Transportation Impact Study
for
Raptor Crossing
Fruita, Colorado

May 13, 2021

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Project Number: M1519

Statement of Engineering Qualifications

Kari J. McDowell Schroeder, PE, PTOE is a Transportation and Traffic Engineer for McDowell Engineering, LLC. Ms. McDowell Schroeder has over twenty-four years of extensive traffic and transportation engineering experience. She has completed numerous transportation studies and roadway design projects throughout the State of Colorado. Ms. McDowell Schroeder is a licensed Professional Engineer in the State of Colorado and has her certification as a Professional Traffic Operations Engineer from the Institute of Transportation Engineers.

Traffic Impact Analysis for the Raptor Crossing

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Tables and Figures

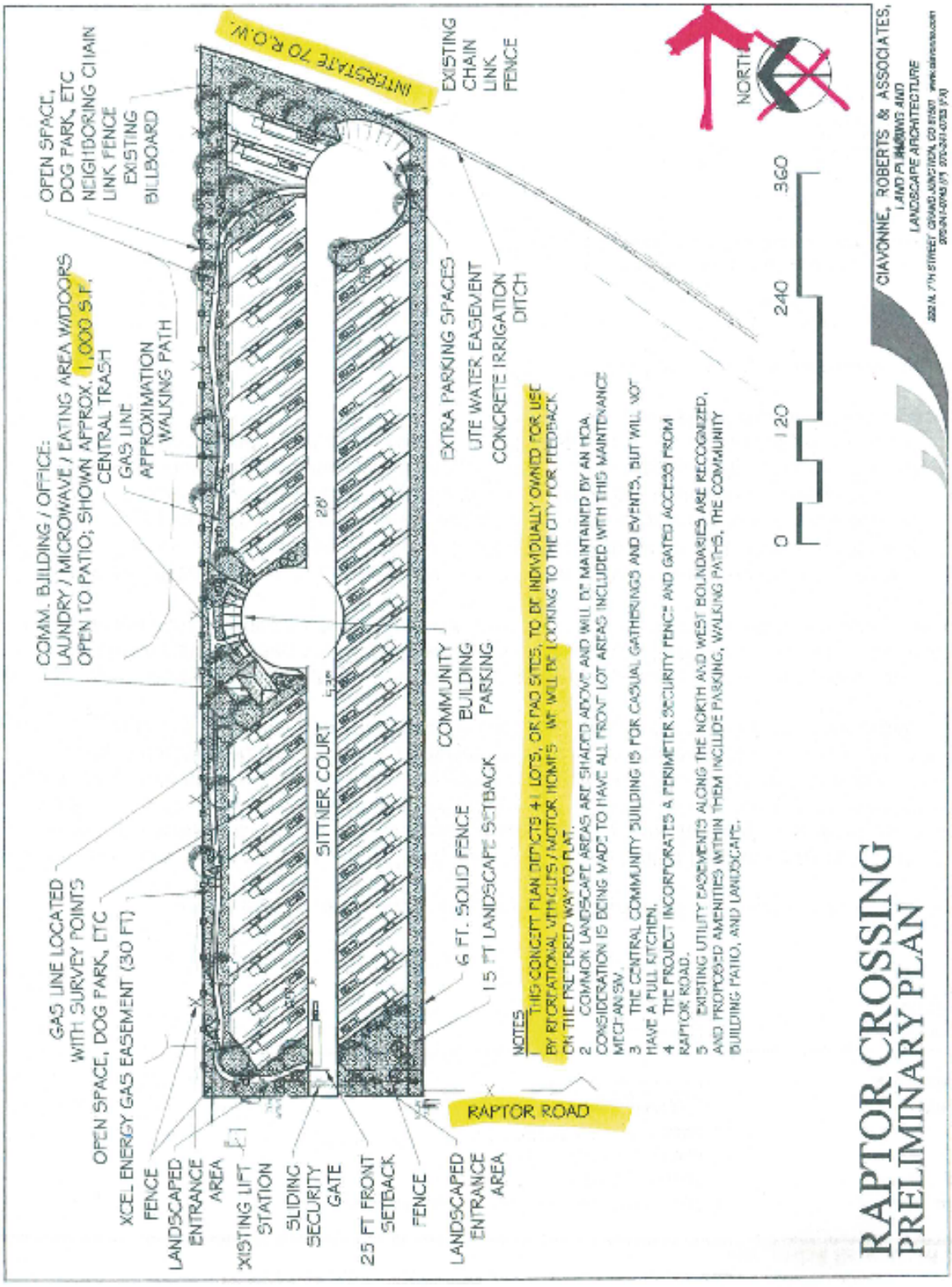
1.0 Project Description

McDowell Engineering has prepared this Transportation Impact Study for the proposed Raptor Crossing project located in Fruita, Colorado. The purpose of this transportation impact analysis is to forecast and analyze the impacts of the additional traffic volumes associated with this project on the surrounding roadway network. Recommendations to mitigate any traffic impacts are also included. The analysis complies with 2020 Mesa County *Design Standards*.

The applicant is proposing to develop a 41 site recreational vehicle (RV) park on a 4.88-acre parcel on Raptor Road in Fruita, CO. The proposed RV park will include ownership RV lots. The ownership RV lots may be leased on occasion. Traditional camping, such as tents or rental cabins, are not included in the project. The site is currently vacant. Refer to the Area Map in **Figure 1** and Site Plan in **Figure 2**.

Figure 1: Area Map

Figure 2: Site Plan



2.0 Existing Conditions

2.1 Description of Existing Transportation System

Raptor Road is an east-west roadway with direct connectivity to State Highway 340 (SH 340). It extends from SH 340 to the end of the project parcel. Pavement ends 1,000 feet west of SH 340 at the eastern boundary of the project parcel. Raptor Road is two-lanes and has an assumed speed limit of 25mph, no shoulders and no passing zones. Raptor Road is classified as access Minor Collector in accordance with the Mesa County *Design Standards*[1].

2.2 Existing Site Access Description

The site consists of one parcel with a gravel access from Raptor Road. The existing access connects to an unpaved section of Raptor Road.

