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Drainage Letter

**Viewpoint Estates
Filing No. 2**

Project No. 61099

February 25, 2023

PCD File No. SP-21-005 & SF-21-042

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Drainage Letter

for

Viewpoint Estates Filing No. 2
El Paso County Colorado
Project No. 61099

February 25, 2023

prepared for

Viewpoint Estates LLC
P.O. Box 6797
Colorado Springs, CO 80909

prepared by

MVE, Inc.
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61099-Viewpoint Estates Drainage Letter.odt

Statements and Acknowledgments

Engineer's Statement

This report and plan for the drainage design of Viewpoint Estates Filing No. 2 was prepared by me (or under my direct supervision) in accordance with the provisions of The City of Colorado Springs Drainage Criteria Manual for the owners thereof. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others.

Charles C. Crum, P.E.
For and on Behalf of MVE, Inc.

Colorado No. 13348

Date

Developer's Statement

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

Viewpoint Estates LLC, Owner
P.O. Box 6797
Colorado Springs, CO 80909

Date

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.

Joshua Palmer
County Engineer/ECM Administrator

Date

Conditions:

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Drainage Letter

Introduction:

The purpose of this Drainage Letter for Viewpoint Estates Filing No. 2 is to update the approved drainage report for Viewpoint Estates Subdivision Filing No. 2 to allow the construction of the proposed subdivision improvements. The owner intends to vacate and re-plat lots 71 & 72, Viewpoint Estates. The approved drainage report for the original subdivision is titled "Viewpoint Estates Final Drainage Report" prepared by Pacific Summits Engineering LTD, dated January 6, 1998 and approved by the El Paso County Engineer on October 6, 1999 with PCD Filing No. SF98040.

1 General Location and Description

1.1 Site Description:

The existing subdivision known as Viewpoint Estates is located in the South One-Half of the South One-Half of Section 10, Township 14 South, Range 63 West of the 6th P.M., El Paso County, Colorado. The current addresses for the properties are 21209 & 21307 Chesley Drive, both of which are currently vacant parcels. The subdivision is located on the north side of Highway 94, east of N. Ellicott Hwy., and west of Peyton Hwy. The site is located in both the Telephone Exchange Drainage Basin (CHWS0200), and the Ellicott Consolidated Drainage Basin (CHBS1200). Both of the drainage basins in which the site resides drain to Chico Creek. The subdivision is 24.33± acres in area, and is zoned RR-2.5 containing two (2) rural residential lots.

The site is bounded on the north by residential lots 62-70 of Viewpoint Estates. The east side of the site is adjacent to a large vacant lot, zoned RR-5, that is utilized as grazing land. Highway 94 borders the south side of the site. The parcel to the west of the site is a vacant lot zoned RR-5.

The site is vacant with Antelope Drive, a public paved road in a 60 ft right-of-way, running through the site between existing lots 71 & 72. Highway 94, a public paved road in a 100 ft right-of-way is adjacent to the south side of the site. Chesley Drive, a public paved road in a 60 ft right-of-way, is adjacent to the northern border of the site, providing access to the proposed subdivision from Antelope drive.

1.2 Floodplain Statement:

According to the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) Community Panel Number 08041C0810G, dated December 7, 2018, for El Paso County, Colorado the site is not located within any Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Areas (SFHA). A portion of the **FIRM** is included with this Drainage Letter for reference.

1.3 Soils:

According to the Natural Resources Conservation Service Web National Cooperative Soil Survey, the soil of the site is made up of Blakeland Loamy Sand (map unit 8), and Truckton Sandy Loam

(map unit 96). Blakeland Loamy Sand, which makes up 78.6% of the soil on the site, is part of hydrologic soil group A. The Blakeland Loamy Sand soil is typically deep and somewhat excessively drained. The permeability of the soil is moderate to rapid, surface runoff is medium and hazard of erosion is moderate. Truckton Sandy Loam, which makes up 21.4% of the soil on the site, is part of hydrologic soil group A. The Truckton Sandy Loam soil is typically deep and well drained. The permeability of the soil is moderate to rapid, surface runoff is medium and hazard of erosion is moderate. A portion of the **National Cooperative Soil Survey Map** is included with this Drainage Letter.

2 Drainage Basins and Sub-Basins

2.1 Existing Drainage Conditions:

The site is delineated by five on-site sub-basins. Off-site flows will continue to enter the site as described in the approved Viewpoint Estates Final Drainage Report for the original subdivision. The rational method was used to calculate the runoff quantities. The existing drainage Map is included in the **Appendix**.

Design Point 1 (DP1) has an off-site flow of $Q_{100} = 20.97$ cfs (existing/proposed flows) crossing under Chesley Drive via an El Paso County 18" CM Pipe. The existing 18" CM Pipe is plugged and requires El Paso County maintenance.

Design Point 5 (DP5) has an off-site flow of $Q_{100} = 42.49$ cfs (existing/proposed flows) crossing under Chesley Drive via an El Paso County 36" CM Pipe. The existing 36" CM Pipe is plugged and requires El Paso County maintenance.

Off-site sub-basin OS-1 with an area of 1.31 acres makes up the south half of the existing right of way of Chelsey Drive west of Antelope Drive. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into existing sub-basin EX-A which is in exiting Lot 71. This sub-basin generates peak storm runoff discharges of $Q_5 = 3.0$ cfs and $Q_{100} = 7.0$ cfs (existing/proposed flows).

On-site sub-basin EX-A, which makes up the northern portion of Lot 71, is 10.27 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The flows from this sub-basin drain overland to an existing detention basin located in the central portion of lot 71. This sub-basin generates peak storm runoff discharges of $Q_5 = 2.9$ cfs and $Q_{100} = 21.0$ cfs (existing flows). The flows from sub-basin EX-A are combined with the off-site flows from OS-1 and from the Viewpoint Estates Subdivision as described in the approved drainage report as noted above which enter the site at existing design point 1 (EX-DP1). The detention basin drains to the south through an existing 24" CM Pipe that drains into sub-basin EX-B at a rate of $Q_{100} = 25.3$ cfs according to the approved Viewpoint Estates Final Drainage Report for the original subdivision.

On-site sub-basin EX-B, which makes up the southern portion of Lot 71, is 1.99 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The stormwater flows from this sub-basin drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin EX-B generates peak storm runoff discharges of $Q_5 = 0.6$ cfs and $Q_{100} = 4.3$ cfs (existing flows). The flows from this sub-basin combine with the flows from sub-basin EX-A and OS-1 at Existing Design Point 2 (EX-DP2) and exit the site through three existing 30" CM Pipes with peak storm runoff discharges of $Q_{100} = 50.4$ cfs (existing flows).

Off-site sub-basin OS-2 with an area of 0.43 acres makes up the south half of the existing Chelsey Drive right of way east of Antelope Drive adjacent to sub-basin EX-C. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into

State what the global trends are: ie runoff flows from north to south.

Where do these flows come from? There are no watersheds associated with these off-site flows. Show watersheds in drainage maps.

The map calls the pipe a 24" CMP

Combine with the flows from DP1 as well.

existing sub-basin EX-C being in existing Lot 72. This sub-basin generates peak storm runoff discharges of $Q_5 = 0.9$ cfs and $Q_{100} = 2.2$ cfs (existing/proposed flows).

On-site sub-basin EX-C, makes up the northern and western portion of Lot 72, and is 4.68 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The stormwater flows from this sub-basin joins with sub-basin OS-2 and drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin EX-C generates peak storm runoff discharges of $Q_5 = 1.4$ cfs and $Q_{100} = 10.3$ cfs (existing flows). The flows from this sub-basin combine with other flows at Existing Design Point 4 (EX-DP4).

Suggest moving the discussion of EX-D here so the flow is clear and the basins are in order.

Based on the drainage map, some flow from EX-C gets to the existing 33" CMP.

Off-site sub-basin OS-4 with an area of 0.17 acres makes up the south half of the existing Chelsey Drive right of way east of Spotted Owl Way adjacent to sub-basin EX-E. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into sub-basin EX-E being in existing Lot 72. This sub-basin generates peak storm runoff discharges of $Q_5 = 0.2$ cfs and $Q_{100} = 0.7$ cfs (existing/proposed flows).

On-site sub-basin EX-E, makes up the eastern portion of Lot 72, and is 1.92 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The stormwater flows from this sub-basin joins with sub-basin OS-2 and drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin EX-E generates peak storm runoff discharges of $Q_5 = 0.5$ cfs and $Q_{100} = 3.7$ cfs (existing flows). The flows from this sub-basin combine with other flows at Existing Design Point 4 (EX-DP4).

Off-site sub-basin OS-3 with an area of 0.75 acres makes up the central south half of the existing Chelsey Drive right of way east of Antelope Drive and adjacent to sub-basin EX-D. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into existing sub-basin EX-C being in the central portion of existing Lot 72. Sub-basin OS-3 generates peak storm runoff discharges of $Q_5 = 1.7$ cfs and $Q_{100} = 4.0$ cfs (existing/proposed flows).

