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At the bottom of the cover page include "PCD File No.
SF-21-015"

Drainage Report
Paso County, CO

CERTIFICATION

DESIGN ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of this report.

SIGNATURE (Affix Seal): _____

Colorado P.E. No. 56012

Date

OWNER/DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all of the requirements specified in this Drainage Report and Plan.

type engineer of
records name

Name of Developer

Authorized Signature

Date

Printed Name

Title

Address:

EL PASO COUNTY

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Jennifer Irvine, P.E.
County Engineer/ ECM Administrator

Date

Conditions:

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Appendix Missing. Unable to review the majority of the content within the narrative section. Drainage report will be reviewed in detail on the resubmittal. Expect additional comments.

INTRODUCTION

PURPOSE AND SCOPE OF STUDY

The purpose of this Final Drainage Report (FDR) is to provide the hydrologic and hydraulic calculations and to document and finalize the drainage design methodology in support of the proposed Winsome Subdivision (“the Project”) Filing No. 2 (“the Site”) for Winsome LLC. The Project is located within the jurisdictional limits of El Paso County (“the County”). Thus, the guidelines for the hydrologic and hydraulic design components were based on the criteria for the County and City of Colorado Springs, described below.

LOCATION

The Project is located approximately 17 miles west of Monument, Colorado within Township 11 South, Range 65 West of the 6th Principal Meridian, County of El Paso, State of Colorado (the “Site”). More specifically, the Site is located north of Hodgen Road, and west of Meridian Road. A vicinity map has been provided in the **Appendix A** of this report.

The Site is currently owned by Winsome, LLC and will be developed by Winsome, LLC.

DESCRIPTION OF PROPERTY

The Project is located on approximately 768 acres of land consisting of vacant land with native vegetation and is classified as “Pasture and Meadow” per Table 6-6 of the City of Colorado Springs Drainage Criteria Manual. Filing No 2 consists of 61 residential lots and a commercial lot. The Site does not currently provide water quality or detention for the Project area. The existing land use is undeveloped vacant land.

The existing topography consists of slopes ranging from 1% to 16%. The West Kiowa Creek (“the Creek”) runs in the northwest corner of the site.

NRCS soil data is available for this Site and it has been noted that soils onsite are generally USCS Type B. The NRCS soil data can be found in **Appendix E** as part of the excerpts from the approved PDR. There are no major drainage ways or irrigation facilities within the Site.

Improvements will consist of mowing, clearing and grubbing, weed control, paved access road construction, roadway grading, two detention ponds, roadside ditches, culverts, drainage swales, native seeding and a proposed channel to convey flows to the detention ponds.

The Site proposes to plat 61 lots for single family development, one commercial lot, as well as, provide the grading, roadway and drainage improvements.

An updated Topographic field survey was completed for the Project by Edward-James Surveying, Inc. dated November 3th, 2020 and is the basis for design for the drainage improvements.

DRAINAGE BASINS

MAJOR BASIN DESCRIPTIONS

A preliminary drainage report was completed for the site previously completed by The Vertex Companies. This Final Drainage Report used the approved Preliminary Drainage Report prepared by The Vertex Companies (PDR) for the Filing No. 2 final design.

The Site improvements are located outside of the 100-year floodplain as determined by the Flood Insurance Rate Map (FIRM) number 08041C0350G effective date, December 7, 2018 (see **Appendix A**).

The Project is located within El Paso County's West Kiowa Creek Drainage Basin.

EXISTING SUB-BASIN DESCRIPTIONS

Per the approved Preliminary Drainage Report prepared by The Vertex Companies (PDR). The Site was divided into 2 subbasins Eb and F. Drainage flows from southeast to northwest overland over vacant land to the West Kiowa Creek. Below is a description of the existing sub-basins.

Sub-Basin Eb

Per the approved PDR sub-basin Eb consists of an on-site area of 74.6 acres, located in the southeast corner of the property. Drainage flows overland from the southeast to the northwest at into the West Kiowa Creek. Runoff during the 5-year and 100-year events are 4.0 cfs and 85.8 cfs respectively. Refer to **Appendix E** for the Existing Conditions Drainage Map.

