FINAL DRAINAGE REPORT
Ferranti Residence, 2290 Old Ranch Road, Colorado Springs, Colorado
Lot 8, Block E, Amended Filing of Springs Crest Subdivision
El Paso County, Colorado

Prepared for:

Jeremy and Allison Ferranti
2290 Old Ranch Road
Colorado Springs, Co 80908

Prepared by:

True West Co, LLC
16352 E. Bates Drive
Aurora, CO 80013
truewest1@usa.net
303-523-3664
Attn: Connie Ellefson, P.E.

Revised February 12, 2024
Revised January 13, 2024
November 1, 2023
PCD File No. CDR2320

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 applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Connie L. Ellefson

Connie L. Ellefson, P.E. Colorado P.E. 23371

Developer's Statement

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

JEREMY FERRANTI - HOMEOWNER — FEB 22, 2024

Name,Title: — Date

Business Name HOMEOWNER

Address: 2290 OLD RANCH RD

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, P.E. — Date
County Engineer / ECM Administrator

Conditions:

A. PURPOSE

The purpose of this letter is to demonstrate that the proposed drainage changes to Lot 8, Block E, Amended Filing of Springs Crest Subdivision will not adversely affect downstream properties, and conform to El Paso County drainage criteria.

The site is located in unincorporated El Paso County, Colorado, in the NW Quarter of Section 28, Township 12 South, Range 66 West, of the 6th Principal Meridian. It is bounded on the northwest by Pendleton Subdivision, on the south by Spring Crest Amended Filing and on the east by unplatted land, with Creekside Subdivision Filing No. 3 beyond.

This site was previously developed with a residence, storage shed, and garage, with a circular gravel driveway, landscape and utilities. With the proposed development, the existing house will be removed and replaced with a 3200--square foot (footprint) residence (2-story) and oversized garage (included in the 3200 sf). The existing garage has been remodeled into a studio/office. The concrete apron to the existing garage will be replaced due to poor condition.

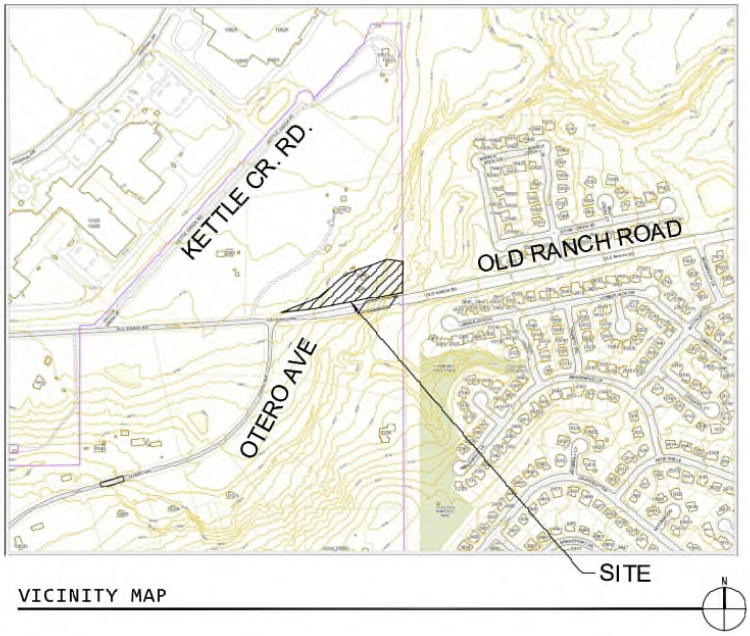
The access drive to the house and its garage will be gravel without curbing, allowing the drive area to drain to open space, and improve water quality.

B. GENERAL LOCATION AND DESCRIPTION

The site is located in the Kettle Creek drainage basin FOMO3000.

It is a roughly triangular area north of Old Ranch Road, approximately 0.6 miles west of Voyager Parkway and one mile east of N. Powers Boulevard. Kettle Creek forms the southeast side of the site.

The lot contains 2.19 acres, of which approximately 0.5 acres along Kettle Creek is in the Zone AE floodplain (floodplain base flood elevation at 6671 adjacent to buildings, at least 10' below the finished floor elevations.)



Runoff will flow off the gravel drive as sheet flow. Runoff from the buildings will return to sheet flow as it travels across grass buffers a minimum of 40 feet wide to flow into Kettle Creek.

C. EXISTING DRAINAGE CHARACTERISTICS

The existing site is sloped from the northwest to the southeast, with steep slopes, between 8 and 20% along the northwest side. The area in the middle of the lot, where the existing buildings and circular drive are located is much flatter, averaging 1.5% slope. The lot drops off steeply to the southeast beyond that, to Kettle Creek.

The drainageway appears stable, with mature vegetation throughout the area within the lot. A limited area of riprap exists near the bridge over Kettle Creek, presumably to stabilize the area after bridge construction. It appears to be stable as well, without signs of excessive erosion.

The slope along the northwest side is heavily wooded with evergreen trees, the upper channel of Kettle Creek (above the floodplain) contains several large deciduous trees, and other trees of both types are scattered more sparsely throughout the lot, with native grass, and a small amount of sod and landscaping around the existing residence.

Offsite runoff enters the site from the northwest (2.91 acres, divided into two basins) part of an existing large-acreage residence (one residence on 11.9 acres) of primarily grassland, with the heavily wooded area adjacent to the northwest corner of the site as sheet flow (Design Points 1, and 3).

The existing onsite area corresponding to the proposed developed area of the lot has been divided into two basins.

Basin H1 (0.23 acres) contains roof, concrete patio, and landscape. It receives runoff from Basin O1 (0.92 acres), and the combined runoff drains around the north end of the house, then southeast to Kettle Creek (Design Point H1).

Basin H2 (0.70 acres) contains buildings, gravel drive, concrete walk, and landscape. It drains, along with runoff from Basin O2 (1.99 acres) to the southeast around the south side of the house, and around the south side of the garage, to Kettle Creek (Design Point H2.)

The only drainage provision is an existing 24" CMP culvert under the entrance drive, connecting the roadside swale that flows along the north side of Old Ranch Road to Kettle Creek. No new storm sewer is proposed.

D. PROPOSED DRAINAGE CHARACTERISTICS

The developed area of the site has been divided into four small basins, and the flows from the total of these four areas was compared to the same area of the existing site,

The wedge of land extending west along the right-of-way from the proposed driveway, as well as the area of the floodplain for Kettle Creek, were both omitted from calculations. The land in both areas will remain unchanged, and any flows from offsite areas draining to those two areas will not be changed or redirected.

Onsite Basin A1 (0.19 acres) consists of the north section of the gravel driveway garage, as well as the greenbelt area north and east of them. It will receive runoff from offsite Basin O1 (Design Point 1), and a swale (Swale A1- See Calculation in Appendix) will be graded in that basin to the direct the offsite runoff east (Design Point 2) around the north end of the new building, and toward the Creek, as under existing conditions.

Basin B1 (0.23 acres) contains open space west of the proposed new residence/garage. This area will remain undisturbed, but is tributary, along with runoff from Basin O2 to the driveway entrance to the site (Design Point 4.)

Basin B2 (0.34 acres) contains most of the gravel drive and the west half of the studio/office roof. It drains to a concrete pan (Swale B1 – See Calculation in Appendix) across the gravel drive at the low point of the drive and gravel Swale B2 south of the garage apron, joining runoff from Basins O2 and B1 (Design Point 5). The runoff releases across riprap erosion protection to spread the flow out, and continues across an approximate 120' buffer of open space before reaching the Kettle Creek top of bank, as under existing conditions.

Basin B3 (0.17 acres of open space, the remainder of the proposed building, and the east half of the studio/office roof, located in the south end of the developed area. It sheet flows to Kettle Creek (Design Point 6).

The total disturbed area is approximately 0.87 acres.

The flows are as follows, for historic (existing) and proposed:

EXISTING RUNOFF SUMMARY

DES. PT.	BASIN	AREA (AC.)	5-YR FLOW (cfs)	100-YR FLOW (cfs)
1	O1	0.92	0.36	2.06
	H1	0.23	0.19	0.81
H1	O1 + H1	1.15	0.48	2.55
2	O2	1.99	0.83	4.74
	H2	0.70	0.71	2.46
H2	O2 + H2	1.69	1.36	6.46
	H1 + H2	0.93	0.90	3.20

PROPOSED RUNOFF SUMMARY

DES. PT.	BASIN	AREA (AC.)	5-YR FLOW (cfs)	100-YR FLOW (cfs)
1	O1	0.92	0.36	2.06
	A1	0.19	0.25	0.73
2	O1 +A1	1.11	0.54	2.51
3	O2	1.99	0.83	4.74
	B1	0.23	0.10	0.65
4	O2 + B1	2.19	0.89	5.14
	B2	0.34	0.52	1.50
5	O2-B2	2.56	1.26	6.20
	B3	0.17	0.24	0.73
6	O2-B3	2.73	1.41	6.60
	A1 - B3	0.93	0.95	3.16

NOTE: The runoff rates are approximately the same for existing and proposed, at the corresponding design points.

