



January 26, 2022

Ms. Sofia Hernandez
Land Development Consultants
950 S. Cherry Street
Suite 512
Denver, CO 80246

Re: Circle K - Wilcox
Trip Generation Comparison Letter
Castle Rock, Colorado

Dear Ms. Hernandez:

Introduction

This traffic study letter documents the results of a trip generation comparison for the proposed Circle K – Wilcox redevelopment project. Circle K is located along the east side of Wilcox Street, north of Plum Creek Parkway in Castle Rock, Colorado. The redevelopment project includes replacing the existing Circle K convenience store with a new Circle K convenience market. The proposed project includes expanding the convenience market space of the existing approximate 2,100 square foot convenience store building to a new building with approximately 3,700 square feet. The existing 16 fueling positions will remain unmodified with the project. A conceptual site plan of the project is attached.

The purpose of this letter is to provide a trip generation comparison of the existing Circle K convenience store based on the existing convenience market space to the proposed Circle K – Wilcox after the larger convenience market expansion. This trip generation comparison will determine the difference in traffic attributable to this proposed expansion project.

Regional access to Circle K is provided by Interstate 25 (I-25) and Founders Parkway (SH-86). Primary and direct access is provided by Wilcox Street. There are currently two full movement accesses along the east side of Wilcox Street, which will remain in place for the Circle K.

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.

Trip generation is based on the ITE Trip Generation, 11th Edition average rates for Convenience Store/Gas Station (ITE Code 945). The trip generation comparison is being conducted to determine the increase in traffic associated with the convenience store expansion, with the convenience store size used as the independent variable in the trip generation equations. Trip generation calculations are attached.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Eleventh Edition, Washington DC, 2021.

**Trip Generation Comparison:
Circle K (original size) vs. Circle K - Wilcox (proposed expanded size)**

Use and Size	Daily Vehicle Trips	Weekday Vehicle Trips					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Original Land Use – Circle K							
Convenience Store/Gas Station (ITE 945) – 2,100 Square Feet	2,696	96	96	192	83	83	166
Current Proposal – Circle K – Wilcox							
Convenience Store/Gas Station (ITE 945) – 3,700 Square Feet	4,748	169	169	338	146	146	292
Net Difference in Trips	+2,052	+73	+73	+146	+63	+63	+126

As summarized in the table, the proposed Circle K - Wilcox with an expanded convenience store of 3,700 square feet is anticipated to generate 4,748 daily weekday trips with 338 of these trips occurring during the morning peak hour, and 292 trips occurring during the afternoon peak hour. The existing Circle K with a 2,100 square foot convenience market was calculated to generate 2,696 daily weekday trips with 192 of these trips occurring during the morning peak hour and 166 trips occurring during the afternoon peak hour based on the ITE Trip Generation Manual equations based on the convenience store size. Therefore, using the convenience market size as the independent variable in the equations, this expansion project may generate an increase of 2,052 daily weekday trips, an additional 146 trips during the morning peak hour, and an additional 126 trips during the afternoon peak hour based on the building area expansion in the trip generation equations. However, the number of fueling positions is not changing. Therefore, if providing trip generation comparison calculations based on the number of fueling positions, the ITE equations would show no change in traffic generated by the existing and future expanded Circle K. Of note, if fueling positions were used as the independent variable for estimating the trip generation of the existing gas station, this would equate to 257 morning peak hour trips and 295 afternoon peak hour trips. As you can see, this is more similar to the trip generation estimated for the proposed 3,700 square foot convenience market. Therefore, the existing site is likely generating more traffic today than what is reported by ITE based on a 2,100 square foot convenience market size. The peak hour change in traffic may be more on the magnitude of 81 more morning peak hour trips (338 trips – 257 trips) and the same amount of afternoon peak hour trips (292 trips – 295 trips).

Conclusions

The proposed Circle K – Wilcox expansion with a larger convenience market may increase traffic from what is currently existing at the Circle K, especially during the weekday morning peak hour. However, it is believed that development of this 3,700 square foot Circle K convenience market expansion will be accommodated successfully on the surrounding street network, as the difference in traffic generated during the controlling afternoon peak hour when based on convenience market size is similar to the trip estimates based on the 16 fueling positions to remain. Please let us know if you have any questions or require anything further.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.


