

**PETERSON BOULEVARD & SPACE VILLAGE AVENUE
COLORADO SPRINGS, CO**

TRAFFIC IMPACT STUDY

PREPARED BY



Shane King, PE, PTOE
License # 48600

Include the engineer's certification page with the engineer's stamp, signature, and date after the cover page.



MAY 2018

PROJECT NO. 017-1754

Add PCD File No. SP-17-009 & SF-18-016

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1.0 INTRODUCTION AND OBJECTIVE

This report documents the results of a Traffic Impact Study (TIS) conducted for an existing parcel and considers impacts of potential development located southeast of the interchange of Peterson Boulevard & US Highway 24 (US-24) in Colorado Springs, CO. A map showing the general location of the proposed development is illustrated in **Figure 1**.

This traffic study was conducted to identify existing street network operations and to identify potential impacts associated with traffic growth and the constraints of the existing network.

2.0 DATA COLLECTION

A data collection effort was performed for a separate study including obtaining peak hour turning movement counts and documentation of current roadway geometrics and traffic control. That information was utilized as part of this analysis.

2.1 Peak Hour Turning Movement Counts

Intersection turning movement counts were collected on Tuesday, August 1, 2017 at the following intersections:

- Peterson Boulevard & Space Village Avenue
- Loaf 'N Jug Drive & Space Village Avenue

Include the traffic counts as an appendix

The Loaf 'N Jug Drive and US-24 off-ramp along Space Village Avenue have offset northbound and southbound legs but are being treated as a four-leg intersection as part of this study.

Each count was taken at 15 minute intervals from 7:00am – 9:00am and 4:00pm – 6:00pm. In addition, 24-hour traffic counts were taken along Space Village Avenue just east of Peterson Boulevard and along Peterson Boulevard just south of Space Village Avenue on Wednesday, June 28, 2017.

Existing peak hour traffic volumes are illustrated in **Figure 2**.

2.2 Field Review of Street Geometrics

A complete review of the existing roadway network including roadway type, general roadway geometrics, pedestrian and bicycle accommodations, and traffic control device locations was completed as part of the data collection effort. There are currently no existing bike lanes constructed within the study area.

