September 30, 2026

Jon Killingsworth
Merrick & Company
5970 Greenwood Plaza Boulevard
Greenwood Village, CO 80111

Re: CFA Dawson Trails (Gambel Ridge Drive & Dawson Trails Boulevard)
Traffic Compliance Letter & Access Analysis
Castle Rock, Colorado

Dear Mr. Killingsworth,

This letter documents the results of a trip generation comparison, drive-thru queuing analysis, and access analysis for the proposed Chick-fil-A restaurant to identify traffic compliance with the original traffic study that was conducted for the overall master plan project site, *Dawson Trails Master Transportation Study (MTS)*. The overall mixed use development area is located in Castle Rock, Colorado and is generally bordered by Interstate 25 (I-25) to the east, Yucca Hills Road to the north, Tomah Road to the south, and Twin Oaks neighborhood to the west Specifically, the Chick-fil-A is proposed to be located on the northwest corner of the Gambel Ridge Drive and Dawson Trails Boulevard intersection within the southwest quadrant of the Crystal Valley Parkway and I-25 interchange. A project vicinity map is attached in **Figure 1.**

The original traffic impact study— *Dawson Trails MTS* — was completed in June 2022, and the original development plan proposed a mix of commercial uses, residential uses, industrial, and educational buildings. Retail space was originally assumed to be built on the project site. Using a 0.25 floor to area ratio, it was reasoned that approximately 15,700 square feet of retail space would fit within the proposed parcel. Applicable documents from the original traffic study are attached. The currently proposed use is a 5,087 square foot fast-food restaurant. A conceptual site plan for the project is attached. One main purpose of this letter is to compare the expected trips generated by the proposed Chick-fil-A fast-food restaurant to the applicable use, retail plaza, evaluated in the original traffic study.

Two points of access will primarily be provided to the proposed fast-food restaurant site. A right-in right-out (RIRO) access will be provided along the north side of Gambel Ridge Drive, approximately equidistant between Territorial Road and Dawson Trails Boulevard. A three-quarters movement access currently exists along the east side of Territorial Road approximately 400 feet to the north of the Gambel Ridge Drive and Territorial Road intersection. Of note, a third access will be operational with full movements along Territorial Road/Crystal Valley Parkway during construction but restricted to right-in/right-out at the operational phase, but is not expected to be used by site generated traffic. This RIRO access is existing along Crystal Valley Parkway/Territorial Road approximately 1,200 feet to the north of the Gambel Ridge Drive and Territorial Road intersection.

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. As only a portion of the originally studied project site is applicable to this study, the trip generation was recalculated for only 15,700 square feet of retail as noted previously. The ITE Trip Generation Manual average rates/equations that apply to Strip Retail Plaza (<40k) (ITE Land Use Code 822) were used for traffic associated with the same development area of the current application.

As Chick-fil-A sites have been found to produce more trips than the ITE calculations for fast food restaurants, site specific data for Chick-fil-A in Colorado were used to predict the number of trips the proposed Chick-fil-A site will generate. The site-specific data is attached.

The following **Table 1** summarizes the estimated trip generation for traffic associated with the currently proposed Chick-fil-A versus the traffic anticipated to be generated in the same development area from the original traffic study (calculations attached). Of note, Saturday data is included to provide a complete comparison between the two uses.

Table 1 – Chick-fil-A Castle Rock
Trip Generation Comparison: Original Traffic Study vs. Current Proposal

Land Use and Size	Weekday Vehicles Trips							Saturday Vehicles Trips		
	Daily	AM Peak Hour			PM Peak Hour			Midday Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
Original Study – Dawson Trails MTS										
Strip Retail Plaza (ITE 822) – 15,700 Square Feet	856	34	28	62	52	52	104	53	51	104
Current Proposal – Site Specific Data										
Chick-fil-A – 5,087 Square Feet	2,750	75	75	150	135	140	275	198	206	404
Net Difference in Trips	***+1,894***	***+41***	***+47***	***+88***	***+73***	***+88***	***+171***	***+145***	***+155***	***+300***

As shown in the table above, the currently proposed Chick-fil-A project is expected to generate approximately 2,750 weekday daily trips, with 150 of these trips occurring during the morning peak hour and 275 of these trips occurring during the afternoon peak hour. On Saturdays, the proposed site is expected to generate 404 trips during the midday peak hour. As compared to the previous trip generation estimates presented in the original MTS and extrapolated to account for only this specific parcel's development area, the proposed Chick-fil-A is anticipated to generate 1,894 more daily weekday trips, with 88 additional trips during the morning peak hour and 171 additional trips during the afternoon peak hour. During the Saturday midday peak hour, the proposed site is expected to produce an additional 300 trips.

1 Institute of Transportation Engineers, *Trip Generation Manual*, Twelfth Edition, Washington DC, 2025.

The 1,894 daily trip increase accounts for a three (3) percent increase when considering the total daily trips generated by the overall MTS. Of note, this Chick-fil-A is proposed to be located in the area identified as E-2 by the original MTS. When considering the entire E-2 planning area, the expected 2,750 daily weekday trips produced by the proposed Chik-fil-A account for approximately 30 percent of the trips planned in this area. Therefore, although this parcel is generating additional trips than evaluated previously, there is still 70 percent of reserved trip generation capacity available for the remaining parcels within E-2. This is typical of master plan developments to have some parcels with higher trip intensity and others with lower trip intensity.

DRIVE-THROUGH QUEUING ANALYSIS

As provided in the Institute of Transportation Engineers (ITE) Drive-Through Queue Generation, by Mike Spack, P.E., PTOE (data and information attached), the recommended drive through vehicle queue length for fast food restaurants is 12 vehicles, represented by the 85th percentile queue. In addition, a drive-through queuing analysis was conducted by Kimley-Horn at an existing Chick-fil-A site in Parker, Colorado. The maximum drive-through queue observed to occur at the existing site in Parker was 21 vehicles or 420 feet (data and information attached). Based on the attached site plan, the proposed Chick-fil-A provides two full-service drive-through lanes, providing a total of approximately 600 feet of vehicle storage in the designated drive through area which equates 30 vehicles. Therefore, based on both industry standard and site-specific vehicle queuing data, it is believed that the site has been designed with an appropriate configuration to accommodate the drive-through queuing needs onsite and within the designated drive through area.

PROJECT ACCESS OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies at the project accesses in the 2040 long term horizon. Traffic projections were derived from the 2040 total traffic volume estimates from the *Dawson Trails MTS* which included weekday AM and PM peak hours as well as the Saturday peak hour. The original *Dawson Trails MTS* did not analyze accesses to the proposed development or surrounding parcels; therefore, the applicable project accesses were evaluated in this study. Of note, project trips accounted for by the originally proposed retail area were not removed for calculations; therefore, this analysis provides a conservative account of the volume of vehicles traveling past the project site.

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding 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 traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown above. **Figure 2** illustrates the trip distribution and **Figure 3** illustrates the traffic assignment for this project. **Figure 4** depicts the 2040 background volumes for the weekday and Saturday peak hours which is derived from the 2040 total traffic volumes from the original *Dawson Trails MTS*. Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the 2040 horizon. These total traffic volumes for the study area are illustrated in **Figure 5**.

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways, standard traffic engineering practice recommends LOS D as the minimum threshold for acceptable operations for intersections and LOS E for movements. The acknowledged source for determining overall capacity is the Highway Capacity Manual[2]. **Table 1** below shows the definition of level of service for signalized and unsignalized intersections.

Table 1 – Level of Service Definitions

Level of Service	Signalized Intersection Average Control Delay (sec/veh)	Unsignalized Intersection Average Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Transportation Research Board, *Highway Capacity Manual*, Seventh Edition, Washington DC, 2022.

[2] Transportation Research Board, *Highway Capacity Manual*, Seventh Edition, Washington DC, 2022.

Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each critical movement. LOS for a two-way stop-controlled intersection is not defined for the whole intersection. Synchro traffic analysis software was used to analyze the project site accesses for level of service. The Synchro Highway Capacity Manual (HCM) methodology reports were used to analyze intersection delay and level of service.

Project Accesses

With completion of the project, two accesses will primarily serve the proposed Chick-fil-A development – one proposed right-in/right-out access along the north side of Gambel Ridge Drive and an existing three-quarter movement access along the east side of Territorial Road. It is recommended that a R1-1 "STOP" sign be installed on the exiting approach of the Gambel Ridge Drive access. In addition, a westbound right turn lane is proposed at the Gambel Ridge Drive Access. The results of the level of service for the project access intersections as identified below in **Table 3**. As shown in the table, the project access intersections are anticipated to have all movements operating with acceptable LOS C or better during the peak hours in the 2040 long-term horizon. The key access intersection recommended improvements and control are shown in **Figure 6**.

Table 3 – 2040 Project Access Level of Service Results

Intersection	Weekday				Saturday	
	AM Peak Hour		PM Peak Hour		MID Peak Hour	
	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS
Terminal Rd Access (3/4)						
Westbound Approach	11.0	B	15.1	C	16.7	C
Southbound Left	9.2	A	12.0	B	12.5	B
Gambel Ridge Dr Access (RIRO)						
Southbound Approach	8.6	A	10.0	B	10.3	C

CONCLUSIONS

Based on the traffic analysis presented in this report, the proposed Chick-fil-A is anticipated to generate more trips than evaluated for the same development area in the original master transportation study. The 1,894 daily trip increase accounts for a three (3) percent increase when considering the total daily trips generated by the overall master transportation study. Of note, this Chick-fil-A is proposed to be located in the area identified as E-2 by the original master transportation study and then considering the entire E-2 planning area, the expected 2,750 daily weekday trips produced by the proposed Chik-fil-A account for approximately 30 percent of the trips planned in this area. Therefore, although this parcel is generating additional trips than evaluated previously, there is still 70 percent of reserved trip generation capacity available for the remaining parcels within E-2. This is typical of master plan developments to have some parcels with higher trip intensity and others with lower trip intensity.

Industry standard for fast-food restaurant designated drive through areas is supplying space for 12 passenger vehicles while site specific drive-through queuing data indicates a need for 21 passenger vehicles. The proposed Chick-fil-A provides two full-service drive-through lanes, providing a total of approximately 30 vehicles of storage. Therefore, it is believed that the site has been designed with an appropriate configuration to accommodate the drive-through queuing needs onsite and within the designated drive through area.

With completion of the project, two accesses will primarily serve the proposed Chick-fil-A development – one proposed right-in/right-out access along the north side of Gambel Ridge Drive and an existing three-quarter movement access along the east side of Territorial Road. It is recommended that a R1-1 “STOP” sign be installed on the exiting approach of the Gambel Ridge Drive access. In addition, a westbound right turn lane is proposed at the Gambel Ridge Drive Access.