Proposed flowrates are not required to match existing flowrates, though they are close in this instance. The imperviousness of the proposed development is higher than existing, however flowpaths are longer, resulting in similar net flowrates (less than or equal to 0.1 cfs difference.)

E. WATER QUALITY

No permanent water quality BMPs are proposed, as the development will disturb less than 1.0 acre, and the site is not part of an overall development.

Water quality is improved by the fact that all the impervious areas drain to wide grass buffers before draining into Kettle Creek.

See "Four-Step Process" below for further information.

F. HYDROLOGY CALCULATIONS AND DRAINAGE FACILITY DESIGN

Drainage criteria was taken from the El Paso County Drainage Design Criteria Manual Volume 1 (DCM). This manual refers to the Mile High Flood District's Urban Drainage Criteria Manual, Volumes 1-3 (Denver, Colorado) for certain calculation methods, specifically in determining detention volume and Minimize Directly Connected Impervious Area.

The design rainfall for the minor storm (5-year) is a one-hour precipitation rate of 1.50 inches, and for the major storm (100-year), a one-hour rate of 2.60 inches. Runoff from all Basins was calculated using the rational method, as outlined in the DCM. Time of concentration was calculated using c-values from the El Paso County DCM Volume 1, Chapter 6. Design storm recurrence intervals used in this hydrologic analysis were the 5-year and the 100-year storms.

See discussion under part "D" for swale locations.

Flow rate calculations are shown in the Appendix for the Rational Method. The standard values used for the calculations, such as the rainfall intensity curves, also appear in the Appendix.

Four Step Process for receiving water protection. The El Paso County requires discussion of how the "Four Step Process" as outlined in Appendix I.7.2 for "reducing runoff volumes, treating water quality capture volume (EURV), stabilizing drainageways, and implementing long-term source controls."

The steps have been considered and incorporated in the drainage plan for this project as follows:

Step 1: Employ runoff reduction practices

The amount of open space/landscape area on the overall site is approximately 89%.

All of the existing and proposed impervious area will release into open space landscape buffers ranging from 40-120' wide before reaching the Kettle Creek channel.

The gravel driveways will be constructed without curb and gutter and are graded to drain as sheet flow to landscape/open space where possible. All the roof areas, but the 250sf roof on the porch of the proposed building drain to landscape.

Step 2: Stabilize drainageways.

The swales will be grass-lined and designed with low velocities. Riprap will protect the locations of concentrated flow to help return it to sheet flow.

Step 3: Provide Water Quality Capture Volume

Detention and Water Quality Capture Volume is not required for this site, as it will disturb under 1.0 acre.

Step 4: Consider Need for Industrial and Commercial BMP's.

Source pollutants are not expected to be a large problem with the proposed site use. No automotive servicing activities are anticipated other than parking. All parking area runoff will be routed through wide grass buffers.

G. FLOODPLAIN STATEMENT

According to the Federal Emergency Management Agency (FEMA), as depicted on Flood Insurance Rate Map (FIRM) No. 08041C0506G, Dec. 7, 2018, the southeastern 0.5 acres of the site is in Zone AE, the deep, defined channel for Kettle Creek. The floodplain won't be disturbed with this redevelopment, and the floodplain base flood elevation is at 6671 adjacent to buildings, at least 10' below the finished floor elevations.

The floodplain line has been corrected to match the FEMA Base Flood Elevations, which was incorrectly shown on the original survey as being much higher at the northeast end of the site.

H. EROSION CONTROL

Erosion control plans are included in the separate plan set, Grading and Erosion Control Plan.

I. DRAINAGE/BRIDGE FEES

No fees are due with site development plan applications.

J. CONSTRUCTION COST OPINION

No drainage structures are proposed.

CONCLUSION

The redevelopment and proposed drainage patterns for Lot 8, Block E, Amended Filing of Springs Crest Subdivision, Ferranti Residence, will not negatively impact downstream properties. The proposed flowrates will be approximately the same as existing.

The existing stream, Kettle Creek is protected by grass buffers at least 40-120' wide from any proposed or existing impervious area, and the one new point of concentrated flow will be protected with riprap.

APPENDIX

National Flood Hazard Layer FIRMette

FEMA

Legend

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

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - 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 *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - 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
  - 513 Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

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 7/20/2019 at 12:03:47 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.

True West Co., LLC
Ferranti Residence
2290 Old Ranch Road

1/12/2024

Hydrologic Soil Type B

Existing Site

2.19 acres 95600

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	87,770	0.09	0.35	2%
Gravel Rd	3,725	0.59	0.70	80%
Roof	2,990	0.73	0.81	90%
Walks/Drives	1,115	0.90	0.96	100%
	95,600			

Proposed Imperviousness

I= 8.9%

C5 = 0.14

C100 = 0.39

Proposed Site 2.19 acres 95600

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	84,470	0.09	0.35	2%
Gravel Rd	6,192	0.59	0.70	80%
Roof	4,185	0.73	0.81	90%
Walks/Drives	753	0.90	0.96	100%
	95,600			

Proposed Imperviousness

I= 11.7%

C5 = 0.16

C100 = 0.40

Basin O1 0.92 acres 40042 Soil Type A

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	38,672	0.09	0.35	2%
Gravel Rd	1,370	0.59	0.70	80%
Roof	0	0.73	0.81	90%
Walks/Drives	0	0.90	0.96	100%

40,042

Proposed Imperviousness

I= 4.7%

C5 = 0.11

C100 = 0.36

Basin O2 1.99 acres 86708 Soil Type A

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	83,398	0.09	0.35	2%
Gravel Rd	2,310	0.59	0.70	80%
Roof	1,000	0.73	0.81	90%
Walks/Drives	0	0.90	0.96	100%
	86,708			

Proposed Imperviousness

I= 5.1%

C5 = 0.11

C100 = 0.36

Basin H1 0.23 acres 9979 Soil Type B

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	8,759	0.09	0.35	2%
Gravel Rd	0	0.59	0.70	80%
Roof	1,153	0.73	0.81	90%
Walks/Drives	67	0.90	0.96	100%
	9,979			

Proposed Imperviousness

I= 12.8%

C5 = 0.17

C100 = 0.41

Basin H2 0.70 acres 30545 Soil Type B

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	23,935	0.09	0.35	2%
Gravel Rd	3,725	0.59	0.70	80%
Roof	1,837	0.73	0.81	90%
Walks/Drives	1,048	0.90	0.96	100%

30,545

Proposed Imperviousness

I= 20.2%

C5 = 0.22

C100 = 0.44

Basin H1 -H2 0.93 acres 40524 Soil Type B

(corresponding to developed area calculated)

Existing Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	32,694	0.09	0.35	2%
Gravel Rd	3,725	0.59	0.70	80%
Roof	2,990	0.73	0.81	90%
Walks/Drives	1,115	0.90	0.96	100%
	40,524			

Proposed Imperviousness

I= 18.4%

C5 = 0.21

C100 = 0.43

A1 0.19 acres 8458

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	5,440	0.09	0.35	2%
Gravel Rd	1,209	0.59	0.70	80%
Roof	1,809	0.73	0.81	90%
Walks/Drives	0	0.90	0.96	100%
	8,458			

Proposed Imperviousness

I= 32.0%

C5 = 0.30

C100 = 0.50

B1 0.23 acres 10018

Proposed Composite Coefficients of Rch

Cover type	Area (sf)	C5	C100	Imperviousness

Landscape	10,018	0.09	0.35	2%
Gravel Rd	0	0.59	0.70	80%
Roof	0	0.73	0.81	90%
Walks/Drives	0	0.90	0.96	100%
	10,018			

Proposed Imperviousness

I= 2.0%

C5 = 0.09

C100 = 0.35

B2 0.34 acres 14792

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	8,893	0.09	0.35	2%
Gravel Rd	4,983	0.59	0.70	80%
Roof	365	0.73	0.81	90%
Walks/Drives	551	0.90	0.96	100%
	14,792			

Proposed Imperviousness

I= 34.1%

C5 = 0.30

C100 = 0.50

B3 0.17 acres 7355

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	5,168	0.09	0.35	2%
Gravel Rd	0	0.59	0.70	80%
Roof	2,005	0.73	0.81	90%
Walks/Drives	182	0.90	0.96	100%
	7,355			

Proposed Imperviousness

I= 28.4%

C5 = 0.28

C100 = 0.49

B1-B3 0.74 acres 32165

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	24,079	0.09	0.35	2%
Gravel Rd	4,983	0.59	0.70	80%
Roof	2,370	0.73	0.81	90%
Walks/Drives	733	0.90	0.96	100%
	32,165			

Proposed Imperviousness

I= 22.8%

C5 = 0.23

C100 = 0.45

A1-B3

Imperviousness of redeveloped area - corresponding to H

Dev. Area-A1-B2 0.93 acres 40623

Proposed Composite Coefficients of Runoff

Cover type	Area (sf)	C5	C100	Imperviousness
Landscape	29,519	0.08	0.35	2%
Gravel Rd	6,192	0.59	0.70	80%
Roof	4,179	0.73	0.81	90%
Walks/Drives	733	0.90	0.96	100%
	40,623			