Design point 3 (EX-DP3) storm water discharges at the corner of Chesley Way and Spotted Owl Way via 1-42" CM Pipe and 1-24" CM Pipe from the Viewpoint Estates Subdivision as described in the approved drainage report as entering site with peak storm runoff discharges for the 42" CM Pipe of $Q_{100} = 45.1$ cfs and peak storm runoff discharges for the 24" CM Pipe $Q_{100} = 21.5$ cfs (existing flows).

The flows from sub-basin EX-D drain overland and are collected in an existing detention basin located in the central portion of lot 72. Sub-basin EX-D generates peak storm runoff discharges of $Q_5 = 1.6$ cfs and $Q_{100} = 11.6$ cfs (existing flows). The flows from sub-basin EX-D are combined with the off-site flows from OS-2 and flows from Existing Design Point 3 (EX-DP3) with all flowing to the detention basin. These combined flows exit the Detention Basin through an existing 33" CM Pipe with a peak storm runoff discharge of $Q_{100} = 42.9$ cfs (existing flows) according to the approved Viewpoint Estates Final Drainage Report for the original subdivision.

The storm water flows from the detention basin combine with the storm water flows from sub-basins EX-C and EX-E exit the site through two existing 30" CM Pipes at Existing Design Point 4 (EX-DP4) and exit the site through two existing 30" CM Pipes with peak storm runoff discharges of $Q_{100} = 50.4$ cfs (existing flows).

2.2 Proposed Drainage Conditions:

The proposed development will not alter the existing basic drainage patterns of the site. The site will continue to drain off-site to the south as in existing conditions. The existing detention basins will remain in place and continue to regulate the flows from the site as in existing conditions. The proposed drainage map is included in the **Appendix**.

Viewpoint Estates Filing No. 2 contains seven (7) single family residential lots. Each of these lots is proposed to have a single-family residence with an associated driveway. To calculate the proposed runoff discharges it was assumed that each residence would have a footprint of 2,000 sf, and each driveway would be 8,000 sf in size.

The site is delineated by five on-site sub-basins. Off-site flows will continue to enter the site as described in the approved Viewpoint Estates Final Drainage Report for the original subdivision. The rational method was used to calculate the runoff quantities. The proposed drainage Map is included in the **Appendix**.

Design Point 1 (DP1) has an off-site flow of $Q_{100} = 20.97$ cfs (existing/proposed flows) crossing under Chesley Drive via an El Paso County 18" CM Pipe which is plugged and requires El Paso County maintenance.

Design Point 5 (DP5) has an off-site flow of $Q_{100} = 42.49$ cfs (existing/proposed flows) crossing under Chesley Drive via an El Paso County 36" CM Pipe. The existing 36" CM Pipe is plugged and requires El Paso County maintenance.

Off-site sub-basin OS-1 with an area of 1.31 acres makes up the south half of the existing right of way of Chelsey Drive west of Antelope Drive. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into existing sub-basin EX-A which is in exiting Lot 71. This sub-basin generates peak storm runoff discharges of $Q_5 = 3.0$ cfs and $Q_{100} = 7.0$ cfs (existing/proposed flows).

On-site sub-basin A, which makes up the northern portion of Lot 71, is 10.27 acres in area. This sub-basin is made up of pasture/meadow areas and four (4) proposed single-family residences with associated driveways all sloping to the south. The flows from this sub-basin drain overland to an existing detention basin located in the central portion of lot 71. This sub-basin generates peak storm runoff discharges of $Q_5 = 4.6$ cfs and $Q_{100} = 23.0$ cfs (existing/proposed flows). The flows from sub-basin A are combined with the off-site flows from OS-1 and from the Viewpoint Estates Subdivision as described in the approved drainage report as noted above which enter the site at Design Point 1 (DP1). The detention basin drains to the south through an existing 24" CM Pipe that drains into sub-basin B at a rate of $Q_{100} = 25.3$ cfs according to the approved Viewpoint Estates Final Drainage Report for the original subdivision.

On-site sub-basin B, which makes up the southern portion of Lot 71, is 1.99 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The stormwater flows from this sub-basin drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin EX-B generates peak storm runoff discharges of $Q_5 = 0.6$ cfs and $Q_{100} = 4.3$ cfs (existing/proposed flows). The flows from this sub-basin combine with the flows from sub-basin A and OS-1 at Design Point 2 (DP2) and exit the site through three existing 30" CM Pipes with peak storm runoff discharges of $Q_{100} = 50.4$ cfs (existing flows).

Off-site sub-basin OS-2 with an area of 0.43 acres makes up the south half of the existing Chelsey Drive right of way east of Antelope Drive adjacent to sub-basin C. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into

existing sub-basin EX-C being in existing Lot 72. This sub-basin generates peak storm runoff discharges of $Q_5 = 0.9$ cfs and $Q_{100} = 2.2$ cfs (existing/proposed flows).

On-site sub-basin EX-C, makes up the northern and western portion of Lot 72, and is 4.68 acres in area. This sub-basin is made up of pasture/meadow areas and two (2) proposed single-family residences with associated driveways all sloping to the south. The stormwater flows from this sub-basin joins with sub-basin OS-2 and drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin C generates peak storm runoff discharges of $Q_5 = 2.3$ cfs and $Q_{100} = 11.4$ cfs (existing/proposed flows). The flows from this sub-basin combine with other flows at Design Point 4 (DP4).

Off-site sub-basin OS-4 with an area of 0.17 acres makes up the south half of the existing Chelsey Drive right of way east of Spotted Owl Way adjacent to sub-basin E. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into sub-basin E being in existing Lot 72. This sub-basin generates peak storm runoff discharges of $Q_5 = 0.2$ cfs and $Q_{100} = 0.7$ cfs (existing/proposed flows).

On-site sub-basin E, makes up the eastern portion of Lot 72, and is 1.92 acres in area. This sub-basin is made up of pasture/meadow areas that slope to the south. The stormwater flows from this sub-basin joins with sub-basin OS-2 and drain overland into an existing drainage ditch that runs along Highway 94. Sub-basin E generates peak storm runoff discharges of $Q_5 = 0.5$ cfs and $Q_{100} = 3.7$ cfs (existing flows). The flows from this sub-basin combine with other flows at Existing Design Point 4 (EX-DP4).

Off-site sub-basin OS-3 with an area of 0.75 acres makes up the central south half of the existing Chelsey Drive right of way east of Antelope Drive and adjacent to sub-basin EX-D. This sub-basin is made up of primarily paved area with pasture/meadow areas south of the paved shoulder, all draining south into existing sub-basin EX-C being in the central portion of existing Lot 72. Sub-basin OS-3 generates peak storm runoff discharges of $Q_5 = 1.7$ cfs and $Q_{100} = 4.0$ cfs (existing/proposed flows).

Design Point 3 (DP3) storm water discharges at the corner of Chesley Way and Spotted Owl Way via 1-42" CM Pipe and 1-24" CM Pipe from the Viewpoint Estates Subdivision as described in the approved drainage report as entering site with peak storm runoff discharges for the 42" CM Pipe of $Q_{100} = 45.1$ cfs and peak storm runoff discharges for the 24" CM Pipe $Q_{100} = 21.5$ cfs (existing flows). These existing CM Pipes are plugged and require El Paso County maintenance.

On-site sub-basin D, makes up the central and northern portion of Lot 72, and is 5.02 acres in area. This sub-basin is made up of pasture/meadow areas and one (1) proposed single-family residence with associated driveway all sloping to the south. Sub-basin D generates peak storm runoff discharges of $Q_5 = 1.9$ cfs and $Q_{100} = 11.2$ cfs (existing/proposed flows). The flows from sub-basin D are combined with the off-site flows from OS-2 and flows from Design Point 3 (DP3) with all flowing to the detention basin. These combined flows exit the Detention Basin through an existing 33" CM Pipe with a peak storm runoff discharge of $Q_{100} = 42.9$ cfs (existing/proposed flows) according to the approved Viewpoint Estates Final Drainage Report for the original subdivision.

The storm water flows from the detention basin combine with the storm water flows from sub-basins C and E and exit the site through two existing 30" CM Pipes at Existing Design Point 4 (DP4) with peak storm runoff discharges of $Q_{100} = 50.4$ cfs (existing flows).

The increase in runoff quantities for 100 year storm events will be 2.0 cfs, and 1.6 cfs at design points 1 and 2 respectively. This minor increase in flows will have a minimal impact on the

Provide a hydrology section that details the methodology used to develop flows separate from the sub-basin description section. The calculations alone do not clearly discuss how flows were combined. Flows with different methodologies and different tc's cannot be summed together.

stormwater flows exiting the site. The existing detention basins will not be altered in any way and will continue to drain at the same rate as in existing conditions.

The existing detention basins will be maintained by the Viewpoint Estates HOA.

2.3 Downstream Culverts:

The Viewpoint Estates Final Drainage Report describes culverts located in Lots 71 & 72, Viewpoint Estates, that convey the flows from the site to the other side of Highway 94. The culverts outlined in the report included 3 - 30 inch CSP culverts on the south side of lot 71, and 2 - 30 inch CSP culverts on the south side of lot 72.

