veh	
LnGrp Delay(d), s/veh	12.8
LnGrp LOS	B
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

HCM 7th TWSC
2: DUFFIELD AVENUE/SUNSET VISTA & 57TH STREET

12/05/2024

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	522	16	90	701	0	0	0	28	0	0	3
Future Vol, veh/h	0	522	16	90	701	0	0	0	28	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	567	17	98	762	0	0	0	30	0	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	762	0	0	585	0	0	-	-	576	-	-	762
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	-	-	6.22	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	-	-	3.318	-	-	3.318
Pot Cap-1 Maneuver	850	-	-	990	-	-	0	0	517	0	0	405
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	850	-	-	990	-	-	-	-	517	-	-	405
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	1.03	12.4	13.96
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	517	850	-	-	990	-	-	405
HCM Lane V/C Ratio	0.059	-	-	-	0.099	-	-	0.008
HCM Control Delay (s/veh)	12.4	0	-	-	9	-	-	14
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.3	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	0	0	26	20	34
Future Vol, veh/h	25	0	0	26	20	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	0	0	28	22	37

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	68	40	59
Stage 1	40	-	-
Stage 2	28	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	936	1031	1545
Stage 1	982	-	-
Stage 2	994	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	936	1031	1545
Mov Cap-2 Maneuver	936	-	-
Stage 1	982	-	-
Stage 2	994	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.96	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1545	-	936	-	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s/veh)	0	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 7th TWSC
4: RIRO Access & 57TH STREET

12/05/2024

Intersection

Int Delay, s/veh 0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	513	17	0	704	0	25
Future Vol, veh/h	513	17	0	704	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	558	18	0	765	0	27

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 567
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	-	- - - 6.22
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	-	- - - 3.318
Pot Cap-1 Maneuver	-	-	0 - 0 523
Stage 1	-	-	0 - 0
Stage 2	-	-	0 - 0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- - - 523
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	12.26
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	523	-	-	-
HCM Lane V/C Ratio	0.052	-	-	-
HCM Control Delay (s/veh)	12.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	213	477	138	148	267	107	92	1126	320	174	1100
v/c Ratio	0.60	0.99	0.27	0.34	0.52	0.20	0.53	0.84	0.43	0.96	0.76
Control Delay (s/veh)	34.3	78.8	6.8	21.9	35.1	3.1	24.1	34.6	8.3	78.4	29.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	34.3	78.8	6.8	21.9	35.1	3.1	24.1	34.6	8.3	78.4	29.5
Queue Length 50th (ft)	94	~341	0	30	145	0	28	325	36	58	307
Queue Length 95th (ft)	#171	#559	46	52	226	22	54	411	101	#191	390
Internal Link Dist (ft)		956			662			1182			652
Turn Bay Length (ft)	450		430	550		200	200			450	
Base Capacity (vph)	354	481	514	492	517	542	174	1415	770	182	1457
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.99	0.27	0.30	0.52	0.20	0.53	0.80	0.42	0.96	0.75

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	196	439	127	1	135	246	98	85	1036	294	160	938
Future Volume (veh/h)	196	439	127	1	135	246	98	85	1036	294	160	938
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	213	477	138		147	267	107	92	1126	320	174	1020
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2	2	2	2	2	2
Cap, veh/h	256	411	349		327	417	354	269	1588	708	249	1538
Arrive On Green	0.05	0.22	0.22		0.05	0.22	0.22	0.05	0.45	0.45	0.06	0.46
Sat Flow, veh/h	1781	1870	1585		3456	1870	1585	1781	3554	1585	1781	3338
Grp Volume(v), veh/h	213	477	138		147	267	107	92	1126	320	174	543
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1728	1870	1585	1781	1777	1585	1781	1777
Q Serve(g_s), s	5.0	22.0	7.4		3.2	12.9	5.6	2.8	25.7	14.0	5.3	23.7
Cycle Q Clear(g_c), s	5.0	22.0	7.4		3.2	12.9	5.6	2.8	25.7	14.0	5.3	23.7
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	256	411	349		327	417	354	269	1588	708	249	819
V/C Ratio(X)	0.83	1.16	0.40		0.45	0.64	0.30	0.34	0.71	0.45	0.70	0.66
Avail Cap(c_a), veh/h	256	411	349		490	505	428	276	1588	708	249	819
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	39.0	33.3		30.0	35.2	32.4	16.6	22.4	19.2	19.6	20.9
Incr Delay (d2), s/veh	20.5	95.5	0.7		1.0	2.0	0.5	0.8	2.7	2.1	8.3	4.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	20.6	2.8		1.3	5.9	2.1	1.1	10.3	5.2	2.5	9.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	58.2	134.5	34.0		31.0	37.2	32.8	17.3	25.1	21.2	27.9	25.1
LnGrp LOS	E	F	C		C	D	C	B	C	C	C	C
Approach Vol, veh/h		828				521			1538			1274
Approach Delay, s/veh		98.1				34.5			23.8			25.5
Approach LOS		F				C			C			C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	50.7	10.3	28.0	9.6	52.1	10.0	28.3				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	6.0	40.0	10.0	22.0	5.0	41.0	5.0	27.0				
Max Q Clear Time (g_c+I1), s	7.3	27.7	5.2	24.0	4.8	25.7	7.0	14.9				
Green Ext Time (p_c), s	0.0	6.6	0.2	0.0	0.0	5.9	0.0	1.4				