Proposed Imperviousness

I= 24.7%

C5 = 0.24

C100 = 0.46

Calculation of Peak Runoff using Rational Method

Designer:
Company:
Date: 1/13/2024
Project: Ferranti Residential
Location:

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i+9)\sqrt{S_t}}$

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	1.19	1.50	1.80	2.00	2.25	2.60	3.35

Rainfall Intensity Equation Coefficients =	a	b	c
	28.50	10.00	0.786

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Site Historic	2.19	B	8.9	0.05	0.06	0.13	0.30	0.38	0.47	0.57	50.00			0.080	6.67	160.00			0.019	20	2.76	0.97	7.64	26.38	10.00	3.22	4.06	4.87	5.41	6.09	7.03	9.06	0.35	0.55	1.37	3.61	5.03	7.20	11.29
					0.14				0.39						6.17								7.14		7.14	3.63	4.58	5.50	6.11	6.87	7.94	10.23	0.39	1.40	1.55	4.08	5.68	6.78	12.74
Site Developed	2.19	B	11.3	0.07	0.08	0.15	0.32	0.39	0.48	0.58	30.00			0.140	4.22	170.00			0.028	20	3.35	0.85	5.07	25.68	10.00	3.22	4.06	4.87	5.41	6.09	7.03	9.06	0.46	0.71	1.58	3.79	5.21	7.37	11.46
					0.15				0.40						3.93								4.78		5.00	4.04	5.09	6.11	6.78	7.63	8.82	11.36	0.58	1.67	1.98	4.75	6.54	7.73	14.37
O1	0.92	A	4.7	0.02	0.02	0.02	0.03	0.07	0.15	0.28	50.00			0.035	9.14	400.00			0.035	7	1.31	5.09	14.23	28.89	14.23	2.77	3.49	4.19	4.65	5.23	6.05	7.79	0.04	0.06	0.08	0.12	0.31	0.82	2.04
					0.11				0.36						8.36								13.45		13.45	2.84	3.58	4.30	4.77	5.37	6.21	8.00	0.04	0.36	0.08	0.12	0.32	2.06	2.09
O2	1.99	A	5.1	0.02	0.02	0.02	0.03	0.07	0.15	0.29	50.00			0.080	6.95	415.00			0.035	7	1.31	5.28	12.23	28.94	12.23	2.96	3.73	4.48	4.98	5.60	6.47	8.34	0.10	0.14	0.20	0.31	0.76	1.93	4.76
					0.11				0.36						6.36								11.65		11.65	3.02	3.81	4.58	5.08	5.72	6.61	8.52	0.10	0.83	0.20	0.32	0.78	4.73	4.86
H1	0.23	B	12.8	0.08	0.09	0.16	0.33	0.40	0.49	0.58	30.00			0.100	4.66	150.00			0.023	15	2.27	1.10	5.76	25.35	10.00	3.22	4.06	4.87	5.41	6.09	7.03	9.06	0.06	0.09	0.18	0.41	0.56	0.79	1.21
					0.17				0.41						4.30								5.40		5.40	3.95	4.98	5.98	6.64	7.48	8.64	11.13	0.07	0.19	0.22	0.50	0.69	0.81	1.49
H2	0.70	B	20.2	0.13	0.15	0.22	0.38	0.44	0.52	0.61	50.00			0.080	6.10	225.00			0.036	15	2.85	1.32	7.42	24.24	7.42	3.59	4.52	5.43	6.03	6.78	7.84	10.10	0.32	0.48	0.84	1.59	2.09	2.85	4.31
					0.22				0.44						5.66								6.97		6.97	3.66	4.62	5.54	6.16	6.93	8.00	10.31	0.33	0.71	0.85	1.62	2.14	2.47	4.40
H1 + H2	0.93	B	18.4	0.12	0.14	0.21	0.36	0.43	0.51	0.60																													
					0.21				0.43																6.97	3.66	4.62	5.54	6.16	6.93	8.00	10.31	0.39	0.90	1.06	2.09	2.77	3.20	5.79
A1	0.19	B	32.0	0.22	0.25	0.32	0.45	0.51	0.57	0.65	40.00			0.020	7.74	110.00			0.050	15	3.35	0.55	8.29	21.17	8.29	3.45	4.35	5.23	5.81	6.53	7.55	9.72	0.14	0.21	0.31	0.50	0.63	0.82	1.21
					0.30				0.50						7.27								7.81		8.00	3.50	4.41	5.29	5.88	6.61	7.64	9.85	0.15	0.25	0.32	0.50	0.64	0.73	1.22
B1	0.23	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54	45.00			0.080	6.63	110.00			0.050	15	3.35	0.55	7.18	26.54	10.00	3.22	4.06	4.87	5.41	6.09	7.03	9.06	0.01	0.01	0.08	0.33	0.47	0.70	1.13
					0.09				0.35						6.16								6.71		6.71	3.71	4.67	5.61	6.23	7.01	8.10	10.44	0.01	0.10	0.09	0.37	0.55	0.65	1.30
B2	0.34	B	34.1	0.24	0.27	0.33	0.46	0.52	0.58	0.66						55.00			0.024	20	3.10	0.30		20.63															
					0.30				0.50																5.00	4.04	5.09	6.11	6.78	7.63	8.82	11.36	0.33	0.52	0.69	1.07	1.34	1.50	2.55
B3	0.17	B	28.4	0.19	0.22	0.29	0.43	0.49	0.56	0.64																													
					0.28				0.49																5.00	4.04	5.09	6.11	6.78	7.63	8.82	11.36	0.13	0.24	0.30	0.49	0.63	0.73	1.24
O1 + A1		B														170.00			0.015	15	1.84	1.54																	
																									15.00	2.70	3.41	4.09	4.54	5.11	5.90	7.61							
O1 + A1		B														170.00			0.015	15	1.84	1.54																	
																									15.00	2.70	3.41	4.09	4.54	5.11	5.90	7.61							
O2 + B1		B														140.00			0.054	15	3.49	0.67																	
																									12.32	2.95	3.72	4.47	4.96	5.58	6.45	8.31							
+B2		B														35.00			0.027	20	3.29	0.18																	
																									12.50	2.93	3.70	4.44	4.93	5.55	6.41	8.26							
+B3																65.00			0.015	15	1.84	0.59																	
																									13.09	2.88	3.62	4.35	4.83	5.44	6.28	8.10							
A1-B3	0.93	B	24.7	0.16	0.19	0.26	0.40	0.47	0.54	0.63	45.00			0.080	5.57	240.00			0.012	20	2.19	1.83	7.39	24.73	7.39	3.59	4.53	5.44	6.04	6.79	7.85	10.12	0.54	0.79	1.30	2.27	2.94	3.95	5.89
					0.24				0.46						5.24								7.07		8.83	3.38	4.26	5.11	5.67	6.38	7.38	9.50	0.51	0.95	1.22	2.13	2.77	3.16	5.54
O1 + H1																150.00			0.023	15	2.27	1.10																	
																									14.55	2.74	3.45	4.15	4.61	5.18	5.99	7.71							
O2 + H2																225.00			0.036	15	2.85	1.32																	
																									12.97	2.89	3.64	4.37	4.85	5.46	6.31	8.13							

CALCULATED BY: CLE

DATE: 1/13/2024

STANDARD FORM SF -2
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

PROJECT: 2290 Old Ranch Rd.

DESIGN STORM: 5 YR

MAJOR STORM: 100YR

	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	tc (MIN)	C . A (AC)	I IN / HR	Q (CFS)	tc (MIN)	SUM C . A (AC)	I IN / HR	Q (CFS)	SLOPE (%)	STREET FLOW(CFS)	DESIGN FLOW(CFS)	SLOPE (%)	PIPE SIZE	LENGTH (FT)	VELOCITY (FPS)	tt (MIN)	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
5-yr	1	O1	0.92	0.11	13.45	0.10	3.58	0.36													
	2	+A1	0.19	0.30	8.00	0.06	4.41	0.25	15.00	0.16	3.41	0.54									
	3	O2	1.99	0.11	11.65	0.22	3.81	0.83													
	4	+B1	0.23	0.09	6.71	0.02	4.67	0.10	12.32	0.24	3.72	0.89									
	5	+B2	0.34	0.30	5.00	0.10	5.09	0.52	12.50	0.34	3.70	1.26									
	6	+B3	0.17	0.28	5.00	0.05	5.09	0.24	13.09	0.39	3.62	1.41									
	H1 + H2	0.93		0.21																	
	A1-B3	0.93	0.93	0.24	8.83	0.22	4.26	0.95													
	O1		0.92	0.11	13.45	0.10	3.58	0.36													
	+H1		0.23	0.17	5.40	0.04	4.98	0.19	14.55	0.14	3.45	0.48									
	O2		1.99	0.11	11.65	0.22	3.81	0.83													
	+ H2		0.70	0.22	6.97	0.15	4.62	0.71	12.97	0.37	3.64	1.36									
100-year																					
	1	O1	0.92	0.36	13.45	0.33	6.21	2.06													
	2	+A1	0.19	0.50	8.00	0.10	7.64	0.73	15.00	0.43	5.90	2.51									
	3	O2	1.99	0.36	11.65	0.72	6.61	4.74													
	4	+B1	0.23	0.35	6.71	0.08	8.10	0.65	12.32	0.80	6.45	5.14									
	5	+B2	0.34	0.50	5.00	0.17	8.82	1.50	12.50	0.97	6.41	6.20									
	6	+B3	0.17	0.49	5.00	0.08	8.82	0.73	13.09	1.05	6.28	6.60									
Existing	H1 + H2		0.93	0.43																	
	A1-B3		0.93	0.46	8.83	0.43	7.38	3.16													
	O1		0.92	0.36	13.45	0.33	6.21	2.06													
	+H1		0.23	0.41	5.40	0.09	8.64	0.81	14.55	0.43	5.99	2.55									
	O2		1.99	0.36	11.65	0.72	6.61	4.74													
	+ H2		0.70	0.44	6.97	0.31	8.00	2.46	12.97	1.02	6.31	6.46									

