

Traffic Memorandum

To: **Town of Eagle**
Attn: Tom Gosiorowski
1050 Chambers Avenue
Eagle, CO 81631

From: Kari J. McDowell Schroeder, PE, PTOE

Date: September 2, 2021

Re: **Eagle Ranch PUD Amendment for Additional Residential Units
Trip Generation Analysis
Eagle, Colorado**

Project Background:

McDowell Engineering has prepared a memorandum summarizing the anticipated traffic generated from a proposed planned unit development (PUD) amendment for the Eagle Ranch subdivision located in Eagle, CO. The Eagle Ranch Property Owner's Association (POA) is seeking an amendment to the PUD that would add multifamily residential units in lieu of commercial floor area in the Eagle Ranch core area. The existing PUD has a current entitlement of 31,000 square feet of commercial surplus floor area. The proposed changes to the PUD will add 100 multifamily residential dwelling units in lieu of a portion of commercial floor area.

Trip Generation:

The traffic that is anticipated to be generated from the proposed 100 multifamily dwelling units was estimated using the Institute of Transportation Engineers' 10th Edition of the *Trip Generation Manual*¹. Mid-rise multifamily housing is applicable for buildings with three or more stories of residential use. The ITE trip generation references used for these analyses are included as an attachment to this memorandum.

- Mid-Rise Multifamily Residential: The average rate published by ITE for land use #221 (Multifamily Housing Mid-Rise) estimates that 100 dwelling units will produce 517 vehicle trips per day (vpd), including 31 trips per hour (vph) in the morning peak hour and 39vph in the evening peak hour. These calculations include a five percent multimodal reduction.
- Commercial: ITE land use #820 (Shopping Center) was used to estimate the reduction of commercial floor area trips anticipated by the swap.

¹ Trip Generation Manual, 10th Edition. Institute of Transportation Engineers, 2017.



- Commercial vs. Mid-Rise Multifamily Residential: The swap of 15,200sf of commercial area would have the same daily traffic impact as 100 mid-rise multifamily residential units. These both produce 517vpd. The proposed residential use would produce 10vph fewer in the morning peak hour and 19vph fewer in the evening peak hour.

Therefore, equivalent traffic is produced with this swap rate:

- **100 Mid-Rise Multifamily Dwelling Units = 15,200sf Commercial Floor Area**

Detailed calculations for the trip generation analysis are included in **Table 1**.

Summary:

The traffic that is anticipated to be generated from the proposed 100 multifamily dwelling units was estimated using the Institute of Transportation Engineers' 10th *Edition of the Trip Generation Manual*². The Eagle Ranch HOA is interested in swapping a portion of their unrealized commercial floor area for multifamily residential units. In making this amendment to the PUD, the following rate produces equivalent daily traffic volumes. Morning and evening peak hour volumes are less for the proposed residential uses than the previous commercial use.

- **1 Mid-Rise Multifamily Dwelling Units = 152sf Commercial Floor Area**

Please call if you would like any additional information or have any questions regarding this matter.

Sincerely,
McDowell Engineering, LLC



Kari J. McDowell, PE, PTOE
Traffic Engineer

Enclosed: Table 1 – Eagle Ranch PUD Amendment Project Trip Generation Comparison
ITE Trip Generation Data Plots

² Trip Generation Manual, 10th Edition. Institute of Transportation Engineers, 2017.



Table 1: Project Trip Generation Comparison

ITE Code	Units ²	Eq. Coef	ITE Trip Generation Equation ³			Average Weekday Trips (vpd)	Morning Peak Hour		Evening Peak Hour	
			Avg. Weekday	AM Peak Hour	PM Peak Hour		Inbound % Trips (vph)	Outbound % Trips (vph)	Inbound % Trips (vph)	Outbound % Trips (vph)
Commercial to Mid-Rise Multifamily Residential										
Commercial Floor Area										
#820 - Shopping Center	15.2 kSF	Type a=b=	Rate 37.75	Rate 3.00	Rate 4.21	574	54% 25	46% 21	50% 32	50% 32
<i>Multi-Modal Reduction</i>	-10%					-57	-3	-2	-3	-3
Removed Commercial Trips						517	22	19	29	29
							41		58	
Mid-Rise Multifamily Residential (3+ Stories of Residential)										
#221 - Multifamily Housing (Mid-Rise)	100 DU	Type a=b=	Rate 5.44	Rate 0.32	Rate 0.41	544	27% 9	73% 23	60% 25	40% 16
<i>Multi-Modal Reduction</i>	-5%					-27	0	-1	-1	-1
Proposed New Residential Trips						517	9	22	24	15
							31		39	
Comparison of Removing Commercial and Replacing with Mid-Rise Residential										
						0	-13	3	-5	-14
							-10		-19	

Notes:

¹ Values obtained from *Trip Generation, 10th Edition*, Institute of Transportation Engineers, 2017.