Sub-basin F

Per the approved PDR sub-basin F consists of an on-site area of 44.5 acres, located in the northeast corner of the property. Drainage flows overland from south to north at the West Kiowa Creek. Runoff during the 5-year and 100-year events are 6.6 cfs and 56.6 cfs respectively. Refer to **Appendix E** for the Existing Conditions Drainage Map.

Offsite flows entering the Site from sub-basin Ea will be conveyed through the Site following historical drainage paths and outfall to West Kiowa Creek. Offsite flows from sub-basin Ea will be routed to Pond 6 and detained on site.

Excerpts from the approved PDR for the Existing Drainage Conditions are included in the **Appendix E** of this report for reference.

PROPOSED HEC-HMS SUB-BASIN DESCRIPTIONS

For the proposed condition, the existing flow patterns from the existing flow paths. The proposed condition will be reviewed on the resubmittal. The associated drainage map and calculations are missing.

The proposed project has been divided into 10 larger sub-basins for the HEC-HMS model and 21 sub basins for rational calculations.

Sub-Basin E0 is an offsite basin on the southeast side of Filing No. 2. Runoff from this basin will be directed to design point E0 where it will be directed to the north in an existing culvert to subbasin E1.1. This sub-basin has an area of 37.9 acres. The curve number for Sub-Basin E0 is 60.00. The basin will generate runoff of 4.9 cfs and 24.6 cfs in the minor and major storm event.

Sub-Basin E1.1 is an onsite basin on the east side of Filing No. 2. The basin consists of one commercial lot. This basin will drain into the full spectrum detention Pond 6 which will outfall to the north into channel and ultimate outfall into Pond 5. This sub-basin has an area of 7.9 acres. It should be noted that half of this lot will remain undeveloped. The curve number for Sub-Basin E1.1 is 76.00. The basin will generate runoff of 8.5 cfs and 20.4 cfs in the minor and major storm event.

Sub-Basin E1.2 consists of 3 large lots. Runoff from this basin will be directed to design point E1.2 where it will be directed to the north in E1.2 culvert to subbasin F2. This sub-basin has an area of 16.3 acres. The curve number for Sub-Basin E1.2 is 64.00. The basin will generate runoff of 4.7 cfs and 19.4 cfs in the minor and major storm event.

Sub-Basin E2 consists of a portion of a large residential lot at the southwest corner of Flapjack Lane and Early Light Drive. Runoff from this basin will be directed to design point E2 where it will be directed to the north in E2 culvert to subbasin E3. This sub-basin has an area of 2.6 acres. The curve number for Sub-Basin E2 is 69.00. The basin will generate runoff of 2.2 cfs and 8.3 cfs in the minor and major storm event.

Sub-Basin E3 consists of 6 large residential lots west of Early Light Drive and south of Rambling Road. Runoff from this basin will be directed to design point E3 where it will be directed to the north in E3 culvert to subbasin E4. This sub-basin has an area of 19.8 acres. The curve number for Sub-Basin E3 is 66.00. The basin will generate runoff of 7.6 cfs and 33.7 cfs in the minor and major storm event.

Sub-Basin E4 consists of 5 large residential lots west of Early Light Drive and south of Alamar Way. Runoff from this basin will be directed to design point E4 where it will be directed to the north in E4 culvert to subbasin E7. This sub-basin has an area of 18.2 acres. The curve number for Sub-Basin E4 is 66.00. The basin will generate runoff of 6.3 cfs and 26.8 cfs in the minor and major storm event.

Sub-Basin E5 consists of 7 large residential lots south of Alamar Way near the southern terminus of Clove Hitch Ct. Runoff from this basin will be directed to design point E5 where it will be directed to the north in E5 culvert to subbasin E6. This sub-basin has an area of 13.5 acres. The curve number for Sub-Basin E5 is 65.00. The basin will generate runoff of 3.9 cfs and 18.3 cfs in the minor and major storm event.

