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**Bent Grass Residential Filing No. 2**  
**Traffic Impact Study**  
PCD File No.: SF-1914  
(LSC #194460)  
January 24, 2020

**Traffic Engineer's Statement**

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



**Developer's Statement**

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

A blue ink signature of the developer, written over a horizontal line.

JAN. 25, 2020


Date

# Summary of Comments on Working File - LSC Responses to County TIS Redline Comments 3-13-20.pdf

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Page: 1

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 Number: 1      Author: dsdrice      Subject: EPC ENG      ReviewDate: 3/11/2020 10:19:47

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severe accidents. Granted, conventional T-intersections have significantly fewer conflict points than four-leg conventional intersections.

- A roundabout may be more aesthetically appealing than a traditional signal-controlled intersection and may have generally lower traffic noise levels.
- Long-term operation and maintenance cost is likely to be lower with a roundabout than a traffic signal.

#### Disadvantages

- A roundabout could potentially require additional right-of-way and construction costs than a traffic signal. The required right-of-way may not be available.
- Due to the proximity to Woodmen Road, southbound queues extending from the signal at Woodmen Road have the potential to back into the circulating lanes of a roundabout.

### **Woodmen Frontage Road/Bent Grass Meadows**

All movements at the stop sign-controlled intersection of the Woodmen frontage road/Bent Grass Meadows are projected to operate at LOS C or better during the peak hours, based on the projected short-term and 2040 total traffic volumes.

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#### **Site Access Points**


Both full-movement site access points to Bent Grass Meadows Drive are projected to operate at LOS B or better for all movements as stop sign-controlled intersections based on the short-term and 2040 total traffic volumes.

### **VEHICLE QUEUING ANALYSIS**

A queuing analysis was performed using Synchro/SimTraffic for the key approach turning movements at the key area intersections to determine the projected queue lengths, based on the projected total traffic volumes. The short-term and 2040 total peak-hour traffic volumes were entered into the Synchro model. The simulation was run five times. The queuing reports are attached.

The projected maximum northbound left-turn queue on Meridian Road approaching Bent Grass Meadows Drive is about 238 feet, based on the short-term total afternoon peak-hour volume and 496 feet, based on the 2040 total afternoon peak-hour volume. This queue could be accommodated by the existing 700-foot left-turn lane.

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 Number: 1      Author: dsdrice      Subject: Text Box      Date: 3/11/2020 10:07:10

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Address Woodmen/Falcon Market Place RAB which is pending approval and would capture some WB traffic heading to this site.

 Author: jchodsdon      Subject: Sticky Note      Date: 3/18/2020 12:00:03

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LSC Response: This has been added to the TIS as requested.