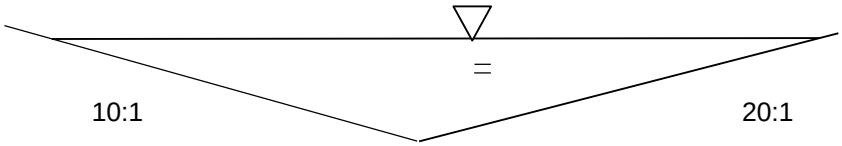
Swale A1 - for Basins O1 + A1 flow - Grass-lined

Q5 = 054 cfs, Q100 =2.51 cfs

S = 1.2 %

n = 0.035

$$Q = \frac{1.486AR^{2/3}S^{1/2}}{n}$$



D =	N =	0.035	Q=	2.50	cfs	
0.34	A =	1.73	sf.	V =	1.4	fps
10	WP =	10.23	ft.			
20	S =	0.012	%			

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Saturday, Jan 13 2024

Swale B1 - Q100 = 6.20 cfs

User-defined

Invert Elev (ft)	= 9.53
Slope (%)	= 2.70
N-Value	= 0.032

Calculations

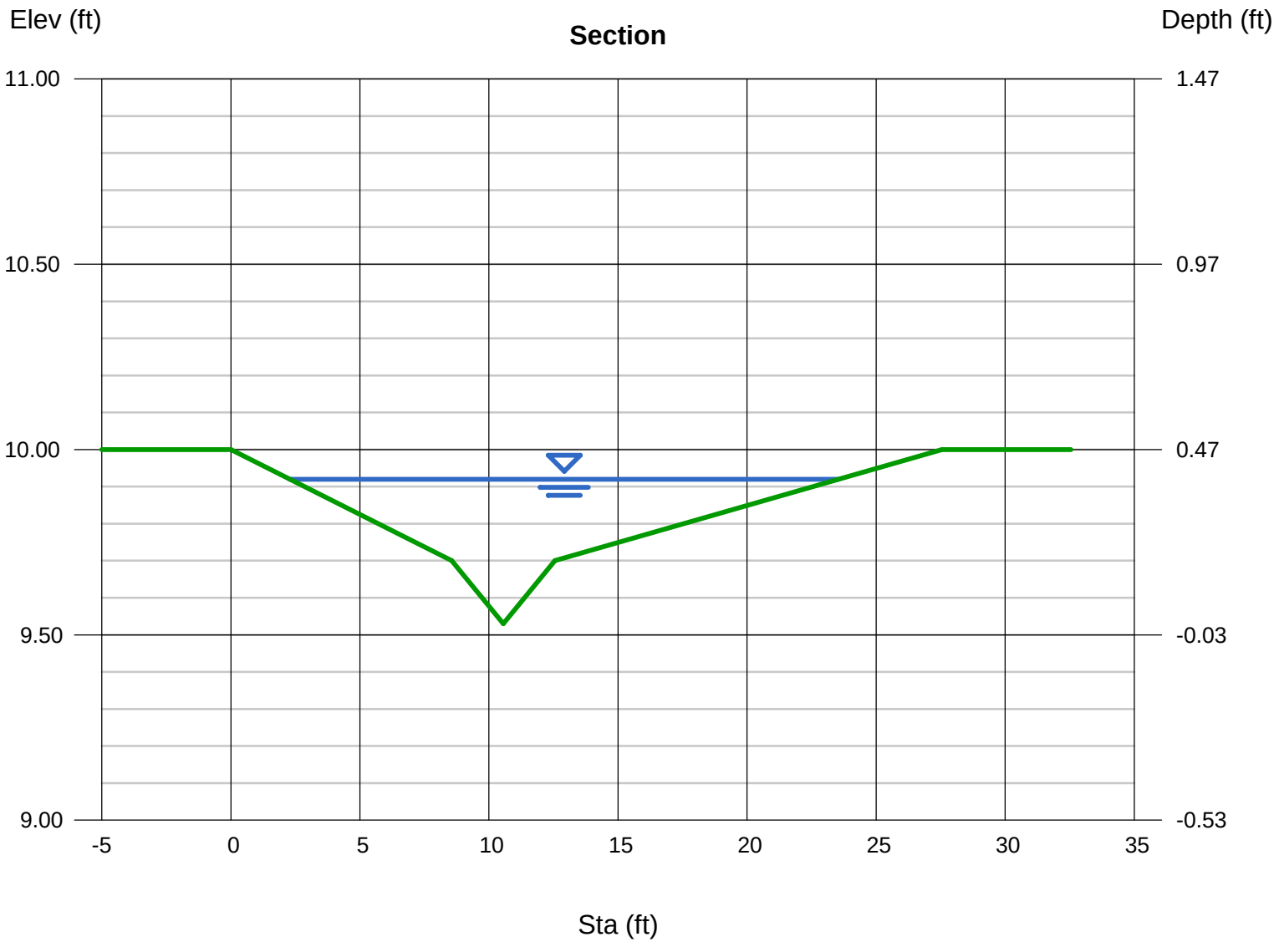
Compute by:	Known Q
Known Q (cfs)	= 6.20

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 6.200
Area (sqft)	= 3.12
Velocity (ft/s)	= 1.99
Wetted Perim (ft)	= 21.29
Crit Depth, Yc (ft)	= 0.38
Top Width (ft)	= 21.27
EGL (ft)	= 0.45

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.00)-(8.55, 9.70, 0.035)-(10.55, 9.53, 0.017)-(12.55, 9.70, 0.017)-(27.55, 10.00, 0.035)

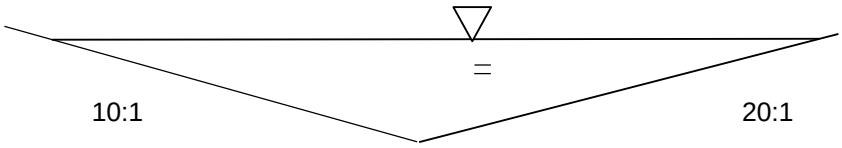


Swale B2 for Basin O1 + B1+B2 - Gravel Lined

Q5 = 1.26 cfs, Q100 =6.20 cf $Q = \frac{1.486AR^{2/3}S^{1/2}}{n}$

S = 1.5 %

n = 0.035



D =	N =	0.035	Q=	6.25	cfs
0.46	A =	3.17	sf.	V = 2.0	fps
10	WP =	13.83	ft.		
20	S =	0.015	%		

Riprap calcultations

All swales are at 2.0 fps or less velocity: grass swales acceptable for up to 5 fps on sandy soil. Riprap at outfalls of swale for level spreader effect.

Swale A1

$$\frac{VS^{0.17}}{(S_s-1)^{0.66}} = 1.0$$

Q = 2.51 cfs V = 1.4 fps S = 1.2%

$$\frac{1.4*.012^{0.17}}{(.012-1)^{0.66}} = 0.7 \text{ Use Type VL}$$

Top Width =~ 10.2'

Use 3' x 11' x 1' buried Type VL riprap

Swale B1 outfalls to gravel roadway

V = 2 fps

Swale B2

Q = 6.5 cfs V = 2.0 fps S = 1.5%

$$\frac{2.0*.015^{0.17}}{(.015-1)^{0.66}} = 1.0 \text{ Use Type VL}$$

Top Width = ~13.8'

Use 3' x 11' x 1' buried Type VL riprap

TABLE 10-6

RIPRAP REQUIREMENTS FOR CHANNEL LININGS**

$VS^{0.17}/(S_s-1)^{0.66}$ * (ft^{1}/2/sec)	Rock Type***
1.4 to 3.2	VL
3.3 to 3.9	L
4.0 to 4.5	M
4.6 to 5.5	H
5.6 to 6.4	VH
*where:	
V = mean channel flow velocity, in fps;	
S = longitudinal channel slope, in feet per foot (ft/ft); and	
S_s = specific gravity of stone (minimum S_s = 2.50)	
** Table valid only for Froude number of 0.8 or less and side slopes no steeper than 2h:1v.	
*** Type VL and L riprap may be buried after placement to reduce vandalism.	