Sub-Basin E6 consists of 6 large residential lots north of Alamar Way. Runoff from this basin will be directed to Channel 15 and Channel 16 where it will drain into the full spectrum detention Pond 5 which will outfall into West Kiowa Creek. This sub-basin has an area of 28.9 acres. The curve number for Sub-Basin E6 is 62.00. The basin will generate runoff of 6.2 cfs and 29.7 cfs in the minor and major storm event.

Sub-Basin E7 consists of 5 large residential lots on the north side of the site and west of Early Light Drive. Runoff from this basin will be directed to Channel 12 and Channel 14 which drain to

Channel 16. Channel 16 will drain into the full spectrum detention Pond 5 which will outfall into West Kiowa Creek. This sub-basin has an area of 13.4 acres. The curve number for Sub-Basin E7 is 65.00. The basin will generate runoff of 4.7 cfs and 20.5 cfs in the minor and major storm event.

Sub-Basin F1 consists of 6 large residential lots on the east of Early Light Drive and west of Meridian Road. Runoff from this basin will be directed to an existing drainage channel which flows offsite and outfalls into West Kiowa Creek. This sub-basin has an area of 36.6 acres. The curve number for Sub-Basin F1 is 60.00. The basin will generate runoff of 6.2 cfs and 26.4 cfs in the minor and major storm event. When comparing the proposed results to the outfall location of F1 to the existing conditions sub-basin F. Both the proposed minor and major storm events are lower than the existing conditions minor and major storm events. It should be noted that even though a large portion of the lots in the sub-basin are not being directed to Pond 5. Pond 5 has been designed to account for this area.

Sub-Basin F2 consists of 2 large residential at the northeast corner of Woodbridge Terrace and Early Light Drive. Runoff from this basin will be directed to design point 5 where it will be directed to the north in DP5 culvert to subbasin E7. This sub-basin has an area of 6.3 acres. The curve number for Sub-Basin F2 is 66.00. The basin will generate runoff of 3.8 cfs and 14.1 cfs in the minor and major storm event.

Per PDR sub-basin D1.2 is an off-site basin to the south of Hodgen Road consisting of agricultural land and large residential lots. Runoff from this basin will be directed to an existing culvert under Hodgen Road where it will be directed to subbasin D3. This sub-basin has an area of 49.90 acres. The curve number for Sub-Basin D1.2 is 60.00. The basin will generate runoff of 5.7 cfs and 34.1 cfs in the minor and major storm event.

Per PDR sub-basin D3 is an off-site basin consisting of 12 undeveloped, large residential lots. Runoff from this basin will be directed to design point O1 where it will be directed to the north in O1 culvert to subbasin D4. This sub-basin has an area of 41.20 acres. The curve number for Sub-Basin D3 is 64.00. The basin will generate runoff of 7.9 cfs and 44.2 cfs in the minor and major storm event.

Per PDR sub-basin D4 is an off-site basin consisting of 12 undeveloped, large residential lots. Runoff from this basin will be directed to design point O2 where it will be directed to the northwest in O2 culvert to an existing drainage channel which outfalls into West Kiowa Creek. This sub-basin has an area of 34.30 acres. The curve number for Sub-Basin D3 is 64.00. The basin will generate runoff of 7.7 cfs and 44.8 cfs in the minor and major storm event.

PROPOSED RATIONAL SUB-BASIN DESCRIPTIONS

Sub-Basin DA1 consists of a portion of the commercial lot in the southeast corner of the site. Runoff from this basin will be directed to design point 1 where it will drain into the full spectrum detention Pond 6 which will outfall to the north into channel and ultimate outfall into Pond 5. This sub-basin has an area of 1.22 acres. The impervious value for Sub-Basin DA1 is 41%. The basin will generate runoff of 1.50 cfs and 3.92 cfs in the minor and major storm event.