3 Drainage Design Criteria

Unresolved: I see the Runoff Calcs from pg 14 to 27. But I don't see where they support this statement.

3.1 Four Step Process:

The El Paso County Engineering Criteria Manual (Appendix I, Section I.7.2) requires the consideration of a "Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long term source controls". The Four Step Process is incorporated in this project and the elements are discussed below.

The portion of the site that is contained within the 2.5-acre single family residential lots are excluded from Post Construction Stormwater Management requirements by ECM I.7.1.B.5 due to the low development density as 2.5-acre lots. There are no proposed improvements associated with the subdivision of the 2.5-acre lots. There are also no improvements planned for the right of way dedication to Highway 94. No post construction stormwater management will be necessary for the planned project.

1) Runoff Reduction Practices are employed in this project. Impervious surfaces have been reduced as much as practically possible with the low residential density. All impervious surfaces on the site will drain to the surrounding pervious areas allowing infiltration and water quality mitigation. Minimized Directly Connected Impervious Areas (MDCIA) is employed on the project because runoff from the impervious areas of the future home sites will pass over the adjacent natural grassed areas for a distance of 25 feet to 300 feet before entering a roadside ditch or natural drainage way.

2) All drainage paths on the site will remain stabilized with the natural native grass lining. No further stabilization is required.

3) The project contains no potentially hazardous uses. The site is exempted from the use of WQCV BMPs by ECM 1.7.1.B.5 by virtue of the large lot rural residential nature of the site having percent imperviousness of less than 10%.

4) The site contains no storage of potentially harmful substances or use of potentially harmful substances. No Site Specific or Other Source Control BMP's are required.

No drainage improvements will be required for the project.

State why - ie no drainageways or culverts will be altered or impacted by development.

3.2 Drainage Fees:

Viewpoint Estates Filing No. 2 is situated in two El Paso County Drainage Basins. The Ellicott Consolidated Drainage Basin has not been studied and is not a Fee Basin at this time. The Telephone Exchange Drainage Basin has drainage fees of \$12,962/Impervious Acre, and bridge fees of \$304/Impervious Acre. The percent Imperiousness of the 2.5-acre Rural Residential site is 11% in accordance with El Paso County Engineering Criteria Manual Appendix L Table 3-1. Also, reductions in the per acre Drainage Fee are allowed pursuant to El Paso County Resolution 99-383.

A fee reduction in the amount of 25% for lots 2.5 acres or larger is utilized for this project. The Viewpoint Estates Filing No. 2 site contains 13.70 acres of land located within the Telephone Exchange Drainage Basin. The Board of County Commissioners, County of El Paso, State of Colorado Resolution No. 20-424 allows the drainage basin fee to be based on impervious acreage.

FEE CALCULATION (2023 Fees)

Telephone Exchange Drainage Basin

Drainage Fee \$12,962 / Impervious Acre @ 13.70 Acres X 11% = \$ 19,533.73

Bridge Fee \$304 / Impervious Acre @ 13.70 Acres X 11% = \$ 458.13

Subtotal = \$ 19,991.86

25% Drainage Fee Reduction = \$ (4,997.97)

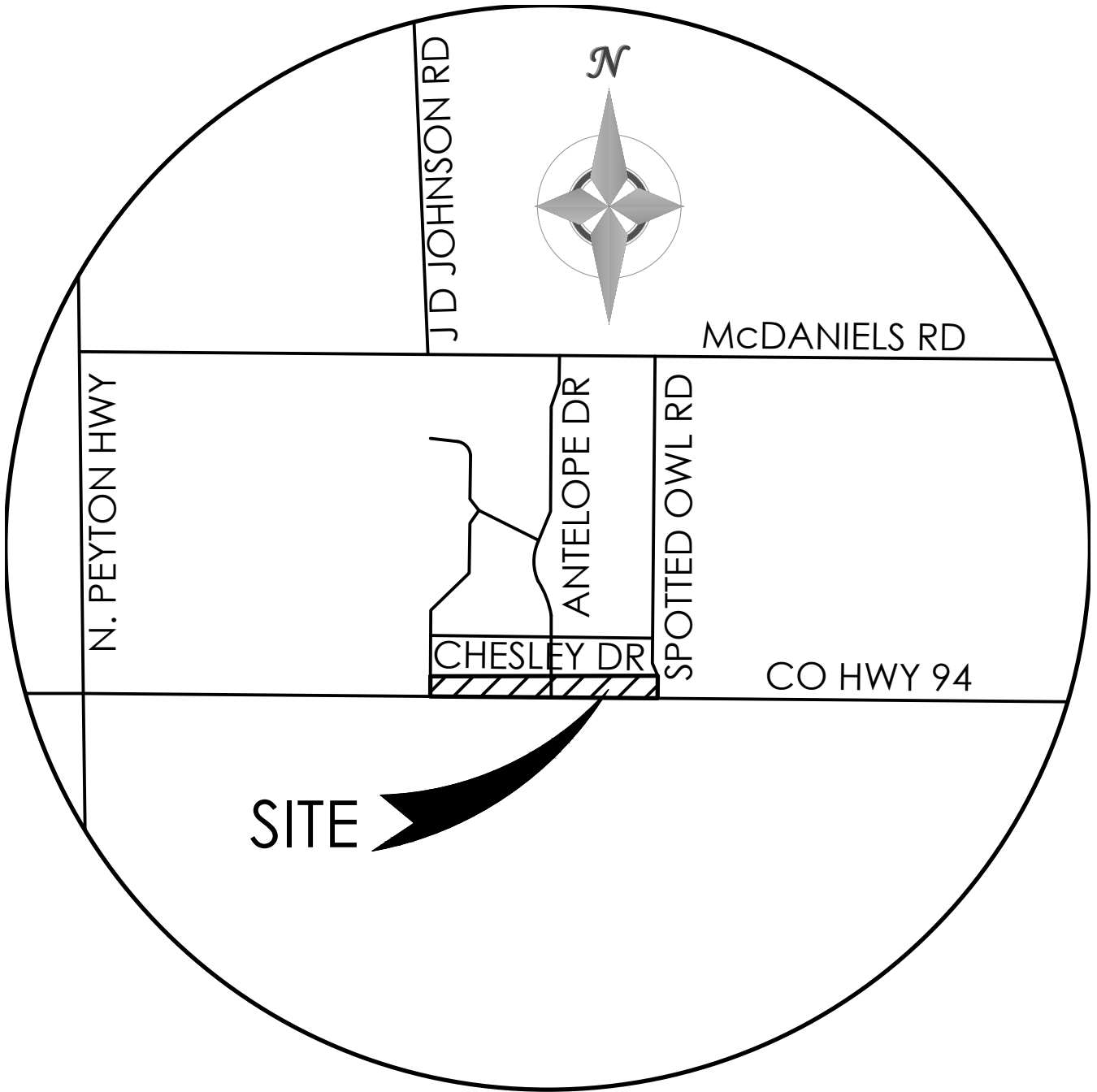
Grand Total Fees = \$ 14,993.90



4 Conclusion:

In Conclusion, the drainage patterns generated by the Viewpoint Estates Filing No. 2 site under proposed developed conditions are essentially the same as those which existed for the existing Plan. During a 100 year storm event it is expected that the storm water runoff will increase by about 2.0% for the entire site. This slight increase represents an insignificant change in the overall drainage patterns of the. The site and drainage are substantially in accordance with the previously approved Drainage Report prepared in 1998. The proposed development as described in this Drainage Letter will have no adverse impacts to downstream and surrounding developments or downstream drainage ways or storm drain facilities.

Attachments



VICINITY MAP

NOT TO SCALE

National Flood Hazard Layer FIRMette



104°26'38"W 38°50'33"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

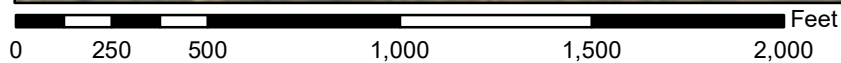
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/8/2021 at 12:57 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette



38°50'35.91"N



1:6,000

38°50'7.88"N

USGS The National Map: Orthoimagery, Data refreshed April, 2019.