If you have any questions or require anything further, please feel free to call me.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

Jeffery R. Planck, P.E.
Project Manager – Traffic



Figures

Kimley»Horn
NORTH
NTS 096206028

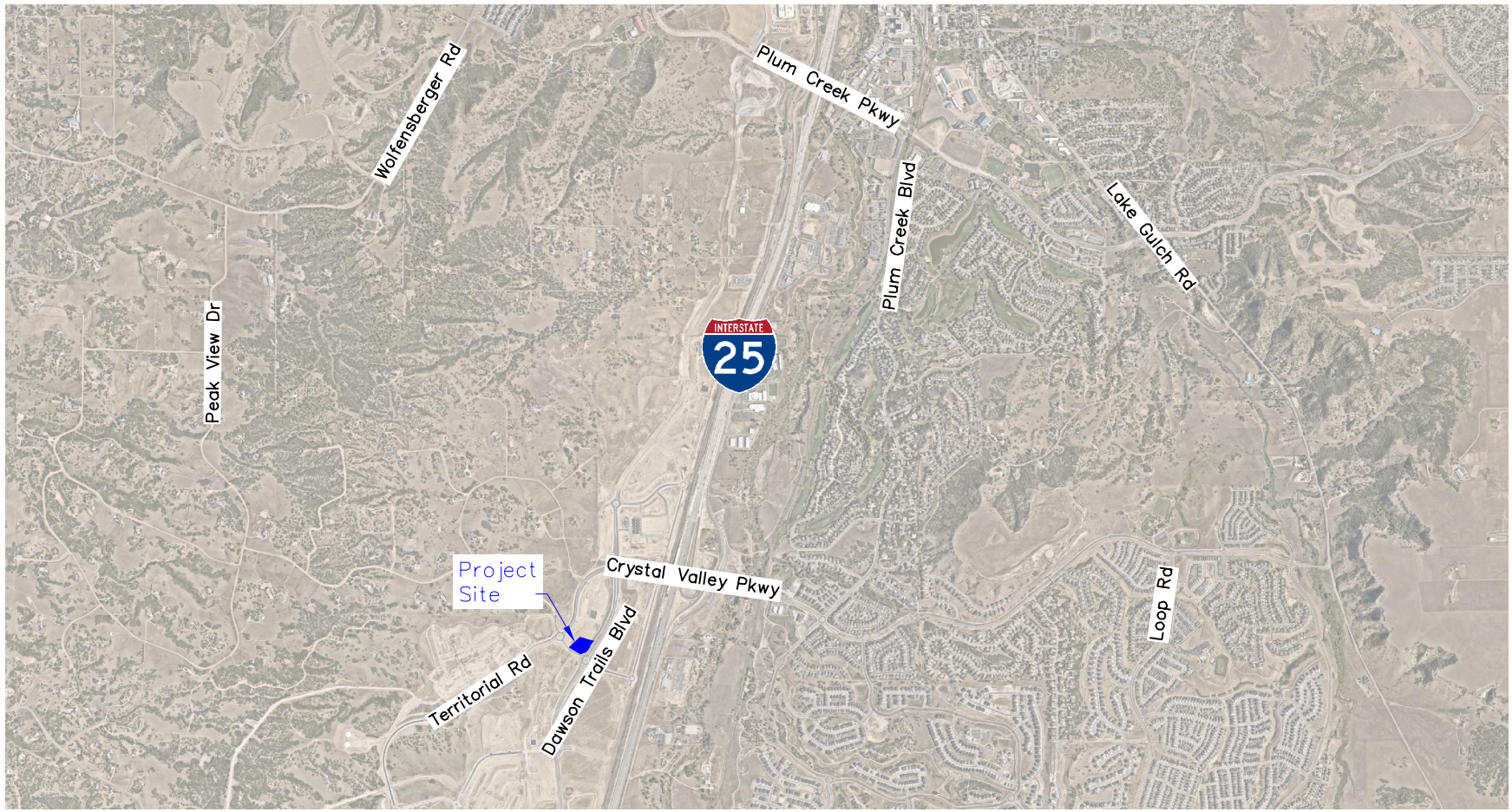
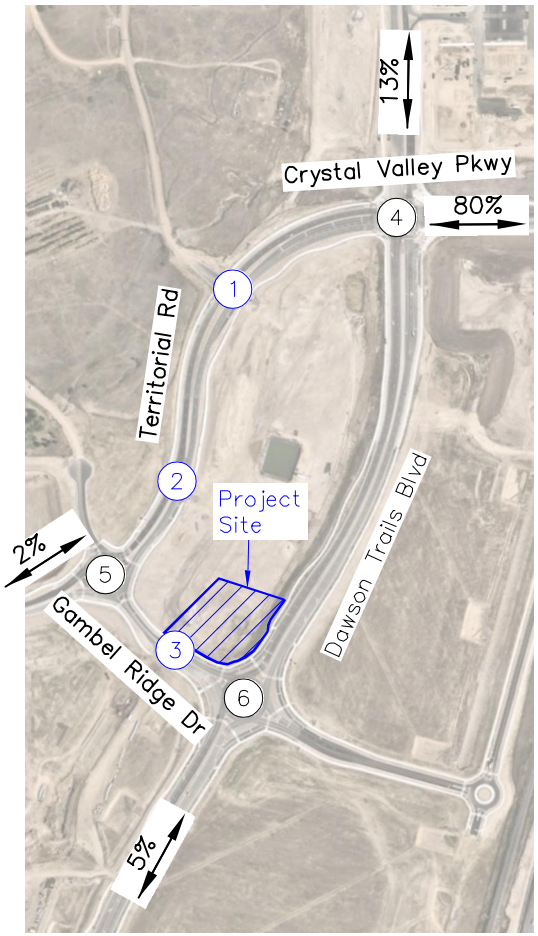
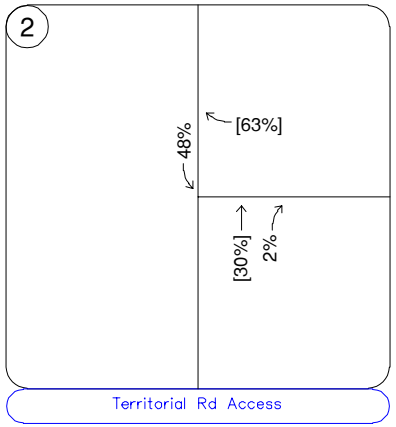


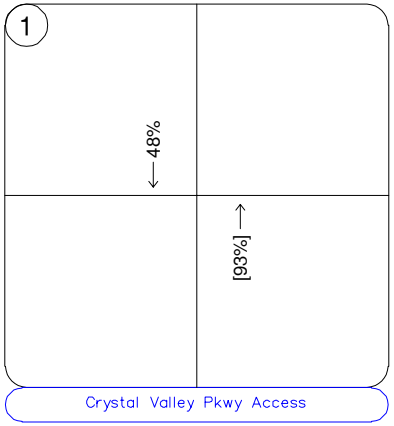
FIGURE 1
Chick-fil-A Dawson Trails
Castle Rock, Colorado
Vicinity Map

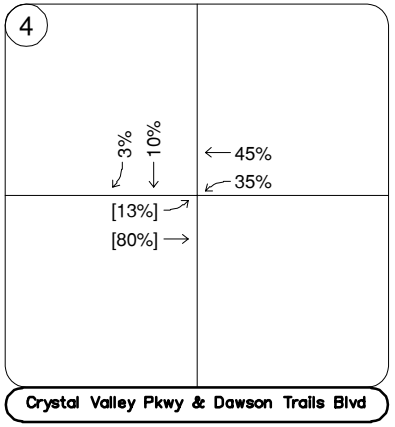
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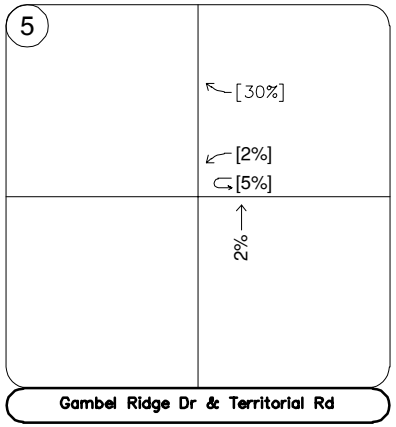
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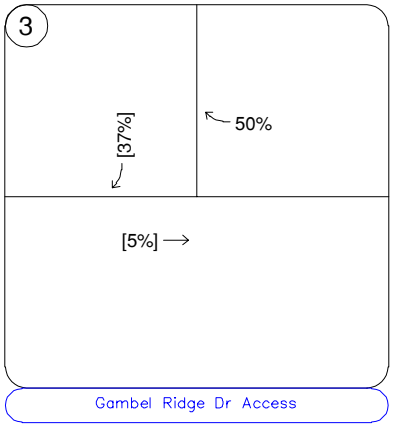


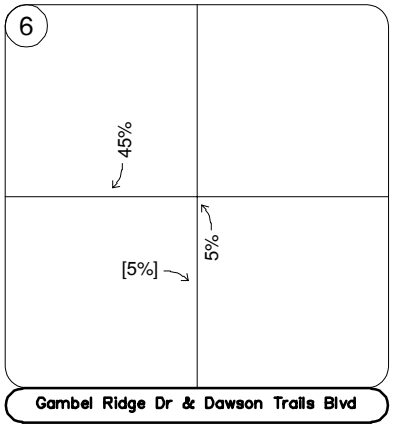










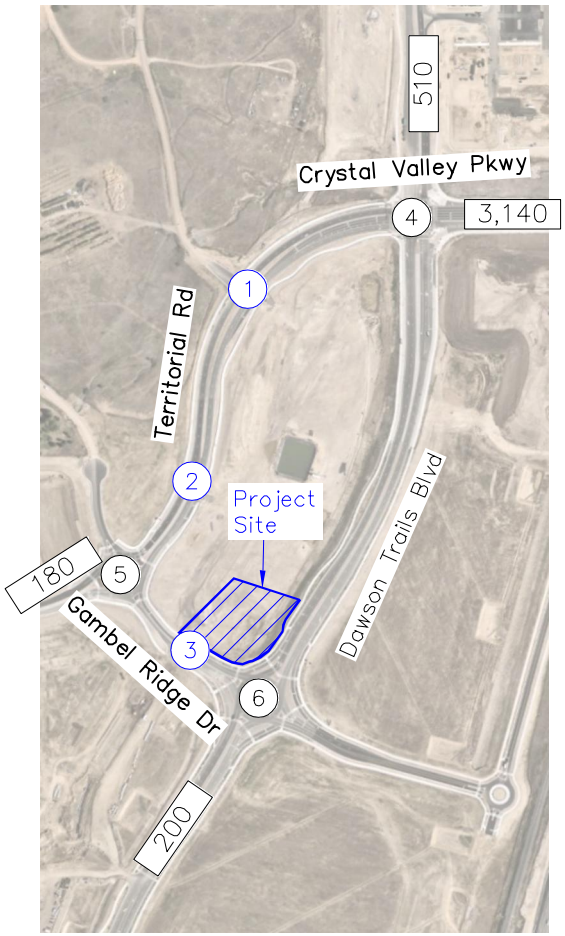


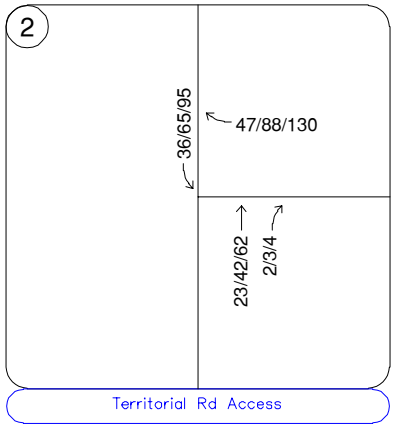
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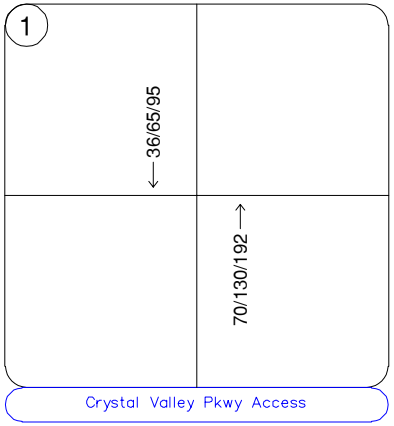
X	Study Area Key Intersection
X	Project Access Intersection
XX%	External Trip Distribution Percentage
XX%[XX%]	Entering[Exiting] Trip Distribution Percentage