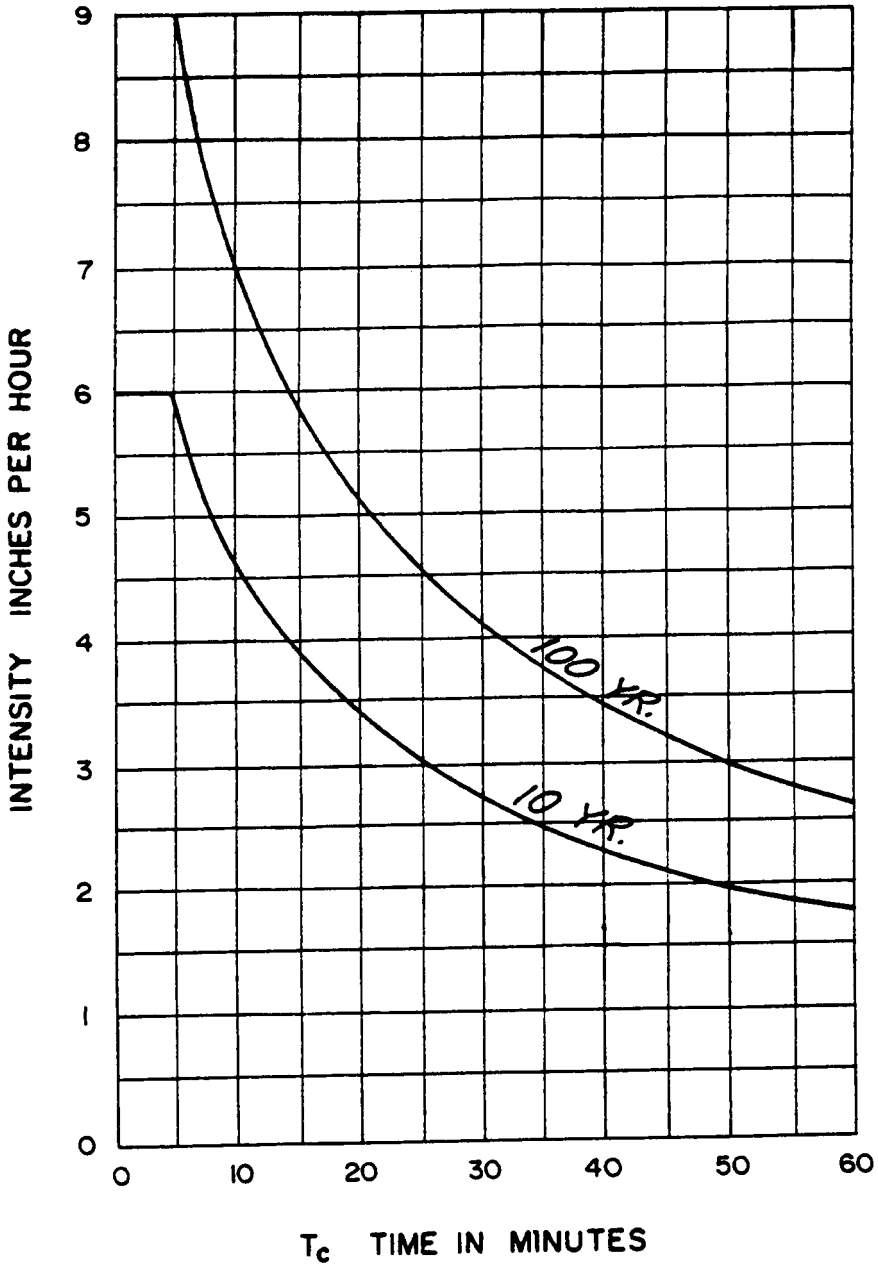
Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.



RE: Based upon Pikes Peak area council of governments/ areawide urban runoff control manual.

HDR Infrastructure, Inc.
A Centerra Company

The City of Colorado Springs / El Paso County
Drainage Criteria Manual

Storm Rainfall
Time Intensity-Frequency Curves

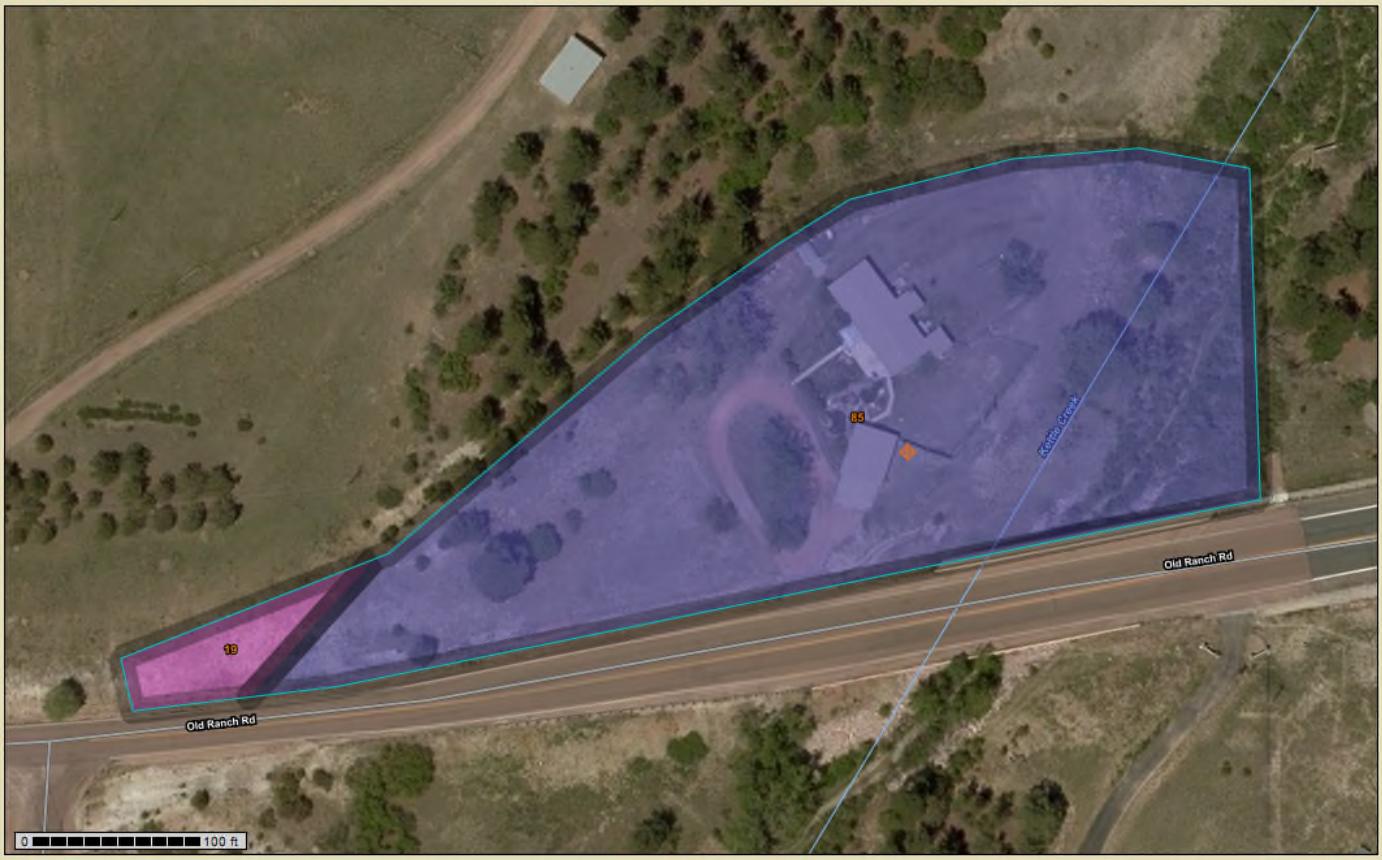
Date
OCT. 1987

Figure
5 - 1

Map — Hydrologic Soil Group

Legend

Scale (not to scale)



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

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map 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.