2.3 Traffic Data Collection

The parcel is currently vacant, and traffic does not regularly enter/exit the site. The intersection of SH 340 and Raptor Road is a roundabout and is expected to have capacity for additional traffic volumes. Therefore, traffic counts were not obtained on Raptor Road.

Existing traffic data was utilized at the KOA campground in Silt to determine the trip generation rates for the proposed facility. Data was collected from Friday, June 17, 2016 to Sunday, June 19, 2016. This data was intended to capture the RV park's peak weekend traffic volumes. Refer to **Section 4.2** for additional information on the trip generation calculations.

3.0 Future Traffic Projections

3.1 Background Infrastructure Assumptions

There are no planned infrastructure improvements in the area of Raptor Road that will impact this study's analysis.

3.2 Background Traffic Growth

The parcel is currently vacant. The intersection of SH 340 and Raptor Road was not analyzed. This intersection is a roundabout and is expected to have additional capacity. Therefore, there is no background traffic included in the analysis.

4.0 Project Traffic

4.1 Proposed Site Access Description

Raptor Crossing is proposing one site access connecting to Raptor Road located approximately 120' east of the southwest corner of the parcel. The existing parcel has a gravel access connecting directly to Raptor Road. The site access and internal roads will be paved. Refer to the access locations in **Figure 2**.

4.2 Trip Generation for Proposed Land Use

The applicant is proposing to develop a 41 site RV park on a 4.88-acre parcel on Raptor Road in Fruita, CO. The project is comprised of ownership RV lots. The demographic typically tows a passenger vehicle and is anticipated to be a part-time resident. The proposed RV facility (comparable to a campground) does not have many data points in the Institute of Transportation Engineer's *Trip Generation Manual*. In such instances, the Institute of Transportation Engineer's *Trip Generation Handbook*[2], states that local data shall be collected to determine a trip generation rate.

The KOA campground in Silt is a similar facility to the proposed Raptor Crossing project. It has 73 RV, tent, and cabin sites. The Silt KOA offers similar amenities and has the same proximity to I-70. Therefore, it is considered a comparable facility to use in determining a trip generation rate.