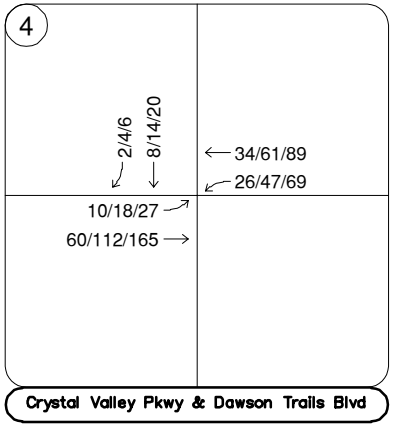
FIGURE 2
Chick-fil-A Dawson Trails
Castle Rock, Colorado
Project Trip Distribution

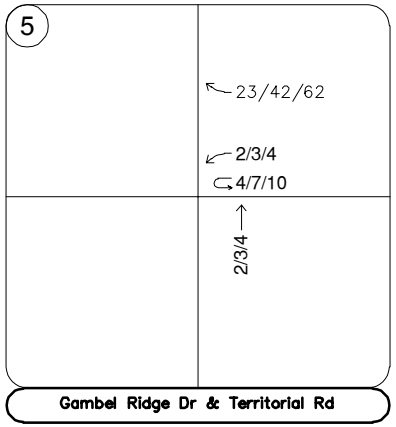
Kimley»Horn

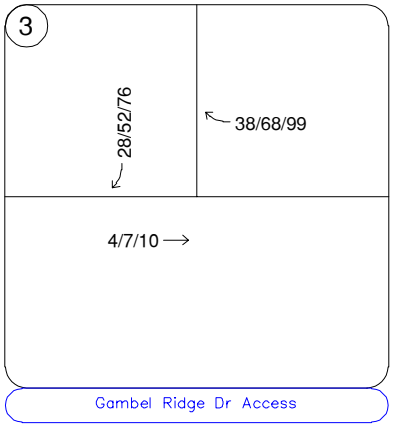


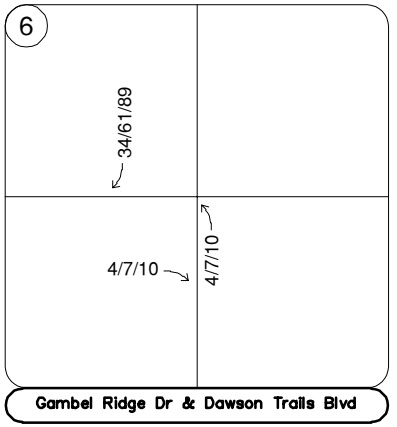












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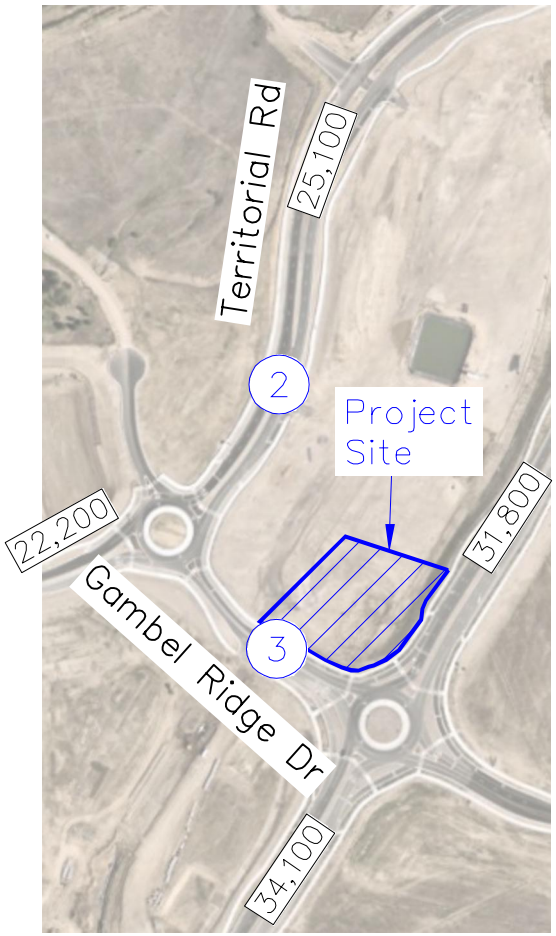
(X) Study Area Key Intersection

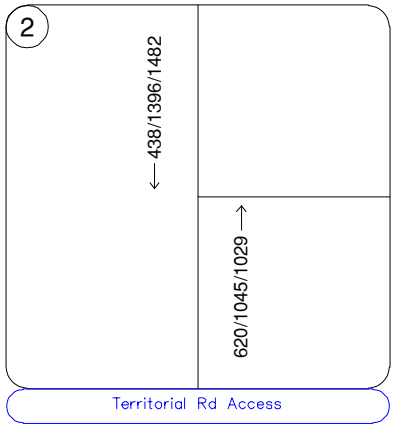
(X) Project Access Intersection

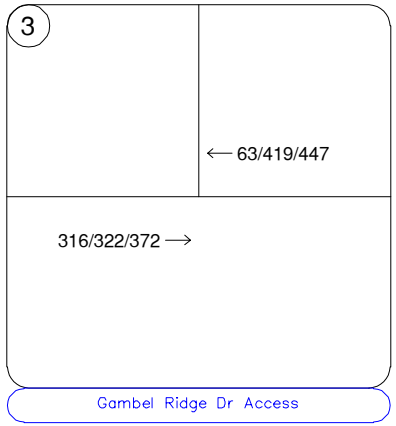
XX/XX/XX Week AM/Week PM/Saturday MID Peak Hour Traffic Volumes

XX,X00 Estimated Weekday Daily Traffic Volumes

FIGURE 3
Chick-fil-A Dawson Trails
Castle Rock, Colorado
Project Traffic Assignment







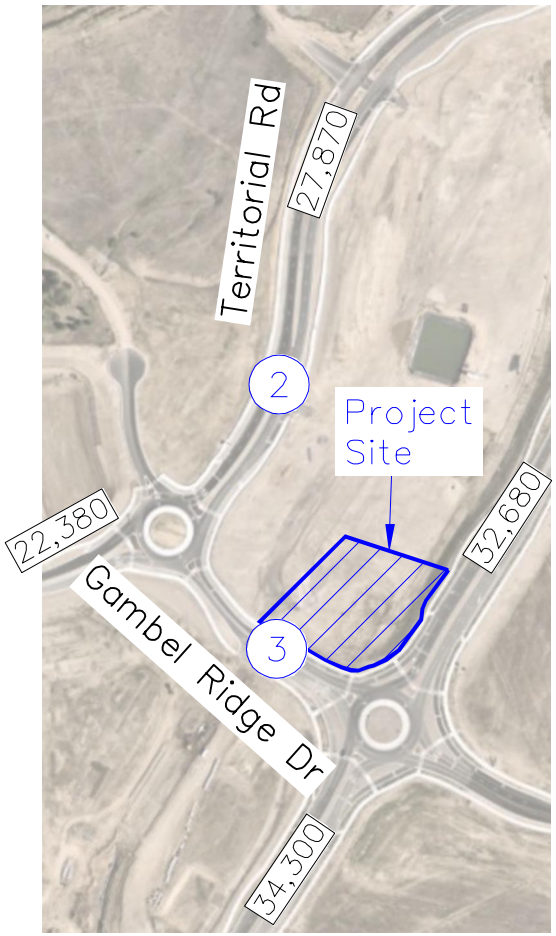
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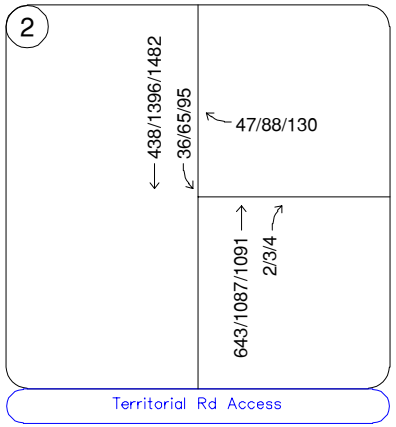
(X) Project Access Intersection

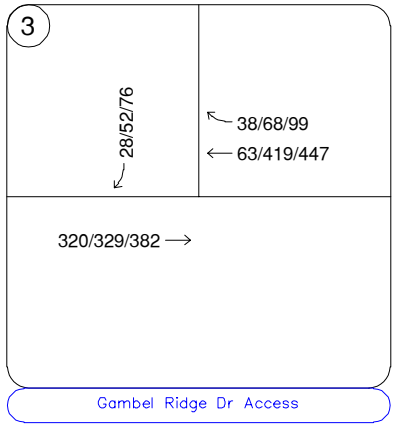
XX/XX/XX Week AM/Week PM/Saturday MID Peak Hour Traffic Volumes

XX,X00 Estimated Weekday Daily Traffic Volumes

FIGURE 4
Chick-fil-A Dawson Trails
Castle Rock, Colorado
2040 Background Traffic Volumes



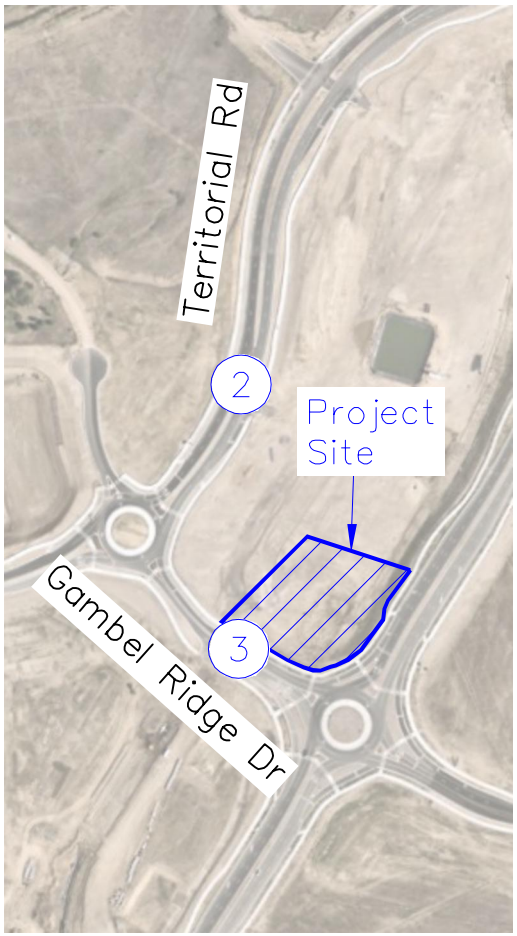


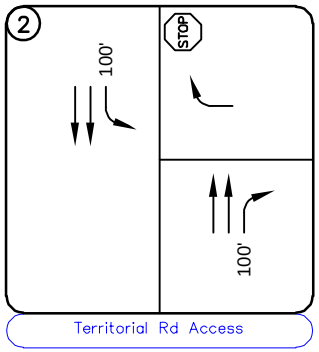


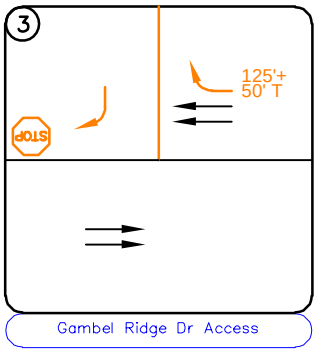
LEGEND

X	Project Access Intersection
XX/XX/XX	Week AM/Week PM/Saturday MID Peak Hour Traffic Volumes
XX,X00	Estimated Weekday Daily Traffic Volumes