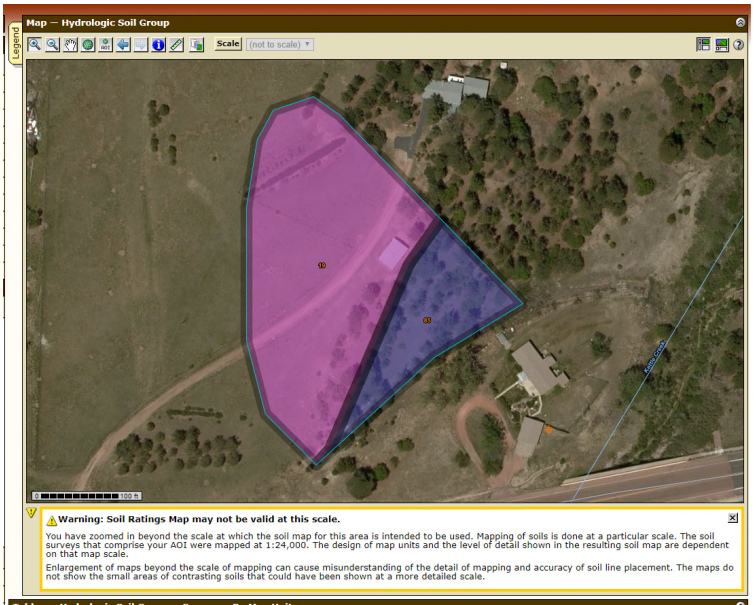
Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	0.1	4.8%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	B	2.3	95.2%
Totals for Area of Interest			**2.4**	**100.0%**

Description — Hydrologic Soil Group



Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	1.7	75.5%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	B	0.5	24.5%
Totals for Area of Interest			**2.2**	**100.0%**

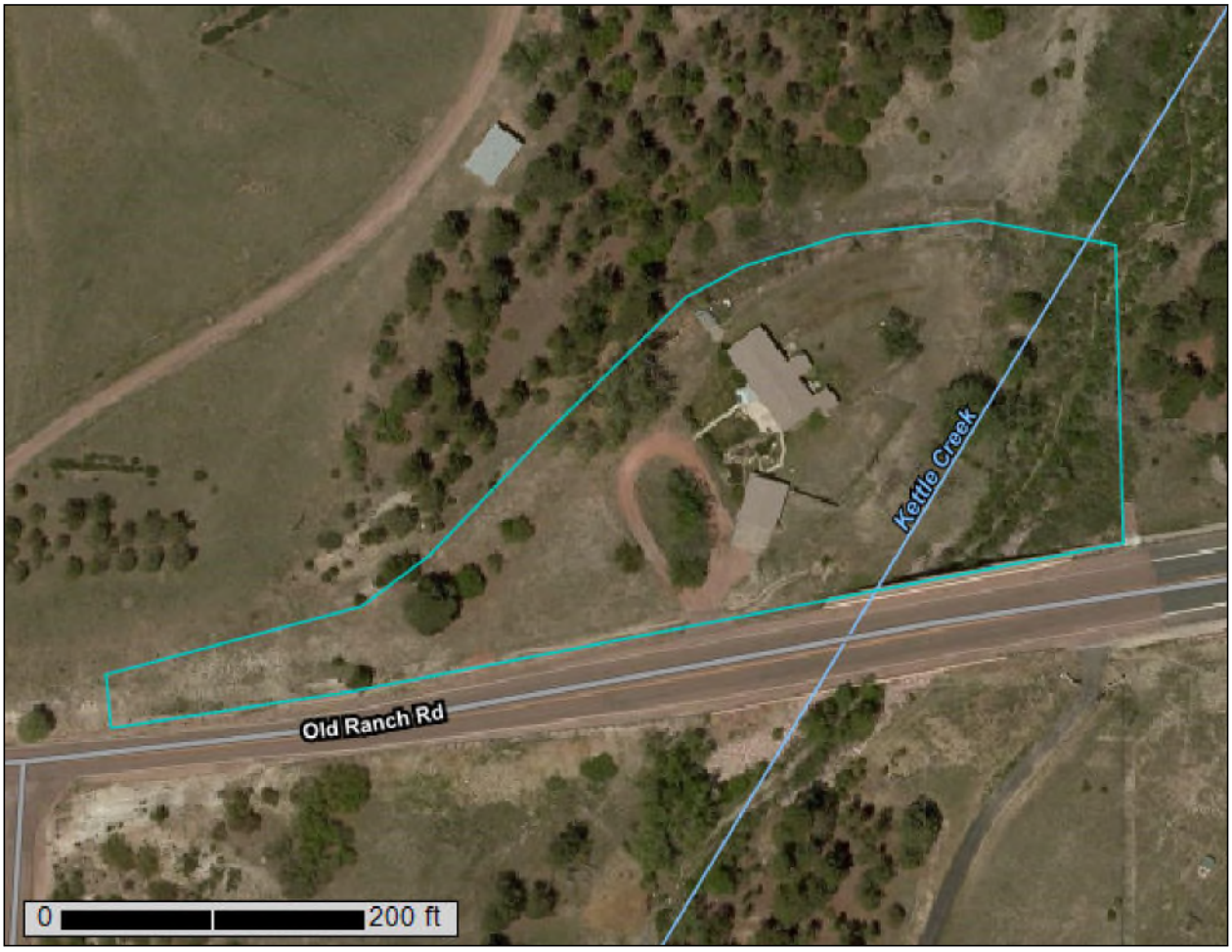
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

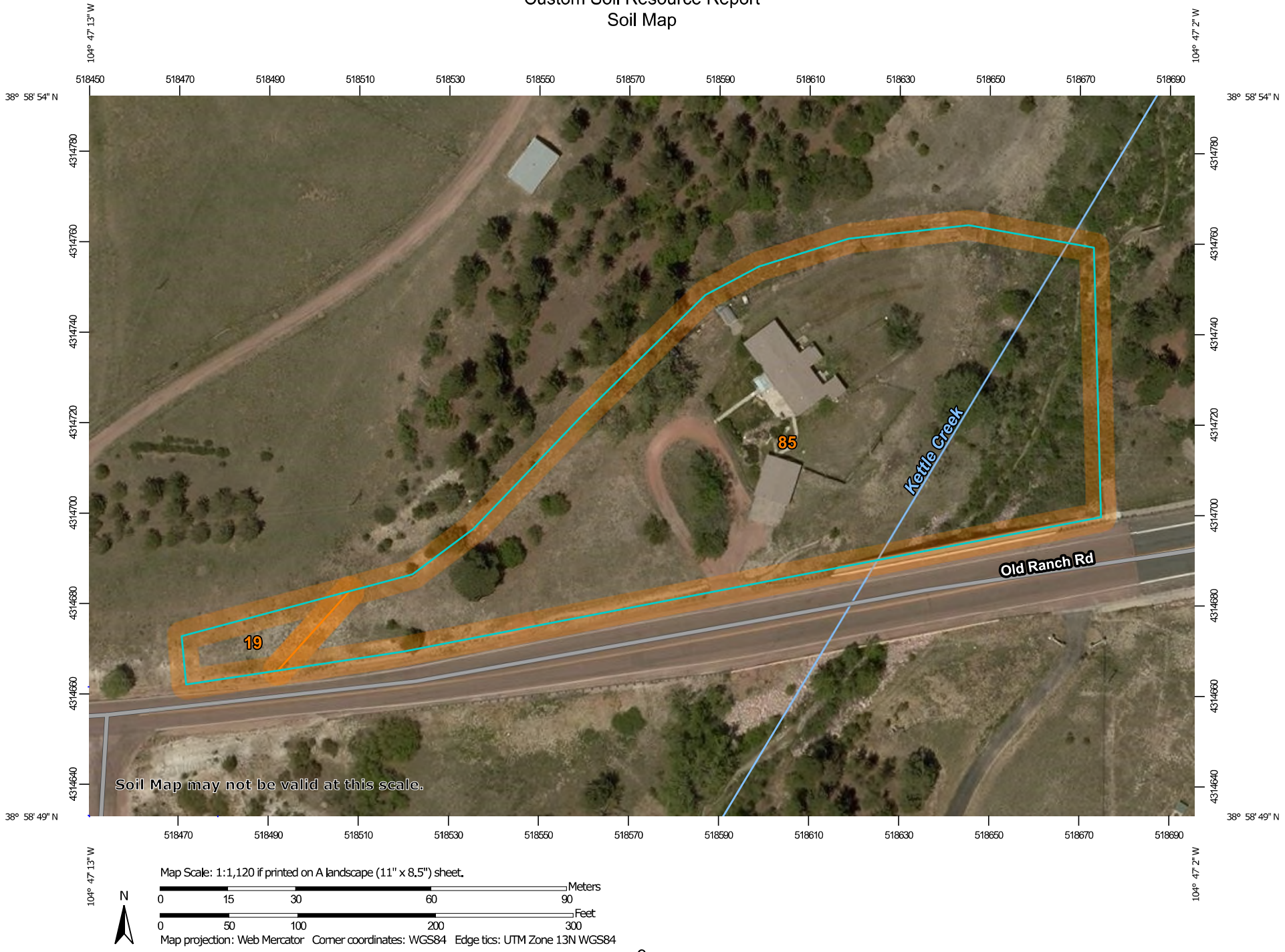
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado



July 20, 2019

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,120 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	0.1	3.9%
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	2.2	96.1%
Totals for Area of Interest		**2.3**	**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,

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

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 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
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit:
Landform: Swales
Hydric soil rating: Yes

Pleasant

Percent of map unit:

Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

85—Stapleton-Bernal sandy loams, 3 to 20 percent slopes

Map Unit Setting

National map unit symbol: 36b1
Elevation: 6,500 to 6,800 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

Stapleton and similar soils: 40 percent
Bernal and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stapleton

Setting

Landform: Hills
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 11 inches: sandy loam
Bw - 11 to 17 inches: gravelly sandy loam
C - 17 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 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 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Description of Bernal

