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MEMORANDUM

DATE: October 27, 2017

TO: Kari Parsons – El Paso County Planning and Community Development

FROM: Jeff Hodsdon - LSC Transportation Consultants, Inc.

SUBJECT: Falcon Marketplace Driveway Permit Application
Woodmen Road Access Review 2
EPC File: AP-17-548
Response to Comments Memorandum
LSC #164350

Following are LSC Transportation Consultants, Inc. responses to the August 28, 2017 El Paso County Planning and Community Development Department comments regarding the August 7, 2017 Falcon Marketplace Driveway Permit Application Updated Traffic Impact Analysis by LSC. An updated traffic report accompanies this response memo.

- 1. Regarding the statement on page 1 of the TIS that the new provision for public access is a “substantial change” from the previous proposal in terms of the purpose of the access, the function and safety of the new proposed design is of concern. The location of the proposed roundabout also needs to be considered in terms of spacing from and impacts to Woodmen Road as well as roundabout functionality. Is there an “optimal” location for the roundabout that would minimize impacts to Woodmen Road mainline traffic, such as further north within the site? The frontage road traffic speed will be reduced through this site due to design considerations regardless of whether there is an access from Woodmen Road or not. The design as proposed appears to be a public driveway in County right-of-way for the benefit of the shopping center. Liability for accidents at this location due to non-standard design features needs to be considered. **Partially resolved; the question about the optimal location for a roundabout in this vicinity remains. Comments about non-standard roundabout design features are covered in comment #5 below.***

LSC Response: The roundabout has been enlarged, shifted to the north and east, and redesigned to address the comments.

- 2. **Resolved***

3. *The TIS needs to include all items required by ECM Appendix B including but not limited to peak hour link volumes and LOS for Meridian Road and Woodmen Road and safety / accident analysis. **Partially resolved; link volumes for Meridian Road and Woodmen Road were not labeled on the figures. The safety analysis only references general accident and injury/fatality history. If there is information about the predominant movements involved in the accidents please provide that.***

LSC Response: Labels for the link volumes for Meridian and Woodmen have been added to the figures. The complete accident history has been received since the previous submittal. These data have been incorporated into the updated report along with LSC explanation of the data.

4. *Additional offsite impacts will require mitigation if the Woodmen right-in access is approved. The TIS focuses on areas that may see improved LOS with the right-in, but it should also address additional signage, striping, signalization, and turn lane improvements at all intersections impacted by the development and specifically the shifted traffic patterns that would be caused by the right-in. The comments below mention some of the foreseen additional offsite improvements. **Partially resolved;***
- a. ***The LOS tables 3 and 4 indicate that the delays contributing to poor LOS would only be shifted from the Eastonville intersection to the Woodmen Road intersection and that the length of additional turn laneage required (tied to reduced and over-capacity levels of service) is significantly higher at the Woodmen Road intersection than at the Eastonville intersection.***

LSC Response: Tables 3 and 4 have been updated. The delays contributing to the poor LOS at Meridian would not be shifted south to Meridian/Woodmen. During the afternoon peak hour with the right-in scenario, a portion of the northbound Meridian “critical volume” would shift to a non-critical turning movement–northbound left. As such, the overall intersection delays at Woodmen/would be lower with the right-in scenario. This is because the analysis of the no-right-in scenario shows an over-capacity, critical northbound through movement. Overall delays would be higher at Meridian/for the no-right-in scenario, with an over-capacity northbound left-turn movement. One additional point is that in addition to the reported intersection delays at Woodmen/and Eastonville/, there would be significantly longer travel distance and added overall travel time for hundreds of vehicles per hour (background and site traffic) if the right-in were not available.

Provide a Table 6 for both the “no RI” and “with RI” scenarios and specify the required additional lengths (including tapers, decel . and storage) at each applicable movement. Include these lengths in recommendations #10, #12, and #13 in the report.

LSC Response: The updated report addresses this comment with additional detail (including tapers, deceleration, and storage) included in Tables 7a and 7b.

- b. ***Ensure that all of the values in Tables 3 and 4 are correct. See redlines regarding discrepancies and values needing clarification.***

LSC Response: Tables 3 and 4 have been updated and these correspond to the updated Synchro and SimTraffic reports.

- c. Provide an overall comparison map showing the recommended improvements for one scenario vs. the other at all intersection movements.*

LSC Response: Added to the updated report as requested. Two sets of similar maps (same format) have been prepared, which can be compared side-by-side. These tie in with Tables 7a and 7b, which contain additional detail.