FIGURE 1

Vicinity Map

Colorado Springs, CO

LEGEND


 Study Intersection



FIGURE 2

Existing Traffic Volumes

Colorado Springs, CO

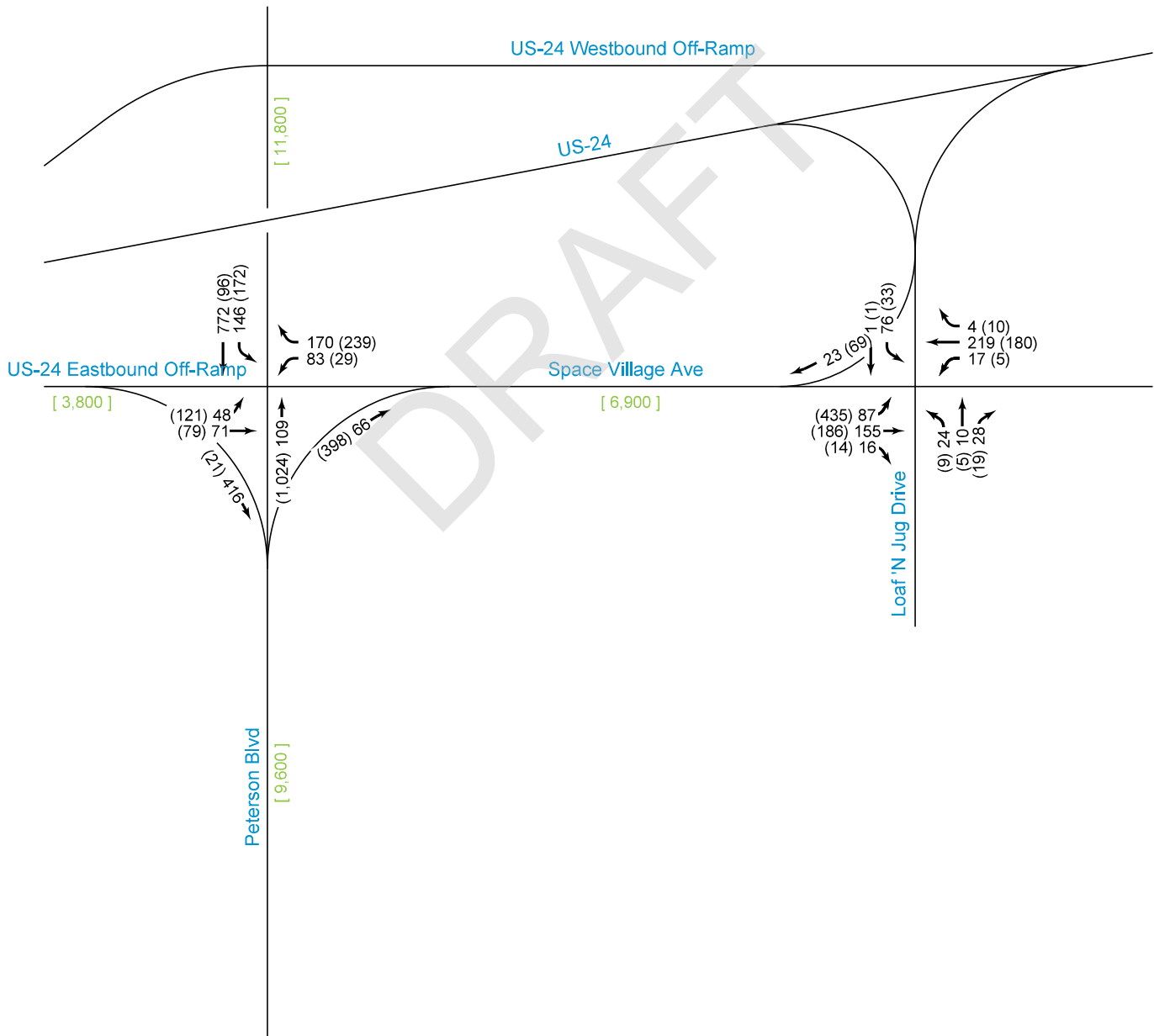
LEGEND

AM (PM) Peak Hour Volume

[XX,XXX] Existing ADTs

AM Peak Hour: 7:00am - 8:00am

PM Peak Hour: 4:00pm - 5:00pm



With this area involving multiple jurisdictions, for clarification identify (via narrative and/or exhibit) which jurisdiction owns/maintains which road.

3. EXISTING CONDITIONS

Existing traffic conditions were evaluated to identify any existing deficiencies and to provide a baseline for comparison purposes.

3.1 Network Characteristics

There are three major roadways within the study area: US-24, Peterson Boulevard, and Space Village Avenue. Data for each roadway was acquired from aerial photography, El Paso County Functional Classification Map, and the Colorado Department of Transportation (CDOT) Online Transportation Information System (OTIS).

Table 1. Existing Roadway Characteristics

Roadway	Section	Median Type	Posted Speed	Functional Classification
US-24	4-Lane	Divided	55 mph	Expressway
Peterson Boulevard	4-Lane	Divided	30 mph	Minor Arterial
Space Village Avenue	2-Lane	n/a	45 mph	Minor Arterial

The intersection of Peterson Boulevard & Space Village Avenue is a signalized intersection. The west leg of the intersection is a US-24 EB Off-ramp. Vehicles either enter the signalized intersection or may take a channelized right-turn lane with the only destination being the Petersen Airforce Base gate. The northbound right-turn is also channelized with yield control at Space Village Avenue.

All other intersections in the study area are unsignalized. Along Space Village Avenue, there is a continuous eastbound right-turn lane that services three site drives (study site, Loaf 'N Jug, and a hotel) within the study limits. As previously mentioned, only destination south of Space Village Avenue is Peterson Air Force Base.

There are two existing eastbound off-ramps from US-24 near the site. The first off-ramp intersects at Peterson Boulevard & Space Village Avenue. The eastbound lane geometry includes a shared through-left and a channelized free right-turn lane. The second off-ramp intersects Space Village Avenue approximately 700 feet east of Peterson Boulevard. This second off-ramp currently has about 300 feet of deceleration length along US-24 before its horizontal curve geometry begins, which is inadequate based on CDOT auxiliary lane guidelines. In addition, this second off-ramp is on a steep downgrade before it intersects with Space Village Avenue. Like the first exit, this second off-ramp includes a free right-turn to travel west and an exclusive southbound left-turn lane at the Space Village Avenue intersection.