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/15/2020 at 11:18:58 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

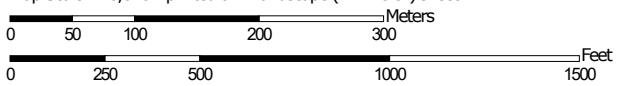
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

104°25'36.61"W

Custom Soil Resource Report Soil Map



Map Scale: 1:6,070 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 17, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	25.6	78.6%
96	Truckton sandy loam, 0 to 3 percent slopes	6.9	21.4%
Totals for Area of Interest		32.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Custom Soil Resource Report

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

Custom Soil Resource Report

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

96—Truckton sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 36bf

Elevation: 6,000 to 7,000 feet

Mean annual precipitation: 14 to 15 inches

Mean annual air temperature: 46 to 50 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Truckton and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Flats

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 8 inches: sandy loam

Bt - 8 to 24 inches: sandy loam

C - 24 to 60 inches: coarse sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 5.7 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Ecological site: Sandy Foothill (R049BY210CO)

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:6,350 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters


0 300 600 1200 1800 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 19, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	21.4	81.1%
96	Truckton sandy loam, 0 to 3 percent slopes	A	5.0	18.9%
Totals for Area of Interest			26.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Time of Concentration (Modified from Standard Form SF-1)

Sub-Basin	Sub-Basin Data				Overland			Shallow Channel				Channelized				t _c Check		
	Area (Acres)	C ₅	C ₁₀₀ /CN	% Imp.	L ₀ (ft)	S ₀ (%)	t _i (min)	L _{0t} (ft)	S _{0t} (ft/ft)	v _{0sc} (ft/s)	t _t (min)	L _{0c} (ft)	S _{0c} (ft/ft)	v _{0c} (ft/s)	t _c (min)	L (min)	t _{c,alt} (min)	t _c (min)
OFFSITE																		
OS-1	1.31	0.45	0.62	45%	25.21	11%	2.7	0	0.000	0.0	0.0	0	0.000	0.0	0.0	25.21	10.1	5.0
OS-2	0.43	0.42	0.61	42%	30.92	10%	3.1	0	0.000	0.0	0.0	0	0.000	0.0	0.0	30.92	10.2	5.0
OS-3	0.75	0.44	0.62	44%	30.92	10%	3.1	0	0.000	0.0	0.0	0	0.000	0.0	0.0	30.92	10.2	5.0
OS-4	0.17	0.28	0.50	25%	30.92	10%	3.8	0	0.000	0.0	0.0	0	0.000	0.0	0.0	30.92	10.2	5.0
EX ONSITE																		
EX-A	10.27	0.08	0.35	0%	100	1%	18.4	680	0.015	0.8	13.4	0	0.000	0.0	0.0	780	14.3	14.3
EX-B	1.99	0.08	0.35	0%	100	1%	18.4	350	0.014	0.8	7.0	0	0.000	0.0	0.0	450	12.5	12.5
EX-C	4.68	0.08	0.35	0%	100	1%	18.4	290	0.021	1.0	4.8	0	0.000	0.0	0.0	390	12.2	12.2
EX-D	5.48	0.08	0.35	0%	100	3%	12.8	480	0.017	0.9	8.9	0	0.000	0.0	0.0	580	13.2	13.2
EX-E	1.92	0.08	0.35	0%	100	1%	18.4	1000	0.018	0.9	17.7	0	0.000	0.0	0.0	1100	16.1	16.1
PROPOSED ONSITE																		
A	10.27	0.13	0.38	7%	100	1%	17.5	680	0.015	0.8	13.4	0	0.000	0.0	0.0	780	14.3	14.3
B	1.99	0.08	0.35	0%	100	1%	18.4	350	0.014	0.8	7.0	0	0.000	0.0	0.0	450	12.5	12.5
C	4.68	0.13	0.39	8%	100	1%	17.5	290	0.021	1.0	4.8	0	0.000	0.0	0.0	390	12.2	12.2
D	5.48	0.10	0.37	3%	100	3%	12.5	480	0.017	0.9	8.9	0	0.000	0.0	0.0	580	13.2	13.2
E	1.92	0.08	0.35	0%	100	1%	18.4	1000	0.018	0.9	17.7	0	0.000	0.0	0.0	1100	16.1	16.1

Provide runoff paths showing overland, shallow concentrated, and channelized Tc path for each watershed.

These don't match the Tc for overland flow which is the only type of flow developed.

Existing Conditions Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C5	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
OFFSITE CONDITIONS																						
	OS-1	1.31	0.45	5.0	0.59	5.09	3.0															
	OS-2	0.43	0.42	5.0	0.18	5.09	0.9															
	OS-3	0.75	0.44	5.0	0.33	5.09	1.7															
	OS-4	0.17	0.28	5.0	0.05	5.09	0.2															
EXISTING CONDITIONS																						
	EX-A	10.27	0.08	14.3	0.82	3.48	2.9															
	EX-B	1.99	0.08	12.5	0.16	3.70	0.6															
	EX-C	4.68	0.08	12.2	0.37	3.74	1.4															
	EX-D	5.48	0.08	13.2	0.44	3.61	1.6															
	EX-E	1.92	0.08	16.1	0.15	3.29	0.5															
EX DESIGN POINTS																						
EX-DP1	VEFDR						UNKNOWN															
EX-DP2																						
	EX-DP1						UNKNOWN															
	OS-1	1.31	0.45	5.0	0.59	5.09	3.0															
	EX-A	10.27	0.08	14.3	0.82	3.48	2.9															
	EX-B	1.99	0.08	12.5	0.16	3.70	0.6															
EX-DP3	VEFDR						UNKNOWN															
DETENTION (RELEASE)																						
	EX-DP3						UNKNOWN															
	EX-C	4.68	0.08	12.2	0.37	3.74	1.4															
	EX-E	1.92	0.08	16.1	0.15	3.29	0.5															
EX-DP4																						
	OS-2	0.43	0.42	5.0	0.18	5.09	0.9															
	OS-4	0.17	0.28	5.0	0.05	5.09	0.2															
	EX-D	5.48	0.08	13.2	0.44	3.61	1.6															
	EX-E	1.92	0.08	16.1	0.15	3.29	0.5															
	DETENTION						UNKNOWN															
EX-DP5	VEFDR						UNKNOWN															
		0.08	0.15																			

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$

P1: 1.5

* Offsite Flows Based On The Approved Viewpoint Estates Final Drainage Report (VEFDR) By Pacific Summit Engineering LLC. Dated January 1998

Why are there so many unknown values? Describe hydrological methodology for developing flows in the text. This table makes it unclear to determine how the flows were developed.

Existing Conditions Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C100	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
OFFSITE CONDITIONS																						
	OS-1	1.31	0.62	5.0	0.82	8.55	7.0															
	OS-2	0.43	0.61	5.0	0.26	8.55	2.2															
	OS-3	0.75	0.62	5.0	0.46	8.55	4.0															
	OS-4	0.17	0.50	5.0	0.08	8.55	0.7															
EXISTING CONDITIONS																						
	EX-A	10.27	0.35	14.3	3.60	5.84	21.0															
	EX-B	1.99	0.35	12.5	0.70	6.21	4.3															
	EX-C	4.68	0.35	12.2	1.64	6.29	10.3															
	EX-D	5.48	0.35	13.2	1.92	6.06	11.6															
	EX-E	1.92	0.35	16.1	0.67	5.53	3.7															
EX DESIGN POINTS																						
EX-DP1	VEFDR						20.97*															
EX-DP2	EX-DP1						20.97*															
	OS-1	1.31	0.62	5.0	0.82	8.55	7.0															
	EX-A	10.27	0.35	14.3	3.60	5.84	21.0															
	EX-B	1.99	0.35	12.5	0.70	6.21	4.3															
EX-DP3	VEFDR						66.6*															
DETENTION (RELEASE)																						
	EX-DP3						66.6*															
	EX-C	4.68	0.35	12.2	1.64	6.29	10.3															
	EX-E	1.92	0.35	16.1	0.67	5.53	3.7															
EX-DP4	OS-2	0.43	0.61	5.0	0.26	8.55	2.2															
	OS-4	0.17	0.50	5.0	0.08	8.55	0.7															
	EX-D	5.48	0.35	13.2	1.92	6.06	11.6															
	EX-E	1.92	0.35	16.1	0.67	5.53	3.7															
	DETENTION						42.9*															
EX-DP5	VEFDR						42.29*															

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$
 P1: 2.52

* Offsite Flows Based On The Approved Viewpoint Estates Final Drainage Report (VEFDR) By Pacific Summit Engineering LLC. Dated January 1998

How were these flows developed? You cannot combine flows developed using different methodologies and Tc.

Unclear how combined runoff was determined - you cannot add flows developed with different tc. How was routing incorporated to get the combined flows? Describe clearly in the drainage text the methodology for developing all flows.