Sub-Basin DA2 consists of the full spectrum detention Pond 6 in the southeast corner of the site. Runoff from this basin will be directed into the full spectrum detention Pond 6 which will outfall to the north into channel and ultimate outfall into Pond 5. This sub-basin has an area of 2.19 acres. The impervious value for Sub-Basin DA2 is 5%. The basin will generate runoff of 0.56 cfs and 5.64 cfs in the minor and major storm event.

Sub-Basin DA3 consists of a portion of a large residential lot in the southwest corner of Woodbridge Terrace and Meridian Road. Runoff from this basin will be directed into design point 3 and where it will be directed to the north in E1.2 culvert to subbasin DA6. This sub-basin has an area of 4.99 acres. The impervious value for Sub-Basin DA3 is 20%. The basin will generate runoff of 2.22 cfs and 9.42 cfs in the minor and major storm event.

Sub-Basin DA4 consists of 3 large residential lots and one commercial lot east of Early Light Drive and north of Hodgen Road. Runoff from this basin will be directed into design point 4 and where it will be directed to the north in E1.2 culvert to subbasin DA6. This sub-basin has an area of 15.70 acres. The impervious value for Sub-Basin DA4 is 11%. The basin will generate runoff of 6.74 cfs and 34.83 cfs in the minor and major storm event.

Sub-Basin DA6 consists of portions of 2 large residential lots at the northeast corner of Woodbridge Terrace and Meridian Road. Runoff from this basin will be directed into design point 5 and where it will be directed to the northwest in DP5 culvert to subbasin DA7. This sub-basin has an area of 6.32 acres. The impervious value for Sub-Basin DA6 is 22%. The basin will generate runoff of 2.91 cfs and 10.54 cfs in the minor and major storm event.

Sub-Basin DA7 consists of the roadside ditch at the northwest corner of Early Light Drive. Runoff from this basin will be directed into design point 6 and where it will be directed to Channel 6 into subbasin DA7. This sub-basin has an area of 0.47 acres. The impervious value for Sub-Basin DA6 is 37%. The basin will generate runoff of 0.77 cfs and 2.12 cfs in the minor and major storm event.

Sub-Basin DA8 consists of portions of large residential lots at the northwest end of Early Light Drive. Runoff from this basin will be directed into design point 7 and where it will be directed to Channel 7 and outfall into Channel 12 in subbasin DA16. This sub-basin has an area of 2.32 acres. The impervious value for Sub-Basin DA8 is 10%. The basin will generate runoff of 0.95 cfs and 4.99 cfs in the minor and major storm event.

Sub-Basin DA10 consists of portions of large residential lots at the southwest corner of Early Light Drive and Flapjack Lane. Runoff from this basin will be directed into design point 8 and where it will be directed to the north in E2 culvert to subbasin DA12. This sub-basin has an area of 1.54 acres. The impervious value for Sub-Basin DA10 is 23%. The basin will generate runoff of 1.51 cfs and 5.28 cfs in the minor and major storm event.

Sub-Basin DA11 consists of portions of large residential lots at the southwest corner of Early Light Drive and Flapjack Lane. Runoff from this basin will be directed into design point 9 and where it will be directed to the north in E2 culvert to subbasin DA12. This sub-basin has an area of 1.11 acres. The impervious value for Sub-Basin DA11 is 19%. The basin will generate runoff of 0.98 cfs and 3.82 cfs in the minor and major storm event.

Sub-Basin DA12 consists of 4 large residential lots west of Early Light Drive and north of Flapjack Lane. Runoff from this basin will be directed into design point E3 and where it will be directed to the north in E3 culvert to subbasin DA14. This sub-basin has an area of 11.66 acres. The impervious value for Sub-Basin DA12 is 13%. The basin will generate runoff of 4.52 cfs and 20.83 cfs in the minor and major storm event.

Sub-Basin DA13 consists of 2 large residential lots located in the east side of the site, south of Rambling Road. Runoff from this basin will be directed into design point 10 and where it will be directed to the north in E3 culvert to subbasin DA14. This sub-basin has an area of 8.16 acres. The impervious value for Sub-Basin DA13 is 10%. The basin will generate runoff of 3.08 cfs and

16.11 cfs in the minor and major storm event.

