

January 9, 2019

Erin Ganaway  
N.E.S. Inc.  
619 North Cascade Avenue, Suite 200  
Colorado Springs, CO 80903  
eganaway@nescolorado.com

**RE: Redtail Ranch Subdivision**  
**REVISED Transportation Memo, El Paso County, CO**

Dear Ms. Ganaway:

Per your request, CLH Associates completed this revised Transportation Memo for the proposed Redtail Ranch Subdivision in unincorporated El Paso County, CO. The proposed development would subdivide existing lands into plots for a total of 12 single family units. The site is in unincorporated El Paso County, with proposed primary access to Vollmer Road between Shoup Road and Swan Road. A secondary access is proposed leading to Swan Road. For the purposes of this analysis, all traffic is assumed to enter and exit via Vollmer Road. While there may be some cross traffic between Redtail Ranch and the development to the north along Ward Lane, we do not anticipate that it will be significant and would mostly even out. As such, the Ward Lane intersection with Swan Road did not need to be investigated for this memo. No improvements to Ward Road are needed.

Traffic counts were collected during the morning and evening peak periods on Wednesday and Thursday, March 14<sup>th</sup> and 15<sup>th</sup>, 2018, on Vollmer Road at the proposed access location. Peak hours are highlighted.

Time Period	Northbound	Southbound
7:00 – 7:15 am	9	24
7:15 – 7:30 am	13	37
7:30 – 7:45 am	11	32
7:45 – 8:00 am	14	25
8:00 – 8:15 am	13	12
8:15 – 8:30 am	16	25
8:30 – 8:45 am	16	21
8:45 – 9:00 am	13	19
4:00 – 4:15 pm	19	11
4:15 – 4:30 pm	20	14
4:30 – 4:45 pm	29	15
4:45 – 5:00 pm	16	21
5:00 – 5:15 pm	29	11
5:15 – 5:30 pm	18	12
5:30 – 5:45 pm	33	18
5:45 – 6:00 pm	23	13

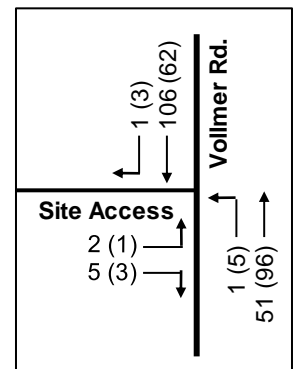
Traffic operations were analyzed using methodologies in the Transportation Research Board's Highway Capacity Manual 6<sup>th</sup> Edition (HCM) and the Synchro software (Version 10). Level of Service (LOS) for this section of Vollmer Road was calculated using procedures in Chapter 15 – Two Lane Highway of the HCM. The calculation is based on the actual average travel speed (affected by factors such as volume, percent trucks, rolling terrain, and percent of no passing zones) compared to the free flow speed (speed limit is 45 mph). Due to the very low volumes on this section of roadway, the factors mentioned above have an insignificant effect on travel speeds. LOS was determined to be “A” for both peak hours. This matched field observations which showed no slowing of traffic. This LOS is not anticipated to change with the low trip generation forecast for this development (see below).

Given the low existing traffic volumes and expected completion year for this development being 2019, there will be negligible background traffic growth. No background traffic increase was assumed for this memo and analysis.

The proposed trip generation is presented below. Average trip generation rates presented in the ITE Trip Generation Manual, 9<sup>th</sup> edition, 2012, for Land Use Code 210 (single-family detached housing), were used.

Units	<u>Trip Generation Rates</u>					<u>Trip Generation</u>				
	Average Weekday	<u>AM Peak Hour</u>		<u>PM Peak Hour</u>		Average Weekday	<u>AM Peak Hour</u>		<u>PM Peak Hour</u>	
		In	Out	In	Out		In	Out	In	Out
12	9.52	.188	.563	.63	.37	114	2	7	8	4

The diagram at right presents the AM and PM peak hour volumes at the new proposed development access (to be named Sanctuary Pine Drive) intersection with Vollmer Road. PM volumes are shown in parentheses. The distribution of traffic was assumed to follow the existing traffic patterns on Vollmer Road. Analysis using Synchro indicates that LOS “A” will be experienced during both the AM and PM peak hours. Intersection analysis printouts are attached to this memo.