FIGURE 5
Chick-fil-A Dawson Trails
Castle Rock, Colorado
2040 Total Traffic Volumes







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X Project Access Intersection

STOP Stop-Controlled Approach

Improvement

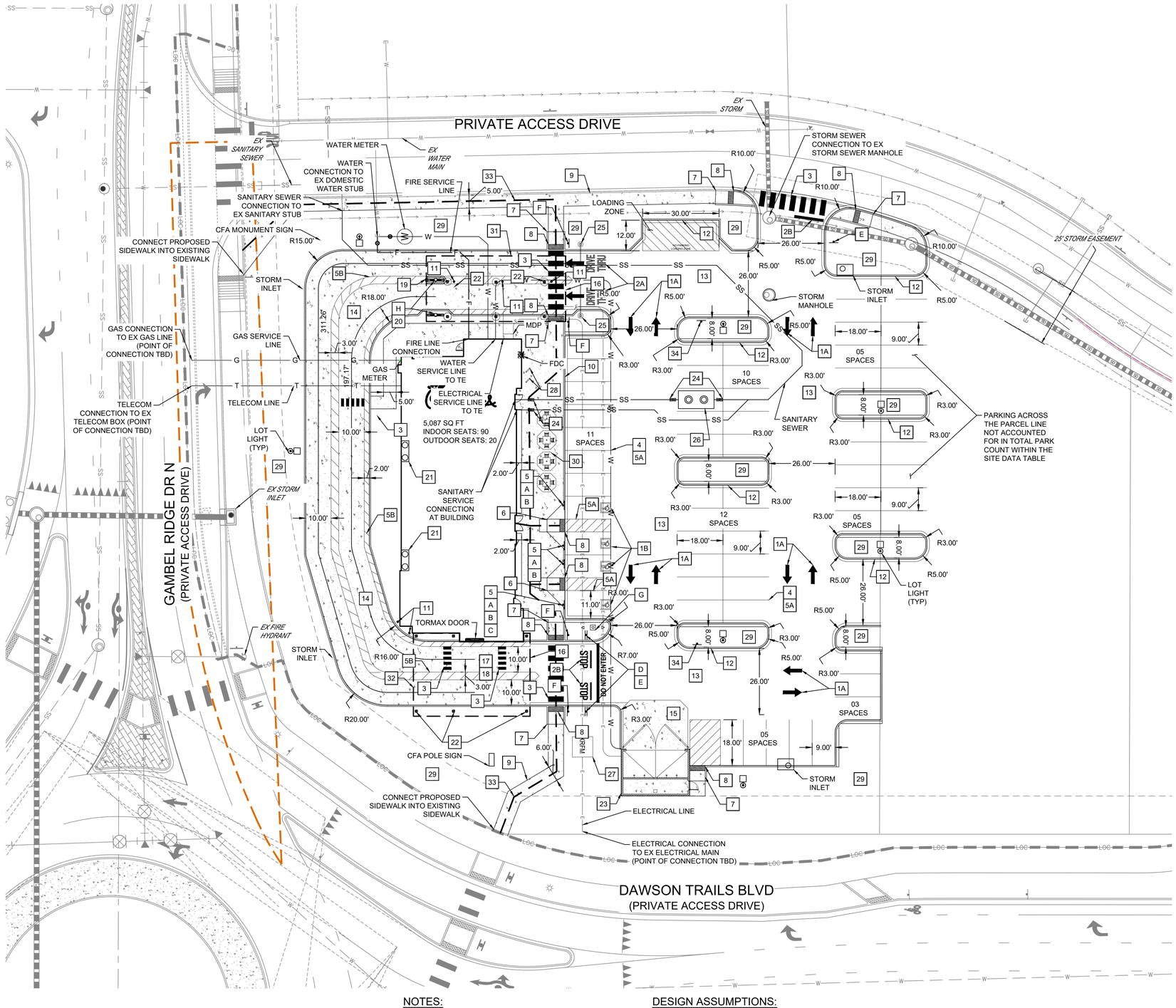
100' Turn Lane Length (feet)

FIGURE 6
Chick-fil-A Dawson Trails
Castle Rock, Colorado
Recommended Geometry and Controls

Kimley»Horn

Conceptual Site Plan

kimley-horn.com | 6200 South Syracuse Way Suite 300, Greenwood Village, CO 80111 | 303 228 2300



SITE PLAN DESIGN NOTES & KEY PLAN

1A DIRECTIONAL ARROW
1B PAINTED HANDICAP PARKING SYMBOL
2A DRIVE-THRU GRAPHICS
2B STOP BAR GRAPHIC
3 CROSSWALK MARKINGS
4 STANDARD OR HANDICAP PARKING STALL PER CODE
5 BOLLARD MOUNTED SIGN
5A 4" SOLID WHITE STRIPING
5B 4" SOLID YELLOW STRIPING
6 CURB RAMP W/ FLARED SIDES
7 RETURNED CURB HANDICAP RAMP
8 DETECTABLE WARNING DEVICE
9 CONCRETE SIDEWALK
10 CONCRETE SIDEWALK W/ CURB & GUTTER
11 CONCRETE BOLLARD
12 CONCRETE CURB & GUTTER
13 TYPICAL HMAC PAVEMENT SECTION
14 CONCRETE PAVEMENT DRIVE-THRU LANE
15 CONCRETE APRON AT TRASH ENCLOSURE
16 PAVEMENT EDGE DETAIL START & END OF DRIVE-THRU LANES
17 DRIVE-THRU PLAN - FLUSH WITH FFE
18 DRIVE-THRU ISOMETRIC
19 DRIVE-THRU ORDER POINT ISLAND
20 MENU BOARD LOOP DETECTION SYSTEM
21 BUILDING DOWNSPOUT CONNECTION (TO SITE DRAINAGE)
22 CANOPY DOWNSPOUT CONNECTION (TO SITE DRAINAGE)
23 SCREENED REFUSE ENCLOSURE (REFER TO ARCH PLANS FOR ADDITIONAL DETAILS)
24 CLEAN-OUT (OUTSIDE OF BUILDING)
25 DRIVE-THRU CLEARANCE BAR (REFER TO SIGNAGE PACKAGE)
26 GREASE TRAP
27 PROPOSED TRANSFORMER
28 BIKE RACK
29 LANDSCAPED AREA
30 TYPICAL LOCATION FOR OUTDOOR TABLES (REFER TO ARCH PLANS)
31 FREE STANDING ORDER POINT CANOPY
32 FREE STANDING OUTSIDE MEAL DELIVERY CANOPY
33 ADA ACCESSIBLE PATH
34 NO PARKING, FIRE LANE SIGN

SIGN LEGEND

** CONTRACTOR TO REFER TO THE SIGNAGE PACKAGE FOR PLACEMENT AND SPECIFICATIONS OF ALL SIGNS **

A HANDICAP PARKING SIGN (SEE SIGNAGE PACKAGE) R7-8; 12" X 18" (TYP.)
B HANDICAP PARKING FINE SIGN (SEE SIGNAGE PACKAGE) 6" X 12" (TYP.)
C "VAN ACCESSIBLE" SIGN (SEE SIGNAGE PACKAGE) R7-8P; 6" X 12" (TYP.)
D "DO NOT ENTER" SIGN (SEE SIGNAGE PACKAGE) R5-1; 24" X 24" (TYP.)
E STOP SIGN (SEE SIGNAGE PACKAGE) R1-1; 30" X 30" (TYP.)
F CFA PEDESTRIAN CROSSING SIGN (SEE SIGNAGE PACKAGE)
G FLAG POLE (SEE SIGNAGE PACKAGE)
H DIGITAL DRIVE-THRU MENU BOARDS

SITE DATA TABLE		
ITEM	REQUIRED	PROPOSED
PROPERTY AREA		
GROSS SF		62,751
GROSS AC		1.44
BUILDING SF		5,087
PARKING		
CALCULATION	10 SPACES PER 1,000 SQ FT GFA	
STANDARD STALLS	48	48
ACCESSIBLE STALLS	3	4
TOTAL	51	52
BICYCLE	2	2
BUILDING SET BACK (FT)		
NORTH	0	0
SOUTH	0	0
EAST	0	0
WEST	0	0
LANDSCAPE SET BACK (FT)		
NORTH	0	0
SOUTH	0	0
EAST	0	0
WEST	0	0

NOTES:

1. SANITARY POC OPTION BY ARCHITECT TEAM
2. GAS METER LOCATION BY ARCHITECT TEAM
3. FIRE LANE ACCESS IS 26 FEET WIDE
4. ELECTRICAL CONNECTION TO EX ELECTRICAL MAIN, POINT OF CONNECTION TBD
5. GAS CONNECTION TO EX GAS MAIN, POINT OF CONNECTION TBD
6. TELECOM CONNECTION TO EX TELECOM MAIN, POINT OF CONNECTION TBD
7. FIRE LINE POC TBD
8. EXISTING FIRE HYDRANT NEAR THE CORNER OF GAMBEL RIDGE DR N AND DAWSON TRAILS BLVD

DESIGN ASSUMPTIONS:

1. PER SECTION 17.54.100 OF THE CASTLE ROCK, COLORADO MUNICIPAL CODE - PARKING ROWS CONTAINING 10 OR MORE PARKING SPACES SHALL HAVE RAISED CURB ISLANDS WITH LANDSCAPING
2. PER THE SIR - THE TOWN REQUIRES THAT NO MORE THAN 15 ADJACENT PARKING STALLS BE LOCATED BETWEEN PARKING ISLANDS OR PENINSULAS
3. PER SECTION 17.54.050, TABLE 64-2. THE TOTAL NUMBER OF PARKING SPACES (55) REQUIRES A MINIMUM OF 3 ACCESSIBLE SPACES
4. PER SECTION 17.54.050. 1 OUT OF EVERY 6 ACCESSIBLE SPACES NEEDS TO BE VAN ACCESSIBLE
5. TE TO DRAIN OUT IN FRONT INTO PROPOSED STORM NETWORK

Know what's below. Call before you dig.