Sub-Basin DA14 consists of 5 large residential lots located north of Rambling Road, and west of Early Light Drive. Runoff from this basin will be directed into design point E4 and where it will be directed to the north in E4 culvert to subbasin DA16. This sub-basin has an area of 14.58 acres. The impervious value for Sub-Basin DA14 is 9%. The basin will generate runoff of 3.95 cfs and 22.14 cfs in the minor and major storm event.

Sub-Basin DA15 consists of the west roadside ditch of Early Light Drive between Rambling Road and Alamar Way. Runoff from this basin will be directed into design point 11 and where it will be directed to the north in E4 culvert to subbasin DA16. This sub-basin has an area of 1.64 acres. The impervious value for Sub-Basin DA15 is 37%. The basin will generate runoff of 1.45 cfs and 4.02 cfs in the minor and major storm event.

Sub-Basin DA16 consists 3 large residential lots located in the north side of the site. Runoff from this basin will be directed into design point 12 and where it will be directed to the west in Channel 16 to the full spectrum detention Pond 5. This sub-basin has an area of 9.54 acres. The impervious value for Sub-Basin DA16 is 9%. The basin will generate runoff of 3.74 cfs and 20.32 cfs in the minor and major storm event.

Sub-Basin DA17 consists of portions of large residential lots located in the north side of the site, south of Alamar Way. Runoff from this basin will be directed into design point 13 and where it will be directed to the north in E5 culvert to subbasin DA20. This sub-basin has an area of 2.09 acres. The impervious value for Sub-Basin DA17 is 10%. The basin will generate runoff of 0.80 cfs and 4.19 cfs in the minor and major storm event.

Sub-Basin DA18 consists of 4 large residential lots located in the northwest side of the site, south of Alamar Way. Runoff from this basin will be directed into design point E5 and where it will be directed to the north in E5 culvert to subbasin DA20. This sub-basin has an area of 10.54 acres. The impervious value for Sub-Basin DA18 is 8%. The basin will generate runoff of 3.68 cfs and 21.00 cfs in the minor and major storm event.

Sub-Basin DA19 consists of portions of large residential lots located in the northwest side of the site, south of Alamar Way. Runoff from this basin will be directed into design point E5 and where it will be directed to the north in E5 culvert to subbasin DA20. This sub-basin has an area of 3.00 acres. The impervious value for Sub-Basin DA19 is 14%. The basin will generate runoff of 1.53 cfs and 7.00 cfs in the minor and major storm event.

Sub-Basin DA20 consists of 2 large residential lots located in the north side of the site, north of Alamar Way. Runoff from this basin will be directed into design point 15 and where it will be directed to the north in Channel 15 into the full spectrum detention Pond 5. This sub-basin has an area of 5.83 acres. The impervious value for Sub-Basin DA20 is 10%. The basin will generate runoff of 2.09 cfs and 10.88 cfs in the minor and major storm event.

Sub-Basin DA21 consists of 1 large residential lot located in the north side of the site, north of Alamar Way. Runoff from this basin will be directed into design point 16 and where it will be directed to the west in Channel 16 into the full spectrum detention Pond 5. This sub-basin has an area of 4.40 acres. The impervious value for Sub-Basin DA21 is 11%. The basin will generate runoff of 1.15 cfs and 7.10 cfs in the minor and major storm event.

DRAINAGE DESIGN CRITERIA

DEVELOPMENT CRITERIA REFERENCE

The proposed storm facilities are designed to be in compliance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)" dated October 2018 ("the MANUAL"), El Paso County "Engineering Criteria Manual" ("the Engineering Manual"), Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014 ("the Colorado Springs MANUAL").

Site drainage is not significantly impacted by such constraints as utilities or existing development.