Setting

Landform: Hills
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

A - 0 to 4 inches: sandy loam
Bt - 4 to 11 inches: sandy clay loam
C - 11 to 13 inches: sandy loam
R - 13 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 20 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Shallow Foothill (R049BY204CO)
Hydric soil rating: No

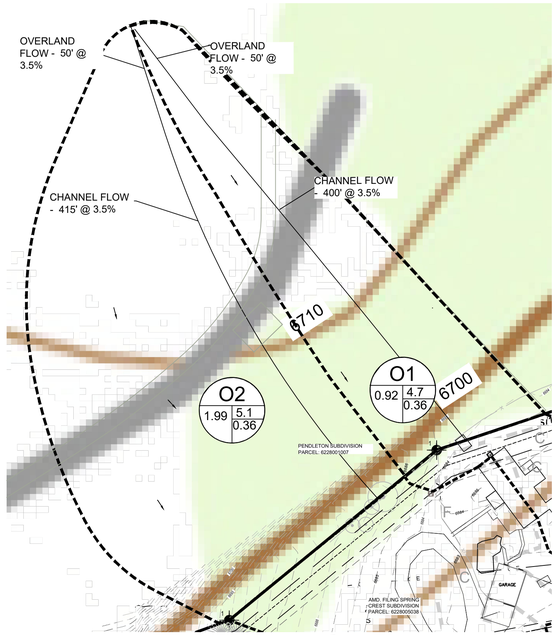
Minor Components

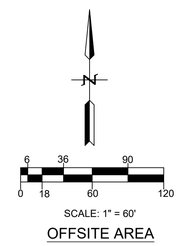
Other soils

Percent of map unit:
Hydric soil rating: No

2290 OLD RANCH ROAD

LOTS 8, BLOCK E, AMENDED FILING OF SPRINGS CREST SUBDIVISION
NW 1/4, SEC. 28, T.12 S., R. 66 W OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

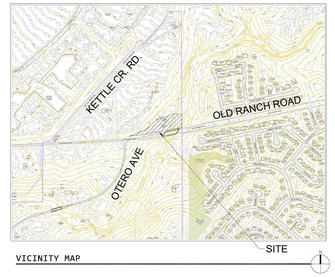




OFFSITE AREA

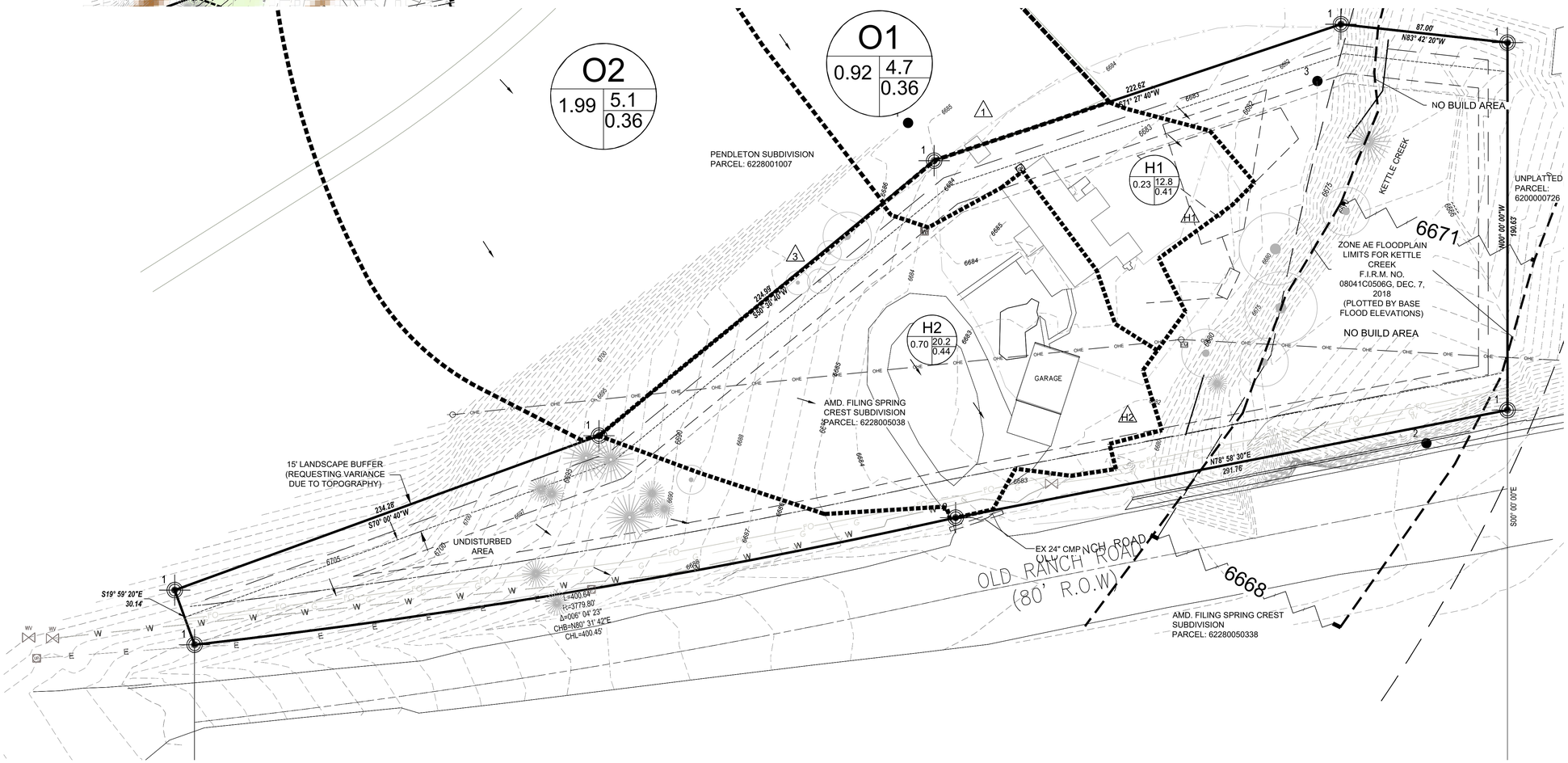
DRAINAGE LEGEND

- DRAINAGE BOUNDARY
- BASIN DESIGNATION
- IMPERVIOUSNESS
- IMPERVIOUSNESS
- AREA IN ACRES
- 100-YEAR RUNOFF COEFFICIENT
- DIRECTIONAL FLOW ARROW
- 6683 EXISTING CONTOUR
- ZONE AE FLOODPLAIN LIMITS FOR KETTLE CREEK - F.I.R.M. NO. 08041C0506G, DEC. 7, 2018



EXISTING RUNOFF SUMMARY

DES. PT.	BASIN	AREA (AC.)	5-YR FLOW (cfs)	100-YR FLOW (cfs)
1	O1	0.92	0.36	2.06
	H1	0.23	0.19	0.81
H1	O1 + H1	1.15	0.48	2.55
2	O2	1.99	0.83	4.74
	H2	0.70	0.71	2.46
H2	O2 + H2	1.69	1.36	6.46
	H1 + H2	0.93	0.90	3.20



PCD File No. CDR2320

CALL UTILITY NOTIFICATION CENTER OF COLORADO
BEFORE YOU DIG
811
CALL 2 BUSINESS DAYS IN ADVANCE, BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS

NO.	DESCRIPTION	DATE	BY	CLE
1	COUNTY COMMENTS	01-15-24		

PREPARED BY:
TRUE WEST CO., LLC
16535 E. Mansfield Ave
Aurora, CO 80013
303-523-3664
truewest1@usa.net

DESCRIPTION:
HISTORIC DRAINAGE
FERRANTI RESIDENCE
2290 OLD RANCH ROAD

PREPARED FOR:
JEREMY AND ALLISON FERRANTI
2290 OLD RANCH ROAD
COLORADO SPRINGS, CO 80908
jeremyferranti@gmail.com

ENGINEERS SEAL:
COLORADO LICENSED
CHRISTOPHER L. ERICKSON
23371
02-22-24
PROFESSIONAL ENGINEER

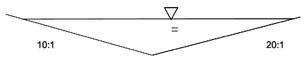
DESIGNED BY:	CLE
DRAWN BY:	CLE
CHECKED BY:	CLE
DRAWER NUMBER:	
DATE:	11/01/23
SCALE:	AS NOTED
SHEET NUMBER:	1 OF 2

2290 OLD RANCH ROAD

LOTS 8, BLOCK E, AMENDED FILING OF SPRINGS CREST SUBDIVISION
NW 1/4, SEC. 28, T.12 S., R. 66 W OF THE 6TH P.M.
COUNTY OF EL PASO, STATE OF COLORADO

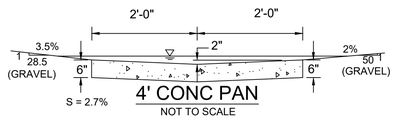
Swale A1 - for Basins O1 + A1 flow - Grass-lined

Q5 = 054 cfs, Q100 =2.51 cfs Q = $\frac{1.486AR^{2/3}S^{1/2}}{n}$
S = 1.2 %
n = 0.035