Chick-fil-A
5200 Buffington Road
Atlanta, Georgia 30349-2998

MERRICK®
8051 E. MAPLEWOOD AVE SUITE 300
GREENWOOD VILLAGE, CO 80111
303-751-0741

FOR AND AND ON-BEHALF OF MERRICK AND COMPANY

CHICK-FIL-A
DAWSON TRAILS
NWC QUANDARY PEAK BLVD. & DAWSON TRAILS BLVD.
CASTLE ROCK, CO

FSU#06404

BUILDING TYPE / SIZE: P15 LE BASE
RELEASE: vX.YY.MM

REVISION SCHEDULE

NO.	DATE	DESCRIPTION

ENGINEERED SITE PLAN

CONSULTANT PROJECT #
PRINTED FOR
DATE 06/19/2026
DRAWN BY KEA
SHEET
SHEET NUMBER

File Path: Q:\DEN\Projects\101780.00 - CFA Dawson Trails 06404\CAD\ESP\2026-0811 ESP\ENGINEERED SITE PLAN.dwg
Last Saved By: KAT.ADAMS
9/2/2026 9:49 AM
00-LS-0000-A101-SHEET NAME

Original Traffic Impact Study Excerpts

Dawson Trails
Master Transportation Study



PREVIOUS SUBMITTAL DATES: July 7 & December 6, 2021;
April 14 & May 25, 2022

UPDATED DATE: June 7, 2022

PREPARED FOR:
Dawson Trails I LLC
Dawson Trails II LLC
Westside Property Investment Company, Inc.
4100 East Mississippi Avenue - Suite 500
Denver, CO 80246

PREPARED BY:
Fox Tuttle Transportation Group, LLC
1624 Market Street, Suite 202
Denver, CO 80202

FOX TUTTLE

Table 6A – Trip Generation and Phases (External Trips)

Planning Area	Land Use	Size	Unit	Non-Auto Factor	Internal Capture Adjust	Average Daily Trips				AM Peak Hour Trips				PM Peak Hour Trips				Saturday Peak Hour Trips				
						Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out	Peak Factor	Rate	Total	In	Out
A	ITE 210 - Single-Family Detached Housing	471	Dwelling Units	0.95	0.65	9.44	2,746	1,373	1,373	0.74	215	54	161	0.99	288	181	107	0.875	0.93	237	128	109
B-1	ITE 210 - Single-Family Detached Housing	484	Dwelling Units	0.95	0.65	9.44	2,821	1,411	1,410	0.74	221	55	166	0.99	296	186	110	0.875	0.93	243	131	112
B-2	ITE 210 - Single-Family Detached Housing	228	Dwelling Units	0.95	0.65	9.44	1,329	665	664	0.74	104	26	78	0.99	139	88	51	0.875	0.93	115	62	53
C-1	ITE 210 - Single-Family Detached Housing	481	Dwelling Units	0.95	0.65	9.44	2,804	1,402	1,402	0.74	220	55	165	0.99	294	185	109	0.875	0.93	242	131	111
C-2	ITE 210 - Single-Family Detached Housing	908	Dwelling Units	0.95	0.65	9.44	5,293	2,647	2,646	0.74	415	104	311	0.99	555	350	205	0.875	0.93	456	246	210
D-1	ITE 210 - Single-Family Detached Housing	955	Dwelling Units	0.95	0.65	9.44	5,567	2,784	2,783	0.74	436	109	327	0.99	584	368	216	0.875	0.93	480	259	221
D-1	ITE 220 - Multi-Family Housing (Low-Rise)	983	Dwelling Units	0.95	0.65	7.32	4,443	2,222	2,221	0.46	279	64	215	0.56	340	214	126	0.875	0.70	372	182	190
E-1	ITE 820 - Shopping Center	30.00	1,000 sq. ft.	0.95	0.50	37.75	538	269	269	0.94	13	8	5	3.81	54	26	28	1.0	4.50	64	33	31
	Pass-by Shopping Center (PM)	*34%*					*183*	*91*	*92*		*0*	*0*	*0*		*18*	*9*	*9*			*0*	*0*	*0*
	Pass-by Shopping Center (Sat)	*26%*					*0*	*0*	*0*		*0*	*0*	*0*		*0*	*0*	*0*			*17*	*9*	*8*
E-2	ITE 220 - Multi-Family Housing (Low-Rise)	400	Dwelling Units	0.95	0.65	7.32	1,808	904	904	0.46	114	26	88	0.56	138	87	51	0.875	0.70	151	74	77
	ITE 820 - Shopping Center	412.00	1,000 sq. ft.	0.95	0.50	37.75	7,388	3,694	3,694	0.94	184	114	70	3.81	746	358	388	1.0	4.50	881	458	423
	Pass-by Shopping Center (PM)	*34%*					*2,512*	*1,256*	*1,256*		*0*	*0*	*0*		*254*	*122*	*132*			*0*	*0*	*0*
	Pass-by Shopping Center (Sat)	*26%*					*0*	*0*	*0*		*0*	*0*	*0*		*0*	*0*	*0*			*229*	*119*	*110*
	ITE 710 - General Office	23.00	1,000 sq. ft.	0.95	0.60	9.74	128	64	64	1.16	15	13	2	1.15	15	2	13	1.0	0.53	7	4	3
F-1	ITE 110 - General Light Industrial (Flex)	135.00	1,000 sq. ft.	0.95	0.85	4.96	541	271	270	0.70	76	67	9	0.63	69	9	60	1.0	0.41	45	21	24
	ITE 710 - General Office (Flex)	135.00	1,000 sq. ft.	0.95	0.60	9.74	749	375	374	1.16	89	77	12	1.15	88	14	74	1.0	0.53	41	22	19
	ITE 710 - General Office	105.00	1,000 sq. ft.	0.95	0.50	9.74	486	243	243	1.16	58	50	8	1.15	57	9	48	1.0	0.53	26	14	12
F-2	ITE 220 - Multi-Family Housing (Low-Rise)	440	Dwelling Units	0.95	0.65	7.32	1,989	995	994	0.46	125	29	96	0.56	152	96	56	0.875	0.70	166	81	85
	ITE 710 - General Office	120.00	1,000 sq. ft.	0.95	0.60	9.74	666	333	333	1.16	79	68	11	1.15	79	13	66	1.0	0.53	36	19	17
	ITE 857 Discount Club	180.00	1,000 sq. ft.	0.95	0.65	42.46	4,719	2,360	2,359	0.80	89	54	35	4.19	466	233	233	1.0	6.37	708	347	361
F-3	ITE 220 - Multi-Family Housing (Low-Rise)	500	Dwelling Units	0.95	0.65	7.32	2,260	1,130	1,130	0.46	142	33	109	0.56	173	109	64	0.875	0.70	189	93	96
	ITE 710 - General Office	552.00	1,000 sq. ft.	0.95	0.60	9.74	3,065	1,533	1,532	1.16	365	314	51	1.15	362	58	304	1.0	0.53	167	90	77
	ITE 820 - Shopping Center	278.00	1,000 sq. ft.	0.95	0.50	37.75	4,985	2,493	2,492	0.94	124	77	47	3.81	503	241	262	1.0	4.50	594	297	297

Table 6A – Trip Generation and Phases (External Trips)

Planning Area	Land Use	Size	Unit	Non-Auto Factor	Internal Capture Adjust	Average Daily Trips				AM Peak Hour Trips				PM Peak Hour Trips				Saturday Peak Hour Trips				
						Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out	Peak Factor	Rate	Total	In	Out
F-3 cont'd	ITE 110 - General Light Industrial (Flex)	362.50	1,000 sq. ft.	0.95	0.85	4.96	1,452	726	726	0.70	205	180	25	0.63	184	24	160	1.0	0.41	120	56	64
	ITE 710 - General Office (Flex)	362.50	1,000 sq. ft.	0.95	0.60	9.74	2,013	1,007	1,006	1.16	240	206	34	1.15	238	38	200	1.0	0.53	110	59	51
	Pass-by Shopping Center (PM)	*34%*					*1,695*	*848*	*847*		*0*	*0*	*0*		*171*	*82*	*89*			*0*	*0*	*0*
	Pass-by Shopping Center (Sat)	*26%*					*0*	*0*	*0*		*0*	*0*	*0*		*0*	*0*	*0*			*154*	*77*	*77*
G-1	ITE 110 - General Light Industrial	375.00	1,000 sq. ft.	0.95	0.85	4.96	1,502	751	751	0.70	212	187	25	0.63	191	25	166	1.0	0.41	124	58	66
	ITE 110 - General Light Industrial (Flex)	60.00	1,000 sq. ft.	0.95	0.85	4.96	240	120	120	0.70	34	30	4	0.63	31	4	27	1.0	0.41	20	9	11
	ITE 710 - General Office (Flex)	60.00	1,000 sq. ft.	0.95	0.60	9.74	333	167	166	1.16	40	34	6	1.15	39	6	33	1.0	0.53	18	10	8
G-2	ITE 110 - General Light Industrial (Flex)	5.00	1,000 sq. ft.	0.95	0.85	4.96	20	10	10	0.70	3	3	0	0.63	3	0	3	1.0	0.41	2	1	1
	ITE 710 - General Office (Flex)	5.00		0.95	0.60	9.74	28	14	14	1.16	3	3	0	1.15	3	0	3	1.0	0.53	2	1	1
PLD 1.10	ITE 530 - High School	2000	Students	1.00	0.10	2.03	406	203	203	0.52	104	70	34	0.14	28	13	15	1.0	0.10	20	13	7
PLD 1.07	ITE 488 - Soccer Complex [assuming for all the fields/courts]	5	fields	0.90	0.80	71.33	257	129	128	0.99	4	2	2	16.43	59	39	20	1.0	40.10	144	69	75
PLD 1.04 & PLD 1.09	ITE 520 - Elementary School	900	Students	1.00	0.10	1.89	170	85	85	0.67	60	32	28	0.17	15	7	8	1.0	0.00	0	0	0
PLD 1.05	ITE 465 - Ice Skating Rink	60	1,000 sq. ft.	0.95	0.80		610	305	305	0.17	8	3	5	1.33	61	34	27	1.0	2.63	120	64	56
					Total Pass-by Trips:		***4,389***	***2,195***	***2,194***	***AM >***	***0***	***0***	***0***	***PM >***	***443***	***212***	***231***		***SAT >***	***399***	***205***	***194***
					Total New Trips:		***57,066***	***28,361***	***28,344***	***AM >***	***4,248***	***2,124***	***2,124***	***PM >***	***5,777***	***2,802***	***2,975***		***SAT >***	***5,503***	***2,832***	***2,671***
					Total Trips (New + Pass-By):		***61,455***	***30,556***	***30,538***	***AM >***	***4,248***	***2,124***	***2,124***	***PM >***	***6,220***	***3,014***	***3,206***		***SAT >***	***5,902***	***3,037***	***2,865***

Source: ITE Trip Generation 10th Edition, 2017. Non-Auto are trips where people walk, bike, use transit, or telecommute instead of travel in an automobile. Internal Capture Adjustment is the multi-purpose trips that go to more than one location within the site but do not drive on the arterial roadways or through the study intersections.