<p><b>Table 5</b> <b>Roadway System Improvements</b> <b>Bent Grass Residential Filing No. 2</b></p>					
Description			Trigger	Timing	Responsibility
<b>Meridian Road/Bent Grass Meadows Road</b>					
A	Signalize Meridian/Bent Grass Meadows	Remove existing stop-sign and replace with traffic signal control.	When warrant(s) are met – 2 of the 3 conditions of the "Crash Experience" warrant are currently met. The current number of reported crashes (susceptible to correction with a signal) exceeds the threshold as do the associated traffic volume thresholds.	With opening of the approved expansion of the veterinary clinic or Once El Paso County determines that the remaining condition within the Crash Experience Warrant has been met (determines that alternatives have failed to reduce crash frequency) and determines that a signal should be installed.	Bent Grass Metro District
B	Right-turn acceleration lane on Meridian at Bent Grass Meadows	ECM criteria indicates the acceleration lane would need to be 960 feet long plus a 222-foot taper based on the design speed of 60 mph. Note that Owl Lane is located approximately 925 feet south of Bent Grass Meadows Drive. Therefore, the lane would be a continuous acceleration/deceleration lane between Bent Grass Meadows Drive and Owl Lane.	ECM criteria has been exceeded. A deviation was previously approved waiving this requirement with the development of Bent Grass Residential Filing 1 and Bent Grass East Commercial Filing 2A. Additional development will either require the submittal and approval of a new deviation or construction of this improvement. (Notes: The installation of the traffic signal will regularly stop southbound traffic allowing eastbound right turns to enter southbound Meridian Road without an acceleration lane. The LOS analysis indicates significant improvement of the LOS with the signal. The crash data does not indicate a safety issue with the current eastbound right movement without the accel lane. Several costly improvements may be needed to build the accel lane – including burying the overhead power lines south to Owl Place, reconstructing the ditch section along the west side of Meridian Road, and reworking the radius at Meridian Road. This intersection is similar to the Meridian/Woodmen Hills, Meridian/Stapleton, and Meridian/Londonderry intersections to the north in that [or "to the extent that"] southbound right acceleration lanes have not been added. If the County ultimately wants a raised right-turn island on this southwest corner of the Bent Grass Meadows-Meridian Road intersection in conjunction with an accel lane, this would likely need to be accomplished later with the overall widening of Bent Grass Meadows just west of Meridian Road.	Accel lane construction or a deviation – with any development beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.	Bent Grass Metro District
<b>Bent Grass Meadows Dr</b>					
C	Construct Bent Grass Meadows Drive between the existing sections located north of the Woodmen frontage road and west of Meridian Road	Construct Bent Grass Meadows Drive as a Non-Residential Collector	With any development west of Bent Grass Residential Filing No. 1	With the currently proposed Bent Grass Residential Filing No. 2	Bent Grass Metro District
D	Restrict westbound left-turn at 7-Eleven access	Remove the striping for the left-turn bay at the 7-Eleven access, restripe for two sets of dual yellow lines as shown in Figure 9. If trigger for closure of westbound left-in is reached prior to the trigger for access closure, install No Left Turn signs and reflective, plastic delineators within the painted center median across the 7-Eleven access.	When westbound left-turn queue exceeds the length of the existing lane.	"With 50% percent development of the remaining vacant parcels within Bent Grass East Commercial beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.  or With the completion of Bent Grass Meadows Dr between the Woodmen frontage road and Meridian Road	Bent Grass Metro District
E	Close 7-Eleven Access	Remove the existing curb cut.	When the eastbound right-turn queue approaching Meridian Road blocks the access and/or if motorists exiting from the 7-Eleven access and turning into the eastbound left-turn lane approaching Meridian Road regularly impede/block the adjacent eastbound right-turn lane approaching Meridian Road.	With 50% percent development of the remaining vacant parcels within Bent Grass East Commercial beyond the approved expansion of the veterinary clinic and expansion of parking for the dental clinic.  or With the completion of Bent Grass Meadows Dr between the Woodmen frontage road and Meridian Road	Bent Grass Metro District
<b>Woodmen frontage road/Bent Grass Meadows Dr</b>					
F	Eastbound left-turn lane on Woodmen frontage road approaching Bent Grass Meadows Dr.	ECM criteria indicates the left-turn lane would need to be 315 feet long (155 feet of deceleration length plus 160 feet of storage length) plus a 160-foot taper based on the design speed of 40 mph.	When the eastbound left-turn volume exceeds 25 vehicles per hour	With the completion of Bent Grass Meadows Dr between the Woodmen frontage road and Meridian Road	Bent Grass Metro District
<b>Woodmen/Golden Sage</b>					
G	Add protected/permitted phasing for left-turn movements	Provide new traffic signal heads for protected phasing and modify existing signal timing plan	If/when needed to maintain acceptable level of service/traffic operations and/or to control vehicle queues. Fair-share participation by the development or the district on behalf of the district members.	<b>AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE . This is estimated to be occur with buildout of Falcon Marketplace</b>	Bent Grass Metro District - pro-rata share (based on total traffic volumes) of the cost of the improvement. <sup>(1)</sup> Note: Other potential responsibility for participation: In addition to the yet-to-be developed properties within the Bent Grass Metro District service area and the Falcon Marketplace development, other future developers of currently vacant lane within the "travel shed" of the north leg (and potentially the south leg) of the Golden Sage/Woodmen and Golden Sage/Woodmen N. Frontage Road intersection may also be assigned as responsible participants in future or completed (if a cost recovery agreement is put in place) traffic/roadway improvements.
H	Lengthening of the current eastbound single left-turn deceleration lane on Woodmen approaching Golden Sage Road	Provide a 240-foot transition taper (20:1 taper ratio), 290 feet of deceleration distance plus sufficient vehicle stacking distance. CURRENT: 175-foot taper plus a 465-foot left-turn lane which translates to a 175-foot taper, 290-foot deceleration distance, and 175 feet of stacking distance. SHORT TERM: Adequate stacking is available in the current turn lane - calculated queue length 204 feet. LONG TERM: Lengthen single left-turn lane and/or future implementation of dual left-turn lanes (if capacity needs dictate). If a dual left is implemented in the future, consideration will need to be given to the configuration on Golden Sage and at the Golden Sage/Woodmen Frontage Road intersection to receive the dual left-turn movement.	The estimated "trigger" of 40 PM peak hour eastbound left turns above the estimated short term total volume (from Figure 16a of the TIS) approximately translates to and additional 589 directional ADT for residential trips making this turning movement (based on the ITE single family trip ratio). This estimated threshold may be reached with a combination of site-generated trips and background trips.	<b>AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE . This is estimated to be when the eastbound left turn turning volume reaches approximately 200 vehicles per hour during the PM peak. This translates to about 40 vehicles per hour over the estimated short term total volume from Figure 16a of the Falcon Marketplace TIS. Note: Short term total volumes assume the Meridian extension to Highway 24 to be open.</b>	Bent Grass Metro District - pro-rata share (based on total traffic volumes) of the cost of the improvement. <sup>(1)</sup> Note: Other potential responsibility for participation: In addition to the yet-to-be developed properties within the Bent Grass Metro District service area and the Falcon Marketplace development, other future developers of currently vacant lane within the "travel shed" of the north leg (and potentially the south leg) of the Golden Sage/Woodmen and Golden Sage/Woodmen N. Frontage Road intersection may also be assigned as responsible participants in future or completed (if a cost recovery agreement is put in place) traffic/roadway improvements.
I	Southbound exclusive right-turn lane on Golden Sage Road approaching Woodmen Road	A continuous right-turn lane within the 150 feet between the Woodmen Frontage Road and Woodmen Road	The estimated "trigger" of 5:30 AM peak hour southbound right turns above the estimated short term total volume (from Figure 16a of the Falcon Marketplace TIS) approximately translates to an additional 85-510 directional ADT for residential trips making this turning movement (based on the ITE single family trip ratio). This estimated threshold may be reached with a combination of site-generated trips and background trips.	<b>AS NEEDED TO MAINTAIN ADEQUATE LEVEL OF SERVICE AND VEHICLE STACKING DISTANCE . A preliminary trigger could be a southbound right turn volume of about 150-175 vehicles per hour. This translates to about 5 to 30 vehicles per hour over the projected short term volume from Figure 16a of the Falcon Marketplace TIS. This may be conservative due to the westbound right turn acceleration lane on Woodmen Road. Additional study may indicate a higher threshold based on empirical data collection and analysis.</b>	Bent Grass Metro District - pro-rata share (based on total traffic volumes) of the cost of the improvement. <sup>(1)</sup> Note: Other potential responsibility for participation: In addition to the yet-to-be developed properties within the Bent Grass Metro District service area and the Falcon Marketplace development, other future developers of currently vacant lane within the "travel shed" of the north leg (and potentially the south leg) of the Golden Sage/Woodmen and Golden Sage/Woodmen N. Frontage Road intersection may also be assigned as responsible participants in future or completed (if a cost recovery agreement is put in place) traffic/roadway improvements
J	Signalization of Golden Sage Road/Woodmen Frontage Road or reconstruction as a modern roundabout. Future additional laneage may be necessary at this intersection to accommodate vehicle queues and for traffic operations.	Remove existing stop-signs and replace with traffic signal control or reconstruct as modern roundabout	If/when needed to maintain acceptable level of service/traffic operations and/or to control vehicle queues. Fair-share participation by the development or the district on behalf of the district members.	If/when needed to maintain acceptable level of service/traffic operations and/or to control vehicle queues.	Bent Grass Metro District - pro-rata share (based on total traffic volumes) of the cost of the improvement. <sup>(1)</sup> Note: Other potential responsibility for participation: In addition to the yet-to-be developed properties within the Bent Grass Metro District service area and the Falcon Marketplace development, other future developers of currently vacant lane within the "travel shed" of the north leg (and potentially the south leg) of the Golden Sage/Woodmen and Golden Sage/Woodmen N. Frontage Road intersection may also be assigned as responsible participants in future or completed (if a cost recovery agreement is put in place) traffic/roadway improvements.
<p>Notes: (1) See Table 6 for pro-rata percentage calculations Source: LSC Transportation Consultants, Inc. (1-24-2020)</p>					

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Number: 1    Author: dsdrice    Subject: Callout    Date: 3/9/2020 15:48:39

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J

Author: jchodsdon    Subject: Sticky Note    Date: 3/18/2020 12:00:43

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LSC Response: Added as requested.

**Table 6**  
**Prorata Share Contribution Calculations**  
**Bent Grass Residential Filing No. 2**

Description		AM	PM	AM + PM	
G	Add protected/permitted phasing at Woodmen/Golden Sage	Site-Generated Traffic <sup>(1)</sup> (vehicles per hour)	12	52	64
		2040 Total Traffic <sup>(1)</sup> (vehicles per hour)	374	442	816
		%	3.21%	11.76%	7.84%
H	Lengthening of the current eastbound single left-turn deceleration lane on Woodmen approaching Golden Sage Road	Site-Generated Traffic <sup>(1)</sup> (vehicles per hour)	12	52	64
		2040 Total Traffic <sup>(1)</sup> (vehicles per hour)	374	442	816
		%	3.21%	11.76%	7.84%
I	Southbound exclusive right-turn lane on Golden Sage Road approaching Woodmen Road	Site-Generated Traffic <sup>(2)</sup> (vehicles per hour)	39	30	69
		2040 Total Traffic <sup>(2)</sup> (vehicles per hour)	366	430	796
		%	10.66%	6.98%	8.67%
J	Signalization of Golden Sage Road/Woodmen Frontage Road or reconstruction as a modern roundabout; Future additional laneage may be necessary at this intersection to accommodate vehicle queues and for traffic operations.	Site-Generated Traffic <sup>(3)</sup> (vehicles per hour)	51	84	135
		2040 Total Traffic <sup>(3)</sup> (vehicles per hour)	1124	1401	2525
		%	4.54%	6.00%	5.35%

## Notes:


(1) Eastbound left-turn volume at the intersection of Woodmen/Golden Sage

(2) Southbound right-turn volume at the intersection of Woodmen/Golden Sage

(3) Sum of all traffic volumes at the intersection of Golden Sage/Woodmen frontage road

Source: LSC Transportation Consultants, Inc.