D =	N =	0.035	Q=	2.50 cfs	
0.34	A =	1.73 sf.	V =	1.4	fps
10	WP =	10.23 ft.			
20	S =	0.012 %			

SWALE B2 - FOR BASIN O2, B1 AND B2 - CONCRETE/GRAVEL LINED

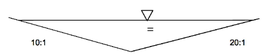


4' CONC PAN
NOT TO SCALE

Q5 = 1.26 CFS, Q100 = 6.20 CFS
@D = 0.39', Q = 6.20, V = 2.0 FPS

Swale B2 for Basin O1 + B1+B2 - Gravel Lined

Q5 = 1.26 cfs, Q100 =6.20 cf Q = $\frac{1.486AR^{2/3}S^{1/2}}{n}$
S = 1.5 %
n = 0.035



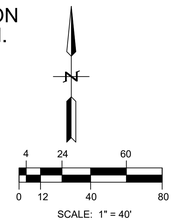
D =	N =	0.035	Q=	6.25 cfs	
0.46	A =	3.17 sf.	V =	2.0	fps
10	WP =	13.83 ft.			
20	S =	0.015 %			

PROPOSED RUNOFF SUMMARY

DES. PT.	BASIN	AREA (AC.)	5-YR FLOW (cfs)	100-YR FLOW (cfs)
1	O1	0.92	0.36	2.06
	A1	0.19	0.25	0.73
2	O1 +A1	1.11	0.54	2.51
3	O2	1.99	0.83	4.74
	B1	0.23	0.10	0.65
4	O2 + B1	2.19	0.89	5.14
	B2	0.34	0.52	1.50
5	O2-B2	2.56	1.26	6.20
	B3	0.17	0.24	0.73
6	O2-B3	2.73	1.41	6.60
	A1 - B3	0.93	0.95	3.16

DRAINAGE LEGEND

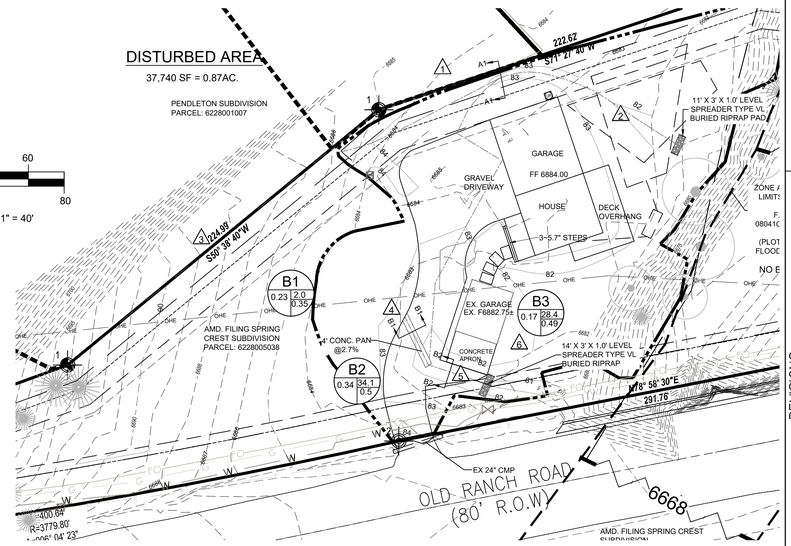
- DRAINAGE BOUNDARY
- A1 / 0.14 / 2.0 / 0.20 — BASIN DESIGNATION; IMPERVIOUSNESS; AREA IN ACRES; 100-YEAR RUNOFF COEFFICIENT
- DIRECTIONAL FLOW ARROW
- 6683 — EXISTING CONTOUR
- 83 — PROPOSED CONTOUR
- x85.3 — PROPOSED SPOT ELEVATION
- ZONE AE FLOODPLAIN LIMITS FOR KETTLE CREEK - F.I.R.M. NO. 08041C0506G, DEC. 7, 2018
- 6671 — BASE FLOOD ELEVATION
- A1 A1 — SWALE CROSS-SECTION SYMBOL

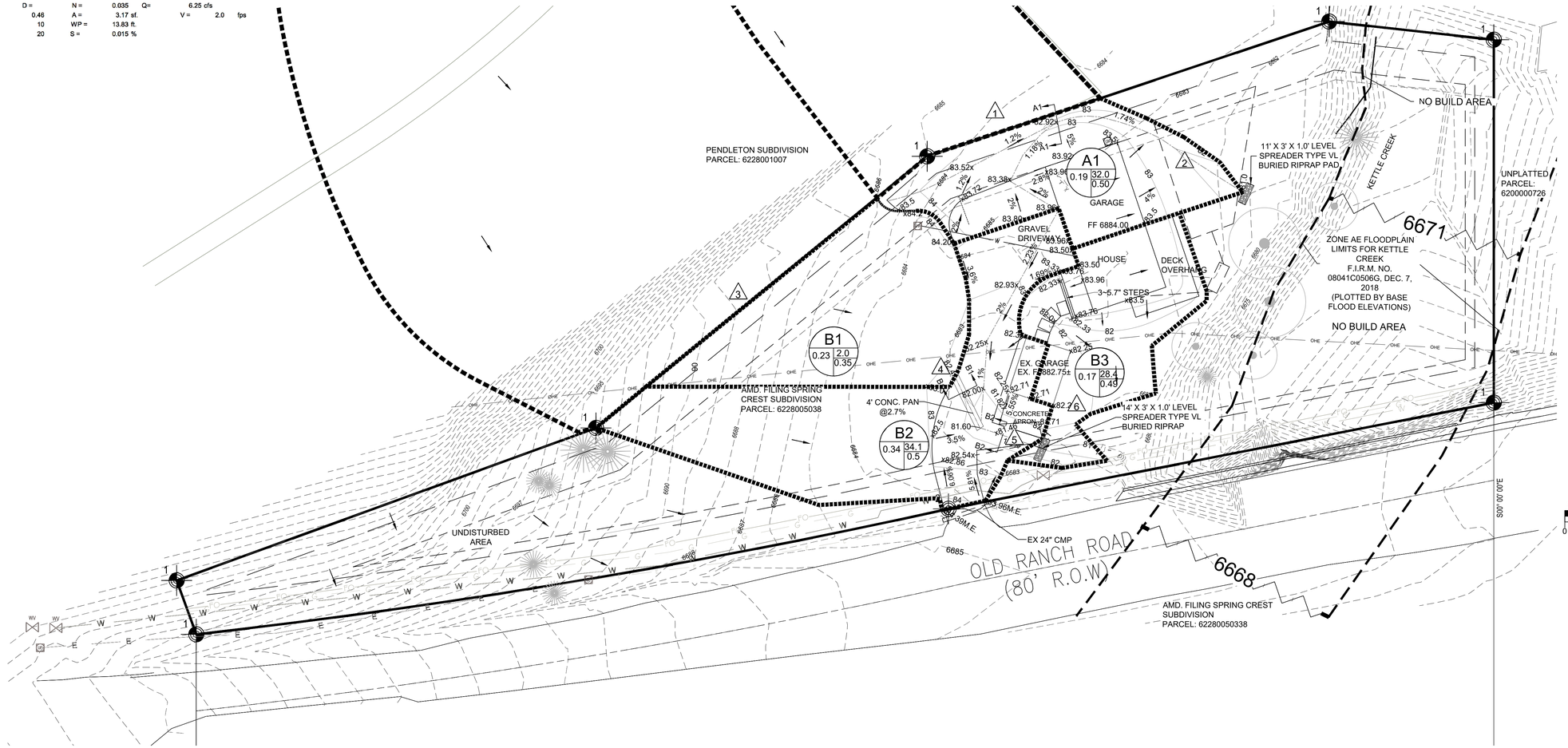


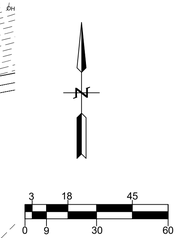
SCALE: 1" = 40'

DISTURBED AREA

37,740 SF = 0.87AC.







SCALE: 1" = 30'

PCD File No. CDR2320

CALL UTILITY NOTIFICATION CENTER OF COLORADO 811
BEFORE YOU DIG
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS

NO.	DESCRIPTION	DATE	BY
1	COUNTY COMMENTS	01-15-24	CLE
1	COUNTY COMMENTS	02-12-24	CLE

PREPARED BY:
TRUE WEST CO., LLC
1658 Ellis Street
Aurora, CO 80013
303-523-3664
truewest1@usa.net

DESCRIPTION: FINAL DRAINAGE PLAN
FERRANTI RESIDENCE
2290 OLD RANCH ROAD

PREPARED FOR:
JEREMY AND ALLISON FERRANTI
2290 OLD RANCH ROAD
COLORADO SPRINGS, CO 80908
jeremyferranti@gmail.com

ENGINEERS SEAL:

COLORADO LICENSED
23371
02-22-24
PROFESSIONAL ENGINEER

DESIGNED BY:	CLE
DRAWN BY:	CLE
CHECKED BY:	CLE
DRAWER NUMBER:	
DATE:	11/01/23
SCALE:	AS NOTED
SHEET NUMBER:	2 OF 2