Passenger Car Equivalents (PCEs)

In situations where an access is expected to generate a significant percentage of heavy vehicles, Section 2.3(4)(e) of the *State Highway Access Code*[3] requires that all large vehicles be converted to Passenger Car Equivalents (PCEs) prior to the auxiliary turn lane analysis. Per the Access Code, all vehicles longer than 40 feet shall be considered equivalent to three passenger cars. Vehicles between 20 and 40 feet in length shall be equivalent to two passenger cars.

With PCEs, the project can be anticipated to generate 6 morning peak hour trips (3 inbound + 3 outbound) and 6 evening peak hour trips (4 inbound + 2 outbound). The project's peak traffic occurs on the weekend. The Saturday peak traffic yields 15 peak hour trips. A typical weekday can be anticipated to generate 62vpd and 97vpd on a Saturday. Refer to **Table 1** for the trip generation calculations.

4.3 Trip Mode Split

Given the auto-oriented land use, the site was assumed to have 100% vehicular traffic. This will yield a conservative traffic analysis of the impacts on the adjacent roadway system.

4.4 Directional Distribution

The distribution of project-generated vehicular traffic on Raptor Road is influenced by several factors including the following:

- The location of the site relative to other facilities and the roadway network
- The configuration of the existing and proposed adjacent roadway network
- Relative location of neighboring population/commercial centers

Therefore, it is anticipated that 100% of the RV park traffic will be originating from or destined to the east. Raptor Road ends to the west of the project site. Therefore, traffic will not originate to/from the west. The anticipated directional distribution of project-generated traffic is depicted in **Figure 3**.

4.5 Traffic Assignment and Total Traffic

When the trip generation expected for this site is applied to the estimated trip distribution, the result is the anticipated assignment of trips on the roadway system. **Figure 4** depicts the new vehicle trips that are anticipated from the proposed RV park.

PROJECT NUMBER: M1519
PREPARED BY: KJS
DATE: May 3, 2021
REVISED:

Table 1 - Project Trip Generation *

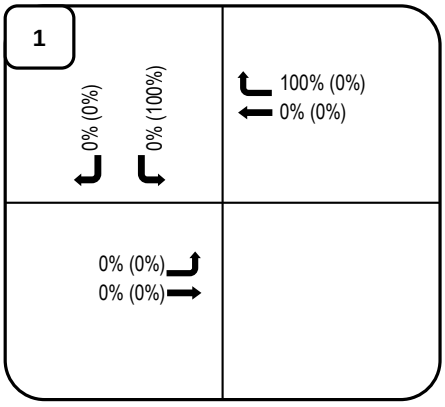
Raptor Campground
Fruita, Colorado
Estimated Project-Generated Traffic

ITE Code	Units		Avg. Weekday	Avg. Saturday	AM Peak Hour	PM Peak Hour	SAT Peak Hour	Average Weekday Trips (VPD)	Average Saturday Trips (VPD)	Morning Peak Hour Inbound % Trips	Morning Peak Hour Inbound Trips	Morning Peak Hour Outbound % Trips	Morning Peak Hour Outbound Trips	Evening Peak Hour Inbound % Trips	Evening Peak Hour Inbound Trips	Evening Peak Hour Outbound % Trips	Evening Peak Hour Outbound Trips	Saturday Peak Hour Inbound % Trips	Saturday Peak Hour Inbound Trips	Saturday Peak Hour Outbound % Trips	Saturday Peak Hour Outbound Trips
Existing Site Data at Similar Regional Campground																					
Campground[1]	73	Sites	1.51	2.36	0.15	0.15	0.37	110	172	55%	6	45%	5	64%	7	36%	4	48%	13	52%	14
Proposed Land Use [1]																					
Campground[1]	41	Sites	1.51	2.36	0.15	0.15	0.37	62	97	55%	3	45%	3	64%	4	36%	2	48%	7	52%	8
Proposed Land Use Total								62	97		3		3		4		2		7		8
Total New Trips								**62**	**97**		**3**		**3**		**4**		**2**		**7**		**8**

* Does not include pass-by trip calculations.