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 Number: 1    Author: dsdrice    Subject: Callout    Date: 3/11/2020 11:12:11


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This is shown on short term **Synchro** sheets.

 Author: jchodsdon    Subject: Sticky Note    Date: 3/18/2020 12:08:07

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LSC Response: Correct. See response to the comments in the letter. The TIS has been modified to address this.

 Number: 2    Author: dsdrice    Subject: Highlight    Date: 3/9/2020 15:55:45

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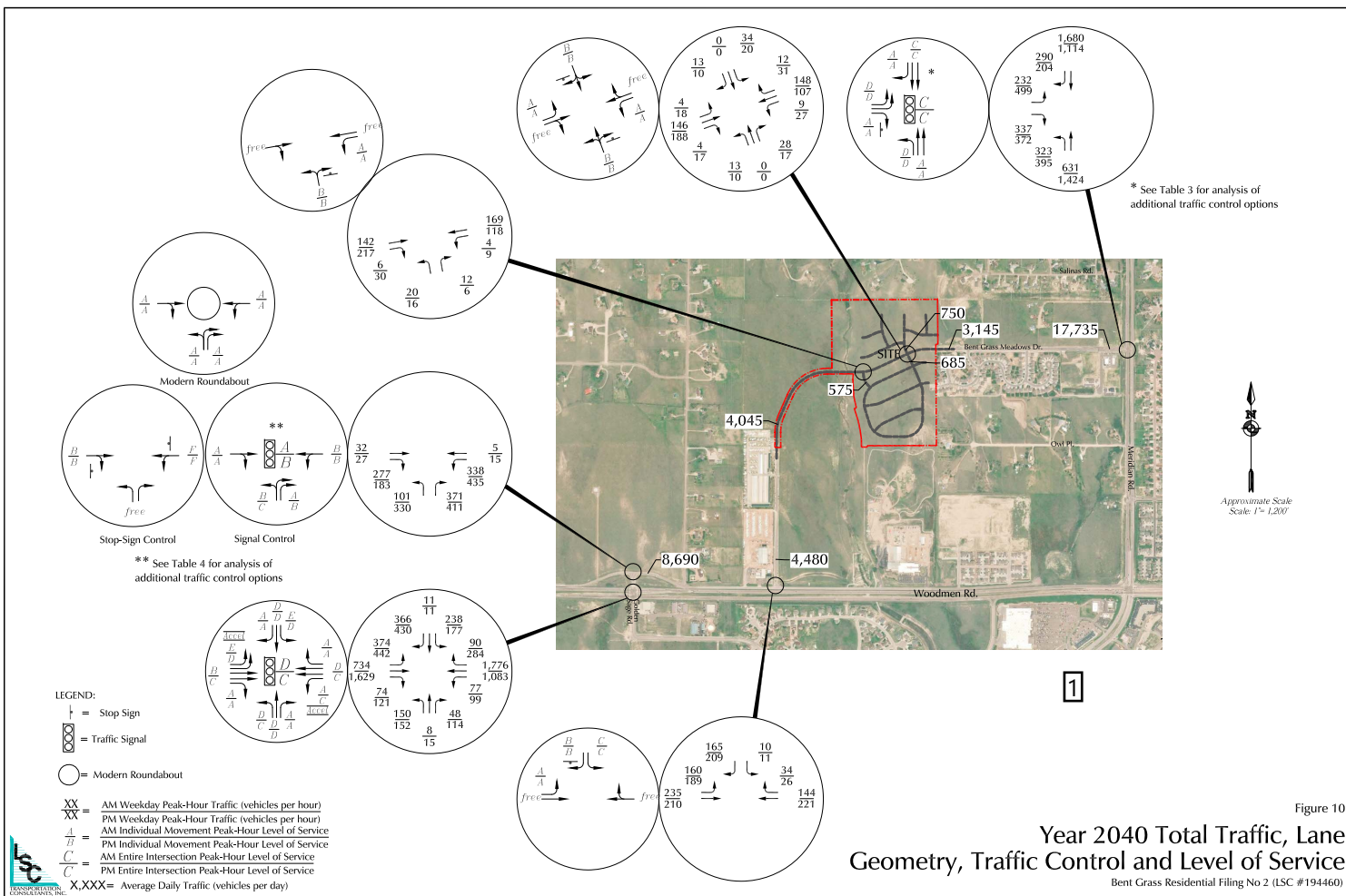


Figure 10  
**Year 2040 Total Traffic, Lane Geometry, Traffic Control and Level of Service**  
 Bent Grass Residential Filing No 2 (LSC #194460)

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 Number: 1      Author: dsdrice    Subject: Callout    Date: 3/11/2020 10:04:52

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Add a note addressing this potential access. (Would westbound traffic be likely to use this to access Bent Grass Meadows Drive?)























 Author: jchodsdon      Subject: Sticky Note      Date: 3/18/2020 12:08:51

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LSC Response: This has been added to the TIS as requested.

# Timings 25: Golden Sage & Woodmen

Short-Term Total Traffic  
PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	245	1301	44	19	869	54	105	34	24	77	19
Future Volume (vph)	245	1301	44	19	869	54	105	34	24	77	19
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases	5	2		1	6		3	8		7	4
Permitted Phases	2		2	6		6	8		8	4	
Detector Phase	5	2	2	1	6	6	3	8	8	7	4
Switch Phase											
Minimum Initial (s)	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0
Minimum Split (s)	10.0	11.0	11.0	10.0	11.0	11.0	10.0	21.0	21.0	10.0	21.0
Total Split (s)	11.0	54.0	54.0	10.0	53.0	53.0	15.0	21.0	21.0	15.0	21.0
Total Split (%)	11.0%	54.0%	54.0%	10.0%	53.0%	53.0%	15.0%	21.0%	21.0%	15.0%	21.0%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-3.0	-3.0	-1.0	-3.0	-3.0	-1.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None	None
Act Effect Green (s)	57.6	56.4	56.4	55.2	49.1	49.1	21.0	11.5	11.5	17.0	8.5
Actuated g/C Ratio	0.63	0.61	0.61	0.60	0.53	0.53	0.23	0.13	0.13	0.18	0.09
v/c Ratio	0.71	0.65	0.05	0.09	0.49	0.06	0.48	0.18	0.09	0.31	0.69
Control Delay	23.5	15.2	0.1	7.8	15.3	0.1	33.1	39.8	0.5	29.9	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.5	15.2	0.1	7.8	15.3	0.1	33.1	39.8	0.5	29.9	18.8
LOS	C	B	A	A	B	A	C	D	A	C	B
Approach Delay		15.9			14.2			29.7			21.8
Approach LOS		B			B			C			C

## Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 91.9

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 16.8

Intersection LOS: B

Intersection Capacity Utilization 72.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 25: Golden Sage & Woodmen