The proposed location of Sanctuary Pine Drive is appropriate. Two small vertical curves exist on either side of the proposed access, but neither is high enough to block intersection or stopping sight distance for cars. Intersection and stopping sight distance standards for a 50-mph design speed, according to “El Paso County Engineering Criteria Manual”, 12/13/16 Revision 6, are listed below, along with the field measured actual sight distances. It should be noted that the measured sight distance indicated below is to see a 4.25-foot target car traveling down the road or stopped to turn left into Sanctuary Pine Drive. Stopping sight distance is usually measured for a 1/2-foot target object height. The small vertical curves on either side of the driveway would block seeing a 2-foot high object, but not a stopped car. The Preliminary Site Plan shows the proposed location of the Sanctuary Pine Drive Access so lanes align properly with the proposed access on the east side.

#### Standards

Intersection Sight Distance – Left Turning Vehicles with “Stop” Sign Control: 555 feet  
Intersection Sight Distance – Right Turning Vehicles with “Stop” Sign Control: 480 feet  
Stopping Sight Distance: 425 feet

#### Measured Sight Distance

Sight Distance to the North: >2,000 feet  
Sight Distance to the South: >1,600 feet (to Shoup Road)

The El Paso County requirements for exclusive left turn and right turn lanes were also examined. For a Collector road like Vollmer Road, a left turn lane is required for any access with a projected peak hour ingress turning volume of 25 vehicles per hour (vph) or greater. Only 5 vph is forecast to make the left turn. A right turn lane is required for any access with a projected peak hour right turning volume of 50 vehicles per hour (vph) or greater. Only 3 vph is forecast to make the right turn. Therefore, left and right turn lanes are not required and neither are any acceleration or deceleration lanes. No additional signing and striping is needed except what is standard for a residential side street of this type.

Pavement condition on Vollmer Road appears to be fair. The road appears to be concrete with an asphalt overlay. Typical cracking appears at the concrete joints, and there does not appear to be significant rutting. Pavement width is approximately 23 feet, with one lane per direction and no shoulders.

As per the El Paso County Engineering Criteria Manual, for a Rural Major Collector with a 50 mph design speed and an average daily traffic volume of over 1,500 vehicles, the following standards apply:

- One 12-foot lane per direction
- 4 foot paved shoulders and 8 foot total shoulder width
- Roadside ditch with a 15 foot foreslope and 10 foot backslope
- Clear zone from the edge of the travel lane of 20 feet
- Left turn lane storage of 235 feet, with a 200 foot approach taper and 270 foot redirect taper (assuming widening on both sides of the road)

Installation of left turn lanes, widening Vollmer to El Paso County standards, and milling/overlay are planned as part of the development on the east side of Vollmer Road in the near future. As an interim mitigation until that occurs, it is recommended that an 8 foot paved shoulder be added on the west side of Vollmer for approximately 200 feet both north and south from the proposed site access point. Roadside ditch modification should be performed to maintain adequate drainage.

There are currently no on-road or roadside facilities for pedestrians or bicycles in this area. To the best of our knowledge, there are no neighborhood or public input issues associated with this development.

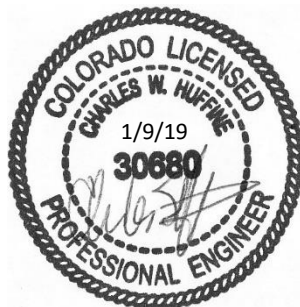
We trust that this information will assist you in obtaining approvals for this subdivision. Please let me know if you have any questions or need additional information.

Sincerely,

CLH Associates LLC






Chuck Huffine, P.E., PTOE, AICP  
President



# HCM 6th TWSC

1:




03/17/2018

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	5	1	51	106	1
Future Vol, veh/h	2	5	1	51	106	1
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	91	91	72	72
Heavy Vehicles, %	2	2	2	5	5	2
Mvmt Flow	2	6	1	56	147	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	206	148	148	0	-	0
Stage 1	148	-	-	-	-	-
Stage 2	58	-	-	-	-	-
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	782	899	1434	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	965	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	781	899	1434	-	-	-
Mov Cap-2 Maneuver	781	-	-	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	965	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.2	0.1		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1434	-	862	-	-	
HCM Lane V/C Ratio	0.001	-	0.01	-	-	
HCM Control Delay (s)	7.5	0	9.2	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

# HCM 6th TWSC

1:

03/17/2018

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	5	5	96	62	3
Future Vol, veh/h	2	5	5	96	62	3
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	73	73	74	74
Heavy Vehicles, %	2	2	2	5	5	2
Mvmt Flow	2	6	7	132	84	4
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	232	86	88	0	-	0
Stage 1	86	-	-	-	-	-
Stage 2	146	-	-	-	-	-
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	756	973	1508	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	881	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	752	973	1508	-	-	-
Mov Cap-2 Maneuver	752	-	-	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	881	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9	0.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1508	-	898	-	-	
HCM Lane V/C Ratio	0.005	-	0.009	-	-	
HCM Control Delay (s)	7.4	0	9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	