Job No.: **61099**
 Project: **Viewpoint Estates Filing No. 2**
 Design Storm: **5-Year Storm (20% Probability)**
 Jurisdiction: **UDFCD**

Date: **03/03/2023 16:30**
 Calcs By: **WCG, JO**
 Checked By: _____

Proposed Conditions Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C5	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	t _c (min)	CA (Acres)	I5 (in/hr)	Q5 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{Pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
OFFSITE CONDITIONS																						
	OS-1	1.31	0.45	5.0	0.59	5.09	3.0															
	OS-2	0.43	0.42	5.0	0.18	5.09	0.9															
	OS-3	0.75	0.44	5.0	0.33	5.09	1.7															
	OS-4	0.17	0.28	5.0	0.05	5.09	0.2															
PROPOSED CONDITIONS																						
	A	10.27	0.13	14.3	1.32	3.48	4.6															
	B	1.99	0.08	12.5	0.16	3.70	0.6															
	C	4.68	0.13	12.2	0.62	3.74	2.3															
	D	5.48	0.10	13.2	0.56	3.61	2.0															
	E	1.92	0.08	16.1	0.15	3.29	0.5															
PP DESIGN POINTS																						
DP1	VEFDR						UNKNOWN															
DP2																						
	DP1						UNKNOWN															
	OS-1	1.31	0.45	5.0	0.59	5.09	3.0															
	A	10.27	0.13	14.3	1.32	3.48	4.6															
	B	1.99	0.08	12.5	0.16	3.70	0.6															
DP3	VEFDR						UNKNOWN															
DETENTION (RELEASE)																						
	DP3						UNKNOWN															
	C	4.68	0.13	12.2	0.62	3.74	2.3															
	E	1.92	0.08	16.1	0.15	3.29	0.5															
DP4																						
	OS-2	0.43	0.42	5.0	0.18	5.09	0.9															
	OS-4	0.17	0.28	5.0	0.05	5.09	0.2															
	D	5.48	0.10	13.2	0.56	3.61	1.6															
	E	1.92	0.08	16.1	0.15	3.29	0.5															
	DETENTION						UNKNOWN															
DP5	VEFDR						UNKNOWN															

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$

P1: 1.5

* Offsite Flows Based On The Approved Viewpoint Estates Final Drainage Report (VEFDR) By Pacific Summit Engineering LLC. Dated January 1998

Job No.: **61099**
 Project: **Viewpoint Estates Filing No. 2**
 Design Storm: **100-Year Storm (1% Probability)**
 Jurisdiction: **UDFCD**

Date: **03/03/2023 16:30**
 Calcs By: **WCG, JO**
 Checked By: _____

Proposed Conditions Sub-Basin and Combined Flows (Modified from Standard Form SF-2)

DP	Sub-Basin	Area (Acres)	C100	Direct Runoff				Combined Runoff				Streetflow			Pipe Flow					Travel Time		
				t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	t _c (min)	CA (Acres)	I100 (in/hr)	Q100 (cfs)	Slope (%)	Length (ft)	Q (cfs)	Q (cfs)	Slope (%)	Mnngs n	Length (ft)	D _{Pipe} (in)	Length (ft)	V _{disc} (ft/s)	t _t (min)
OFFSITE CONDITIONS																						
	OS-1	1.31	0.62	5.0	0.82	8.55	7.0															
	OS-2	0.43	0.61	5.0	0.26	8.55	2.2															
	OS-3	0.75	0.62	5.0	0.46	8.55	4.0															
	OS-4	0.17	0.50	5.0	0.08	8.55	0.7															
PROPOSED CONDITIONS																						
	A	10.27	0.38	14.3	3.94	5.84	23.0															
	B	1.99	0.35	12.5	0.70	6.21	4.3															
	C	4.68	0.39	12.2	1.81	6.29	11.4															
	D	5.48	0.37	13.2	2.00	6.06	12.1															
	E	1.92	0.35	16.1	0.67	5.53	3.7															
PP DESIGN POINTS																						
DP1	VEFDR						20.97*															
DP2	DP1						20.97*															
	OS-1	1.31	0.62	5.0	0.82	8.55	7.0															
	A	10.27	0.38	14.3	3.94	5.84	23.0															
	B	1.99	0.35	12.5	0.70	6.21	4.3															
DP3	VEFDR						66.6*															
DETENTION (RELEASE)																						
	DP3						66.6*															
	C	4.68	0.39	12.2	1.81	6.29	11.4															
	E	1.92	0.35	16.1	0.67	5.53	3.7															
DP4	OS-2	0.43	0.61	5.0	0.26	8.55	2.2															
	OS-4	0.17	0.50	5.0	0.08	8.55	0.7															
	D	5.48	0.37	13.2	2.00	6.06	12.1															
	E	1.92	0.35	16.1	0.67	5.53	3.7															
	DETENTION						42.9*															
DP5	VEFDR						42.29*															

Rainfall Intensity: $I = (28.5 * P1) / (10 + tc)^{0.786}$

P1: 2.52

* Offsite Flows Based On The Approved Viewpoint Estates Final Drainage Report (VEFDR) By Pacific Summit Engineering LLC. Dated January 1998

Offsite Sub-Basin OS-1 Runoff Calculations

Job No.: 61099

Date: 03/03/2023 16:30

Project: Viewpoint Estates Filing No. 2

Calcs by: WCG, JO

Jurisdiction: UDFCD
Runoff Coefficient: Surface Type

Checked by: _____

Soil Type: A
Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	25,734	0.59	0.89	0.9	0.92	0.94	0.95	0.96	100%
Pasture/Meadow	31,492	0.72	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	57,225	1.31	0.41	0.45	0.50	0.56	0.59	0.62	45.0%

57225

Basin Travel Time

Shallow Channel	Ground Cover	Paved areas/shallow paved swales					
$L_{max,Overland}$	300 ft	C_v	20				
L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)		
Total	25	3	-	-	-	-	
Initial Time	25	3	0.113	-	2.7	10.1 UDFCD Formula RO-3	
Shallow Channel			0.000	0.0	0.0	- UDFCD Formula RO-4	
Channelized			0.000	0.0	0.0	-	
			t_c	5.0 min.			

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	2.2	3.0	3.9	5.0	5.9	7.0
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.2	3.0	3.9	5.0	5.9	7.0

Notes

Offsite Sub-Basin OS-2 Runoff Calculations

Job No.:	61099	Date:	03/03/2023 16:30
Project:	Viewpoint Estates Filing No. 2	Calcs by:	WCG, JO
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	A
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	7,885	0.18	0.89	0.9	0.92	0.94	0.95	0.96	100%
Pasture/Meadow	10,861	0.25	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	18,746	0.43	0.39	0.42	0.47	0.54	0.57	0.61	42.1%

18746

Basin Travel Time

	Shallow Channel Ground Cover		Paved areas/shallow paved swales			
	$L_{max,Overland}$	300 ft	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	31	3	-	-	-	-
Initial Time	31	3	0.103	-	3.1	10.2 UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-
				t_c	5.0 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	0.7	0.9	1.2	1.6	1.9	2.2
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.7	0.9	1.2	1.6	1.9	2.2

Notes

Offsite Sub-Basin OS-3 Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	14,270	0.33	0.89	0.9	0.92	0.94	0.95	0.96	100%
Pasture/Meadow	18,470	0.42	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	32,740	0.75	0.40	0.44	0.49	0.55	0.58	0.62	43.6%

32740

Basin Travel Time

	Shallow Channel Ground Cover		Paved areas/shallow paved swales			
	$L_{max,Overland}$	300 ft	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	31	3	-	-	-	-
Initial Time	31	3	0.103	-	3.1	10.2 UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-
				t_c	5.0 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	1.2	1.7	2.2	2.8	3.3	4.0
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	1.2	1.7	2.2	2.8	3.3	4.0

Notes

Offsite Sub-Basin OS-4 Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Paved	1,809	0.04	0.89	0.9	0.92	0.94	0.95	0.96	100%
Pasture/Meadow	5,460	0.13	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	7,270	0.17	0.24	0.28	0.34	0.42	0.46	0.50	24.9%

7270

Basin Travel Time

	Shallow Channel Ground Cover		Paved areas/shallow paved swales			
	L _{max,Overland} (ft)	ΔZ ₀ (ft)	S ₀ (ft/ft)	v (ft/s)	t (min)	t _{Alt} (min)
Total	31	3	-	-	-	-
Initial Time	31	3	0.103	-	3.8	UDFCD Formula RO-3
Shallow Channel			0.000	0.0	0.0	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-
				t_c	5.0 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	4.04	5.09	5.94	6.78	7.63	8.55
Runoff (cfs)	0.2	0.2	0.3	0.5	0.6	0.7
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.2	0.2	0.3	0.5	0.6	0.7

Notes

Sub-Basin EX-A Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	447,487	10.27	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	447,487	10.27	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

447487

Basin Travel Time

	Shallow Channel	Ground Cover	Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft			C_v	7
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	780	11	-	-	-	-
Initial Time	100	1	0.010	-	18.4	14.3 UDFCD Formula RO-3
Shallow Channel	680	10	0.015	0.8	13.4	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	14.3 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.76	3.48	4.06	4.64	5.22	5.84
Runoff (cfs)	0.6	2.9	6.3	11.9	16.1	21.0
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.6	2.9	6.3	11.9	16.1	21.0

Notes

Sub-Basin EX-B Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	86,860	1.99	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	86,860	1.99	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

86860

Basin Travel Time

Shallow Channel Ground Cover		Short Pasture/Lawns					
	$L_{max,Overland}$	300 ft			C_v	7	
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	450	6	-	-	-	-	
Initial Time	100	1	0.010	-	18.4	12.5	UDFCD Formula RO-3
Shallow Channel	350	5	0.014	0.8	7.0	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
					t_c	12.5 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.93	3.70	4.32	4.93	5.55	6.21
Runoff (cfs)	0.1	0.6	1.3	2.5	3.3	4.3
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.6	1.3	2.5	3.3	4.3

Notes

Sub-Basin EX-C Runoff Calculations

Job No.:	<u>61099</u>	Date:	<u>03/03/2023 16:30</u>
Project:	<u>Viewpoint Estates Filing No. 2</u>	Calcs by:	<u>WCG, JO</u>
Jurisdiction	UDFCD	Checked by:	_____
Runoff Coefficient	Surface Type	Soil Type	A
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	203,897	4.68	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	203,897	4.68	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

203897

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns				
	$L_{max,Overland}$	300 ft			C_v	7	
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)	
Total	390	7	-	-	-	-	
Initial Time	100	1	0.010	-	18.4	12.2	UDFCD Formula RO-3
Shallow Channel	290	6	0.021	1.0	4.8	-	UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	-	V-Ditch
				t_c	12.2 min.		