Intersection Summary

HCM 7th Control Delay, s/veh	40.5
HCM 7th LOS	D

Notes

User approved ignoring U-Turning movement.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	74
Future Volume (veh/h)	74
Initial Q (Qb), veh	0
Lane Width Adj.	1.00
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	80
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	121
Arrive On Green	0.46
Sat Flow, veh/h	262
Grp Volume(v), veh/h	557
Grp Sat Flow(s),veh/h/ln	1823
Q Serve(g_s), s	23.7
Cycle Q Clear(g_c), s	23.7
Prop In Lane	0.14
Lane Grp Cap(c), veh/h	840
V/C Ratio(X)	0.66
Avail Cap(c_a), veh/h	840
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	20.9
Incr Delay (d2), s/veh	4.1
Initial Q Delay(d3), s/veh	0.0
%ile BackOfQ(50%),veh/ln	10.1
Unsig. Movement Delay, s/veh	
LnGrp Delay(d), s/veh	25.0
LnGrp LOS	C
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	922	4	28	477	3	0	0	46	0	0	3
Future Vol, veh/h	1	922	4	28	477	3	0	0	46	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1002	4	30	518	3	0	0	50	0	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	522	0	0	1007	0	0	-	-	1004	-	-	520
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	-	-	6.22	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	-	-	3.318	-	-	3.318
Pot Cap-1 Maneuver	1045	-	-	688	-	-	0	0	293	0	0	556
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1045	-	-	688	-	-	-	-	293	-	-	556
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.01	0.58	19.78	11.51
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	293	1045	-	-	688	-	-	556
HCM Lane V/C Ratio	0.17	0.001	-	-	0.044	-	-	0.006
HCM Control Delay (s/veh)	19.8	8.4	-	-	10.5	-	-	11.5
HCM Lane LOS	C	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	6	7	12	27	53
Future Vol, veh/h	8	6	7	12	27	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	7	8	13	29	58
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	86	58	87	0	-	0
Stage 1	58	-	-	-	-	-
Stage 2	28	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	915	1008	1509	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	910	1008	1509	-	-	-
Mov Cap-2 Maneuver	910	-	-	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	8.85	2.73		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	663	-	950	-	-	
HCM Lane V/C Ratio	0.005	-	0.016	-	-	
HCM Control Delay (s/veh)	7.4	0	8.9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

HCM 7th TWSC
4: RIRO Access & 57TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↵			↑		↵↑
Traffic Vol, veh/h	889	5	0	480	0	38
Future Vol, veh/h	889	5	0	480	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	966	5	0	522	0	41
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	969
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	-	0	308
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	308
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		0		18.51	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	308	-	-	-		
HCM Lane V/C Ratio	0.134	-	-	-		
HCM Control Delay (s/veh)	18.5	-	-	-		
HCM Lane LOS	C	-	-	-		
HCM 95th %tile Q(veh)	0.5	-	-	-		

Queues

1: TAFT AVENUE & 57TH STREET

12/05/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	150	388	128	339	612	155	187	1029	262	149	1374
v/c Ratio	0.89	0.94	0.28	0.77	1.29	0.31	1.13	0.65	0.31	0.69	0.90
Control Delay (s/veh)	78.1	74.6	8.0	38.4	181.2	10.3	133.0	26.2	3.2	31.9	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	78.1	74.6	8.0	38.4	181.2	10.3	133.0	26.2	3.2	31.9	38.1
Queue Length 50th (ft)	~75	274	0	87	~552	14	~98	286	0	49	450
Queue Length 95th (ft)	#190	#467	48	#131	#772	66	#244	357	45	#95	556
Internal Link Dist (ft)		956			632			1182			652
Turn Bay Length (ft)	450		430	550		200	200			450	
Base Capacity (vph)	169	413	451	440	474	499	165	1608	862	217	1555
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.94	0.28	0.77	1.29	0.31	1.13	0.64	0.30	0.69	0.88