Multi-Family (low-rise)	2,323
Single-Family	3,527
Total DU	5,850

Retail	900
Office	800
Light Industrial	375
Flex	1,125
Total 1,000 Sq. Ft.	3,200

Table 6B – Trip Generation and Phases (Internal Trips)

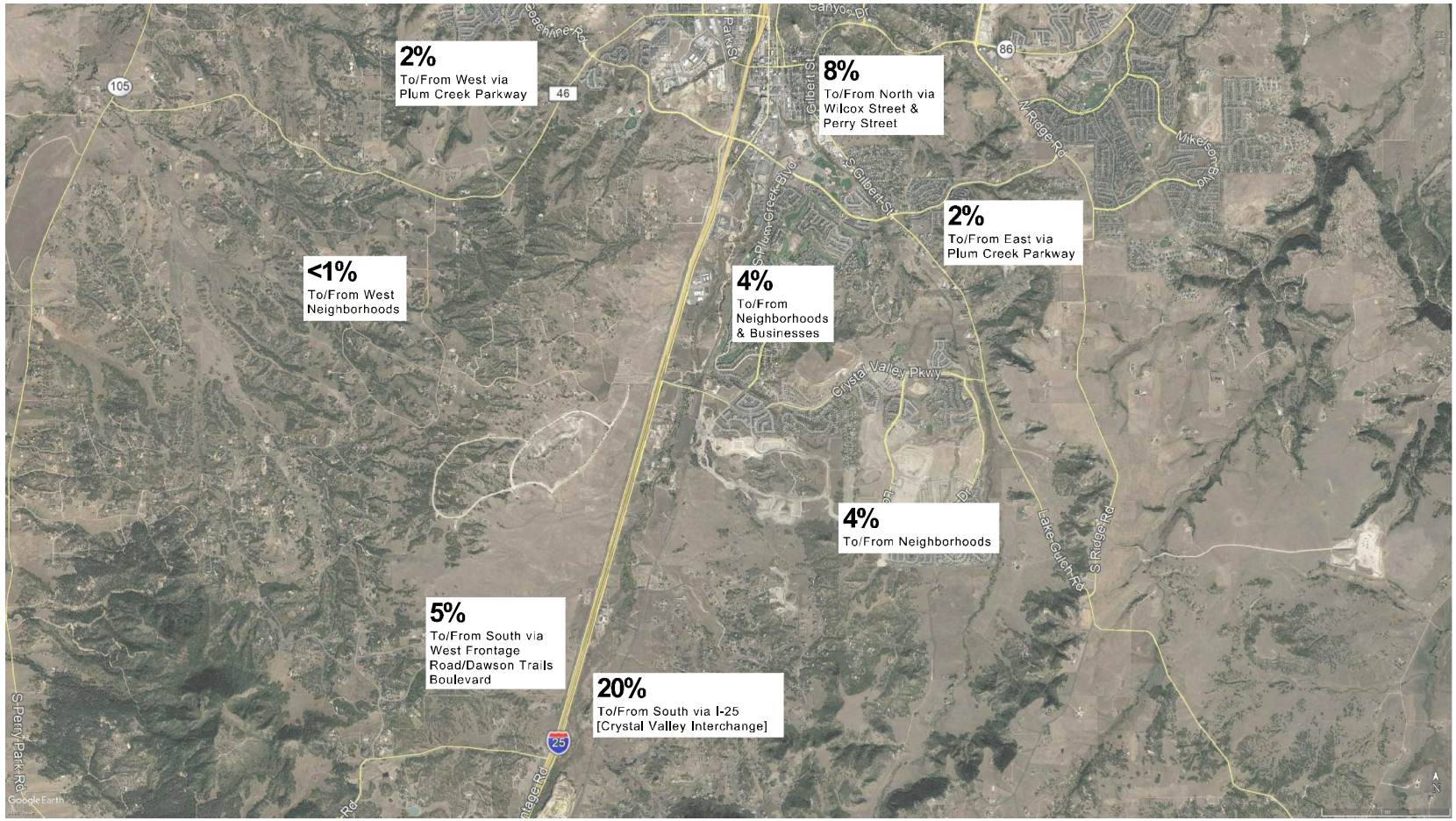
Planning Area	Land Use	Size	Unit	Non-Auto Factor	Internal Capture Adjust	Average Daily Trips				AM Peak Hour Trips				PM Peak Hour Trips				Saturday Peak Hour Trips				
						Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out	Peak Factor	Rate	Total	In	Out
E-1	ITE 820 - Shopping Center	30.00	1,000 sq. ft.	0.95	0.40	37.75	430	215	215	0.94	11	7	4	3.81	43	21	22	1.0	4.50	51	27	24
E-2	ITE 820 - Shopping Center	412.00	1,000 sq. ft.	0.95	0.40	37.75	5,910	2,955	2,955	0.94	147	91	56	3.81	596	286	310	1.0	4.50	705	367	338
	ITE 710 - General Office	23.00	1,000 sq. ft.	0.95	0.35	9.74	74	37	37	1.16	9	8	1	1.15	9	1	8	1.0	0.53	4	2	2
F-1	TE 110 - General Light Industrial (Flex)	135.00	1,000 sq. ft.	0.95	0.15	4.96	95	48	47	0.70	13	11	2	0.63	12	2	10	1.0	0.41	8	4	4
	ITE 710 - General Office (Flex)	135.00	1,000 sq. ft.	0.95	0.35	9.74	437	219	218	1.16	52	45	7	1.15	52	8	44	1.0	0.53	24	13	11
	ITE 710 - General Office	105.00	1,000 sq. ft.	0.95	0.40	9.74	389	195	194	1.16	46	40	6	1.15	46	7	39	1.0	0.53	21	11	10
F-2	ITE 710 - General Office	120.00	1,000 sq. ft.	0.95	0.35	9.74	389	195	194	1.16	46	40	6	1.15	46	7	39	1.0	0.53	21	11	10
	ITE 857 Discount Club	180.00	1,000 sq. ft.	0.95	0.65	42.46	4,719	2,360	2,359	0.80	89	54	35	4.19	466	233	233	1.0	6.37	708	347	361
F-3	ITE 710 - General Office	552.00	1,000 sq. ft.	0.95	0.35	9.74	1,788	894	894	1.16	213	183	30	1.15	211	34	177	1.0	0.53	97	52	45
	ITE 820 - Shopping Center	278.00	1,000 sq. ft.	0.95	0.40	37.75	3,988	1,994	1,994	0.94	99	61	38	3.81	402	193	209	1.0	4.50	475	238	237
	ITE 110 - General Light Industrial (Flex)	362.50	1,000 sq. ft.	0.95	0.15	4.96	256	128	128	0.70	36	32	4	0.63	33	4	29	1.0	0.41	21	10	11
	ITE 710 - General Office (Flex)	362.50	1,000 sq. ft.	0.95	0.35	9.74	1,174	587	587	1.16	140	120	20	1.15	139	22	117	1.0	0.53	64	35	29
	Pass-by Shopping Center (PM)	*0%*					*0*	*0*	*0*		*0*	*0*	*0*		*0*	*0*	*0*			*0*	*0*	*0*
	Pass-by Shopping Center (Sat)	*0%*					*0*	*0*	*0*		*0*	*0*	*0*		*0*	*0*	*0*			*0*	*0*	*0*
G-1	ITE 110 - General Light Industrial	375.00	1,000 sq. ft.	0.95	0.15	4.96	265	133	132	0.70	37	33	4	0.63	34	4	30	1.0	0.41	22	10	12
	ITE 110 - General Light Industrial (Flex)	60.00	1,000 sq. ft.	0.95	0.15	4.96	42	21	21	0.70	6	5	1	0.63	5	1	4	1.0	0.41	4	2	2
	ITE 710 - General Office (Flex)	60.00	1,000 sq. ft.	0.95	0.35	9.74	194	97	97	1.16	23	20	3	1.15	23	4	19	1.0	0.53	11	6	5
G-2	ITE 110 - General Light Industrial (Flex)	5.00	1,000 sq. ft.	0.95	0.15	4.96	4	2	2	0.70	0	0	0	0.63	0	0	0	1.0	0.41	0	0	0
	ITE 710 - General Office (Flex)	5.00		0.95	0.35	9.74	16	8	8	1.16	2	2	0	1.15	2	0	2	1.0	0.53	1	1	0
PLD 1.10	ITE 530 - High School	2000	Students	1.00	0.90	2.03	3,654	1,827	1,827	0.52	936	627	309	0.14	252	121	131	1.0	0.10	180	113	67
PLD 1.07	ITE 488 - Soccer Complex [assuming for all the fields/courts]	5	fields	0.90	0.20	71.33	64	32	32	0.99	1	1	0	16.43	15	10	5	1.0	40.10	36	17	19
PLD 1.04 & PLD 1.09	ITE 520 - Elementary School	900	Students	1.00	0.90	1.89	1,531	766	765	0.67	543	293	250	0.17	138	66	72	1.0	0.00	0	0	0
PLD 1.05	ITE 465 - Ice Skating Rink	60	1,000 sq. ft.	0.95	0.20		150	75	75	0.17	2	1	1	1.33	15	8	7	1.0	2.63	30	16	14
					Total New Trips:		***25,569***	***12,788***	***12,781***	***AM >***	***2,451***	***1,674***	***777***	***PM >***	***2,539***	***1,032***	***1,507***		***SAT >***	***2,483***	***1,282***	***1,201***

Source: ITE Trip Generation 10th Edition, 2017.

15%
To/From North via future Prairie Hawk Drive

35%
To/From North via I-25 [Crystal Valley Interchange]

5%
To/From North via I-25 [Plum Creek Interchange]



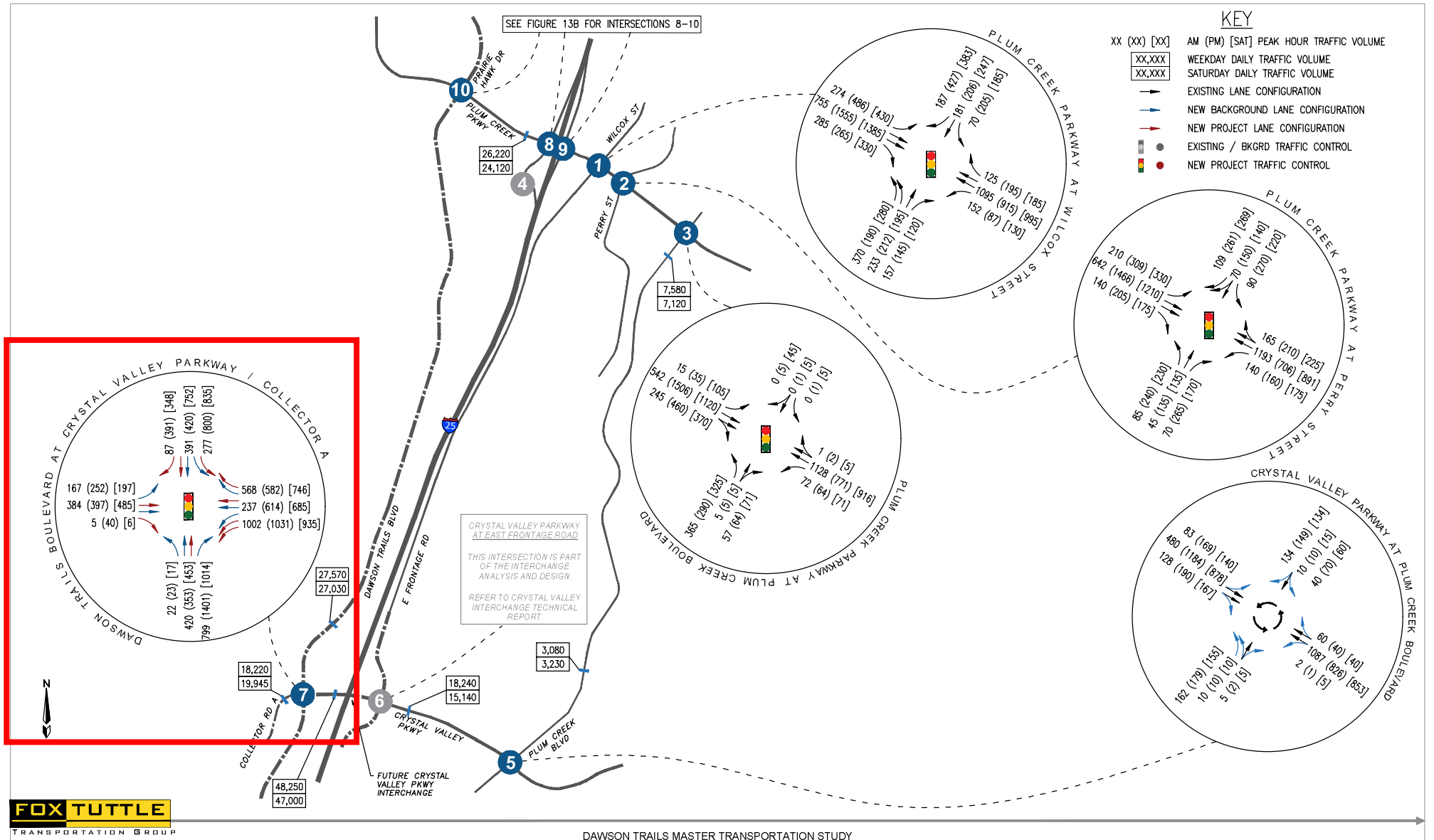
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FOX TUTTLE TRANSPORTATION GROUP