Curtis D. Rowe, P.E., PTOE
Vice President



Conceptual Site Plan

Proposed Trip Generation Calculations

Project Circle K - Wilcox (Proposed Land Use)
 Subject Trip Generation for Convenience Store/Gas Station - VFP (16-24)
 Designed by TES Date January 25, 2022 Job No. 096554020
 Checked by _____ Date _____ Sheet No. _____ of _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Convenience Store/Gas Station - VFP (16-24) (945)

Independent Variable - 1,000 Square Feet (X)

SF= 3,700
 X = 3.700
 T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series page 901)

Average Weekday	Directional Distribution:	50% ent.	50% exit.
T = 91.35 (X)	T = 338	Average Vehicle Trip Ends	
T = 91.35 * 3.700	169 entering	169 exiting	
	169 + 169 = 338		

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series page 902)

Average Weekday	Directional Distribution:	50% ent.	50% exit.
T = 78.95 (X)	T = 292	Average Vehicle Trip Ends	
T = 78.95 * 3.700	146 entering	146 exiting	
	146 + 146 = 292		

Weekday (900 Series page 900)

Average Weekday	Directional Distribution:	50% entering, 50% exiting
T = 1283.38 (X)	T = 4748	Average Vehicle Trip Ends
T = 1283.38 * 3.700	2374 entering	2374 exiting
	2374 + 2374 = 4748	

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 25% Non-Pass By	AM Peak Hour = 24% Non-Pass By
IN Out Total	
AM Peak 41 41 81	
PM Peak 37 37 73	
Daily 594 594 1188	PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 75% Pass By	AM Peak Hour = 76% Pass By
IN Out Total	
AM Peak 128 128 257	
PM Peak 110 110 219	
Daily 1780 1780 3560	PM Peak Hour Rate Applied to Daily

Existing Trip Generation Calculations

Project Circle K - Wilcox (Existing Land Use)
 Subject Trip Generation for Convenience Store/Gas Station - VFP (16-24)
 Designed by TES Date January 25, 2022 Job No. 096554020
 Checked by _____ Date _____ Sheet No. _____ of _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Convenience Store/Gas Station - VFP (16-24) (945)

Independent Variable - 1,000 Square Feet (X)

SF= 2,100
 X = 2.100
 T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series page 901)

Average Weekday	Directional Distribution:	50% ent.	50% exit.
T = 91.35 (X)	T = 192	Average Vehicle Trip Ends	
T = 91.35 * 2.100	96 entering	96 exiting	
	96 + 96 = 192		

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series page 902)

Average Weekday	Directional Distribution:	50% ent.	50% exit.
T = 78.95 (X)	T = 166	Average Vehicle Trip Ends	
T = 78.95 * 2.100	83 entering	83 exiting	
	83 + 83 = 166		

Weekday (900 Series page 900)

Average Weekday	Directional Distribution:	50% entering, 50% exiting
T = 1283.38 (X)	T = 2696	Average Vehicle Trip Ends
T = 1283.38 * 2.100	1348 entering	1348 exiting
	1348 + 1348 = 2696	

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 25% Non-Pass By	AM Peak Hour = 24% Non-Pass By
IN Out Total	
AM Peak 23 23 46	
PM Peak 21 21 42	
Daily 337 337 674	PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

PM Peak Hour = 75% Pass By	AM Peak Hour = 76% Pass By
IN Out Total	
AM Peak 73 73 146	
PM Peak 62 62 125	
Daily 1011 1011 2022	PM Peak Hour Rate Applied to Daily

Project Circle K - Wilcox (Existing Land Use)
Subject Trip Generation for Gasoline/Service Station with Convenience Market
Designed by TES Date January 25, 2022 Job No. 096554020
Checked by _____ Date _____ Sheet No. _____ of _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Convenience Store/Gas Station - GFA (2-4K) (945)

Independant Variable - Vehicle Fueling Positions (X)

Vehicle Fueling Positions= **16** Positions

X = 16

T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 867)

Average Weekday
T = 16.06 (X)
T = 16.06 * 16

Directional Distribution: 50% ent. 50% exit.
T = 257 Average Vehicle Trip Ends
128 entering 129 exiting
128 + 129 = 257

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 868)

Average Weekday
T = 18.42 (X)
T = 18.42 * 16.000

Directional Distribution: 50% ent. 50% exit.
T = 295 Average Vehicle Trip Ends
147 entering 148 exiting
147 + 148 = 295

Weekday (Page 866)

Average Weekday
T = 265.12 (X)
T = 265.12 * 16.000

Directional Distribution: 50% entering, 50% exiting
T = 4242 Average Vehicle Trip Ends
2121 entering 2121 exiting
2121 + 2121 = 4242