[1] Trip generation rates were calculated from obersvations at the Silt KOA Campground on June 17, 2016. Includes total number camping sites and is adjusted for Passenger Car Equivalents (PCEs).
DU = Dwelling Units
kSF = 1,000 Square Feet

Figure 3: Project Generated Traffic Distribution



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LEGEND:
Directional Distribution = Inbound% (Outbound %)
AM/PM/SAT Volumes = XX/XX/XX VPH (in PCEs)
Turning Movements

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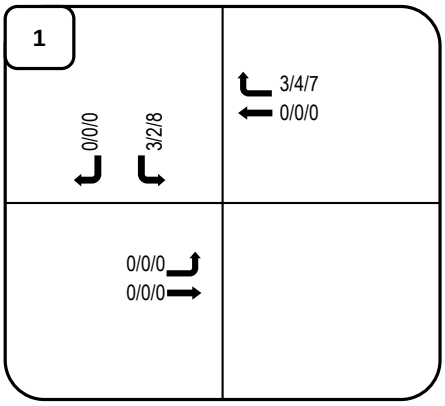
Prepared By	MLE

Figure 4: Project Generated Traffic Assignment



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Turning Movements

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Project Number M1519
Prepared By MLE

5.0 Transportation Impact Analysis

5.1 Access Locations/Spacing

The Raptor Crossing project is proposing one access on the south side of the parcel. The proposed access is approximately 150' west of an existing business access.

Section 5.09 and Exhibit 5.1[1] of Mesa County's *Design Standards* state with design speeds of 25 mph or less the edge of the proposed access must be a minimum of five (5) feet from adjacent property lines, and a minimum of 100 feet from the edge of the traveled way of a non-local road intersection. The site access is approximately 160' west of an existing business access and meets the required access spacing.

5.2 Access Design Criteria/Queue Analysis/Staging Area

The accesses shall be designed to safely accommodate the turning characteristics of the largest vehicle that will typically utilize the proposed access. The access width shall be a minimum of 20 feet and a maximum of 40 feet. These criteria are described in more detail in Section 4.3 of the *Road Access Policy*[4].

Per Section 4.3.6 of the *Road Access Policy*[4], adequate vehicle storage capacity shall be provided to move vehicles safely and efficiently between the road and the development. The minimum throat length shall be 40 feet to prevent vehicles from backing up onto Raptor Road.

Per Exhibit 6.8[1] of Mesa County *Design Standards*, Minor Collector (Urban) roadways should have a pavement width of 36 feet. A portion of Raptor Road is currently unpaved. The length extends from the eastern boundary of the project parcel to the site access. Therefore, approximately 120 feet of Raptor Road should be improved to meet Mesa County *Design Standards*.

5.3 Turn Lane Analysis

The City of Fruita does not specify auxiliary turn lane requirements. Therefore, the Mesa County *Design Standards*[1] were used to determine the need for auxiliary turn lanes. Section 6.10 addresses auxiliary/speed change lanes. Several criteria apply when determining the traffic volume thresholds. Raptor Road is a two-lane section with an assumed speed limit of 25mph.

Per Exhibit 6.15[1], left turn lanes are warranted when the design hour volume of the roadway is greater than 500vph and the turn lane volume is greater than 30vph/250 vehicles per day (vpd). Traffic is not anticipated to enter from the west. Therefore, a westbound left turn lane into the site is not required.

Per Exhibit 6.16[1], right turn lanes are warranted when the design hour volume of the roadway is greater than 500vph and the turn lane volume is greater than 50vph or 450vpd. Traffic counts were not obtained on Raptor Road. However, the site

volumes are well below this threshold. Therefore, an eastbound right turn lane into the site is not required.

5.4 County Road Access Permits

As part of the land use change, Section 2.1 of the *Road Access Policy*[4] requires the County's approval for the access location and the associated access permit.