DAWSON TRAILS MASTER TRANSPORTATION STUDY

SITE TRIP DISTRIBUTION

FT Project #	20092	Original Scale	NTS	Date	11/30/2021	Drawn by	MAR	Figure #	7

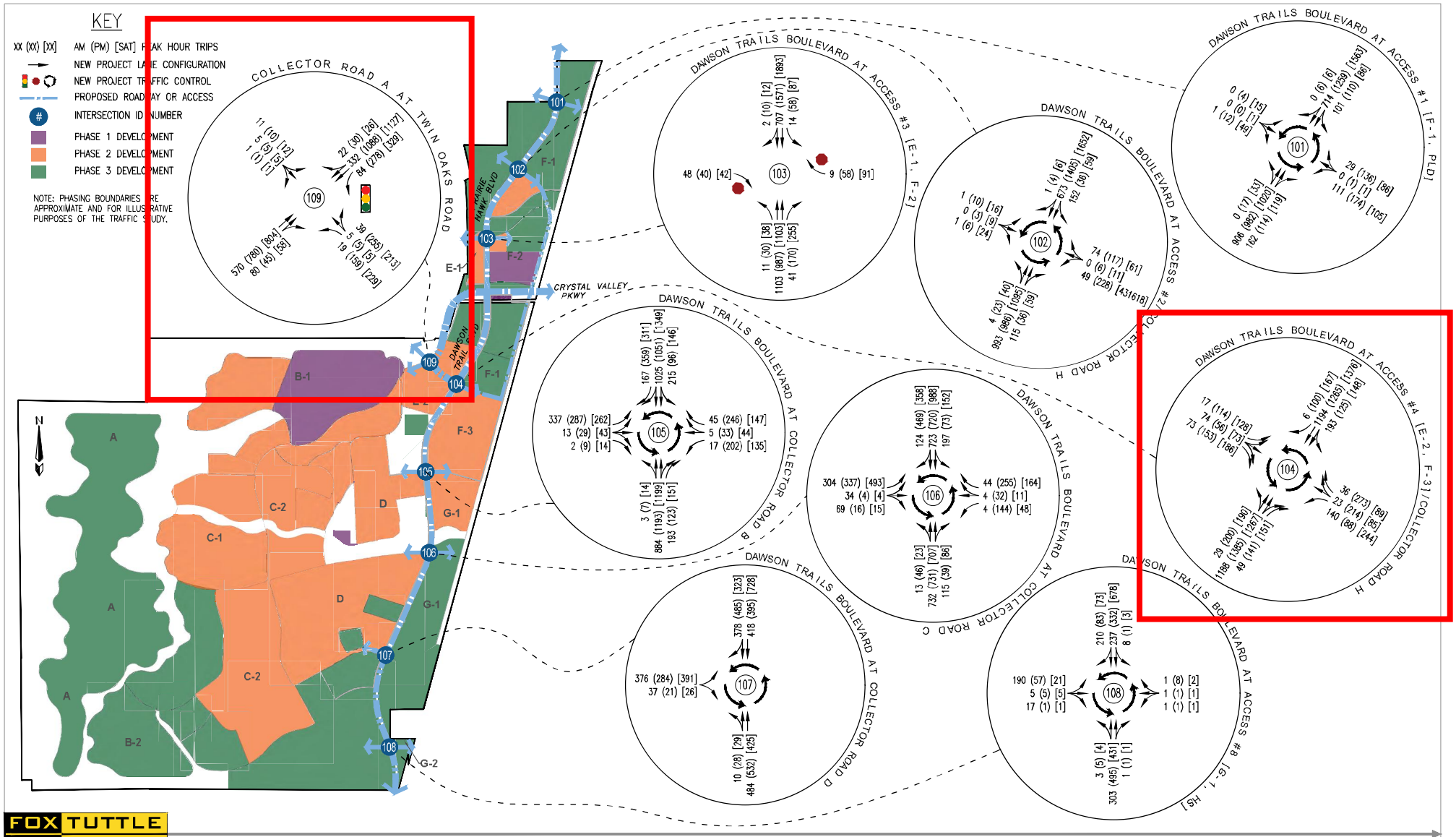


FOX TUTTLE
TRANSPORTATION GROUP

DAWSON TRAILS MASTER TRANSPORTATION STUDY

YEAR 2040 BACKGROUND + FULL BUILDOUT TRAFFIC VOLUMES [EXISTING INTERSECTIONS]

FT Project #	20092	Original Scale	NTS	Date	4/3/2022	Drawn by	MAR	Figure #	13A



FOX TUTTLE TRANSPORTATION GROUP

DAWSON TRAILS MASTER TRANSPORTATION STUDY

YEAR 2040 BKGRD + FULL BUILDOUT TRAFFIC VOLUMES [ACCESS & INTERNAL INTERSECTIONS]

FT Project #	20092	Original Scale	NTS	Date	5/24/22	Drawn by	MAR	Figure #	13C

Kimley»Horn

Trip Generation Worksheets

kimley-horn.com | 6200 South Syracuse Way Suite 300, Greenwood Village, CO 80111 | 303 228 2300

Original Study Area Daily Trip Generation Calculations

	TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		BASELINE TRIPS		
	Land Use + Code	Source	Scale	ITE Unit	Equation/Rate	Entering %	Exiting %	In	Out	Total
2	(822) Strip Retail Plaza (<40k)	ITE 12th Ed	15.7	LKSF	T = 54.45(X)	50%	50%	428	428	856
							Total:	428	428	856

Original Study Area AM Peak Hour Trip Generation Calculations

	TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		BASELINE TRIPS		
	Land Use + Code	Source	Scale	ITE Unit	Equation/Rate	Entering %	Exiting %	In	Out	Total
2	(822) Strip Retail Plaza (<40k)	ITE 12th Ed	15.7	LKSF	T = 3.93(X)	55%	45%	34	28	62
							Total:	34	28	62

Original Study Area PM Peak Hour Trip Generation Calculations

	TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		BASELINE TRIPS		
	Land Use + Code	Source	Scale	ITE Unit	Equation/Rate	Entering %	Exiting %	In	Out	Total
2	(822) Strip Retail Plaza (<40k)	ITE 12th Ed	15.7	LKSF	Ln(T) = 0.68 Ln(X) + 2.77	50%	50%	52	52	104
							Total:	52	52	104

Original Study Area Saturday Trip Generation Calculations

	TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		BASELINE TRIPS		
	Land Use + Code	Source	Scale	ITE Unit	Equation/Rate	Entering %	Exiting %	In	Out	Total
2	(822) Strip Retail Plaza (<40k)	ITE 12th Ed	15.7	LKSF	T = 6.63(X)	51%	49%	53	51	104
							Total:	53	51	104

Existing Chick-Fil-A Counts (User-Specific)

Land Use and Size	Square Footage	Weekday Vehicle Trips						Weekday Vehicle Trip Rates					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total Per 1 KSF	In	Out	Total Per 1 KSF
Existing Chick-Fil-A Counts (User-Specific)													
Chick-fil-A Greeley - 4,950 Square Feet	4,950	71	66	137	133	112	245	52%	48%	27.68	54%	46%	49.49
Chick-fil-A Timnath - 4,760 Square Feet	4,760	77	73	150	147	138	285	51%	49%	31.51	52%	48%	59.87
Chick-fil-A Broomfield - 5,120 Square Feet	5,120	39	40	79	61	92	153	49%	51%	15.43	40%	60%	29.88
Chick-fil-A Parker - 4,460 Square Feet	4,460	93	101	194	174	169	343	48%	52%	43.50	51%	49%	76.91
							Average	**50%**	**50%**	**29.53**	**49%**	**51%**	**54.04**

Land Use and Size	Square Footage	Saturday Vehicle Trips			Saturday Vehicle Trip Rates		
		Midday Peak Hour			Midday Peak Hour		
		In	Out	Total	In	Out	Total Per 1 KSF
Existing Chick-Fil-A Counts (User-Specific)							
Chick-fil-A Parker - 4,460 Square Feet	4,460	173	181	354	49%	51%	79.37

Kimley»Horn

Project	Chick-fil-A Dawson Trails - Proposed Use - Site-Specific				
Subject	Trip Generation for Fast-Food Restaurant with Drive-Through Window				
Designed by	LSM	*Date*	September 25, 2026	*Job No.*	96206028
Checked by		*Date*		*Sheet No.*	of

TRIP GENERATION MANUAL TECHNIQUES

Site Specific, Average Rates
*This data is taken from counts collected at existing Chick-fil-A sites in Parker, Broomfield, Greeley, and Timnath.

Independent Variable - 1000 Square Feet (X)
SF = 5,087
X = 5.087
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.

Directional Distribution: 50% ent. 50% exit.
(T) = 29.53 (X) T = 150 Average Vehicle Trip Ends
(T) = 29.53 * (5.1) 75 entering 75 exiting

75 + 75 = 150

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.

Directional Distribution: 49% ent. 51% exit.
(T) = 54.04 (X) T = 275 Average Vehicle Trip Ends
(T) = 54.04 * (5.1) 135 entering 140 exiting

135 + 140 = 275

Weekday (K-Factor of 0.1 from PM Peak Hour)

Directional Distribution: 50% ent. 50% exit.
T = 2750 Average Vehicle Trip Ends
1375 entering 1375 exiting

1375 + 1375 = 2750

Saturday Peak Hour of the Generator

Directional Distribution: 49% ent. 51% exit.
(T) = 79.37 (X) T = 404 Average Vehicle Trip Ends
(T) = 79.37 * (5.1) 198 entering 206 exiting

198 + 206 = 404

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Drive Through Queue Data

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COUNTINGcars.com

Drive-Through Queue Generation

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1.0 Introduction

This report provides queuing data for businesses with drive-through services. It is intended to be an aid for site designers and reviewers, similar to the Institute of Transportation Engineers' *Trip Generation* and *Parking Generation* reports. The data presentation is modeled on the *Parking Generation* report and data is provided based on at least six sites, similar to data sets marked as statistically significant in *Trip Generation*.

