Drainage Letter
Rock Island Trail
Sand Creek to Constitution
Colorado Springs, Colorado

Prepared for:
City of Colorado Springs
Parks, Recreation and Cultural Services Department
1401 Recreation Way
Colorado Springs, CO 80905
(719) 385-6951

Prepared by:

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
Ph: (719)630-7342

Kiowa Project No. 16028

SWENT File: STM-REV24-____

March 7, 2024

Table of Contents

Appendix A

- Vicinity Map
- Soils Map
- FEMA Flood Insurance Map

Appendix B

- Rational Calculations

Appendix C

- Draiange Conditions Map

Engineer's Statement
This report and plan for the drainage design of the Rock Island Trail was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Signature (Affix Seal): _____ _____
Todd Cartwright Colorado P.E. No. 33365 Date

CITY PROJECT MANAGER'S STATEMENT
I hereby certify that the drainage for Rock Island Trail shall be constructed according to the design presented in this report. I further understand that field changes must be reviewed by the City Review Engineer to ensure conformance with the original design intent. I am employed by and perform engineering services solely for the City of Colorado Springs, and therefore am exempt from Colorado Revised Statute Title 12, Article 25, Part 1 according to § 12-25-103(1), C.R.S.

Name of City Project Manager: Emily Duncan

Signature: _____Date: _____

City of Colorado Springs Statement:
Filed in accordance with Section 7.7.906 of the code of the City of Colorado Springs, 2001, as amended.

_____ _____
For City Engineer Date

Conditions:

I. GENERAL LOCATION AND DESCRIPTION

The purpose of this Drainage Letter is to identify on-site and off-site drainage patterns, storm sewers, culvert and inlet locations, areas tributary to the site, and to safely route developed storm water to adequate outfalls for Rock Island Trail.

Rock Island Trail is comprised of 36.2 acres, located in southeast Colorado Springs, Colorado between Sand Creek and Constitution Ave. The property is bordered multiple commercial and residential lots and city property.

The property is located in Sections 5 and 6, Township 14, Range 65 of the 6th Principal Meridian, in Colorado Springs, El Paso County, Colorado. The vegetation in the site consists of native grasses. A vicinity map showing the general location of the site is presented in Appendix A.

The property is primarily the abandoned Rock Island Railroad alignment. And is now a almost 2 mile long narrow strip of land that is city owned open space. The total disturbed area associated with this project is approximately 4.48 acres. There is no proposed development within any streamside buffer zone or in any designated floodplain, as indicated on FEMA panel 08041C0752G. A FEMA firmette for the site is located in Appendix A.

II. GENERAL CONCEPT

A. EXISTING DRAINAGE PATTERNS

In the existing condition, the site generally drains from north to the south and from east to west. The site sheet flows south offsite onto the developed properties to the south. Sand Creek is at the west end of the project which intercepts flows and conveys them West to Fountain Creek.

Because of the long and narrow shape of the project most of the storm runoff leaves the property as sheet flow onto the numerous properties adjacent to the property. There are not points on the property where flows leave in a concentrated manner. The following is a description of the existing drainage sub-basins.

Sub-basin E-1: Sub-basin E-1 is 0.88 acres, with 5 and 100-year runoff of 0.3 and 1.7 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the south side of the site and consists of open space and trails. The runoff from this sub-basin flows south across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E1. The flow ultimately gets to Sand Creek through numerous paths.

Sub-basin E-2: Sub-basin E-2 is 8.12 acres, with 5 and 100-year runoff of 2.3 and 15.5 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the north side of the site and consists of open space and trails. The runoff from this sub-basin flows north across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E2. The flow enters a concrete trapezoidal ditch that borders the project to the north. This ditch discharges directly to Sand Creek and the west end of the project.

Sub-basin E-3: Sub-basin E-3 is 10.73 acres, with 5 and 100-year runoff of 3.1 and 20.5 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the south side of the site and consists of open space and trails. The runoff from this sub-basin flows south across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E3. The flow ultimately gets to Sand Creek through numerous paths.

Sub-basin E-4: Sub-basin E-4 is 6.33 acres, with 5 and 100-year runoff of 1.8 and 12.1 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the north side of the site and consists of open space and trails. The runoff from this sub-basin flows north across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E4. The flow ultimately gets to Sand Creek through numerous paths.

Sub-basin E-5: Sub-basin E-5 is 9.52 acres, with 5 and 100-year runoff of 2.7 and 18.2 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the south side of the site and consists of open space and trails. The runoff from this sub-basin flows south across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E5. The flow ultimately gets to Sand Creek through numerous paths.

Sub-basin E-6: Sub-basin E-6 is 0.63 acres, with 5 and 100-year runoff of 0.2 and 1.2 CFS respectively. It is not expected to receive any offsite flow. The sub-basin includes a portion of the south side of the site and consists of open space and trails. The runoff from this sub-basin flows south across the basin as sheet flow and does not concentrate. The design point is depicted as Design Point E6. The flow discharges into basin E-5.

B. PROPOSED DRAINAGE PATTERNS

Similar to the existing conditions, the proposed drainage will generally travel to the west into Sand Creek, then ultimately flow into the Fountain creek drainage basin.

The runoff in the developed condition will be the same as the existing condition.

I. OFF-SITE RUNOFF CONSIDERATION

Most of the storm runoff leaves the site as sheet flows onto the adjacent properties. The amount of flow going onto any one property is negligible.

No significant off-site flows are expected to enter the site. No off-site flows will enter the site from the south due to the topography. No off-site flows will enter the site from the northwest of Peterson Blvd due to a concrete ditch separating the project site from all the properties north of the site. Some residential back yards will drain onto the site east of Peterson on the north side of the site. But this flow is negligible and unconcentrated flow.

II. HYDROLOGIC AND HYDRALIC CALCULATIONS

Hydrologic and hydraulic calculations for the site were performed using the methods outlined in the *Colorado Springs Drainage Criteria Manual*. Topography for the site was compiled using a one-foot contour interval and is presented on the Drainage Plan.

The hydrologic calculations were made for the historic and developed site conditions. The Drainage Plan presents the drainage patterns for the site, including the sub-basins. The peak flow rates for the sub-basins were estimated using the Rational Method. The 5-year (Minor Storm) and 100-year (Major Storm) recurrence intervals were determined. The one-hour rainfall depth was determined from Table 6-2 of the *Drainage Criteria Manual*. These depths are shown in the runoff calculations spreadsheet.