HCM 6th TWSC  
26: Golden Sage Rd & Woodmen Frontage Rd

2040 Background Traffic  
PM Peak Hour

Intersection												
Int Delay, s/veh	283											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱			↱			↱	↱		↱	
Traffic Vol, veh/h	0	27	183	405	15	0	330	0	359	0	0	0
Future Vol, veh/h	0	27	183	405	15	0	330	0	359	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	95	95	95	95	92	95	92	95	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	28	193	426	16	0	347	0	378	0	0	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	695	1	806	695	-	1	0	-	0	0	0
Stage 1	-	1	-	694	694	-	-	-	-	-	-	-
Stage 2	-	694	-	112	1	-	-	-	-	-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	366	1084	~ 300	366	0	1622	-	0	-	-	-
Stage 1	0	895	-	433	444	0	-	-	0	-	-	-
Stage 2	0	444	-	893	895	0	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	-	288	1084	~ 191	288	-	1622	-	-	-	-	-
Mov Cap-2 Maneuver	-	288	-	~ 191	288	-	-	-	-	-	-	-
Stage 1	-	895	-	~ 340	349	-	-	-	-	-	-	-
Stage 2	-	349	-	711	895	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	\$ 635.9	7.8	0
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1622	-	800 193	-	-	-
HCM Lane V/C Ratio	0.214	-	0.276 2.291	-	-	-
HCM Control Delay (s)	7.8	0	11.2\$ 635.9	0	-	-
HCM Lane LOS	A	A	B F	A	-	-
HCM 95th %tile Q(veh)	0.8	-	1.1 35.8	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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HCM 6th TWSC  
26: Golden Sage Rd & Woodmen Frontage Rd

2040 Total Traffic  
AM Peak Hour

Intersection												
Int Delay, s/veh	33.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↱	↰		↰	
Traffic Vol, veh/h	0	32	277	338	5	0	101	0	371	0	0	0
Future Vol, veh/h	0	32	277	338	5	0	101	0	371	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	95	95	95	95	92	95	92	95	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	34	292	356	5	0	106	0	391	0	0	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	213	1	376	213	-	1	0	-	0	0	0
Stage 1	-	1	-	212	212	-	-	-	-	-	-	-
Stage 2	-	212	-	164	1	-	-	-	-	-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	684	1084	581	684	0	1622	-	0	-	-	-
Stage 1	0	895	-	790	727	0	-	-	0	-	-	-
Stage 2	0	727	-	838	895	0	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	-	640	1084	388	640	-	1622	-	-	-	-	-
Mov Cap-2 Maneuver	-	640	-	388	640	-	-	-	-	-	-	-
Stage 1	-	895	-	739	680	-	-	-	-	-	-	-
Stage 2	-	680	-	590	895	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	61.8	7.4	0
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1622	-	1011	390	-	-
HCM Lane V/C Ratio	0.066	-	0.322	0.926	-	-
HCM Control Delay (s)	7.4	0	10.2	61.8	0	-
HCM Lane LOS	A	A	B	F	A	-
HCM 95th %tile Q(veh)	0.2	-	1.4	10	-	-

1





Timings  
3: Bent Grass Meadows Dr

2040 Total Traffic  
PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↱	↰	↰	↰↱	↰↱	↰
Traffic Volume (vph)	499	372	395	1424	1114	204
Future Volume (vph)	499	372	395	1424	1114	204
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	31.0	31.0	37.0	89.0	52.0	52.0
Total Split (%)	25.8%	25.8%	30.8%	74.2%	43.3%	43.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Max	Max	Max
Act Effect Green (s)	22.7	22.7	84.1	84.1	52.7	52.7
Actuated g/C Ratio	0.19	0.19	0.72	0.72	0.45	0.45
v/c Ratio	0.79	0.63	0.85	0.59	0.73	0.26
Control Delay	53.8	8.8	43.0	9.5	31.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.8	8.8	43.0	9.5	31.6	4.0
LOS	D	A	D	A	C	A
Approach Delay	34.6			16.8	27.3	
Approach LOS	C			B	C	

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 116.8  
 Natural Cycle: 60  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 24.1  
 Intersection Capacity Utilization 79.4%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 3: Bent Grass Meadows Dr



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 Number: 1    Author: dsdrice    Subject: Text Box    Date: 3/18/2020 12:09:10

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/Meridian Rd.

 Author: jchodsdon    Subject: Sticky Note    Date: 3/18/2020 12:09:37

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LSC Response: This has been corrected in the updated TIS as requested.

HCM 6th TWSC  
26: Golden Sage Rd & Woodmen Frontage Rd

2040 Total Traffic  
PM Peak Hour

Intersection												
Int Delay, s/veh	326.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↱	↱		↰	
Traffic Vol, veh/h	0	27	183	435	15	0	330	0	411	0	0	0
Future Vol, veh/h	0	27	183	435	15	0	330	0	411	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	95	95	95	95	92	95	92	95	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	28	193	458	16	0	347	0	433	0	0	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	695	1	806	695	-	1	0	-	0	0	0
Stage 1	-	1	-	694	694	-	-	-	-	-	-	-
Stage 2	-	694	-	112	1	-	-	-	-	-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	366	1084	~ 300	366	0	1622	-	0	-	-	-
Stage 1	0	895	-	~ 433	444	0	-	-	0	-	-	-
Stage 2	0	444	-	893	895	0	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	-	288	1084	~ 191	288	-	1622	-	-	-	-	-
Mov Cap-2 Maneuver	-	288	-	~ 191	288	-	-	-	-	-	-	-
Stage 1	-	895	-	~ 340	349	-	-	-	-	-	-	-
Stage 2	-	349	-	711	895	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	\$ 708.2	7.8	0
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1622	-	800 193	-	-	-
HCM Lane V/C Ratio	0.214	-	0.276 2.454	-	-	-
HCM Control Delay (s)	7.8	0	11.2\$ 708.2	0	-	-
HCM Lane LOS	A	A	B F	A	-	-
HCM 95th %tile Q(veh)	0.8	-	1.1 39.6	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



## MEMORANDUM

DATE: March 13, 2020

TO: Kari Parsons, PCD-Project Manager

FROM: Jeff Rice / Steve Kuehster, PCD-Engineering  
719-520-7877 / 719-520-6813

SUBJECT: SF-19-014– Bent Grass Residential Filing No. 2  
Third Submittal  
**(w/ LSC Responses – 4/19/2020)**

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### **Engineering Division**

Planning and Community Development (PCD)-Engineering reviews plans and reports to ensure general conformance with El Paso County standards and criteria. The project engineer is responsible for compliance with all applicable criteria, including other governmental regulations. Notwithstanding anything depicted in the plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code (LDC), the Engineering Criteria Manual (ECM), the Drainage Criteria Manual (DCM), and the Drainage Criteria Manual Volume 2 (DCM2). Any deviations from regulations and standards must be requested, and approved by the ECM Administrator, in writing. Any modifications necessary to meet overlooked criteria after-the-fact will be entirely the developer's responsibility to rectify.

The comments include unresolved previous comments and new comments resulting from the re-submittal in ***bold italic***. All previous comments that have been resolved have been noted or deleted. A written response to all comments and redlines is required for review of the re-submittal. Please arrange a meeting between the developer's team and County staff to review and discuss these comments and prepared revisions/responses prior to the next submittal. Additional comments may be generated on items added or revised after the original comments. If any deviation requests are submitted, a 21-day review period will be necessary with the next review.

Note: The ECM was updated July 2, 2019 requiring updated plan requirements, checklists and forms in order for the County to maintain compliance with its MS4 permit. These comments reflect the updates.