Existing lane configurations and traffic control are illustrated in **Figure 3**.

FIGURE 3

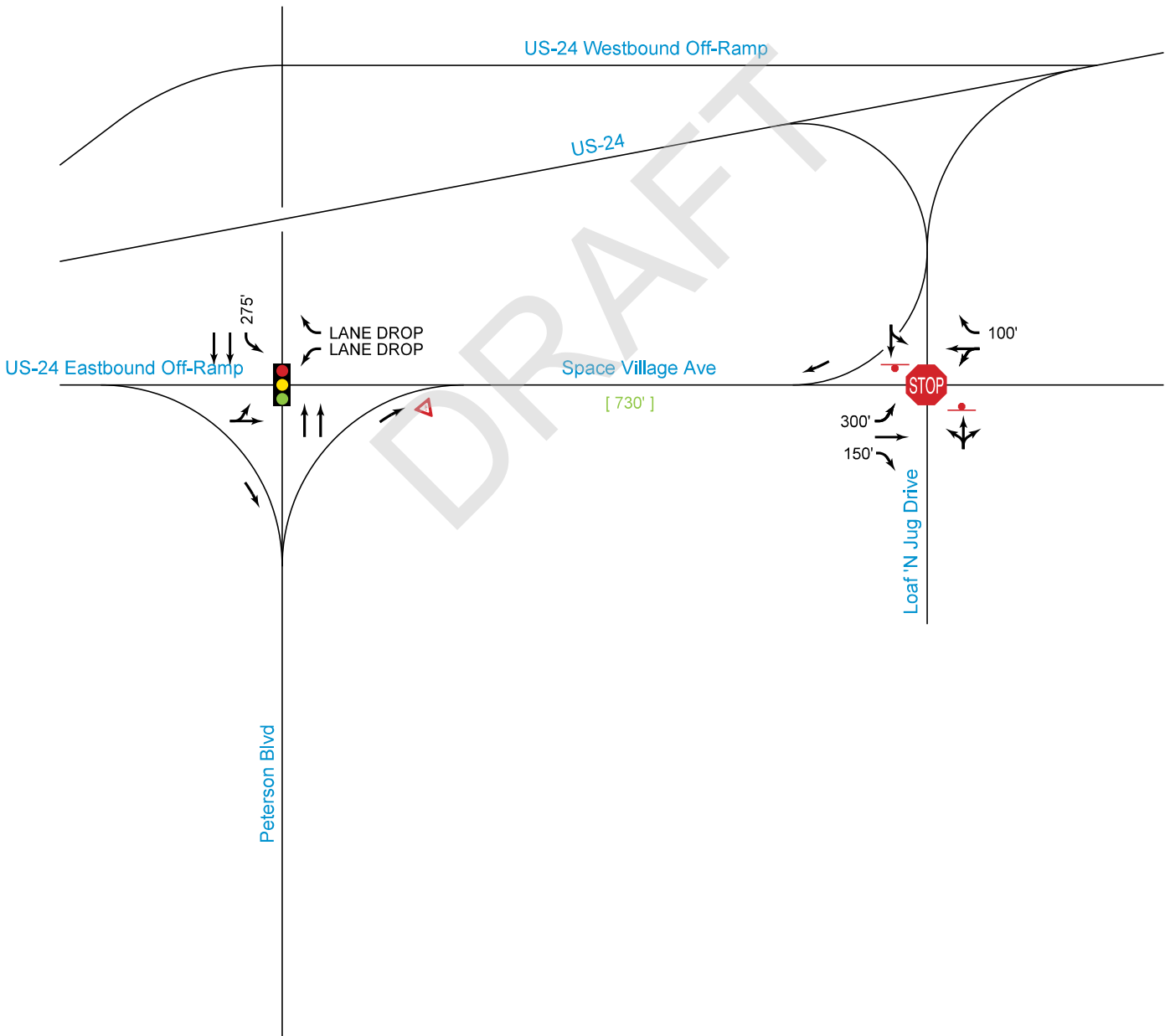
Existing Lane Configurations and Traffic Control

Colorado Springs, CO

LEGEND



- XX' → Lane Configuration & Storage Length
- ⬮ Existing Signalized Intersection
- ⬮ Stop Controlled Intersection
- ⬮ Stop Sign
- [XXX'] Intersection Spacing
- ⬮ Yield Sign



3.2 Existing Conditions Capacity Analysis

Include the synchro data/results as an appendix.