Collection of the runoff will be accomplished through a combination of sheet flow, gutter flow, creek flow, and off-site storm flow.

The peak flow data generated using the rational method was used to verify minimal increase in cfs of the site due to proposed site development within the subdivision.

The onsite soils were assumed to be Hydrologic Soil Group C & D, based on the *Soil Survey* and the result of earth-moving operations. For existing conditions, runoff coefficients were determined using the land use of pasture/meadow. The land use for the proposed development will be Commercial.

A Grading and Erosion Control plan is not required for this project since the area of disturbance 0.37 acre is under 1.0 acre requirement threshold.

III. DRAINAGE BASIN FEES

The site is city property and will not be required to pay drainage fees.

IV. SUMMARY

The site runoff proposed for Rock Island Trail will not increase and not adversely affect the downstream and surrounding developments. This report and findings are in general conformance with the Sand Creek DBPS.

Basins	Existing		Proposed	
	5 yr Flow (cfs)	100-yr Flow (cfs)	5 yr Flow (cfs)	100 yr flow (cfs)
E-1 / D-1	0.3	1.7	0.3	1.7
E-2 / D-2	2.3	15.5	2.3	15.5
E-3 / D-3	3.1	20.5	3.1	20.5
E-4 / D-4	1.8	12.1	1.8	12.1
E-5 / D-5	2.7	18.2	2.7	18.2
E-6 / D-6	0.2	1.2	0.2	1.2

C. AGENCY REQUIREMENTS

I. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

The subject property limits are shown on Flood Insurance Rate Map (FIRM) 08041C0752G with effective dates of December 7, 2018 that are included in Appendix A. The FIRMs also show that the property to be developed is located outside of the FEMA regulated floodplain.

III. REFERENCES

1) Sand Creek Drainage Basin Planning Study Final Report, dated January 2021, prepared by Stantec, HDR and DewBerry.

2) Colorado Springs Drainage Criteria Manual Volume 1, dated July 2014, Revised January 2021.

3) Colorado Springs Drainage Criteria Manual Volume 2, dated July 2014, revised December 2020.

4) Colorado Springs Engineering Criteria Manual, dated July 2019.

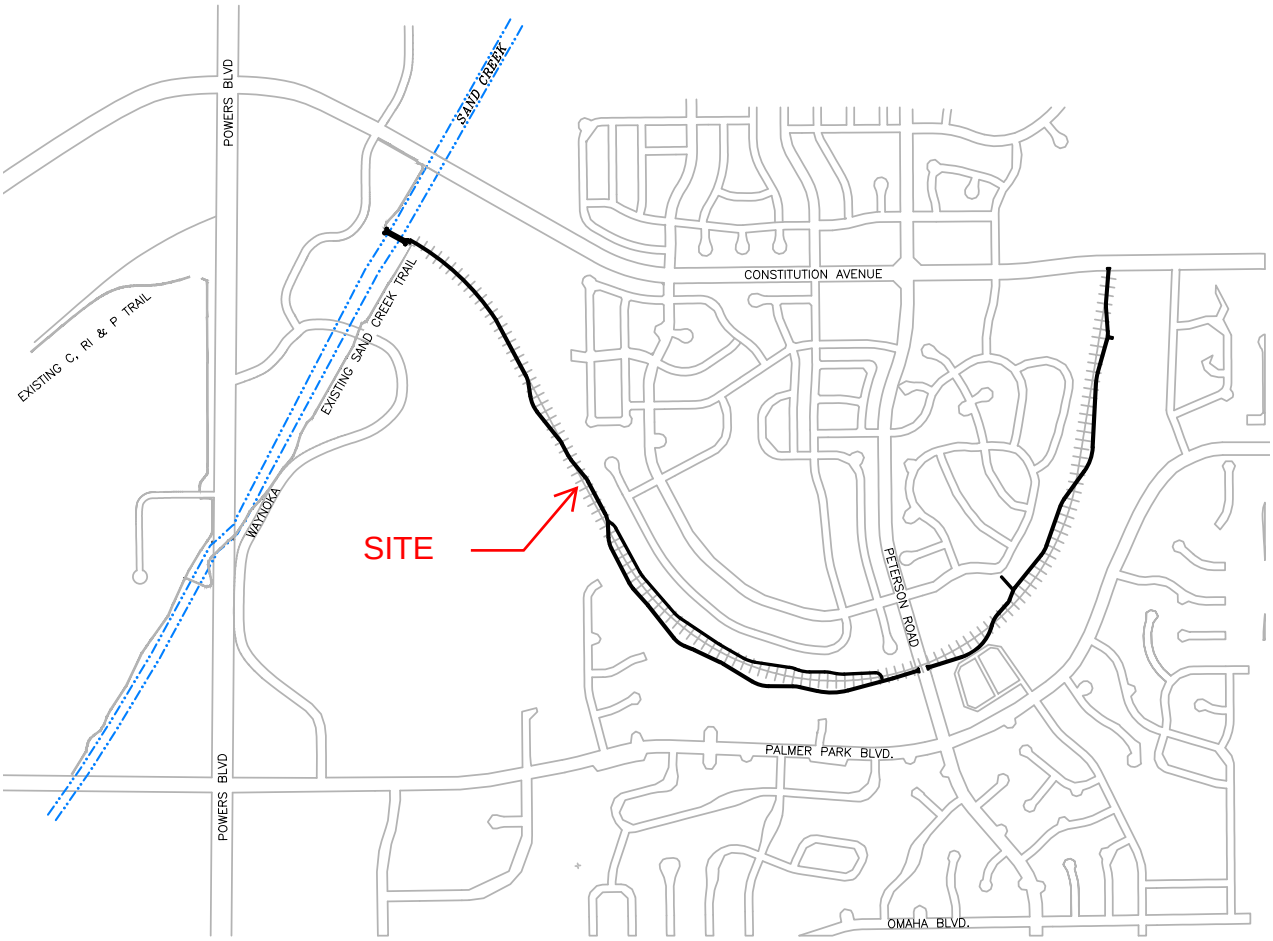
5) National Flood Insurance Hazard layer FIRMette portion of panels 08041C0741G, Federal Emergency Management Agency, both Effective Date 12/7/2018.