### General

1. ***through 4 – Resolved.***
5. See Letter of Intent redlines. It needs to be clarified that the offsite FSD/Stormwater Quality pond (Pond WU) (or other WQCV facility) will need to be operational before site construction. Partially resolved; see updated LOI redlines. ***Partially resolved; see updated minor LOI redlines.***
6. ***Resolved.***
7. ***The soils and geology study states that underdrains are not anticipated to be provided due to the need for a pump station. If this is the case, a plan needs to be provided for approval showing allowable locations of sump pump discharges (not***

**toward the public right-of-way) or restricting home designs to those that would not require sump pumps.**

#### Final Plat

1. If there will be underdrains add a plat note stating the entity responsible for maintenance. Unresolved (not found). **See General Comment #7 above. Provide plat notes as appropriate.**
2. **Resolved.**
3. Resolved.
4. Regarding the necessary (redlined) temporary cul-de-sac easements (if not proposed as ROW), the template of the Non-Exclusive Permanent Easement can be provided electronically upon request. Unresolved. **Unresolved. Delete “temporary” from cul-de-sac labels. Provide NEPE form or show the cul-de-sacs with right-of-way which can be vacated and replatted when the roads are extended.**
5. **Resolved.**
6. See final plat redlines for additional comments. Partially resolved; see updated plat redlines. **Partially resolved; see updated plat redlines.**
  - a. **Floodplain elevations need to be shown.**

#### Transportation / Traffic Impact Study

1. See TIS redlines. Partially resolved; see updated TIS redlines. A response to redlines was not found. **Partially resolved; see updated TIS redlines. LSC Response: Please refer to attached LSC responses to TIS redline comments.**
2. Provide all information required by ECM Appendix B, sections B.2.3.B and B.2.4.B. including accident analysis, pedestrian and bicycle traffic... Applicable warrant study may be placed in the Appendix. Unresolved. **Partially resolved with the Meridian/Bent Grass study; address pedestrians and bicycle traffic in this study. LSC Response: This has been added to the updated report.**
3. Note: regarding the “Cost Reimbursement” and “Cost Recovery” letters dated October 31, 2019, reference LDC 8.7.2(D) - Process for Request and Approval of Fair Share Reimbursement. The request will be processed when all required items have been submitted, which is to be no earlier than the date of final plat approval and no later than one year after the date of completion of the improvement(s). Please add the following information to the cost recovery request:
  - a. Add the file number (SF-19-14) to the sheet.
  - b. List the lengths, dimensions and descriptions of the infrastructure anticipated to be constructed and requested for cost recovery.
  - c. Address the Bent Grass metro district involvement, including LDC Section 8.7.2.B.4 (does the district qualify as the requestor?).
4. **Resolved.**
5. **The protected/permissive phasing for eastbound left turns from Woodmen Road to Golden Sage is included in the short-term modeling. If this change is needed in the short term, plans are required and coordination with EPC DPW and possibly the City of Colorado Springs will be necessary for implementation of the added signals and timing.**  
**LSC Response: This has been addressed in the last section of the updated TIS report.**

**The left turn phasing has been added to Table 6 with the Bent Grass Metro District listed as the “responsible party” as with the other Woodmen/Golden Sage**

improvements listed. It is our understanding that the specifics of the district participation will need to be included in the SIA/revised development agreement to be completed and finalized prior to the development of lots beyond the initial 49 lots.

6. *The pro-rata shares for improvement items G-J in Table 6 need to have costs assigned if the fair shares of those costs are to be escrowed at or prior to plat recording, with the escrow amounts identified in an escrow agreement. If the district will be providing the fair share at platting the district needs to be a party to the SIA, or responsibility for these improvements included in a revised development agreement.*

**LSC Response:** This note has been added to Table 6. It is our understanding that the specifics of the district participation will need to be included in the SIA/revised development agreement to be completed and finalized prior to the development of lots beyond the initial 49 lots.

If for some reason the District is unable or unwilling to participate, or if determination by the district is delayed, the applicant would be responsible. In this case, an escrow agreement between the applicant and the County would be prepared and finalized).

We understand that staff would like for that the applicant to understand the estimated/approximate costs associated with their fair share of future improvements at Golden Sage/Woodmen. LSC will provide preliminary fair share cost estimates utilizing available information from the Falcon Marketplace SIA. This will be provided to the applicant and staff once available.

#### MDDP

1. There appear to be several diversions upstream of the site. These need to be addressed; is flow split or different from what the DBPS shows? Partially resolved; additional description and analysis of the diversion on the west side of the school site and where the total contributing flows will be conveyed is still required. ***Partially resolved; refer to the other drainage report that addresses flows in and along Bent Grass Meadows Drive, downstream conveyance and necessary capacities.***
2. Address any differences in the proposed design from the DBPS, including the DBPS regional pond that is identified on this site but proposed not to be constructed. Changes may require a DBPS addendum and drainage board approval. ***Partially resolved;***
  - a. Summarize the proposed changes from the DBPS in the Conclusion section. ***Partially resolved; address the channels as well.***
  - b. County maintenance and drainage fee reimbursement for constructed improvements will be dependent on Drainage Board approval of a DBPS addendum. It is recommended that an information package be assembled for initial Drainage Board consideration.
3. Provide an Existing Drainage Plan. Partially resolved; see redlines. ***See updated redlines.***
4. See MDDP redlines. Partially resolved; see updated redlines. ***Partially resolved; see updated redlines.***

5. Provide HEC-HMS modeling for the Pond WU inflows and outflows with the proposed development and outlet structure revisions. **Partially resolved; provide the electronic model and additional input information per redlines.**
6. Split flow design of the Pond WU inlet features needs to be discussed **further.**

#### Final Drainage Report / Drainage Plans

1. See FDR redlines. **Partially resolved; see updated redlines.**
2. Regarding the adjacent Falcon West Tributary channel:
  - a. Address how re-routing of flows to one(?) specific outfall on the west tributary channel will affect the channel flow, velocities and localized outfall conditions.
  - b. Address channel velocities and any stabilization necessary above that called for in the DBPS. **Unresolved.**
  - c. Details, including preliminary design, sizing, and modeling (to verify depths and velocities) are required, including the offsite area (MDDP area). The entire reach through and adjacent to this development needs to be addressed. Final drainage reports need to provide a comprehensive plan for improvements.
3. Regarding the channel:
  - a. Provide a complete channel plan and profile. **Unresolved.**
  - b. Provide maintenance access to the channel and box culvert. **Partially resolved; see CD redlines.**
  - c. If the channel is proposed to be County-maintained rather than metro district-maintained, improvements according to the DBPS need to be provided; address completely in the FDR. Additional improvements to those proposed in the DBPS may be needed to qualify for reimbursement and maintenance eligibility. If the developer desires reimbursement for the construction costs and for the County to maintain the improvements, the process in the DCM needs to be followed (reference DCM Sections 1.7 and 3.3). **Revise MDDP and FDR text and plat notes accordingly. Conditions of approval will apply regarding final channel design and construction.**
  - d. **Resolved.**
  - e. Complete channel stabilization improvements need to be provided adjacent to/around the proposed outfalls to protect the outfall and to protect the area impacted by the outfalls. **(to be verified with next review)**
  - f. Specifically address geotechnical hazards and any wetlands mitigation in the FDR see redlines. **Verify wetlands report conclusions per Environmental comments.**
  - g. An O&M manual for onsite and downstream channel maintenance will need to be provided; the template for this document will be provided to you when available.
4. Regarding ditch protection calculations, long-term stability of native vegetation needs to be shown. Long runs of channel (over 200 feet) needing permanent long-term protection need a long-term design, such as ditch checks, drop structures or riprap. Address as appropriate. **See redlines regarding modeled channel velocities and Froude numbers. Conditions of approval will be provided regarding developer/district maintenance responsibility.**
5. Provide discussion of maintenance access and aspects of the preliminary design. Show access roads for permanent BMPs and channels on the drainage plans. Reference ECM 3.3.3.K. **Partially resolved; see redlines.**
6. Provide a PDB/BMP Maintenance Agreement and Easement for district maintenance of PBMPs. The latest template for the agreement can be e-mailed upon request. **See CAO comments.**