A preliminary drainage report was completed for the overall Winsome subdivision. This was previously completed by The Vertex Companies. This Final Drainage Report used the approved Preliminary Drainage Report prepared by The Vertex Companies (PDR) for the Site's final design. The PDR identified Pond 6 100-yr release rate of 18 cfs and Pond 5 100-yr release rate of 120 cfs. The proposed release rates for Pond 5 and 6 are equal to or less than what was determined in the PDR.

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage analysis per the MANUAL. Table 6-2 of the Colorado Springs MANUAL is the source for rainfall data for the 5-year and 100-year design storm events. Design runoff was calculated using the NRCS curve number method for developed conditions as established in the MANUAL. This aligns with what was completed in the PDR. The NRCS curve number method was used for existing conditions and proposed conditions due to the on-site and off-site basins containing more than 130 acres. Per the PDR the runoff curve numbers for the existing and proposed drainage basins used the curve numbers in DCM. The PDR developed the following values for the 2 ½ and 5 acre lots in **Table 1** below. These values were also used for the final design in this report.

Table 1: Values Extrapolated per the PDR

Lot Size (Acres)	% Imp	Soil Type			
		A	B	C	D
2 /12	11	N/A	64	76	81
5	7	N/A	60	72	77

The rainfall depths that were determined in the PDR were also used for the final design. The rainfall depths utilized the Frontal Storm which produced higher design flows. See **Table 2** below for the Frontal Storm rainfall values.

Table 2: Frontal Storm Rainfall Depths

	Duration (HRS)	
Storm Event	1 HR	24 HR
5 Year	1.5	2.7
100 Year	2.52	4.6

Calculations for the composite curve numbers are included in the **Appendix C**. Per the PDR rational method peak flows were determined to size the proposed culverts and channels. The rational calculations utilized the frontal storm values of 1.5 inches and 2.52 inches for a 1-hour storm, for the 5-year and 100-year storms respectively.

The proposed impervious values were determined in the PDR and were utilized in this report for the final design.

The Site is providing two full spectrum detention ponds as the Site is not significantly increasing the imperviousness of the Site, the Project is maintaining the historic drainage patterns as much as possible and not significantly increasing developed flows.

There are no additional provisions selected or deviations from the criteria in both the MANUAL and Colorado Springs MANUAL.

HYDRAULIC CRITERIA

Applicable design methods were utilized to size the proposed ponds, culverts and drainage channels, which includes the use of the UD-Detention spreadsheet, rational calculations spreadsheet, HY-8 and FlowMaster, V8i software.

Proposed drainage features on-site have been analyzed and sized for the following design storm events:

- Major Storm: 100-year Storm Event

For the stormwater modeling for the Site was completed utilizing the NRCS Curve Number Method as required by the City of Colorado Springs. The Rational Method peak flows were determined to size the proposed culverts and channels. The same assumptions were kept from the PDR for the time of concentration calculations. **Table 3** below outlines these assumptions from the PDR:

Table 3: Time of Concentration Assumptions

	Shape	Side Slope	Depth (ft)	Wetted Perimeter (ft)	Cross Sectional Area (sq. ft.)
< 100 Acre Basin Channels	Triangular	4:1	4	32.98	64
>100 Acre Basin Channels	Triangular	4:1	3	24.74	36

Channels and roadside ditches are designed to carry flows from Pond 6 to Pond 5. The channels have varying bottom widths, and slopes, with equal 4:1 side slopes. The channel sizing and capacity calculations are provided in the **Appendix D** and channel design point are provided in the Proposed Drainage Maps

Culverts were sized to convey flows from the ditches and channels, underneath the Site's paved roads. The proposed culverts range in diameter from 18" to 42" and have been designed to convey the 100-year storm event. Culvert calculations are provided in the **Appendix D** and culvert locations are provided in the Proposed Drainage Maps.

The Project was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in Chapter 1 Section 4.0 of the Colorado Springs MANUAL.

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Step 2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release –Permanent water quality measures and detention facilities will be necessary for the Project. Temporary water quality and erosion control measures will be provided during construction to prevent sediment laden water from discharging from the Site.