APPENDIX A

Figure 1: Vicinity Map

Figure 2: Soils Map

Figure 3: FEMA Flood Insurance Rate Map



N

SCALE: 1"=1500'

0 1500' 3000'

FIGURE 1
VICINITY MAP
ROCK ISLAND MULTI-USE TRAIL

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

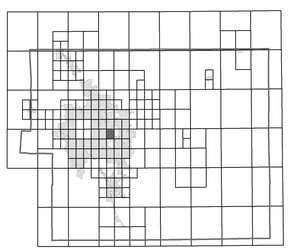
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

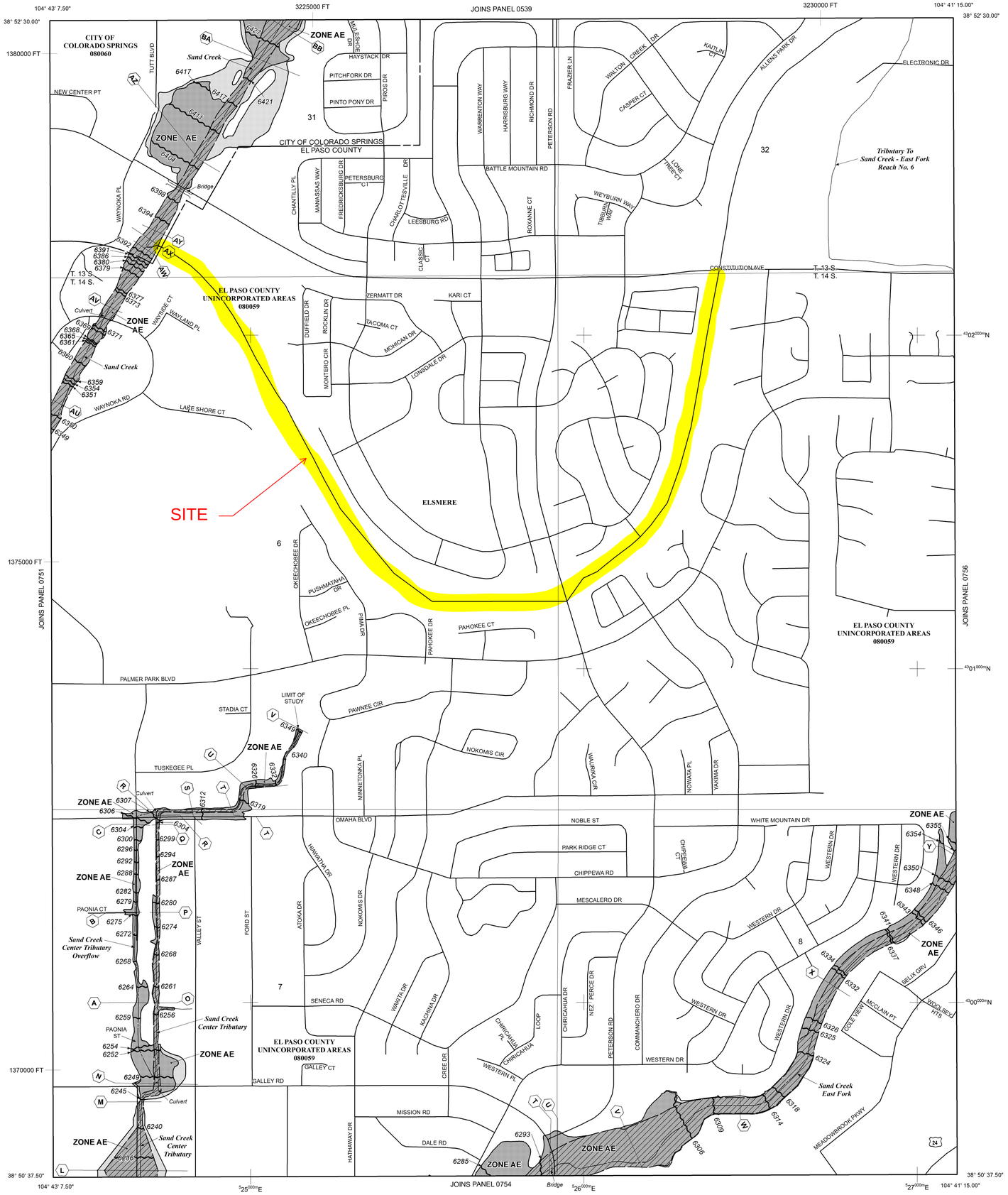
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 65 WEST, AND TOWNSHIP 14 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A — Cross section line
23 — 23 — Transect line
97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0752G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 752 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0752	G
EL PASO COUNTY	080059	0752	G

Notice: This map was reissued on 05/15/2020 to make a correction.This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0752G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