Capacity analyses were performed for the existing study intersections utilizing the existing lane configurations and traffic control. Analyses were conducted using Synchro, Version 10.0 which is based on the Highway Capacity Manual, 6th Edition delay methodologies. For simplicity, the amount of control delay is equated to a grade or Level of Service (LOS) based on thresholds of driver acceptance. The amount of delay is assigned a letter grade A through F, LOS A representing little or no delay and LOS F representing very high delay. **Table 1** shows the delays associated with each LOS grade for signalized and unsignalized intersections, respectively.

Table 2. Intersection LOS Criteria

Level-of-Service	Average Control Delay (seconds)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Highway Capacity Manual (HCM, 6th Ed.)

Results of the analyses indicate that the signalized intersection of Peterson Boulevard & Space Village Avenue operates at LOS B or better in both peak hours. All individual movements operate at LOS C or better in both peak hours. The 95th percentile queue lengths for all movements do not queue past existing turn-bay storage lengths except for the northbound through movement queuing through the channelized northbound right-turn lane, located approximately 225 feet south of the intersection. The 95th percentile queue length for the northbound through movement is approximately 270 feet in the PM peak hour.

The exiting northbound movements at Loaf 'N Jug Drive operate at LOS E in the PM peak hour. Similarly, the southbound left-turn movement at the second US-24 EB Off-ramp operates at LOS F in the PM peak hour. All other movements operate at LOS C or better. The 95th percentile queue length for southbound left-turn movements are approximately five vehicles (125 feet) which will spill back into the horizontal curve portion of the off-ramp, blocking the channelized right-turn. As additional vehicles exit US-24 at this off-ramp, they may not have enough space to slow down which could potentially cause safety issues. All other queue lengths are no more than three vehicles in any peak hour.

The Existing Conditions Capacity Analysis Summary is illustrated in **Figure 4**.

FIGURE 4

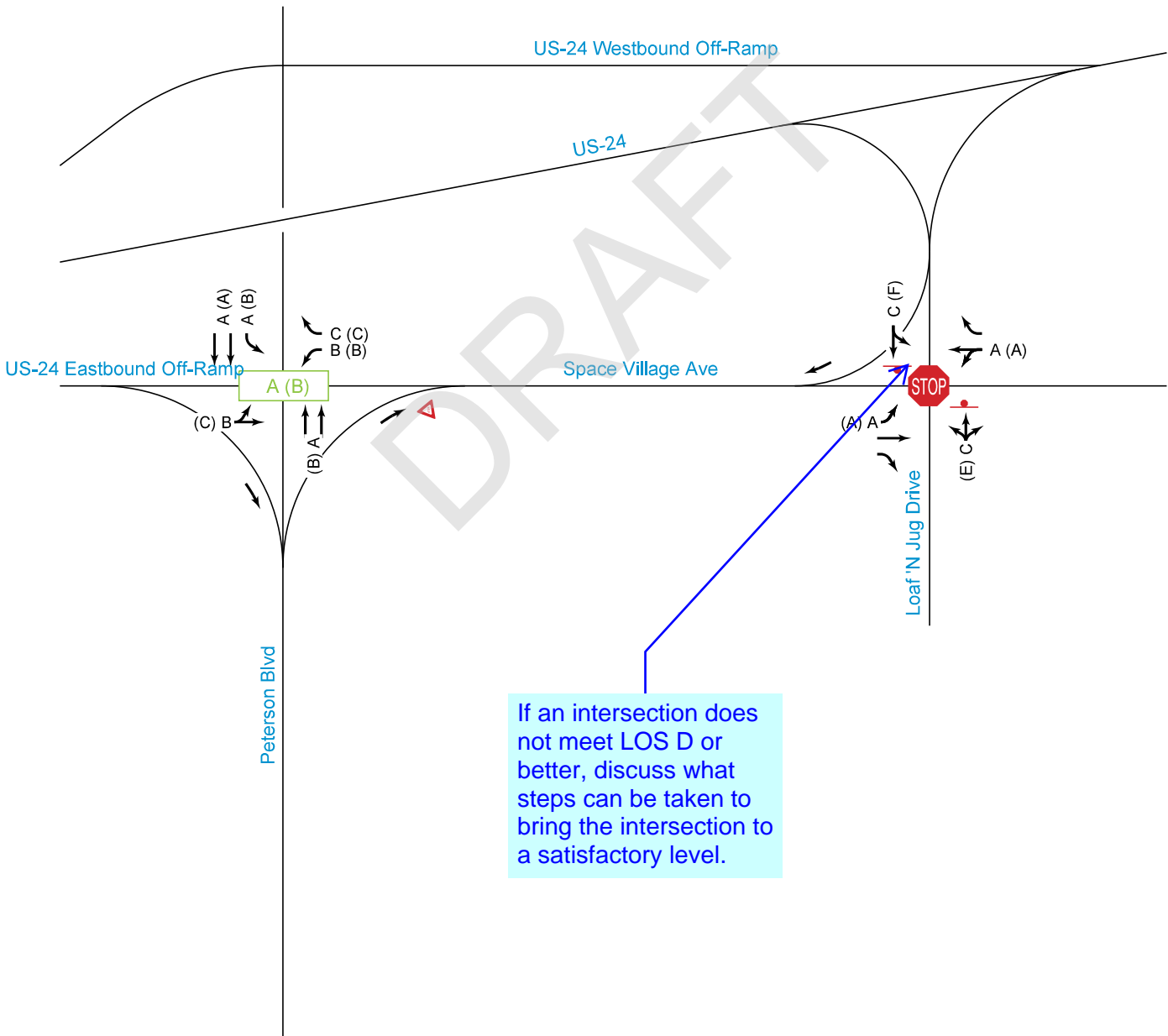
Existing Conditions Capacity Analysis Summary