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	138	357	118	1	311	563	143	172	947	241	137	1088
Future Volume (veh/h)	138	357	118	1	311	563	143	172	947	241	137	1088
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1870	1870	1870		1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	150	388	128		338	612	155	187	1029	262	149	1183
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2	2	2	2	2	2
Cap, veh/h	146	400	339		443	476	403	200	1615	720	246	1366
Arrive On Green	0.05	0.21	0.21		0.09	0.25	0.25	0.05	0.45	0.45	0.05	0.45
Sat Flow, veh/h	1781	1870	1585		3456	1870	1585	1781	3554	1585	1781	3066
Grp Volume(v), veh/h	150	388	128		338	612	155	187	1029	262	149	683
Grp Sat Flow(s),veh/h/ln	1781	1870	1585		1728	1870	1585	1781	1777	1585	1781	1777
Q Serve(g_s), s	5.0	22.6	7.6		8.2	28.0	8.9	6.0	24.5	11.9	5.0	38.1
Cycle Q Clear(g_c), s	5.0	22.6	7.6		8.2	28.0	8.9	6.0	24.5	11.9	5.0	38.1
Prop In Lane	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	146	400	339		443	476	403	200	1615	720	246	792
V/C Ratio(X)	1.02	0.97	0.38		0.76	1.29	0.38	0.94	0.64	0.36	0.61	0.86
Avail Cap(c_a), veh/h	146	400	339		443	476	403	200	1615	720	246	792
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	42.9	37.0		31.5	41.0	33.9	26.9	23.0	19.6	19.8	27.5
Incr Delay (d2), s/veh	81.0	37.3	0.7		7.7	143.7	0.6	45.7	1.9	1.4	4.2	12.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	14.3	2.9		3.8	31.4	3.4	5.0	9.9	4.5	2.2	17.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	121.6	80.2	37.7		39.2	184.7	34.5	72.6	25.0	21.0	24.0	39.5
LnGrp LOS	F	F	D		D	F	C	E	C	C	C	D
Approach Vol, veh/h		666				1105			1478			1523
Approach Delay, s/veh		81.4				119.1			30.3			38.3
Approach LOS		F				F			C			D
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	56.0	14.5	29.5	11.0	55.0	10.0	34.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	5.0	50.0	9.5	23.5	6.0	49.0	5.0	28.0				
Max Q Clear Time (g_c+I1), s	7.0	26.5	10.2	24.6	8.0	40.6	7.0	30.0				
Green Ext Time (p_c), s	0.0	8.3	0.0	0.0	0.0	5.1	0.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh	60.5
HCM 7th LOS	E

Notes

User approved ignoring U-Turning movement.

HCM 7th Signalized Intersection Summary

1: TAFT AVENUE & 57TH STREET

12/05/2024



Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	176
Future Volume (veh/h)	176
Initial Q (Qb), veh	0
Lane Width Adj.	1.00
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Work Zone On Approach	
Adj Sat Flow, veh/h/ln	1870
Adj Flow Rate, veh/h	191
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	219
Arrive On Green	0.45
Sat Flow, veh/h	493
Grp Volume(v), veh/h	691
Grp Sat Flow(s),veh/h/ln	1782
Q Serve(g_s), s	38.6
Cycle Q Clear(g_c), s	38.6
Prop In Lane	0.28
Lane Grp Cap(c), veh/h	794
V/C Ratio(X)	0.87
Avail Cap(c_a), veh/h	794
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	27.6
Incr Delay (d2), s/veh	12.5
Initial Q Delay(d3), s/veh	0.0
%ile BackOfQ(50%),veh/ln	17.8
Unsig. Movement Delay, s/veh	
LnGrp Delay(d), s/veh	40.2
LnGrp LOS	D
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer - Assigned Phs	

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	728	16	90	1015	0	0	0	28	0	0	3
Future Vol, veh/h	0	728	16	90	1015	0	0	0	28	0	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	200	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	791	17	98	1103	0	0	0	30	0	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1103	0	0	809	0	0	-	-	800	-	-	1103
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	4.12	-	-	-	-	6.22	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	-	-	3.318	-	-	3.318
Pot Cap-1 Maneuver	633	-	-	817	-	-	0	0	385	0	0	257
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	633	-	-	817	-	-	-	-	385	-	-	257
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	0.81	15.15	19.19
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	385	633	-	-	817	-	-	257
HCM Lane V/C Ratio	0.079	-	-	-	0.12	-	-	0.013
HCM Control Delay (s/veh)	15.2	0	-	-	10	-	-	19.2
HCM Lane LOS	C	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.4	-	-	0

HCM 7th TWSC
3: DUFFIELD AVENUE & 50TH STREET

12/05/2024

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	4	5	26	20	34
Future Vol, veh/h	25	4	5	26	20	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	4	5	28	22	37

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	79	40	59	0	-	0
Stage 1	40	-	-	-	-	-
Stage 2	39	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	923	1031	1545	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	983	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	920	1031	1545	-	-	-
Mov Cap-2 Maneuver	920	-	-	-	-	-
Stage 1	979	-	-	-	-	-
Stage 2	983	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	8.99	1.18	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	290	-	934	-	-
HCM Lane V/C Ratio	0.004	-	0.034	-	-
HCM Control Delay (s/veh)	7.3	0	9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 7th TWSC
4: RIRO Access & 57TH STREET

12/05/2024

Intersection

Int Delay, s/veh 0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	719	17	0	1018	0	25
Future Vol, veh/h	719	17	0	1018	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	782	18	0	1107	0	27

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 791
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	-	- - - 6.22
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	-	- - - 3.318
Pot Cap-1 Maneuver	-	-	0 - 0 390
Stage 1	-	-	0 - 0
Stage 2	-	-	0 - 0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- - - 390
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	14.93
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	390	-	-	-
HCM Lane V/C Ratio	0.07	-	-	-
HCM Control Delay (s/veh)	14.9	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-