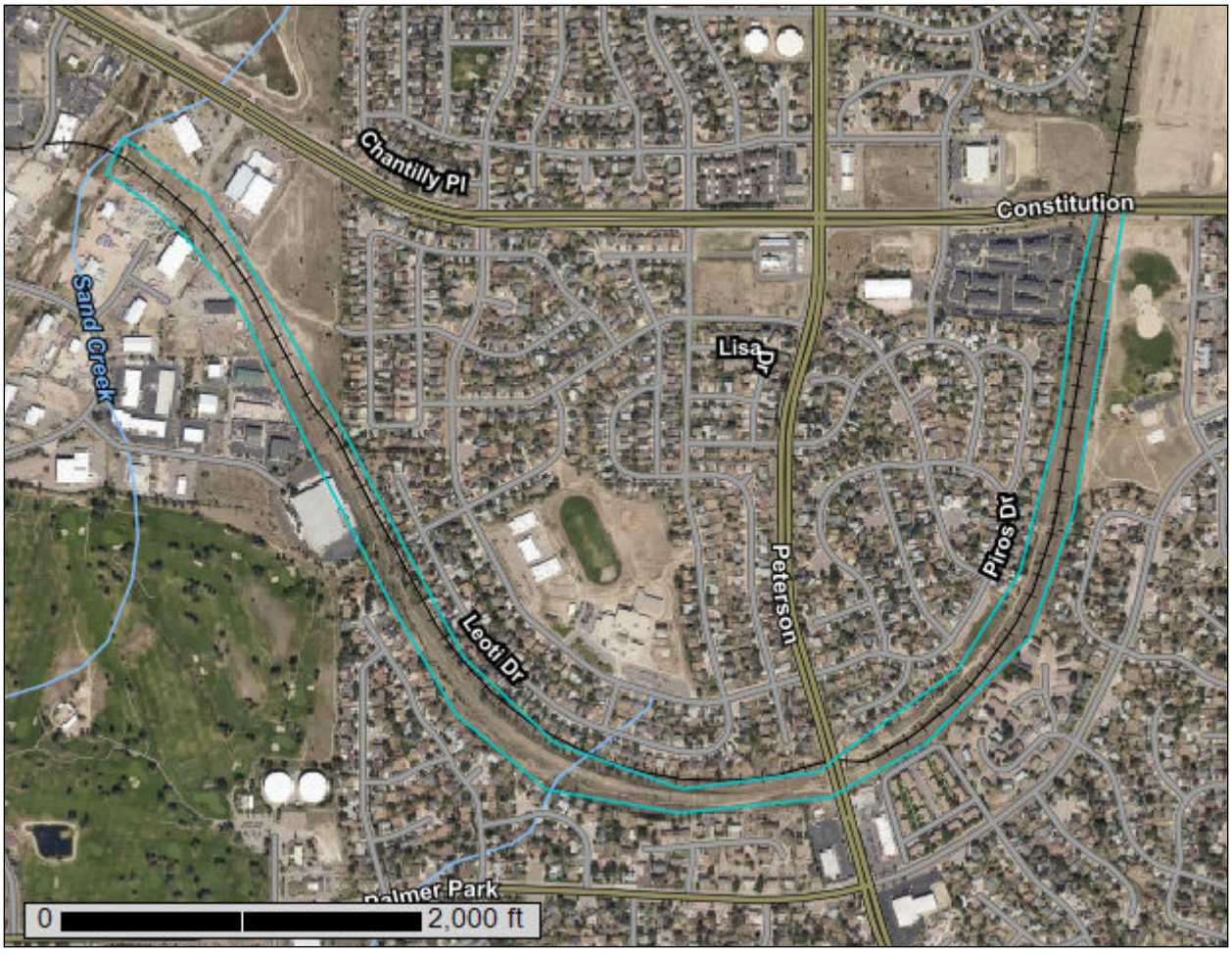
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

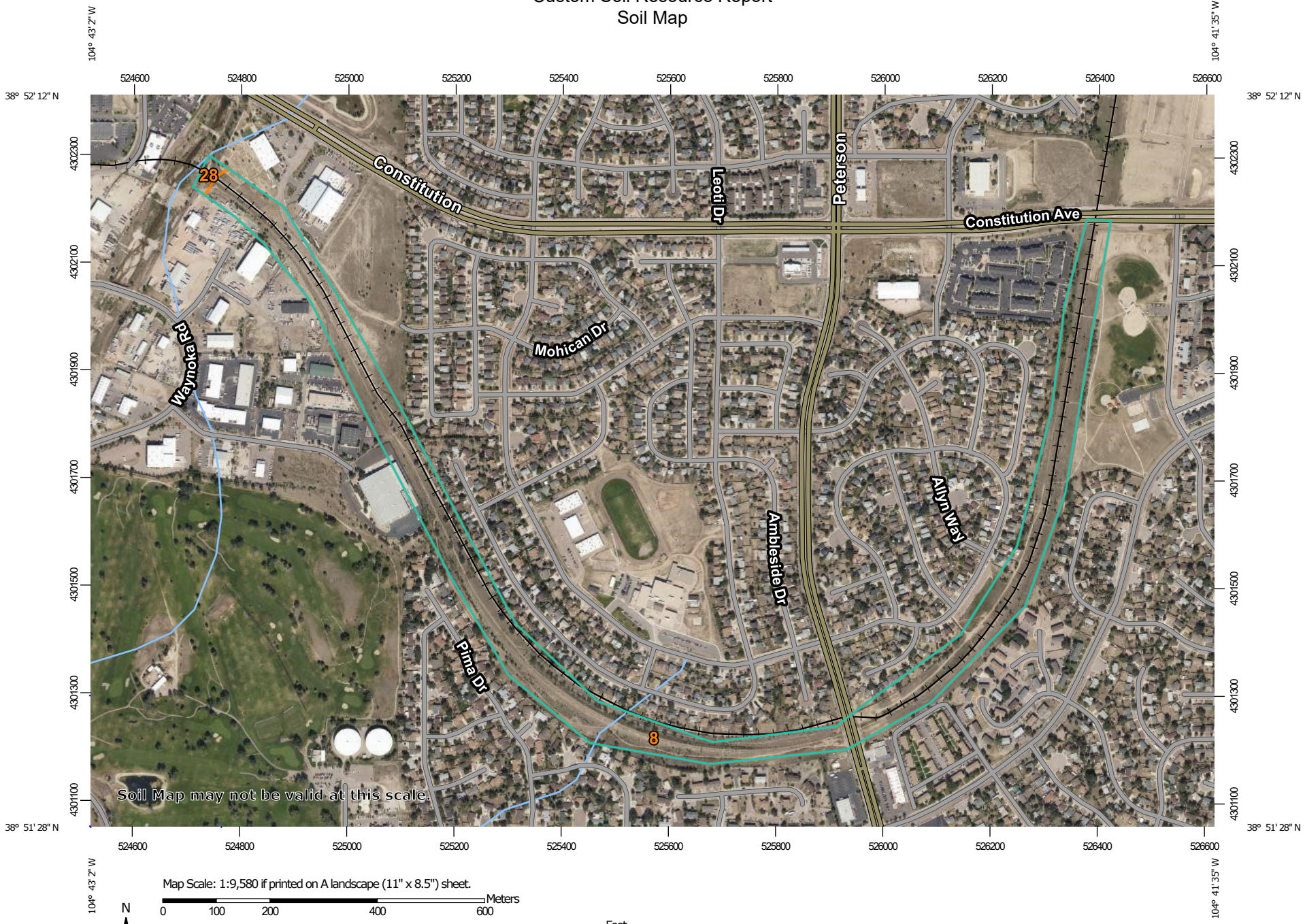
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado



February 29, 2024

Custom Soil Resource Report
Soil Map



Map Scale: 1:9,580 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1800 2700

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 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	41.7	98.8%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	0.5	1.2%
Totals for Area of Interest		**42.2**	**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

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
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 content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Ellicott and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellicott

Setting

Landform: Flood plains, stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively 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: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A

Ecological site: R069XY031CO - Sandy Bottomland
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils
Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

APPENDIX B
Rational Calculations

Rock Island Trail

Drainage Letter

Area Runoff Coefficient Summary - EXISTING

			DEVELOPED			UNDEVELOPED			WEIGHTED	
BASIN	TOTAL AREA		AREA	C_5	C_{100}	AREA	C_5	C_{100}	C_5	C_{100}
	(SF)	(Acres)	(Acres)			(Acres)				
E-1	38,324	0.88		0.53	0.68	0.88	0.09	0.36	***0.09***	***0.36***
E-2	353,696	8.12		0.53	0.68	8.12	0.09	0.36	***0.09***	***0.36***
E-3	467,531	10.73		0.53	0.68	10.73	0.09	0.36	***0.09***	***0.36***
E-4	275,750	6.33		0.53	0.68	6.33	0.09	0.36	***0.09***	***0.36***
E-5	414,728	9.52		0.53	0.68	9.52	0.09	0.36	***0.09***	***0.36***
E-6	27,537	0.63		0.53	0.68	0.63	0.09	0.36	***0.09***	***0.36***

Calculated by: _____

Date: _____

Checked by: _____

Rock Island Trail
Drainage Letter
Area Drainage Summary - EXISTING

		WEIGHTED		OVERLAND				STREET / CHANNEL FLOW					T_t	CA		INTENSITY		TOTAL FLOW	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Grass/ Paved	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	CA_5	CA_{100}	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
		* For Calcs See Runoff Summary																	
E-1	0.88	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.08	0.32	3.2	5.3	0.3	1.7
								Grass				0.0							
E-2	8.12	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.73	2.92	3.2	5.3	2.3	15.5
								Grass											
E-3	10.73	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.97	3.86	3.2	5.3	3.1	20.5
								Grass											
E-4	6.33	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.57	2.28	3.2	5.3	1.8	12.1
								Grass											
E-5	9.52	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.86	3.43	3.2	5.3	2.7	18.2
								Grass											
E-6	0.63	0.09	0.36	0.15	100	1.0	17.8	Grass	100	1.0%	1.3	1.3	19.1	0.06	0.23	3.2	5.3	0.2	1.2
								Grass											

Calculated by: CKC
Date: 12/15/2023
Checked by: TC

Rock Island Trail

Drainage Letter

Pipe Hydraulics

PIPE SEGMENT	*Q_{max} (cfs)*	*Surf Grade (%)*	*LEN (ft)*	*$K_{(q,s)}$*	*DIA (in)*	*DIA USED (in)*	*K_{dia}*	*A (ft^2)*	*V (fps)*	*S_f (%)*
1	**1.2**	1.3%	**40**	10.8	**18**	**18**	105.1	1.8	0.7	0.1%
				#DIV/0!	**#DIV/0!**		N/A	0.0	#DIV/0!	#VALUE!
				#DIV/0!	**#DIV/0!**		N/A	0.0	#DIV/0!	#VALUE!