7. Provide the new PBMP Applicability Form, which can be found at:  
<https://planningdevelopment.elpasoco.com/wp-content/uploads/Engineering/EngineeringDocuments/PBMP-Applicability-Form.docx>.  
**See redlines (BMP agreements needed).**
8. Regarding the BMP O&M/I&M Plan, ensure that all stormwater control measures/BMPs are addressed and maintenance procedures provided corresponding to the final design.  
**(not reviewed on this submittal)**
9. Note: Any proposed urban lot areas draining directly offsite require an easement or other documentation from the adjoining owner(s) that the proposed developed condition is acceptable.
10. **Address drainage through the temporary cul-de-sacs.**

#### Construction Plans / Geotechnical Issues / Grading and Erosion Control Plan / SWMP

1. Provide Construction plans for the offsite "Pond WU" proposed construction. Partially resolved; see updated redlines. Note: a complete review was not performed due to time constraints. **Note: a complete review will still need to be performed pending revisions. It is recommended that a thorough quality control check be done on the CDs due to limited Staff review time.**
2. Clearly show and label all required drainage easements and offsite easements. Provide permission/easement documentation or reception numbers. **Unresolved (discussed 3/13).**
3. Revise pipe size/slope or provide a deviation request with adequate justification and specifications for watertight pressure pipe (ECM 3.3.1.D - exceeding short runs with a pressure head) where applicable. **(Verify)**
4. **Resolved.**
5. Show and label all maintenance access roads and the trail on the plans. **Partially resolved; see redlines.**
6. **Resolved.**
7. If there will be USPS mail kiosk/cluster(s) in this subdivision provide location(s) and details. Resolved – response is that there will be no USPS kiosk/cluster facilities in this subdivision.
8. Resolved.
9. As noted at the beginning of these comments, updated checklists are required to be provided by the design engineer. Provide with the next submittal. Instructions are provided below the list of attachments. Checklists can be found at:  
[https://planningdevelopment.elpasoco.com/wp-content/uploads/Engineering/EngineeringDocuments/Copy-of-GEC-SWMP\\_Checklists.xlsx](https://planningdevelopment.elpasoco.com/wp-content/uploads/Engineering/EngineeringDocuments/Copy-of-GEC-SWMP_Checklists.xlsx). (To be reviewed with next submittal) **Partially resolved; see redlined checklists, SWMP and GEC Plan.**
10. Resolved.
11. See CD/GEC Plan redlines for additional comments and clarification of these comments. Partially resolved; see updated CD redlines. GEC Plan and SWMP comments will be provided with the next submittal. **Partially resolved; see redlines.**
12. **Provide a complete channel plan and profile. Show interim and ultimate flowline grades. (See FDR comments.)**

#### Forms / SIA / Surety Estimate Form

1. Provide the updated FAE form. Note: FAE quantities and costs will be reviewed in detail with the next submittal. Partially resolved; see updated CD redlines. The Pond WU

improvements need to be discussed. ***Partially resolved; see updated FAE redlines. The Pond WU improvements still need to be discussed.***

2. See attached Engineering Final Submittal Checklist for reference.
3. The SIA needs to include a statement about the Meridian/Bent Grass traffic signal and escrow for other offsite improvements as applicable (per TIS). If the intersection improvements at Golden Sage and Woodmen Frontage Road are necessary this needs to be addressed as well. ***Coordination with the County Attorney's Office will be necessary; see TIS comments above.***
4. ***Note: The SIA paragraph regarding drainage fees also needs to be revised; draft revisions will be provided by Staff when available.***
5. ***Note: A license agreement will be required for landscaping in the Bent Grass Meadows Drive ROW. A template will be provided.***

#### Attachments/Electronic Files

1. LOI redlines
2. Landscape Plan redlines
3. Final Plat redlines
4. TIS redlines
5. MDDP redlines
6. FDR redlines
7. CD redlines
8. GEC checklist
9. GEC redlines
10. SWMP checklist
11. SWMP redlines
12. PBMP Applicability Form redlines
13. Engineering Final Submittal Checklist

**GEC/SWMP Checklist Instructions:**

1. The applicant shall insert into each box either of the following:
  - a. check mark or Y - this item has been addressed
  - b. N/A - This item does not apply to this project.
2. All checkboxes must be filled in. If necessary provide comments at the end of the checklist.
3. The review engineer will verify each item by inserting one of the following:
  - a. check mark or Y - This item has been adequately addressed or agree that it does not apply
  - b. N - This item has not been adequately addressed.
4. A copy of the checklist will be returned to the applicant.
5. The checklist will be required to be updated and returned with the resubmittal.

SWMP Checklist caveat:

For "N/A". A statement or note is required specifying exactly why a checklist item is not applicable.

Engineering Final Submittal Checklist for Electronic Submittals	
Check Box	Item: Report/Form
<input type="checkbox"/>	Drainage Report (signed)
<input type="checkbox"/>	PBMP Applicability Form
<input type="checkbox"/>	Traffic Impact Study (signed)
<input type="checkbox"/>	Grading & Erosion Control Plan <b>and checklist</b> (signed)
<input type="checkbox"/>	Street Construction Plans (signed)
<input type="checkbox"/>	Deviation Request (signed)
<input type="checkbox"/>	MS4 Post Construction Form and SDI worksheet
<input type="checkbox"/>	Proof of embankment/pond submittal to State Engineer
<input type="checkbox"/>	ESQCP (signed)
<input type="checkbox"/>	* Financial Assurance Estimate, SIA (signed)
<input type="checkbox"/>	* Pond/BMP Maint. Agreement and Easement (signed)
<input type="checkbox"/>	* Operation & Maintenance Manual
<input type="checkbox"/>	AutoCAD base drawing (submitted to DPW)
<input type="checkbox"/>	Pre-Development Site Grading Acknowledgement and Right of Access Form (signed)
<input type="checkbox"/>	Other: Offsite Easements, Other Permits (FEMA LOMR, USACE, Floodplain...), Conditions of Approval, Street light license agreement, etc. _
Pre-Construction Checklist:	
<input type="checkbox"/>	Driveway/Access Permit (Temporary access permits to be obtained from EPC DPW)
<input type="checkbox"/>	Work Within the ROW Permit (DPW or CDOT)
<input type="checkbox"/>	* Stormwater Management Plan (SWMP) <b>and checklist</b> Submit to PCD-Inspections 2 weeks prior to precon.
<input type="checkbox"/>	* Colorado Discharge Permit (COR: _____ )
<input type="checkbox"/>	* County Construction Activity Permit
<input type="checkbox"/>	* CDPHE APEN – (if over 25 ac. or 6 mos.)
<input type="checkbox"/>	* Financial Surety (Letter of Credit/Bond/Collateral/Check)
<input type="checkbox"/>	Construction Permit Fee: <i>Major Final Plat with Early Grading Credit</i> <span style="float: right;"><b>\$ 3,437.00</b></span> (Verify fees with Inspections Supervisor at time of scheduling)
<input type="checkbox"/>	Other: _____

\* - required items to obtain an ESQCP

Permit Fee and Collateral must be separate checks

Post Construction Submittal Checklist: (ECM 5.10.6)	
<input type="checkbox"/>	As-Built Drawings
<input type="checkbox"/>	Pond Certification Letter
<input type="checkbox"/>	Acceptance Letter for wet utilities