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.97	3.74	4.37	4.99	5.61	6.29
Runoff (cfs)	0.3	1.4	3.1	5.8	7.9	10.3
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.3	1.4	3.1	5.8	7.9	10.3

Notes

Sub-Basin EX-D Runoff Calculations

Job No.:	61099	Date:	03/03/2023 16:30
Project:	Viewpoint Estates Filing No. 2	Calcs by:	WCG, JO
Jurisdiction	UDFCD	Checked by:	
Runoff Coefficient	Surface Type	Soil Type	A
		Urbanization	Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	238,569	5.48	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	238,569	5.48	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

238569

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft			C_v	7
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	580	11	-	-	-	-
Initial Time	100	3	0.030	-	12.8	UDFCD Formula RO-3
Shallow Channel	480	8	0.017	0.9	8.9	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	13.2 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.86	3.61	4.21	4.81	5.41	6.06
Runoff (cfs)	0.3	1.6	3.5	6.6	8.9	11.6
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.3	1.6	3.5	6.6	8.9	11.6

Notes

Sub-Basin EX-E Runoff Calculations

Job No.:	<u>61099</u>	Date:	<u>03/03/2023 16:30</u>
Project:	<u>Viewpoint Estates Filing No. 2</u>	Calcs by:	<u>WCG, JO</u>
Jurisdiction	<u>UDFCD</u>	Checked by:	
Runoff Coefficient	<u>Surface Type</u>	Soil Type	<u>A</u>
		Urbanization	<u>Urban</u>

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	83,715	1.92	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	83,715	1.92	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

83715

Basin Travel Time

	Shallow Channel Ground Cover	Short Pasture/Lawns	
	$L_{max,Overland}$	300 ft	C_v 7
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft) v (ft/s) t (min) t_{Alt} (min)
Total	1,100	19	- - - -
Initial Time	100	1	0.010 - 18.4 16.1 UDFCD Formula RO-3
Shallow Channel	1,000	18	0.018 0.9 17.7 - UDFCD Formula RO-4
Channelized			0.000 0.0 0.0 - V-Ditch
			t_c 16.1 min.

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.61	3.29	3.84	4.39	4.94	5.53
Runoff (cfs)	0.1	0.5	1.1	2.1	2.8	3.7
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.5	1.1	2.1	2.8	3.7

Notes

Sub-Basin A Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	407,487	9.35	0.02	0.08	0.15	0.25	0.3	0.35	0%
Roofs	8,000	0.18	0.71	0.73	0.75	0.78	0.8	0.81	90%
Gravel	32,000	0.73	0.57	0.59	0.63	0.66	0.68	0.7	80%
Combined	447,487	10.27	0.07	0.13	0.20	0.29	0.34	0.38	7.3%

447487

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	780	11	-	-	-	-
Initial Time	100	1	0.010	-	17.5	14.3 UDFCD Formula RO-3
Shallow Channel	680	10	0.015	0.8	13.4	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	14.3 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.76	3.48	4.06	4.64	5.22	5.84
Runoff (cfs)	2.0	4.6	8.1	13.8	18.0	23.0
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	2.0	4.6	8.1	13.8	18.0	23.0

Notes

Sub-Basin C Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	183,897	4.22	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	16,000	0.37	0.57	0.59	0.63	0.66	0.68	0.7	80%
Roofs	4,000	0.09	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	203,897	4.68	0.08	0.13	0.20	0.29	0.34	0.39	8.0%

203897

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	390	7	-	-	-	-
Initial Time	100	1	0.010	-	17.5	12.2 UDFCD Formula RO-3
Shallow Channel	290	6	0.021	1.0	4.8	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	12.2 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.97	3.74	4.37	4.99	5.61	6.29
Runoff (cfs)	1.1	2.3	4.1	6.8	8.9	11.4
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	1.1	2.3	4.1	6.8	8.9	11.4

Notes

Sub-Basin D Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	228,569	5.25	0.02	0.08	0.15	0.25	0.3	0.35	0%
Gravel	8,000	0.18	0.57	0.59	0.63	0.66	0.68	0.7	80%
Roofs	2,000	0.05	0.71	0.73	0.75	0.78	0.8	0.81	90%
Combined	238,569	5.48	0.04	0.10	0.17	0.27	0.32	0.37	3.4%

238569

Basin Travel Time

	Shallow Channel Ground Cover		Short Pasture/Lawns			
	$L_{max,Overland}$	300 ft		C_v	7	
	L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)
Total	580	11	-	-	-	-
Initial Time	100	3	0.030	-	12.5	UDFCD Formula RO-3
Shallow Channel	480	8	0.017	0.9	8.9	- UDFCD Formula RO-4
Channelized			0.000	0.0	0.0	- V-Ditch
				t_c	13.2 min.	

Rainfall Intensity & Runoff

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.86	3.61	4.21	4.81	5.41	6.06
Runoff (cfs)	0.7	2.0	3.9	7.1	9.4	12.1
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.7	2.0	3.9	7.1	9.4	12.1

Notes

Sub-Basin E Runoff Calculations

Job No.: 61099 Date: 03/03/2023 16:30
 Project: Viewpoint Estates Filing No. 2 Calcs by: WCG, JO
 Checked by: _____
 Jurisdiction: UDFCD Soil Type: A
 Runoff Coefficient: Surface Type Urbanization: Urban

Basin Land Use Characteristics

Surface	Area		Runoff Coefficient						% Imperv.
	(SF)	(Acres)	C2	C5	C10	C25	C50	C100	
Pasture/Meadow	83,715	1.92	0.02	0.08	0.15	0.25	0.3	0.35	0%
Combined	83,715	1.92	0.02	0.08	0.15	0.25	0.30	0.35	0.0%

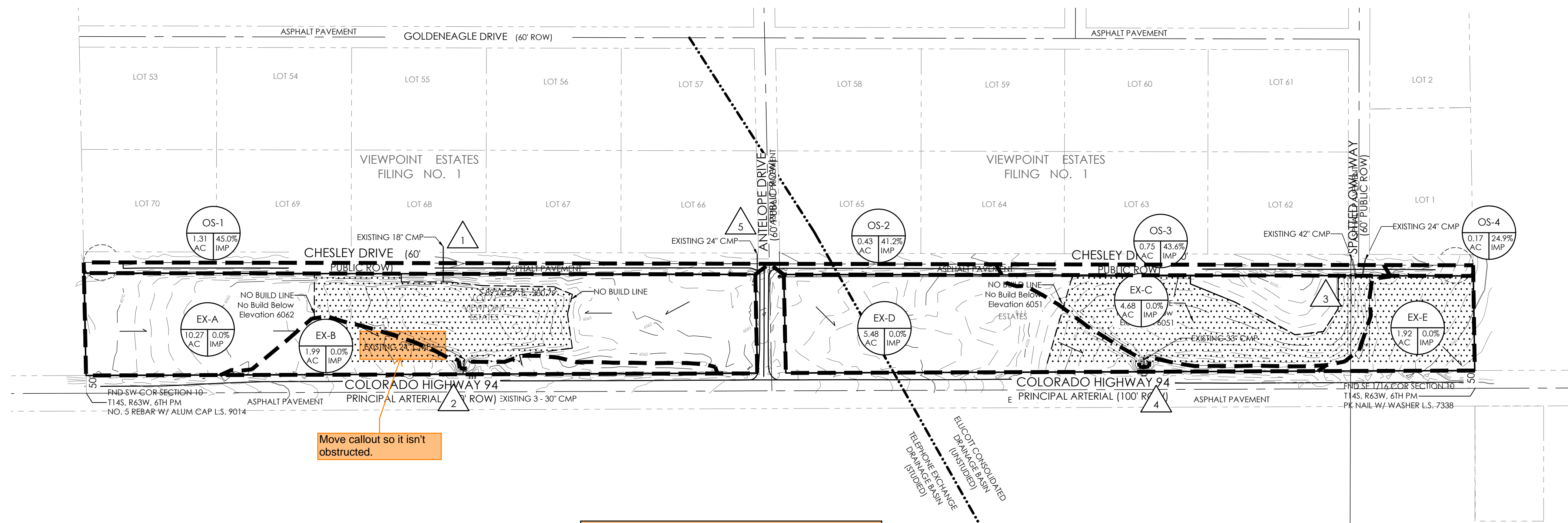
Basin Travel Time

	Shallow Channel	Ground Cover	Short Pasture/Lawns				
$L_{max,Overland}$	300	ft	C_v	7			
L (ft)	ΔZ_0 (ft)	S_0 (ft/ft)	v (ft/s)	t (min)	t_{Alt} (min)		
Total	1,100	19	-	-	-		
Initial Time	100	1	0.010	-	18.4	UDFCD Formula RO-3	
Shallow Channel	1,000	18	0.018	0.9	17.7	UDFCD Formula RO-4	
Channelized			0.000	0.0	0.0	V-Ditch	
				t_c	16.1 min.		