Calculated by: _____

Date: _____

Checked by: _____

Rock Island Trail

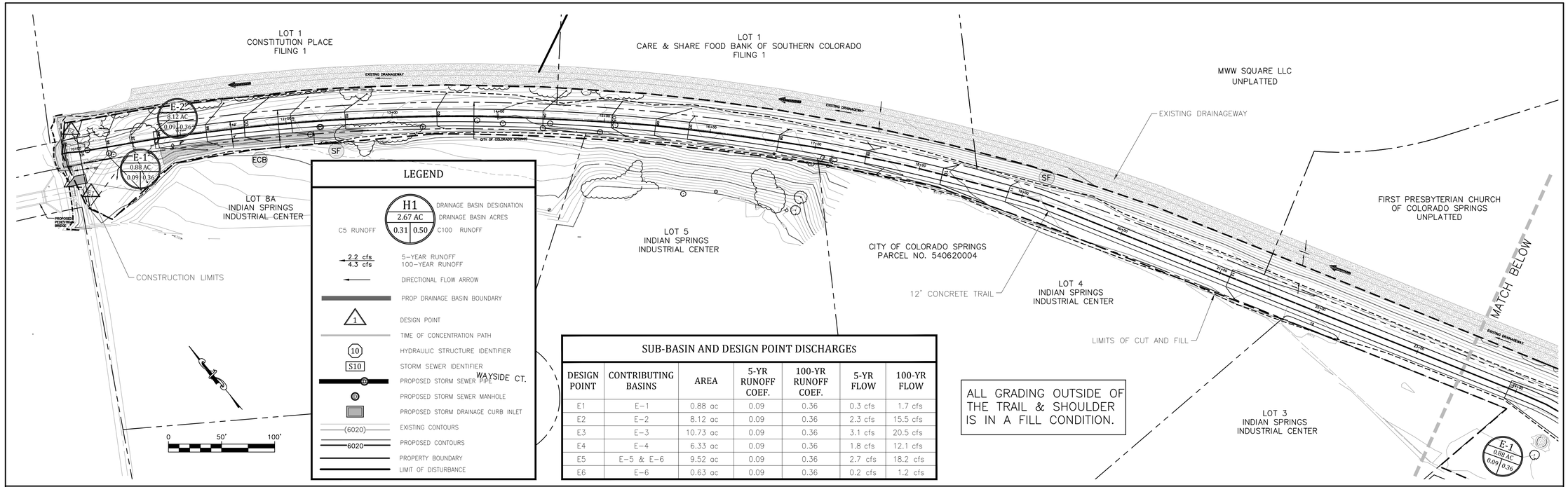
Drainage Letter

Recommended Runoff Coefficients

Figure 5-1

LAND USE OR SURFACE CHARACTERISTICS	*PERCENT IMPERVIOUS*	*FREQUENCY*			
		5		*100*	
		A&B	*C&D*	*A&B*	*C&D*
Business:					
Commercial Areas	95	0.81	0.84	0.88	0.89
Neighborhood Areas	70	0.49	0.53	0.62	0.68
Residential:					
Single-Family					
1/8 Acre or Less	65	0.45	0.49	0.59	0.65
1/4 Acre	40	0.30	0.35	0.50	0.58
1/3 Acre	30	0.25	0.30	0.47	0.57
1/2 Acre	25	0.22	0.28	0.46	0.56
1 Acre	20	0.20	0.26	0.44	0.55
Industiral:					
Light Areas	80	0.59	0.63	0.70	0.74
Heavy Areas	90	0.73	0.75	0.81	0.83
Parks, Cemetaries:	7	0.12	0.19	0.39	0.52
Playgrounds:	13	0.16	0.23	0.41	0.54
Railroad Yard Areas:	40	0.30	0.35	0.50	0.58
Undeveloped Areas:					
Historic Flow Analysis	2	0.09	0.16	0.36	0.51
Greenbelts, Agricultural					
Pasture / Meadow	0	0.08	0.15	0.35	0.50
Forest	0	0.08	0.15	0.35	0.50
Exposed Rock	100	0.90	0.90	0.96	0.96
Offsite Flow Analysis	45	0.32	0.37	0.51	0.59
(when land use not defined)					
Streets:					
Paved	100	0.90	0.90	0.96	0.96
Gravel	80	0.59	0.63	0.70	0.74
Drive and Walks:	100	0.90	0.90	0.96	0.96
Roofs:	90	0.73	0.75	0.81	0.83
Lawns	0	0.08	0.15	0.35	0.50

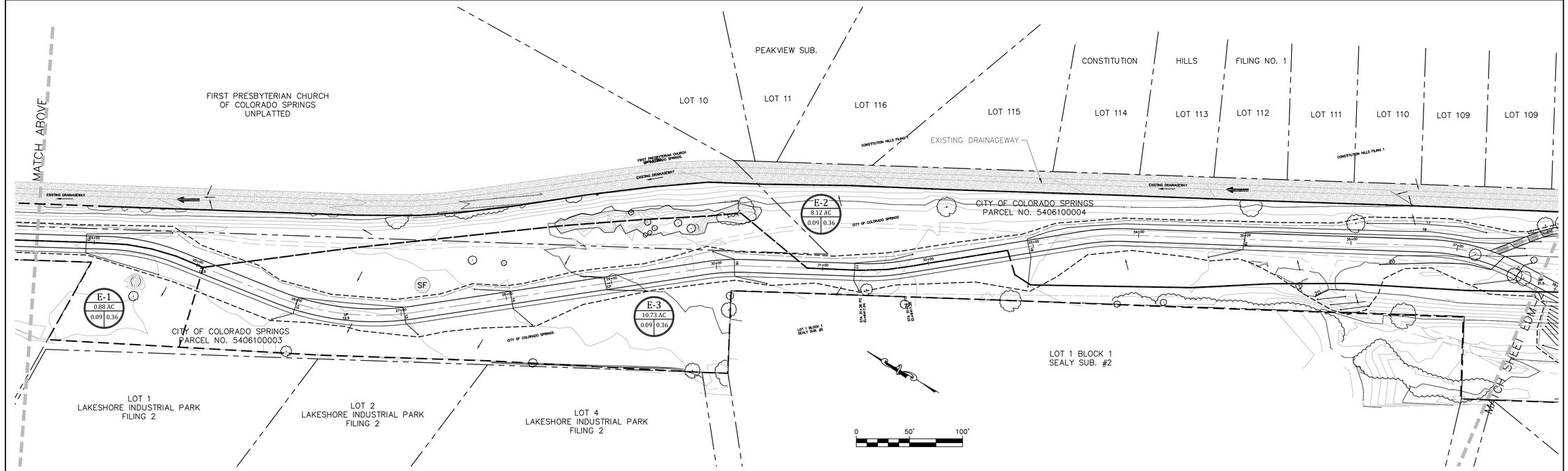
APPENDIX C
Drainage Map



SUB-BASIN AND DESIGN POINT DISCHARGES

DESIGN POINT	CONTRIBUTING BASINS	AREA	5-YR RUNOFF COEF.	100-YR RUNOFF COEF.	5-YR FLOW	100-YR FLOW
E1	E-1	0.88 ac	0.09	0.36	0.3 cfs	1.7 cfs
E2	E-2	8.12 ac	0.09	0.36	2.3 cfs	15.5 cfs
E3	E-3	10.73 ac	0.09	0.36	3.1 cfs	20.5 cfs
E4	E-4	6.33 ac	0.09	0.36	1.8 cfs	12.1 cfs
E5	E-5 & E-6	9.52 ac	0.09	0.36	2.7 cfs	18.2 cfs
E6	E-6	0.63 ac	0.09	0.36	0.2 cfs	1.2 cfs

ALL GRADING OUTSIDE OF THE TRAIL & SHOULDER IS IN A FILL CONDITION.



COLORADO SPRINGS

Celebrating 30 years
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

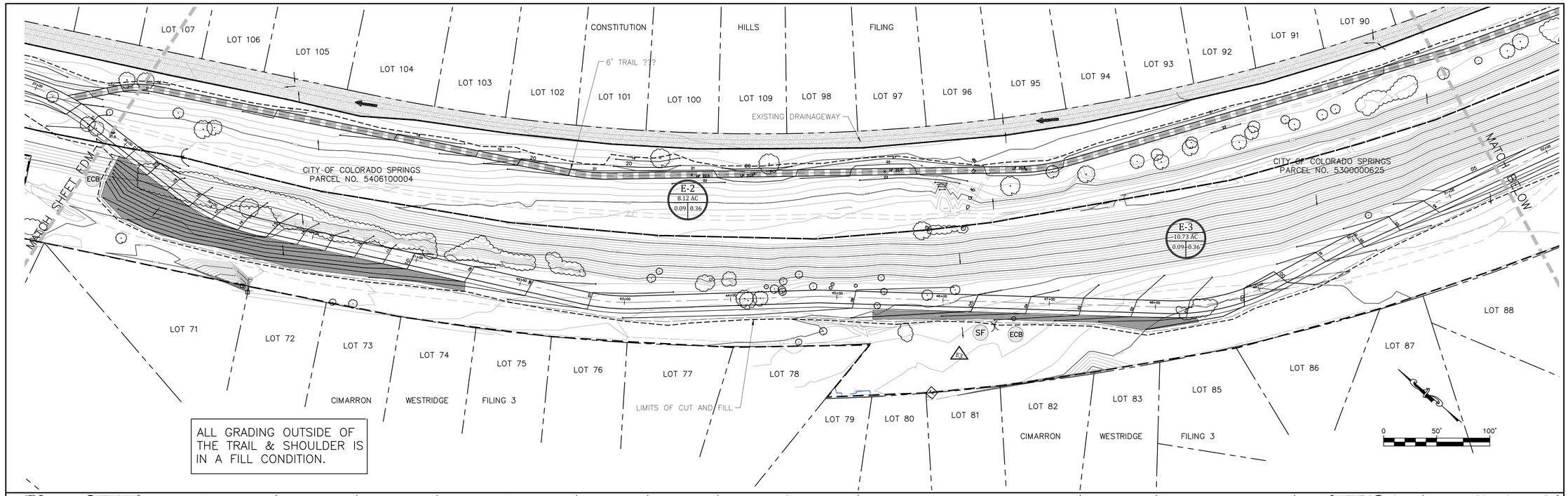
Sheet Revisions		
	No Revisions:	
	Revised:	
	Void:	