5. *A complete roundabout analysis addressing basic design aspects such as design vehicle, inscribed circle diameter, entry angles and widths, fastest paths, entry spacing and vehicle tracking was not provided and is requested. There are several issues of concern with the design as proposed:*

- a. The roundabout entry legs do not appear to be geometrically aligned to provide for the safest fastest path operations. The westbound movement appears to be designed as a free entry or bypass into the site, which will not function properly with the other legs. Traffic exiting Woodmen Road (the westbound movement) is likely to assume it has right-of-way to enter the site freely, which will conflict with the eastbound/northbound movement, and possibly the southbound movement depending on its exit leg.*

Unresolved; provide complete roundabout details meeting the specified criteria and matching modeling per comments below. The proposed deflections entering the roundabout are still of concern, and other issues remain, including appropriate overall sizing (inscribed circle) and alignments for the design vehicle and other vehicles that will utilize the roundabout.

LSC Response: The roundabout has been redesigned to address the comments. The resubmittal includes the complete set of roundabout details.

- b. The access from Lot 11 is not designed as a proper roundabout leg. Resolved (pending further revision due to other comments regarding roundabout size)*
- c. Resolved*
- d. If the RI access with roundabout is approved, 60% to 90% roundabout technical reports and construction plans (for both roundabouts) will be required with the Preliminary Plan submittal to allow for adequate review time.*

LSC Response: Noted.

6. *Regarding auxiliary lane length requirements, it does not appear that there is enough overlap/weaving distance between the acceleration lane and the deceleration lane for efficient merging: Partially resolved;*

- a. The acceleration length should be for the 55-mph posted speed at the west end of the acceleration lane, requiring 960 feet (the approximate current length). According to the report submitted (Figure 21) the proposal is to effectively reduce the acceleration length to less than 860 feet. What is the necessary/acceptable weaving overlap produced through a*

*weaving analysis? **Resolved with modeling; any real-world locations with similar conditions would be helpful for comparison.***

LSC Response: There are numerous locations in the Pikes Peak region with continuous acceleration/lanes on arterial streets. Each location appears to have a unique combination of lane length, entry radius, weaving volume, arrival patterns from upstream signals, etc. Several are at freeway interchanges with one-way ramp configurations. Many are at locations with downstream full-movement intersections within a relatively short distance. No particular location appears to be directly comparable to this location.

What is perhaps most unique about this location is that the first downstream full-movement intersection is 1.3 miles downstream (to the west). Many locations with channelized right-turn movements have full-movement intersections (or intersections with a left turn from the major street) a short distance downstream. At this location, southbound right-turning vehicles do not need to weave over multiple lanes into the left through lane on westbound Woodmen Road as there is no downstream opportunity to turn left for a long distance. It would be difficult to find a location on a major street in an urban/area where this extended spacing to a downstream full-movement intersection exists. The 1.3-mile spacing even exceeds Expressway spacing criteria (1.0 miles).

- b. Deceleration length should include some stacking storage length at the roundabout (with a proper roundabout design). Without storage length accounted for, the required and proposed weaving overlap between the acceleration and deceleration lengths cannot be determined. If the roundabout were to be moved further north additional storage length would be provided. **Partially resolved; since multiple vehicles would arrive at the roundabout because of signal queue releases, did the modeling take this into account for the queue back analysis? If the roundabout design is adjusted, available queuing length could be impacted.***

LSC Response: The queue results from the SimTraffic analysis account for the signal queue release in the simulation model. This is why the SimTraffic queuing was included in addition to the Rodel and HCM queue estimates. The HCM and Rodel queuing analysis results are also provided because they are beneficial—provide queue results from alternate analysis methods. The SimTraffic analysis better accounts for vehicle arrivals due to the upstream signal release. This analysis has been updated to reflect the revised volumes and updated operations analysis.

- c. The report statement that “The proposed Woodmen access will have little effect on the operation of Woodmen Road...” is lacking as it does not address weaving implications and impacts to westbound Woodmen Road traffic in the adjacent through lane. Considering a nominal value for saturation (capacity) flow rate of 1,900 vehicles/hour/lane, and the sum of AM decelerating traffic (333) and accelerating traffic (1060) being almost 1,400, this is approaching saturation. This suggests the likelihood of difficulty with merging maneuvers, resulting in lowered traffic speeds on Woodmen Road, especially if the weaving length is not sufficient. **The peak hour volumes involved / affected by the weaving are significant and include the SBRT (1060), the WBT outside lane (448 or 896/2), the NBLT (211 or 421/2), the EB U-turn volume (not included), and the WBRT access volume of 333, for a grand total of at least 2052 vph. This is an enormous amount of volume within the***

proposed accel / decel lane area, and could result in LOS not anticipated by modeling. Address the total with U-turns and potential real-world issues not anticipated by the modeling.

LSC Response: Figures, tables, and analysis have been updated to include projected U-turns. The report also includes a discussion to address the comment.