Colorado Springs, CO

LEGEND



- AM (PM) Signalized Intersection LOS
- AM (PM) Movement LOS
- Stop Controlled Intersection
- Stop Sign
- Lane Geometry
- Yield Sign



If an intersection does not meet LOS D or better, discuss what steps can be taken to bring the intersection to a satisfactory level.

4.0 FUTURE CONDITIONS

This section highlights and discusses the area and are expected to contribute to the

Site Development

It is anticipated that at some point in the future, the vacant lot immediately southeast of the Peterson Boulevard & Space Village Avenue will be re-developed. The site does not currently have a trip generator but does have parking stalls lining the perimeter.

Colorado Military Academy

A separate study has been performed for the proposed Colorado Military Academy (K-12). The school site will generally encompass the area bound by Vandenberg Street and Command View. The study indicated a potential 2,300 vehicles per day when the site is fully utilized.

Peterson Air Force Base

Base staff have indicated that approximately 14,500 (enter/exit total) vehicles utilize the north gate per day. Growth initiatives could push an additional 12,000-14,000 new personnel to Peterson Air Force Base with will drastically increase vehicular trips.

General Growth

Colorado Springs and El Paso County are growing in population. Most roadways in communities such as this incur general traffic volume growth associated with development that cannot be pinpointed to a single site.

Provide a trip generation table (exist plus proposed). What is the percent of traffic impact that this subdivision is incurring on the surrounding streets? What is the breakdown of trip distribution this subdivision has to the surrounding streets?.

Provide a summary of what is being coordinated with the AFB, CDOT, and City regarding the reconfiguration of the roadways and intersection in the immediate vicinity of the proposed subdivision. Is there a special district that will fund the improvements? What contribution will the developer of Space Village Filing 3 provide with regards to these off-site improvements?

State definitively what improvements the developer will be constructing with the project as part of the Space Village Filing 3 final plat.

List ECM criteria for stacking, storage, and taper for every affected auxiliary lane and access and for each access state whether the criteria is met. If it can't be met, state the required modification so that it can be met.

State or list what the sight distance is for every affected access and whether it can be met. If it cannot be met, state the required modifications so that it can be met.

State what the current applicable Transportation Impact Fees are and what option the developer will be selecting for payment (full, PID #2 or #3). If the site is in a special district, so state and summarize the applicable fees.

Given all the off-site future conditions listed, what is the trip generation threshold that a commercial development can produce that would not require off-site improvements or is the existing condition already insufficient so no matter the type site development off-site improvements would be required when Lot 1 goes through site development.

With queueing backing onto US-24, why is the Synchro analysis at Space Village/Peterson be at LOS B or better?