Businesses with drive-through lanes are very common in the United States and having data that gives usage information for drive-through lanes will assist designers as well as cities in determining the appropriate amount of storage needed for proposed drive-through businesses. Data for drive-through queues was published by the ITE Technical Council Committee 5D-10 in 1995 based on information collected between the late 1960's and the 1990's. A paper was also published in 2009 by Mark Stuecheli, PTP giving updated information for bank and coffee shop drive-through lanes. The results from the 2009 study are incorporated into this paper (thank you Mark for your assistance).

2.0 Data Collection

Data was collected using COUNTcam video recording systems at a total of 30 drive-through locations in Minneapolis, MN and several surrounding suburbs between 2010 and 2012 (26 of the 30 videos were recorded in February of 2012, which should represent peak usage in the cold Minnesota winter). Videos of drive-through lanes were collected at banks, car washes, coffee shops, fast food restaurants and pharmacies. A total of six locations were selected for each of the five different land uses. Each location was recorded for between one and five days where the majority of locations were recorded for two consecutive days. The days of the week that each video was recorded on varies.

The 24-hour videos were watched at high speeds with the PC-TAS counting software and maximum queues throughout the day were noted. Most of the COUNTcams were set up such that the entire queue lane could be seen, but at a few locations the drive-through lanes wrapped around the building in a way that the entire queue length would not be able to be seen. For these situations, the COUNTcams were set up so that the ordering window and back of the queue could be seen and it was noted how many vehicles could fit between the ordering window and the front of the queue. For drive-through locations with multiple lanes, the number of lanes was noted but the maximum queue is defined as the sum of the queues at each lane for any given point in time, not the queue per lane. This approach provides overall demand, which may assist designers in determining how many drive through lanes are appropriate in addition to determining how long they should be.

Coffee shops produced the longest maximum queues of any of the land uses in this study with all of the maximum queues occurring in the morning. In four of the six cases, the queues spilled out of the parking lot and into the street. These spillovers would typically only happen once or twice a day and last only a few minutes, however, one location had stacking into the street for about 15 minutes in addition to multiple periods of several minutes where cars would queue in the street.

With an 85th percentile maximum queue of 13 vehicles, the data suggests that coffee shops with drive-through lanes should be able to accommodate at least 260 feet of vehicle stacking during morning hours.

3.4 Fast Food Restaurants

Data collection was done at six fast food restaurants with drive-through services in August 2011 and February 2012. Fourteen days of data were collected. The restaurants were located in the cities of Golden Valley, Hopkins, Minneapolis and St. Louis Park, MN. Vehicles being served were counted as being in the queue.

Table 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Statistics

Number of Data Points	**14**
Average Maximum Queue (Vehicles)	**8.50**
Standard Deviation (Vehicles)	**2.68**
Coefficient of Variation	**32%**
Range (Vehicles)	**5-13**
85th Percentile (Vehicles)	**12.00**
33rd Percentile (Vehicles)	**7.90**

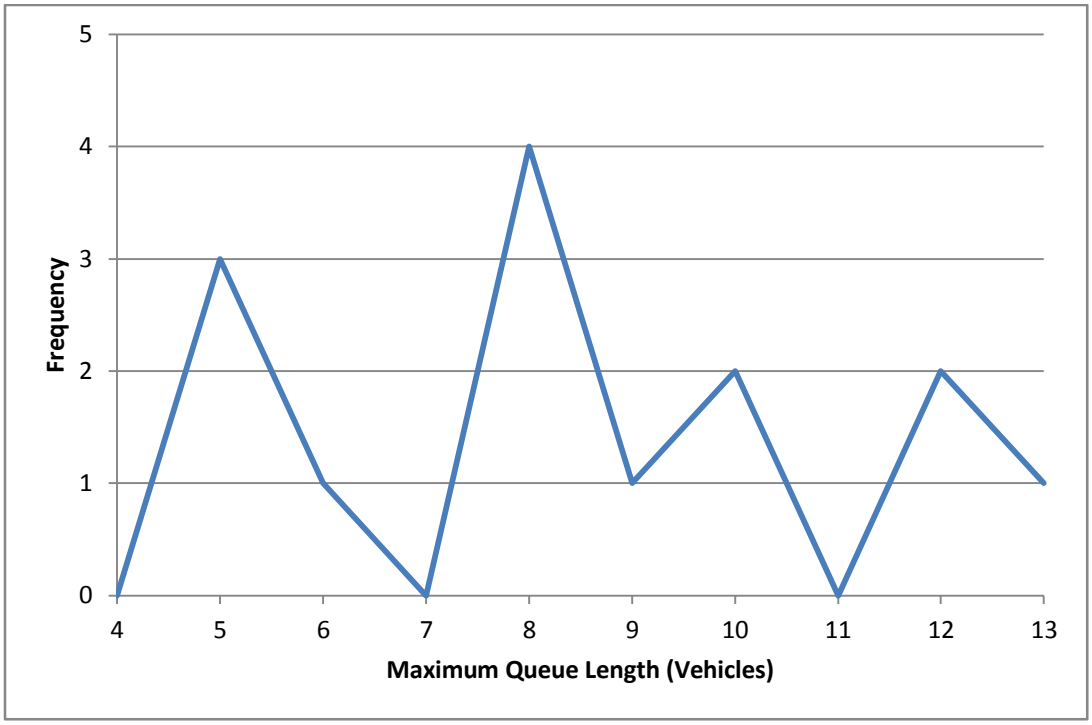


Figure 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Frequency

The maximum queues for fast food restaurants were spread throughout the day from 8:00am to 10:00pm. With an 85th percentile maximum queue of 12 vehicles, the data suggests that fast food restaurants with drive-through lanes should be able to accommodate 240 feet of vehicle stacking throughout the day.

3.5 Pharmacies

Data collection was done at six pharmacies with drive-through services in February 2012. Twelve days of data were collected. The pharmacies were located in the cities of Hopkins, Minneapolis, New Hope and Robbinsdale, MN. Vehicles being served were counted as being in the queue.

Table 3.5 – Drive-Through Pharmacy Maximum Queue Statistics

Number of Data Points	**12**
Average Maximum Queue (Vehicles)	**2.92**
Standard Deviation (Vehicles)	**1.16**
Coefficient of Variation	**40%**
Range (Vehicles)	**1-5**
85th Percentile (Vehicles)	**4.05**
33rd Percentile (Vehicles)	**2.00**

CFA - Parker (5:00 to 6:00 PM)

Veh #	Time at Window (s)	Begin Time
1	15	5:00
2	11	5:01
3	115	5:02
4	28	5:03
5	9	5:03
6	10	5:03
7	39	5:03
8	84	5:04
9	16	5:06
10	39	5:07
11	128	5:07
12	32	5:09
13	8	5:10
14	18	5:10
15	25	5:10
16	39	5:11
17	15	5:11
18	64	5:12
19	17	5:13
20	12	5:13
21	15	5:14
22	13	5:14
23	44	5:14
24	62	5:15
25	85	5:16
26	27	5:18
27	30	5:18
28	118	5:19
29	29	5:21
30	16	5:21
31	11	5:21
32	24	5:22
33	21	5:22
34	14	5:22
35	18	5:23
36	74	5:23
37	21	5:24
38	19	5:25
39	16	5:25
40	20	5:25
41	22	5:26
42	37	5:26
43	8	5:27
44	38	5:27
45	23	5:27
46	26	5:28
47	16	5:28
48	18	5:28
49	16	5:29
50	43	5:29
51	19	5:30
52	38	5:30
53	33	5:31
54	26	5:31
55	123	5:32
56	10	5:34
57	12	5:34
58	20	5:34
59	26	5:35
60	14	5:35
61	18	5:36
62	53	5:36
63	17	5:37
64	40	5:37
65	75	5:38
66	122	5:39
67	23	5:41
68	49	5:42
69	52	5:42
70	46	5:43
71	12	5:44
72	73	5:44
73	12	5:46
74	35	5:46
75	24	5:46
76	17	5:47
77	14	5:47
78	18	5:47
79	14	5:48
80	28	5:48
81	16	5:49
82	46	5:49
83	39	5:50
84	13	5:50
85	13	5:51
86	53	5:51
87	33	5:52
88	58	5:52
89	24	5:53
90	21	5:54
91	57	5:54
92	59	5:55
93	22	5:56
94	54	5:57
95	11	5:57
96	9	5:58
97	26	5:58
98	27	5:58
99	22	5:59
100	16	5:59
101	31	5:59
Average (s)	**33.28**	
Maximum Queue Observed (veh)		**21**

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Access Intersection Operational Analysis

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Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	47	643	2	36	438
Future Vol, veh/h	0	47	643	2	36	438
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	-	100	100	-
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	51	699	2	39	476

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	349	0	0	701	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	0	647	-	-	892	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	647	-	-	892	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	11.04	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	647	892	-
HCM Lane V/C Ratio	-	-	0.079	0.044	-
HCM Ctrl Dly (s/v)	-	-	11	9.2	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	88	1087	3	65	1396
Future Vol, veh/h	0	88	1087	3	65	1396
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	-	100	100	-
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	96	1182	3	71	1517

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	591	0	0	1185	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	0	450	-	-	585	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	450	-	-	585	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	15.14	0	0.53
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	450	585	-
HCM Lane V/C Ratio	-	-	0.212	0.121	-
HCM Ctrl Dly (s/v)	-	-	15.1	12	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	0.8	0.4	-

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	130	1091	4	95	1482
Future Vol, veh/h	0	130	1091	4	95	1482
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	-	100	100	-
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	141	1186	4	103	1611

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	593	0	0	1190	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	0	449	-	-	582	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	449	-	-	582	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	16.66	0	0.75
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	449	582	-
HCM Lane V/C Ratio	-	-	0.315	0.177	-
HCM Ctrl Dly (s/v)	-	-	16.7	12.5	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	1.3	0.6	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	320	63	38	0	28
Future Vol, veh/h	0	320	63	38	0	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	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	348	68	41	0	30

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	34
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	1031
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	1031
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	1031
HCM Lane V/C Ratio	-	-	-	0.03
HCM Ctrl Dly (s/v)	-	-	-	8.6
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	329	419	68	0	52
Future Vol, veh/h	0	329	419	68	0	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	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	358	455	74	0	57

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	228
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	775
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	775
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	10.01
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	775
HCM Lane V/C Ratio	-	-	-	0.073
HCM Ctrl Dly (s/v)	-	-	-	10
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	382	447	99	0	76
Future Vol, veh/h	0	382	447	99	0	76
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	150	-	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	415	486	108	0	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	243
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	758
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	758
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	10.33
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	758
HCM Lane V/C Ratio	-	-	-	0.109
HCM Ctrl Dly (s/v)	-	-	-	10.3
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.4