- d. *Given the exceptional SB to WB turning volumes and limited weaving distance, the potential future need for a second SB right turn lane from Meridian Road to Woodmen Road needs to be addressed. Provide analysis and discussion on how a second right turn lane and the associated two lane weaving movement would function and how the access point would be affected (or need to be removed). **Unresolved; provide modeling analysis of the dual right turn. Response indicates that sufficient ROW will be dedicated for the southbound right-turn lane; does this also account for a third southbound through-lane?***

LSC Response: As per this comment, we are providing a modeling analysis of a dual southbound right turn. Numerous locations in the region at which there are dual right-turn movements have one free right (bypassing the signal at the intersection) and an allowance for an additional right-turn lane because of another intersection a short distance downstream at which some right-turning drivers want to then turn left.

At this location, southbound right-turning vehicles do not need to weave over multiple lanes into the left through lane on westbound Woodmen Road as there is no downstream opportunity to turn left for a significant distance.

We have modeled a dual southbound right-turn lane with a free right into the single acceleration/lane and a second right-turn lane extending south and curving to the right side of a right-turn channelizing island (no accel lane—from this lane was assumed to turn into the through lanes of Woodmen Road). An exhibit is attached and the Synchro analysis is attached.

This would result in a more complex southbound lane configuration. Southbound motorists arriving from Meridian Road from the north would need to change lanes twice to enter the right-turn lane connecting into the acceleration/lane (which would be preferable to an inside right-turn lane in which vehicles must yield to any conflicting traffic on Woodmen). It would be more complex for cyclists as well and would result in a longer pedestrian crossing distance from the raised island to the inside radius. A dual right would likely diminish the effectiveness of the free right as both lanes would likely need to be controlled with a Yield sign and any vehicles in the inside right-turn lane would make it more difficult for motorists in the outside lane to see westbound traffic arriving on Woodmen Road.

Also, in the future, once Stapleton Drive is connected to the west, this will result in a significant reduction in traffic volume for this turning movement.

Regarding the right-of-way, it is our understanding that the plan as prepared includes right-of-way dedication to accommodate the six-lane Meridian Road, including shifting of the bike lane and southbound right-turn lane to the west by one lane. However, an additional southbound right-turn

lane associated with a dual right would require additional dedication beyond what is currently proposed. Our analysis indicates that this would be unnecessary and could result in some negative effects.

7. *When Woodmen Road is expanded to 6 lanes, the location and function of this access point will potentially exacerbate conflicts due to anticipated higher traffic speeds on Woodmen Road. If the proposed access is approved, Staff recommends that escrow be required in the amount necessary to remove the right-in and roundabout in the future. **Resolved regarding the weaving analysis; the question remains regarding actual physical construction. Potential removal of the right-in due to safety issues and/or widening of Woodmen Road will be addressed in a development agreement.***

LSC Response: Noted; The right-in-only access would not be affected by the widening of Woodmen to six lanes.

8. *Regarding the statement concerning the Woodmen Road eastbound left turn movement at Meridian Road operating at LOS E with or without this development:*
 - a. *Resolved*
 - b. *The EB left turn queue is 735 feet which exceeds the current left turn bay length and site generated vehicles would further extend the queue into the adjacent Woodmen Road through lane. The proposed right-in will most likely generate additional left-turn traffic in the form of U-turn movements in order to gain more convenient access to the site and frontage road properties. **Unresolved; the modeling with the EB movement as “NO U-Turn” was not compared to modeling allowing the u-turn. Since the EB left turn has a protected left turn movement, unless there is found to be a safety issue, the “NO U-Turn” sign will not be allowed. Replace item 12 on Table 6 with the WB to NB accel. lane from Woodmen to Meridian and address the Falcon Marketplace development’s traffic impact to this movement.***

LSC Response: The report and analysis have been updated to remove the “NO U-Turn” condition and U-turn volume projections have been added into the analysis. Regarding the comment to add to the improvements table a westbound to northbound right-turn acceleration lane on Meridian Road extending north from the Woodmen/intersection:

The proposed addition of the right-in-only access on Woodmen Road reduces the projected site-generated and background westbound right-turning volume at the Meridian/intersection. The long-term projected level of service for this turning movement under this scenario is LOS A because there is more than adequate capacity for this movement in its current configuration (a channelized right turn with a Yield sign). The existing peak volume is 200 vehicles per hour. This volume is projected to be reduced initially with the Meridian connection to US 24. This project with the right-in would reduce the baseline volume of this turning movement. The site-generated projected volume assuming the right-in on Woodmen is about 30 vehicles per hour, however background traffic would be reduced. The total afternoon peak-hour right-turn volume (with the right-in) is projected to be 262 vehicles per hour. The queue for this right-turn movement is projected to be 230 feet and the existing westbound right-turn lane can accommodate this queue.