Rainfall Intensity & Runoff

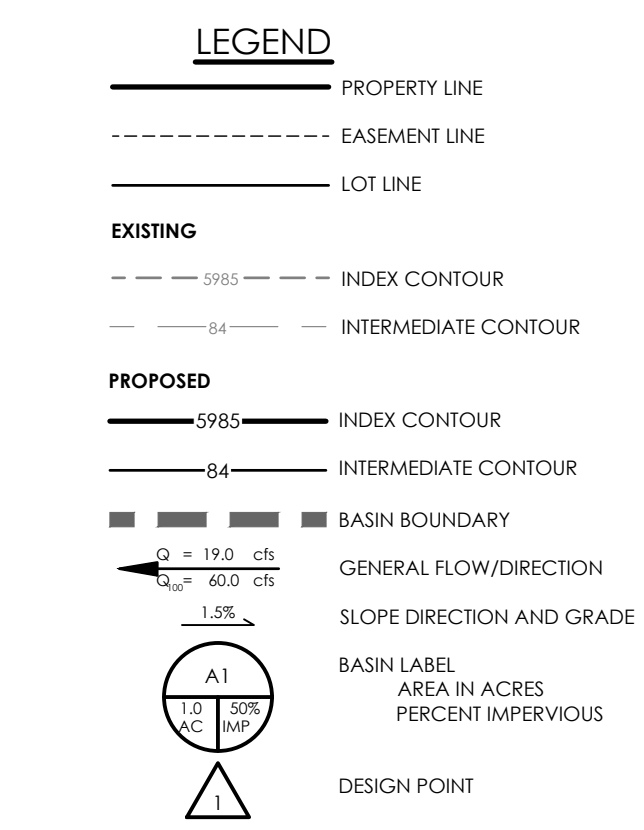
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Intensity (in/hr)	2.61	3.29	3.84	4.39	4.94	5.53
Runoff (cfs)	0.1	0.5	1.1	2.1	2.8	3.7
Release Rates (cfs/ac)	-	-	-	-	-	-
Allowed Release (cfs)	0.1	0.5	1.1	2.1	2.8	3.7

Notes



Move callout so it isn't obstructed.

Show off-site watersheds that contribute to DP1, DP5
Show to paths



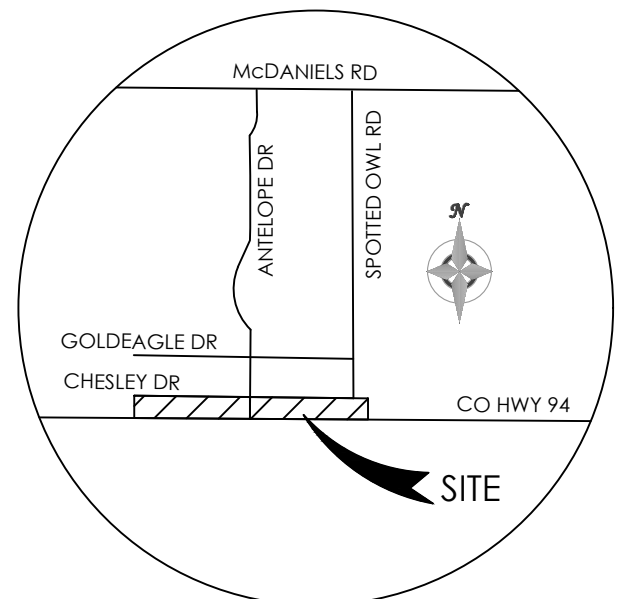
FLOODPLAIN STATEMENT

NO PORTION OF THE SUBJECT PROPERTY IS LOCATED WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) AS INDICATED ON THE FLOOD INSURANCE RATE MAP (FIRM) FOR EL PASO COUNTY, COLORADO AND INCORPORATED AREAS - MAP NUMBERS 08041C0805 G AND 08041C0810 G, EFFECTIVE DECEMBER 7, 2018.

EXISTING DRAINAGE SUMMARY TABLE

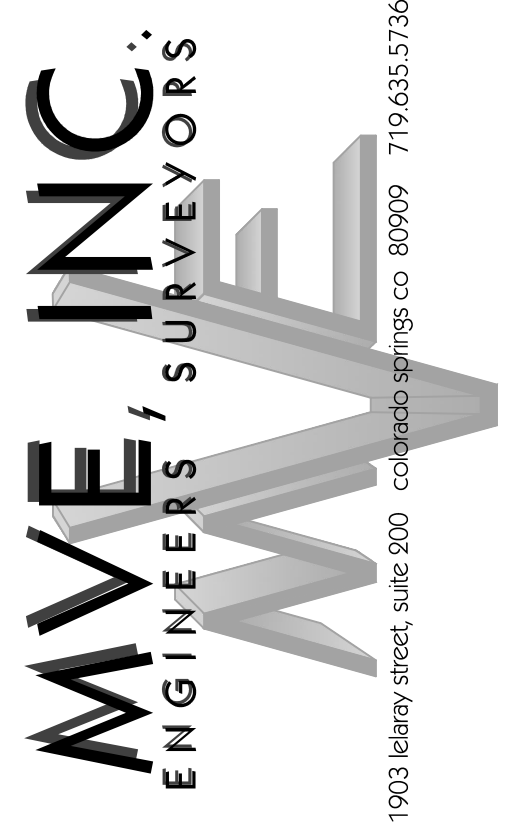
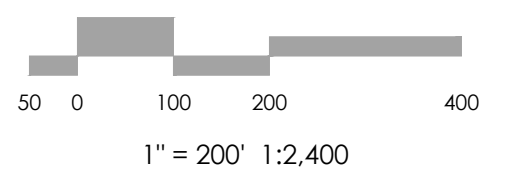
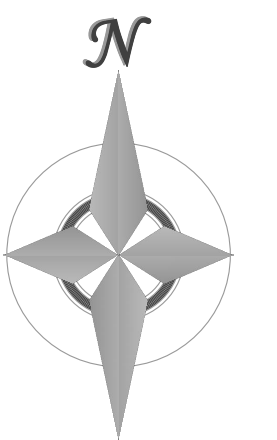
DESIGN POINT	INCLUDED BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF	
				Q5 (CFS)	Q100 (CFS)
	OS-1	1.31	5.0	3.0	7.0
	OS-2	0.43	5.0	0.9	2.2
	OS-3	0.25	5.0	1.7	4.0
	OS-4	0.17	5.0	0.2	0.7
	EX-A	10.27	14.3	2.9	21.0
	EX-B	1.99	12.5	0.6	4.3
	EX-C	4.68	12.2	1.4	10.3
	EX-D	5.48	13.2	1.6	11.6
	EX-E	1.92	16.1	0.5	3.7
EX-DP1*	VEFDR	-	-	-	20.97*
	EX-DP1, OS-1,				
EX-DP2*	EX-A, EX-B	-	-	6.5+	52.27*
EX-DP3*	VEFDR	-	-	1.9+	66.6*
	OS-2, OS-4,				
EX-DP4*	EX-C, EX-E,	-	-	3.0+	60.8*
	DETENTION				
EX-DP5*	VEFDR	-	-	-	42.29*

*OFFSITE FLOWS ARE BASED ON THE APPROVED VIEWPOINT ESTATES FINAL DRAINAGE REPORT (VEFDR), BY PACIFIC SUMMITS ENGINEERING LLC, DATED JANUARY 1998. DENOTED 100 YEAR RUNOFF.