ROCK ISLAND TRAIL
Sand Creek to Constitution Avenue
EXISTING DRAINAGE MAP

Designer:	RNW		
Detailer:	RNW		
Date:	3/7/2024		

Kiowa Proj. No. 16028
TAP M240-162
SubAcct No.20391
Sheet Number EDM-1

K:\2016\16028 Rock Island Trail Design\DRAWINGS\Drainage\ 16028-Rock Island-EDM.dwg Mar 07, 2024 - 2:17pm



K:\2016\16028 Rock Island Trail Design\DRAWINGS\Drainage\ 16028-Rock Island-EDM.dwg Mar 07, 2024 - 2:17pm

COLORADO SPRINGS

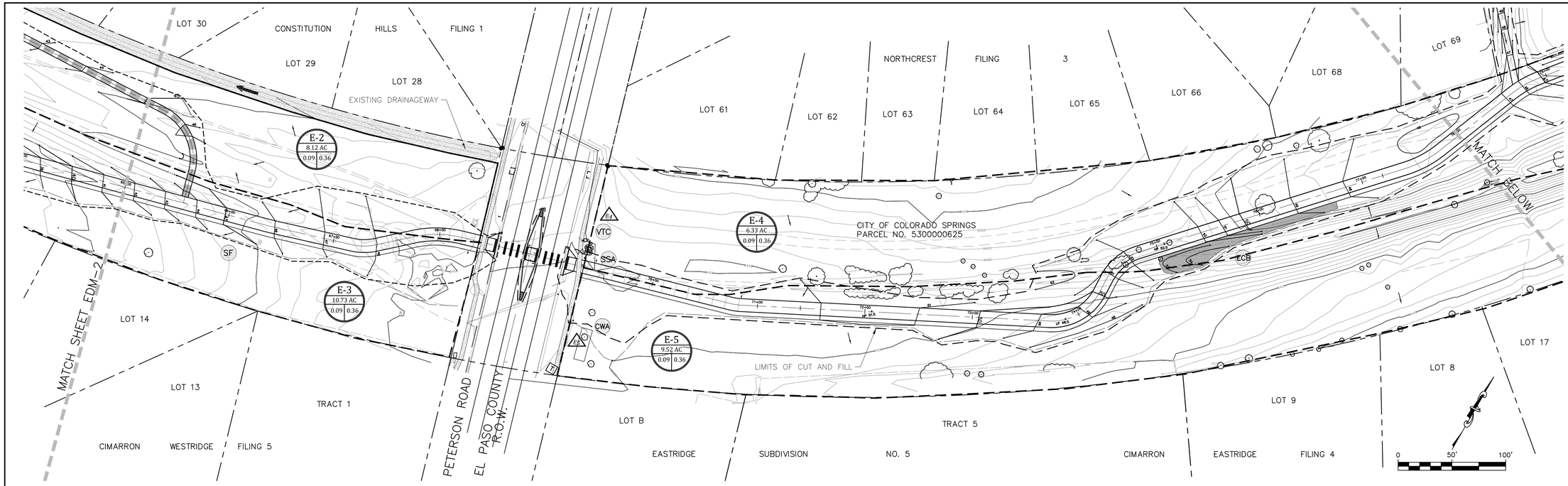
Celebrating 30 years
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Sheet Revisions	
	No Revisions:
	Revised:
	Void:

ROCK ISLAND TRAIL
Sand Creek to Constitution Avenue
EXISTING DRAINAGE MAP

Designer:	RNW
Detailer:	RNW
Date:	3/7/2024

Kiowa Proj. No.	16028
TAP	M240-162
SubAcct No.	20391
Sheet Number	EDM-2

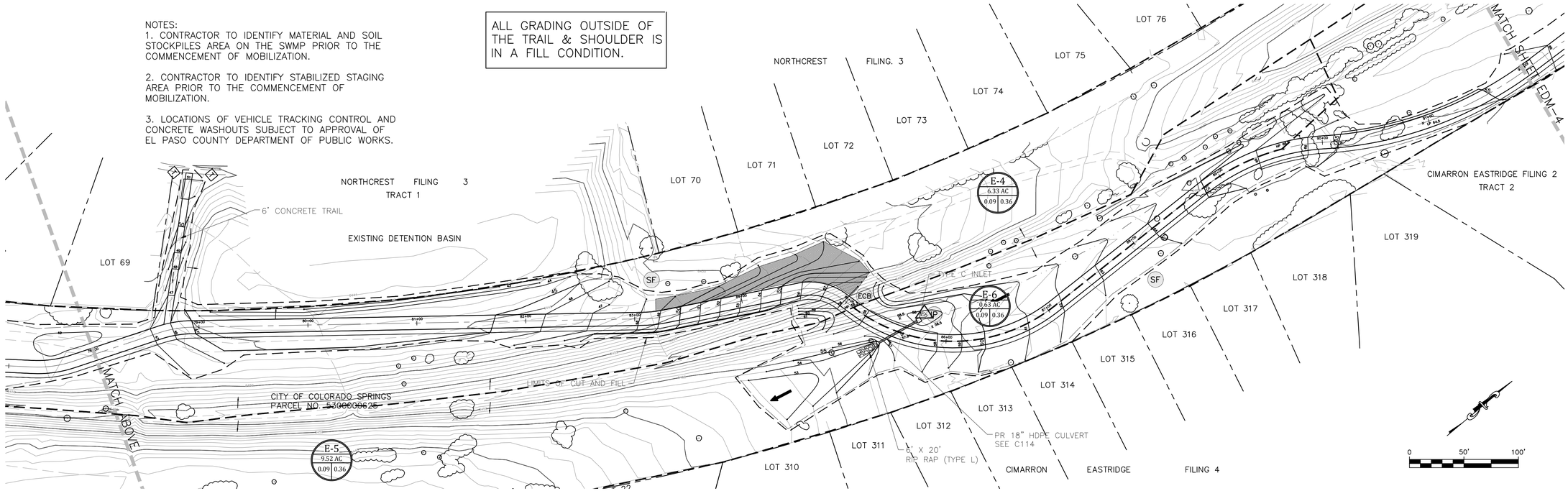


NOTES:
1. CONTRACTOR TO IDENTIFY MATERIAL AND SOIL STOCKPILES AREA ON THE SWMP PRIOR TO THE COMMENCEMENT OF MOBILIZATION.