We recommend against implementing the right-turn acceleration lane as it has the potential to actually create a less desirable situation during peak periods as motorists intending to turn left “downstream” to the north at the Meridian//access intersection (to enter the site or the anticipated future Owl Lane redevelopment) may either use the first part of the acceleration lane to attempt a short weave across multiple through lanes or choose not use the acceleration lane and wait for conflicting traffic from the northbound through or westbound left turn to clear (wait for a gap), negating the usefulness of the acceleration lane. The latter would likely be the choice of most drivers.

In this situation, it would be preferable not to have the acceleration lane and have right-turning traffic wait for the Woodmen Road east/west through green phase (no conflicts) or the southbound left-turn phase on Meridian Road or, if gaps in traffic permit, turn right during the other Woodmen/signal phases. The point is that there will be ample opportunity for right turns with the current right-turn configuration. Presumably, this acceleration lane was not incorporated into the recent Meridian Road project for some (or all) of these reasons.

- c. *Address lengthening of the EB left turn lanes and/or additional signage to help prevent left-turn queue spillback into the adjacent Woodmen Road through lane. **Partially resolved;***
 - i. *The proposal does not take into account current traffic that may be making legal u-turns at the intersection, and that “NO U-Turn” signage will likely be ignored due to the protected left turn. Address current traffic (possibly from Foxtail Meadow Lane) utilizing this movement.*

LSC Response: Please refer to the response to comment 8b above.

- ii. *Include impacts of the allowed u-turn movement in the scenario modeling and conclusions.*

LSC Response: Please refer to the response to comment 8b above.

- iii. *Would advance signage west of Golden Sage Road directing traffic to use the frontage road to the proposed development aid in reducing u-turns at Meridian Road?*

LSC Response: Advance signage for eastbound traffic west of Golden Sage has the potential to reduce U-turns and eastbound left-turn demand at Woodmen/. We have added this as a recommendation in our report.

- iv. *With the proposal to contribute escrow, the amount, design responsibilities and timing of construction to extend the eastbound lanes would need to be quantified. It appears that some short-term off-site improvements will be required if the right-in is approved.*

LSC Response: Noted. The updated table includes additional detail regarding short-term improvements.

9. *Regarding the statement concerning the addition of the right-in access being projected to improve overall operations of the Meridian Road at Woodmen Road intersection:*
- a. *through d – Resolved*
 - e. *With the revised analysis shouldn't this statement be removed or revised to state that the proposed right-in will degrade overall operations of the Woodmen/Meridian intersection?*

LSC Response: Please refer to the response to 4a. Also, this statement has been updated to add clarification/.

f. *See comment #4 above.*

10. *See TIS redlines regarding these comments and other associated issues.*

LSC Response: The TIS redlines have been addressed in the updated report.

























Enclosures: Meridian/Woodmen Dual Right Synchro Analysis

Timings

1: Meridian Rd & Woodmen Rd

2040 Total Traffic WITH Right-in Access

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	457	520	175	150	884	168	328	344	100	294	941	1041
Future Volume (vph)	457	520	175	150	884	168	328	344	100	294	941	1041
Turn Type	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			6			Free			Free
Detector Phase	5	2		1	6	6	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.5		10.0	11.5	11.5	10.0	11.5		10.0	11.5	
Total Split (s)	22.0	45.0		17.0	40.0	40.0	17.0	35.0		23.0	41.0	
Total Split (%)	18.3%	37.5%		14.2%	33.3%	33.3%	14.2%	29.2%		19.2%	34.2%	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	5.5		4.0	5.5	5.5	4.0	5.5		4.0	5.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min	Min	None	None		None	None	
Act Effect Green (s)	18.0	40.4	118.4	11.3	33.6	33.6	13.0	31.5	118.4	16.2	34.7	118.4
Actuated g/C Ratio	0.15	0.34	1.00	0.10	0.28	0.28	0.11	0.27	1.00	0.14	0.29	1.00
v/c Ratio	0.92	0.44	0.11	0.47	0.90	0.30	0.89	0.37	0.06	0.64	0.93	0.38
Control Delay	74.5	32.1	0.1	55.7	53.5	6.6	78.3	37.5	0.1	54.9	55.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.5	32.1	0.1	55.7	53.5	6.6	78.3	37.5	0.1	54.9	55.9	0.4
LOS	E	C	A	E	D	A	E	D	A	D	E	A
Approach Delay		44.4			47.2			50.0			30.4	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 118.4

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 39.9

Intersection LOS: D

Intersection Capacity Utilization 89.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Meridian Rd & Woodmen Rd