VICINITY MAP
NOT TO SCALE

BENCHMARK



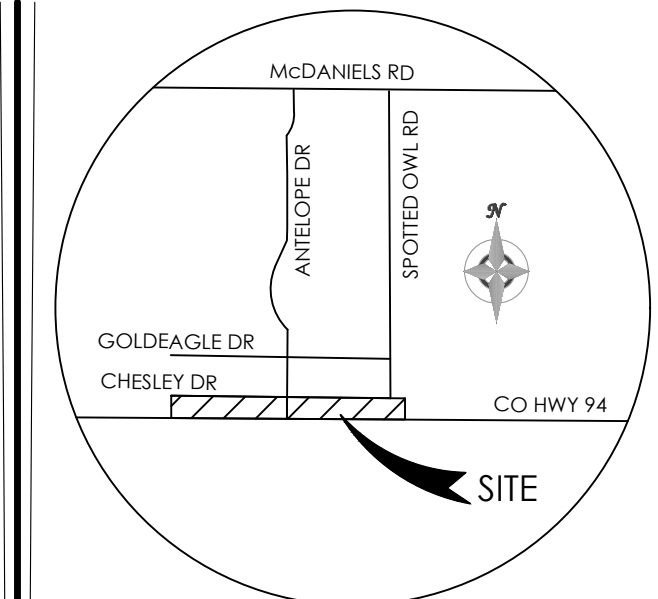
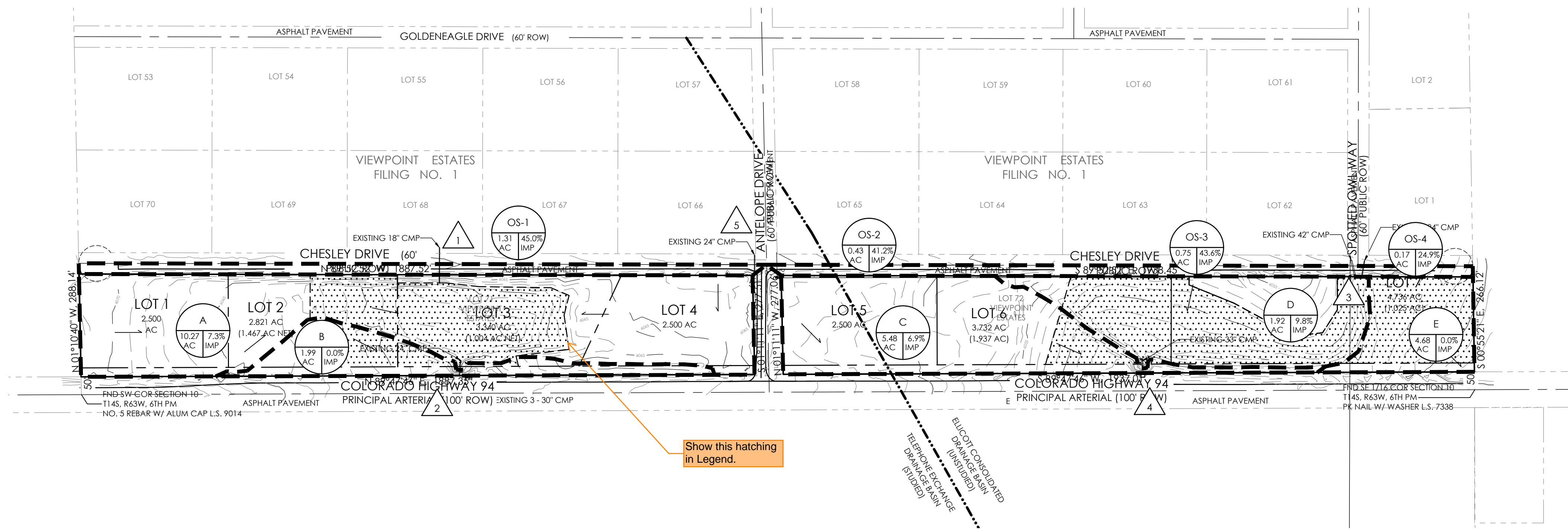
REVISIONS
1. FEBRUARY 25, 2023
OS SUB-BASINS ADDED

DESIGNED BY _____
DRAWN BY _____
CHECKED BY _____
AS-BUILT BY _____
CHECKED BY _____

VIEWPOINT ESTATES FILING NO. 2

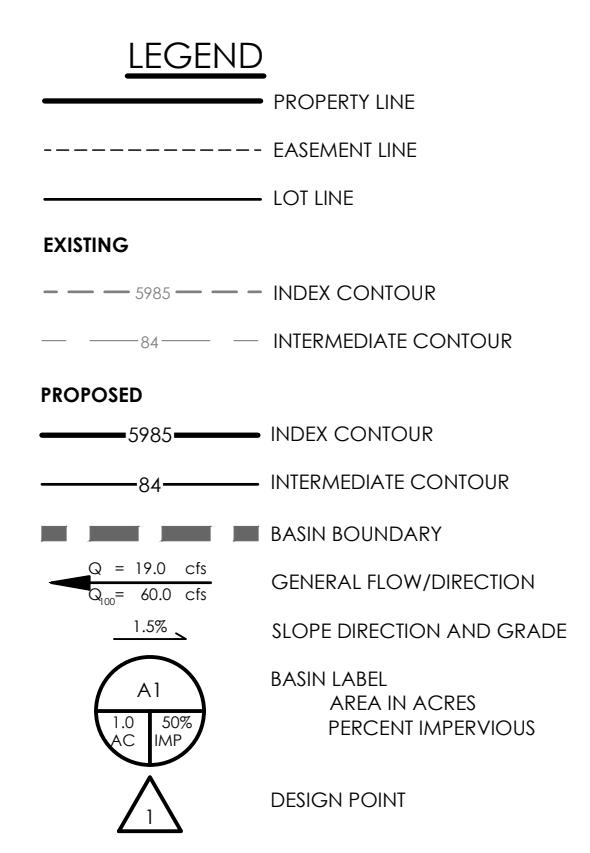
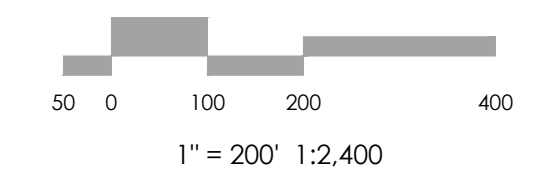
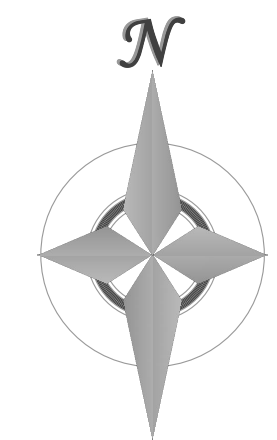
EXISTING DRAINAGE MAP

MVE PROJECT 61099
MVE DRAWING EX-DRN



VICINITY MAP
NOT TO SCALE

BENCHMARK



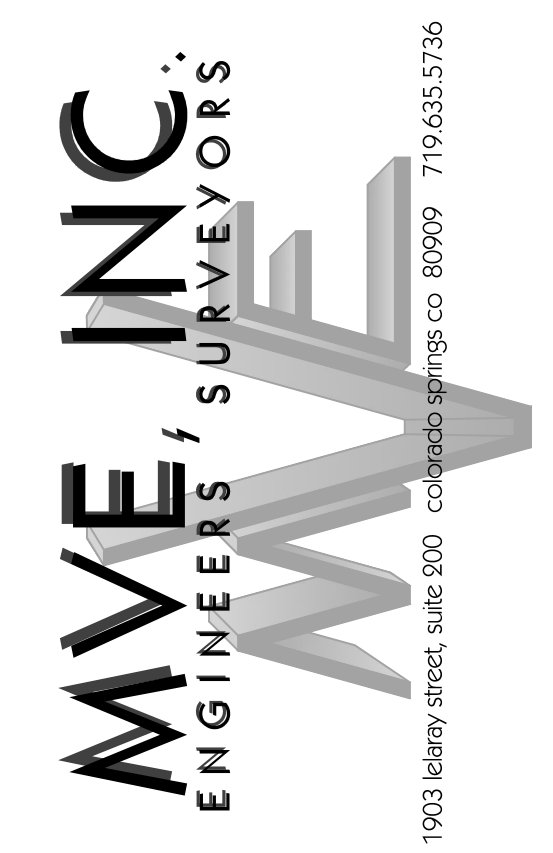
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EXISTING DRAINAGE SUMMARY TABLE

DESIGN POINT	INCLUDED BASIN(S)	AREA (AC)	Tc (MIN.)	RUNOFF	
				Q5 (CFS)	Q100 (CFS)
	OS-1	1.31	5.0	3.0	7.0
	OS-2	0.43	5.0	0.9	2.2
	OS-3	0.25	5.0	1.7	4.0
	OS-4	0.17	5.0	0.2	0.7
	A	10.27	14.3	4.6	23.0
	B	1.99	12.5	0.6	4.3
	C	4.68	12.2	2.3	11.4
	D	5.48	13.2	1.9	11.2
	E	1.92	16.1	0.5	3.7
EX-DP1*	VEFDR	-	-	-	20.97*
	EX-DP1, OS-1,				
EX-DP2*	EX-A, EX-B	-	-	8.2+	55.27
EX-DP3*	VEFDR	-	-	-	66.6*
	OS-2, OS-4,				
EX-DP4*	EX-C, EX-E,	-	-	3.9+	60.9
	DETENTION				
EX-DP5*	VEFDR	-	-	-	42.29*

*OFFSITE FLOWS ARE BASED ON THE APPROVED VIEWPOINT ESTATES FINAL DRAINAGE REPORT (VEFDR), BY PACIFIC SUMMITS ENGINEERING LLC, DATED JANUARY 1998. DENOTED 100 YEAR RUNOFF.



REVISIONS
1. FEBRUARY 25, 2023
OS SUB-BASINS ADDED

DESIGNED BY _____
DRAWN BY _____
CHECKED BY _____
AS-BUILT BY _____
CHECKED BY _____

VIEWPOINT ESTATES FILING NO. 2

PROPOSED DRAINAGE MAP

MVE PROJECT 61099
MVE DRAWING PP-DRN