January 14, 2018

Mr. Gilbert C. LaForce, PE
El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, Colorado 80910
719-520-7945

Re: McCune Ranch Subdivision, City of Colorado Springs, Preliminary Drainage Report Review #1

Dear Mr. Gilbert C. LaForce:

On behalf of Winsome Subdivision and its design team, The Vertex Companies, Inc. (VERTEX) is pleased to present the second submittal of the above referenced documents for the proposed residential development at the property located at 17480 Meridian Road North to El Paso County for review. The accompanying documents have been revised to address the County's comments from the recent review of this project. A summary of the actions taken in response to the County's's concerns is listed below:

Cover Sheet Comments:

1. Add "PCD File No. SP-18-006"
   Response: File number has been added as requested.

2.0 Drainage Basins and Sub-Basins:

1. Replace "Watershed" with Drainage Basin (KIKI0200)"
   Response: The verbiage was revised.

2. Update "…no major drainage studies (DBPS or MDDO)…"
   Response: Acknowledged.

3. Correct West Kiowa Creek call out to read 1-N-10.
   Response: West Kiowa Creek call out has been revised.

4. Revise. Identify the hydrology method used (should be NRCS Curve Number methodology) with AutoCAD Storm and Sanitary 2018.
   Response: The method description used has been updated.

5. Show Design Points on the map.
   Response: Design Point have been removed for the Preliminary Drainage Report and will be added for the Final Drainage Report when describing culvert sizing.

6. Update Sub-Basin E1, include a commercial lot. Elaborate on the commercial aspect of this sub-basin. On-site FSD should be provided on-site before releasing into the public roadside ditch.
   Response: Sub-basin E1 description has been updated. A FSD pond is being specified there.

3.0 Drainage Design Criteria:

1. Revise the name. The County has adopted Chapter 6 of the City's Drainage Criteria Manual which calls this as NRCS Curve Number Methods. Per the adopted DCM the appropriate Initial Abstraction (Ia) value is 0.10S instead of the default value of 0.20S.
   Response: The name has been revised as suggested.

2. Update Type II to read "NRCS Type II"
   Response: Updated.

3. Update 5-year storm – see City DCM Table 6-2.
   Response: Updated.

4. Per the adopted City DCM Chapter 6 Section 2.2.2 "For flood studies or when the highest probable design flow or sizing facilities is requires, it may be necessary to evaluate both thunderstorms and frontal storms to determine the appropriate design flows. It is the responsibility of the designer to determine the dominant design storm for each project. Both peak flow rates and runoff volumes should be checked…" Update the narrative and analysis accordingly.
   Response: A simulation for a thunderstorm was run and found to be a lower impact then the frontal storm model. Rain gage data for both storm events has been included in the report. Further, a copy of the full thunderstorm output is included in the appendix for reference.

5. Hydraulic Criteria Expand the narrative. Note the following:
   a. Culvert sizing shall be based on the rational method peak flows.
      Response: Acknowledged. Culvert sizing will be included in the Final Drainage Report.

b. Permanent detention facilities shall size for full spectrum detention using UD-Detention.

Response: Acknowledged.

c. Include the HEC-RAS analysis of West Kiowa Creek.

Response: Some of tabled output from the HEC-RAS model is included in the report. A copy of the full FEMA submittal has also been uploaded for reference. The complete HEC-RAS model is included there.

d. Why are the natural drainage ways modeled as a standard trapezoidal channel? Each one seems to vary considerably? Additionally, analysis of the drainage ways must include the velocities and Froude numbers. Stabilization may be required.

Response: The channels were all modeled as 20' wide for efficiency. The HEC-RAS model takes into account the shape of the drainage ways for a more accurate representation.

4.0 Drainage Facility Design:

1. Incorrect statement. See ECM Appendix I Section I.7.1.B Development areas of low density (rural) housing (2.5 acres of larger lots). WQCV is not required but may be considered. Sediment control BMPs for lots and roads must be provided. Detention requirement is based on the criteria that the overall development must release at or less than historic rate. If required, then the detention facilities must be design as full spectrum.
   Response: This description has been updated. The ponds are all designed as full spectrum.