Step 3 Stabilize Drainageways– Stabilizing proposed roadside ditches, swales, and channels by designing them with slopes that control the flow rates. Placement of riprap upstream and downstream of culverts to help reduce erosion of the roadside ditches. Rock chutes will be constructed to reduce the velocities of runoff entering the ponds at the channel locations. We anticipate this will minimize erosion.

Step 4. Implement Site Specific and Other Source Control BMPs – The erosion control construction BMPs of the Project were designed to reduce contamination. Source control BMPs include the use of vehicle tracking control, culvert protection, stockpile management, and stabilized staging areas.

DRAINAGE FACILITY DESIGN

GENERAL CONCEPT

The proposed drainage patterns will match the historic patterns. To maintain historic flows, two full spectrum detention ponds are being proposed and will capture and control the flows from the proposed development into a series of channels and culverts.

Provided in the **Appendix C** are hydrologic calculations utilizing the NRCS/HEC-HMS method for the proposed conditions. Provided in **Appendix D** are the hydraulic calculations for the proposed conditions HY-8 culvert calculations, Flowmaster details and cross sections for proposed drainage features. As previously mentioned the and existing drainage map can be found in **Appendix E** and the proposed drainage maps can be found in **Appendix B**.

SPECIFIC DETAILS

The existing conditions of the Site have flows conveying from the southeast to the northwest and discharging in the West Kiowa Creek. Runoff conditions for the Site were developed utilizing the previously referenced Hydrologic Criteria per the approved PDR for the Winsome subdivision.

Sub-basins E1.1 through E7, F1 and F2 consist of future residential lots, one commercial lot, and paved roadways. All basins have flows being captured and conveyed onsite with the except of F1. Flows are conveyed from the southeast corner of the Site to the northwest corner through detention ponds, roadside ditches, culverts and constructed channels. On site flows enter Pond 5 which then discharges into the West Kiowa Creek.

A Proposed Drainage Conditions Map and hydrologic calculations are included in the **Appendix B, Appendix C, and Appendix D** of this report for reference.

Discuss the intent of the temporary channel and the plan for the final conveyance within the commercial lot.
Identify who is responsible for maintenance for the temporary channel and permanent conveyance.

The Site will disturb more than 1 acre and will require a Colorado Discharge Permit System (CDPS) General Permit for Stormwater Discharge Associated with Construction Activities from the Colorado Department of Public Health and Environment (CDPHE).

There are no current drainage and fees for the Project as the West Kiowa Creek Drainage Basin is not part of the El Paso County Drainage Basin Fee Program.

SUMMARY

The proposed drainage design is to maintain the historic drainage patterns, the overall imperviousness and release rates for the Site. Runoff from the Site will flow overland to existing El Paso County drainage basins: The West Kiowa Creek Basin. The basin ultimately discharges to the West Kiowa Creek. The drainage design presented within this report conforms to the criteria presented in both the MANUAL and the Colorado Springs MANUAL. Additionally, the Site runoff and storm drain facilities will not adversely affect the downstream and surrounding developments, including West Kiowa Creek.

REFERENCES

1. City of Colorado Springs “Drainage Criteria Manual (DCM) Volume 1”, dated May, 2014
2. El Paso County “Drainage Criteria Manual”, dated October 31, 2018
3. El Paso County “Engineering Criteria Manual” Revision 6, dated December 13, 2016
4. Chapter 6 and Section 3.2.1. of Chapter 13-City of Colorado Springs Drainage Criteria Manual, May 2014.
5. Urban Drainage and Flood Control District Drainage Criteria Manual (UDFCDCM), Vol. 1, prepared by Wright-McLaughlin Engineers, June 2001, with latest revisions.
6. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0507F and 08041C0530F, Effective Date March 17, 1997, prepared by the Federal Emergency Management Agency (FEMA).
7. Winsome Subdivision Preliminary Drainage Report (PDR), prepared by The Vertex Companies, Inc, May 15, 2019.