- ☐ = Need final / signed version
- ☒ = complete, in file
- ☐ = PCD Staff to provide

- ☐ = Undetermined at this time
- ☐ = Need later

## MEMORANDUM

DATE: April 8, 2020

TO: Kari Parsons, PCD-Project Manager

FROM: Jeff Rice / Steve Kuehster, PCD-Engineering  
719-520-7877 / 719-520-6813

SUBJECT: SF-19-014– Bent Grass Residential Filing No. 2  
Fourth Submittal  
**(LSC Responses below)**

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### **Engineering Division**

Planning and Community Development (PCD)-Engineering reviews plans and reports to ensure general conformance with El Paso County standards and criteria. The project engineer is responsible for compliance with all applicable criteria, including other governmental regulations. Notwithstanding anything depicted in the plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code (LDC), the Engineering Criteria Manual (ECM), the Drainage Criteria Manual (DCM), and the Drainage Criteria Manual Volume 2 (DCM2). Any deviations from regulations and standards must be requested, and approved by the ECM Administrator, in writing. Any modifications necessary to meet overlooked criteria after-the-fact will be entirely the developer's responsibility to rectify.

The comments include unresolved previous comments and new comments resulting from the re-submittal in **blue bold**. All previous comments that have been resolved have been noted or deleted. A written response to all comments and redlines is required for review of the re-submittal. Please arrange a meeting between the developer's team and County staff to review and discuss these comments and prepared revisions/responses prior to the next submittal. Additional comments may be generated on items added or revised after the original comments. If any deviation requests are submitted, a 21-day review period will be necessary with the next review.

Note: The ECM was updated July 2, 2019 requiring updated plan requirements, checklists and forms in order for the County to maintain compliance with its MS4 permit. These comments reflect the updates.

### General

1. *through 6 – Resolved.*
7. *The soils and geology study states that underdrains are not anticipated to be provided due to the need for a pump station. If this is the case, a plan needs to be provided for approval showing allowable locations of sump pump discharges (not toward the public right-of-way) or restricting home designs to those that would not require sump pumps. **Unresolved; plan not provided. See also e-mail from Elizabeth Nijkamp dated 4/7/20.***

#### Final Plat

1. See General comment #7, above.
2. through 6 – Resolved.

#### Transportation / Traffic Impact Study

1. See TIS redlines. Partially resolved; see updated TIS redlines. A response to redlines was not found. *Partially resolved; see updated TIS redlines.* **Partially resolved; submit completed TIS.**  
**LSC RESPONSE: The updated TIS has been completed and included with this submittal. Note: The March 4, 2020 TIS Addendum Memo has been attached to the TIS for reference.**
2. **Resolved.**
3. Note: regarding the “Cost Reimbursement” and “Cost Recovery” letters dated October 31, 2019, reference LDC 8.7.2(D) - Process for Request and Approval of Fair Share Reimbursement. The request will be processed when all required items have been submitted, which is to be no earlier than the date of final plat approval and no later than one year after the date of completion of the improvement(s). Please add the following information to the cost recovery request:
  - a. Add the file number (SF-19-14) to the sheet.
  - b. List the lengths, dimensions and descriptions of the infrastructure anticipated to be constructed and requested for cost recovery.
  - c. Address the Bent Grass metro district involvement, including LDC Section 8.7.2.B.4 (does the district qualify as the requestor?).
4. *Resolved.*
5. *The protected/permissive phasing for eastbound left turns from Woodmen Road to Golden Sage is included in the short-term modeling. If this change is needed in the short term, plans are required and coordination with EPC DPW and possibly the City of Colorado Springs will be necessary for implementation of the added signals and timing.*
6. *The pro-rata shares for improvement items G-J in Table 6 need to have costs assigned if the fair shares of those costs are to be escrowed at or prior to plat recording, with the escrow amounts identified in an escrow agreement. If the district will be providing the fair share at platting the district needs to be a party to the SIA, or responsibility for these improvements included in a revised development agreement.* **Provide estimated costs when available. Conditions of approval will be provided.**  
**LSC RESPONSE: Estimated costs will be provided when available.**

#### MDDP

1. **Resolved.**
2. Address any differences in the proposed design from the DBPS, including the DBPS regional pond that is identified on this site but proposed not to be constructed. Changes may require a DBPS addendum and drainage board approval. Partially resolved;
  - a. **Resolved.**
  - b. County maintenance and drainage fee reimbursement for constructed improvements will be dependent on Drainage Board approval of a DBPS addendum. It is recommended that an information package be assembled for initial Drainage Board consideration.
3. **Resolved.**
4. See MDDP redlines. Partially resolved; see updated redlines. *Partially resolved; see updated redlines.* **Partially resolved; see updated redlines.**

5. Provide HEC-HMS modeling for the Pond WU inflows and outflows with the proposed development and outlet structure revisions. *Partially resolved; provide the electronic model and additional input information per redlines. **Provide electronic model.***
6. Split flow design of the Pond WU inlet features needs to be discussed *further. **County staff is awaiting input from USACE regarding the wetlands. If revisions to simplify the design and save construction costs and maintenance are possible they will be discussed. This will not require revisions to the MDDP.***

#### Final Drainage Report / Drainage Plans

1. See FDR redlines. *Partially resolved; see updated redlines. **Partially resolved; see updated redlines.***
2. Regarding the adjacent Falcon West Tributary channel:
  - a. Address how re-routing of flows to one(?) specific outfall on the west tributary channel will affect the channel flow, velocities and localized outfall conditions.
  - b. Address channel velocities and any stabilization necessary above that called for in the DBPS. *Unresolved. **See comment #4 below; address in the FDR narrative as appropriate.***
  - c. Details, including preliminary design, sizing, and modeling (to verify depths and velocities) are required, including the offsite area (MDDP area). The entire reach through and adjacent to this development needs to be addressed. Final drainage reports need to provide a comprehensive plan for improvements.
3. Regarding the channel:
  - a. Provide a complete channel plan and profile. *Unresolved. **Partially resolved; add the plan and profile to the CDs or GEC plan with revisions per the comments below included.***
  - b. **Resolved.**
  - c. If the channel is proposed to be County-maintained rather than metro district-maintained, improvements according to the DBPS need to be provided; address completely in the FDR. Additional improvements to those proposed in the DBPS may be needed to qualify for reimbursement and maintenance eligibility. If the developer desires reimbursement for the construction costs and for the County to maintain the improvements, the process in the DCM needs to be followed (reference DCM Sections 1.7 and 3.3). *Revise MDDP and FDR text and plat notes accordingly. Conditions of approval will apply regarding final channel design and construction.*
  - d. **Resolved.**
  - e. Complete channel stabilization improvements need to be provided adjacent to/around the proposed outfalls to protect the outfall and to protect the area impacted by the outfalls. *(to be verified with next review) **See CD redlines regarding angles of confluence and softening grading at the south outfalls.***
  - f. Specifically address geotechnical hazards and any wetlands mitigation in the FDR see redlines. *Verify wetlands report conclusions per Environmental comments.*
  - g. An O&M manual for onsite and downstream channel maintenance will need to be provided; the template for this document will be provided to you when available.
4. Regarding ditch protection calculations, long-term stability of native vegetation needs to be shown. Long runs of channel (over 200 feet) needing permanent long-term protection need a long-term design, such as ditch checks, drop structures or riprap. Address as appropriate. *See redlines regarding modeled channel velocities and Froude numbers. Conditions of approval will be provided regarding developer/district maintenance responsibility. **See updated redlines on the comparison table and***