² DU = Dwelling Units, kSF = 1,000 Square Feet



Multifamily Housing (Mid-Rise) (221)

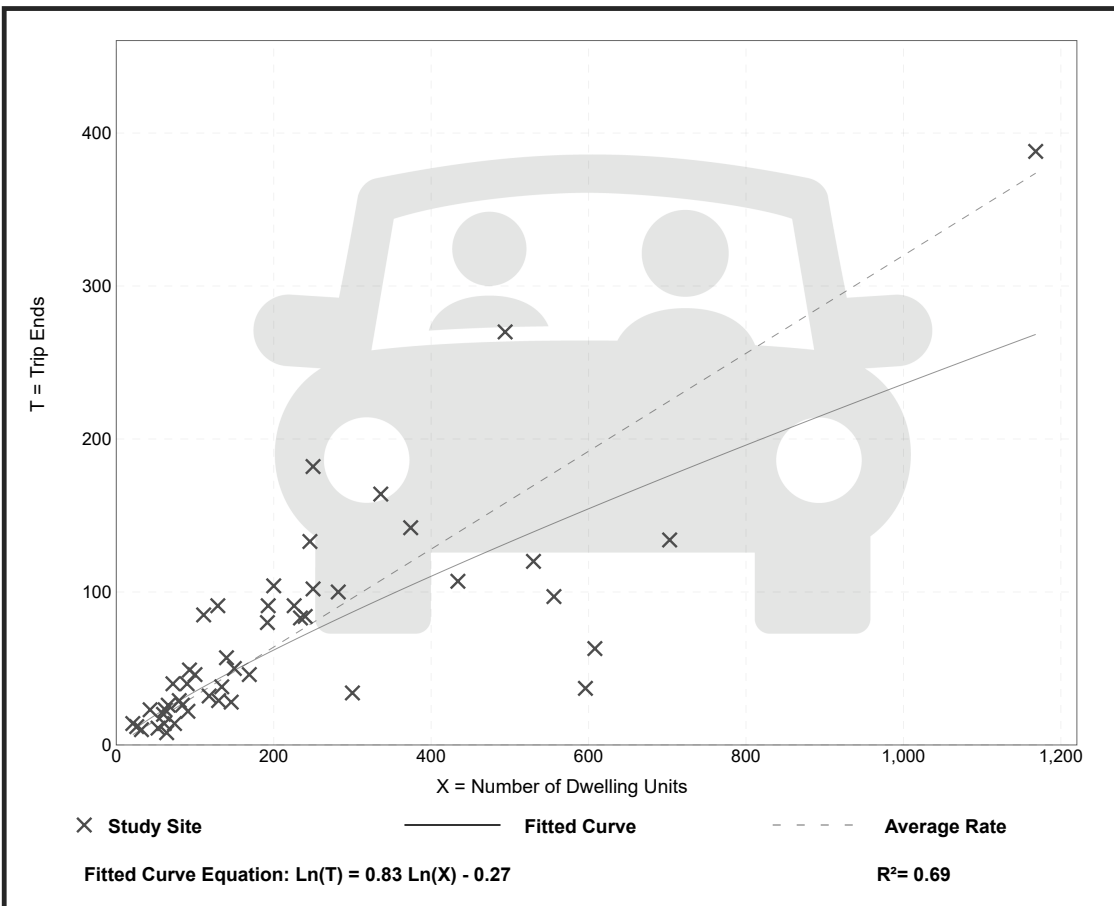
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
 Number of Studies: 48
 Avg. Num. of Dwelling Units: 225
 Directional Distribution: 27% entering, 73% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.32	0.06 - 0.77	0.17

Data Plot and Equation



Multifamily Housing (Mid-Rise) (221)