5.5 State Highway Access Permit

Section 2.6(3) of the *State Highway Access Code*[3] requires a new State Highway Access Permit if traffic is anticipated to increase by over twenty percent. The Raptor Crossing project is anticipated to add 6 to 15 vph to Raptor Road in the vicinity of SH 340. Per CDOT's Online Transportation Information System (OTIS), the AADT (annual average daily traffic) on the north leg of the roundabout (station ID 105369) is 12,000vpd[6]. This equates to approximately 1,200 vehicles per hour. Peak hour project traffic volumes range from 6 – 15vph. Therefore, the project is anticipated to increase traffic by less than 20% percent on the Raptor Road leg of the SH 340 intersection. A State Highway Access Permit will not be required.

5.6 Sight Distance

Per Mesa County *Design Standards* Exhibit 6.1[1], the stopping distance for a 25mph roadway is 155 feet. The proposed access is on a relatively flat grade. The site access has adequate stopping sight distance in both directions that exceeds the 155 foot requirement.

The Mesa County *Design Standards* defer to AASHTO *A Policy of Geometric Design of Highways and Streets* for larger vehicle types. Some of the traffic will be comprised of recreational vehicles. Per AASHTO *A Policy of Geometric Design of Highways and Streets*[5], "The truck driver is able to see substantially farther beyond vertical sight obstructions because of the higher position of the seat in the vehicle. Separate stopping sight distances for trucks and passenger cars, therefore, are not generally used in highway design." This is true for some of the recreational vehicles, however, not all the recreational vehicles will be higher from the ground like a semi-truck. Per the Colorado Department of Transportation's (CDOT) *State Highway Access Code* Table 4-2[3] requires 425 feet of entering sight distance for multi-unit trucks on a two lane roadway with a posted speed limit of 25mph. The site access has adequate sight distance in both directions that exceeds the requirement of 425 feet.

All landscaping should be placed outside of the sight triangle to allow sufficient sight distances.

6.0 Recommendations and Conclusions

The proposed Raptor Crossing facility is anticipated to be successfully accommodated into the greater roadway system.

Trip Generation:

The applicant's Raptor Crossing project can be anticipated to generate 62 vehicle trips per day (vpd) on the average weekday and 97 vpd on the average weekend day. This equates to a weighted daily average of 72 vpd.

The proposed site is expected to generate 6 weekday morning peak hour trips and 6 evening peak hour trips. The project's peak traffic occurs on the weekend. The Saturday peak traffic yields 15 peak hour trips.

Access Locations:

The Raptor Crossing is proposing one access on the south side of the parcel. The proposed access is approximately 160' west of an existing business access. This distance meets the required access spacing.

Access Permits:

As part of the land use change, Section 2.1 of the *Road Access Policy*[4] requires the County's approval for the Primary Access Location and the associated Access Permit.

State Highway Access Permit:

The proposed Raptor Crossing project traffic is not impacting the intersection of SH 340 and Raptor Road by more than 20 percent. Therefore, no State Highway Access Permit will be required.

Auxiliary Turn Lanes:

There are no auxiliary turn lanes on Raptor Road that would be required as a result of this project.

Sight Distance:

The proposed site access has adequate stopping and entering sight distances of 155 feet and 425 feet per Mesa County *Design Standards* and the *State Highway Access Code*, respectively.

Access Construction:

The proposed accesses shall be constructed per *Mesa County Standards*[1]. The site access will include southbound stop control at the intersection with Raptor Road. The accesses shall be designed to safely accommodate the turning characteristics of the largest vehicle that will typically utilize the proposed access. The access width

shall be a minimum of 20 feet and a maximum of 40 feet. These criteria are described in more detail in Section 4.3 of the *Road Access Policy*[4].

Per Section 4.3.6 of the *Road Access Policy*[4], adequate vehicle storage capacity shall be provided to move vehicles safely and efficiently between the road and the development. The minimum throat length shall be longer than the longest camper (<40') that is anticipated to access the site.

A portion of Raptor Road is currently unpaved. The length extends from the eastern boundary of the project parcel to the site access. Therefore, approximately 120 feet of Raptor Road should be improved to meet Mesa County *Design Standards*.