2. CONTRACTOR TO IDENTIFY STABILIZED STAGING AREA PRIOR TO THE COMMENCEMENT OF MOBILIZATION.

3. LOCATIONS OF VEHICLE TRACKING CONTROL AND CONCRETE WASHOUTS SUBJECT TO APPROVAL OF EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS.

ALL GRADING OUTSIDE OF THE TRAIL & SHOULDER IS IN A FILL CONDITION.

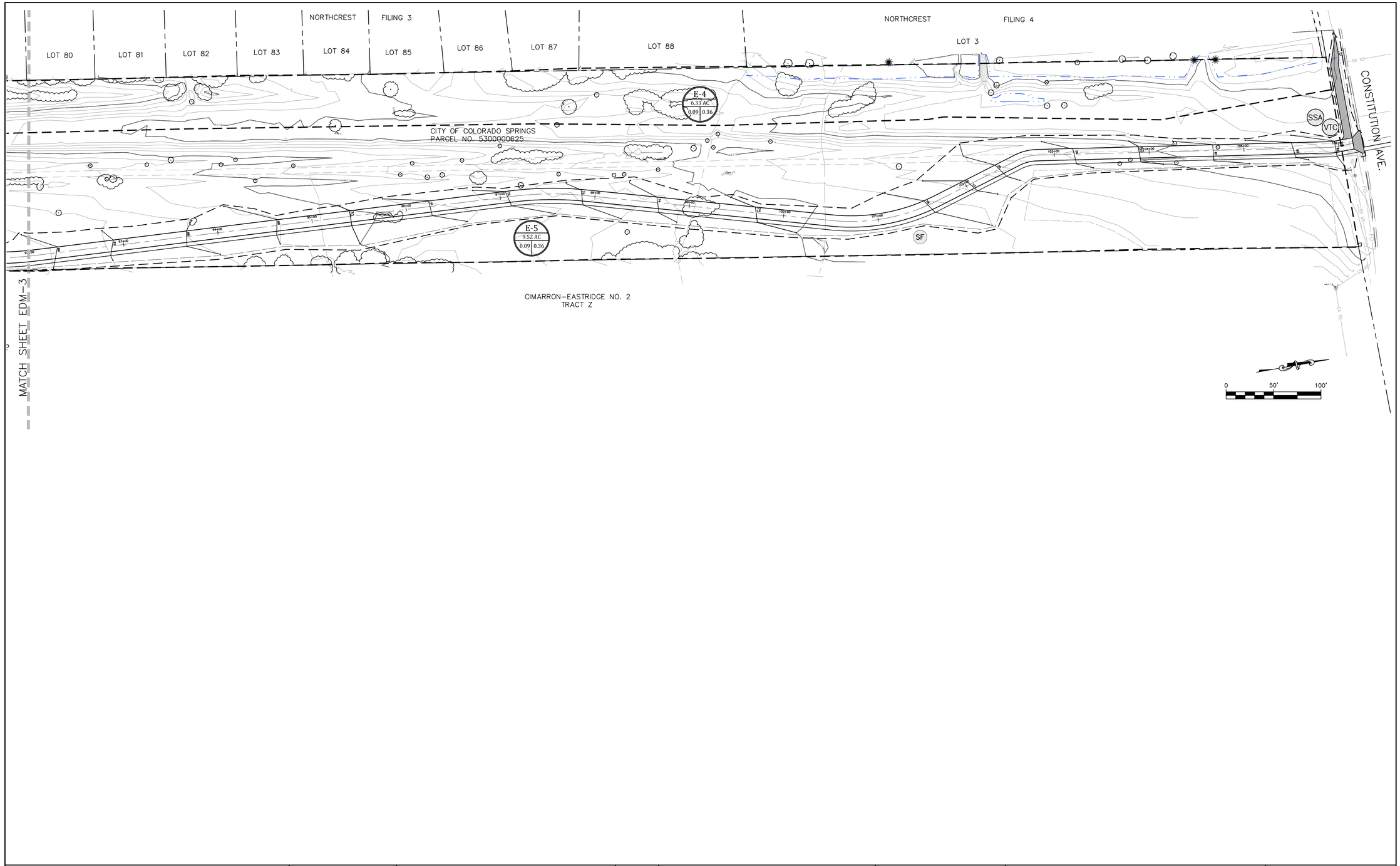


COLORADO SPRINGS

Celebrating 30 years
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Sheet Revisions		ROCK ISLAND TRAIL Sand Creek to Constitution Avenue EXISTING DRAINAGE MAP	Kiowa Proj. No. 16028
	No Revisions:		TAP M240-162
	Revised:	Designer: RNW	SubAcct No.20391
	Void:	Detailer: RNW	Sheet Number EDM-3
		Date: 3/7/2024	

K:\2016\16028 Rock Island Trail Design\DRAWINGS\Drainage\ 16028-Rock Island-EDM.dwg Mar 07, 2024 - 2:17pm



K:\2016\16028 Rock Island Trail Design\DRAWINGS\Drainage\ 16028-Rock Island-EDM.dwg Mar 07, 2024 - 2:17pm

COLORADO SPRINGS

Celebrating 30 years
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Sheet Revisions

No Revisions:
Revised:
Void:

ROCK ISLAND TRAIL
Sand Creek to Constitution Avenue
EXISTING DRAINAGE MAP

Designer: RNW
Detailer: RNW
Date: 3/7/2024

Kiowa Proj. No. 16028
TAP M240–162
SubAcct No.20391
Sheet Number EDM–4