2. State whether or not the ponds are private and identify who will own and maintain these facilities. What type of facilities are these expected to be constructed as (EBD, SF, etc).
   Response: This has been updated. The ponds will be owned and maintained by the subdivision metro district.

3. Specific Details Include the Hw/D in Culvert Summary Table:
   Response: Culvert sizing details will be part of the final drainage report.

4. Specific Details provide a specific pipe run ID on the Culvert Summary Table and Label on the drainage map:
   Response: Culvert sizing details will be part of the final drainage report.

5. Explain how the extrapolation was done IS this a linear extrapolation? Include the calculation in the appendix for the weighted CNs of each sub-basin. The 5 ac Type C soil CN seems low, should be around 72.
   Response: The extrapolated curve numbers have been updated and a section is now included in the report discussing this.

6. Per county criteria the subdivision must release at equal to or less than historic rate.

Response: Detention ponds have been added to the model (sized with UD Detention) and now shows us as releasing below historic rates.

7. With each subsequent final drainage report the pond design shall be incorporated int the NRCS model and compared to the historic condition model to ensure release rates are equal to or less than historic rate.
   Response: Complied.

8. WQ Pond Summary Table – Identify what these percentages are supposed to be. If these are percent impervious then adjust per ECM Appendix L Table 3-1" Single family 5ac Lots – 7% imperviousness, Single-family 2.5 ac Lots – 11% imperviousness Commercial Areas = 95%
   Response: Updated.

6.0 <u>Conclusions:</u>

1. Add a section for the 4-Step Process (See Appendix I Section I.7.2.A). List each step and provide a narrative below each step discussing how the particular step was considered/implemented in the design process.
   Response: A section for the 4-step process has been added to the report.

2. Add a section for Drainage Basin Fee and note that at this time West Kiowa Creek drainage basin is not a part of the El Paso County Drainage Basin Fee program.
   Response: Added.

<u>Attachments:</u>

1. FIRM Map – Hatch and label the project site.
   Response: Complied.

2. Storm Model Outputs – 5-year:
   a. Provide the schematic diagram for the existing and proposed model.
      Response: A schematic diagram has been provided for the existing and proposed model. Further, all junctions and links have been renamed to provided clarity.

   b. Provide Titles
      Response: Titles have been provided.

   c. Identify/label these channels on the drainage map.
      Response: A schematic diagram has been provided for the existing and proposed model. Further, all junctions and links have been renamed to provided clarity.

   d. Provide the lag time calculation on the worksheet.
      Response: A complete output of the storm models has been included.

e. Provide the calculation for the Weighted Curve Number. The worksheet should include the different land uses assumed and the HSG B, C & D. If the thunderstorm calculation is required (see comments in Section 3.0) then there is a different CN table (Table 6-9) for Pre-Develop Thunderstorm Conditions. Print out the values.
Response: Complied.

f. Revise. Culvert sizing shall be based on the rational method peak flows for a conservative sizing. Exception is if the sub-basin tributary to the culvert is greater than 100 acres such as the large bridge crossings.
Response: Culvert sizing details will be part of the final drainage report. Use of rational method is acknowledged.

g. These appear to be pipe capacity calculations. Culvert sizing must be conducted with culvert design methods. Include the Hw/D in the summary table.
Response: Culvert sizing details will be part of the final drainage report. Use of rational method is acknowledged.

3. Storm Model Outputs –100-year:
   a. No schematic provided. Will be reviewed with the re-submittal. Update the drainage map to include the corresponding ID.
   Response: A schematic diagram has been provided for the existing and proposed model. Further, all junctions and links have been renamed to provided clarity.

4. Water Quality Pond Calculations:
   a. Under retail business column – preliminary plan shows 7.9 acre not 7.0 acre.
   Response: The acreage has been confirmed and modified as necessary.

   b. Detention Basin Stages – Storage Table Builder: Based on the oil map it looks like the majority tributary to Pond 12 is HSG C.
   Response: Detention ponds have been redesigned.

   c. Detention Basin Stages – Storage Table Builder: Per UDFCD Volume 3 it notes that EDBs are best suited for tributary areas of 5 imperious acre or more. See UDFCD DCM Volume 3 Chapter 2 Figure 2-2 for BMP Decision Tree. Review all the other pond designs and update accordingly.
   Response: Acknowledged and updated as necessary.

   d. Detention Basin Stages – Storage Table Builder: Maps shows HSG C – clarify.
   Response: Detention ponds have been redesigned.