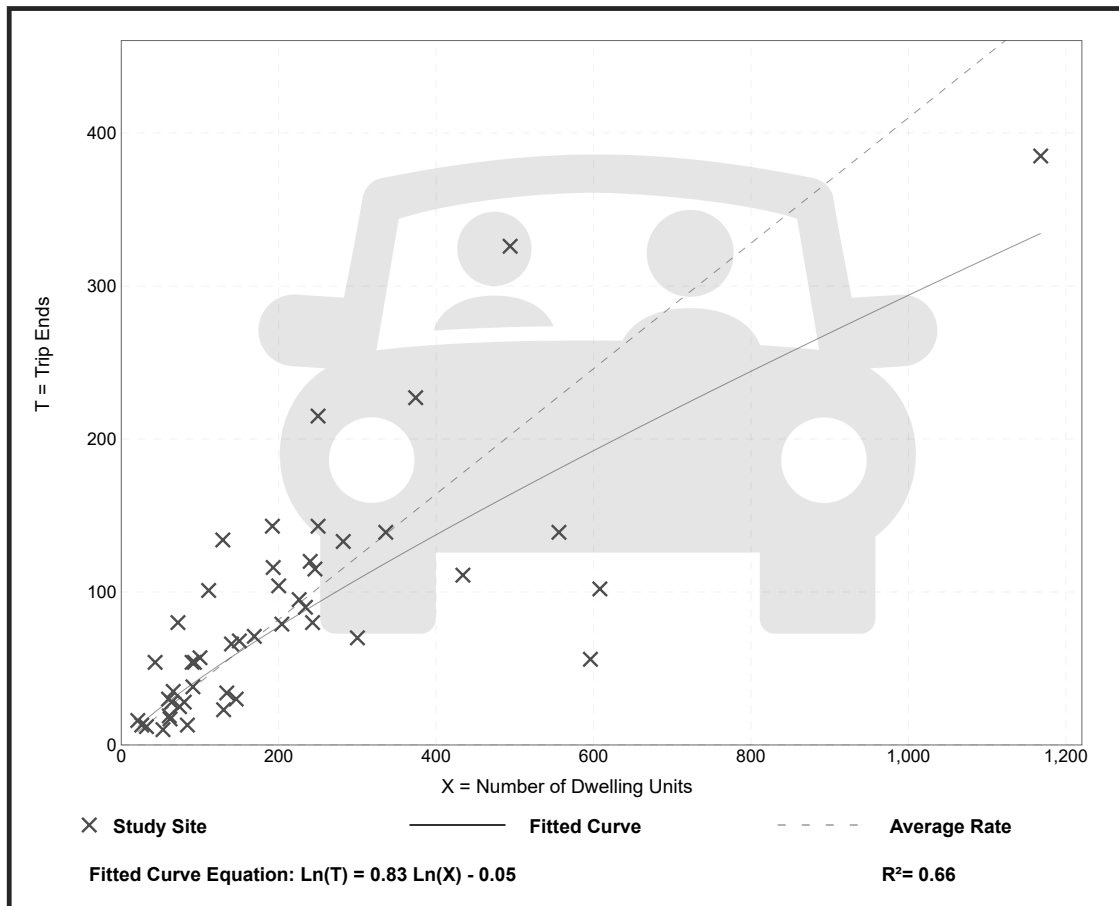
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
 Number of Studies: 47
 Avg. Num. of Dwelling Units: 211
 Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.41	0.09 - 1.26	0.22

Data Plot and Equation



Shopping Center (820)

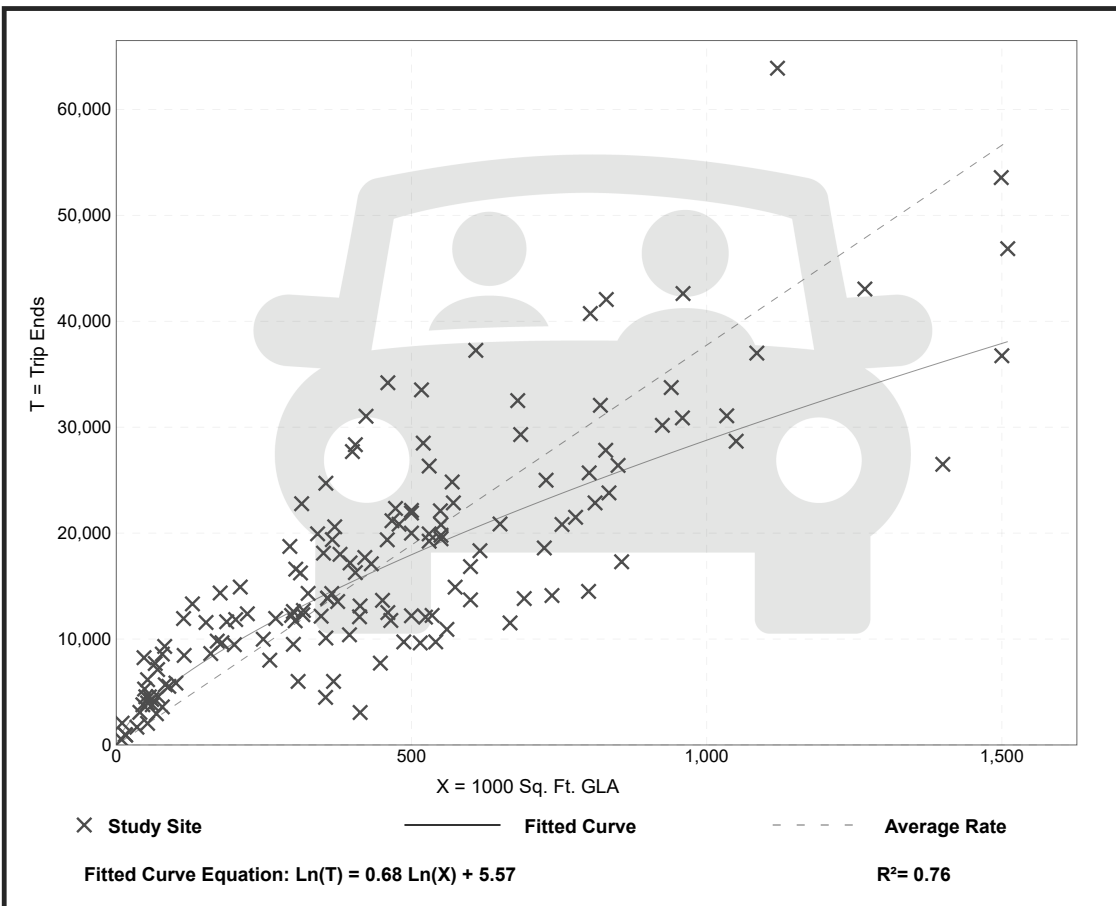
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 147
Avg. 1000 Sq. Ft. GLA: 453
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.75	7.42 - 207.98	16.41