5.0 CONCLUSIONS

It is recommended that a detailed traffic impact study should be performed with any area site developments which considers the growth factors identified in this report and is coordinated with CDOT, El Paso County, City of Colorado Springs, and Peterson Air Force Base.

That said, the purpose of this study was to identify the traffic and transportation related impacts associated with potential development and other growth in the area. A list of observations to be mitigated include:

Queueing on to US-24 Mainline

Air Force Base, County, and DOT staff have all expressed concerns with queueing on US-24 ramps and the extension of those queues back on to US-24 mainline. In addition to the information shared about the two main ramps, existing capacity analysis indicates that the second eastbound ramp experiences queues at the Space Village Avenue stop sign which block the channelized right-turn movement. The Air Force Base, CDOT, and County should plan for network improvements that mitigate ramp queueing.

Auxiliary Lanes

It desirable to separate turning and through vehicles in different lanes on arterials. This is especially true for left-turns where stopped vehicles can impose unnecessary crash exposure to through vehicles. It is recommended that where turn movements are allowed, they are from exclusive lanes.

Intersection Control

No area intersections except the two US-24 ramps are expected to satisfy traffic signal warrants. However, other forms of control (roundabouts) should be considered when developing network modifications.

Modes of Travel

Neither Peterson Boulevard or Space Village Avenue have continuous sidewalks and no exclusive bike accommodations are being made. Planning for these improvements will help to reduce the vehicular trip demand.

Access Spacing and Vehicular Conflicts

Intersection spacing and vehicular conflict points are closely related. Space Village Avenue access spacing is dense and allows various vehicular movements and speeds into a condensed area. Merge and weave movements should be monitored and controlled to limit crash patterns and impacts when traffic events occur.

Remove County. The County does not own/maintain any of the roads in the immediate vicinity.

Markup Summary

dsdlaforce (11)

May 2018
PROJECT No. 017-1754
Add PCD File No. SP-17-009 & SF-18-016

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to study including delineating peak hour turning roadway geometrics and traffic control. That

ed on Tuesday, August 1, 2017 at the
Place Village Avenue have offset northbound intersection as part of this study.
Elliott - 30th and 40th - 400pm. In Place Village Avenue just west of Peterson
of Place Village Avenue on Westchester

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Include the traffic counts as an appendix

Use the following table to determine the appropriate delay category.

Delay Category: Delay to identify any existing deficiencies and correct them.

There are three delay categories within the study area: LOS D, Peterson Avenue (at Peterson Avenue) and 40th - 400pm. In Place Village Avenue just west of Peterson Avenue on Westchester Avenue.

Delay Category	Delay	Delay Type	Delay
LOS D	15-20	15-20	15-20
LOS C	20-30	20-30	20-30
LOS B	30-40	30-40	30-40
LOS A	40-50	40-50	40-50

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With this area involving multiple jurisdictions, for clarification identify (via narrative and/or exhibit) which jurisdiction owns/maintains which road.

Include the synchro data/results as an appendix.

r the existing study intersections utilizing the existing delay methodology. For empirical a grade or Level of Service (LOS) based on these delay is assigned a letter grade A through F. LOS A

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Include the synchro data/results as an appendix.



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If an intersection does not meet LOS D or better, discuss what steps can be taken to bring the intersection to a satisfactory level.



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Given all the off-site future conditions listed, what is the trip generation threshold that a commercial development can produce that would not require off-site improvements or is the existing condition already insufficient so no matter the type site development off-site improvements would be required when Lot 1 goes through site development.



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Provide a trip generation table (exist plus proposed). What is the percent of traffic impact that this subdivision is incurring on the surrounding streets? What is the breakdown of trip distribution this subdivision has to the surrounding streets?.

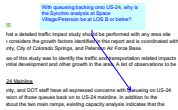
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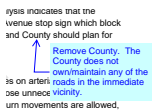
State or list what the sight distance is for every affected access and whether it can be met. If it cannot be met, state the required modifications so that it can be met.

State what the current applicable Transportation Impact Fees are and what option the developer will be selecting for payment (full, PID #2 or #3). If the site is in a special district, so state and summarize the applicable fees.



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With queueing backing onto US-24, why is the Synchro analysis at Space Village/Peterson be at LOS B or better?



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Remove County. The County does not own/maintain any of the roads in the immediate vicinity.