**floodplain/channel plan in the FDR. Two or three areas of disturbance combined with supercritical channel attributes need to be addressed per redlines.**

5. **Resolved.**
6. Provide a PDB/BMP Maintenance Agreement and Easement for district maintenance of PBMPs. The latest template for the agreement can be e-mailed upon request. See *CAO comments*.
7. **Resolved.**
8. Regarding the BMP O&M/I&M Plan, ensure that all stormwater control measures/BMPs are addressed and maintenance procedures provided corresponding to the final design. *(not reviewed on this submittal)* **Again not reviewed due to time constraints.**
9. Note: Any proposed urban lot areas draining directly offsite require an easement or other documentation from the adjoining owner(s) that the proposed developed condition is acceptable.
10. Address drainage through the temporary cul-de-sacs. **Unresolved.**

#### Construction Plans / Geotechnical Issues / Grading and Erosion Control Plan / SWMP

1. Provide Construction plans for the offsite "Pond WU" proposed construction. Partially resolved; see updated redlines. Note: a complete review was not performed due to time constraints. *Note: a complete review will still need to be performed pending revisions. It is recommended that a thorough quality control check be done on the CDs due to limited Staff review time.* **Partially resolved; see updated/remaining FDR redlines regarding a few locations of concern regarding channel stability.**
2. Clearly show and label all required drainage easements and offsite easements. Provide permission/easement documentation or reception numbers. **Unresolved (discussed 3/13 and 4/7).**
3. Revise pipe size/slope or provide a deviation request with adequate justification and specifications for watertight pressure pipe (ECM 3.3.1.D - exceeding short runs with a pressure head) where applicable. *(Verify)*
4. **Resolved.**
5. **Resolved.**
6. **Resolved.**
7. If there will be USPS mail kiosk/cluster(s) in this subdivision provide location(s) and details. Resolved – response is that there will be no USPS kiosk/cluster facilities in this subdivision.
8. **Resolved.**
9. As noted at the beginning of these comments, updated checklists are required to be provided by the design engineer. Provide with the next submittal. Instructions are provided below the list of attachments. Checklists can be found at: [https://planningdevelopment.elpasoco.com/wp-content/uploads/Engineering/EngineeringDocuments/Copy-of-GEC-SWMP\\_Checklists.xlsx](https://planningdevelopment.elpasoco.com/wp-content/uploads/Engineering/EngineeringDocuments/Copy-of-GEC-SWMP_Checklists.xlsx). (To be reviewed with next submittal) *Partially resolved; see redlined checklists, SWMP and GEC Plan.* **Provide signed checklist.**
10. **Resolved.**
11. See CD/GEC Plan redlines for additional comments and clarification of these comments. Partially resolved; see updated CD redlines. GEC Plan and SWMP comments will be provided with the next submittal. *Partially resolved; see redlines.* **Partially resolved; see updated/remaining redlines.**
12. Provide a complete channel plan and profile. Show interim and ultimate flowline grades. (See FDR comments.) **Partially resolved; see FDR and CD redlines.**



#### Forms / SIA / Surety Estimate Form

1. Provide the updated FAE form. Note: FAE quantities and costs will be reviewed in detail with the next submittal. Partially resolved; see updated CD redlines. The Pond WU improvements need to be discussed. *Partially resolved; see updated FAE redlines. The Pond WU improvements still need to be discussed. Partially resolved; see updated/remaining FAE redlines. Temporary mulch or ECB is required with temporary seeding. Channel improvements remain to be discussed.*
2. See attached Engineering Final Submittal Checklist for reference.
3. The SIA needs to include a statement about the Meridian/Bent Grass traffic signal and escrow for other offsite improvements as applicable (per TIS). If the intersection improvements at Golden Sage and Woodmen Frontage Road are necessary this needs to be addressed as well. *Coordination with the County Attorney's Office will be necessary; see TIS comments above. (Coordination is ongoing.)*
4. *Note: The SIA paragraph regarding drainage fees also needs to be revised; draft revisions will be provided by Staff when available.*
5. *Note: A license agreement will be required for landscaping in the Bent Grass Meadows Drive ROW.*
  - a. **A redline was previously provided on the landscaping plan to address pedestrian sight distance on the north side of Bent Grass Meadows at the ramp where pedestrians cross toward Lemon Grass Road. It appears that the landscape plan has been revised, but a sight distance line was not found on the plan; please show the line on the landscape plan.**

#### Attachments/Electronic Files

1. TIS redlines (see previous version)
2. MDDP redlines
3. FDR redlines
4. CD redlines
5. GEC redlines
6. Engineering Final Submittal Checklist

Engineering Final Submittal Checklist for Electronic Submittals	
Check Box	Item: Report/Form
<input type="checkbox"/>	Drainage Report (signed)
<input checked="" type="checkbox"/>	PBMP Applicability Form
<input type="checkbox"/>	Traffic Impact Study (signed)
<input type="checkbox"/>	Grading & Erosion Control Plan <b>and checklist</b> (signed)
<input type="checkbox"/>	Street Construction Plans (signed)
<input type="checkbox"/>	Deviation Request (signed)
<input type="checkbox"/>	MS4 Post Construction Form and SDI worksheet
<input type="checkbox"/>	Proof of embankment/pond submittal to State Engineer
<input checked="" type="checkbox"/>	ESQCP (signed)
<input type="checkbox"/>	* Financial Assurance Estimate, SIA (signed)
<input type="checkbox"/>	* Pond/BMP Maint. Agreement and Easement (signed)
<input type="checkbox"/>	* Operation & Maintenance Manual
<input type="checkbox"/>	AutoCAD base drawing (submitted to DPW)
<input type="checkbox"/>	Pre-Development Site Grading Acknowledgement and Right of Access Form (signed)
<input type="checkbox"/>	Other: <u>Offsite Easements, Other Permits (FEMA LOMR, USACE, Floodplain...), Conditions of Approval, Street light license agreement, etc.</u>
Pre-Construction Checklist:	
<input type="checkbox"/>	Driveway/Access Permit (Temporary access permits to be obtained from EPC DPW)
<input type="checkbox"/>	Work Within the ROW Permit (DPW or CDOT)
<input type="checkbox"/>	* Stormwater Management Plan (SWMP) <b>and checklist</b> Submit to PCD-Inspections 2 weeks prior to precon.
<input type="checkbox"/>	* Colorado Discharge Permit (COR: _____ )
<input type="checkbox"/>	* County Construction Activity Permit
<input type="checkbox"/>	* CDPHE APEN – (if over 25 ac. or 6 mos.)
<input type="checkbox"/>	* Financial Surety (Letter of Credit/Bond/Collateral/Check)
<input type="checkbox"/>	Construction Permit Fee: <i>Major Final Plat with Early Grading Credit</i> <span style="float: right;"><b>\$ 3,437.00</b></span> (Verify fees with Inspections Supervisor at time of scheduling)
<input type="checkbox"/>	Other: _____

\* - required items to obtain an ESQCP

Permit Fee and Collateral must be separate checks

Post Construction Submittal Checklist: (ECM 5.10.6)	
<input type="checkbox"/>	As-Built Drawings
<input type="checkbox"/>	Pond Certification Letter
<input type="checkbox"/>	Acceptance Letter for wet utilities

- ☐ = Need final / signed version
- ☒ = complete, in file
- ☐ = Undetermined at this time
- ☐ = Need later
- ☐ = PCD Staff to provide