5. Exiting Drainage Plan Overall:

a. Expand the existing sub-basin narrative to explain how these offsite impact the development. Analyze the drainage crossings (culverts, overtopping, etc.) Are the crossings hydraulically adequate?
Response: Culvert sizing details will be part of the final drainage report.

b. Are there improvements needed offsite to mitigate any impacts these basins may cause as it enters the development? Is there additional drainage easements needed for the drainage overtopping width?
Response: Culvert sizing details will be part of the final drainage report.

c. The narrative (pg5) noted overtopping of Hodgen Road for Basin D. Does it meet criteria overtopping depth or is there a need to mitigate?
Response: Culvert sizing details will be part of the final drainage report.

6. Exiting Drainage Plans:
   a. Draw the flow path used for the time of concentration calculation. Typical all.
   Response: The flow path used to calculate time of concentration is shown on the drainage plan.

7. Proposed Drainage Plan Overall:
   a. Elaborate regarding these reservoirs in the narrative. Some questions that should be clarified are: The assumptions used for the NRCS modeling the basins with the reservoir. (i.e. were excluded in the SCS modeling and why).
   Response: The reservoirs are not part of the hydrology modeling. With the FEMA floodplain submittal, to include these reservoirs would require that they are FEMA reviewed.

   b. Are these jurisdictional ponds and what is the existing hazard classification?
   Response: These are jurisdictional ponds. The flood hazard classification is currently "Low". We have modeled the largest of the 3 reservoirs under the direction of the state dam safety office. Easements have been placed on 2 proposed lots that will allow the Low Risk Hazard for the dams to remain unchanged. A copy of this analysis and the correspondence the State is included in the appendix.

   c. Will the proposed development result in a reclassification of the hazard? Should a breach analysis be conducted to determine the inundation area to ensure no negative impact to this development?
   Response: Easements have been placed on 2 proposed lots that will allow the Low Risk Hazard for the dams to remain unchanged.

   d. Contact/coordinate with the state Dam Safety Engineer's Office regarding the hazard classification and any requirements they may require.

Response: Acknowledged.

e. Include the required release rates.
Response: Acknowledged and added to the plan.

f. Show the design points on the map and provide a summary table for the cumulative flows. Update the existing and proposed sub-basin narrative to include the design points.
Response: Previous Design Points have been removed for the Preliminary Drainage Report but will be addressed for culvert sizing in the Final Drainage Report.

g. Include a section in the narrative regarding the channel. Include the HEC-RAS analysis in the appendix and discuss the results.
Response: Acknowledged.

h. Discuss the channel stability and erosion potential. Some of the banks/bends appears to be unstable (vertical). The HEC-RAS model in the FEMA application showed sections of West Kiowa Creek exceed the Country's, criteria for velocities and Froud's number (DCM Section 6.5.2). Channel improvements appear to be required.
Response: The full FEMA report is being uploaded with all the HEC-RAS modeling. A Prudent Line Analysis has also been completed.

i. Update the narrative to note that the subsequent Final Drainage Report will analyze the segment between the pond outfall to the main channel (West Kiowa Creek). Offsite improvements may be required if the segment from the outfall to the stream is not hydraulically adequate.
Response: Pond outfalls will be addressed in the final drainage report.

j. Fix spelling of Berm.
Response: Complied.

k. Revise the 100 year delineation. The line type used is too similar to the contours.
Response: Complied.

l. Roadside ditch analysis will be required with each final drainage report. Part of the analysis will need to identify the lots that will need driveway culverts greater than the standard 18" diameter and identify the required culvert size.
Response: Ditch capacity and culvert sizing will be addressed in the final drainage report.

m. Add drainage channel and easement.
Response: Complied.

Please feel free to call with any questions.

Sincerely,

Jason Priddy
Project Engineer
The Vertex Companies, Inc.