Data Plot and Equation



Shopping Center (820)

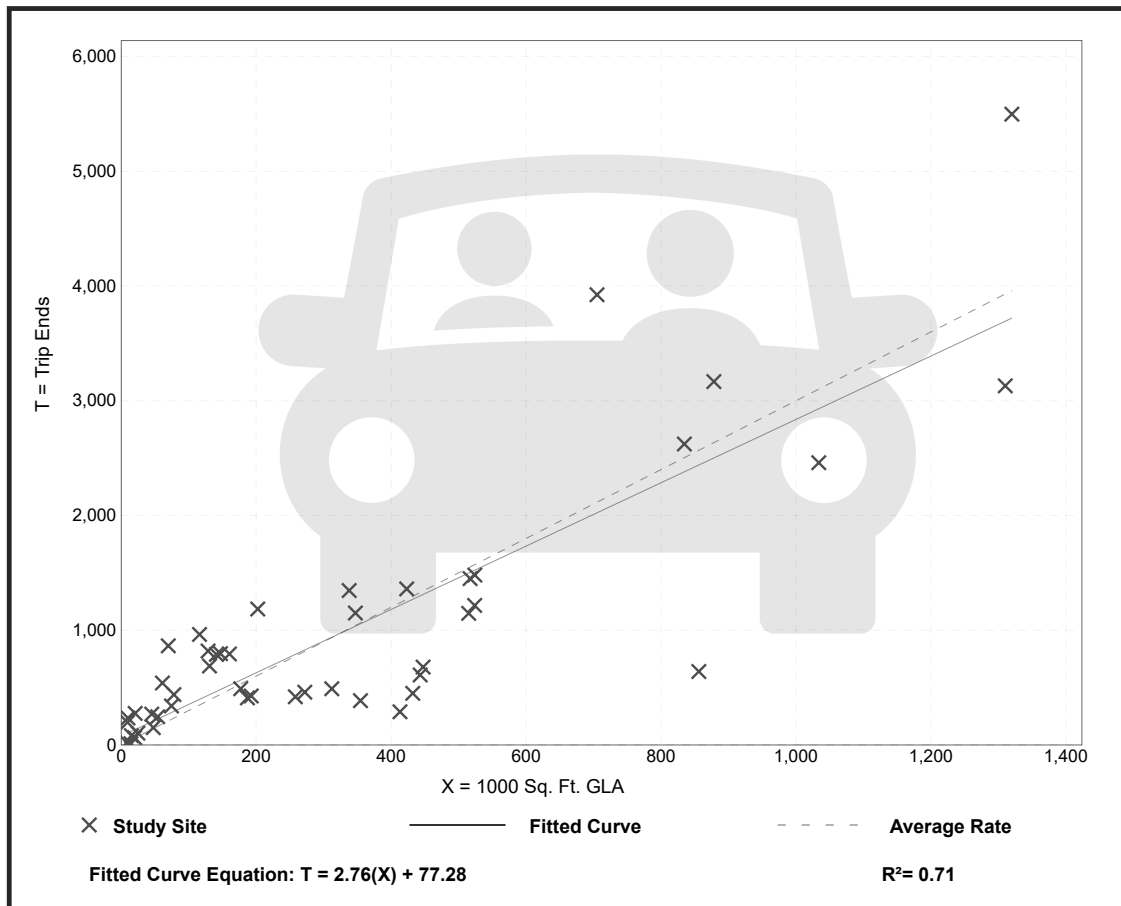
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 47
Avg. 1000 Sq. Ft. GLA: 323
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.00	0.70 - 23.74	1.85

Data Plot and Equation



Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
 Number of Studies: 53
 Avg. 1000 Sq. Ft. GLA: 298
 Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
4.21	0.78 - 27.27	2.47

Data Plot and Equation

